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Health Systems in COVID-19

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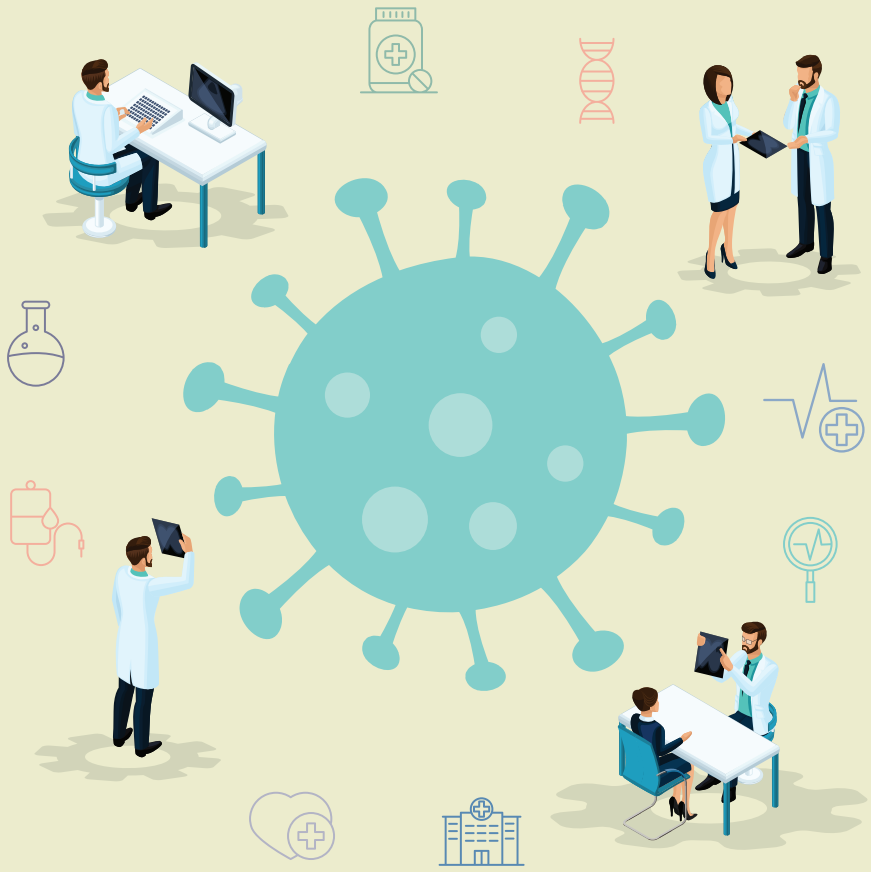

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Policy Brief

Health Systems and COVID-19: A Call for Integrated Systems Approaches to Health from the Malaysian Experience

OCTOBER 2021

Key Message

COVID-19 reminded us that the health system is embedded in and part of a larger social-environmental system. Health outcomes are both dependent on the wider system and are also key enablers of the socio-economic structures we have developed.

How COVID-19 demonstrates the need for deeper integration in health

Systems Thinking Analyses for Health Policy and Systems Development: A Malaysian Case Study was written before the outbreak of the COVID-19 pandemic. In that publication, systems thinking analysis of the development of Malaysia's health system over the past 60 years showed how health systems—and health outcomes—are deeply intertwined with their social, political, and economic contexts. Therefore, achieving health requires cooperation and coordination beyond institutional boundaries and organisational silos.

In the COVID-19 pandemic, mask mandates, movement restrictions, and unprecedented levels of cash aid to households are just a few examples of how the crisis response has required a whole-of-society response well beyond the bounds of the traditional health system. This has forced us to consider trade-offs between health outcomes, personal liberties, and economic engines. By bringing these trade-offs—hidden by acceptance of the status quo under "normal" circumstances—into the spotlight, the pandemic has caused policymakers and the public to rethink health systems and the values that underpin them. Health practitioners and experts need to learn and communicate the right lessons to strengthen health systems.

This issue brief draws on *Systems Thinking Analyses for Health Policy and Systems Development: A Malaysian Case Study,* applying a systems-thinking lens to the COVID-19 pandemic and the health system in Malaysia. As the crisis is still unfolding, a detailed evaluation of the response is premature. Rather, the brief examines feedbacks, structures, and interfaces in which the pandemic and the response took place to draw systems' lessons for health systems. Though the examples are drawn from Malaysia, they are not unique, with similar challenges—especially in multisectoral coordination—observed in countries worldwide.[1]

[1] The Independent Panel for Pandemic Preparedness & Response. 2021. *How an Outbreak Became a Pandemic: The Defining Moments of the COVID-19 Pandemic*. The Independent Panel for Pandemic Preparedness & Response.

Introduction to Systems and Feedback in COVID-19

The COVID-19 pandemic is a systems problem characterised by complex behaviours created through causal feedback loops. At the most basic level, it is a communicable disease described by epidemiological models (Box 1: Feedback loops in COVID-19 epidemiology). However, the feedback loops are far more complex: the disease has created social-economic impacts, which in turn shape individual and collective behaviours in ways that have restricted or enabled the spread of the disease.

Various epidemiological models created at the onset of the pandemic tried to capture such social feedback effects, using a variety of assumptions. Would the public adopt masks and social distancing behaviours, and how effective would these be? Would compliance fade as pandemic fatigue set in? Would governments institute lockdowns in response to surging cases, and would the costs of lockdowns make them less likely to reuse them? How long would it take to develop, produce, and distribute a vaccine? How effective would it be, in what order would individuals and countries have access, and would vaccine hesitancy delay uptake? Would mutations make the disease more or less contagious and deadly? These and other questions complicated the struggle to predict the shape of the coming global pandemic and our responses to it.

Faced with this extent of complexity, variables, and unknowns, what can systems thinking and systems models offer? The quantitative epidemiological models developed by various health experts were not meant to be highly accurate forecasts of the future. Rather, models are tools that allow users to explore different futures and the drivers that might shape them. They help inform learning and decision-making in the face of uncertainty.

In *Systems Thinking Analyses for Health Policy and Systems Development: A Malaysian Case Study* and in this brief, qualitative systems models are used to explore complex relationships of cause-and-effect to identify key connections and interfaces. Although we cannot always predict when and how a shock to a system will take place, a good understanding of the system can help us anticipate how the system will respond. The flows of information, how learning takes place (or does not!), and the interfaces between different components of a system will shape this behaviour. With this knowledge, we can identify critical leverage points and strengths and weaknesses of the system to make it more effective and strengthen resilience in times of crisis.

Health Systems in COVID-19

Feedback loops in COVID-19 epidemiology

When the COVID-19 pandemic broke out, we turned to epidemiological models to understand the spread of the disease. At the most basic level, these models were variations on the Susceptible-Infected-Recovered (SIR) model (Figure 1), which describes the rate of infection as some function of the number of susceptible people and the number of infected people.

Figure 1: The Susceptible-Infected-Recovered Model

Unless the number of susceptible people is small—either due to vaccination or because a large fraction of the population has been infected and gained some level of immunity—the rate of new infections is determined primarily by the number of infected people. This creates a reinforcing feedback loop where the level of COVID-19 infections increases the risk of new COVID-19 infections, creating an exponential growth of the disease (Figure 2, R1 loop).

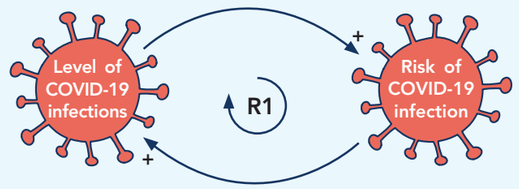

Figure 2: The reinforcing feedback loop of COVID-19 spread

The goal of these epidemiological models was not merely to predict the rate of spread but also to determine the level of protective measures necessary to contain it until a vaccination or treatment intervention could be implemented. These measures ranged from individual behaviours in adopting masks and social distancing to collective measures such as closing places of work and implementing movement restrictions. Such measures create social and economic costs and are only adopted to the extent that individuals and society consider the cost commensurate to the threat, creating a balancing feedback loop that limits their use (Figure 3, B1 loop). Thus, the COVID-19 health response must be understood in terms of the larger socio-environmental feedback system.

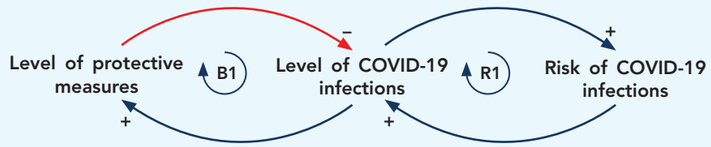

Figure 3: The reinforcing feedback loop of COVID-19 spread

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Health Systems in Society Model

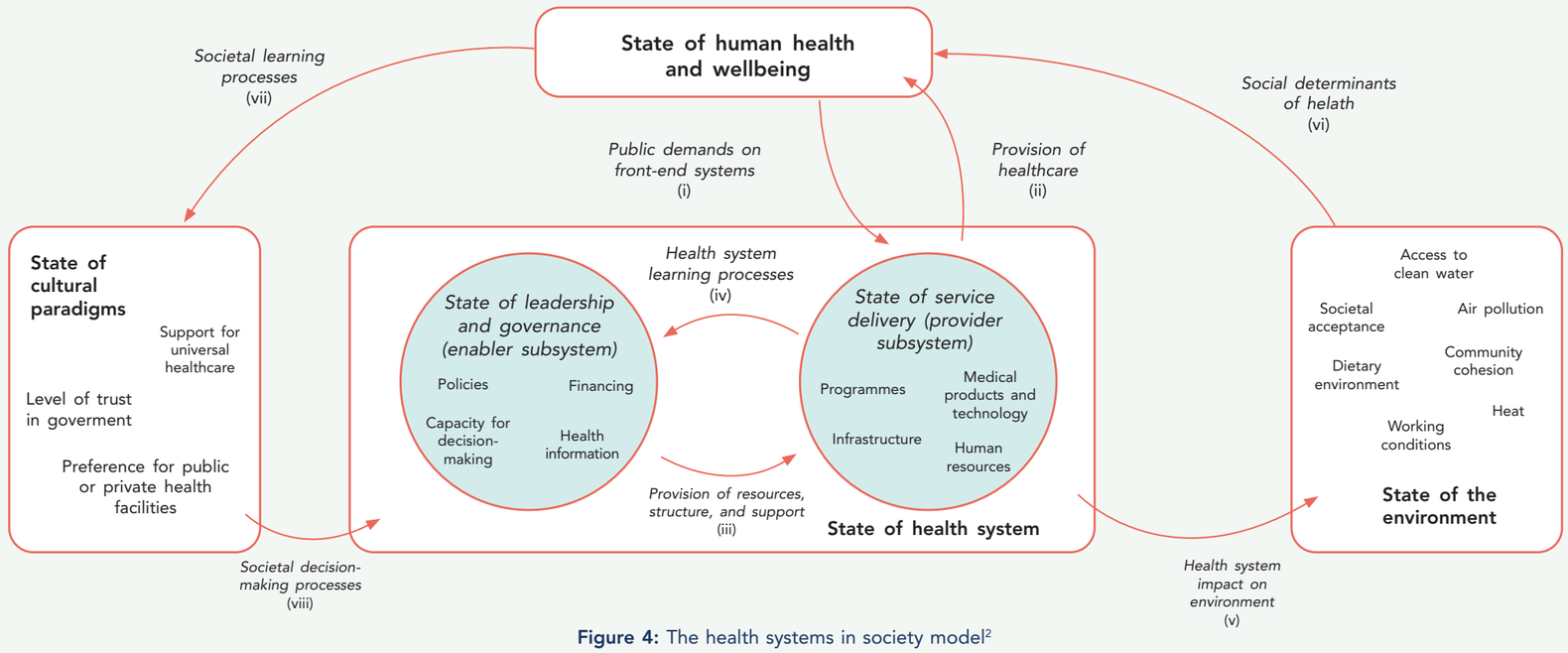

Figure 4: The health systems in society model[2]

To better conceptualise the feedback dynamics that drive the behaviour of health systems, the WHO health system building blocks[3] were reorganised into Dyball and Newell's cultural adaptation template (Figure 4).[4] Five types of feedback loops were characterised. Type I feedback loops are formed through 'natural' interlinkages within an enabler or provider subsystem. Public demands on the health system drive type II feedback loops due to health and wellbeing (i) and the response of these systems to meet demands (ii). Type III feedback loops are learning loops within a health system stemming from support from the enabler subsystem (iii) and demands from provider subsystem (iv). Type IV feedback loops include the pathways that affect the state of the environment and social determinants of health (v and vi). Type V feedback loops are societal-level learning loops shaped by health and wellbeing (vii) that form attitudes, norms, and policies toward health systems (viii).

Examples of COVID-19 Feedback Loops at Different Levels of the Health System

The "health systems in society" model is a useful tool for mapping the different levels of health system feedback loops that shape health systems. An example of each in the COVID-19 pandemic in Malaysia is presented to illustrate how the model can facilitate learning.

Type I Example:

During the early weeks and months of the COIVD-19 outbreak, there were sudden bottlenecks in the supply-chains of personal protective equipment (PPE), as regular production systems and stockpiles could not cope with the surge in demand. Some medical front-liners were forced to stretch out their use or even improvise PPE, affecting capacity and morale.

Takeaway: Safety margins that seem robust under "normal" operating conditions may be inadequate in the face of anticipatable but rare crises. The use of scenario planning and foresight are necessary to ensure resilience.

Type II Example:

Drawing on evidence from the experiences of other countries, the Malaysian health authorities realised that COVID-19 is too contagious for the treatment of symptomatic patients alone to contain its spread. Therefore, a new health service—large-scale contact tracing for COVID-19—had to be developed and implemented to identify and test potential patients.

Takeaway: Under "normal" circumstances, health services have largely operated reactively, responding to patients seeking treatment. However, proactive approaches to containment and treatment may be beneficial in various cases, such as non-communicable diseases (NCDs) and communicable diseases of concern. Health systems should identify where proactive measures can improve efficacy and reduce the overall cost of health services.

Type III Example:

Before the COVID-19 pandemic, Malaysia faced a bottleneck in absorbing new medical officers

[2] United Nations University International Institute for Global Health (2021). *Systems Thinking Analyses for Health Policy and Systems Development: A Malaysian Case Study.* Cambridge: Cambridge University Press.

[3] World Health Organisation (2010). *Monitoring the Building Blocks of Health Systems: A Handbook of Indicators and Their Measurement Strategies.* Geneva: WHO.

[4] Dyball, R., and Newell, B., eds. (2015). *Understanding Human Ecology: A Systems Approach to Sustainability.* New York: Routledge.

into the public health workforce due to a surge of medical graduates. This resulted from a disconnect between policies set by different ministries in the previous decade for medical students' training and human resources in health.[5] A new short-term contract modality provided a temporary solution. However, the COVID-19 pandemic created new pressures. Contract doctors felt they were asked to make sacrifices while receiving lower pay and benefits, experiencing job insecurity, and lack of access to specialist training. Meanwhile, the pandemic squeezed the fiscal space available to the government to create permanent positions. Contract doctors have resorted to "Code Black" protests due to the prolonged absence of a satisfactory solution.

Takeaway: Institutional silos can create long delays in corrective feedback loops, creating system inertia that takes a long time to correct. These legacy problems can pose points of vulnerability when new crises emerge.

Type IV Example:

The COVID-19 outbreak in Malaysia was initially contained after an initial round of movement restrictions, MCO 1.0, between 18 March and 3 May 2020. However, as in many other countries, outbreaks would recur in places with crowded conditions where social distancing is impractical, such as prisons, detention centres, and migrant worker housing. Such locations acted as reservoirs for the disease, which would inevitably spill over to the surrounding community.

Takeaway: Social and economic systems external to health systems can play critical roles in determining health outcomes. Likewise, a well-functioning health system is necessary to support the socio-economic structures on which we depend.

Type V Example:

As the COVID-19 pandemic stretched on and the socio-economic costs of managing it escalated. Difficult policy trade-offs had to be made, sometimes resulting in conflicting messages and approaches from different government ministries. Two of note were the level of strictness or latitude in allowing workplaces to operate; and security versus humanitarian priorities in the testing and vaccination of undocumented migrants. The COVID-19 pandemic is likely to shape societal attitudes and values toward health systems and the costs and trade-offs involved in health policy in ways that are yet to be fully realised.

Takeaway: Health leadership needs to develop the capacity to engage other sectors for coordinated policy. It also needs to develop and disseminate accurate and accessible narratives about health to the general public to ensure informed societal-level learning that will inform health system policy.

Integrating health systems

The examples explored using the "health systems in society" model point toward the need to design interfaces within health systems and between health systems and other sectors of government and society to ensure adaptive rather than maladaptive feedback. Here, we explore three gaps in interfaces exposed during the COVID-19 pandemic and need to be strengthened.

[5] For the pre-COVID case study, see United Nations University International Institute for Global Health (2021). "System Analysis Case Study 8.1: Unexpected Influx of New Medical Graduates Threatens to Overwhelm the Health System," *Systems Thinking Analyses for Health Policy and Systems Development: A Malaysian Case Study.* Cambridge: Cambridge University Press.

Health Systems in COVID-19

Integrating Health Systems: Bridging the Dichotomies within the Health System

The public healthcare system deals with the major brunt of the COVID-19 pandemic. However, considerable health system capabilities and capacity reside in the private healthcare system (hospitals, general practitioners, and laboratories) and, to a lesser extent, in the universities and the Ministry of Defence. Although patients move between these systems, the systems are often competing for expertise, materials, and financial resources. Furthermore, these systems plan, operate and are regulated without consideration of their impacts on each other. Thus, bridging mechanisms across the interfaces are fragile.

The scale of the pandemic and the speed of the COVID-19 virus demanded the rapid mobilisation of resources from all the subsectors. The pandemic highlighted entry points for the bridging mechanisms to strengthen responses.

The following examples illustrate further potential entry points:

- There were initial difficulties in mobilising private hospital resources. In the face of rapid escalation of COVID-19 cases, the government declared a national emergency. The MOH cited the national emergency as useful for compelling cooperation from the private sector and mobilising resources across the public-private interface. Critics insist that existing legal and administrative measures would have been sufficient. Subsequently, private hospitals demonstrated cooperation in several ways without compulsion, such as accepting non-COVID cases from public hospitals. There is an opportunity to review the political and civil consequences of using the national emergency mechanism.
- Half the Malaysian population uses clinics in the private sector for acute illness, and GPs provide most of the care for the undocumented, high-risk population. The recruitment of GPs into the vaccine rollout and into managing milder categories of COVID-19 patients, though delayed, was important in the effort to accelerate coverage.
- Universities have demonstrated a willingness to contribute their expertise in analysis for refining and expediting course corrections in the response. The system would benefit from a mutually agreed mechanism for the MOH to provide disaggregated data with governance mechanisms that protect privacy.
- Several university laboratories have the capacity for genome sequencing. The use of this expertise would require prioritising this technology and allocating resources to fund the analyses.

Trust needs to be strengthened between the sectors to avoid politicisation of health decisions and the flow-on effects on the erosion of public trust and compliance, with adverse effects beyond the health system.

The strong systemic interactions between the different branches of the health system[6] need to be recognised and harnessed in ways that strengthen rather than weaken the health system as a whole. Bridging mechanisms across the interfaces must be nurtured and strengthened in the COVID-19 pandemic and under "normal" conditions to achieve better flow and allocation of expertise and resources and build and sustain institutional trust.

[6] United Nations University International Institute for Global Health (2021). "Integrated policies for health service delivery in the public and private sectors." United Nations University International Institute for Global Health.

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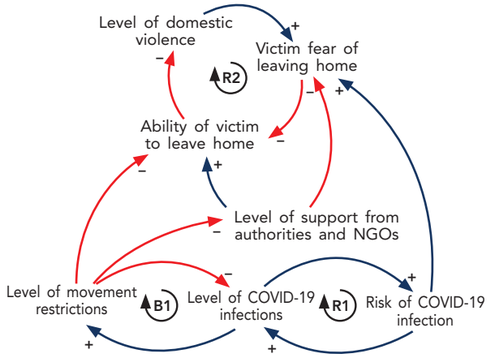

Figure 5: COVID-19 and domestic violence

Domestic Violence

Domestic violence is an insidious problem that traps its victims—disproportionately women—and keeps them from leaving home and seeking help. Fear of abusers keeps victims from leaving home but staying home traps victims in a cycle of abuse (Figure 5, R2 loop). Help from police and women's aid organisations are important in enabling victims to leave. During the COVID-19 pandemic, movement restrictions kept victims at home while also diverting human resources from police authorities and restricting the ability of non-government organisations (NGOs) to operate, resulting in increased reports of domestic violence in Malaysia and around the world.[10]

Integrating Health Systems: A Whole-System Approach toward Health

The COVID-19 pandemic and the measures taken to contain it had a wide range of socio-economic impacts, including access to work, education, healthcare, and increased domestic tensions, psychological distress, and use of tobacco and alcohol products.[7] Four examples, developed through interviews and curation of local news reports,[8] illustrate how pre-existing systemic challenges to the health and safety of vulnerable persons intersected with the COVID-19 crisis in Malaysia. These examples connect the epidemiology of the pandemic and protective measures (Figure X3)—particularly movement restrictions—with other systems that shape health and wellbeing.

Whether amid a pandemic or under "normal" conditions, such challenges require coordination between health systems and other parts of government and civil society to address. There are past examples of successful interfaces in the Malaysian health system, particularly in rural water supply and sanitation.[9] At present, stronger interfaces need to be developed with social welfare, urban planning, and economic policy, among others.

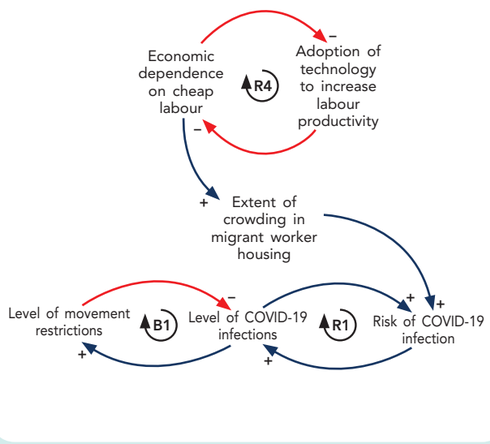

Figure 7: COVID-19 and migrant housing

Migrant Housing

Malaysia has a long-standing dependence on cheap migrant labour. While the adoption of technology and automation has long been advocated to increase productivity, economic dependence on cheap labour has been an obstacle to implementation, creating a chicken-and-egg problem (Figure 7, R4 loop).[11] Employer-provided cramped dormitories or even makeshift shelters have been a means of keeping labour costs low. Such living conditions enable transmission of communicable diseases—from tuberculosis to COVID-19.

Homelessness

Homelessness creates obstacles to accessing regular work, food, shelter, and other necessities essential for coping with homelessness and developing the capacity to exit homelessness (Figure 6, R3 loop). Homeless persons develop local knowledge and networks—typically in city centres—that help them access these necessities. The COVID-19 pandemic disrupted support provided by NGOs. Homeless persons have also been perceived as a COVID-19 risk, and many were removed from city centres and placed in various quarantine centres and shelters. While aid and job training were provided, this also disrupted their access to support structures and networks.

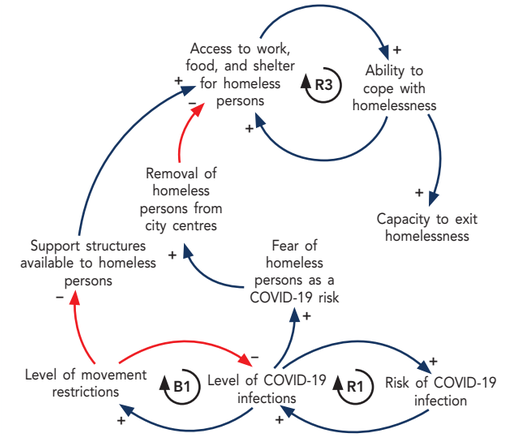

Figure 6: COVID-19 and homelessness

Undocumented Migrants

At the start of the COIVD-19 pandemic, Malaysian health officials highlighted the importance of providing COVID-19 testing to migrants without cost or risk of deportation. If migrants avoided COVID-19 testing, they could become an undetected reservoir for COVID-19, increasing the risk to the general public. Subsequently, however, undocumented migrant workers have been rounded up, causing migrant workers to be wary of governing authorities, including healthcare providers (Figure 8, R5 loop). Concurrently, movement restrictions and economic impacts have caused many documented migrant workers to become unemployed or face difficulty and delays in renewing working documents. Some have chosen to violate working visa conditions to maintain incomes, contributing to the pool of undocumented migrant workers who may choose to avoid the healthcare system (Figure 8, R6 loop).

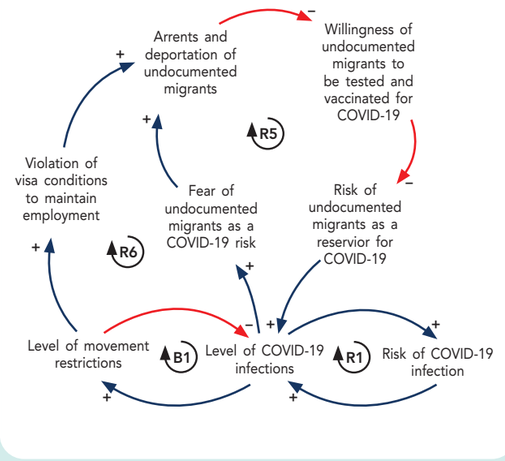

Figure 8: COVID-19 and undocumented migrants

[7] United Nations Development Programme. *Rapid Household Income Survey (RAHIS) Findings Report.* (Not yet published).

[8] United Nations Development Programme. *Cari Makan: General Observations on Building Forward Better from COVID-19.* October 2021. UNDP.

[9] United Nations University International Institute for Global Health (2021). "System Analysis Case Study 7.1: Rural Water Supply and Sanitation," *Systems Thinking Analyses for Health Policy and Systems Development: A Malaysian Case Study.* Cambridge: Cambridge University Press.

[10] UNDP brief on Gender-based violence and COVID-19. May 11, 2020. UNDP.

[11] Low-Skilled Foreign Workers' Distortions to the Economy. March 2018. Bank Negara Malaysia.

Integrating Health Systems: Global Systems for Health and Sustainable Development

Human health is a derivative of multiple circumstances and variables. Not all are subject to accurate measurement. The globalisation of public health in an inter-dependent world raises cognitive challenges for health systems to address the interlinkages of emerging and re-emerging infectious diseases, chronic non-communicable diseases and risk factors, and health impacts of large-scale natural disasters largely driven by climate change. Globalisation has altered the erstwhile distinction between national and global health. Microbes do not carry national passports, neither do they recognise the geo-political boundaries of countries. As COVID-19 has demonstrated, the world has become a single germ pool in which there are no health sanctuaries.

One important lesson from the COVID-19 pandemic is that COVID is not simply a health crisis. It is a developmental crisis that has reversed the gains made towards achieving the SDGs, particularly in Low- and Middle-income Countries (LMICs), exposing the fault lines of the fragile SDG architecture of countries. COVID-19, among others, raises localised and global challenges that underscore the inexorable linkages of national and global health systems. Health disparities have continued to increase within and across countries, with COVID-19 disproportionately impacting poor and vulnerable groups in most countries.

The globalisation of public health calls for a "collective action to improve key aspects of global health that can be realised only by addressing the global systemic and structural health inequities that impose significant social, economic, and inter-generational costs."[12] A case in point is the acute shortage of COVID vaccines in LMICs which has been characterised as "vaccine apartheid."[13] As Tedros Adhanom Ghebreyesus, the Director-General of the World Health Organization observed, "despite the growing number of vaccine options, current manufacturing capacity meets only a fraction of global need. Vaccines are the best chance of bringing this pandemic under control—unless leaders succumb to vaccine nationalism."[14]

Most LMICs, including Malaysia, launched rapid vaccine rollout programmes in the first half of 2021.[15] Of the estimated 3.5 billion COVID-19 vaccine doses administered globally thus far, most LMICs still face serious vaccine shortages, with several estimates suggesting that many countries may not achieve substantial vaccination levels until 2023. A significant component of the national immunisation programmes in LMICs is anchored on vaccines donated through the COVID-19 Vaccine Allocation Plan—also known as the COVAX Facility—a partnership between WHO, the Coalition for Epidemic Preparedness Innovations (CEPI), Gavi, and UNICEF. However,

[12] Y. Thomas, et al, *Reaffirming the Significance of Global Public Goods for Health: Global Solidarity in Response to COVID-19 and Future Shocks,* T20 Policy Brief, 2020.

[13] Tedros Adhanom Ghebreyesus, World has entered "vaccine apartheid", https://www.reuters.com/business/healthcare-pharmaceuticals/world-has-entered-stage-vaccine-apartheid-who-head-2021-05-17/

[14] Tedros Adhanom Ghebreyesus, "Vaccine Nationalism Harms Everyone and Protects No One", Foreign Policy, 2 February 2021; https://foreignpolicy.com/2021/02/02/vaccine-nationalism-harms-everyone-and-protects-no-one/

[15] BMJ, Covid-19: "Malaysia hit by record cases despite prolonged lockdown", *BMJ* 2021; 374:n2155

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the remaining vaccine disparity shows that far more needs to be done to develop integrated systems that ensure equitable vaccine access worldwide.[16]

Beyond COVID-19, trade in goods and services and corporate investment regimes create unintended opportunities for the globalisation of unhealthy lifestyles and marketing of harmful products such as tobacco and unsafe food, which lay the foundations for high blood pressure, increased blood glucose, obesity and consequently, diabetes, cardiovascular disease, and other chronic illnesses. Meanwhile, the mortality and morbidity burdens of natural disasters worldwide are unprecedented in all millennia of recorded history. To address these multifaceted health challenges, there is an urgent need to innovatively adapt the governance architecture of global health by placing health firmly at the centre of sustainable development.

According to WHO, a resilient and integrated health systems governance framework built on the interactions of three main categories of stakeholders (governments, health service providers, and citizens) is essential for strengthening the capacity of governments to develop and implement strategies towards achieving Universal Health Coverage by 2030.[17] In Malaysia and elsewhere, this resilient and integrated health systems framework is an important building block towards recognising the right of everyone to the highest attainable standard of health in the context of emerging and re-emerging infectious disease pandemics, chronic non-communicable illnesses, and health impacts of natural disasters, ensuring that no one is being left behind in fulfilment of the SDGs.

[16] UNDP & Malaysian Institute for Economic Research (MIER), *Inequality in Access to Essential Health and Medicine [COVID-19 Vaccines],* Final Report, 22 July 2021.

[17] WHO, "Health Systems Governance", https://www.who.int/health-topics/health-systems-governance#tab=tab_1

Conclusions

The complexity of the world means that our capacity to make specific predictions is limited. When the next crisis will happen, and the specific form it will take is uncertain. However, the types of challenges that can arise, the likelihood and risk of these challenges, and the likely responses of our health, governance, and economic systems are scenarios that we can anticipate and for which we can plan. Here, a systems thinking lens can help decision-makers better understand how these systems are likely to respond to stresses and shocks and the potential of the interactions between these systems to generate stresses and shocks of their own.

Efficiency in health systems, other public services, and private sector enterprise is valuable. However, the pursuit of efficiency can lead to siloed decision-making that ignores externalities and undermines resilience. The "health systems in society model" draws attention to the impacts of decisions across different organisational scales and the interfaces that need to be considered by visually illustrating feedback loops at different levels. This is particularly useful in the context of COVID-19, where social, economic, education, and health systems are simultaneously influencing and being influenced by each other.

This brief highlights how the pandemic response in Malaysia has been shaped by the pre-existing interfaces or lack thereof between different branches of the health system; how the pandemic influenced individual behaviour and system-level action on domestic violence, homelessness, migrant housing, and undocumented migrants; and how the global systems of development and health are deeply intertwined. These examples illustrate the logical cause-and-effect relationships between variables at work that seem obvious in hindsight but are often missed because we fail to consider the interactions between different systems components.

The COVID-19 pandemic exemplified the inherent interconnectedness of the health system with the social, political, and economic context, both in Malaysia and around the world. The scale of the crisis has demanded a whole-of-society response and revealed the strengths and weaknesses of existing interfaces for coordinating such action. Improving our understanding of systems is a prerequisite for effectively strengthening these interfaces and creating more resilient health systems and societies.

Tan, D., Pathmanathan, I. & Aginam, O. (2021). Health Systems and COVID-19: A Call for Integrated Systems Approaches to Health from the Malaysian Experience. United Nations University International Institute for Global Health and United Nations Development Programme Malaysia, Singapore & Brunei Darussalam: https://www.doi.org/10.37941/PB-F/2021/3

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