

Learning From COVID-19: A Systems Approach for Public Health Governance

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Abstract

The COVID-19 spread very quickly worldwide, which has resulted in a global pandemic. All countries in the world have taken measures for the purpose of preventing and controlling the epidemic. China for example, has control the spread effectively, while the United States, Brazil and India are still striving to cope with the increasing COVID-19 confirmed cases. The epidemic has impacted the whole world, also revealing quite a lot problems of urban health governance in different countries. This commentary reviews the pandemic response measures in selected countries such as China, Italy, America, Brazil and India. On the basis of critical reflection on the problems incurred in each country's pandemic response, we further provide a theoretical framework to reconceptualise public health as multiple types of economic goods. We couple this reconceptualisation with the systems approach to urban health and wellbeing to offer new thinking on the governance of public health. Finally, we propose suggestions for better, preventative and comprehensive epidemic prevention and public health governance.

1. Introduction

The COVID-19 pandemic has shaken many families and lives throughout the world. On 30 January, the WHO declared the Chinese outbreak of COVID-19 to be a Public Health Emergency of International Concern (PHEIC) posing a high risk to countries with vulnerable health systems.^[1] The COVID-19 subsequently has spread rapidly around the world and the number of cases continue to rise every day until now. By August 7, 2020, the number of total confirmed cases has closed to 20 million, and the number of total deaths also has reached half million across 212 countries.^[2, 3]

To control the spread of this novel COVID-19 virus, the Chinese government was the first to raise national public health response to the highest state of emergency^[4] and carried out extreme control strategies, such as the lockdown of Wuhan city and strict quarantine measures. For the different quarantine time points, it shows that the early quarantine strategy is significantly important for the disease controlling, which also means the time delayed quarantining will seriously increase the COVID-19 disease patients and prolongs the time of epidemic control.^[5]

Historically, quarantine, including the adherence to home infection control measures, wearing masks in the presence of other household members, not sharing utensils, and sleeping in separate quarters,^[6] is becoming an effective component of the public health response to emerging and reemerging infectious diseases.^[7] It was introduced as a means to control the transmission of severe acute respiratory syndrome (SARS) in 2003 in China^[8] and also was effectively used in the 2009 influenza A(H1N1) pandemic.^[9] During the Ebola outbreak in Western Africa in 2014, people who have been in contact with the patient are put in quarantine in their homes or in special facilities for 21 days.^[10]

Similar to other effective health measures, quarantine is not a panacea, and has its limits.^[11] From the perspective of urban health governance, the pandemic has evolved into a governance dilemma for all levels of governments worldwide, testing their emergency coping capacity in today's increasingly urban

society. It is worth asking: what can we learn from the lessons and experience coping with COVID-19, and what is needed for better public health governance? We aim to use this commentary to address the questions. First, we offer a comparative review of the pandemic response measures among selected countries, reflecting the problems incurred in each country's pandemic response. Second, we provide a theoretical framework of public health as multiple types of economic goods, coupled with the systems approach to urban health and wellbeing, to rethink on the governance of public health. Lastly, we propose suggestions for better, preventative and comprehensive epidemic prevention and public health governance.

2. Responses, Problems, And Experience In Different Hard-hit Countries

To get a more accurate picture of the global pandemic response, we chose five countries – China, Italy, the United States, India and Brazil, to represent the worst-hit countries in Asia, Europe, North America, and emerging developing economies respectively. Figure 1 shows a comparison of total confirmed COVID-19 deaths per million people among these countries, plus China and the world as additional references. Italy and the United States were particularly hard hit in this measurement. Even though all three countries have taken similar quarantine measures ranging from two to four or even more weeks, a typical pattern of COVID-19 development among these countries is the rapid increase in the number of new contractions as well as the number of deaths.

China was the first country where COVID-19 spread widely in the beginning of 2020. The COVID-19 epidemic, breaking out in Wuhan city, which is known as the "Chicago of China" for its role as a business hub throughout the nation's modern history with high population mobility, has spread very quickly with only 30 days expanding from Hubei to the rest of Mainland China.^[13] Since Professor Zhong Nanshan confirmed that 2019-nCoV is spreading between people on January 21,^[14] China has taken many measures including mandating a quarantine of the Wuhan city,^[15] case detection with immediate isolation, tracing with quarantining and medical observation of all contacts,^[16] transforming stadiums, as well as hotels and schools into hospitals or spaces for "centralized quarantine" for patients showing symptoms.^[17] By March 18, the government reported no new confirmed cases in Hubei Province^[18] and the epidemic has entered the stage of normalized prevention and control but still with recurrent risks. On June 13, an epidemic broke out in Beijing Xinfadi wholesale market with 36 confirmed COVID-19 cases reported. This time, the government responded swiftly with large-scale nucleic acid detection and epidemiological investigation, adhering to the principle of timely detection, rapid disposal, precise control and effective treatment to prevent and control the spread of the epidemic.

Italy was the first developed country in which COVID-19 reached a major outbreak outside of China. In Italy, the long gap between the first diagnoses confirmed on January 31 to the first death reported on February 21, unfortunately, gave the coronavirus the chance to transmit widely across the country. On March 8, the Italian Government implemented extraordinary measures to limit viral transmission—

including restricting movement in the region of Lombardy,^[19] then placed almost all of Italy in lockdown: closure of schools, university, and many business such as theaters, cinemas, pubs, and so on, blanket public transportation restrictions, quarantine zone in all country, sporting events, all religious ceremonies are suspended.^[20, 21] Italy experienced the month of March with very high fatality. The deadliest day from Coronavirus – March 27 saw 969 deaths. After a long tough struggle, since May, COVID-19 has been under relatively successful control in Italy. By June 2, Italy reopened its borders to tourists.

As of August 7, the top three countries all around the world in the number of confirmed COVID-19 cases are the United States, Brazil and India respectively. The United States is worst hit by the second wave of COVID contractions. The first case of COVID-19 was announced on January 20, 2020, in Washington State. New York state quickly became epicenter with the majority of cases and deaths reported in New York City.^[22] The United States suspended all entry of immigrants and non-immigrants having travelled to high-risk zones and set up U.S. quarantine stations, located at 18 major U.S. ports of entry, with the intention of halting further viral spread.^[23, 24] By April 11, The United States surpassed Italy for having the most confirmed coronavirus deaths in the world. As of August 7, The United States has exceeded 160,000 coronavirus deaths as more than 60,000 new cases are detected on this day alone across more than 12 states.

Brazil, where was the first Latin America COVID-19 case registered, implemented the social distancing measure such as remote working for vulnerable civil servants in at-risk groups.^[25] The patient, who had mild symptoms of the disease, was given the standardized care recommended by the epidemiological surveillance authorities and told to self-isolate at home while contacts were investigated among family members.^[25] Another emerging developing country, India, confirmed its first case in the country on January 30 and similar like in Italy, the first coronavirus death was only recorded much later, on March 12. With Italy as an alarming precedent reference, India was quick to close its international borders and enforce an immediate lockdown.^[26]

The COVID-19 pandemic has revealed many problems of public health governance. In the early stage of the pandemic, the Wuhan local government's transparency and capacity to cope with the pandemic were being widely questioned to which panic, psychological stress and hoarding of daily consumption products had increased as an instinctive response. At the same time, there are also deficiencies in the types, quantity, and availability of emergency medical supplies.^[27] The abrupt quarantine also particularly worsened the financial situations for large vulnerable, low-income groups who lack social security, such as urban migrant workers, refugees in war-torn zones, and small medium-sized enterprises. The annual GDP growth rate of China estimated to drop to about 5%^[28] while over 6.6 million Americans applied for unemployment benefits, bringing the total to over 10 million Americans by the end of March. Further, as the epidemic spread globally, the economy of all countries in the world has declined seriously,^[29] which has impacted each country's economy for the second time under the background of globalization.

Though Italy's health system is highly regarded and has 3.2 hospital beds per 1000 people (as compared with 2.8 in the United States), it has been impossible to meet the needs of so many critically ill patients simultaneously.^[30] In the most affected regions, the National Healthcare Service is close to collapse.^[31] India was quick to active but without adequate health system or human mobility preparedness.^[32] Owing to the lack of accurate data collection and tracking as well as test equipment, India faced an even more complicated challenge of controlling the pandemic. Nevertheless, in Brazil, contradictory messages from political leaders, delay in a uniform and controlled adoption of containment and mitigation measures, and poor preparation of the health system made the confirmed cases of COVID-19 increase extreme rapidly.^[33]

Quarantine measures in these five countries were similar but differentiated regarding time and population coverage. As a result, their COVID-19 pandemic control outcome was distinctive from one another. Nonetheless, all these five countries have been badly hit, also owing to high population mobility and economic volume. The COVID-19 pandemic has returned as a second wave as countries across the world reopened. The global urbanization trend brings people physically closer and more connected to each other than ever. The increasing urban density and speed of social and economic activities have exacerbated the spread of COVID-19 which is endangering particularly emerging, dense urban areas in regions with less developed medical prevention and control mechanisms as well as with a large ageing population. Besides, the increasing possibility of wild animal consumption as people's income rapid growing and the global warming and climate change under the background of urbanization make new infectious diseases, similar to COVID-19, occur more likely in the future. In general, the major population is still susceptible, which means it is still necessary for the authorities to be vigilant and constant alert to prevent the recurrence of the epidemic before the effective vaccine is developed. Thus, it is necessary to rethink the current urban health governance and make some suggestions for a better preventive system.

4. Theoretical Reframing Of Urban Health Resources For Better Governance

From the public governance perspective, the WHO defines health as a resource for everyday life and a necessary condition for socio-economic development and a fundamental human right. Governments are expected to intervene and maintain public health by providing medical infrastructure and services using public resources (such as tax budgets) as necessary supplementary means to health provision by the private sector. This is due to the defect of private-sector health provision. While it might be efficient in meeting some aspects of individual health needs, like the allocation of food, private-sector health provision creates nuisance effects, for example, inequalities in health access due to individuals having varied financial limits. Hence, health services cannot be simply or primarily treated as private good like they currently are in many developed states.

Urban health resources or services are determined by social, environmental and technological features which could be public, private, club goods or even common-pool resources (Table 1). For example, food

and common vaccines are ideally public goods as they are basic conditions for health. No one should be excluded from these basic conditions, nor should anyone's access to food and common vaccines be an obstacle for others to obtain the same. Products like toothbrushes and facial masks are necessarily exclusive and rivalry for health purpose, they, therefore, are private goods. Premium health maintenance and high-end wellbeing products are often club goods which allow non-rivalry and exclusive access depending on consumers' willingness to pay. Urban green spaces are known to have multiple health benefits, they are not exclusive to any individuals, but some users entering a green space could result in less available space or facilities for other potential users. Therefore, urban green spaces, for example, are often considered common-pool resources.

Table 1
typology of urban health resources

	Excludable	Non-excludable
Rivalry	Private goods e.g., toothbrushes, facial masks, retail and prescribed drugs	Common-pool goods e.g., urban green spaces, medicinal plants, health centers, public hospital beds and equipments
Non-rivalry	Club goods e.g., Premium health maintenance and high-end wellbeing products, tailored personal care, private parks, swim clubs,	Public goods e.g., free healthcare, health norms, common health culture, food and common vaccines, healthy urban living environment

Therefore, urban health governance requires dealing with the entire range of goods and services which a city provides. Urban health is an outcome of many interacting social, environmental and technological determinants in the city, such as transportation, housing, education, food and nutrition, the economy and income opportunities, green spaces and social cohesion. One single form of governance to address all types of urban health goods and services is insufficient for managing health; rather, it becomes malfunctioning when public health emergencies appear in the first instance. Accordingly, health governance needs to use the entire bandwidth of governance types: market or private sector, the government, and communities. A systems approach is a suitable approach for urban health governance, as it is about the management of the total urban system goods and services, which, by their interactions and functioning, constitute urban health.

Apart from applying different governance types to the appropriate type of good or service and at the right scale, a systems approach to urban health governance consists of (1) an improved understanding of the complex interactions and functioning of one or more determinants of urban health and possible causes for an infectious disease outbreak, (2) the active participation and collective action of stakeholders in the co-creation, management and knowledge of urban health. As such, the systems approach constitutes a multi-level collective learning cycle. With each cycle, the knowledge and management of certain urban health aspects can improve and contribute to advancing collective intelligence in society. Collective

intelligence is an emergent property of (1) an improved data metabolism, which turns data into information and knowledge, (2) it consists of the transformation of knowledge into action, and (3) involves all stakeholders in a continuous learning process with multiple feedbacks. A systems approach is the precondition for collective intelligence to emerge.

In line with that understanding of urban health and its governance, the level of public health depends not only on the services which governments provide, but also on individual members of society to co-create and maintain it. The individual members of society need to recognize that it is within their responsibility to learn and participate in public health management. The *Ottawa Charter for Health Promotion* recognizes the need to enable people to have greater control over their health and well-being.^[34] The *Healthy China 2030 Agenda* also emphasizes that people should be responsible for their health under the leading of governments.^[35]

5. Recommendations for better public health governance in an increasingly urban future

Back to the experience of the countries mentioned above coping with COVID-19, effective centralized coordination and rapid response to a public health emergency of a large population and economic scale need to be recognized and widely learnt among the international health management community. Besides, the rapid global spread of COVID-19 has shown that world governments, public health sectors and individual citizens by and large lack a precautionary mindset in public health management. A precautionary approach is better than the best emergency response, especially when human health is at stake.

Drawing these lessons learned and the above-presented systems approach framework, we thereby provide recommendations for better public health governance for national and local governments worldwide in an increasingly urban future. First, we recommend governments adopt a more polycentric urban health governance approach with better regulation, information and multiple stakeholder participation. Governments not only need to take on the responsibility to act upon COVID-19 with the notion of health as a public good but also need to accept their limitations. Governments need to cultivate a sense of shared responsibility and transparency between themselves, social enterprises and citizens, for building better social capital and maximizing the utility of existing private, club and common-pool health resources. Health promotion is not merely the responsibility of the health sector nor the vested interest of divided private enterprises. In this globalized world, the COVID-19 pandemic has quickly come to affect everyone. Individual citizens and enterprises, therefore, need to take on the responsibility to speak and act upon their best knowledge and potential for the health of their community. Governments need to facilitate public participation and private sector support in maintaining health with transparent and updated information. Confronting an outbreak like COVID-19 requires trust and collaboration. "No single organization can deliver the wide range of services and systems needed for a truly global mechanism that prepares for and responds to outbreaks and emergencies," writes Margaret Chan, former director-general of the WHO, as she reflects on experiences from coping with Ebola.^[36] Diversity in institutions and types of governance for health increases the effectiveness of preventive measures and

societal resilience against a virus outbreak. Collective intelligence and societal resilience would reduce the high social and economic costs of drastic administrative decisions like the quarantine taken during an emergency.

Second, we recommend the public health system to move from responding to emergencies to long-term preparation with a precautionary mindset. This is due to the multiple attributes of urban health resources (Fig. 2). For example, common-pool resources such as public hospital bed facilities and medical equipment require good public funding planning and long-term investment to set in place. In addition, due to the unpredictability and increased likelihood of future pandemics, it is necessary to prepare emergency medical supplies and medical professionals for the long term. A pandemic monitoring and early warning system based on health information contributed from bottom-up without constraints would be critical to improving the preparedness of the public health system. Additionally, according to recent studies, the aerosol transmission route, the source origin as well as the seasonality of 2019 novel coronavirus are all poorly understood.^[37-42] Besides, Feng He stated that it is still too early to develop an accurate R_0 estimate or to assess the dynamics of transmission.^[43]

A better scientific understanding of the emergence and transmission of the virus in the context of demographic, climate and environmental change is needed in the future, which can help governments make long-term preparation of public health system.

As we look to the future, pandemics are likely to become more frequent globally, unless we adopt a systems approach to urban health governance. In a globally interconnected world, health concerns us all and getting its governance right is urgently needed. As the rising numbers of confirmed cases of COVID-19 are showing, the world remains dangerously unprepared for a global pandemic. It is inappropriate to meet urban and public health challenges by relying on the government or private sector alone. As social justice and equity are core foundations for health, it is critical to involve the people to engage in long-term health prevention and maintenance. In addition to emergency response, public health governance needs to reform by adopting a more systemic approach that is long-term, multi-stakeholder, multi-sectoral, organized around community health services, particularly in the context of global climate change, rapid urbanization, demographic and epidemiological changes.

6. Conclusion

The COVID-19 pandemic has brought impact to all countries in the world, which reveals a set of problems of the public health governance system. It is necessary to rethink what we can learn from this pandemic and activate to improve urban health governance for the purpose of responding to emergency public health events more quickly and effectively. This requires not only effort of governments but also supply from the public all around the world. A more comprehensive public health governance system as well as a public with higher awareness of self-protection can largely reduce impact or even occurrence of emergency public health events in the future.

Abbreviations

COVID-19

Coronavirus disease 2019

SARS

Severe Acute Respiratory Syndrome

WHO

World Health Organization

GDP

Gross Domestic Product

Declarations

Ethics approval and consent to participate: No approval is needed for this study.

Consent for publication: Not applicable

Availability of data and material: Data sharing not applicable to this article as no data-sets were generated or analyzed during the current study.

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Figures

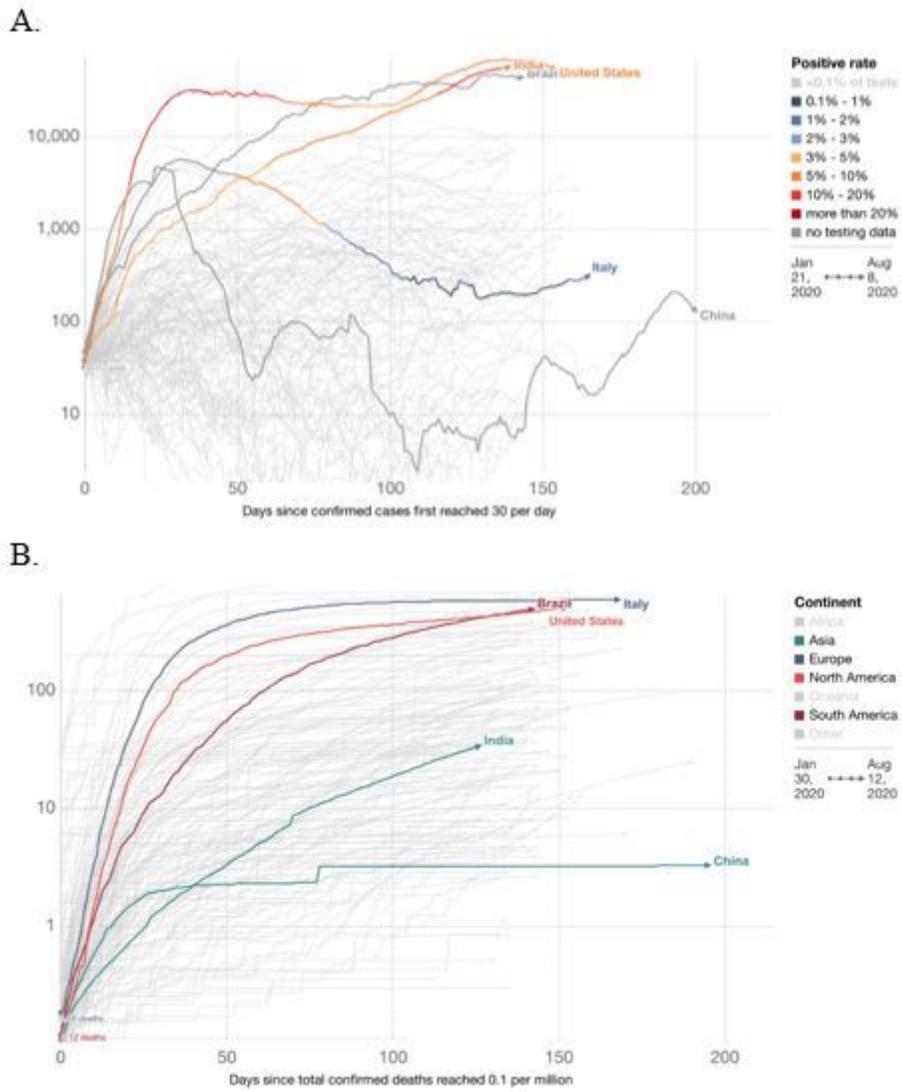


Figure 1

Daily confirmed COVID-19 deaths (A) V.S. Total confirmed COVID-19 deaths per million people (B).

Source: Our World in Data/Roser, updated July 1, 2020[12]