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Abstract

A common challenge faced by the healthcare systems in many low- and middle-income countries is the substantial unmet mental healthcare needs, or the large gap between the need for and the provision of mental healthcare treatment. This paper investigates the potential causes of this treatment gap from the perspective of economics. Specifically, we hypothesize that people with mental illness face *four* major hurdles in obtaining appropriate healthcare, namely the high nonmonetary cost due to stigma, the high out-of-pocket payment due to insufficient public funds devoted to mental health, the high time costs due to low mental healthcare resource availability, and the low treatment benefit due to slow technology diffusion. We use China as a study setting to show country-specific evidence. Our analysis supports the above theoretical argument on the four barriers to access, which in turn sheds light on the effective approaches to mitigate the treatment gap. Four policy options are then discussed, including an information campaign for mental health awareness, increasing public investment in primary mental healthcare resources, transforming the healthcare system towards an integrated people-centered system and capitalizing on e-health technologies.

Key words: mental illness; treatment gap; access barrier; China

1.   Introduction

In recent years, the rising prevalence of mental illness has led to widespread public and professional concern. One of the related areas on which this concern focuses is the large treatment gap, measured by the difference between the need for and the actual provision of treatment among patients with mental illness. It was estimated that at least 10% of the global population is affected by one or more mental disorders; however, according to the estimation by the World Health Organization, more than three quarters of people with severe mental disorders in low- and middle-income countries (LMICs) receive no medical treatment. Although the situation in high-income countries is better, there is still a high proportion, ranging from 35% to 50%, of people with mental illness who go untreated (WHO, 2013).

The questions that this paper tries to answer are (1) why so many people with mental illness go untreated, and (2) how to bridge the treatment gap for them. We first provide economic perspectives to explain the potential causes of treatment gap in mental healthcare generally. Specifically, we propose a testable hypothesis that patients with mental illness face *four* major hurdles in accessing appropriate care, including stigma, high out-of-pocket payment, low availability of mental health resources and the slow diffusion of new medical knowledge and technology. We then use China as a case study to show the evidence in support of this four-hurdle hypothesis, and we propose four policy options to bridge the treatment gap in mental healthcare. Although our empirical evidence and policy discussion lie in the context of China's health system, our findings also have important implications for other low- and middle-income countries (LMICs) with similar development experience and challenges in the healthcare sector.

Our work contributes to the growing body of research on the mental health policy designs in LMICs. Many studies have demonstrated a substantial treatment gap in mental health services

(Kohn et al., 2004; Knapp et al., 2006; Patel et al., 2016), however, little research has investigated the potential determinants of the treatment gap in a systematic way. Several international agencies have identified major roadblocks to receiving treatment in mental health, including stigma, inadequate funding, and poor design of health system (The World Bank Group and WHO, 2016), however, there is limited research that unpacks the key factors that shape such roadblocks, especially in LMICs. Our research aims to provide a synthesis for the various academic endeavors and policy discussions on how to help people with mental illness get out of the shadow and receive appropriate diagnosis and treatment. It provides a relatively general framework by integrating institutional analysis with economic analysis of healthcare-seeking behavior to achieve a better understanding on the potential causes of the treatment gap. Based on this analytical framework, we then propose several policy options on bridging the treatment gap in the mental health sector.

2. Conceptual Framework

The economic theory of healthcare-seeking behavior states that individuals will seek healthcare for their mental illness as long as the expected benefit of doing so exceeds its expected cost. Based on this framework, the low treatment rate of mental illness can be explained by two potential reasons: the cost is too high and/or the benefit is too low. A closer look of mental healthcare delivery indicates that the costs of seeking treatment include both monetary and nonmonetary costs. The nonmonetary cost is to a large extent due to the stigma associated with mental illness. The full monetary costs that the patients pay for receiving treatment can be further divided into two parts: (1) the financial prices of mental healthcare as reflected by the patient out-of-pocket payment; and (2) the time prices of seeking mental

healthcare as reflected by the opportunity cost of a patient's time allocated to travelling, waiting and receiving treatment (Sloan and Hsieh, 2017).

Compared to physical illness, a most distinctive feature associated with mental illness is *stigma* (Frank and McGuire, 2000). Stigma indicates the co-occurrences of the following five components: labeling, stereotyping, separation, status loss, and discrimination (Link and Phelan, 2001). In the first component, people distinguish and label the differences of persons with mental illness. In the second, negative stereotyping, such as unpredictable, unstable, dangerous, violent, and socially worthless, often surrounds the images of people with mental illness (McSween, 2002). As a result, the stigma of mental illness creates a position of social distance or rejection (Link, 1987). Specifically, negative consequences of stigma include a decrease in the opportunity of seeking employment and housing, an increase in family stress, and the lower quality of life. The fear of status loss and discrimination in turn becomes the internal cost and a major barrier for people with mental illness to overcome when they seek medical treatment. This implies that the non-monetary cost imposed by social stigma is the first hurdle in the access to mental healthcare.

The second hurdle in seeking mental healthcare is the money price in the form of patient out-of-pocket payments for mental healthcare utilization. As shown in the WHO report, many countries (especially LMICs) suffer from the under-funding problem in the sense that the public sector allocates an extremely low share of health budgets into the mental health sector (World Bank Group and WHO, 2016). According to a recent survey conducted by WHO, governments spend on average 3% of their health budgets on mental health (a figure much lower than the non-mental health sector such as hypertension and diabetes), with a distribution from 0.5% in the low-income countries to 5.1% in the high-income countries (WHO 2014; World Bank Group and

WHO, 2016). A natural consequence of the under-funding problem is that patients with mental illness typically need to pay a higher out-of-pocket amount to finance their treatment compared to their counterparts with physical illness.

Thirdly, many countries do not have sufficient healthcare resources (including mental health personnel and facilities) to deliver the appropriate care to people with mental illness. The low availability of mental health resources is mainly reflected in two dimensions: (1) inadequate capacity building in the training of mental health professionals, which leads to the overall insufficient supply in mental healthcare; (2) the limited resources for mental healthcare, including both professionals and facilities, are usually concentrated in the densely-populated urban areas within a country, indicating an uneven geographic distribution of mental healthcare resources. One of the significant consequences of the insufficiency and maldistribution of healthcare resources is the increase in the time cost for seeking mental healthcare, which in turn becomes the third hurdle for people suffering from mental health conditions, such as depression.

Finally, the fourth hurdle in accessing mental healthcare is the low expected benefits of treatment arising from the technology gaps between the frontier of new knowledge in treatment procedures and the clinical practice available to patients. Although there has been a rapid development in medical knowledge and technology for mental healthcare in recent years, whether the frontier of these new technology and knowledge can be transmitted to become a prevailing local practice standard depends on the speed of knowledge diffusion and technology adoption. Many studies have shown the evidence that the incentives for innovation in general and the technology diffusion in particular are positively correlated with the market size (Acemoglu and Linn, 2004; Berndt and Cockburn, 2014). As mentioned, many countries face common challenge of inadequate funding in their mental health sectors, indicating that mental

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healthcare has a relatively smaller market size compared to that of the general healthcare. As a result, mental health sector is in disadvantage in facilitating technology diffusion such as the launch of new prescription drugs and the provision of psychological treatments for mental illness (e.g. cognitive-behavioral therapy for mild depression). This in turn enlarges the gap between the frontier of treatment know-how and the local practice standards in those countries. The existence of such a knowledge gap and outdated clinical practice may reduce the potential benefits of mental health treatment, which in turn further decreases the incentive for the patients to seek medical assistance when in need.

In summary, the above analyses indicate that people with mental illness face higher marginal costs of accessing mental healthcare than other patients, including the psychological cost imposed by social stigma, the out-of-pocket cost arising from the low public funding, the time cost due to the poor availability of mental healthcare resources. In addition, the perceived benefits of medical treatment may be lower due to the slow diffusion of new medical knowledge and technology. We hypothesize that these four hurdles largely explain why many people with mental illnesses tend to delay the treatment or go completely undiagnosed, a stylized fact in epidemiological studies in many countries (Bor, 2015). In the next section, we use China as an example to show the evidence for this four-hurdle hypothesis.

3. Empirical Evidence from China

3.1 Stigma

WHO has pointed out the long-term negative effects of stigma, highlighting that stigma, as a major source of discrimination and exclusion, can damage people's self-esteem, disrupt their family relationships, and consequently limit their ability and willingness to socialize, obtain

housing and seek employment. Table 1 presents the comparative statistics among adult groups of different mental health status in China based on data from the China Family Panel Studies (2012), a nationally representative household survey. We classify the respondents' mental health status based on their CES-D (Center for Epidemiologic Studies Depression Scale) scores. The table shows a significant correlation between the respondents' mental health status and their ideology and social economic status. People with mental depression (CES-D at 28 or higher) or depressive symptoms (CES-D between 16 and 27) are shown to have significantly lower life satisfaction on their family and themselves, less self-confidence and lower trust towards family members and other social groups. 58.4% of the mentally healthy people (CES-D at 15 or lower), compared to only 37.5% of people with depression, tend to believe that most people are trustworthy.

In fact, stigma has been reported to hamper the prevention and treatment of mental health disorders and the promotion of mental well-being (WHO 2017), which in turn results in poorer physical health, suicidality, and higher mortality rates (Thornicroft et al. 2007). Stigma can increase the feelings of worthlessness and despondency that increase the risk of depression and suicide, and potentially more damaging than the mental illness itself (Eagles et al. 2003). For example, based on interviews with close associates of people who committed suicide and of people who died from other injuries in China, Phillips et al. (2002) find that a high depression symptom score remains a significant predictor for suicidality after adjusting for sex, age, residential location and other factors. Corrigan et al. (2005) also find that the negative impacts of stigma are likely to extend from the daily life of patients to that of their family members, friends and even mental health provider groups, implying a negative spill-over effect of social stigma.

The long-term consequences of stigma among the mentally ill may also extend from health outcomes to labor market outcomes such as employment and income. For example, using the

National Co-morbidity Survey-Replicate (NCS-R) data, Chatterji et al. (2011) find that psychiatric disorders are associated with reductions of 9% and 14% of the labor force participation rate and the employment rate for male. Peng et al. (2013) estimate that depression leads to an annual work loss of about 1.4 days (accounting for 33% of total health-related workday loss). The CFPS 2012 dataset provides additional evidence of stigma in China's labor market: for example, the years of education and the levels of personal income are shown to be significantly lower for people with mental depression or depressive symptoms compared to the mentally healthy respondents. On average, individuals without mental illness acquire 7.6 years of formal schooling, which is almost twice as much as the average education years of people with depression. The annual income of individuals without mental illness is 50% higher than those with depressive symptoms and triple that of people with depression (see Table 1).

[Insert Table 1 Here]

3.2 Out-of-pocket costs of mental healthcare

Although China has made significant progress in achieving the goal of universal healthcare coverage, the current system contains more than 3,000 local health insurance plans that vary substantially in eligibility criteria, insurance benefits and co-payment schemes (Meng et al., 2015). More specifically, different health insurance plans, such as the New Rural Cooperative Medical Scheme (NCMS, a government subsidized plan covering all rural families), the Urban Employee Basic Medical Insurance (UEBMI, a social insurance program financed by employers and employees covering urban workers in the formal sectors) and the Urban Resident Basic Medical Insurance (URBMI, an urban health insurance scheme covering informal sector workers

and people without employment), differ in their enrollment criteria and co-insurance rates. Within each plan, coinsurance and copayment rates also differ by regions and types of treatment. Generally speaking, the copayment rates for outpatient visits are higher than those for inpatient admissions in China, especially for rural health insurance programs.

Before 2012, the insurance coverage and reimbursement for mental healthcare are usually limited and dependent on the provincial government's financial capacity. In 2012, the Chinese central government announced a decision to expand the coverage of the country's health insurance system to include the treatment of critical illnesses including major mental diseases. Meanwhile, the Mental Health Law of China was launched in 2013, which formalizes the legal protection and treatment of people with mental disorders (Qin et al., 2016). After these milestone steps in strengthening mental healthcare, a significant portion of mental health outpatient and inpatient medical expenses were able to be covered by the national health insurance system. For example, Beijing covered six types of major mental illnesses (e.g. schizophrenia, bipolar disorder) in its insurance plan in 2014 and increased the reimbursement rates for the inpatient and outpatient healthcare for these conditions from 60% to 70% with no maximum payment limits. In addition, the essential drugs for the treatment of these major mental diseases are also made free to outpatients, which benefited more than 12,000 mental health patients by 2016. Shanghai included four mental disease into its Critical Disease Insurance Plan in 2015, which provides a 50% reimbursement rate (increased to 55% in 2017) in supplement to the basic health insurance coverage. Several cities in China's eastern coastal provinces, including Jinan, Zhanjiang, Foshan and Dongguan also added mental diseases into their health insurance coverage in 2015. The city of Shenzhen covered six mental diseases in 2016 with maximum reimbursement rates of up to 90%. In the rural sector, NCMS started to launch pilot programs to cover mental diseases and

other critical illnesses in 2013. Meanwhile, the average government financial support for NCMS increased from 320 RMB (about $53) per person in 2013 to 450 RMB (about $75) per person in 2017. However, there remains substantial variation in the reimbursement rates for mental illnesses across regions within NCMS.

Despite the above-mentioned progress in extending health insurance coverage for mental health patients, China still suffers from a serious disparity in the coverage and reimbursement rates for mental diseases. High-income areas such as the eastern coastal regions and major urban cities usually have better coverage as well as higher reimbursement rates. For example, based on the data from 1989-2011 China Health and Nutrition Survey (CHNS), we estimate the effective reimbursement rates (total medical expenditure less the patient out-of-pocket payment) for mental healthcare and non-mental healthcare in China's eleven provinces (see Figure 1). As indicated, patients with mental health problems in the eastern provinces have a significantly higher effective reimbursement rate compared to their counterparts in the Northeast, Central and West. In addition, compared with the reimbursement rates of physical conditions such as heart disease, tumor and respiratory diseases, the mental illness patients that are surveyed in the 1989-2011 CHNS receive a lower average reimbursement rate (10.46% vs. 16.61%). Therefore, there is substantial variation not only in insurance coverage across regions, but also in the depth of benefits between the general healthcare and mental healthcare. Given such disparity of financial support from health insurance plans, people with mental health problems in lower-income areas would face higher out-of-pocket burden, which in turn deters the proper use of treatment (Lambregts and van Vliet, 2017).

[Insert Figure 1 Here]

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3.3 Mental healthcare resources

Much of the access barriers for mental healthcare in China is due to the limited supply and unequal distribution of professional mental healthcare resources. For example, China only had 1.46 psychiatrists per 100,000 population in 2010, which was substantially below the global average mental health workforce (4.15 psychiatrists per 100,000 population) (Liu et al., 2011; Qian, 2012). The lack of qualified mental health professionals may be partially due to the government control of medical education and accreditation, and it may also be attributable to the severe under-diagnosis of mental illnesses that results in the mismatch between supply and potential demand of mental healthcare. According to Fan et al. (2013), over 100 million Chinese experience different kinds of mental disorders during a year, and these mental diseases account for over 20% of the total burden of diseases in China. Given the high prevalence rate of depression (4.08%) in China estimated by Qin et al. (2016), the medical resource of mental health care is relatively scarce compared to the general health care. In addition to the overall undersupply of manpower, geographic mal-distribution of available mental health resources in China and the concentration of qualified personnel in the urban-based psychiatric hospitals indicate that mental health services are quite limited in rural areas (Philips et al., 2009).

To illustrate the above points, Table 2 compares the mental healthcare resources and general healthcare resources between 2010 and 2015 in China. A cross-sectional comparison indicates that in 2015, the number of licensed doctors in the mental healthcare sector contributes to only 0.9% of the total supply of licensed doctors, and the number of hospital beds in the mental health sector accounts for only 1.1% of total hospital bed capacity in China. A time series comparison indicates that while the physician density of general healthcare has increased from 18.0 per

10,000 population in 2010 to 22.2 in 2015, the density of licensed mental healthcare physicians decreased from 0.234 per 10,000 population in 2010 to 0.199 in 2015. In contrast with the stable growth in the density of general healthcare doctors, the growth rate of licensed doctors in the mental health sector has fluctuated between -21.79% to 6.32% in recent years. The annual growth rate of hospital beds in mental health is also significantly lower than that in the general health care until 2014.

[Insert Table 2 Here]

One of the plausible reasons for the undersupply of mental healthcare manpower is that the profession offers less attractive wage payment and working environment compared to other specialties of medical care. Table 3 presents the service revenue, service costs and the implied gross profit rates of different specialty hospitals in China based on the public data in the national health statistical yearbook of 2016. Compared to the profit-generating specialties such as plastic surgery (83.3%), ophthalmology (52%) and rehabilitation (42.4%), psychiatric hospitals (16.8%) rank comparatively low in the profit rates in year 2015, despite their relatively high annual revenue of 29.6 million *Yuan* per hospital. Given that most hospitals in China rely on their own profits for daily operation and physician employment, the above comparison indicates that the prospective income is lower for mental health doctors compared to doctors in other specialties, which suggests that the mental health profession may fail to attract sufficient personnel in the long term.

[Insert Table 3 Here]

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In addition to the insufficiency of overall mental healthcare capacity, the geographic mal-distribution of available mental health resources in China is also pronounced. Figure 2 maps the provincial density of hospital beds in psychiatric services in 2015. The figure indicates a dramatic disparity in mental healthcare resources across the country: the economically developed eastern provinces such as Shanghai and Zhejiang enjoys higher densities of psychiatric hospital beds, while the economically less developed inland regions in Central and Western China are in dire need of mental healthcare resources. The most underdeveloped provinces such as Qinghai, Gansu, Ningxia and Guizhou have extremely low densities of hospital beds for professional mental health treatment. Given that the prevalence rates of depression and depressive symptoms are also higher in central and western provinces (Qin et al., 2016), the above findings indicate that the inland regions suffer from the most severe problem of unmet mental healthcare needs.

[Insert Figure 3 Here]

3.4 Diffusion of new medical knowledge and technology in mental healthcare

Under the current practices in China's healthcare sector, two institutional features may enlarge the technology gaps in the field of mental healthcare. First, due to the lack of government subsidy for low service fees charged by public hospitals, healthcare providers in China rely heavily on profits obtained from prescription drugs as their major sources of revenue, indicating that physicians may choose to prescribe drugs based not on efficacy, safety or cost, but solely on the extent of the profit margins that they or their institutions obtain (Yang 2016). Second, given the Essential Drug Policy and the regulated insurance reimbursement schedule, there may be a

long delay in the launch of new mental healthcare drugs or treatment procedures in China; as a result, physicians may not be able to prescribe what proves to be the most effective treatment regimes, and this translates to another policy-induced barrier for the mental illness patients in China.

Burns and Liu (2017) illustrate the complex market access process for pharmaceutical products (patented or differentiated generic drugs) in China, which involves the following steps: registration and approval of new drugs, pricing and bidding, reimbursement listing at the local and national level, and at last hospital listing. More specifically, provincial bidding is held every two years or so; national reimbursement listing takes place every 4-5 years; another two years' time is needed for the hospital listing process. As such, for a domestic or multinational pharmaceutical company to launch a new drug in China, it has to wait seven years on average for drug approval, launching and listing in the target hospitals. Companies are not allowed to sell new drugs on the market until the above process is fully completed. This results in a wide gap in the launch of new and innovative drugs between China and high-income countries such as U.S., Japan and U.K. This is illustrated in Figure 4, which shows that the initial market share of new drugs in China (2.5%) is considerably lower than that in U.S. (56.3%), Japan (12.6%), U.K. (7.7%), Germany (6.5%) and Korea (3.1%) in year 2015. Given that the knowledge and technology frontier in the mental health treatment witnesses fast expansion in recent years, the above statistics suggest that the mental illness patients in China are less likely to benefit from the most innovative drugs and treatment options compared to their counterparts in the above mentioned countries. As a result, this system may produce lower expected value for its patients, which in turn reduces the incentives for people with mental health conditions to utilize the system.

[Insert Figure 4 Here]

There is ample evidence to illustrate the slow adoption of mental health drugs in China compared with the high income countries, taking the United States as an example. First, as Table 4 illustrates, among 12 new molecular entities for Central Nervous System (CNS) diseases (the therapeutic category for mental illness) available in the global market, only one was launched in China. By contrast, eight drugs are adopted in the United States. This indicates a difference of 0.583 (8/12 minus 1/12) in the adoption rate between U.S. and China. Furthermore, the difference in adoption rates between CNS drugs and drugs for other NCDs in China is 0.094, which is higher than that of U.S. (0.01). Therefore, not only China has a slow adoption of new drugs, but its adoption of drugs for mental illnesses are even slower than that for other non-communicable diseases. Second, Table 5 takes 14 atypical antipsychotic medicine as examples, and shows the year in which these mental health drugs were approved by the U.S. Food and Drug Administration (USFDA) and whether they were approved to be marketed in China by year 2016 by the China Food and Drug Administration (CFDA). As indicated, drugs approved by USFDA *before* 2009 have all been marketed in China, but only 1 out of the 7 drugs approved by USFDA *after* 2009 has been marketed in China by 2016, which suggests a long delay in the launch of new pharmaceutical products in China's mental health sector.

[Insert Table 4 Here]

[Insert Table 5 Here]

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Another piece of evidence for the knowledge gap comes from the comparison of clinical guidelines for the first-line drug prescription on mental health conditions between China and the developed countries (see Table 6). Clinical guidelines for the treatment of mental depression started to be published in China from 2006, the first edition of which is only five pages long (Chinese Medical Association, 2006). The guideline was still officially recommending the use of TCAs (a category of first-generation antidepressant with considerable adverse drug reaction), while at the same time second-generation antidepressants such as SSRIs and SNRIs had been widely recommended in U.S. and other developed countries for more than a decade due to their effective treatment and less side effects (Gelenberg et al., 2010). This represents a lag in guideline development between China and developed countries as well as a technology gap in the pharmaceutical industry. The second edition of official guidelines for the treatment of depressive disorders was published in 2015, with much more detailed and up-to-date content, recommending SSRIs, SNRIs and NaSSAs as first-line treatment options for mental depression (Chinese Medical Association, 2015). However, there still exists a large know-do gap between the official recommendations and the field practices in China, and first-generation therapies such as TCAs and TeCAs were still commonly prescribed by mental health doctors in various regions of China.

[Insert Table 6 Here]

Other than the regulation-induced barrier to the diffusion of medical knowledge and technology, the persistent under-funding problem of the mental health sector also enlarges the gap between the technology frontier and the local clinical practices in China. Figures 4 and 5

present the market shares (measured as the number of outpatient visits or inpatient discharges for a specific service type as a percentage of total number of outpatient visits or inpatient discharges) of various types of diseases among China's medical institutions in 2015. As indicated, both outpatient and inpatient shares of psychiatry (mental health department) account for merely 1% among all types of healthcare services, suggesting that the mental healthcare sector accounts for a very small size in the overall healthcare market in terms of patient volumes and service revenues. Given that the public and private funds tend to flow into major sectors with large market sizes (such as internal medicine and traditional Chinese medicine), the under-funding problem is expected to plague China's mental health sector in the foreseeable future and in turn reduce the speed of technology adoption in the field. The vicious cycle of under-funding and under-treatment is thus exacerbated by the gap, leading to further reduction in the effectiveness of mental healthcare services in China.

[Insert Figure 4 Here]

[Insert Figure 5 Here]

4. Policy Options for Bridging the Treatment Gap in Mental Healthcare

Given the evidence that high costs and low benefits are two main causes of under-treatment in mental healthcare, we offer two approaches to bridge the treatment gap: the "push incentives" and the "pull incentives", which are designed to reduce the costs of treatment and to increase the benefits of treatment, respectively. For push incentives, we suggest three policy options to reduce the nonmonetary cost, out-of-pocket cost and time cost in the mental healthcare seeking process. For pull incentives, we suggest using the information and communication technology (ICT) to speed up the technology diffusion and hence to increase the quality (benefit) of the treatment. We

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discuss all these policy options in the following subsections.

4.1 Out of the shadow: Information campaign for the awareness of mental illnesses

Given the high prevalence rates of mental disorders in China, it is important to educate the public through information campaigns to increase the awareness of mental illnesses. In addition, an anti-stigma campaign would be beneficial to reduce the nonmonetary cost of seeking mental healthcare. In the Chinese traditional culture, some forms of the stigma associated with mental disorders arise from the names of mental illnesses per se. Thus, an effective approach to mitigate the stigma is to rename the diseases to eliminate the negative bias inherent to the name tags and to give the medical condition a neutral image. This could be done in both psychiatric textbooks and popular culture, and hence change how doctors and the general public think about mental illnesses. Table 7 lists the traditional names of mental illnesses in the Chinese language (Mandarin) that contain a strong stigma as well as the suggested new names that may substantially reduce the stigma associated with the medical condition.

[Insert Table 7 Here]

International experiences also suggest that mass media campaigns made by trusted sources (such as professional medical associations) can also contribute to reduce the social stigma and encourage patients with mental diseases to seek proper healthcare. For example, an advertisement campaign in Germany made by Phychenet features a patient suffering from mental illness, which demonstrates and explains the symptoms and prevalence of mental diseases with warm-hearted encouragement for people with such symptoms to seek help. This campaign has successfully raised the public awareness of mental diseases and let patients know that many other

people are suffering from the same health conditions, which in turn helped to reduce the self-perceived stigma among these patients. Another example is the Canadian "Bell Let's Talk" campaign that encourages discussions about mental health and raises funds (https://letstalk.bell.ca/en/our-initiatives). Similar mass media campaigns have been experimented in various parts of China, with government-financed advertisement displayed on TV, on large advertisement boards in densely populated areas (such as subway stations) and within hospitals.

4.2 Increasing the public investment in mental healthcare

Currently, the public funds allocated to the mental health sector only accounts for less than 1% of total health expenditure in China. Thus, China still has ample room for increasing the public investment in mental health resources, which can be achieved through two main channels: one is to use the general tax revenues to directly subsidize the mental healthcare institutions; the other is through an earmarked tax in the existing health insurance programs by specifically enhancing the mental health benefit and financing levels.

The advantage for the direct public subsidy to mental health facilities is to mitigate the price distortion and the related profit-seeking behaviors by physicians and hospitals. For example, the essential psychotropic medications for the treatment of mental illnesses are relative inexpensive in LMICs, because many of them are already off patent and can thus be produced by local pharmaceutical firms. However, this does not mean that physicians in these countries have incentives to prescribe these cost-effective medicines under a profit-centered health system such as China's, as the hospitals still rely on the profit of higher-priced prescriptions to resolve their funding gaps. The increase in public investment through direct government subsidy may thus

help to reduce such behavioral distortion and hence increase the efficiency of mental healthcare. The advantage of the second financing channel (through an earmarked tax) is to reduce the out-of-pocket payment for the patients with mental illnesses, which in turn provides push incentives for reducing the under-treatment gap in mental healthcare.

A recent study suggests that increasing public funds provides a strong return on investment, ranging from 2.3 to 5.7 USD per dollar invested (Chisholm et al., 2016). Although the argument is clear, the government needs to have a strong political willingness to take action. One of such motivations is to treat mental health as a public good (an important component of public health with large social benefits) instead of private good (a personal healthcare matter) (Qian 2012). This change of mentality and alignment of social awareness are necessary, and they can provide a justification for the government to increase the public investment in the mental health sector.

4.3   Integrated people-centered health system

Many studies have shown that the current hospital-centered health system in China is not an efficient approach to bridge the treatment gap in mental healthcare. Rather, an effective intervention and treatment model is to deliver the mental healthcare at the primary and community level. There are at least three arguments to support the urgent need to restructure the current delivery system for mental health services. First, hospital-centered health system is more likely to be constrained by the maldistribution of healthcare resources across regions. By contrast, primary care facilities are relatively easy to access at the community level. As a result, a natural consequence of a shift from the hospital-centered to the primary-care-oriented system is a reduction in the time cost of diagnosis and treatment, which in turn provides strong push incentives to bridge the treatment gap in mental healthcare. Second, a people-centered system, which integrate primary, maternal, and the care for other NCDs together, is in a better position to

address the co-morbidities of mental illnesses and the common co-existence of risk factors such as hypertension and obesity. Third, mental health is also strongly correlated to economic poverty and poor lifestyle choices (such as malnutrition and physical inactivity), an integrated system is beneficial in the sense that it provides an effective treatment by integrating mental healthcare with anti-poverty policies and other disease management programs. In sum, an integrated people-centered delivery model can be a viable choice to break the vicious cycle of economic poverty, under-treatment of mental illnesses and the co-morbidity with other NCDs.

4.4   e-health system

One major barrier for developing the integrated people-centered primary care system in China is that the primary care is often perceived as low-quality care (Li et al., 2017). An effective policy option for breaking this perception is to develop an ICT-based platform, or the e-health system, to inform the public about mental healthcare options and to facilitate the remote and data-based healthcare practices. Properly managed, these ICT-based platforms can potentially lead to quality improvement and cost reduction in mental healthcare, with at least the following identifiable benefits. First, digital healthcare can be an effective approach to reducing the regional inequality in the accessibility of mental healthcare resources, especially in mitigating the quality and technological gaps between the urban and rural areas as well as between large hospitals and primary care institutions. Second, ICT offers alternative models of delivering mental healthcare by eliminating many access barriers in the current system, including the transportation barriers, the perceived stigma associated with visiting mental health clinics, clinician shortages, and the slow diffusion of medical technology from urban to rural areas. Third, ICT has a potential to bridge the treatment gap in mental healthcare by providing remote

screening, diagnosis, monitoring, treatment and even remote training for non-specialist healthcare workers.

5   Conclusions

One of the common problems that plague the mental healthcare sectors in many developing countries is the substantial unmet healthcare needs, or the large gap between the need for and the provision of mental healthcare treatment. This paper contributes to increasing our understanding on the potential causes of the treatment gap from the perspectives of economics. We hypothesize that mental health services face more access barriers than the general healthcare. Based on the institutional features in China's health system, we find evidence to support our hypothesis on the *four* major hurdles in accessing mental healthcare, namely, the nonmonetary costs associated with stigma, the monetary costs due to the limited insurance coverage and reimbursement, the time costs that result from the geographic maldistribution of healthcare resources, and the poor healthcare quality due to the slow diffusion of knowledge and technology.

An important implication of our study is that removing access barriers to mental healthcare is a multi-dimensional task that requires coordination from mental health institutions, the healthcare planning and financing authorities, the patients and the society in general. Previous policy efforts to remove access barriers have been focused on reducing the monetary cost of mental healthcare through expanding health insurance coverage and on reducing the time costs through a redistribution of health care resources. This approach that relies on a single policy tool proves to be insufficient to mitigate the treatment gap in mental healthcare. Our analysis indicates that more policy tools and further actions are needed. Specifically, we propose an information campaign for mental health awareness and we suggest properly renaming the mental

health conditions in the Chinese language, both of which aim to reduce the social stigma in public perception and to reduce the nonmonetary costs of seeking mental healthcare. In addition, we also call for more policy efforts to accelerate the process of new drug launch and the adoption of new medical technology in the treatment of mental illnesses, which helps to improve the value and to close the treatment gap of mental healthcare.

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	Mentally healthy	Depressive symptoms	Severe depression
Life Satisfaction and Confidence			
satisfaction of one's family (from 1 to 5)	3.645	3.197	2.754***
	(0.976)	(1.053)	(1.218)
social status of one's family in local area (from 1 to 5)	0.902	0.996	1.177***
	(2.928)	(2.708)	(2.466)
satisfaction of one's life (from 1 to 5)	3.485	3.037	2.618***
	(0.99)	(1.049)	(1.202)
social status of oneself (from 1 to 5)	2.745	2.554	2.391***
	(0.982)	(1.059)	(1.213)
degree of confidence to one's future (from 1 to 5)	3.874	3.367	2.736***
	(1.006)	(1.153)	(1.361)
Tendency to Trust Other People			
most people are trustworthy (1=yes; 0=no)	0.584	0.482	0.375***
	(0.493)	(0.5)	(0.484)
do you trust your parents (from 0 to 10)	9.278	8.881	8.448***
	(1.485)	(1.828)	(2.288)
do you trust your neighbor (from 0 to 10)	6.567	6.015	5.65***
	(2.138)	(2.241)	(2.638)
do you trust the doctors (from 0 to 10)	2.189	2.29	2.642***
	(6.686)	(6.362)	(6.01)
do you trust the cadres (from 0 to 10)	2.424	2.481	2.857***
	(4.924)	(4.68)	(4.529)
do you trust strangers (from 0 to 10)	2.264	2.045	1.943***
	(2.14)	(2.066)	(2.257)
do you trust the American	2.526	2.426	2.678***
	(2.564)	(2.439)	(2.465)
Labor Market Outcomes			
years of education by 2012	7.625	5.958	3.992***
	(4.764)	(4.953)	(4.627)
personal annual income (in 1000 Yuan)	13.42	8.694	4.703***
	(36.95)	(25.23)	(10.21)
Observations	16503	6104	1114

Table 1 Differences in Psychological and Socio-economic Characteristics among Three

Mental Health Groups in China, 2012

Notes: (1) Data Source: China Family Panel Studies (2012). (2) Mental health status (Mhs) is divided into three groups: mentally healthy group, group with depressive symptoms and group suffering from severe depression, which are categorized using the CES-D score (mentally healthy = CES-D at 15 or lower; depressive symptoms = CES-D between 16 and 27; depression = CES-D at 28 or higher). (3) The statistics reported are sample means within each mental health status group, with standard deviation in parenthesis.

ANOVA test with the null hypothesis that the mean values of different mentally health status groups are the same is provided. *** denotes statistical significance at 1% level.

Table 2. Capacity and Annual Growth Rate in Healthcare Resources in China: Mental Health Sector vs. General Healthcare (2010-2015)

	Health care sector	2010	2011	2012	2013	2014	2015
Number of licensed doctors (per 10,000 population)	General health care	18.0	18.3	19.4	20.4	21.2	22.2
	Mental health care	0.234	0.183	0.174	0.185	0.190	0.199
Growth rate of licensed doctors (%)	General health care		1.67	6.01	5.15	3.92	4.72
	Mental health care		-21.79	-4.92	6.32	2.70	4.74
Number of hospital beds (per 10,000 population)	General health care	35.76	38.36	42.40	45.50	48.45	51.12
	Mental health care		0.45	0.48	0.49	0.54	0.58
Growth rate of hospital beds (%)	General health care		7.27	10.53	7.31	6.48	5.51
	Mental health care			6.67	2.08	10.20	7.41

Notes: (1) Data Source: Health Statistical Yearbook of China (2011-2016), National Bureau of Statistics of the People's Republic of China. (2) The statistics reported are density of licensed doctors, density of hospital beds and their annual growth rate from 2010 to 2015 for general health care sector and mental health care sector respectively. General health care include mental health care and other specialty such as internal medicine, paediatrics and gynaecology.

Table 3. Estimated Profit Rates of Specialty Hospitals in China, 2015

	Number of hospitals	Average medical service revenue (1,000 yuan)	Average medical service costs (1,000 yuan)	Profit rate (%)
Cosmetic hospital	228	19,649	8,228	138.8
Plastic surgery hospital	57	19,850	10,828	83.3
Ophthalmic/eye hospital	455	28,825	18,964	52.0
Rehabilitation hospital	453	12,354	8,675	42.4
Stomatological hospital	501	24,173	17,146	41.0
Others	1290	17,135	12,658	35.4
Hospital of dermatology	163	13,274	9,923	33.8
Obstetrics and gynecology hospital	703	27,640	20,878	32.4
Orthopaedic hospital	558	18,145	14,287	27.0
ENT hospital	89	24,061	19,246	25.0
Psychiatric hospital	**920**	**29,606**	**25,354**	**16.8**
Hematonosis hospital	10	99,115	85,802	15.5
Cardiovascular hospital	79	108,461	94,049	15.3
Occupational disease hospital	16	52,880	45,866	15.3
Tumor hospital	135	372,513	324,137	14.9
Tuberculosis hospital	34	121,546	109,549	11.0
Children's hospital	114	236,575	218,898	8.1
Chest hospital	20	280,775	263,850	6.4
Leprosy hospital	31	4,765	4,670	2.0
Hospital for infectious diseases	167	99,161	98,459	0.7
Specialty hospital	**6023**	**38,811**	**31,977**	**21.4**

Notes: (1) Data Source: Health Statistical Yearbook of China (2016). (2) Statistics on medical service revenue and costs reflect the average revenue and costs per hospital for the particular medical specialty in year 2015 (Average medical service revenue = total medical service revenue / number of hospitals; Average medical service costs = total medical service costs / number of hospitals.); statistics for psychiatric hospital are shown in bold. (3) The profit rates are based on the authors' calculation. Profit rate = (average medical services revenue – average medical service costs) / average medical service costs.

Table 4. Estimated Availability of New Molecular Entities (NME) for Diseases of Central

Nervous System (CNS) and Other NCDs: China vs. U.S. (2008-2012)

Country NME/Global NME	China	US	Difference (NME in U.S. – NME in China)
NMEs for CNS Diseases	1/12	8/12	0.583
NMEs for Other NCDs	11/62	42/62	0.500
Difference (Drugs for other NCDs - CNS drugs)	0.094	0.010	0.083 (Difference in difference)

Notes: (1) Data Source: *Global Outlook for Medicines through 2018* - IMS Institute for Healthcare Informatics (2014). (2) New molecular entities (NME) include small molecule and biologic pharmaceutical products where at least one of the ingredients is novel. The availability of Global NMEs is measured by the number of NMEs with global launch in at least one country between 2008 and 2012. The availability of country NMEs is measured by the number of global NMEs available in a specific country by the end of 2013. (3) CNS drugs are drugs designed for treating illness in central nervous system, which are mainly related to mental health problems. NMEs for other NCDs (Non-communicable Diseases) include drugs for cardiovascular diseases, diabetes and tumor.

Table 5. Time lag between U.S. and China in the approval/marketing for new atypical antipsychotic (AAP) drugs for the treatment of schizophrenia, 1989-2016

AAP Drugs	Year Approved by FDA	Whether Marketed in China by 2016
Clozapine	1989	yes
Risperidone	1993	yes
Olanzapine	1996	yes
Quetiapine	1997	yes
Ziprasidone	2001	yes
Aripiprazole	2002	yes
Paliperidone	2006	yes
Iloperidone	2009	no
Asenapine	2009	no
Paliperidone palmitate	2009	yes
Lurasidone	2010	no
Aripiprazole lauroxil	2015	no
Brexpiprazole	2015	no
Cariprazine	2015	no

Notes: (1) Data Source: U.S. Food and Drug Administration; China Food and Drug Administration. (2) Drugs listed in the table are USFDA-approved atypical antipsychotic (AAP) medicine used to treat schizophrenia by 2016.

Table 6. Major Antidepressants and Whether They are Recommended as First-line

Therapy for Treating Depression in Different Countries

Whether recommended as first-line therapy for depressive disorders	U.S. Guideline (2010)	U.K. Guideline (2009)	Canada Guideline (2016)	China Guideline (2006)	China Guideline (2015)	Treatment practice in China
MAOIs						
TCAs				Yes		Yes
TeCAs	Yes	Yes				Yes
SSRIs	Yes	Yes	Yes		Yes	
SNRIs	Yes		Yes		Yes	
NaSSAs	Yes		Yes		Yes	
NDRIs	Yes		Yes			

Notes: (1) Data Source: *Practice Guideline for the Treatment of Patients with Major Depressive Disorder* (2010) by American Psychological Association; *Depression in Adults with a chronic physical health problem: Treatment and Management* (2009) by the National Institute for Health and Care Excellence (NICE); Canadian Network for Mood and Anxiety Treatments (CANMAT) *2016 Clinical Guidelines for the Management of Adults with Major Depressive Disorder: Introduction and Methods*; *Clinical Guidelines for treatment-Psychiatry* (2006) by Chinese Medical Association (CMA); *Guidelines for the Prevention and Treatment of Depression in China* (2015) by Chinese Medical Association (CMA). (2) Drugs listed in the table are major categories of medicines used to treat depression. (3) The last column, treatment practice in China, reflects the main drugs in current usage for the majority of Chinese regions based on the reports in *Guidelines for the Prevention and Treatment of Depression in China* (2015).

Table 7. Name Tags of Mental Illnesses as a Source of Stigma in Chinese Language

| English name for mental illness	Chinese name with stigmatic bias, followed by literal English translation	Neutral name that avoids stigma, followed by literal English translation
Dementia	痴呆症	失智症
	Mentally Retarded	Loss of Mental Capability
Schizophrenia	精神分裂症	思觉失调症
	Mentally Split	Early Psychosis Disorder
Bipolar Disorder	躁郁症	双向情感障碍
	Choleric and Depressed	Bipolar Disorder
Paranoid Disorder	妄想症	偏执性精神障碍
	Hallucination	Paranoid Disorder
Alzheimer's Disease	老年痴呆症	阿尔茨海默氏症
	Old-age Mental Retard	Alzheimer's Disease

Notes: (1) Chinese names with stigmatic bias are the name tags for mental illnesses commonly used in mainland China. (2) Neutral names for Dementia and Schizophrenia are name tags adopted in Taiwan, neutral names for other mental illnesses are the recommended name tags in Chinese.

Figure 1 Regional Variation in the Effective Reimbursement Rates for Mental Healthcare

in Eleven Provinces of China (1989-2011).
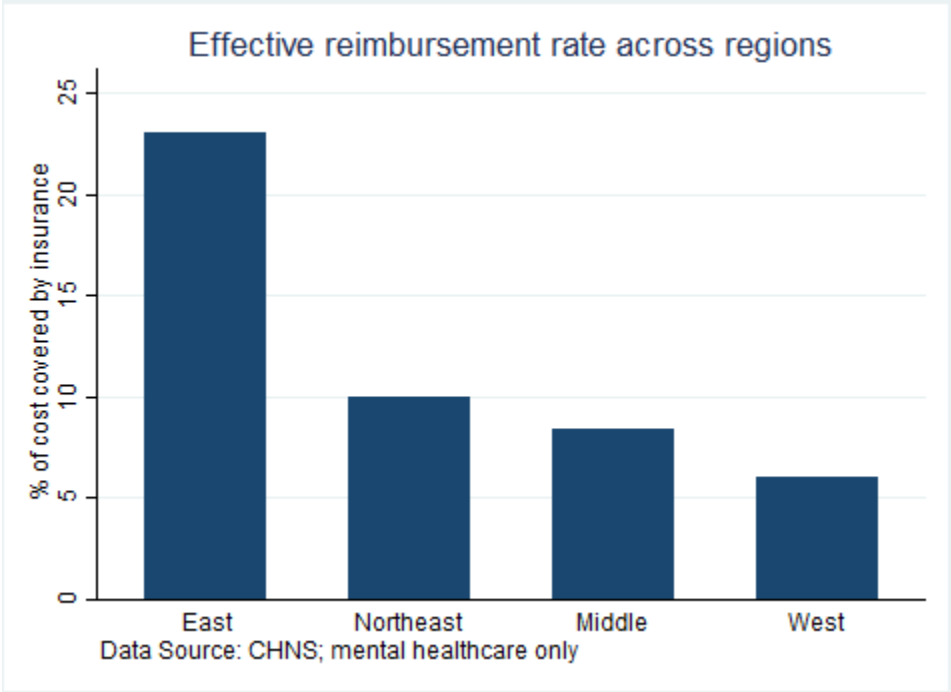
Notes: (1) Data source: China Health and Nutrition Survey (CHNS, 1989-2011). (2) Effective reimbursement rate is calculated as the patient out-of-pocket cost (total medical spending less the patient out-of-pocket payment) expressed as a percentage of total medical spending for the most recent treatment for mental health conditions. (3) Caution: only 4 provinces in East China (Beijing, Shanghai, Jiangsu, Shandong), 2 provinces in Northeast China (Liaoning, Heilongjiang), 3 provinces in Middle China (Henan, Hubei, Hunan) and 3 provinces in West China (Guangxi, Guizhou, Chongqing) are covered in the sample. Sample may not be nationally representative.
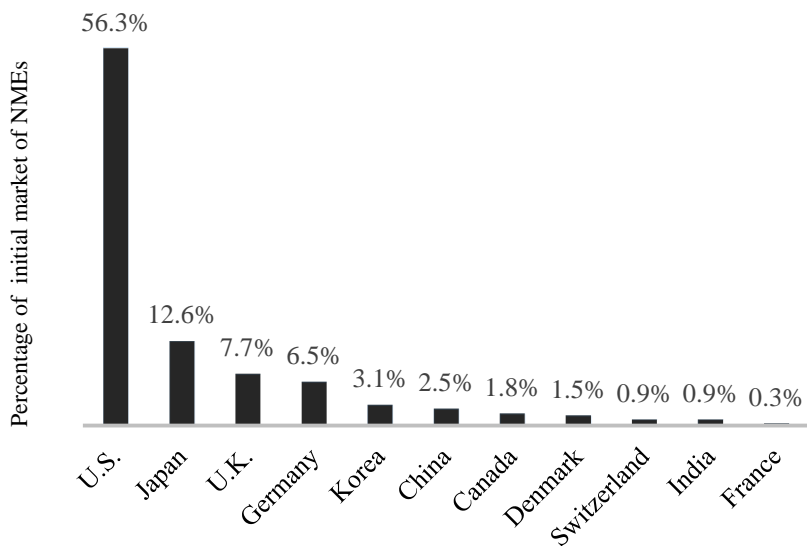
Figure 2. Density of Hospital Beds in Psychiatric Departments per 1,000 Population in

China's All Provinces, 2015.
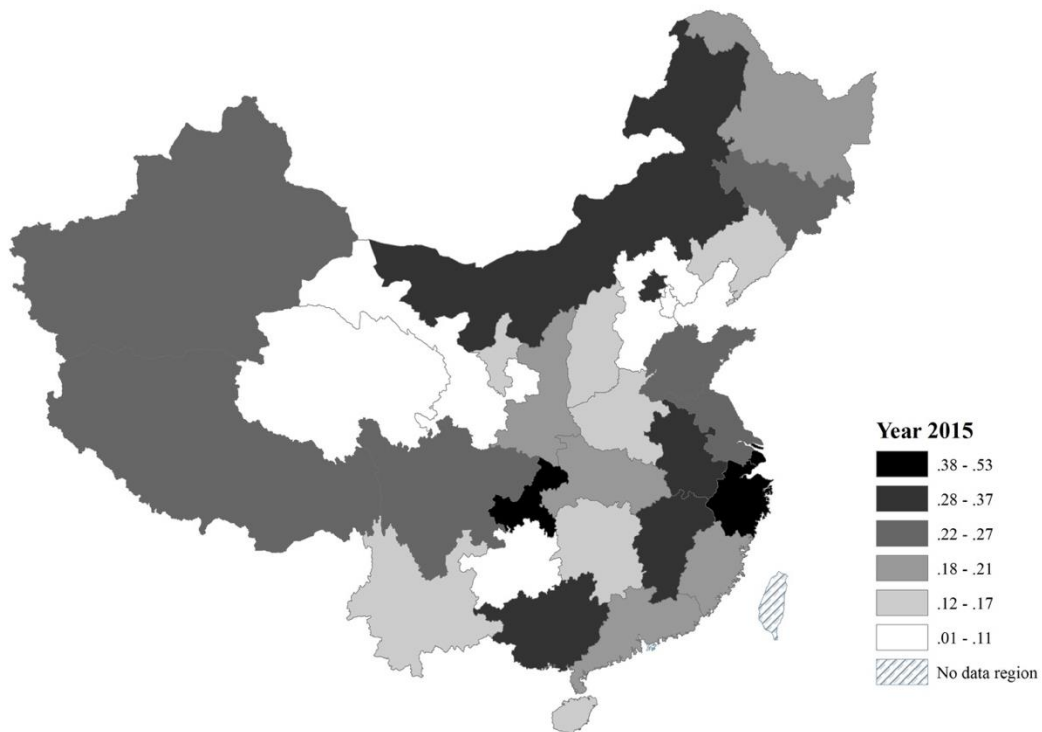
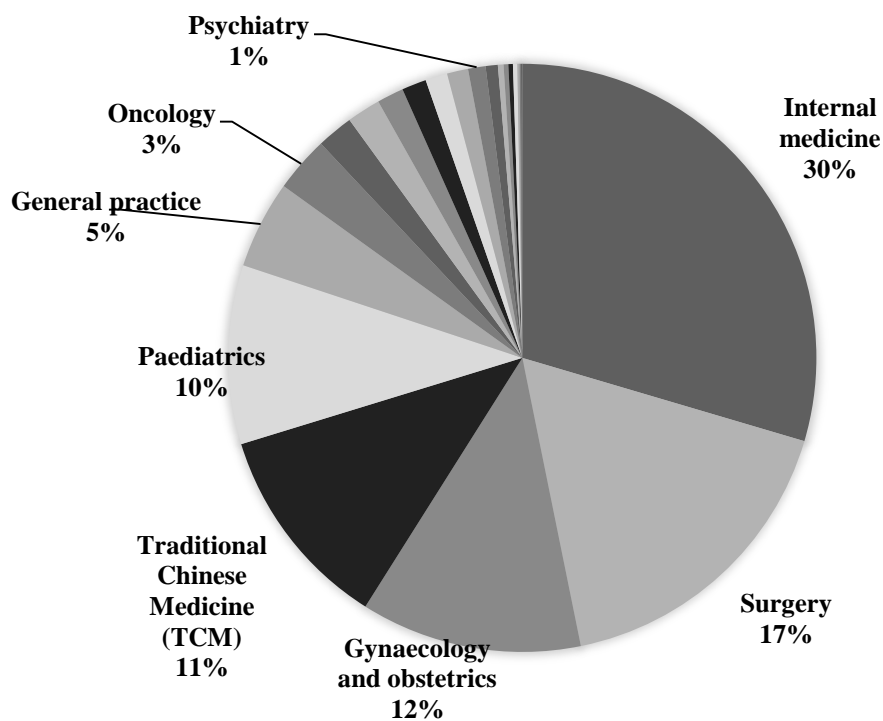Data Source: Health Statistical Yearbook of China (2016).

Figure 3. Initial Market of New Molecular Entities (NMEs) as a Percentage of All NME Launches for Various Countries, 2007-2015
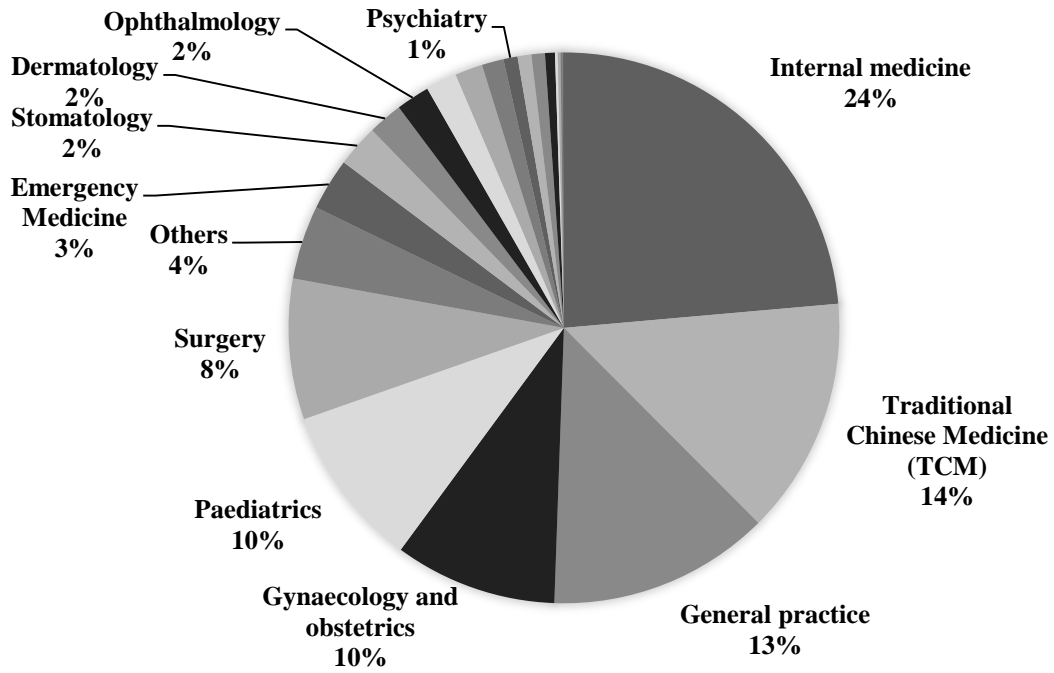

Notes: (1) Data Source: *Constructing a sustainable Chinese Pharmaceutical Innovation Ecosystem* (2016), by China Pharmaceutical Enterprises Association, et al. (in Chinese) (2) Percentage of initial market of NMEs= NMEs launched in a certain country as initial market / total number of NMEs marketed globally. Only new molecular entities (NMEs) between 2007 and 2015 are included in the calculation. (3) Launching NMEs as initial market in a country partially indicates the drug R&D strength of the country, thus the percentage of initial market illustrated in the figure partially indicates the relative R&D strength for innovative pharmaceutical products in a country compared to other countries in the world.

Figure 4. Percentage of Outpatient and Emergency Visits by Types of Healthcare Services

in China, 2015.

Notes: (1) Data Source: Health Statistical Yearbook of China (2016). (2) Services with percentage less than 1% are not annotated in this figure.

Figure 5. Percentage of Hospital Discharge by Types of Healthcare Services in China, 2015.

Notes: (1) Data Source: Health Statistical Yearbook of China (2016). (2) Services with percentage less than 1% are not annotated in this figure.