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The COVID-19 Pandemic and the Transformation of Health Policy: A Syndemic Perspective

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Abstract

The Coronavirus Disease 2019 (COVID-19) pandemic is bringing about once-in-a-century changes to human society. Three key properties escalate the COVID-19 pandemic into a *syndemic*. To address this triple crisis, we discuss the importance of integrating early, targeted and coordinated public health measures with more equitable social policy, and with health care policy that realigns incentives of the major players in the health care market. Drawing on evidence from past and present epidemics as well as comparing variations in response to the current health emergency between China, the U.S. and beyond, we navigate long-awaited health policy transformation in areas that help us better prepare for the next pandemic.

Keywords: COVID-19, pandemic, syndemic, healthcare reform, global health policy

JEL Classification: I18, J24, H12, P41, H51

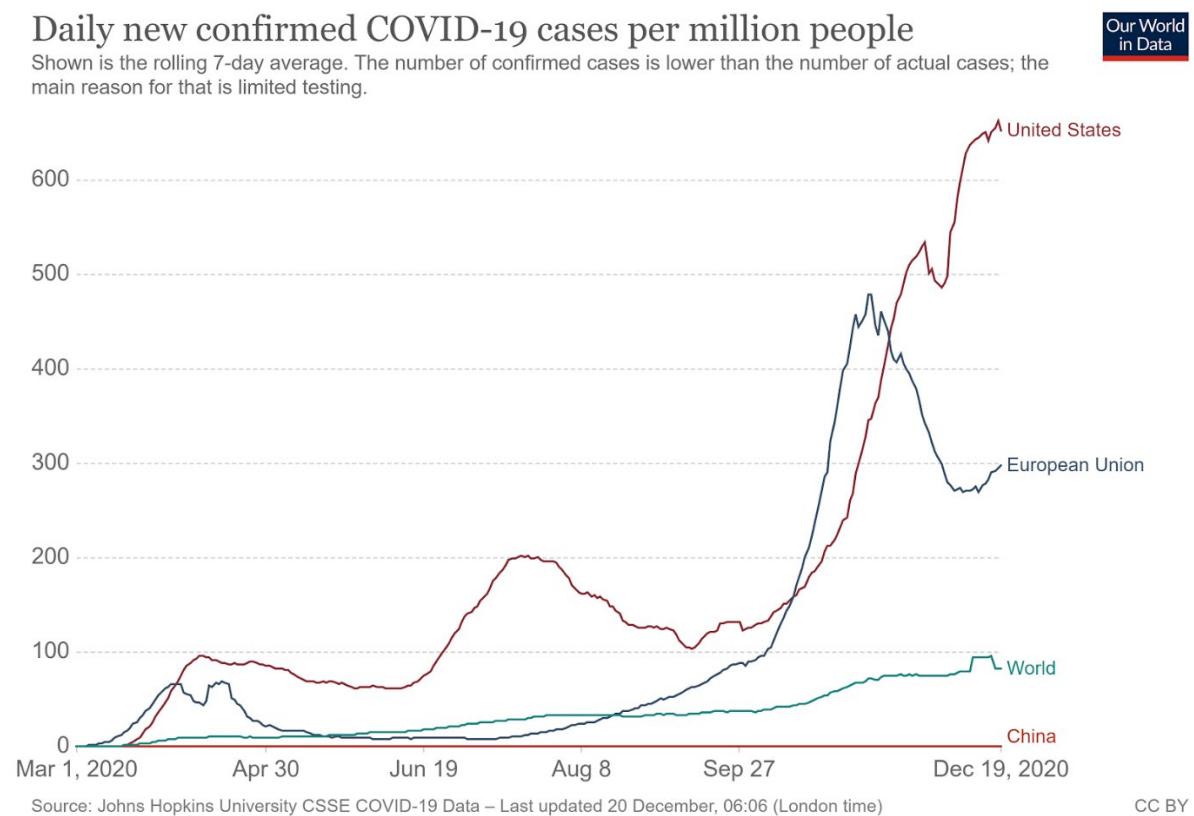
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1. Introduction

The COVID-19 pandemic emerged in 2019 and was caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), resulting in an unprecedented health and economic crisis worldwide. Throughout year 2020, the pandemic has resulted in over 1.5 million deaths and 65 million infections worldwide (Figure 1). This only reflects the number of people who have been identified, since many countries have limited ability to identify cases. Starting from November 2020, with a new wave arising due to seasonality, especially when people spend more time in poorly ventilated indoor settings, travel and congregate for holidays, the number of cases are expected to continue to increase over the coming months. Given the largest ever number of new infections each day, a majority of hospital beds in America have been occupied. The number of daily deaths in America climbs rapidly, from approximately 900 deaths per day in September 2020 to around 3,000 projected deaths per day in February 2021, even if the death rate is substantially declining (IHME 2020).

Figure 1. Total global confirmed cases per million people.



Source: Our World in Data. Total global confirmed cases per million people.

As the COVID-19 pandemic has plunged the whole world into the worst recession since World War II, contractions in economic activity are at unprecedented speed and scale. The

pandemic disrupts both the supply and demand side of the economy. On the demand side, the dramatically rising unemployment and shrinkage in family income and wealth devastate consumer purchasing power. Unlike an economic recession that disrupts consumption of goods, the pandemic hurts demand for services much harder.

On the supply side, reduced manufacturing investment and output, collapsed global supply chain, lost productivity due to worker morbidity and mortality all impact the economy. Since mid-March 2020, when the U.S. declared a state of emergency, 84 million Americans have filed for unemployment. At the peak, around 22.7 million lost their jobs in April 2020 (US Bureau of Labor Statistics 2020). While it is well documented that the pandemic predominantly affects older adults, especially those with underlying medical conditions, it also has a tremendous impact on the supply of labor force and therefore the labor market. Relative to the earliest wave of infections when a majority of people who died or were ill were older adults, more younger age people die in subsequent waves.

The COVID-19 pandemic has also stricken the economy well beyond its influences on supply or demand. In a time of historical uncertainty, low confidence may lead firms to cut back on investment and consumer to hold back spending. Strategies to best integrate economic policy with adequate health measures to reduce uncertainty is the key to cushion its consequences and better prepare for future resurgence.

Our analysis follows the *syndemic* framework developed by Merrill (2009). The COVID-19 pandemic is essentially a *syndemic* with three key properties that interact to increase susceptibility and worsen outcomes, highlighting the importance of a systematic approach. First, the biological properties of SARS-CoV-2, especially its high transmissibility and virulence, call for early, targeted and coordinated public health response, which is discussed in **Section 2**. Second, people at the bottom of the social ladder suffer the most, which emphasizes the urgency of building more inclusive and equitable social safety nets against this pandemic and the future ones. **Section 3** analyzes social policy for such purpose. Third, the fact that older adults or those with chronic health conditions are at the highest risk of infection and death suggests reform the healthcare sector to realign incentives of major players, including governments, patients, providers and payers, and streamline health care services. **Section 4** summarizes changes in health care policy to fulfil these objectives.

We cannot simply approach the COVID-19 pandemic from biological properties of the virus. Rather, it is critical to also address the *syndemic* through dealing with the underlying

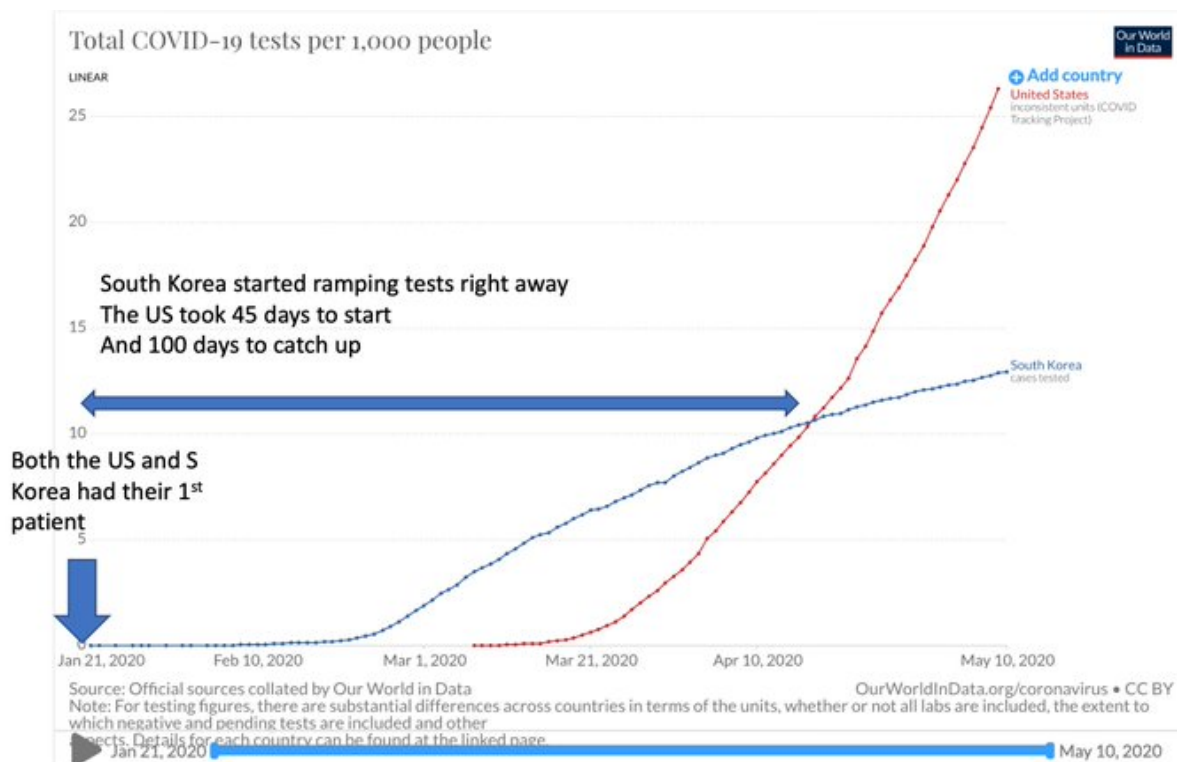
diseases in the healthcare sector, especially chronic conditions of the aging population, and narrowing socioeconomic inequality between the rich and the poor through social policy. Such integrated health policy has the greatest potential to join hands with basic medicine and clinical innovations to offer a systematic solution for all populations. The rest of the paper focuses on two countries, i.e. China and the U.S., and compares with others when applicable.

2. Early, Targeted, and Coordinated Response to the *Syndemic*

2.1 The importance of early response

History often repeats itself. The not-so-distant history offers us wisdom. About 100 years ago, the 1918 influenza influenced the world economy at a comparable scale. The world was faced with similar choices between the economy and public health. While the pandemic substantially decreased manufacturing employment and output, cities that intervened earlier and more aggressively not only ended up with lower mortality but also faster economic recovery. Areas more inflicted remained more depressed through 1923 (Miles Ott 2007; Chen 2020; Correia et al. 2020).

Figure 2. Total COVID-19 tests per 1,000 people, South Korea vs. the United States



Source: Our World in Data. <https://ourworldindata.org/grapher/full-list-cumulative-total-tests-per-thousand>

The importance of early responses is also manifested during the COVID-19 pandemic. Viruses often spread exponentially, the first 100 days may determine the future of the pandemic. Since China has not released its national nucleic acid testing data, we compare the United States with South Korea due to their identification of the first COVID-19 case on the same day. However, South Korea started massive testing shortly afterwards, while the U.S. took 45 days to start scaling up testing and 100 days to catch up with South Korea (Figure 2). Even by July 2020, the U.S. still lagged South Korea and many other countries in the number of testing per confirmed case identified, an important indicator on whether testing volume matches with the severity of infections.

The largest wave of infections often comes during the winter season when people spend more time indoors and attend holiday gatherings. With COVID spreading, the regular flu season may become even deadlier after crushing health care infrastructure. Back to the 1918 influenza, most of the deaths were in the winter wave. Therefore, the earlier we can cut virus spreading, the better we may prepare the healthcare system for spikes of hospital visits, patient overflow, and deaths.

Cost-benefit analysis also points to earlier interventions during an epidemic, as mounting evidence suggests that later responses tend to lead to longer shutdown and more economic loss. The International Monetary Fund (2020) estimates a 37 percent contraction in the U.S. GDP in the second quarter of 2020 (April through June) with a shutdown of the economy, which resulted in daily losses of \$22 billion US dollars. More lives saved and a healthier labor force further add to the monetary value of early actions. The US Department of Transportation (2016) puts the value of a statistical life at \$10.4 million. Based on the 290,000 lives lost by December 10, 2020, this suggests that in purely monetary terms, the value of the loss of life that has resulted from the pandemic is approximately \$3.1 trillion. Therefore, the stakes of public health interventions like ramping-up testing and contact tracing are high enough to warrant immediate actions.

On the other hand, spending on public health measures only takes a small share of the value of lives saved and the avoided long-term economic costs. For instance, a \$200 billion investment in testing would be cost effective in purely economic terms if it led to a 6 percent increase in economic activity during the remainder of 2020 (Berry and Cooper 2020). This again reinforces that we must spend more aggressively on public health measures to address this crisis.

Loose monetary policy and fiscal policy may help shore up the economy. Whether a V-shape recovery is achievable, or if we experience a W-shaped or even L-shape recovery with large permanent economic loss, the answer depends critically on how long the pandemic lasts. Since March 2020, the U.S. Federal Reserve cut interest rates to the lowest level. Three COVID-19 stimulus packages, i.e. the Families First Coronavirus Response Act (FFCRA, \$192 billion), the Coronavirus Aid, Relief, and Economic Security Act (CARES, \$1.7 trillion dollars), and the Paycheck Protection Program and Healthcare Enhancement Act (COVID 3.5, \$483billion), were issued, reaching a total of \$2.4 trillion. Stimulus checks and unemployment benefits were offered to Americans. However, less than 8 percent of the 2.4 trillion US dollars relief fund went to public health measures, while majority of the funding went to affected people and firms (Congressional Budget Office 2020). This is essentially treating the symptoms, not the cause of the pandemic. To match with the speed and scale of the crisis, the U.S. needs to spend way more on public health efforts to support safe reopening. Public health measures are not the enemy of the economy, but the pandemic is.

Responses in different countries were shaped by cultural norms and societal realities. In China, many people live in concentrated apartments, so social distancing is more important for them. Early and stringent measures by the end of February, including building makeshift hospitals and isolation camps, city lockdown, and closed community management, likely avoided 1.4 million infections and 56,000 deaths outside Hubei province (Qiu et al. 2020). However, these measures might be considered extreme and difficult to implement for westerners, as most regard such protocol measures restricting individual freedom. However, in a pandemic we may have to sacrifice some individual good for a greater good. In some societies, individuals' responsible behaviors helped reduce virus transmission and return to some extent of normalcy before the arrival of safe and effective vaccines (Burki 2020).

2.2 Targeted and coordinated response to pandemics

As the WHO declared the COVID-19 pandemic a global public health emergency, many countries chose to shut down their borders with the outside world as well as their domestic travel. Although lockdown can be effective for curbing virus transmission, it also hurts the economy and the society. Targeted travel restrictions, on the other hand, have the potential to maintain the effectiveness of such measures while reducing unnecessary negative effects. Recent evidence from both China and the U.S. lend support to such ideas. Chen et al. (2020)

demonstrate that, with targeted city route-specific travel restrictions, China could achieve the same performance against COVID-19 (e.g. less than 100,000 infections and 6,000 deaths) by prioritizing optimal travel restrictions between 5 percent of city pairs, or 20 percent of population, instead of untargeted universal travel restrictions throughout the country. In reality, a large set of Chinese cities imposed more restrictive travel orders than optimally required, while another large set of cities enforced less restrictive travel policies than optimal ones, leaving room for future improvement.

Future policy design may utilize the history of economic activities and human migration data to model which city pairs need to be restricted and how much restrictions need to be imposed. In this regard, Chen et al. (2020) develop theoretical models to identify the types of cities to prioritize restrictions, including those in the epicenter of this pandemic (e.g. Wuhan and its nearby cities) and cities that are major transportation hubs with strong links to the epicenter (e.g. Beijing, Shanghai and Guangzhou).

Coordinated response to the pandemic is another key but difficult to achieve across the U.S. given its prevalent rugged individualism (Bazzi et al. 2020). First, while universal mask mandates in public spaces can effectively slow down virus spread, save thousands of lives and a significant portion of GDP (IHME 2020), a large number of U.S. states have not coordinated such policy. Second, the delayed timing and early uncoordinated relaxation of stay-at-home orders have caused many preventable infections and deaths in the U.S (The Economist 2020;). Population mobility has bounced back after a temporary decline, such as non-essential visits to parks and outdoor spaces in hotspot regions (Badr 2020). The enforcement of stay-at-home has also demonstrated geographic patterns and, in some areas, resembled a ‘giant garden party’ (Davies 2020).

Consequently, the trends in the past three waves of coronavirus surge in America were quite different across geographic regions. While there still is no concrete federal plan to coordinate states to work together, some states demonstrated more efficiency in their coordination among each other. For example, Northeastern states like New Jersey, New York and Connecticut formed a joint committee to coordinate public health responses and phased reopening and achieved good results in ending the first wave of coronavirus surge.

As no state would like to be the first mover to impose public health restrictions that may hurt its own economy and community, coordination is needed to enforce collective actions and generate positive spillovers to benefit all (or mitigate losses). Coordination may leverage

the fact that contact patterns of people in a given region are significantly influenced by the policies and behaviors of people in other, sometimes distant, regions. Holtz et al. (2020) show that for U.S. states with geographically close peer states that adopted stay-at-home policies also reduced their own mobility through positive spillover effects. The U.S. findings are similar to China. Chen et al. (2020) illustrate that in the scenario with no national level coordination, each city has to double their restrictions in their outbound traffic in comparison to the scenario when all cities follow optimal restrictions. In other words, uncoordinated travel restrictions ignore policy externalities and therefore are sub-optimal in comparison to coordinated restrictions, so the latter may reduce the stringency of restrictions.

Coordinated policy may also virtually shift individuals' behavior via social networks. Some of the positive externalities can be generated via social media platforms, even among people geographically distant but socially close to each other. Holtz et al. (2020) show that Facebook posts in Florida promote healthy behavior or public health compliance on their friends and relatives living in Northeast America. When one third of a state's socially peer states adopt stay-at-home policies, it creates a reduction in mobility equal to the state's own policy decisions, a spillover effect mediated by peer travel and distancing behaviors in those states. To the contrary, the loss from uncoordinated state policies is increasing in the number of non-cooperating states and the size of socially close spillovers.

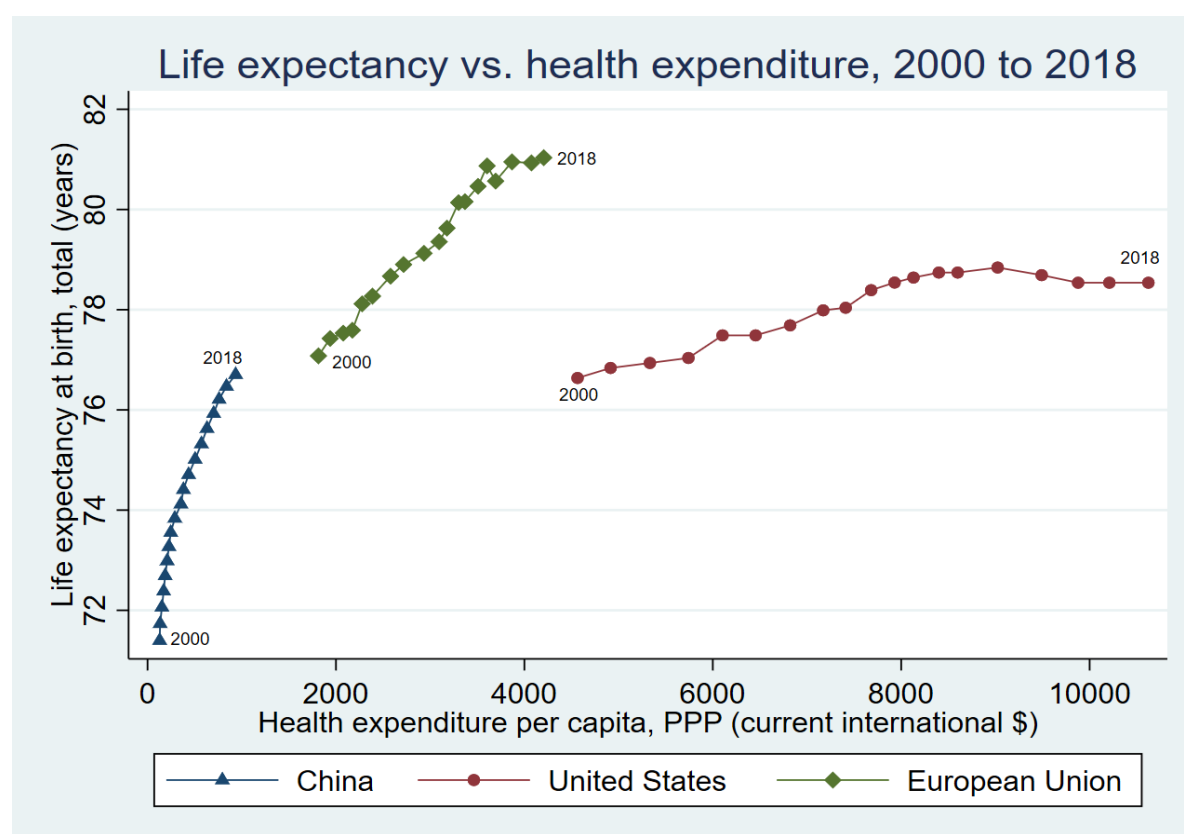
3. Social Policy in the Face of the *Syndemic*

3.1 Investing in health vs. health care

As the U.S. has been among the hardest hit countries in the COVID-19 pandemic, it is important to examine what makes the U.S. health performance today and what lessons China should learn in the coming health reforms. To achieve this objective, the European Union (EU) offers an intriguing comparison with the U.S. in the return derived from health spending, because of their similar development stage, culture and institutions. However, since the 1980s their health spending and returns have followed two different paths, with much smaller increase in life expectancy per dollar spent on health in the U.S. than in the EU (Figure 3). While health spending per capita in China still falls short of that for the U.S. or the EU back in 2000, the return to health spending in China is higher.

Lessons from the US-EU divergence in health spending – life expectancy trajectories may offer insights for China to improve its return to health spending as China expands its health spending towards the levels of the U.S. or EU. One important lesson for much lower return to health investment in the U.S. is the large mismatch in health spending. Specifically, only 35 percent of the resources have been spent on social, environmental and behavior factors that determine over 60 percent of health. Around 65 percent of health resources have been spent on healthcare, which only determines 20 percent of health (McGinnis et al. 2002). Across all U.S. states, the larger the mismatch, the worse the health outcomes, including higher obesity rates, mental illness rates, and cancer mortality rates (Bradley et al. 2016). In contrast, no such mismatch exists in the EU (Bradley and Taylor 2013).

Figure 3 Life expectancy and health expenditure, 2000-2018



Source: World Health Organization Global Health Expenditure database (apps.who.int/nha/database)

Notes: Current expenditures on health per capita expressed in international dollars at purchasing power parity (PPP time series based on ICP2011 PPP).

Therefore, spending on healthcare is not equivalent to spending on health. Policies on health spending that better match with the major determinants of population health may represent an essential change of the current paradigm of health investment. In comparison to spending directly on healthcare, spending that addresses non-healthcare determinants of

health, such as accessing adequate nutrition through food supplementation programs, building recreational spaces, supporting affordable housing, tightening pollution control and environmental reservation, curbing domestic violence, promoting education and employment opportunities have greater potential to improve population health. Many of these investments in social services have contributed to a convergence in health gaps by socioeconomic status (Aizer and Currie 2014).

A continued and much bolder investment in fighting environment degradation and climate change will generate among the highest returns in preparation for the next pandemic. The climate emergency and COVID-19, a zoonotic disease, are both borne of human activity. Both have led to the preventable loss of lives through actions that are delayed, insufficient, or mistaken (The Lancet 2020). In the last 20 years we have already seen several pandemics, starting with SARS and then MERS and now COVID-19. Climate change and environmental degradation might be the fundamental reason for more frequent pandemics. Curbing the drivers of climate change will help to suppress the emergence of zoonotic diseases that are made more likely by intensive farming, international trade of exotic animals, and increased human encroachment into wildlife habitats, which in turn increase the likelihood of contact between people and zoonotic disease. Therefore, changing the paradigm of health investment and realigning our responses present an opportunity to improve public health with lowered risk of major threats to humanity.

3.2 The role of social safety nets

Social welfare programs are essential to vulnerable populations, such as older adults, minority and socially disadvantaged communities, during public emergencies. Those who are in lower paid or less flexible jobs during this pandemic have been hit the hardest. Their jobs demand daily commuting to work even in the middle of a pandemic, which elevates their risk of virus infection. In the meantime, stringent social distancing measures have disproportionately affected vulnerable populations as their jobs or lives often require face-to-face communications.

In comparison to most of the developed nations with large-scale social welfare coverage, lack of nationwide policies, U.S. states vary greatly in access to social safety nets,

such as unemployment benefits, paid sick leave, and basic health insurance coverage, which bear grave consequences to various vulnerable populations.

Less than 40 percent of jobless workers receive unemployment benefits in 42 U.S. states (US Bureau of Labor Statistics 2020). Paid sick leave has only been mandated in 14 out of 50 U.S. states. Mandating employee access to paid sick leave reduces influenza-like-illness transmission as well as pneumonia and influenza mortality rates at the population level. More optimally designed social insurance systems generate positive externalities to society (Pichler et al. 2020).

Lack of health insurance coverage, especially for those vulnerable populations, is a major concern in the US healthcare system, especially during such an unprecedented pandemic. In America, around 8-10 percent of residents still have no health insurance. More than 10 states have not adopted Medicaid expansion to cover low-income or disabled people. Four in ten adults with employer-sponsored insurance report having high deductible health insurance plans (Hamel et al. 2019). It is critical to ensure comprehensive and affordable access to testing, including for the uninsured. Efforts to control coronavirus will be less effective if infected individuals fail to seek diagnosis or appropriate care, often due to large out-of-pocket costs or co-pays. In contrast, shortly after the initial Wuhan lockdown, China's health authorities issued a policy to cover all diagnosis and treatment costs regarding COVID-19, effectively contributing to the quick control of the pandemic in China.

4. Health Care Policy in Response to the *Syndemic*

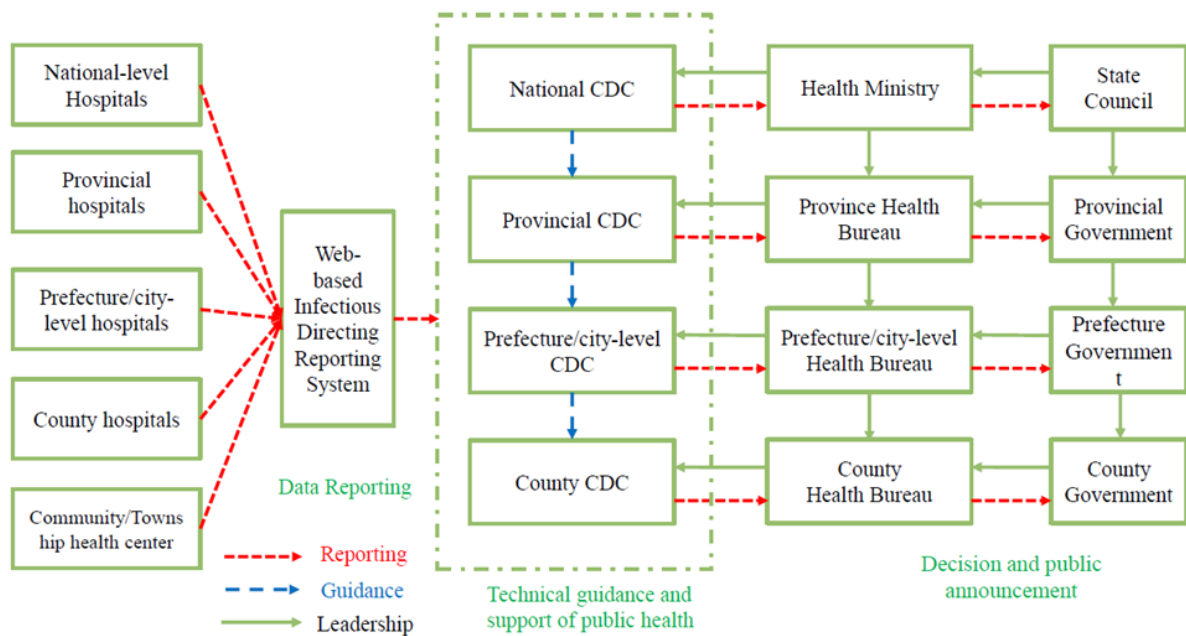
In addition to addressing biological properties of the *syndemic* through public health measures and social properties through social policy, this crisis calls for fundamental changes in health care policy to reform four major players in the healthcare sector, i.e. governments, patients, health providers, and health insurance. The unprecedented shock to the healthcare system may serve as a catalyst to shape future health care.

4.1 Streamlining health governance and leadership: the governments' perspective

The launch of the China CDC in 2002 was an effort to replicate the gold standard agency of the world then in charge of disease control and prevention - the U.S. CDC - via building state-of-the-art laboratories, data analytics, and surveillance networks, and training an elite workforce to control epidemics. During the COVID-19 pandemic, both the Chinese and

American CDC have been criticized. While the U.S. is still in an active debate over reforming CDC, as the pandemic is not under control yet, in China discussions are ongoing about how to make the CDC a better functioning surveillance agency, allowing scientists to have more independent voices.

Figure 4 Chinese Public Health Surveillance and Governance Networks



Source: authors' construction.

As visualized in Figure 4, there are four levels of China CDC, ranging from the national CDC to county CDC. Each report to the same level of health authority and is governed by the same level government. Therefore, under the leadership of the government, health authorities have the leverage in the role played by the CDC. In other words, all levels of CDC offer technical guidance and support of public health, while all levels of government and their health authorities make decisions and public announcements. By design, this makes the CDC less independent. Emergency reporting from a lower level CDC has to go through its government and health authorities to reach higher level government for critical decisions. Faced with an infectious disease outbreak, the conflicting objectives to safeguard short-term economic growth while minimizing public health risks often delay epidemic control efforts and decisions made by local governments. Future reforms will likely establish new mechanisms to allow more independent voices from scientists and public health staff in various levels of CDC to directly sound the alarm to higher level governments or through, for example, higher level CDC.

In addition to improved public health governance structure that facilitates timely reporting and functioning leadership among CDC, the government and its health authorities, China needs to significantly strengthen its web-based infectious disease direct reporting system. Built over the past years, this system aimed to directly link all levels of hospitals and community health centers with the CDC. Training of health practitioners in all levels of the health infrastructure to accurately report potential infectious disease risks will be essential but challenging.

Bureaucratic professionalism may also play an important role in response to a public crisis like the COVID-19 pandemic, as bureaucrats oversee policy formulation and enforcement to contain the spread of the virus that often follows an exponential growth trajectory and calls for swift responses. Their scientific knowledge may affect their perceptions of the underlying risks and corresponding responses. In China, only a very small proportion of cities/counties are led by government officials with public health or medical backgrounds (PHMBGs), partly because China's rapid opening up and economic reform during the past four decades have inevitably prioritized economic growth over public health.

During this pandemic, top officials with PHMBGs witnessed significantly lower infection rates and lower death rates, than cities whose top officials lacked such backgrounds. These patterns were at least partially driven by their more rapid lockdown or community closure decisions (Li et al. 2020). Closing down the traffic or the city's economic activities days or weeks earlier is critical to mitigate a large number of infections, especially in the densely populated Chinese cities. Public health background may have different effects in comparison to medical background, as the former deals more with population health while the latter emphasizes on treating individual patients. However, even when both are combined, only 4 percent of the cities have their top officials with such working experience or education. Reforms to improve health governance in the face of future epidemics may consider optimizing leadership team composition via recruiting more top officials with PHMBGs and training officials currently with no PHMBGs.

4.2 Improving disease burden and access to care: the patients' perspective

Population aging is accelerating globally, so are the burdens of chronic conditions. One of the key features of the COVID-19 pandemic is that older adults and people with chronic health conditions, especially hypertension, obesity, metabolic disease, and cardiovascular disease,

are more likely than younger, healthier people to experience serious illnesses and deaths (US CDC 2020). The rapid shift in disease burden and the aim for improved preparedness to future pandemics all call for fundamental reform in the care delivery system. Some European countries, such as the UK and Germany, have built a more functioning primary care system and attempted to move away from hospital centric systems. In this respect, Both China and the U.S. are lagging European countries.

Hospital centric systems have played a central role in treating acute diseases. However, as chronic conditions require adequate management to prevent or slow down progression, the health care system needs to meet this shifting disease profile. In a hospital centric system, light symptoms are often mixed with severe diseases in care seeking, illnesses are often found in a later stage, and more aggressive and expensive treatments are needed. For instance, among U.S. older adults with Medicare, 75 percent of the healthcare costs are concentrated on 15 percent of the beneficiaries who mostly have three or more chronic conditions. Per capita healthcare spending for patients in this sickest stage is on average 50 times the costs among those in a stable stage (Mitchell 2019). Treating diseases in later stages tends to be saliently more inefficient, costly, and does not meet the needs of the population, in comparison to an integrated care system where hospitals and strengthened primary care facilities can work together to streamline the process.

As the coronavirus pandemic surges globally, hospitals are faced with increasing pressure. Routine health care services are crowded out, such as delayed treatment for urgent non-COVID-19 conditions, chronic conditions. The psychological impact of COVID-19 may also worsen mental illnesses through social isolation and burnout.

Scaling up adequate health insurance coverage will benefit the vulnerable populations with underlying conditions, which may help eventually end this pandemic. In China, after the expansion of the Rural Cooperative Medical Scheme (NCMS) and then the Urban/Rural Basic Medical Insurance (URBMI), together with the earlier established Urban Employer-based Medical Insurance (UEBMI), almost all rural and urban populations received insurance coverage. While the benefits still need to increase, shortly after the coronavirus outbreak in China in January 2020, the Chinese government changed the insurance policy to cover all coronavirus diagnosis and treatment costs, substantially lowering the burden on patients and promoting timely testing and care during the epidemic.

The COVID-19 pandemic revealed a number of weaknesses and inadequacies of the U.S. health financial system. While the U.S. health insurance is notorious for its high premium, high deductible and out of pocket costs. Although the FFCRA requires COVID-19 testing for diagnosis to be covered fully by the US government, patients still have to pay out of pocket expenses for the treatment of infections. The average cost of hospitalizations for pneumonia with complications was \$20,292, with potential out of pocket deductible exceeding \$1,000 - \$1,300 and total out-of-pocket cost over \$2,000 (Gaffney 2020). The financial burden prohibits infected patients from seeking for treatments or getting diagnosis, which could further worsen the spread of the virus. Considering the financial burden is worse among disadvantaged populations, elderly, uninsured, unemployed and low-income populations, who are also at higher risk of infection and spreading the disease. Health care insurance reform is needed to enhance international competitiveness of the industry and the economy. In April, the CARES Act attempted to expand the coverage among uninsured, many still consider it incomplete (Gaffney 2020).

4.3 Enhancing care coordination and primary care: the providers' perspective

An overarching feature of the healthcare system is that much of the conventional medical resources are not quite mobile, especially during such a large-scale crisis. Uneven geographic distribution of ICUs, primary care facilities, testing sites, and rehabilitation facilities exacerbate the suffering of the COVID-19 pandemic in low-income regions and challenges to contain the infection (Tonna 2020).

Many countries, including China and the U.S., also have fragmented healthcare systems. While the primary care system should be at the frontline combating epidemics, including screening, triaging, treating, tracing, monitoring, educating and coordinating care across communities, the hospital centric system weakened the role played by primary care. Prior to the COVID-19 pandemic, primary care physicians were the lowest paid among peers. Few health care professionals chose to practice primary care, which lowered care quality, trust towards them, and rates of primary care visits in both countries (Wong et al. 2021). In the U.S., the lack of centralized public health surveillance and tracing, data coordination, resource and workforce allocation hindered primary care response (Lal et al. 2020). The stay-at-home order made the financial situation worse for primary care practices,

especially those in underserved areas, which had to close due to sharp decline in primary care visits.

Chinese primary care system was also inadequately prepared in the face of the pandemic. During the initial outbreaks, people bypassed primary care facilities and took the risk of infection to obtain diagnoses in major urban hospitals. However, the timely decision to lock down the only epicenter city Wuhan largely contained virus transmission to other cities and therefore enabled a large number of healthcare professionals to support the frontline team in Hubei in their implementation of mass screening, isolating, and treating infected patients. With the help of a large number of medical staff nationwide and donated medical supplies, Wuhan and Hubei province quickly set up screening clinics to test fever, monitor symptoms and triage care. In this way, major hospitals and newly built makeshift health facilities in Hubei province could prioritize the treatments for critically ill patients. In other areas with sporadic outbreaks, local primary care professionals played critical roles in screening, isolating, and treating those smaller number of infected patients (Li X 2020).

Regardless of the long-term call in China to transform from a hospital-centric system to a primary care system, the number of hospital beds per individual keeps increasing in the past decades; with more large hospitals built in urban areas, more resources are absorbed by the upper level hospitals that further weaken primary care facilities. Since service fees in the hospitals are tightly regulated by the Chinese authorities, leaving barely no room to increase service price, hospitals therefore have strong incentives to generate revenues by increasing patient volume as much as possible. Consequently, hospitals transcend patient volume by taking more patients, even those with mild symptoms (Yip et al. 2019). On the other hand, shortage of qualified physicians, poor care quality and patient experience, mismatched incentives, lack of continuity of care are the among reasons for patients losing trust in the primary care system. Patients tend to seek care in major urban hospitals even for mild diseases. To better prepare for the next pandemic, the primary care system has to be reformed with enhanced manpower, infrastructure and quality (Li et al. 2020).

The pandemic also put many long-term care facilities in crisis, especially in the U.S. Over 40 percent of total COVID-related deaths have been attributable to nursing homes and assisted living communities in which a much larger share of American older adults than Chinese older persons live. Even before the pandemic, American's nursing home system had been in the center of criticisms for many years, for its lack of resources, financing models,

quality issues and transparency. Residents in nursing homes are mostly elderly with multiple comorbidities, with a mix of long-term residents and short-term Medicare covered patients discharged from hospitals. Nursing homes' revenue largely rely on the short-term Medicare covered patients, who often travel between hospitals and nursing homes. The congregate living environment of nursing homes in which older persons share dining places or even bathrooms makes virus transmissions much easier. In addition, since nursing home staff are mostly under-paid, many nursing home workers are from low-income communities, where community spreading of the COVID-19 was the most severe, further increasing the spread of virus from nursing home workers. Fundamental reforms are needed for the nursing home system, with additional resources, alignment of financial structure, and regulations.

Hopefully, the unprecedented impact of COVID-19 on the healthcare system may incentivize the health sector to seek this crisis as an opportunity to reform. The total estimated Chinese healthcare costs associated with COVID-19 were \$0.62 billion (inpatient care accounting for 44.2%), though other social costs such as compulsory quarantine and productivity loss were as much as \$383.02 billion (Jin et al. 2020). The longer the pandemic lasts, the larger loss the healthcare sector will bear. The American Hospital Association (2020) estimated that the U.S. healthcare system experienced declines of 19.5 percent in inpatient volume and 34.5 percent in outpatient volume by May 2020, loss of at least \$323.1 billion and 1.4 million jobs in 2020, and receipt of over \$200 billion federal financial assistance.

4.4 Realigning incentives: the payers' perspective

This pandemic, in combination with the economic impact, is a wake-up call for reforms in disease management systems and payment structures. In the traditional fee-for-service systems, hospitals' revenue relies on service volume with low incentive to provide preventive care. Since the 1980s, Centers for Medicare and Medicaid Services (CMS) introduced a series of value-based payment (VBP) programs in the US market, which employs prospective payment structures by linking payments to providers with patients' health improvement or episode of care. Participating healthcare providers are rewarded through performance related bonus payments, and hence have the incentives to deliver care efficiently while maintaining their autonomy of treating patients. The most common types of VBP programs include Accountable Care Organizations (ACOs) and bundled payments.

Data from early programs have shown that the prospective payment system was able to improve quality of care, while saving the budget for CMS (Macmillan et al. 2020). However, the transformation of VBP takes time. Until today, Fee-for-Service (FFS) still dominates payment mechanisms. About 64 percent of Medicare services payment is via FFS, while less than 20 percent is paid through VBP. The CMS has set the goal to have all Medicare spending tied to VBC contracts by 2025 (Macmillan et al. 2020).

During this pandemic, FFS providers had the most severe financial loss due to sharp decline in service volume that triggered staff reductions and small independent medical practice closures. On the other hand, providers in the VBP arrangements showed stronger financial flexibility, stability and were better positioned to respond to the pandemic through more comprehensive deliverable models, including care coordinators, data infrastructure, telehealth, and home-based care capabilities. For instance, ACOs are able to maintain a stable revenue stream due to the prospective payment schedule or shared savings arrangements. Financial flexibility and greater capital reserve enable VBP-based organizations to build infrastructure to expand telehealth services, data platforms to track and monitor high risk patients, and provide dedicated staff and workflows to support care coordination and home-based care (Roiland et al. 2020). In general, organizations engaged in VBP reform often already have needed capabilities in place to respond to COVID-19.

Many strides have been made to promote universal health coverage in recent Chinese healthcare reform. One key area is medical payment. Starting from 2021, diagnosis-related groups (DRGs) payment will largely replace the traditional FFS as a payment mechanism for inpatient care. Under DRG, patients with similar clinical diagnosis and amount of resource use are in one diagnosis group. An average cost of necessary resources needed to treat patients in a particular DRG was calculated based on primary and secondary diagnosis, specific procedures needed, adjusted for comorbidities, age and gender. Since the payments to hospitals are predetermined, hospitals will have the incentives to treat patients more efficiently, and keep the savings as profit. DRG effectively prevents hospitals' incentives to over-treat patients, delaying hospital discharges and reducing wastes. Since most public hospitals in China generate revenue through volume of services, not charging higher prices, DRG may play some effective role in healthcare cost containment. Several experiments have been implemented in China with mixed results, while concerns have been raised regarding the impact on quality of care and equity (Xu et al. 2019).

During this public health emergency, specific components of DRG groups have to be designed carefully to meet the policy goal. In the U.S, the CARES Act increases COVID-19 inpatients DRG rate by 20 percent, a measure to shift hospital resources to COVID treatment and support hospital financial stability. While the pandemic may slow down the shifting to VBP in the short-term, in the long term the budget constraint brought by the pandemic and economic uncertainty will further promote the demand for value and efficiency, and accelerate the transition from volume-based care to value-based care in both countries.

5. Concluding remarks

The COVID-19 pandemic is stress-testing health systems of all countries. The global health community spares no time in learning about the exposed weakness of the health systems as well as learning from one another, given the large variations in key characteristics of the health systems worldwide and their performance during the pandemic. Taking early, targeted, and coordinated public health measures, reshaping the paradigm of health spending and building more equitable social safety nets through social policy, reforming and realigning incentives for major parties in the health care market are essential in addressing the *syndemic*. Some of these critical reforms have been in debate for years but with slow progress. This pandemic may offer substantial momentum to accelerate these long-awaited reforms to better prepare for future public health emergencies.

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