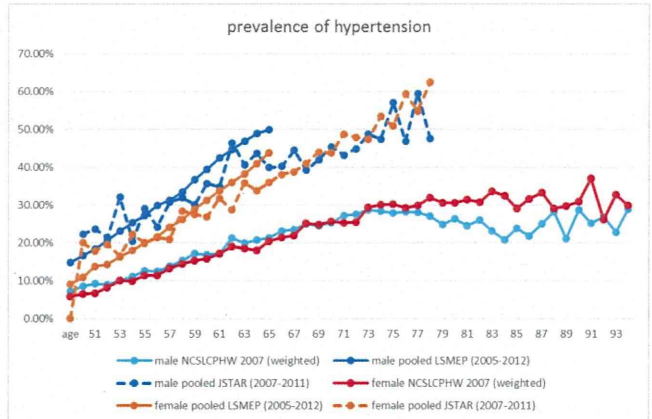
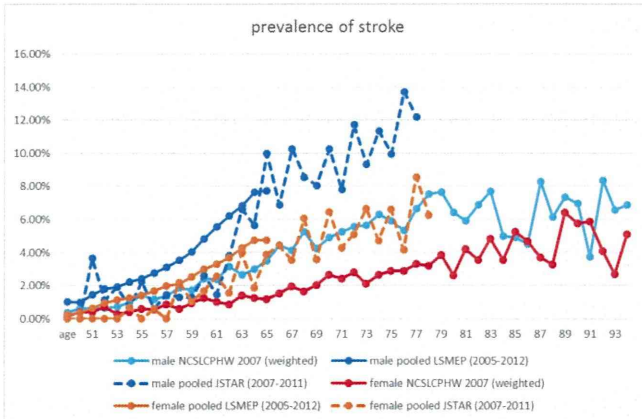


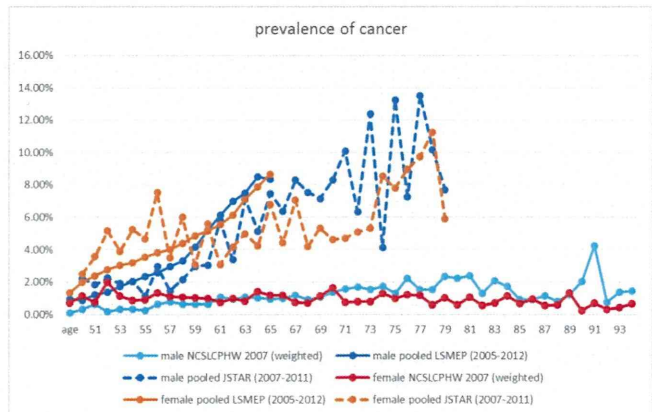
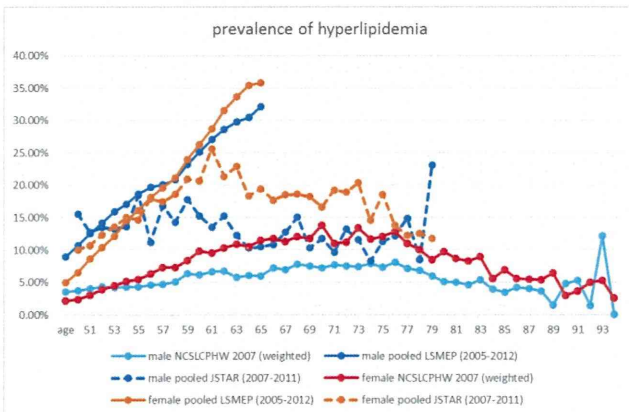
(c) stroke

(d) hypertension



(e) hyperlipidemia

(f) cancer



References

Bhattacharya, J., Shang, B., Su, C. K., & Goldman, D. P. (2005). Technological advances in cancer and future spending by the elderly. *Health Aff (Millwood)*, 24 Suppl 2, W5R53-66. doi: 10.1377/hlthaff.w5.r53

Bronnum-Hansen, H., Davidsen, M., Thorvaldsen, P., & Danish, M. S. G. (2001). Long-term survival and causes of death after stroke. *Stroke*, 32(9), 2131-2136.

Cabinet Office, (2015). The Aging Society: Current Situation and Implementation Measures FY 2015, available at <http://www.oecd.org/els/health-systems/health-data.htm> (accessed February 1, 2016).

Chen, B. K., et al., (2016). Forecasting Trends in Disability in a Super-Aging Society: Adapting the Future Elderly Model to Japan. NBER Working Paper No. 21870.

Fujiwara, Y., et al., (2010) Brief screening tool for mild cognitive impairment in older Japanese: validation of the Japanese version of the Montreal Cognitive Assessment. *Geriatr Gerontol Int*, 10(3): p. 225-32.

Goldman, D. P., et al., (2005). Consequences of health trends and medical innovation for the future elderly. *Health Aff (Millwood)*, 24 Suppl 2, W5R5-17. doi: 10.1377/hlthaff.w5.r5

Goldman, D. P., et al., (2004). Health status and medical treatment of the future elderly: final report. Santa Monica, CA, RAND Corporation.

Goldman, D. P., et al., (2009). The benefits of risk factor prevention in Americans aged 51 years and older. *Am J Public Health*, 99(11), 2096-2101. doi: 10.2105/AJPH.2009.172627

Health, Labour and Welfare Statistics Association (2015). Statical Tables of Number of Death <available at <http://www.hws-kyokai.or.jp/16download-index.html>> (accessed on October 15, 2015).

Ichimura, H., et al., (2009). JSTAR First Results 2009 Report RIETI Discussion Paper Series 09-E-047.

Ikeda, N., et al., (2011). What has made the population of Japan healthy? *Lancet*, 378(9796), 1094-1105. doi: 10.1016/S0140-6736(11)61055-6

Lakdawalla, D., and Philipson, T. (2009). The growth of obesity and technological change. *Econ Hum Biol*, 7(3), 283-293. doi: 10.1016/j.ehb.2009.08.001

Lakdawalla, D. N. (2014). Projecting the Future of Health: Lessons for Japan. *Iryokeizaikenkyu*, Vol.26(No.2), 100-121.

Lakdawalla, D. N., et al., (2009). U.S. pharmaceutical policy in a global marketplace. *Health Aff (Millwood)*, 28(1), w138-150. doi: 10.1377/hlthaff.28.1.w138

Lakdawalla, D. N., et al., (2005). The health and cost consequences of obesity among the future elderly. *Health Aff (Millwood)*, 24 Suppl 2, W5R30-41. doi: 10.1377/hlthaff.w5.r30

Ma, E., et al., (2007). Stratified age-period-cohort analysis of stroke mortality in Japan, 1960 to 2000. *J Stroke Cerebrovasc Dis*, 16(3), 91-102. doi: 10.1016/j.jstrokecerebrovasdis.2006.11.006

Michaud, P. C., et al., (2011). Differences in health between Americans and Western Europeans: Effects on longevity and public finance. *Soc Sci Med*, 73(2), 254-263. doi: 10.1016/j.socscimed.2011.05.027

Michaud, P. C., et al., (2012). The value of medical and pharmaceutical interventions for reducing obesity. *J Health Econ*, 31(4), 630-643. doi: 10.1016/j.jhealeco.2012.04.006

National Institute of Population and Social Security Research, (2012). Population Projections for Japan (January 2012): 2011 to 2060.

Shimizutani, S., et al. (2014). Option value of work, health status, and retirement decisions in Japan evidence from the Japanese Study on Aging and Retirement (JSTAR) NBER working paper series no 20001 (pp. 1 online resource (44 p.)). Retrieved from <http://www.nber.org/papers/w20001>

Stowasser, T., et al. (2011). "Healthy, wealthy and wise?" revisited an analysis of the causal pathways from socio-economic status to health NBER working paper series no 17273 (pp. 1 online resource (36, A12 p.)). Retrieved from <http://papers.nber.org/papers/w17273>

Tango, T., and Kurashina, S. (1987). Age, period and cohort analysis of trends in mortality from major diseases in Japan, 1955 to 1979: peculiarity of the cohort born in the early Showa Era. *Stat Med*, 6(6), 709-726.

Vital Statistics (2014). [Table 5-25] Trends in death rates (per 100,000 population) from malignant neoplasms by sex, age and site: Japan

Wang, C., et al., (2015). Age, period, and cohort effects on gastric cancer mortality. *Dig Dis Sci*, 60(2), 514-523. doi: 10.1007/s10620-014-3359-0

W. H. O. (2008). Closing the Gap in a Generation Commission on Social Determinants of Health FINAL REPORT.

参考資料 4

Reich M, Shibuya K. The Future of Japan's Health System – Sustaining Good Health with Equity at Low Cost. *New England Journal of Medicine*. 2015;373: 1793-1797



INTERNATIONAL HEALTH CARE SYSTEMS

The Future of Japan's Health System — Sustaining Good Health with Equity at Low Cost

Michael R. Reich, Ph.D., and Kenji Shibuya, M.D., Dr.P.H.

Four years ago, Japan celebrated 50 years of achievement of good health at low cost and increasing equity for its population.¹ In 1961, at the beginning of a period of rapid economic development, while

the country was still relatively poor (with a gross domestic product [GDP] half the size of Britain's), Japan reached full health insurance coverage of its population. In the next half-century, it

continued to develop its health system and improve equity, even applying this principle of universal health coverage in its global health diplomacy.¹ Now, however, Japan faces serious fiscal pressure due to a sluggish economy and the rapid aging and low birth rate of its population — but it is striving to sustain its health system in the face of these challenges.

 An interactive graphic is available at NEJM.org

Japan followed a nonlinear path to universal coverage. Previous Japanese policymakers were sometimes motivated to develop the health system for reasons of political economy that were unrelated to health. For example, Japan's first national policy for health insurance was introduced in 1923, motivated in part by imperial visions and the desire for a strong and healthy workforce for war. During World War II, Japan achieved nearly 70% health insurance coverage. Then, in the post-war period, political competition among the major parties promoted government efforts to expand coverage, as the conservative Lib-

eral Democratic Party sought to provide benefits to its rural constituents and to weaken the agendas of the Socialist and Communist parties by redistributing social resources to industrial workers. Japan was not unique in this regard: in countries such as Britain and Germany, the process of attaining universal health coverage also stretched over long periods and was advanced by various political motivations.² Though such mixed origins don't diminish the value of Japan's health policy accomplishments, they do highlight the importance of viewing the process from historical and political perspectives.

Japan's achievements in health status are well known (see table). Since 1986, Japan has ranked first in the world in women's life expectancy at birth, which reached 87 years in 2014. Life expectancy

Selected Characteristics of the Health Care System and Health Outcomes in Japan.*	
Variable	Value
Health expenditures in 2013	
Per capita (U.S. \$)	3,966
Percentage of GDP	10.3
Out-of-pocket (% of private health expenditures)	80.2
Public sources (% of total)	82.1
Health insurance	
Percent of population covered	>99.9
Funding sources	Taxes and premiums
Access	
Hospital beds per 10,000 population in 2013 (no.)	133
Physicians per 1000 population in 2012 (no.)	2.3
Percent of total government health expenditures spent on mental health care in 2011	4.9
Clinics using electronic medical records in 2011 (%)	20.9
Physicians' average monthly income in 2013 (U.S. \$)	11,769
Life and death	
Life expectancy at birth in 2013 (yr)	83.5
Additional life expectancy at 60 yr in 2013 (yr)	25.9
Deaths per 1000 population in 2013 (no.)	10.1
Infant deaths per 1000 live births in 2013 (no.)	2.1
Deaths of children <5 yr of age per 1000 live births in 2013 (no.)	3.0
Maternal deaths per 100,000 live births in 2013 (no.)	3.4
Fertility and childbirth	
Average births per woman in 2014 (no.)	1.4
Births attended by skilled health staff in 2013 (%)	99.8
Preventive care	
Colorectal-cancer screening generally available at primary care level	Yes
Children 12–23 mo of age receiving measles immunization in 2013 (%)	95.5
Prevalence of chronic diseases (%)	
Diabetes in persons 20–79 yr of age in 2014	5.1
HIV infection	<0.1
Prevalence of risk factors (%)	
Obesity in adults ≥20 yr of age in 2013	3.7
Smoking in adults ≥20 yr of age in 2013	19.3

* Data are from the Organization for Economic Cooperation and Development; the World Bank, Hashimoto et al.³; the Japan Ministry of Health, Labor, and Welfare; the World Health Organization; and the National Institute of Population and Social Security Research. GDP denotes gross domestic product, and HIV human immunodeficiency virus.

for Japanese men surpassed 80 years in 2013. Japan's infant mortality rate, reported as 2.1 per 1000 live births in 2013, is the lowest

in the world. But a continuing decline in birth rate means that the country's population is shrinking, even as it ages more rapidly

than in other societies. The proportion of people older than 65 years increased from around 12% in 1990 to 25% in 2013, and the proportion of older people has exceeded the proportion of young people (0 to 14 years of age) since 1997. This demographic transition has created huge fiscal and health care challenges.

In addition to improving health outcomes, Japan's social insurance system has made incremental improvements in equity through cross-subsidies and tax transfers, which contributed to income redistribution in addition to risk pooling. As many countries have done, Japan expanded health coverage population group by population group, through policies designed for different groups with differing levels of coverage (both in terms of benefits and funding) — thereby creating disparities and problems of fairness. Government action and new social policy were required in order to reduce these inequities. Japan's single reimbursement fee schedule (for all physicians and patients) and single benefit package for all social insurance programs created a foundation for equity in access. The government then increased equity by changing the copayment policies for the various insurance programs, reducing benefits for employees of private companies (by increasing their copayment rates), and increasing benefits for the elderly and non-employment-based insurance plans (by reducing their copayment rates). Policy-makers thus made the overall health system more equitable over time, reflecting the value that Japanese society places on egalitarianism.

Those achievements in equity are now at risk. Japan still has about 3500 insurance plans, with

MYOCARDIAL INFARCTION

A 55-year-old man with no serious health conditions has a moderately severe myocardial infarction.

In his suburban Tokyo home, Tanaka-san wakes up one day with chest pain. When the pain continues for 30 minutes, his family becomes worried and calls an ambulance, which arrives in 5 minutes. The emergency medicine team contacts the dispatcher, who asks a neighborhood general hospital whether there is room for an admission but is told that the coronary care unit is full. After 30 minutes of calls, the dispatcher finally finds a private hospital (with 150 beds) 20 minutes away that is willing to accept the patient.

This hospital has heart catheterization, MRI, and other equipment, and the emergency doctor in charge obtains an electrocardiogram and serum enzyme test to diagnose a myocardial infarction. A cardiologist is called to perform a cardiac catheterization, which reveals an infarction of a high lateral branch of the left anterior descending artery. A stent is immediately inserted, and reperfusion is established. The patient then stays in the hospital for 2 weeks.

The total hospitalization fee reaches ¥1.5 million (U.S. \$12,000, including two heart stents for \$6,700 and facility fees of \$2,500). Coverage from Japan's High-Cost Medical Care Benefit System allows Tanaka-san to pay only \$1,300, to cover the fee for a single-bed room for a few nights, insurance copayments, and some extra meal fees.

The day before discharge, Tanaka-san receives instructions on medication and lifestyle counseling. He is instructed to visit the outpatient clinic 2 weeks later. Because the hospital is far from his home, the patient asks for an introduction to a nearby general practitioner. Eight months later, however, follow-up angiography to see whether any restenosis has occurred has still not been done.

Hideki Hashimoto, Masayo Matsuzaki, and Mikko Kanda contributed to this case study.

varying premium levels, so some private companies or municipalities provide better financial benefits than others. The fragmented insurance plans are differentially affected by the increasing number of elderly people in Japan. As people age and retire, they move from employment-based plans to non-employment-based plans, whose costs per person increase as older enrollees are added. As a result, non-employment-based plans increasingly have financial

problems, especially as compared with Japan's employment-based plans. In an effort to reduce the financial problems for these plans and address the needs of the aging population, Japan introduced a national policy for long-term care insurance in 2000, and in 2008, it created a new health insurance program for people over 75 years of age.

Rising health care costs are a serious concern in Japan today: if the country takes no action,

health expenditures could increase from the current 8% of GDP to around 11% by 2025.⁴ Rising costs are a result of structural problems in the health system, especially the rapidly aging population and the frequent use of high-cost technologies such as magnetic resonance imaging and relatively high-priced generic medicines (which cost 60% of brand-name prices in Japan). Two decades of economic stagnation during the 1990s and 2000s (the "lost decades") also mean that health care costs have been taking a proportionately greater bite out of the GDP.

A final major challenge involves improving the quality of care in the Japanese system. Quality and efficiency have often been ignored by Japan's health policies. Existing government programs tend to focus on quantifying inputs and structures rather than on creating incentives to improve quality or addressing problems in outcomes. Some studies have suggested that postsurgical mortality rates in large hospitals in Japan are as low as those reported in other countries but that the quality of primary care and inpatient chronic care services may be problematic.³ Japanese hospitals and clinics are poorly differentiated by level of services, and there is no standardized benchmarking to assess hospital performance.

The Japanese government is acutely aware of these challenges and the intersecting crises of rapid aging and fiscal sustainability, which are further confounded by the health system's complex governance, including the mechanism for defining the fee schedule, as well as people's changing expectations about both medical and nonmedical aspects of health care.¹ The government is trying

PREGNANCY AND CHILDBIRTH

A healthy 23-year-old woman is pregnant for the first time.

Suzuki-san is married and lives in a Tokyo suburb. Realizing that she is pregnant, she goes to a neighborhood hospital to consult an obstetrician, who confirms the pregnancy, and she pays him ¥8,000 (U.S. \$64), since pregnancy is not covered by Japan's national health insurance.

Suzuki-san next visits the nearby municipal health center. She notifies the authorities about her pregnancy and receives the Mother and Child Health Handbook, to record information from the physician's medical examination, any concerns about the pregnancy, observations about the newborn baby, and ongoing observations about the infant. She also receives a pregnancy health checkup consultation ticket and an ultrasound inspection visit ticket, which provide her with partial financial support for these antenatal services.

During her pregnancy, Suzuki-san follows the typical schedule of 14 visits for health checkups at her hospital. At each visit, she is examined by the obstetrician for risks and symptoms of pregnancy complications and meets with the midwife for nutritional and mental health care and support.

At 20 weeks, she decides on a hospital and on a vaginal delivery. After the birth, Suzuki-san stays as an inpatient for 5 days. She pays a total of ¥620,000 (\$5,000) for all hospital services and is reimbursed by health insurance for ¥420,000 (\$3,400).

Two weeks after the birth, a midwife will visit Suzuki-san at home at no charge. Two weeks later, Suzuki-san will bring her infant to the hospital where she gave birth, where she will see an obstetrician-gynecologist and her child will see a pediatrician.

Hideki Hashimoto, Masayo Matsuzaki, and Mikko Kanda contributed to this case study.

to find ways to ensure fiscal sustainability, in response to the commitment made by Prime Minister Shinzō Abe to eliminate deficits by 2020. Recent laws seek to promote both the differentiation of hospitals by function and the community-level integration of medical treatment, long-term care, and preventive care by 2025. Japan is also considering a proposal to consolidate insurance plans at the prefectural level. In 2014, the Abe cabinet endorsed a government health care strategy that aims to facilitate the development of innovative technologies through a

new Agency for Medical Research and Development. But these changes are not likely to be sufficient to address the profound fiscal and demographic problems facing the country. Maintaining Japan's current system by increasing premiums or taxes while cutting benefits, as was done in the past, might buy some time — but it would be very costly politically and would not resolve fundamental structural problems. Incremental changes at the margins will no longer suffice.

Instead, we believe that Japan needs a new vision of health care

and health systems for the future. In June 2015, an advisory panel of young experts, appointed by Health Minister Yasuhisa Shiozaki, presented its vision of health care for Japan in 2035.⁵ The panel's report proposes a paradigm shift for Japan's health system, to redirect its focus from inputs to outcomes, from the quantity of services provided to patients' concerns about quality, from governmental regulation to professional self-regulation, from cure to care and well-being, and from specialization of services to integrated approaches across medical and social service sectors. The new health system would continue to emphasize fairness and solidarity, while building on individual patient values and desires and emphasizing global health perspectives.⁵ The government, recognizing that Japan needs new solutions for its profound problems, has explicitly called on the younger generation to produce innovative ideas for improving the health system.

The hope is that Japan will be able to mobilize new ideas, systems, and technologies to assist its growing elderly population and conform to changing social values and growing structural constraints and that the Japanese government will be able to jumpstart the economy and get it growing again (using Prime Minister Shinzō Abe's strategies of government spending, monetary easing, and structural reforms, known as "Abenomics"), even as the population continues to age and shrink. More and more countries are confronting similar challenges, but Japan is first in line. Accomplishing these multiple and sometimes conflicting goals will not be easy, but that's the challenge that Japan's health system and society must tackle.

Disclosure forms provided by the authors are available with the full text of this article at NEJM.org.

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1. Shibuya K, Hashimoto H, Ikegami N, et al. Future of Japan's system of good health at

low cost with equity: beyond universal coverage. *Lancet* 2011;378:1265-73.

2. Bump JB. The long road to universal health coverage: historical analysis of early decisions in Germany, the United Kingdom, and the United States. *Health Syst Reform* 2015;1:28-38.

3. Hashimoto H, Ikegami N, Shibuya K, et al. Cost containment and quality of care in Japan: is there a trade-off? *Lancet* 2011;378:1174-82.

4. Desvaux G, Woetzel J, Kuwabara T, Chui

M, Fjeldsted A, Guzman-Herrera S. The future of Japan: reigniting productivity and growth. San Francisco: McKinsey Global Institute, March 2015.

5. Japan vision: health care 2035. Tokyo: Ministry of Health, Labor and Welfare. June 2015 (<http://www.mhlw.go.jp/seisakunitsuite/bunya/hokabunya/shakaihoshou/hokeniryuu2035/future/>).

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New Math on Drug Cost-Effectiveness

Peter B. Bach, M.D., M.A.P.P.

Related article, p. 1803

Nowadays, the reality of exorbitant drug pricing overshadows even the most exceptional stories of drug efficacy. It's true that we're making huge biomedical strides, yet it's also true that prices for new drugs are rising, as are prices of existing treatments.

A case in point is nivolumab, which, as Motzer et al. report in this issue of the *Journal* (pages 1803–1813), appears to extend median survival in patients with metastatic renal-cell cancer by nearly half a year. But the cost to insurers and patients of using the drug for this condition — by my estimate, around \$65,000 for Medicare beneficiaries and up to twice that for commercially insured patients — can't be ignored.

The price hurts patients, limiting their access and depleting their savings. Under the current system of insurance, many patients have to pay large sums out of pocket, and research shows that when that happens, some patients will stop taking medications even if they are very effective.¹ The high costs of cancer care also drive patients into bankruptcy.

The problem is particularly acute for Medicare beneficiaries, who account for the majority of

patients with cancer in the United States. For nivolumab, a drug categorized as physician-administered and thus insured under Medicare's Part B benefit, Medicare assigns 20% of the cost to the patient. Although most Medicare beneficiaries have extra insurance to cover this expense — through Medicaid, an employer-based plan, or a private-market product such as Medigap — approximately 15% do not, according to the 2011 Medicare Current Beneficiary Survey. In other words, a sizable number of Medicare patients receiving this treatment could owe about \$13,000 — more than half the typical annual median income among Medicare beneficiaries, which is \$24,150 (Medicare beneficiaries who lack additional coverage actually tend to have incomes below this level).

Exacerbating this problem, Medicare sets no upper limit on coinsurance under Part B (or under Part D) even though commercial plans regulated under the Affordable Care Act do have out-of-pocket maximums. Federal law prevents the maker of nivolumab (Bristol-Myers Squibb) from providing assistance to patients who cannot afford the treatment. Programs such as Genentech's for

Avastin, in which beneficiaries receive the drug free once they have spent a certain amount in a calendar year, are rare.²

Policymakers, stymied by the rising cost of drugs, might think that an approach that relies on cost-effectiveness analyses would help the health care system deal with the high price of new treatments. After all, the United Kingdom sets standards for cost-effectiveness at about \$40,000 per quality-adjusted life-year for new drugs, and overall health care spending there is a fraction of what it is in the United States.

Of course, this potential solution remains theoretical today, since Medicare cannot limit drug access on the basis of cost-effectiveness; rather, laws require Medicare to cover all cancer drugs for all uses approved by the Food and Drug Administration (FDA) or listed in recognized compendia and to pay the price the manufacturer chooses to charge. But even if Medicare could set such limits, I believe that policymakers would find limited relief from the approach.

Expensive drugs can still seem deceptively cost-effective, because of the long upward spiral we have seen in the prices of cancer treat-

參考資料 5

Liao Y, Gilmour S, Shibuya K. Health Insurance Coverage and Hypertension Control in China: Results from the China Health and Nutrition Survey. PLOS ONE. 2016; 11: e0152091