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What can be achieved with a single-payer NHI system: The case of Taiwan

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ABSTRACT

The United Nations has incorporated the noble goal of Universal Health Coverage (UHC) in its 2030 Agenda for Sustainable Development. Most nations have already embraced UHC as their goal. However, an intense policy debate has risen about which health system structure can best achieve UHC. Is a single-payer system more efficient, equitable and effective than a multiple-payer system for middle income countries? We argue that empirical evidence and in-depth analysis of single-payer and multiple-payer systems should inform this debate. First, we need a clear definition of single- and multiple-payer health systems that enables us to compare their differences and clarify the issues to be debated. Second, at least four key issues confront any nation that wishes to achieve UHC: (1) how to design an affordable comprehensive health benefit package for UHC and to finance it (2) how the health expenditure inflation rate can be managed to sustain UHC (3) how modern information technology can be used to enhance efficiency and quality of healthcare and (4) how to assure an adequate supply of high-quality services will be distributed equitably throughout a nation. This paper offers a definition of single- and multiple-payer and compares them. We then use Taiwan's National Health Insurance system to address the four key issues, and illuminate how its policies and operations led to Taiwan's successful UHC.

1. Introduction

The World Health Organization (WHO) has announced a visionary goal: Universal Health Coverage (UHC) for all nations (World Health Organization, 2010). In September 2015, the UN General Assembly adopted this goal in the 2030 Agenda for Sustainable Development (United Nations, 2015). Since then, much debate has ensued regarding how to organize a nation's financing and healthcare delivery systems to achieve UHC. One school of thought, based on the theory of market competition, argues for multiple and competing public and private insurance plans to finance and purchase health care. The International Financing Corporation of the World Bank Group and the US Agency for International Development (USAID), for instance, promote extensive private sector engagement in financing and provision of health care through multiple-payer systems. The United States and Dutch health care systems are the most prominent examples of multiple-payer systems.

On the other hand, another school of thought, based on the principles of equity and efficiency, argues for a public single-payer system (Anderson et al., 2003). The superiority of the single-payer systems is evidenced by the performance of the Canadian, Taiwanese, and German health care systems (Deber, 2003; Lu and Hsiao, 2003; Wendt et al., 2013). South Korea recognized the advantages of the single-payer system and merged its multiple payers into one in the 1990s (Kwon, 2003), but changing from a multiple-payer system to single-payer is a very difficult reform. Thailand and Mexico tried to merge their multiple-payer systems into single-payer systems in the 2000s, but failed for political reasons (Hughes and Leethongdee, 2007; Knaul et al., 2012). Even a major candidate in the 2016 US presidential primary election campaign promoted a single-payer system (Meckler, 2016), but he did not make it past the primaries. Currently, China, India, Malaysia, South Africa and other African nations are also debating whether to adopt single-payer or multiple-payer systems. Insights and evidence from

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Taiwan, which achieved UHC with a single-payer system, can inform which option is better for middle income countries.

In designing UHC, most nations have to answer at least four critical questions. First, how do nations design an affordable benefit package, and how should it be financed? Lagomarsino et al. (2012) first raised this issue in 2012 for nine developing countries, and more recently Reich et al. (2015) raised the same issue, discussing the experience of eleven nations. Second, how can UHC manage the health expenditure inflation rate to sustain UHC financially? This question has been raised by several papers (Schmidt et al., 2015; Marten et al., 2014), but adequate answers were not provided. Third, how do nations build up the supply of health services to assure universal effective coverage? Van Minh et al. (2014) showed that most Southeast Asian nations have failed to achieve effective coverage. Thailand is an exceptional successful case, but it took nearly half a century for Thailand to build up supply and distribute it equitably to each community (Patcharanarumol et al., 2011). Lastly, how can nations seize the advantages of modern information technology (IT) and use the data gathered by UHC to improve the overall performance of a health system? In our literature review, most papers related to this topic explain how IT can be used for hospitals, clinics, or selected services or diseases (Schoen et al., 2012; Buntin et al., 2011), but not how vast comprehensive electronic data from a UHC operation could be used for system-level analysis and improvement.

Taiwan, a society of 23 million people, established a single-payer UHC system in 1995 called National Health Insurance (NHI). This new system was designed after a thorough examination of the theories, evidence, and experience of the major advanced nations' health care systems, regardless of whether they were single-, multiple-payer, or National Health Service (Council for Economic Planning and Development, 1990). The design of Taiwan's NHI system thus relied on worldwide evidence and the best practices that existed at that time, and it has become one of the most advanced single-payer UHC systems. Thus, Taiwan's experience can provide answers to the four questions stated above. Regrettably, the success of Taiwan's NHI system has not yet been widely recognized because Taiwan has been isolated internationally and excluded from international organizations due to unresolved issues about Taiwan's political status in relationship to the People's Republic of China.

We first define the single-payer system and compare it with the multiple-payer system, followed by an overview of Taiwan's single-payer NHI system and its historical development. Then we illuminate how Taiwan's single-payer NHI system addresses the four key issues confronting any nation that wishes to achieve UHC: (1) How can an affordable comprehensive benefit package for universal insurance coverage be designed and financed? (2) How can the healthcare expenditure inflation rate be managed? (3) How can cutting-edge information technology be used to enhance healthcare efficiency and quality? And (4) How can an adequate supply of high-quality health services be assured and distributed equitably throughout a nation? Finally, the last section draws lessons for middle-income nations.

2. Definition of single- and multiple-payer systems

Various definitions of single-payer have been used in the literature. Sherry Glied (2009) has stated there is no consensus on what is meant by the term “single-payer plan.” She argued that a single-payer plan is one that relies on a single source of revenue (Glied, 2009). Others have defined single-payer as a single purchaser of health services on behalf of the population living in a defined geographic area (Kutzin, 2001). The lack of a clear and concise definition of single-payer has hindered in-depth and rigorous analysis of single- and multiple-payer systems for UHC.

We define the major attributes of a single-payer system under UHC as including the following: (1) pooling the health risk of the whole nation (or each province) into one risk pool; (2) covering every citizen in that nation/province with one uniform benefit package of health services, with people able to voluntarily purchase additional insurance covering services beyond what is available in the uniform benefit package; (3) developing human and physical resources to assure covered persons have access to affordable services of reasonable quality; (4) establishing one single purchaser who institutes for providers one uniform set of rules that establishes reimbursement rates, sets health care quality standards, and determines what care is considered medically necessary; and (5) enabling a nation or province to manage the health expenditure inflation rate to sustain the UHC financially. Items 1–3 enhance the equity of health care, and items 4 and 5 improve the efficiency of the system. Under this definition, Germany, Canada, South Korea, and Taiwan would be classified as single-payer systems.

In contrast, multiple-payer systems operate with many different plans, offering group and individual health insurance as the principal sources of health care financing. Risks are not pooled nationwide, but instead by various population groups, including employers, employment status, occupation, community, age and sex, health status, individual preference for health insurance and willingness or ability to pay, etc. There are numerous benefit packages but no uniform benefit package for everyone. Universal coverage does not necessarily exist. As a result, equity in health care suffers. Lastly, the multiple insurance plans each set different rules for the provision of services and for payment to health care providers. Complying with these multiple rules and multiple payment systems vastly increases provider administrative costs.

Seldom any nation's health system would fit perfectly into the definitions we have offered for single-payer or multiple-payer. A nation's historical base and the political and economic reality in structuring its system would make slight modifications. Nevertheless, the policy that structures the healthcare system was based on a selected socioeconomic theory and the system embraces the essential characteristics of single-payer or multiple-payer.

The USA is the best example of a nearly pure multiple-payer system, even with the present Affordable Care Act reform. The US system relies on the principle of market competition. Meanwhile, the Netherlands, Switzerland, Australia, Chile, and Mexico have hybrid multiple-payer systems that operate under strong governmental regulations instead of being driven mainly by market competition. These hybrid multiple-payer systems may mandate purchase of health insurance to deal with adverse selection and free-rider problems, and to attain universal insurance coverage. The Netherlands employs a set of complex risk adjustment mechanisms to create national risk pooling (Lamers et al., 2003).

However, all multiple-payer systems have one common distinctive feature: No single purchaser sets the rules, either for the provision of services or for payment to providers. Each insurance plan selects providers to contract for services, sets its own private rules to manage providers, and establishes its own payment methods, rates, and procedures for paying providers. Fundamentally, the multiple-payer system is a derivative of competitive market principles. Multiple insurance plans are available—giving people a choice of insurance plans is the key advantage of the multiple-payer system—and these multiple plans are relied upon to set their own rules and incentive structures for consumers and providers without much government regulation. In theory, this market-based approach should promote efficiency and quality because multiple insurance plans compete on both premium rates and quality of health services in order to attract the largest numbers of buyers for their insurance products. To achieve a

competitive advantage, insurance plans have to control the prices and quality of services of their contracted providers, as well as manage the behavior of patients.

3. Taiwan's NHI system

Taiwan was a high middle-income society with per capita income of USD $8300 (purchasing power parity basis) in 1988 when it began in earnest to plan a NHI to achieve UHC (International Monetary Fund, 2015). Besides designating a powerful agency—Taiwan's Council of Economic Development and Planning—to conduct the planning with competent Taiwanese technical experts, Taiwan had the right political and economic environment, which is crucial to achieving UHC. At that time, Taiwan was undergoing a transformation from a one-party authoritarian regime to a democratic state. President Lee Teng-Hui was strongly committed to establishing a new landmark social program for all citizens. Meanwhile, Taiwan's economy was booming, with an annual growth rate ranging from 7 to 11%; wages and corporate profits were rising rapidly. In this environment, employers and workers were more willing to fund UHC. Lastly, the Taiwanese government appointed an extremely dedicated and competent person, Dr. Ching-Chuan Yeh, to lead the implementation of UHC.

Detailed descriptions of Taiwan's NHI and evaluation of its performance have been published previously (Lu and Hsiao, 2003; Cheng, 2003; Chiang, 1997). Another recent paper (Cheng, 2015) describes the benefit package, financing, and the performance of Taiwan's NHI. Readers interested in a detailed description of Taiwan's NHI and its performance may refer to that paper.

The government had twin goals for its UHC system: (1) providing every citizen with equal access to good quality health services and (2) assuring financial sustainability by controlling health spending at an affordable level (Council for Economic Planning and Development, 1990). To achieve these twin goals, Taiwan's NHI had to address the four key issues stated above.

3.1. Nationwide risk pooling, the uniform benefit package, and financing

Key advantages of the single-payer system are pooling risk nationwide and covering everyone with the same essential benefit package. Before the implementation of NHI in 1995, fifty-seven percent of Taiwanese were insured under three major health insurance plans: government employee insurance, labor insurance for workers in the formal sector, and farmers' insurance (Chiang, 1997). The benefit package and financing schemes for each of these were very different, and they were administered by different agencies that set different rules and payment incentives for providers. Among the uninsured, financial barriers prevented them from accessing health care. The greatest challenge was how to bring uninsured workers in the informal sector—and their families—into an affordable universal plan.

The crucial element in developing any NHI plan involves the design of the benefit package, which determines how resources are allocated to different health services as well as the overall cost of the NHI. The financing requirements for the benefit package determine whether it is feasible under that country's economic and political circumstances, and who pays for NHI. Universal coverage is determined by how much government budget can be allocated to subsidize premiums for poor and low-income families and informal sector workers. While not made explicit in UHC, equality in insurance benefit coverage and equal access to health care are goals that most middle- and high-income countries have in mind. Taiwan, like most emerging economies, including Mexico and Thailand, had already insured civil servants with a very comprehensive benefit package of medical services and prescription drug coverage. Politically, when a benefit package has been provided, it is almost impossible to take it away. Thus, to achieve equality, the benefit package for the NHI had to start with what the civil servants already had as a baseline. Taiwan then added Chinese medicine and dental services when these providers successfully lobbied for coverage. Consequently, Taiwan enacted NHI with a very comprehensive benefit package.

Taiwan's NHI benefit package includes all medical services, Chinese medicine, pharmaceuticals, most dental care, and home care by a visiting nurse. To reduce moral hazard, modest copayments and coinsurance were introduced in 1998 and are modified every few years. The current cost sharing consists of patients being required to pay a co-payment of USD $1.60 for a routine outpatient visit to a primary care clinic. The co-payment progressively increases to USD $12.00 for a visit to a tertiary hospital specialty clinic. For medications costing more than USD $3, patients have to pay coinsurance of 10–20%. As for inpatient care, the coinsurance rates for admissions for acute and chronic diseases are 10% and 5%, respectively; coinsurance can go up to 30% for patients with very lengthy stays. However, inpatient hospital coinsurance is capped at 6% of the average national income per person for a single admission, and 10% for an entire calendar year (Ministry of Health and Welfare, Taiwan, 2012).

The crucial question was how to finance such a comprehensive benefits package for everyone. Fortunately, Taiwan's booming economy provided fiscal space for new government spending, and the president decided to allocate additional budget resources to health care. Meanwhile, employers were willing to pay higher premiums because of a shortage of labor in Taiwan at that time, and workers were willing to pay higher premiums because of rising wages. This political commitment and set of economic conditions enabled Taiwan to create UHC with a single-payer NHI program covering everyone with a comprehensive benefit package.

The financing principle was to have government, employers, and workers each share one-third of the cost of insurance for workers in the formal sector, while the government heavily subsidized poor and informal sector workers and families. This principle has been followed for the past two decades, with some additional shift of financial burden to workers when Taiwan's economic growth slowed down. In 2010, 28% of the NHI's total premium revenue came from employers, 38% from workers, and 34% from government. However, a reform in NHI financing launched in January 2013 reduced the share contributed by insured workers while raising the government's share to 36% (Ministry of Health and Welfare, 2015a, b). For more detail on NHI's current financing, see Table 1.

3.2. Financial sustainability and the global budget system

The critical question confronting every nation is how to assure the financial sustainability of NHI or UHC. While the benefit package and organization of health care delivery and payment incentives determine the cost of NHI, the efficiency of the health system greatly depends on the establishment of an aggregate budget constraint. Taiwan's NHI did not alter its fragmented health care delivery system nor change its payment incentive; nevertheless, Taiwan's single-payer system enabled Taiwan to adopt a global budget system between 1998 and 2003 to manage health expenditure inflation rates and assure the financial sustainability of its NHI.

Under NHI's global budget, the key feature is to limit next year's total spending to next year's expected revenue by establishing an annual hard aggregate budget for NHI. The Cabinet sets a range for next year's budget at the beginning of the year. The actual budget is

Table 1
Premium contribution percentage, by population group, 2015.

Population group	Insured	Employers	Government
Category 1	30	70	0
Civil servants			
Employees in formal sector	30	60	10
Category 2	60	0	40
Union members			
Category 3	30	0	70
Farmers and fishermen			
Category 4	0	0	100
Active soldiers and jailed prisoners			
Category 5	0	0	100
The poor			
Category 6	0	0	100
Unemployed veterans and surviving dependents of veterans			
Other unemployed households	60	0	40

Note: The percentages in parentheses following category names indicate the proportion of the insured population that each category comprises.
Source of data: National Health Insurance Administration (2016, Taiwan)

then determined by negotiation within the thirty-five member National Health Insurance Committee that represents the whole range of stakeholders and consists of premium payers (employers, workers, and the government), providers (hospitals, physicians, dentists, pharmacies), and faculty from academic institutions who provide objective public interest views and help to break ties. The National Health Insurance Committee meets three months before the following year to adjust the baseline budget according to a set of non-negotiable and negotiable factors. The baseline budget is the current year's global budget. Non-negotiable factors include the projected increase in the number of insured, the population aging effect, and expected increases in input prices for producing health services (e.g. wages, rent, drugs, and medical supplies). Negotiable factors include target efficiency gains and expansion of NHI's benefit packages to cover new drugs and technologies, as well as other initiatives that aim to improve access to care but are still in the pilot stage (National Health Insurance Administration, 2015).

The global budget is then allocated to six geographic regions through a two-part formula: 1) a capitated budget based on the number of beneficiaries and a risk-adjusted capitation payment rate specific to the region; and 2) the region's share of the total budget in the base year. Risk adjustment factors include age, gender, rural areas, and adequacy of supply. Over time, the relative share of each of the two parts of a region's budget has evolved.

The global budget system is very effective in controlling total health spending. However, the NHI continues to pay providers predominantly by fee-for-service (FFS) according to the NHI Fee Schedule. Under FFS, providers have incentives to increase both volume and intensity of services. How does Taiwan reconcile these FFS incentives with the global budget cap? Instead of specifying a fee for each service item, the Fee Schedule specifies a number of points for each service. Providers bill the regional National Health Insurance Administration (NHIA) according to the Fee Schedule and receive a payment that equals the number of billed points multiplied by a conversion factor. The conversion factor is not fixed but is calculated by dividing the regional budget by the total number of points billed. As a result, the total spending of a region is kept within the regional global budget.

However, the points on the NHI Fee Schedule do not reflect the actual costs of the service. This gives providers incentives to induce demand for services with a profit margin, especially diagnostic tests. Also, the conversion factor for pharmaceutical expenditure is fixed at one, thus giving providers further incentives to prescribe pharmaceuticals. Finally, although the global budget system is very effective in controlling NHIA program costs, providers can still prescribe services not covered by NHI to patients, although the scale of this behavior has so far been limited since the NHI benefit package is very comprehensive. Recognizing the limitations of FFS, Taiwan has in recent years introduced a number of provider payment changes, such as the Diagnosis Related Groups (DRG) payment method, which now covers about 29% of total inpatient spending; pay-for-performance (P4P) for selected health conditions, such as tuberculosis, diabetes, asthma (Hsieh et al., 2015); and capitation payments on a pilot basis (Lin et al., 2003). However, scaling up such payment interventions has been slow due to resistance from providers.

3.2.1. Health care spending inflation rates and the global budget

Taiwan experienced a very rapid increase in the rate in real health expenditures per capita before the introduction of NHI. In the decade before NHI (1985–1995), the average annual rate of health care expenditure growth was 8.3%. In the year that NHI was implemented, the annual rate shot up to 14.1% because of the increase in demand caused by NHI (Lu and Hsiao, 2003). However, in the immediate years after its implementation of NHI, Taiwan was able to reduce inflation rates significantly because the single-payer system enabled the reduction of fraud and abuse. Taiwan eventually managed the annual rate of increase with the global budget. For details about the value of global budget in UHC, see the following paper on Taiwan in this issue.

The single-payer global budget kept the average annual rate of increase in NHI expenditure per person to 4.1% (See Fig. 1 for details). Taking into account the rising population, the average annual rate of increase in total health expenditures between 1995 and 2013 was 5.2% (Ministry of Health and Welfare, 2015a). Taiwan has been able to manage the health care expenditure inflation rate and hold national health expenditures to 6.6% of GDP, which compares very favorably to the OECD nations' average of 9.1% (OECD, 2015).

3.3. Single-payer and the use of information technology to improve efficiency and quality

To improve efficiency, reduce fraud and abuse, and assure quality, Taiwan seized the advantages of the single-payer system and embraced modern information technology (IT) for its operations. A single-payer UHC system can capture comprehensive information on all providers and patients. An effective IT system can use this information to monitor the quality of health care, vastly reduce fraud and abuse, minimize administrative costs, and provide ample information to patients for self-care.

In planning Taiwan's NHI, planners recognized two potential sources of significant savings: the widespread fraud in billing and

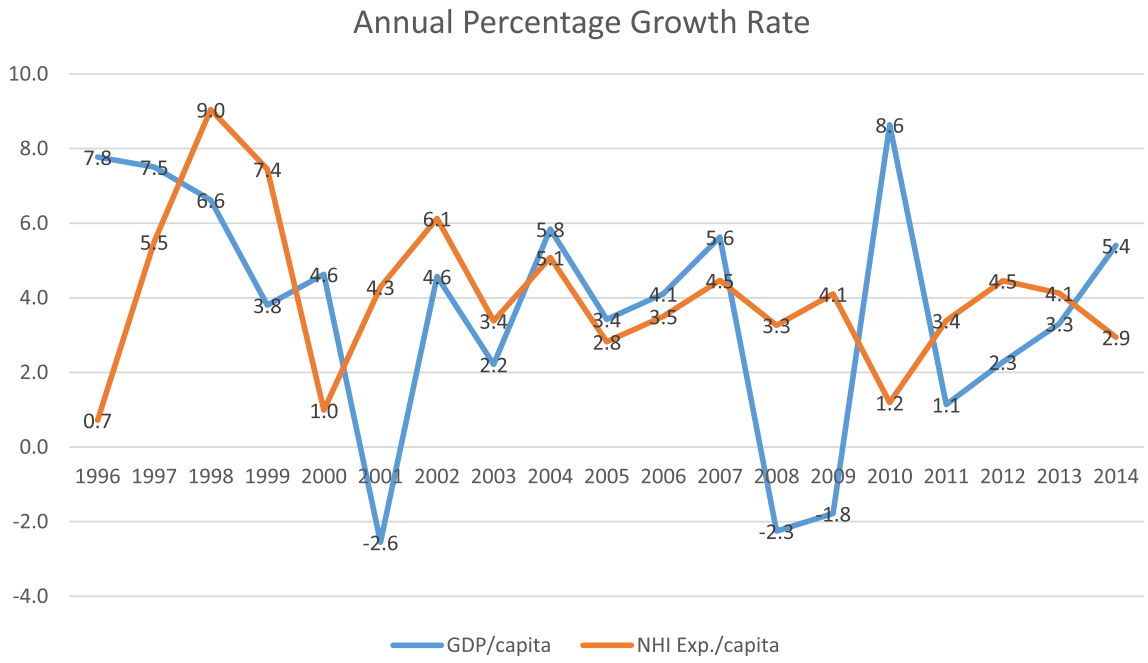

Fig. 1. Annual increase in NHI expenditure per capita and GDP per capita. Note: Growth rates are based on nominal terms. Data are not available before 1996; NHI started in 1995. Source of data: Ministry of Health and Welfare (2015b)

abuse of coding services that existed in Taiwan at that time, and the induced demand of unnecessary services by providers, evidenced by over-prescription of drugs and very numerous office visits (Taiwanese, on average, visit Western and Chinese medicine doctors 16.8 times each year). These problems were presented to foreign experts during the NHI planning phase (National Health Insurance Administration, 2015). Professor Robert Evans recommended the Canadian single-payer system method, which enables the management of provider and patient fraud and misuse (Evans et al., 1989). The single-payer system allows a nation to establish a complete profile of every provider and patient through a comprehensive data system. Abusers can then be identified with solid evidence. However, the administrators of the three existing Taiwanese insurance plans strongly opposed the consolidation of their plans into one single plan. They mobilized all of their political supporters to block the consolidation. In the end, the personal intervention of President Lee Tung-hui was required in order to overcome this opposition (National Health Insurance Administration, 2013).

Taiwan's healthcare IT system begins with an identification card (IC) for each patient, which serves as the patients' ID card when they seek care. The IC card contains the patient's basic medical information such as allergies, living will, and medical record for the last six months' visits to physicians, including diagnosis, treatment, test results, and drugs prescribed and dispensed.

The IT system consists of three major components: the patient's record, physician profiles, and hospital practice profiles. The data come from claims filed by the providers. Computer programs record a continuous history of patients' utilization of services, tests, diagnosis, drugs, and treatments received. Hospitals and clinics adopted the latest international clinical document architecture (SDO's Level 7) so information could be exchanged and merged between all hospitals and clinics. Relying on these transactional records, Taiwan's NHIA established a profile of every provider and patient, and computes a distribution of clinical practices by diagnosis, tests, prescriptions, and treatments. Using statistical and epidemiological methods, NHIA establishes reference points for diagnosis and treatment for every major disease and illness, which allows NHIA to identify statistical outliers. Then NHIA closely monitors and reviews the quality of health care provided by these providers and thus identifies potential fraud and abuse. Suspicious cases are given to a physician committee for detailed review. Physicians and hospitals are penalized for fraud, abuse, and seriously deviant clinical practices. In the first two years of its operation, Taiwan's NHIA was able to reduce total health expenditures by 8% simply by controlling fraud and gross abuses (Lu and Hsiao, 2003).

Taiwan was also able to use IT data to help control the SARS and H1N1 epidemics by tracking Taiwanese travelers returning from infected countries and where the returnee sought health care once back in Taiwan. Because the claim record of an office visit or a hospital discharge is automatically reported within 24 h to the central data bank, Taiwan's Centers for Disease Control (CDC) was able to monitor more closely who got sick with SARS or H1N1 symptoms. The IT system is also used to control TB and HIV/AIDS by tracking patients who may have missed their treatments. The comprehensive IT database can also be used by patients to manage their own health care and monitor the frequency of use of toxic drugs; in Taiwan the database of information used for this purpose is called the Pharmaceutical Cloud. Taiwan also uses the data to create a Health Bank for each person. For details about the value and other potential uses of IT in UHC, see the following paper on Taiwan in this issue.

3.4. Ensuring an adequate supply of healthcare services

UHC calls for universal effective coverage, which means people should have reasonable access to covered services. For Taiwan, the question was whether it had an adequate supply of qualified human resources and medical facilities to meet the expected increase in demand for services once NHI was introduced. Fortunately for Taiwan, human resources and health facilities had expanded since Taiwan established its National Department of Health (DOH) in 1971. Upon its establishment, the DOH recognized that Taiwan had a shortage of physicians. Taiwan thus took three measures to

increase the supply of physicians in the 1970s: expanding the capacity of existing medical schools, establishing two new public medical schools, and licensing two new private medical schools. The new capacity increased medical school graduates by 1300 each year (Lai, 2009). When the NHI was implemented in 1995, Taiwan had 2.1 physicians per 1000 population (Ministry of Health and Welfare, 1996), which seemed to be adequate, as indicated by the absence of long waiting times for care.

As for hospital beds, the government decided in the early 1980s that it lacked the funds to vastly expand public hospitals to address the shortage of hospital beds. More importantly, the government was aware of inefficient and poor quality health care provided by public hospitals resulting from overly bureaucratic management. Thus, as an alternative to public hospitals, Taiwan established a tax policy in the early 1980s to encourage private investment in hospitals. This policy produced a blossoming of charitable nonprofit hospital chains and some for-profit hospital beds. In 1990, the government went further and provided interest-free loans to private investors who built small hospitals in underserved areas. By 1995, hospital beds per 1000 population had increased to 4.2/1000 from 3.7/1000 in 1980. Public hospitals supplied 44% of the total hospital beds while 30% were supplied by small for-profit hospitals (Ministry of Health and Welfare, 1996). Again, the adequacy of hospital supply was evidenced by the short waiting time for hospitalization when NHI was implemented in 1995.

Taiwan dealt with the competency and quality of human resources and hospitals with the traditional approach. It relied on licensing of physicians and accreditation of hospitals. It was not until the late 2000s that Taiwan went beyond these traditional measures and began to assure quality by measuring both the process and outcomes of health services rendered.

The Taiwanese had a severe maldistribution of human resources and medical facilities in the 1970s. Rural and mountainous communities had a serious shortage of physicians and clinical facilities. This problem was recognized in the early 1980s by enlightened public health officials like Dr. Hsu Tsu-chiu, Minister of Health, and others. They led Taiwan to successfully establish an innovative group practice model (Lu and Chiang, 2011), where specialists in major hospitals teamed with primary care physicians to staff group practice clinics in rural and remote communities by using the public health station as their facilities. Each sub-district in Taiwan had to identify underserved rural and remote communities and the government provided the initial funding to finance group practice plans. To staff these group practice clinics in underserved communities, graduates of public medical schools were sent there for their two years of mandatory service. In addition, physicians were allowed to keep 80% of the profits from the group practice clinics. Today, most of the rural and remote communities have primary care clinics. However, 4.9% of townships and districts still only have one doctor to serve more than 6000 people (Taiwan Medical Association, 2014). For a detailed analysis of how Taiwan built up its supply and rationally distributed it, please see the paper on Taiwan in this same issue of SSM.

Today, Taiwan has an adequate overall supply of health services. At the end of 2014, Taiwan had 2.7 physicians per 1000 people, 5.7 hospital beds per 1000 people, and 1.4 pharmacists per 1000 people (Ministry of Health and Welfare, 2016). While the number of hospital beds per 1000 people is comparable with the highest third of OECD countries, the ratios of physicians and pharmaceutical personnel are lower (OECD, 2015). Meanwhile, the average annual outpatient visits per person are 15.1 for western medicine, 1.7 for Chinese medicine, and 1.39 visits for dentistry (World Health Organization, 2015). The very high visit numbers are partly due to the incentives of the fee-for-service payment system and the tradition of medical practice that Japan introduced to Taiwan during its 50-year occupation. Japanese medical practice encourages patients to come back frequently for short visits. And indeed, Taiwanese patients have easy access to physicians and inpatient services. Usually patients can see physicians within 24 hours, and the longest waiting time for non-emergent hospital admission for knee replacement surgeries is 18 days (National Health Insurance Administration, 2014). The overall hospital occupancy rate is 70% (Ministry of Health and Welfare, 2015a), which seems to indicate Taiwan has a surplus of hospital beds.

4. Lesson for middle income nations

Taiwan's single-payer NHI system holds a number of lessons for other countries aspiring to achieve UHC: affordable and equal access to effective health care for all without significant financial hardship. Being a single-payer system, its foremost advantage pertains to its ability to achieve UHC equitably and efficiently. Taiwan's NHI provides universal coverage with a generous benefit package, which assures that all beneficiaries have equal access to covered services. The benefit package also offers financial risk protection for everyone. In addition, pooling the risk nationwide allows Taiwan's NHI to produce an equitable distribution of financial burden and benefits, as the healthier people are pooled with the less healthy, employed workers pay according to their income, and the government subsidizes premiums in full for the poor and veterans. Meanwhile, Taiwan's NHI has been able to sustain its system financially through the adoption of a global budget system, which sets a hard aggregate budget cap annually to limit its total spending to its expected revenue; however its use of a fee-for-service payment system to reimburse providers has introduced incentives for the overuse of services where fees are set above cost, such as for many diagnostic tests and drugs. Furthermore, by being a single-payer system, Taiwan's NHI was able to effectively use information technology to capture comprehensive information on all providers and patients which is then used to improve the quality of care, reduce fraud and abuse, and minimize administrative costs. Taiwan was fortunate to introduce the NHI when it had adequate hospital beds, physicians, and nurses to meet the increased demand from patients. This supply was built up over twenty years through a dual strategy of expanding the supply by public and private partnership, and by policies to attract physicians to practice in rural remote locations.

Taiwan's experience and evidence shows how to use the massive force of a single-payer NHI to achieve UHC, but it also has shortcomings. For health equity reasons and to pool risk nationwide, the compulsory nature of NHI denies people the choice to be insured or not. In addition, people are all insured with one single comprehensive benefit package, though people can voluntarily purchase supplementary insurance beyond the comprehensive benefits such as private room hospital care. Another shortcoming arises from a primary characteristic of the single-payer system—a single agency administers NHI. Being a monopoly, this agency could stagnate and become very inefficient and ineffective because it does not face any competition. Therefore, the design for the governance structure of this single agency is critical to assure it serves public interest, and it continues to innovate and improve. Lastly, the NHI is a monopsony purchaser of the services for the insured. If the NHI agency does not set the correct purchasing price, it would create shortage or surplus of different health services and medical specialists.

Every nation must make its own decision to adopt a single- or multiple-payer system to achieve UHC. We offer clearer and concise concepts of both types of systems and compare their major advantages and disadvantages. Evidence from Taiwan's single-payer NHI system sheds light on how middle income nations can

design and plan an equitable and efficient single-payer NHI system when they pursue UHC.

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