

PANDEMIC-PROOFING THE FUTURE

Lessons from the G20's COVID-19
Response and Recovery

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Contents

Executive Summary	4
Introduction	8
COVID-19 Inequities and the G20	10
Preparing for the Next Health Crisis: The G20's Role	13
Health and Healthcare in the G20	17
Global Healthcare Models and Health Security	21
Modern Healthcare Models: Challenges and Vulnerabilities	21
Health Security through the 'Sustainomics' Framework	23
International Development Cooperation for Global Health Security	26
Tracking COVID-19-Related Outcomes and G20 Responses	30
Analytical Framework, Methodology, and Data Sources	30
Key Findings and Discussion	37
Strategic Imperatives for Pandemic Prevention, Preparedness and Response in the G20	47
Prevention	48
Absorption	49
Adaptation	50
Transformation	51
Conclusion & Key Recommendations	53
Appendices	56
Dimension 1: Contribution to Global Equity	56
Dimension 2: Domestic Pandemic Prevention	58
Dimension 3: Domestic Pandemic Recovery	59
Dimension 4: Health Personnel & Infrastructure	61
About the Authors	65

Executive Summary

The COVID-19 pandemic presented unique global health, economic, and social challenges that required urgent and coordinated action by countries and international organisations worldwide. The G20 countries, for instance, supported initiatives for equitable vaccine access, strengthened their respective healthcare systems, and promoted pandemic preparedness on a global scale. Not all the G20 economies are equal, however, and there were disparities in their COVID-19 responses and the outcomes. Indeed, the challenges they faced during the pandemic were unique, to begin with, given the differences in the structures and workings of their healthcare systems. In this post-COVID-19 era characterised by greater awareness that health security is of paramount importance to the overall security of nations, it is imperative to evaluate, through a comprehensive lens, the efficiency and effectiveness of healthcare systems.

This report conducts an evaluation of the G20 countries in the context of their pandemic response and uses the ‘sustainomics’ framework that emphasises equity, efficiency, and sustainability. Equity is scrutinised as systems grapple with the influx of patients, revealing disparities in health outcomes across the globe; efficiency—a cornerstone of economic thinking—is tested in timely resource allocation to mitigate health insecurities; and sustainability becomes paramount as nations redirect resources towards crisis management while ensuring continuity in essential healthcare services.



3. Dimension 3: Domestic Pandemic Recovery

Dynamic variables on recovery reflect the effectiveness of a country's infrastructure and health system in responding to a surge in infections. There was a marked disparity observed within the Global South in terms of pandemic recovery efficiency. While China emerges as a relatively stronger player in the context of this dimension, data reporting challenges in the country make its variables largely incomparable to the pandemic situation of other G20 nations and require closer inspection.

4. Dimension 4: Health Personnel and Infrastructure

The Global North outperformed the Global South across all indicators within this dimension. The imperative is greater cooperation, particularly among countries in the Global South, to address disparities in UHC service coverage, hospital beds, OOPE, and other health infrastructure and personnel indicators.

5. Contribution to global equity has been at par (on average), with respective groups of countries playing to their strengths.

In domestic pandemic prevention, the Global North outperformed the Global South, indicating a need for better and more efficient vaccination delivery infrastructure in emerging economies. At the same time, the average performance of the emerging countries on pandemic recovery has been on a par with, if not better than, the advanced nations. In health personnel and infrastructure, the Global North-South divide is pronounced across various parameters.

6. Some countries from the Global South witnessed notable improvements in their healthcare systems, while others continue to lag.

The developing G20 countries exhibit a high divergence among themselves compared to the advanced economies. Under dimensions 3 and 4, the variations in testing capacities, and demographic and financial stressors are significantly higher among the emerging G20 economies, compared to the advanced G20 countries. While the Global North-South divide in health outcomes is more apparent, there exist pockets of performance among the group of emerging and developing G20 economies. These economies can partner with Global South leaders to build stronger healthcare systems, improve health outcomes, and reduce health inequalities with a more inward-looking or regional approach.



The next public health crisis has become inevitable; it is now only a matter of ‘when’ and not ‘if’. The G20 countries must build, as the whole world does, robust health systems characterised by the ability to *prevent, absorb, adapt, and transform*. A robust health system is not only resilient during health crises, but also recovers, learns from them, and improves in the aftermath.

This report outlines a comprehensive strategy that can serve as the building tenets of a G20-level pandemic plan for collaboration among its member countries, international organisations, and other stakeholders for pandemic-proofing the future. The report offers the following recommendations to nurture a strong health system that can effectively respond to public health emergencies.

- a. Strengthen Preventive Capacities:** The G20 should prioritise strengthening the preventive capacities of health systems. This involves developing strategies for tracking demographic and financial stressors at the population level and implementing effective communication strategies for widespread information dissemination.
- b. Promote Absorption and Adaptation:** The G20 should focus on initiatives that enhance the ability of health systems to absorb shocks and adapt to crises. This includes monitoring the range of available resources, mapping systemic strengths and weaknesses, and fostering equitable health systems.
- c. Advocate for Transformative Changes:** The G20 should advocate for transformative changes to health systems. This includes promoting flexibility in health governance frameworks and crisis management plans and advocating for localisation of response mechanisms.
- d. Shift Perspective on Healthcare Spending:** The G20 should lead a shift in perspective from ‘healthcare expenditure’ to ‘healthcare investment’. This could include expanding key sectors such as pharmaceuticals and harnessing digital health innovations for improving coverage.
- e. Promote the Pandemic Treaty and strengthen the Pandemic Fund:** The G20 should consider actively promoting and supporting the proposed Pandemic Treaty, as well as raising more resources for the Pandemic Fund. Both are key inclusive tools for improving global health governance and ensuring coordinated and equitable response during health crises.



Introduction

More than three years since the COVID-19 outbreak, societies and economies globally are still grappling with the impacts of the pandemic. Right from its onset, the pandemic had laid bare the shortcomings of healthcare systems worldwide, with the fallouts cutting across sectors. Even countries with seemingly secure and well-equipped public healthcare systems were overwhelmed by the rapid spread of the virus and suffered massive losses of lives and livelihoods.¹ Sudden lockdowns and other containment measures led to job losses, business closures, and economic instability in countries worldwide.² The pandemic's impacts have been particularly severe for low-income countries that lacked the resources to respond effectively to the crisis.³

The recurring waves of the COVID-19 pandemic were a harsh reminder of the critical role of public health in safeguarding economic and social well-being. Countries have had to make significant investments in healthcare infrastructure and personnel to effectively handle the pandemic's challenges. Governments and healthcare organisations allocated resources to testing, contact tracing, treating COVID-19 patients, and vaccinating their populations on a priority basis.^{4,5} The pandemic also highlighted the importance of investing in research and development (R&D) to understand the virus better and develop the ability to adapt effective treatments and vaccines for its mutating variants.

The G20 is not only an economic powerhouse but also a central figure in shaping global policy responses. Its role in the aftermath of the 2008 financial crisis was a testament to its potential to bring together disparate economies for



a unified response.⁶ That crisis saw the G20 coordinating fiscal and monetary policies, ensuring liquidity, and stabilising the global economy. Beginning in early 2020, as the world grappled with the unprecedented health and economic challenges posed by the COVID-19 pandemic, the historical role of the G20 provided hope for a cohesive and effective response.

The pandemic brought unprecedented challenges to the global healthcare system and the economy, both exposing existing health insecurities within the G20 countries and exacerbating them. Drawing a parallel to the ‘sustainomics’ framework that aims to reconcile the needs of the present with the opportunities of the future generations, equity, efficiency, and sustainability emerge as the three pillars of global health security, and their significance has never been more apparent than during the COVID-19 pandemic.⁷ The repercussions of this global health crisis have reverberated across nations and their healthcare systems. To gain insight into the future of global health security, this report assesses the progress and performance of countries along these three critical dimensions.

A number of studies have examined country-level response to the COVID-19 pandemic. One study conducted by The *British Medical Journal (BMJ)* provides an analysis of 28 national responses to COVID-19 in the first year of the pandemic.⁸ The researchers identified characteristics of high-performing responses, such as robust testing and contact tracing, and compared them to low-performing responses. They also discussed strategies for sustaining momentum in the pandemic response and implementing the recommendations of the Independent Panel for Pandemic Preparedness and Response.

Another report by Economist Impact reflects the findings of research in 12 countries and the insights of an Advisory Panel of six international experts in pandemic response.⁹ The report presented a country-level pandemic response toolkit, which includes a range of measures such as testing protocols, contact tracing methods, and quarantine procedures. It also discussed lessons learned from these countries’ responses to the pandemic, providing valuable insights for future pandemic preparedness.

Drawing on three country case studies, the Asian Development Bank’s report provided an overview of a country’s health system and pandemic preparedness efforts. It identified those factors, strategies, mechanisms, and innovations that were most successful in supporting COVID-19 response efforts.¹⁰ The report highlighted the importance of robust health systems, effective communication strategies, and innovative technological solutions in managing the pandemic.



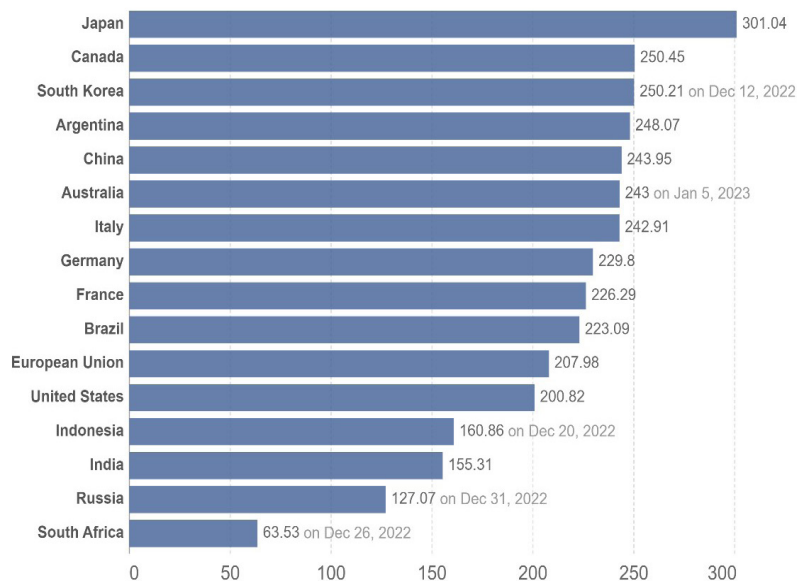
healthcare, and experienced the severe effects of the virus. Even in advanced countries like the United States (US), the Black, Indigenous, and People of Colour (BIPOC) populations saw higher rates of infection, hospitalisation, and death from COVID-19 than white Americans.¹⁷

Abstracting from the within-country inequalities at various levels, there is a marked divergence between the Global North's and the Global South's COVID-19 response and recovery paths. For example, as of October 2022, Mexico witnessed an alarming mortality risk of 4.66 percent, and Indonesia's stood at a concerning 2.46 percent.¹⁸ While India's mortality risk was nearly half of Indonesia's, it was still among the worst-performing of all G20 nations. Such mortality risk rates are a significant indicator of these nations' poor general health profiles and sub-optimal public health infrastructure. This also meant that, even with equivalent rates of infection, the developing and emerging G20 nations needed to catch up to their developed counterparts regarding the quality of medical services available to their people in order to calibrate the COVID-19-associated mortality risks. Similar trends were evident in the granularity and accessibility of COVID-19-related data made available over the three years—an extremely crucial input to planning and implementing the pandemic response.¹⁹

Another critical priority for effective pandemic response is prevention. Vaccination against the COVID-19 virus has by far been the most effective means to prevent the perpetuation of the pandemic in developed and developing nations alike.²⁰ Due to the ever-evolving nature of the COVID-19 virus, and the diminishing effect of the immunity provided by the available vaccines, the World Health Organization (WHO) had recommended that second and third precautionary doses be given to eligible persons.²¹ This means that a single person should ideally receive multiple doses of the vaccine, where most nations have a vaccination rate of more than 100 doses per 100 people in their population. By December 2022, most developed G20 nations had achieved over 200 doses per 100 persons, while the emerging G20 economies struggled to achieve these levels of vaccination despite significant production capacities. Indonesia (160.86), India (155.31), and Russia (127.07) remained under the 200-mark, despite all of them having commenced the administration of the second and third doses. South Africa remained an outlier due to widespread vaccine hesitancy.²² In September 2021, at a time when South Africa had enough doses to vaccinate its eligible adult population, uptake remained limited to two out of five people.²³ Figure 1 indicates the level of vaccine penetration in G20 member nations as of 1 January 2023.



Figure 1: COVID-19 Vaccine Doses Administered Per 100 People (as of 1 January 2023)



Source: Our World in Data²⁴

Recognising these rising inequities, the G20 has also made attempts to coordinate global efforts to bridge the gaps in pandemic response across the world through various approaches. These include provisioning medical countermeasures to vulnerable countries and communities, development and distribution of vaccines on a need-based priority basis, and provision of economic support. Other critical aspects for consideration are the efficiency and sustainability of these measures. For example, some vaccines such as Pfizer, Covishield and Covaxin recorded significantly higher effectivity than the Chinese Sinovac.²⁵ On the other hand, inexpensive mass exports from countries like India have arguably served humanity much more than finite donations of prohibitively expensive vaccines originating in countries like the US. During the 2020 G20 Leader's Summit, under Saudi Arabia's presidency, the G20 countries committed to supporting an end-to-end multilateral solution to speed up the pandemic response across its members and other non-member countries through the Access to COVID-19 Tools (ACT) Accelerator, a WHO-led initiative.²⁶

Making efforts towards ensuring global equity, the G20 countries, particularly the advanced ones, pledged financial commitments for operationalising response and recovery in the Global South. However, according to the ACT-Accelerator interactive funding tracker, there is a persistently significant financing gap.²⁷ In the G20 Rome Leader's Declaration, the G20 reaffirmed its support for global



health initiatives such as the COVAX, a pillar of ACT-Accelerator which aims to ensure equitable access to vaccines and pledged to support low- and middle-income countries in their pandemic response and recovery efforts.²⁸

Equity, particularly in healthcare, is a cornerstone of any global response to pandemics. It ensures that irrespective of socio-economic or geographic differences, all individuals have fair access to health resources. Beyond the moral argument, Gostin and Mok (2009) elucidate that equity is strategically vital. Unequal access to resources, such as vaccines, can prolong the pandemic, lead to mutations of the virus, and destabilise societies.²⁹

However, even as COVID-19 has become endemic across countries at the time of writing, there is still much work to be done to address these health inequities and ensure a sustainable and complete global recovery.³⁰ It will be crucial for the G20 to continue to prioritise a holistic approach to global health security in its pandemic response and recovery efforts. In this context, moving forward from the COVID-19 pandemic, the G20 will have to strengthen collaboration to enhance global health security in a comprehensive manner.

Preparing for the Next Health Crisis: The G20's Role

Comprising some of the world's largest advanced and emerging economies, the G20 is characterised by varying development needs, priorities, and capabilities. At the same time, the G20 collectively caters to two-thirds of the global population, making health security an essential focus area in its deliberations.³¹ These countries also have capacities to mobilise finance and other resources that can be used to address health inequities and enhance global health security.

As the world transitions into long-term pandemic management and prepares for similar crises in the future, this should include a renewed impetus to close the ACT-accelerator financing gap and provide financial support to low- and middle-income countries to strengthen their health systems and respond to pandemics, as well as invest in research and development of new vaccines and treatments.³² The G20 countries also have technical expertise in areas such as public health, medicine, and scientific innovation, which can be leveraged to develop and implement effective pandemic response and recovery strategies, as well as to address the broader challenges of health insecurity. Many member countries, including India, have the productive capacities to make available safe and affordable medical countermeasures,³³ while those like the European



Union (EU) can share technical expertise and knowledge inputs for the health research and innovation ecosystems.³⁴

The interplay between health imperatives and economic stability has always been delicate, especially during global crises. Pandemics, while primarily being health crises, have far-reaching economic ripple effects. Lee and McKibbin (2004) delved into the economic ramifications of pandemics, highlighting how they can disrupt global supply chains, stymie growth, and lead to job losses.³⁵ In such a backdrop, a two-pronged response, addressing both health and economic concerns, becomes imperative. The G20's dual focus on health measures and economic stabilisation can be seen as a reflection of this intricate balance.

The importance of global equity and cooperation in times of health crises cannot be overstated, as it can help prevent unfair treatment of certain nations. In response to calls from around the world to prevent future pandemics and promote sustainable health, the Quadripartite, including the World Organisation for Animal Health (WOAH), the United Nations Environment Programme (UNEP), the Food and Agriculture Organization of the United Nations (FAO), and the World Health Organization (WHO), have developed the One Health Joint Plan of Action (2022-2026).³⁶

Additionally, the Lombok G20 One Health Policy Brief, authored by the Quadripartite in 2022 to assist the Indonesian G20 Presidency, proposes specific measures for countries to implement the One Health approach more comprehensively.³⁷ These include raising awareness for One Health priorities; identifying gaps and opportunities; improving governance, funding and investment; using the One Health Joint Plan of Action as a blueprint for action; implementing the One Health approach in all relevant policies; and facilitating research, knowledge, and capacity-building. The G20's significant influence and convening power within the international community and global institutions can play a critical role in shaping the contours and fast-tracking the implementation of the One Health Joint Plan of Action.

The World Bank estimates that between US\$10.3 billion and US\$11.5 billion per year will be required to promote One Health globally.³⁸ All available funding sources, including the private sector, domestic resources, international financial institutions, and multilateral development banks, will be needed to achieve this goal. The Quadripartite, in collaboration with the G20, can research and develop innovative financing mechanisms and advocate for increased support for public health at the national level. The One Health approach to pandemic prevention, preparedness, and response is emphasised in both the One Health



Joint Plan of Action and the G20 Lombok Policy Brief to mitigate the socio-economic consequences of pandemics, especially for low- and middle-income nations.

To consolidate the implementation of these plans for addressing global health inequities and public health security, the Indian G20 Presidency has identified three priority sectors for enhanced development cooperation.³⁹ Priority I emphasises the prevention, preparedness, and response to health emergencies, with a specific focus on the One Health approach and Antimicrobial Resistance. Priority II aims to enhance cooperation in the pharmaceutical sector, particularly in terms of providing access to safe, effective, quality, and affordable medical countermeasures, including vaccines, therapeutics, and diagnostics. Priority III explores digital health innovations and solutions that can improve healthcare service delivery and help achieve universal health coverage.

The COVID-19 pandemic has revealed other shortcomings of healthcare systems globally and underscored the need for continuous investment in healthcare infrastructure and personnel. Effective emergency communication, adaptive socio-economic behaviour, mobilisation and deployment of resources, and political and social leadership are all essential in managing health crises. By promoting and incentivising investments in these areas, governments and healthcare organisations across the G20 can better prepare for future health crises and ensure that societies are equipped to respond effectively to such challenges.

With the G20 assuming a crucial role in addressing global health inequities, this report aims to explore how these inequities and inefficiencies of healthcare systems have played out across the G20 during the COVID-19 pandemic. It identifies the most suitable approaches to resolve these challenges.

Outlining four key dimensions of pandemic response and recovery for the G20—contribution to global equity, domestic pandemic prevention, domestic pandemic recovery, and healthcare personnel and infrastructure—the report presents a cross-country comparative analysis of progress along the three pillars of equity, efficiency and sustainability for global health security. Tracking Global North-South divergences as well as identifying potential best-case scenarios within the Global North's and Global South's pandemic response and recovery strategies, the report aims to build a case for North-South, South-South or trilateral development cooperation models to tackle specific challenges, mitigate disparities and promote global health security with a more targeted approach within the G20.



The rest of the report is structured as follows. Section 2 provides a brief overview of the inherent demographic health inequities and the nature of healthcare systems across the G20 countries; Section 3 discusses the different types of healthcare systems across the world and the dimensions of resilience through the lens of the 'sustainomics' framework; and Section 4 elaborates on the various development cooperation models that countries can employ to promote global health security. Section 5 lays out the methodology of the analysis and reports the divergences observed in COVID-19-related outcomes and responses across the G20. Section 6 identifies specific strategies that the G20 can adopt for better pandemic prevention, preparedness and response which contribute to national and global health equity; and section 7 outlines the key recommendations.



This report builds a case for North-South, South-South, or trilateral development cooperation models to tackle challenges, mitigate disparities, and promote global health security with a more targeted approach within the G20.



Health and Healthcare in the G20

Due to their disparities in socio-economic backgrounds, health systems, and demographics, the extent and degree of health inequalities and demographic risks can differ among the G20 countries. Income inequality and poverty rates, as well as the availability of social services, play a significant role in widening, or otherwise narrowing health inequalities.⁴⁰ While the pandemic exacerbated the vulnerabilities of health systems, many of the barriers to equitable and inclusive societies are structural and persistent, both within and across countries. A 2022 WHO report, “Building health systems resilience for universal health coverage and health security during the COVID-19 pandemic and beyond”, provides a roadmap to recoup the massive losses from years of inadequate investment and divisive policies that have left primary health systems vulnerable and universal health coverage failures worldwide.⁴¹

G20 countries with more pronounced income inequality may experience more stark health disparities. Countries with strong social safety nets and extensive healthcare systems tend to experience narrower health inequalities than those with less robust social support structures. Healthcare systems must be designed and implemented in a way that effectively addresses health inequalities.⁴² Generally, G20 countries with comprehensive healthcare coverage and robust primary healthcare systems have improved health outcomes and reduced disparities. Ensuring access to, and the affordability and quality of healthcare services is essential for the reduction of health inequalities.



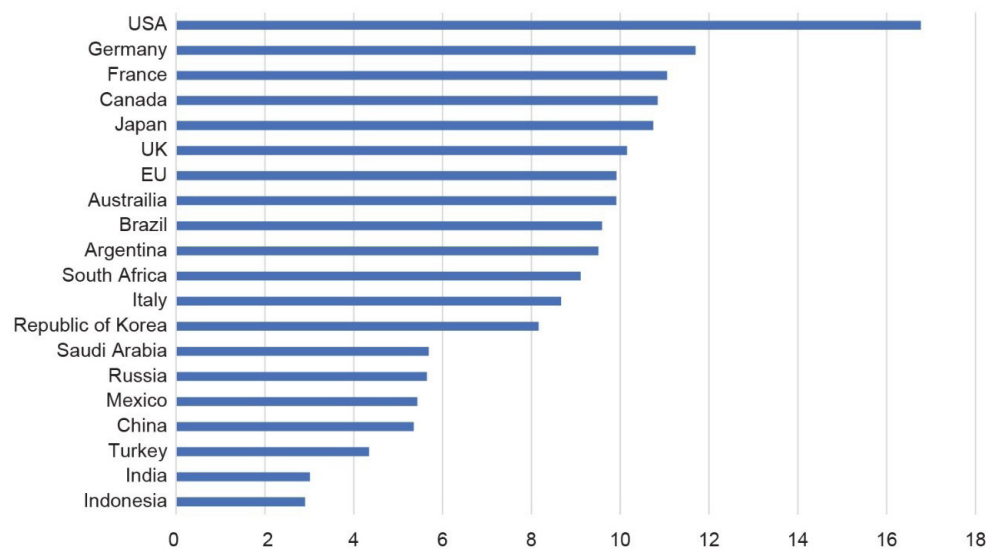
Demographic patterns such as age, sex, race, ethnicity, and migration can also contribute to health disparities. For instance, ageing populations in certain G20 countries have specific health issues that require targeted healthcare services.⁴³ Systemic biases and discrimination may also lead to disparities in access to health, and their outcomes, for racial and ethnic minorities. Amidst the growing prevalence of Non-Communicable Diseases (NCDs), disparities in rates and associated risk factors are observed in different socio-economic groups.

Health inequalities, in turn, have consequences to access to opportunities across an individual's life cycle. The health of children has a significant impact on their future outcomes, including educational attainment and performance in the labour market. Health outcomes are also strongly linked to socioeconomic status: those from lower socioeconomic backgrounds are more likely to have many of the risk factors associated with poor health. For instance, the overweight-obesity prevalence in six G20 countries with available data is 24-percent higher in the least-educated adults than in the most-educated.⁴⁴ Furthermore, risk factors more prevalent in low-income individuals contribute to susceptibility to non-communicable diseases, which in turn, have a significant impact on life expectancy. While all G20 economies offer some form of financial support for healthcare, access to essential health services remains a challenge especially in many lower-income countries.

To address crises within their spheres of influence, national governments are tasked with developing health mechanisms that are flexible, affordable, and inclusive. Governments will need to give healthcare high priority and translate that rhetoric to real investments. While a country's health spending (as a proportion of GDP) does not completely capture its crisis readiness, it does demonstrate the commitment of the government to health. At least 6 percent of the GDPs of the most developed G20 countries in 2019 were spent on health (see Figure 2). The G20 nations have a responsibility to demonstrate their aim to establish robust health systems both domestically and internationally, as the grouping plays a significant role in supporting global development. About 90 percent of the official development assistance for global health development goals and initiatives is provided by countries of the grouping.⁴⁵



Figure 2: G20 Countries' Expenditure on Health in 2019 (as a share of GDP)



Source: Pattanshetty, et. al. (2023)⁴⁶

Health outcomes and access to healthcare vary among countries in the Global North and the Global South. These differences are due to factors such as economic development, health infrastructure, and political stability.⁴⁷ Healthcare systems differ between the developed and developing economies. For example: In the United States, the healthcare system is largely private, with a combination of private and government programs such as Medicare and Medicaid; access to healthcare is largely determined by insurance coverage, and the cost of healthcare is generally high.⁴⁸ In contrast, in the United Kingdom, the National Health Service (NHS) is publicly funded and provides universal healthcare coverage. Services are generally provided free of charge at the point of care.⁴⁹ In Germany, meanwhile, the health insurance system is compulsory for employed individuals and their dependents; contributions are based on income.⁵⁰

In China, the healthcare system is two-tiered, with urban areas receiving insurance-based coverage and the rural areas, basic medical insurance. China has made efforts to enhance access to healthcare and broaden health insurance coverage, but there are still disparities in the quality of care available to urban and rural areas.⁵¹ In India, the healthcare system comprises a mix of public and private healthcare providers, with the government providing services through public health facilities and programs like the National Health Mission. Additionally, the private sector in some countries like India is expanding and



providing services to those who are able to afford it.⁵² In Brazil, the Unified Health System (SUS) provides healthcare to all residents regardless of financial capacity, though the quality and accessibility of healthcare can vary depending on the region.⁵³

The financing mechanisms for the health sector and the expenditures on public health for social security differ between countries, which is a reflection of the healthcare systems, the priorities of the government, and the resources available. However, there may be disparities in the public health expenditure on social security, especially in countries that have limited resources or have a fragmented healthcare system.⁵⁴ Potential causes of these gaps include the lack of coverage for certain populations, poor access to health services, limited investment in prevention and public health, and difficulties in guaranteeing the financial sustainability of the social security program.

The G20 countries confronted the COVID-19 pandemic with significant health inequalities and variations in demographic risks. A comprehensive and multifaceted approach was, therefore, essential. It necessitated the inclusion of elements related to policy, short-term interventions and financial investments to ensure equitable access to healthcare, tailored measures to efficiently address the specific health issues faced by different populations, and sustained efforts to maintain continuity in responses. Global collaboration and partnerships for health and development initiatives became a cornerstone for securitising health outcomes worldwide.

“

The pandemic exacerbated the vulnerabilities of health systems, but many of the barriers to equitable societies are structural, both within and across countries.



Global Healthcare Models and Health Security

Modern Healthcare Models: Challenges and Vulnerabilities

Healthcare systems across the world are confronted with a multitude of challenges, including inadequate financing and inefficiencies in service delivery. How these healthcare systems are organised is critical, and there are convergences and divergences across the world.⁵⁵ With an increasing congruence of public and individual responsibility for effective healthcare, there is also an emerging interest in comparing healthcare systems to identify the most efficient models. However, the balance between the capacity of healthcare systems and their accessibility, affordability, and availability remains a point of contention across countries.

Providing healthcare revolves around questions of efficiency, effectiveness, and legitimacy.⁵⁶ Healthcare investments comprise social sector expenditure, and understanding its effectiveness and legitimacy is crucial. Table 1 lists the features of different models of healthcare systems in operation across the world. In Europe, there are two: the social insurance system (Bismarck model), and the UK national healthcare system (Beveridge model). In North America, healthcare systems are socially controlled and legitimised between actors such as the medical professionals, the state, and the insurers, either through the market, hierarchy, or common norms. Japan's healthcare system is based on a social insurance model, with mixed private and public providers, similar to the Bismarckian healthcare model of Germany.⁵⁷



Table 1: Models of Healthcare^a

<p>Beveridge Model</p> <ul style="list-style-type: none"> • Socialised Medicine • Publicly funded and delivered • Practised in: Britain, Spain, Cuba, New Zealand 	<p>Bismarck Model</p> <ul style="list-style-type: none"> • Funded by employers and employees • Privately delivered • Practised in: France, Germany, Netherlands, Japan
<p>National Health Insurance</p> <ul style="list-style-type: none"> • Publicly funded and privately delivered • Practised in: Canada, Taiwan, South Korea 	<p>Out-of-Pocket Model</p> <ul style="list-style-type: none"> • Individuals predominantly pay for own care • Practised in: India, Africa, South America, China

Source: Peace Innovation Institute⁵⁸

These healthcare models prioritise different values. For example, many European countries prefer a collectivist approach to healthcare, ensuring equal distribution of healthcare resources among all strata of society. Other nations prioritise individual autonomy, self-determination,^b and independence in healthcare.⁵⁹ A dilemma is whether values of efficiency and self-determination can be sustained without losing equity and solidarity.

While Japan is known for its most equitable healthcare system in the world,⁶⁰ India faces five crucial challenges: awareness, availability, human resources, affordability, and accountability. Apart from infrastructural, policy-based, and structural divergences across nations, there are also divergences in culture and value orientation in healthcare. While some societies in Europe and Asia consider healthcare a collective good for the benefit of all citizens, healthcare is seen as a commodity that can be traded in market-oriented societies like the US.

Although health is essential to social well-being, economic expansion has frequently displaced it as the main goal of development in the 20th century. In addition to economic development, health policy and investments have been somewhat dominated by the supply of healthcare and, in wealthier nations, by influencing individual choice. Market-oriented economic policies, which have

a The features and examples mentioned here are illustrative and not exhaustive.

b Self-determination in healthcare emphasises the extent to which the healthcare-seeking behaviour of individuals is relatively autonomous, directed by motivational quality and quantity to achieve a particular health outcome.

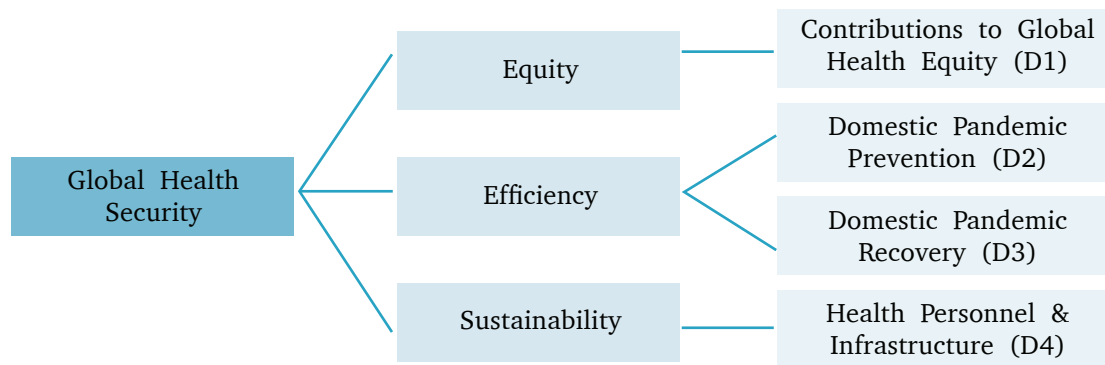


characterised the last three decades of globalisation, have been associated with uneven growth, rising economic inequality, deterioration and increased insecurity in key social determinants of health, and a notable reversal in global health outcomes.⁶¹ A growing body of research indicates that this trend may be influenced by the over-reliance on market-oriented policies that have generated unsustainable levels of inequality and inequity in the distribution of income and wealth.^{62,63} Understanding the health implications of broader social and economic policies than those contained in the health sector alone is essential for comprehending population health and health inequalities or inefficiencies.⁶⁴ As they are now set up, healthcare systems show a nearly universal bias to preserve and exacerbate health insecurities.

Health Security through the ‘Sustainomics’ Framework

The COVID-19 pandemic has exposed the vulnerabilities of healthcare systems across the globe. The underlying healthcare systems, health policy structures, and their interactions are important for determining the extent of cooperation required between nations. The study of these structures in a generalised manner within a common framework is necessary to understand the interlinkages among healthcare systems worldwide and their susceptibility to collapse when faced with shocks such as a global health contagion. As highlighted earlier, concerns over global health security can be envisioned as a direct parallel to the broader sustainable development framework. Healthcare systems across the world face similar challenges, and divergences in their organisation, culture, and value orientation. It is thus critical that an assessment of the G20’s COVID-19 response and recovery be underpinned by the three broad pillars of consideration, i.e., equity, efficiency and sustainability (see Figure 3). In this context, the ‘sustainomics’ framework, which seeks to harmonise present needs with those of future generations, emerges as a powerful tool.⁶⁵



Figure 3: Pillars of Global Health Security

Source: Authors' own

Among the pandemic's stark revelations is the inequities in health outcomes worldwide.⁶⁶ Equity, the principle of ensuring equal access to healthcare services, was severely tested as systems struggled to accommodate the rapid influx of patients. Notably, low-income countries and vulnerable populations or regions found themselves ill-equipped to respond effectively, highlighting the pressing need to address health disparities and ensure equitable access to healthcare resources for all.

Efficiency, a cornerstone of economic thinking, was also challenged as governments and healthcare institutions grappled with the urgency of resource allocation. Swift and effective allocation of resources was paramount in mitigating the pandemic's mounting health insecurities and economic consequences.⁶⁷ Fast-tracking testing, contact tracing, treatment, and vaccination efforts became a global imperative.

Sustainability, intricately linked with equity and efficiency, faced scrutiny as healthcare systems confronted the recurring waves of the COVID-19 pandemic.⁶⁸ Nations were compelled to mobilise and redirect substantial resources towards crisis management while ensuring continuity in essential healthcare services. The pandemic underscored the critical importance of long-term investment and planning in the context of healthcare infrastructure, personnel, and research and development (R&D) to understand the virus better and develop effective treatments and vaccines for its evolving variants.

To assess the G20 countries' contributions to global health security, analysing the efforts of these nations across multiple dimensions that align with the broader pillars of equity, efficiency, and sustainability can help gain insight into their role in addressing the pandemic's myriad challenges. Dimension 1 on



contributions to global health equity assesses the G20 countries' contributions along the equity pillar using relevant indicators, dimension 2 on domestic pandemic prevention and dimension 3 on domestic pandemic recovery focuses on intra-country comparisons along the efficiency pillar, while dimension 4 on health system resources and stressors takes stock of the ability of these health systems to ensure sustainability in its outcomes and responses to the pandemic. For each dimension, a set of indicators has been incorporated into the analytical framework.

The 'sustainomics' framework provides a robust analytical tool to assess health security on a global scale through cross-country comparative analysis. As the G20 countries continue to grapple with the pandemic's consequences, understanding progress along the dimensions of equity, efficiency, and sustainability is crucial. By embracing these principles, we can highlight the importance of global health cooperation and the emerging scope for functional collaboration between nations to promote global health security.

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Analysing the efforts of G20 nations across dimensions that align with the pillars of equity, efficiency, and sustainability can give insight into their role in addressing the pandemic's challenges.



International Development Cooperation for Global Health Security

International development cooperation plays a critical role in addressing global health inequities by allowing for the sharing of resources and capabilities across countries with different healthcare systems and at various levels of development. Development cooperation can help address global health inequities and enhance public health security by strengthening health systems, increasing access to healthcare, investing in research and development, supporting health education and awareness campaigns, and strengthening global health governance.⁶⁹ By improving infrastructure, training health workers, and providing essential medical equipment and supplies, low-income countries can prevent and control outbreaks of infectious diseases, which can contribute to global health security. Moreover, development cooperation can help reduce health inequities and ensure that everyone has access to healthcare, vaccines, drugs, and medical technologies. It can empower individuals and communities with the knowledge and skills they need to protect themselves and others, and promote international cooperation on health issues.

In order to promote convergences in health policies and outcomes, and achieve equity, it is essential to understand the approaches to development cooperation for public health security, specifically the vertical (North-South) and horizontal (South-South) approaches. While conventional notions view South-South Cooperation (SSC) as antithetical to North-South Cooperation (NSC), data on Southern aid flows shows otherwise.⁷⁰ Both NSC and SSC are legitimate transfers of resources and capabilities from a partner country to a recipient country that implements development programmes to target specific outcomes.



Table 2 summarises the key differences between the NSC and SSC frameworks of development cooperation.

Table 2: NSC and SSC Frameworks

Criteria	North-South Cooperation	South-South Cooperation
Rationale	Global North competence	Developing and emerging economies' competence
Donors	Advanced economies such as the OECD	Southern countries/emerging donors such as India and China
Beneficiary	Based on an aid flow model to benefit the Global South	Based on a mutual benefit model, involving both donor and recipient
Agenda	Maintenance of the international order	Reform of the international order and the global economic system

Source: Lengyel and Malacalza (2011)⁷¹

However, the specific approach that is well-suited to tackle an issue of relevance is a critical choice. For example, regarding health research collaborations, the trickle-down approach in scientific research primarily focuses on developing resources and opportunities in the Global North that can supposedly benefit the Global South. There is scant evidence for North-South health research collaboration, with only a few projects in place, which have their own issues of agenda setting, different policies, and remuneration rates.⁷² Given that the Global South carries the greatest burden in terms of diseases and the world's poor population, any North-South partnerships on health research must include capacity-building elements. A strong organisational foundation is required to support a comprehensive agenda for health research and development. Currently running multidisciplinary research programmes may act as the embryonic stages for such organisations; finding connections between the variables affecting health across developed and developing countries, as well as figuring out the best ways to work together at various phases of the process, will be necessary to achieve this.

In many instances, North-South collaborations also turn out to be counterproductive due to governments and researchers from the North having their own priorities, which influence what is studied in the South.⁷³ Consequently, while the North focuses on universally applicable technological solutions, the local stakeholders in the Global South do not engage with the research because it fails to meet their needs, leading to Southern researchers becoming locally isolated due to a lack of local investment. Thus, the need is to develop demand-driven and locally embedded health research in low-income countries.⁷⁴



At the same time, there are also positive examples of institutional health partnerships between the Global North and the Global South that emerged during the COVID-19 pandemic, ensuring that essential services were maintained in low- and middle-income countries. The ESTHER alliance was one such example, using digital platforms to share essential learnings to maintain health services.⁷⁵ This was because the partnership was responsive to local needs and adapted rapidly to changing COVID-19 needs and priorities. This echoes the urgent need for innovative and unified strategies to address global health crises.

Given the emerging global health issues, increasing vulnerabilities within the Global South population and rising capabilities of the emerging nations in the Global South, the stage is ripe for developing more opportunities for SSC. In theory, two approaches to SSC exist. The framework approach, which guides aid flows, and the ingredient approach (see Table 3).⁷⁶

Table 3: Key Features of Approaches to SSC

Aspect	Framework Approach	Ingredient Approach
Key Focus	Framework of an economic system	Various components of the economy
Objectives	Setting rules for economic agents to make decisions	Focusing on organisational units and their vision for expansion
Orientations	Institutional reform	Viewing institutions as inputs that shape economic change
Outcomes	Determined by the market	Flexible, not strictly determined by the market

Source: Authors' own

The idea of a development compact driven by the SSC approach allows for five levels of development support, including trade and investment, technology, skill development, LoCs, and grants.⁷⁷ The earlier concept of SSC was regionally focused, which is why India, China, Brazil, and South Africa have established strong ties within their own continents. More recently, SSC has been steadily increasing, driven by developing economies' interactions with other Southern nations that emphasise holistic support for developmental progress in the Global South and increasing convergence with the Global North.⁷⁸

Besides the traditional NSC and SSC models of development cooperation, there also exists scope to explore trilateral cooperation models, of the North-North-



South (NNS) or North-South-South (NSS) kinds, in the realm of developmental partnerships for global health security. This is primarily because it enables reconciliation between the most efficient resource flow and localisation/contextualisation of development efforts for effective delivery, helps lower the transaction costs associated with the development cooperation initiatives steered by the Global North, and mitigates the risks associated with two-party development cooperation models for beneficiary country (also seen in case of Southern donors like China) by including a third facilitating actor.⁷⁹

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Development cooperation can help address global health inequities and enhance public health security.



Tracking COVID-19-Related Outcomes and G20 Responses

Analytical Framework, Methodology, and Data Sources

The importance of effective global health governance has never been more pronounced amidst the multitude of health challenges facing the global community. Infectious diseases, for example, are transmitted rapidly across borders and have far-reaching impacts. Davies, Kamradt-Scott, and Rushton (2015) stress that in such scenarios, international organisations and groups like the G20 have a pivotal role.⁸⁰ By setting standards, mobilising resources, and coordinating efforts, they not only shape immediate health outcomes but also influence long-term global health trajectories.

Focusing on systematically monitoring the responses of G20 countries to the COVID-19 pandemic, an ODI report provides valuable insights into their contributions to global health equity in terms of vaccination efforts.⁸¹ It helps identify areas of support and shortcomings, shedding light on steps that the G20 nations took to prioritise equity in their vaccination strategies through a COVID-19 Equity Index. However, there have been limited attempts to comprehensively monitor the G20's overall COVID-19 pandemic response.

In a recent report, the Observer Research Foundation constructed a Health Systems Resilience Index (HSRI) for India's states and union territories (UTs) for a comparative analysis of their overall performance and resilience to the COVID-19 pandemic using both static and dynamic indicators of pandemic response.⁸² While the HSRI identified trends towards clusterisations and divergences at the national level, a similar assessment for the G20 could be useful in assessing the state of global health equity. Notably, in the case of the



Dimension 4 provides an approximate cumulative measure of the health system's resources and stressors across the G20 countries—including indicators that can account for human capital resources, physical capital resources, and variations in demographic and financial stressors. The resource base of the health systems provides a measure of effective service delivery and rehabilitation capacities of the health systems across the G20 countries. Indicators of demographic stressors include the prevalence of NCDs among the population. While immunisation programmes may contribute to health resilience by limiting vulnerability, comorbidities have been significant catalysts of mortality and morbidity in case of COVID-19 infections.

Indicators of financial stressors that fundamentally deter access to healthcare include the Universal Health Coverage (UHC) service coverage index^c and per capita out-of-pocket expenditure on healthcare. UHC is critical to pandemic preparedness and response as it ensures that everyone, including the most vulnerable, has access to essential health services without suffering financial hardship. Indeed, in June 2019 during the first-ever G20 Finance and Health Ministers joint session, the discussion aimed at motivating G20 countries towards the common goal of financing UHC in developing countries.

The timeline taken under consideration for the study of each dynamic or static indicator was up to 31 December 2022, starting from the onset of the pandemic. Particularly, for indicators under dimension 4, the latest available value for the indicators was taken into consideration. Table 4 lists the indicators studied under each dimension, along with their corresponding data sources.

c The UHC service coverage index value reflects the proportion of a population that can access essential health services without incurring financial hardship. It provides an indication of the extent to which a country has achieved UHC, which is an important indicator of the country's preparedness to respond to health emergencies like pandemics.



Table 4: Indicators and Data Sources

Pillar of Global Health Security	Dimension	Indicator	Sources
Equity	Contribution to Global Equity (D1)	COVID-19 vaccines doses exported (in millions)	WTO-IMF COVID-19 Vaccine Trade Tracker ⁸³
		ACT-Accelerator contribution (US\$)	Access to COVID-19 tools (ACT) Funding Commitment Tracker ⁸⁴
		Whether or not support to TRIPS waiver at WTO and C-TAP (constructed variable by ODI)	ODI report on “Monitoring G20 contributions to global COVID-19 health equity: issues and options” (March 2022) ⁸⁵
		Total Donated Vaccines Doses	UNICEF COVID-19 Supply Dashboard ⁸⁶
Efficiency	Domestic Pandemic Prevention (D2)	Days taken to reach benchmark vaccination coverage of overall population	Coronavirus (COVID-19) Vaccinations, Our World in Data ⁸⁷
	Domestic Pandemic Recovery (D3)	Days between highest peak of daily cases (per million people) to its 20 percent	Coronavirus (COVID-19) Cases, Our World in Data ⁸⁸
		Days between peak positivity rate to fall below 5 percent	Coronavirus (COVID-19) Testing, Our World in Data ⁸⁹
		Peak daily caseload per million population (seven-day average)	Coronavirus (COVID-19) Cases, Our World in Data ⁹⁰



Pillar of Global Health Security	Dimension	Indicator	Sources
Sustainability	Health Personnel & Infrastructure (D4)	UHC service coverage Index value (most recent)	UHC Service Coverage Index, World Bank ⁹¹
		Cause of death by NCD (percentage)	Cause of Death by NCD (percentage of total), World Bank ⁹²
		Number of hospital beds per 1,000 people	Hospital Beds (per 1,000 people), World Bank ⁹³
		Out-of-Pocket expenditure as a percentage of current health expenditure	Out-of-Pocket Expenditure (percentage of current health expenditure), World Bank ⁹⁴
		Number of physicians per 1,000 people	Physicians (per 1,000 people), World Bank ⁹⁵
		Number of nurses and midwives per 1,000 people	Nurses and midwives (per 1,000 people), World Bank ⁹⁶
		Number of CHWs per 1,000 people	Community Health Workers (per 1,000 people), World Bank ⁹⁷

Source: Authors' own

To identify broad trends of clustering among the G20 countries from the Global North and the Global South, or identify any pockets of performance, a mu-sigma analysis is undertaken for each indicator. Data across all 15 indicators was compiled for the 19 countries and the European Union. Any inherent scale bias was removed, and the data points were accordingly adjusted to be expressed in relative terms. To aid the analysis and make it unit as well as direction-free across all indicators, the values were normalised on a scale of 0 to 1 using the following formula:

$$Y_{ij} = (y_{ij} - y_{j(\min)}) / (y_{j(\max)} - y_{j(\min)}) - (1)$$

Where,

Y_{ij} denotes the normalised value of the j^{th} indicator for i^{th} G20 member;

y_{ij} is the value of the j^{th} indicator for i^{th} G20 member;



$y_{j(\min)}$ is the minimum value of j^{th} indicator across G20;

$y_{j(\max)}$ is the maximum value of j^{th} indicator across G20;

For negative indicators, where a lower value of the indicator reflects better performance, the complement of the normalised value was considered for the mu-sigma classification and subsequent analysis. As such, for all indicators, therefore, a higher normalised value indicates better performance, while a lower normalised value indicates worse outcomes.

The methodology used three stages of analysis to explore:

1. the patterns of global health disparities that have played out across the advanced and emerging G20 countries' response to and recovery from the pandemic along the four dimensions using a mu-sigma classification method;
2. if these disparities mimic the broader trends of economic and developmental divergences between the Global North and the Global South using a mean difference test between the advanced and emerging G20 economies;
3. if the observed health disparities are more pronounced among the countries of the Global South than among those in the Global North, using a variance comparison test between the two sets.

The mu-sigma classification is based on the following criteria:

Table 5: Classification categories used

Advanced	$Y_{ij} > \mu_j + \sigma_j$
Progressive	$\mu_j < Y_{ij} < \mu_j + \sigma_j$
Satisfactory	$\mu_j - \sigma_j < Y_{ij} < \mu_j$
Laggard	$Y_{ij} < \mu_j - \sigma_j$

Source: Authors' own

where,

Y_{ij} denotes normalised value of the j^{th} indicator for i^{th} G20 member,

μ_j is the mean of the scores for the j^{th} indicator across the G20 countries,



σ_j is the standard deviation of the scores for the j^{th} indicator across the G20 countries

While this classification helps identify broader trends of clusterisation among the different groups of countries within the G20, a mean difference test enables us to identify the statistical significance of any observed Global North-South divergences. Better average performance of the advanced economies across specific indicators would imply that there is sufficient scope for improving global health equity through international development cooperation between the Global North and the Global South, with partnerships being led primarily by the better performing advanced economies. Similarly, the variance comparison test between the advanced and emerging G20 economies explores the difference in health inequities within these two groups. A higher level of variance within the emerging economies, compared to the variance among the advanced G20 economies would likewise indicate that there exist pockets of performance, and the Global South can look inward to identify best practices within themselves to enhance health security for the entire region.

The framework primarily seeks to analyse individual indicator behaviour, not aggregation over dimensionalities. While aggregate indices often prove useful as a composite measure, aggregating the scores for the present set of indicators using the average for each dimension (or any other measure of centrality) without accounting for/appropriately imputing the missing values can introduce biases and therefore lead to wrong inferences. Such potential bias becomes particularly visible against countries with low indicator scores compared to those with missing values for the same indicators. For example, in the case of the indicator “Normalized values of no. of CHWs per 1000 people” under Dimension 4, where the overall aggregate score for the dimension is pushed lower for countries like Indonesia, adversely its score, and, favouring the overall performance of countries with the particular value missing. Therefore, in view of the heterogeneous nature of the missing values, and the resulting inaccuracies and biases in aggregated indices, the aggregated framework has not been used for this analysis.

Furthermore, using non-standardised scale bias-free values from the dataset for deriving aggregate country scores in the health report is also not feasible, since each indicator will have a different unit, making mathematical averaging impossible. Additionally, the problem of completely ignoring missing values remains unresolved. To ensure meaningful analysis using composite indices, it is crucial to standardise the scale of indicators and appropriately handle missing values. This ensures accurate and unbiased assessments while allowing for comparability and inclusion of all relevant information.



Key Findings and Discussion

Mu-Sigma Classification

Dimension 1: Contribution to Global Equity

In summary, the contribution to the global effort for COVID-19 can be evaluated through various sub-indicators. Emerging economies like China and India took the lead in exporting COVID-19 vaccine doses in 2021-22, while advanced economies did not actively participate, indicating slower manufacturing capacity. At the same time, advanced economies such as the United States, Germany, and Japan are the top contributors to the Advanced COVID Tools-Accelerator Contribution. The TRIPS waiver, necessary to enhance vaccine manufacturing capacity and provide equitable access to vaccines, was supported by most G20 countries, while advanced economies like South Korea, Germany, and the United Kingdom resisted it. In terms of total donated vaccine doses, China, the US, and Germany are the top-producing countries, while India's contribution is significant, but less than China's. The European Union, Brazil, and South Africa were among the lowest suppliers of vaccines. There is also a significant disparity in vaccine production capability across emerging nations.

Table 6: Performance of G20 countries across dimension 1

Classification	COVID-19 vaccines doses exported (2021-22) (in millions)	ACT-Accelerator contribution (US\$)	Whether or not support to TRIPS waiver at WTO and C-TAP (constructed variable by ODI)	Total Donated Vaccines Doses
Advanced	China	US, Germany	Indonesia, South Africa, Mexico	China, US, Germany
Progressive	EU, India	Japan, Canada	Argentina, Brazil, Australia, China, US, Russia	France, Italy, UK



Classification	COVID-19 vaccines doses exported (2021-22) (in millions)	ACT-Accelerator contribution (US\$)	Whether or not support to TRIPS waiver at WTO and C-TAP (constructed variable by ODI)	Total Donated Vaccines Doses
Satisfactory	US, Russia, South Korea, Brazil, Mexico, South Africa	UK, EU, Italy, France, Saudi Arabia, Australia, South Korea, China, Brazil, Indonesia	Turkey, Italy, India, Canada, Japan, Saudi Arabia, France, South Korea, Germany	Australia, Japan, Canada, India, Turkey, South Korea, Argentina, Saudi Arabia, Russia, Mexico, EU, Brazil, South Africa
Laggard			UK	

Source: Authors' own

Dimension 2: Domestic Pandemic Prevention

In terms of the dimension of domestic vaccine effort, the emerging economies took more than 300 days to achieve 70 percent vaccination coverage of their respective overall population, with South Africa taking the longest at 634 days among the G20 countries. This indicates a need for better access to vaccines in emerging countries. In contrast, advanced economies such as the United Kingdom, the United States, and Japan were able to reach the same benchmark in less than five months, almost half the time it took for emerging countries to do so. However, most notably, the low dispersion among all G20 countries in this domain further reinstates the effectiveness of the G20's overall focus towards ensuring equity in vaccination efforts, albeit through different approaches.

Table 7: Performance of G20 countries across dimension 2

Classification	Days taken to reach benchmark vaccination coverage of overall population
Advanced	
Progressive	Brazil, Saudi Arabia, EU, Turkey, Australia, Canada, South Korea, France, Italy, Germany, Japan, US, UK
Satisfactory	India, Russia, Indonesia, Mexico, Argentina
Laggard	South Africa

Source: Authors' own



Dimension 3: Domestic Pandemic Recovery

Regarding the dimension of Domestic Pandemic Recovery, the time taken for countries to register a downfall in COVID-19 cases below 20 percent and 5 percent from peak positivity date indicates the proactive nature of a country's infrastructure and health system in dealing with a surge. China was the most efficient in this regard, taking only nine days on average to register a downfall below 20 percent, while Germany was the slowest at 340 days. There was no apparent north-south divide, but there was a huge disparity in the Global South. Additionally, the peak caseload per million was highest for advanced economies, indicating better testing capabilities, but these countries—Germany, Italy, Canada, and Australia—also saw higher death rates from NCDs. In contrast, emerging economies had lower percentages, indicating either lower levels of NCDs in their populations or a lower capacity to handle the pandemic and NCDs together.

The COVID-19 pandemic has highlighted the importance of accurate and transparent data reporting to inform public health decision-making. However, the reliability of COVID-19 data from China has been a subject of ongoing debate due to malpractices in data reporting and China's unique approach to controlling the spread of the virus. One of the issues with COVID-19 data from China is the inconsistency in reporting metrics.⁹⁸ This inconsistency makes it difficult to compare the severity of the pandemic in China with other G20 nations, where more uniform reporting metrics are used. Moreover, China's stringent approach to controlling the spread of COVID-19, such as the 'Zero-COVID' policy,⁹⁹ cannot be compared with the policies of other countries, which have taken a more moderate approach. As a result, comparing COVID-19 data from China with other G20 nations is not an easy task. However, China features in the following table, for which its data is available.



Table 8: Performance of G20 countries across dimension 3

Classification	Days between highest peak of daily cases (per million people) to its 20 percent	Days between peak positivity rate to fall below 5 percent	Peak daily caseload per million population (seven-day average) (until 31 December 2021)
Advanced	China		China
Progressive	Brazil, Argentina, Saudi Arabia, Mexico, UK, US, Canada, Indonesia, India, South Africa, Japan, Turkey	US, Indonesia, France, Italy, Turkey, India, Saudi Arabia, UK, Japan, Russia, Argentina, South Korea	South Africa, Brazil, India, Russia, Japan, Indonesia, Mexico, South Korea, Saudi Arabia
Satisfactory	Russia, France	Germany, Australia, Canada, South Africa	US, EU, Canada, Australia, Argentina, Turkey, Germany
Laggard	Germany, EU, South Korea, Australia, Italy	Mexico	UK, France, Italy

Source: Authors' own

Dimension 4: Health Personnel and Infrastructure

The dimension of Health Personnel and Infrastructure is evaluated based on several sub-indicators. The UHC service coverage index reveals that the Global North performs better than the Global South, with countries such as Indonesia and South Africa performing the worst and Canada and the United Kingdom performing the best. There is also great variance in the 'Cause of death due to NCD' among the countries in the Global South, indicating the need for greater cooperation. The number of Hospital Beds per 1,000 people is significantly better in the Global North than in the Global South, with India performing the worst and countries such as Japan, Republic of Korea, and Germany performing the best. OOPE as a percentage of current health expenditure is also better in the Global North than in the Global South, with South Africa performing the best and India and Mexico performing the worst among the G20 nations. The number of Physicians per 1,000 people is also better in the Global North than in the Global South. However, there is no disparity in performance among the countries in the Global South. The number of Nurses



& Midwives per 1,000 people is also better in the Global North than in the Global South, with no noticeable disparity in performance among the countries in the Global South. Finally, the number of CHWs per 1,000 people does not show significant differences between the Global North and the Global South; nor is there any disparity in performance among the countries in the Global South.

Table 9: Performance of G20 countries across dimension 4

Classification	UHC service coverage Index value (most recent)	Cause of death by NCD (percentage)	Number of hospital beds per 1000	Out of Pocket expenditure as a percentage of current health expenditure	Number of physicians per 1000 people	Number of nurses and midwives per 1000 people	Number of CHWs per 1000 people
Advanced	Canada, UK	India, South Africa	Japan, South Korea, Germany	France, South Africa	Italy, France, UK	US, Germany, Australia, Japan	EU
Progressive	Australia, South Korea, Germany, Japan, France, Italy, US, China, EU, Turkey	Mexico, South Korea, Argentina, Indonesia, Brazil, Saudi Arabia	Russia, France, Argentina, EU	Italy, EU, UK, Turkey, Saudi Arabia, Australia, Canada, Japan, Germany, US	Mexico, Russia, Germany, Argentina, Australia	Canada, France, UK, South Korea, Brazil	India



Classification	UHC service coverage Index value (most recent)	Cause of death by NCD (percentage)	Number of hospital beds per 1000	Out of Pocket expenditure as a percentage of current health expenditure	Number of physicians per 1000 people	Number of nurses and midwives per 1000 people	Number of CHWs per 1000 people
Satisfactory	Brazil, Russia, Mexico, Argentina, Saudi Arabia	Germany, Italy, Canada, China, Turkey, EU, Australia, Russia, UK, US, France, Japan	China, Australia, Italy, Turkey, US, UK, Canada, South Africa, Saudi Arabia, Brazil, Indonesia, Mexico	China, Indonesia, South Korea, Argentina, Brazil	Saudi Arabia, US, Japan, Canada, South Korea, Brazil, China, Turkey	Italy, Saudi Arabia, Russia, Indonesia, Turkey, China	South Korea, South Africa
Laggard	South Africa, India, Indonesia		India	India, Mexico, Russia	India, South Africa, Indonesia	Argentina, India, Mexico, South Africa	Indonesia

Source: Authors' own

Mean Difference Test

A comparison of the average performance of the advanced G20 economies and the emerging G20 economies shows that the Global North-South divergences are statistically significant across various dimensions, while for some other indicators it is not. Since only the normalised scores for all positive indicators (and complement of normalised scores for all negative indicators) have been considered for the mean test, a higher average indicates better performance across the indicators. Table 10 shows the results of the mean-difference test across the 15 indicators.

Both advanced and emerging economies within the G20 contributed similarly under dimension 1 on Contribution to Global Equity. While the advanced economies contributed significantly more (significant at 5% level of significance) to the ACT-accelerator fund, the emerging economies made contributions to



Dimensions and Indicators		Mean Difference Test		
		Advanced Economies	Emerging Economies	p-value
Domestic Pandemic Recovery (D3)	Days between highest peak of daily cases (per million) to its 20 percent	0.53	0.83	0.99
	Days taken between peak positivity rate to fall below 5percentage	0.9	0.8	0.25
	Peak daily caseload per million population	0.57	0.85	0.99
Health Personnel & Infrastructure (D4)	UHC Service Coverage Index Value	0.84	0.42	0***
	Cause of Death by NCD percentage	0.12	0.35	0.97
	Number of Hospital Beds per 1000 people	0.41	0.19	0.04*
	Out of Pocket Expenditure as percentage of current health expenditure	0.77	0.49	0.01**
	Number of physicians per 1000 people	0.48	0.25	0.03*
	Number of nurses and midwives per 1000 people	0.66	0.14	0***
	Number of CHWs per 1000 people	0.75	0.33	0.16

The statistical significance of the results obtained are indicated as follows:
 * : Significant at 5% level of significance
 ** : Significant at 1% level of significance
 *** : Significant at 0.1% level of significance

Source: Authors' own

Variance Comparison Test

Higher levels of economic growth and development in the Global North compared to the Global South have often perpetuated health inequities among the two groups. However, with the rise of emerging economies from within the Global South, some countries have made concerted efforts towards capacity building and amelioration of these inequities. This progress, however, also indicates that while some countries from the Global South have witnessed



significant developments in their healthcare systems, others continue to lag. Table 11 shows a comparison of the within-group divergences in COVID-19-related outcomes between the advanced and emerging G20 economies.

Particularly with respect to the G20 countries COVID-19 pandemic response and recovery rates, similar trends were observed across certain parameters. While under dimension 1 of Contribution to Global Equity, within-group remain the same for both advanced and emerging G20 economies, the developing or emerging G20 countries exhibit a high divergence compared to the advanced economies (statistically significant at 0.1% level of significance). Similar trends are observed under dimensions 3 and 4; there are significantly higher variations in testing capacities, and demographic and financial stressors, respectively, among the emerging G20 economies, as opposed to the advanced G20 countries.

While the Global North-South divide in health outcomes is quite visible, there are pockets of performance among the group of emerging and developing G20 economies who can work with partners in the Global South to build stronger healthcare systems, improve health outcomes, and reduce health inequalities with a more inward-looking or regional approach.¹⁰⁰ This offers specific advantages such as understanding of local contexts and complexities of the issues being dealt with, as well as offers a more sustainable resolution through local stakeholder engagement, capacity building and mutual benefits to both partners.¹⁰¹

Table 11: Variance Comparison Test for Advanced and Emerging G20 Economies

Dimensions and Indicators		Variance Comparison Test		
		Advanced Economies	Emerging Economies	p-value
Contribution to Global Equity (D1)	COVID Vaccine Doses Exported (2021-22)	0.09	0.16	0.38
	ACT-Accelerator Contribution	0.09	0	1
	TRIPS waiver support	0.02	0.06	0.06
	Donated Vaccines	0.05	0.12	0.1
Domestic Pandemic Prevention (D2)	Days taken to reach benchmark vaccination coverage of overall population	0	0.07	0***



Dimensions and Indicators		Variance Comparison Test		
		Advanced Economies	Emerging Economies	p-value
Domestic Pandemic Recovery (D3)	Days between highest peak of daily cases (per million) to its 20 percent	0.13	0.02	0.99
	Days taken between peak positivity rate to fall below 5 percent	0.01	0.13	0***
	Peak daily caseload per million population	0.11	0.01	1
Health Personnel & Infrastructure (D4)	UHC Service Coverage Index Value	0.02	0.07	0.05*
	Cause of Death by NCD percentage	0.02	0.1	0.01**
	Number of Hospital Beds per 1000 people	0.1	0.03	0.95
	Out of Pocket Expenditure as percentage of current health expenditure	0.02	0.09	0.01**
	Number of physicians per 1000 people	0.07	0.05	0.72
	Number of nurses and midwives per 1000 people	0.05	0.02	0.96
	Number of CHWs per 1000 people	0.13	0.15	0.55
The statistical significance of the results obtained are indicated as follows: * : Significant at 5% level of significance ** : Significant at 1% level of significance *** : Significant at 0.1% level of significance				

Source: Authors' own

As we evaluate the strategies and responses of the G20 nations to COVID-19, the idea of a Pandemic Treaty gains further relevance. This international agreement could facilitate a more uniform and effective response to future health emergencies, by ensuring a collective commitment to resource sharing and equitable health policies. The proposed Treaty, as highlighted in a recent publication by Dsouza et al. (2023), could lead to more robust mechanisms for global cooperation in health crises.¹⁰²



Strategic Imperatives for Pandemic Prevention, Preparedness and Response in the G20

The G20, as a forum comprising the world's most influential economies, holds a unique position to bolster cooperation among its members for improved global health equity. This collaboration is indispensable in a world increasingly at risk from pandemics and other global health crises. As highlighted in the *World Disasters Report 2022*, health emergencies often result from system vulnerabilities that have been overlooked or neglected.¹⁰³ It is crucial for global leaders, such as the G20, to be proactive in fortifying their systems.

The analysis in the preceding sections looked into the G20 countries' responses to the COVID-19 pandemic and offered a well-rounded perspective on the multifaceted challenges they encountered. A key insight from the literature is that preventive capacities are crucial for mitigating risks associated with sudden shocks such as pandemics. The discussions around the comprehensive redesign of various domains, including workforce, governance, vaccines-therapeutics-diagnostics (VTDs), service delivery, and financing, provide a useful understanding of the areas that warrant attention. The discussion elaborated on the necessity of a well-prepared and adequately staffed workforce for the swift rollout of public health measures, and the importance of transparent, accountable, and responsive governance to ensure public trust and compliance.

Drawing on the WHO Council on the Economics of Health for All (2023) and the G20's Pandemic Preparedness and Response (PPR) financing mechanisms, the narrative underscores the imperative for a well-coordinated approach among G20 countries in gearing up for health crises. The crucial aspect of



rapid and equitable development and distribution of VTDs is highlighted, laying a sturdy groundwork for understanding the dynamics of global health security. This discussion also brought to light the need for better coordination among G20 countries in preparing for health crises, and the rapid development and distribution of essential health resources.

Identifying intrinsic vulnerabilities at the population level forms a crucial part of risk mitigation strategies. Regions with ageing populations or are under financial stress require specific interventions, underscoring the necessity for a nuanced understanding of demographic dynamics in pandemic preparedness and response. This insight is essential in setting the context for understanding the complexities involved in global health governance. The analysis also touched on the importance of monitoring available resources and fostering equitable health systems, which are instrumental in paving the way for a more resilient global health framework.

Advocating for transformative changes, shifting the perspective on healthcare spending, and deliberations on the Pandemic Treaty and the Pandemic Fund encapsulate a forward-thinking approach towards global health challenges. This study highlighted the role of the G20 in driving the agenda of equitable health policies and robust health systems. The discussion on the promotion and support of the proposed pandemic treaty, as well as raising more resources for the Pandemic Fund, aimed to provide a clearer understanding of the inclusive tools available for improving global health governance.

The G20 should consider four key capacities—prevention, absorption, adaptation, and transformation. These capacities form the pillars of a robust health system, enabling it not only to withstand health crises but also to recover and improve in their aftermath. Furthermore, these capacities offer a framework for countries to invest strategically in their health systems, develop more effective governance mechanisms, and leverage digital health innovations.¹⁰⁴

Prevention

Preventive capacities play a significant role in mitigating risks from sudden shocks such as pandemics, reducing the overall vulnerabilities of the system. Effective risk mitigation requires a comprehensive redesign across various domains. A health system that is well-prepared and has strong preventive capacities can significantly lower the impact of a health crisis. Recent recommendations from the WHO Council on the Economics of Health for All (2023) emphasise the importance of transforming economies to deliver health



for all—a goal that aligns with the preventive capacities of a robust health system.¹⁰⁵

The redesign should encompass the areas of workforce, governance, vaccines-therapeutics-diagnostics (VTDs), service delivery, and financing. A well-prepared and adequately staffed workforce is crucial for the swift rollout of public health measures. Governance must be transparent, accountable, and responsive to ensure public trust and compliance.

Tracking intrinsic vulnerabilities such as demographic and financial stressors at the population level is crucial for risk mitigation. For instance, regions with ageing populations may be more susceptible to certain diseases and require specific interventions. Similarly, areas experiencing financial stress will be unable to implement effective preventive measures. The latest World Disasters Report emphasises the importance of these tracking mechanisms and suggests that a better understanding of these vulnerabilities can lead to more effective preventive measures.¹⁰⁶

Effective communication is paramount for widespread information dissemination in all contexts, minimising disruptions to the regular functioning of systems. Clear, accurate, and consistent messaging can help maintain public trust, ensure compliance with preventive measures, and prevent the spread of misinformation. Granularity in data reporting is essential to inform evidence-based feedback mechanisms in the short term and resilience planning in the long term.¹⁰⁷ Detailed, high-quality data can help identify trends, assess the effectiveness of interventions, and guide policy decisions.

Absorption

Taking stock of available physical and human capital resources is critical to crisis management and planning. It helps cushion the impact of both structural and transient shocks to a health system. This involves a thorough assessment of the existing resources and their ability to meet the health demands of the population. Monitoring the range of available resources helps assess the adequacy both the quantity and quality of services to meet the needs of populations. This involves assessing the capacity of hospitals, availability of medical equipment, and the size and skills of the health workforce.¹⁰⁸ A detailed monitoring mechanism can help identify gaps in the system and guide investments and policies to fill these gaps.



Mapping systemic strengths and weaknesses in healthcare service delivery, including different sectors of operation, provides a comprehensive view of the system's capacity. It can highlight areas in need of investment or reform and identify strategies that have been effective in the past. The WHO and World Bank joint paper on G20's PPR financing mechanisms also highlights the importance of mapping systemic strengths and weaknesses in improving the global health response.¹⁰⁹ By incorporating the mapping of systemic strengths and weaknesses in healthcare service delivery, policymakers and stakeholders can better identify specific areas where equity gaps exist. Understanding these disparities can inform targeted interventions and resource allocation to uplift disadvantaged communities and improve overall healthcare access and outcomes.

Creating scope for equitable health systems is also crucial. While all sections of the population need access to care, efforts should be sufficiently targeted towards the most vulnerable groups. This might include the elderly, the impoverished, those with chronic health conditions, and marginalised communities. A more equitable health system can ensure that the health response is more inclusive and effective,¹¹⁰ while improving healthcare utilisation and adherence to treatment regimens among marginalised populations. When individuals have equal access to healthcare services, they are more likely to seek timely medical attention, leading to early detection and management of health conditions. This, in turn, can reduce the prevalence of advanced diseases, hospitalisations, and related healthcare costs, benefiting both individuals and healthcare systems as a whole.

Adaptation

Developing adaptive capacities is essential to generate additional resources for sustaining emergency responses, without compromising regular activities. This ensures that the system can respond to a crisis without hampering the routine health services. This also underlines the importance of digital technologies in promoting adaptive capacities. These technologies can enhance the reach and efficiency of health services, particularly during a crisis. Maintaining excess capacities for routine operations can ensure smooth capacity management during crises or shocks. This might involve maintaining a reserve of medical equipment and supplies, having a plan for quickly training additional staff, or putting in place agreements for increasing hospital bed capacity. Maintaining excess capacities can be a crucial factor in how well a system can absorb and respond to a health crisis.



Planning and implementation of emergency-ready infrastructure and services can ensure speedy and efficient resource mobilisation to restore the system to its original state. This might involve having facilities that can be quickly converted into treatment centres during outbreaks, strategies for rapidly scaling up testing and contact tracing, or platforms for disseminating public health messages quickly. The G20 countries, given their resources and influence, can play a leading role in implementing such emergency-ready infrastructure and services.¹¹¹ Investing in advanced digital health technologies and interoperable health information systems can significantly enhance the coordination of emergency responses across borders and facilitate real-time data sharing among G20 nations. Collaborative efforts in sharing best practices, expertise, and resources can strengthen global preparedness for future health crises, fostering a collective approach to combatting pandemics and emerging infectious diseases effectively. By leveraging their political, economic and diplomatic heft, the G20 countries have a unique opportunity to foster international partnerships and mobilise resources towards building resilient and adaptive healthcare systems capable of swiftly responding to any health emergency.

Sustainable countercyclical financing of adaptive responses can ensure that resources are available when needed. This might involve setting aside funds during times of economic growth that can be used during a crisis. The WHO and World Bank's report on G20's PPR financing mechanisms highlights the importance of such countercyclical financing in ensuring a robust global health response.¹¹² By establishing dedicated funding mechanisms and contingency plans, G20 countries can strengthen the resilience of their healthcare systems against unforeseen challenges such as pandemics or natural disasters. Implementing sustainable countercyclical financing strategies not only enhances the capacity to respond promptly but also mitigates the adverse impacts of economic downturns on healthcare budgets. Embracing a forward-looking approach to healthcare financing can foster long-term sustainability and ensure that adequate resources are readily available to protect public health and well-being in times of crisis.

Transformation

Transformative or structural changes to health systems' operating environment, management, and governance can complement emergency response mechanisms, contributing to long-term resilience. This ensures that the health system not only recovers from a crisis but also improves and becomes more resilient. The WHO Council on the Economics of Health for All's report (2023) underscores the need for such transformative changes, noting that achieving health for all



requires not just healthcare delivery but also addressing social determinants of health and promoting health equity.¹¹³

International Federation of Red Cross and Red Crescent Societies (2021) recommends that strong leadership, inclusive decision-making, and effective communication networks are necessary for accurate information flow and timely action. Leaders must be able to make difficult decisions quickly, based on the best available evidence. They must also communicate these decisions in a clear and transparent manner to ensure public trust and compliance. It emphasises the importance of strong leadership in managing health crises.¹¹⁴ Flexibility of health governance frameworks and crisis management plans is crucial. The nature and scale of health crises can change rapidly, and health systems must be able to adapt accordingly. A flexible governance framework can ensure that the health response is timely and appropriate.

Localisation of response mechanisms enhances the effectiveness of health interventions by making them more contextual and sustainable. By decentralising decision-making and fostering community involvement, localisation ensures tailored solutions that are readily adopted and sustained over the long term. It promotes community ownership, leverages local knowledge, and responds directly to the community's specific health challenges and resources. Thus, localisation is a critical strategy in ensuring appropriate and effective health responses. Furthermore, localisation harnesses the value of local knowledge and expertise, which can be invaluable for designing and implementing interventions. This can lead to innovative strategies that are well-suited to the specific context of a community, thereby increasing the overall effectiveness and efficiency of the health response.

Using relevant facts and figures to substantiate country-specific strengths allows for a tailored approach in strengthening each country's healthcare system. It is important to consider the unique features and strengths of each country. For example, a country with a robust digital infrastructure may have an advantage in implementing digital health solutions, while one that has a large healthcare workforce might focus more on training and expanding this workforce. Understanding these country-specific strengths can lead to more effective and efficient strategies in healthcare delivery, pandemic response, and overall health system resilience.¹¹⁵



Using relevant facts and figures to substantiate country-specific strengths can provide a more accurate picture of each country's health system and thereby inform targeted interventions. For example, a country with a strong healthcare workforce might focus on training and deploying this workforce for pandemic response, while one that has advanced digital infrastructure could concentrate on telemedicine and other digital health interventions. By integrating these capacities, the G20 can better position itself to confront future pandemics and health crises. The key is not just to react to health crises as they occur, but to proactively build systems that can prevent, detect, and respond to these crises effectively.

This study underscores the crucial and influential role of the G20 in pandemic prevention, preparedness, and response, highlighting the need for robust health systems and shedding light on the interplay between health, policy, and economic capabilities in formulating responses to public health crises. The COVID-19 pandemic has unmasked the deep-seated inequities in global health systems which have had disproportionate impacts on vulnerable and marginalised populations. The G20 has an urgent and significant role in addressing these disparities. It is incumbent upon the G20 to foster cooperation among its members, using its influence to advocate for equitable health policies on a global scale. This cooperative approach will not only respond to the immediate crisis but also help build a resilient system to withstand future shocks.

The next public health crisis is only a matter of 'when' and not 'if.' This report elucidates the need to build prevention, absorption, adaptation, and transformation capacities in order to build a robust health system. Such a system not only will have the resilience to withstand health crises but would also possess the capabilities to recover, learn, and improve in their aftermath.

The following are the authors' key recommendations:

Strengthen Preventive Capacities: The G20 should prioritise strengthening the preventive capacities of health systems. This involves developing strategies for tracking demographic and financial stressors at the population level and implementing effective communication strategies for widespread information dissemination.

Promote Absorption and Adaptation: The G20 should focus on initiatives that enhance the ability of health systems to absorb shocks and adapt to crises. This includes monitoring the range of available resources, mapping systemic strengths and weaknesses, and fostering equitable health systems.



Appendices

Dimension 1: Contribution to Global Equity

i. COVID vaccines doses exported (2021-22) (in millions)

Country	Score
China	1
European Union	0.604
India	0.393
United States	0.249
Russia	0.027

Country	Score
South Korea	0.023
Brazil	0.008
Mexico	0.002
South Africa	0

Source: Authors' own



ii. ACT-Accelerator Contribution (US\$)

Country	Score
United States	1
Germany	0.5203
Japan	0.2386
Canada	0.2114
United Kingdom	0.1620
European Union	0.1617
Italy	0.0779

Country	Score
France	0.0693
Saudi Arabia	0.0417
Australia	0.0287
South Korea	0.0282
China	0.0153
Brazil	0.0114
Indonesia	0

Source: Authors' own

iii. Whether or not supporting TRIPS waiver at WTO and C-TAP (constructed variable by ODI)

Country	Score
Indonesia	1
South Africa	0.937
Mexico	0.734
Argentina	0.658
Brazil	0.506
Australia	0.456
China	0.443
United States	0.430
Russia	0.418
Turkey	0.380

Country	Score
Italy	0.342
India	0.304
Canada	0.165
Japan	0.165
Saudi Arabia	0.165
France	0.152
South Korea	0.152
Germany	0.139
United Kingdom	0

Source: Authors' own



iv. Donated Vaccine Doses (Total)

Country	Score
China	1
United States	0.732
Germany	0.465
France	0.352
Italy	0.258
United Kingdom	0.195
Australia	0.166
Japan	0.154
Canada	0.109
India	0.052

Country	Score
Turkey	0.027
South Korea	0.017
Argentina	0.016
Saudi Arabia	0.013
Russia	0.008
Mexico	0.008
European Union	0.002
Brazil	0.001
South Africa	0

Source: Authors' own

Dimension 2: Domestic Pandemic Prevention

i. Days taken to reach benchmark vaccination coverage of overall population

Country	Score
South Africa	0
India	0.621
Russia	0.631
Indonesia	0.635
Mexico	0.726
Argentina	0.776

Country	Score
Brazil	0.794
Saudi Arabia	0.813
European Union	0.847
Turkey	0.859
Australia	0.861
Canada	0.863



Country	Score
South Korea	0.887
France	0.889
Italy	0.891
Germany	0.909

Country	Score
Japan	0.935
United States	0.992
United Kingdom	1

Source: Authors' own

Dimension 3: Domestic Pandemic Recovery

- i. Days taken b/w highest peak of daily cases (per million people) to its 20 percent

Country	Score
Germany	0
European Union	0.110
South Korea	0.230
Australia	0.260
Italy	0.272
Russia	0.507
France	0.597
Brazil	0.731
Argentina	0.743
Saudi Arabia	0.797

Country	Score
Mexico	0.842
United Kingdom	0.854
United States	0.866
Canada	0.872
Indonesia	0.890
India	0.916
South Africa	0.934
Japan	0.946
Turkey	0.946
China	1

Source: Authors' own



ii. Days taken b/w peak positivity rate to fall below 5 percent

Country	Score
Mexico	0
Germany	0.747
Australia	0.796
Canada	0.796
South Africa	0.848
United States	0.921
Indonesia	0.927
France	0.930
Italy	0.948

Country	Score
Turkey	0.952
India	0.961
Saudi Arabia	0.961
United Kingdom	0.961
Japan	0.963
Russia	0.969
Argentina	0.976
South Korea	1

Source: Authors' own

iii. Peak daily caseload per million population (7-day-avg)

Country	Score
United Kingdom	0
France	0.059
Italy	0.391
United States	0.472
European Union	0.520
Canada	0.617
Australia	0.670
Argentina	0.672
Turkey	0.682
Germany	0.687

Country	Score
South Africa	0.825
Brazil	0.836
India	0.877
Russia	0.878
Japan	0.917
Indonesia	0.919
Mexico	0.934
South Korea	0.941
Saudi Arabia	0.947
China	1

Source: Authors' own



Dimension 4: Health Personnel & Infrastructure

i. UHC Service Coverage Index value (most recent)

Country	Score
Canada	1
United Kingdom	0.9667
Australia	0.9333
South Korea	0.9333
Germany	0.9000
Japan	0.8667
France	0.8333
Italy	0.8000
United States	0.8000
China	0.7667

Country	Score
European Union	0.7023
Turkey	0.6667
Brazil	0.5333
Russia	0.5333
Mexico	0.5000
Argentina	0.4667
Saudi Arabia	0.4667
South Africa	0.2667
India	0.0667
Indonesia	0

Source: Authors' own

ii. Cause of Death by NCD (percentage share in population)

Country	Score
Germany	0
Italy	0
Canada	0.025
China	0.025
Turkey	0.025
European Union	0.026
Australia	0.05
Russia	0.05
United Kingdom	0.075
United States	0.075

Country	Score
France	0.1
Japan	0.15
Mexico	0.275
South Korea	0.325
Argentina	0.35
Indonesia	0.375
Brazil	0.4
Saudi Arabia	0.45
India	0.625
South Africa	1

Source: Authors' own



iii. No. of Hospital Beds per 1,000 people

Country	Score
Japan	1
South Korea	0.952
Germany	0.6
Russia	0.528
France	0.432
Argentina	0.36
European Union	0.352
China	0.304
Australia	0.264
Italy	0.208

Country	Score
Turkey	0.192
United States	0.192
Canada	0.16
United Kingdom	0.16
South Africa	0.144
Saudi Arabia	0.136
Brazil	0.128
Indonesia	0.04
Mexico	0.04
India	0

Source: Authors' own

iv. OOPE as a percentage of current health expenditure (latest available)

Country	Score
India	0
Mexico	0.258
Russia	0.371
China	0.398
Indonesia	0.408
South Korea	0.500
Argentina	0.552
Brazil	0.609
Italy	0.641
European Union	0.691

Country	Score
United Kingdom	0.768
Turkey	0.772
Saudi Arabia	0.780
Australia	0.790
Canada	0.812
Japan	0.853
Germany	0.855
United States	0.886
France	0.927
South Africa	1

Source: Authors' own



v. No. of Physicians per 1000 people

Country	Score
Italy	1
France	0.8
United Kingdom	0.707
Mexico	0.573
Russia	0.52
Germany	0.507
Argentina	0.467
Australia	0.44
Saudi Arabia	0.28
United States	0.28

Country	Score
Japan	0.267
Canada	0.253
South Korea	0.253
Brazil	0.24
China	0.2
Turkey	0.173
India	0.053
South Africa	0.04
Indonesia	0

Source: Authors' own

vi. No. of Nurses & Midwives per 1000 people

Country	Score
United States	1
Germany	0.847
Australia	0.826
Japan	0.792
Canada	0.729
France	0.708
United Kingdom	0.625
South Korea	0.431
Brazil	0.424
Italy	0.319

Country	Score
Saudi Arabia	0.3125
Russia	0.222
Indonesia	0.174
Turkey	0.118
China	0.097
Argentina	0.090
India	0.076
Mexico	0.076
South Africa	0

Source: Authors' own



vii. No. of CHWs per 1000 people

Country	Score
European Union	1
India	0.75
South Korea	0.5

Country	Score
South Africa	0.25
Indonesia	0

Source: Authors' own



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