G20 HEALTH

Briefing Paper

on

“Coordinated and Collaborative Response”

Note: This briefing paper contains a compilation of voluntary responses by G20 members, and other invited countries and organisations to a survey circulated by the G20 Italian presidency. This briefing paper is drafted by the G20 Italian presidency, in collaboration with OECD and WHO, without prejudice to members' views and does not purport to suggest agreement among G20 members on these issues.

"Planning a globally coordinated and collaborative response to health crises and emergencies – the role of resilient health systems"

1. The COVID-19 pandemic is still raging and has already had a devastating impact on many aspects of society, affecting the physical and mental health and well-being of individuals, disrupting communities, sending shock waves throughout the global economy and severely impeding progress towards achieving the Sustainable Development Goals. It has emphasised that global collaboration is required to address global challenges. This applies to many areas, but this paper focuses specifically on the need for collaboration to develop strong, equitable, and resilient health systems. Work is underway to strengthen global health security and pandemic preparedness, as reflected in a separate call-to-action document, by seeking to reduce the likelihood of future pandemics occurring. Nevertheless, **the front line of defence against a future pandemic is a resilient health system**. A resilient health system absorbs shocks, continues its pandemic and non-pandemic-related functions, to generate positive physical and mental health outcomes, including for vulnerable groups, minimises the harm to those for whom it cares, and adapts to ensure future shocks have a lesser impact.

2. COVID-19 has had both a direct and an indirect impact on health systems. At the start of the pandemic, as clusters of infections suddenly added pressure on many health systems. One major concern, amongst many, was availability and occupancy rates of intensive care unit (ICU) beds. However, an even more important factor limiting countries' capacity to manage cases of COVID-19 was the availability of staff with the skills needed to work in ICUs. There were also critical shortages of various supplies including personal protective equipment (PPE), diagnostic test kits, therapeutics and oxygen, with marked variations in access to these supplies between countries still existing today. Capabilities for diagnostic testing, tracking, and tracing of infections to contain the spread of the outbreak also became critical. **The need for more effective data integration and real time data reporting became clear as tools to contain the spread of the outbreak and to better manage the use of health system resources.** However, reporting of data in real time remains restricted to very few countries. Supporting mental health and well-being took on added importance as restrictive public health measures implemented to support, physical distancing, made it more difficult to access mental health services in most countries, while bereavement, isolation, loss of income, and fear triggered mental health conditions or exacerbated existing ones. Since the development of the first vaccines was completed and mass immunisations started to take place, there have been marked variations in vaccine access between countries. Furthermore, COVID-19 has also exposed several fundamental weaknesses in health systems. The indirect impact of COVID-19 has included a reduction of unrelated medico-surgical and preventive service utilisation (especially during the initial phase of the pandemic in early 2020) such as reductions in routine vaccinations and population screening, and interrupted services related to infectious diseases in Low and Middle Income Countries (LMICs). COVID-19 has demonstrated the lack of Universal Health Coverage (UHC) and its consequences, in many countries. **Vulnerable people around the world are the most affected by COVID-19, which can be mitigated by UHC in the future.**

3. This **Briefing Paper, based on discussions in the G20 Health Working Group, and responses to a questionnaire, describes several measures that countries are taking to address the weaknesses in their health systems and make them more resilient.** In particular, the Health Working Group identified priority areas where international collaboration can improve the ability of health

systems to respond to crises and emergencies: digital health; addressing health workforce shortages; and reinforcing supply chains. These areas were also reflected in the recent report from the Independent Panel on Pandemic Preparedness and Response (IPPPR)[1]. Furthermore, COVID-19 has also shown marked variations in people's vulnerability, particularly those with pre-existing chronic diseases and those whose circumstances (physical, social, economic, etc.) increased their vulnerability, underlining the need to strengthen public health functions and enabling them to reduce underlying levels of chronic diseases. **Finally, the paper describes approaches that countries are considering to fund the investment necessary to make their health systems more resilient, because without sustainable financing and political will, these priority areas cannot be advanced.** A detailed analysis of questionnaire responses is included in Annex 1. The measures countries have, or are planning to introduce align well with the principles contained in the Rome Declaration[2] adopted at the Global Health Summit in Rome on 21st of May 2021, co-hosted by the European Commission and the Italian G20 Presidency.

Digital Health

4. The health sector has often been characterised as data rich but information poor'[3]. However, the past year has shown the critical importance of making better use of health data for both public health and health care delivery, such as standardised health information (e.g., standardised electronic health records (EHRs)[4], pathogen genomic sequence data, data integration systems, and data analytics tools to track the emergence, spread, and risks posed by variants in real time, and making greater use of mobile technologies. Indeed, the need for digital data and tools has never been greater[5]. **Rapidly accelerating the use of digital tools will not only increase the resilience of health systems and improve their ability to prevent, detect, prepare for, and respond to emerging pandemics**, it will also engender breakthroughs in the prevention and treatment of major infectious diseases in LMICs.

5. Decision makers have been quick to react, and policies that took decades to negotiate have been fast-tracked for ratification. The use of telemedicine, for example, has increased markedly during the pandemic[6]. Early reports, both from the literature and responses to the questionnaire, suggest there have been marked increases in the use of telemedicine in Australia, Brazil, China, France, Germany India, Indonesia, Italy, Russia, South Africa, Turkey and the United States, after these countries lifted restrictions (e.g., telemedicine only allowed after a first face-to-face appointment), introduced new payment mechanisms (e.g., as in India and Brazil) and actively encouraged use of telemedicine by publishing lists of certified providers (as in Indonesia).[7]

6. Nevertheless, barriers to the widespread adoption of digital tools, including for public health purposes remain in many jurisdictions. In part these are technological challenges, but for the most part, the barriers are structural, organisational and institutional. Bringing down these barriers requires political leadership and sustained targeted investment. OECD countries typically invest under 5% of health budgets on managing information. In other sectors investment is four

[1] https://theindependentpanel.org/mainreport/
[2] https://www.governo.it/sites/governo.it/files/documenti/documenti/Approfondimenti/GlobalHealthSummit/GlobalHealthSummit_RomeDeclaration.pdf
[3] https://www.oecd-ilibrary.org//sites/03e9444d-en/index.html?itemId=/content/component/03e9444d-en#
[4] https://www.bmj.com/content/373/bmj.n826
[5] https://www.oecd.org/health/health-systems/Empowering-Health-Workforce-Digital-Revolution.pdf
[6] https://innovations.bmj.com/content/6/4/252
[7] See the results for Question 2 in the Annex.

times higher. There is a need for reliable internet and access to the internet in remote areas of countries. Spending on intangible products such as software and databases, and the purchases of ICT services is comparatively modest in the health sector. Besides investment, the most critical needs include influencing health professionals' attitudes and building their capacity to engage with digital health tools, updating ethical and legal frameworks, engaging health system users, opening data availability and facilitating their integration, and establishing an environment that creates incentives and promotes behaviours for a transformation to take hold. The permanence, or otherwise, of the changes to restrictions, payment mechanisms and organisation structure will impact the choices providers make about adoption of digital tools.

7. While telemedicine and digital health solutions may help bridge gaps in service access in some contexts, in others it may exacerbate inequities in access to care among high-risk populations who may face poorer digital resources or other barriers[8]. Considering how more vulnerable populations engage with digital health tools will need to be an important consideration as countries look to invest in digital technologies.

8. Although the global health sector still lags far behind other sectors in terms of digital practice maturity and implementation, the COVID-19 pandemic has accelerated the adoption of digital technologies in the delivery of health care in many countries[9]. There is work already underway, for example by the Global Digital Health Partnership, looking at issues such as standards and interoperability and countries are already investing in new technologies or the multilateral Digital Health Center of Excellence[10], which provides targeted advice to developing countries on the rapid modification and expansion of digital approaches. The European Union has coordinated digital health across national boundaries and developed the EU Digital COVID Certificate to resume safe international travel. However, there is limited fiscal space so G20 countries may wish to consider developing an economic analysis framework to ensure countries get a positive return on their investment. Additionally, concerns regarding privacy, data safety and security also need to be addressed[11], building from existing initiatives where possible, including the Principles of Donor Alignment[12] and the Principles of Digital Development[13].

9. **Digital tools were used during the pandemic to centralise public health information for effective decision making**. For example, Spain introduced the "National Healthcare system's capacity dashboard, with the daily updated information on the available resources of 567 public hospitals in Spain" improving decision making (Table A.2.).

10. Digital technologies play a vital role in the continuous education and learning of personnel who work in health emergency preparedness and response, within and outside the health system (public health workers, volunteers, community responders, etc.).

11. To resume safe travel the EU Digital COVID Certificate was developed. This certificate is applicable within the European Union and can be extended to third countries, if the conditions are met.

12. Digital solutions also served an important role in many countries to better connect individuals with the supports and services that may have been more difficult to access due to public health

[8] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7268667/
[9] https://www.oecd.org/digital/digital-economy-outlook-covid.pdf
[10] https://www.unicef.org/health/data-and-digital-health#DICE
[11] https://jhumanitarianaction.springeropen.com/articles/10.1186/s41018-020-00072-6
[12] https://digitalinvestmentprinciples.org/
[13] https://digitalprinciples.org/

measures in place. For instance, Canada launched the Wellness Together Canada portal, providing 24/7 access to free and confidential evidence-based tools and resources to support mental health and wellbeing. Individuals across the country can access supports ranging from self-assessment, self-guided programming, and peer support, to confidential sessions with social workers, psychologists and other professionals.

13. With increasing amounts of health information available online, **digital literacy has become an essential component of health literacy**[14]. This indicates a need to improve access to training for health and care workers on how people can use digital devices for learning and accessing health information. **Risk communication to the public was another important aspect of digital health during the COVID pandemic**. Japan approached risk communication by using a centre of excellence model combining academia and industry in a multi-disciplinary setting.

14. Some of the specific measures that G20 countries have recently adopted include building on recent investments (Saudi Arabia), bringing forward planned investments (France) facilitation and/or coordination of research (Canada, China, Germany, Japan and the United Kingdom or increasing investment (Australia, Canada and Italy). The success of such measures can be seen, for example, in a hundred-fold increase in online consultations (France, Germany). Some countries ensured the capacity for telehealth by ensuring hardware (for example, the United Kingdom provided over 40,000 laptops and 18,000 smartcard readers to staff in the English NHS to support remote working), increased financing or support for licencing (United States). Several countries outlined their use of AI these included China (for diagnosis), Germany (personalized medicine, optimising clinical processes and improving diagnosis), Japan (for follow up tools) and the United Kingdom (for imaging).

Health workforce

15. In responding to COVID-19, countries needed to adapt quickly to surging demand on intensive care services, with many countries reporting that the critical limiting factor was the availability of staff with the skills needed to work in intensive care units. Although in many countries clinical staff were re-deployed, that itself brought further challenges, including routine care being delayed.

16. The COVID-19 pandemic has emphasised the shortages of health and care workers in many countries, and the need for mechanisms and national plans to finance, mobilise, surge and repurpose human resources quickly in times of crisis in a manner that seeks to minimise disruptions to other essential and life-saving health services[15] . It also underlined the need for fulsome data and linkable information on the overall health workforce. In Canada specifically there has been a particular challenge with respect to information gaps on the workforce in key areas of care, such as long term care and home care. The projected global shortage of 18 million health workers by 2030 identified by the UN Commission on Health Employment and Economic Growth[16], particularly in low- and middle-income countries (LMICs) affects the ability of countries to cope with a large surge in demand and deliver continuity of care to both those directly affected by COVID-19, and those living with other conditions, or in need of preventive services. While the immediate shortage during the pandemic was a shortage of those who provide direct care services (e.g., ICU workers, nurses, personal support workers, etc.) ICU workers, there is also a

[14] https://pubmed.ncbi.nlm.nih.gov/33094221/
[15] https://onlinelibrary.wiley.com/doi/10.1002/hpm.3137
[16] https://www.who.int/health-topics/health-workforce#tab=tab_1

need to strengthen primary health care and care coordination to reduce pressures on hospitals, and the people who work within them, and maintain essential health services; as well as to scale up community health worker cadres. For example, Italy is organising care into integrated care networks with a multi-disciplinary focus to reduce reliance on hospitals as the main service provider.

17. As countries seek to strengthen their own health and care workforce, many will see international recruitment as the quickest way to increase capacity, but such recruitment needs to respect the WHO Global Code of Practice on the International Recruitment of Health Personnel, as well the ILO's international labour standards on labour migration. Increasing domestic self-sufficiency, by expanding and strengthening national training programmes represents a more sustainable long term approach to securing an adequate supply of health workers. The ILO/OECD/WHO Working for Health programme and the WHO Academy have a key role in this respect, **including through initiatives such as the Italian public health officers training platform 'Laboratorium' - proposed by Italy's National Institute of Health, which has already trained over 450,000 professionals on COVID-19 and other topics - can help strengthen the competencies and capacity of the health workforce.** It will also be important to leverage existing public health networks, including the International Association of National Public Health Institutes, to share and amplify important capacity-building resources to support a stronger public health workforce.

18. Community health systems are critical to fight both existing and future health threats. Community health workers are often the first line of response to infectious diseases and are the actors that reach vulnerable and remote communities. To "leave no one behind" in disease prevention and treatment efforts will require significantly increased investments in hiring and training community health workers and ensuring they have the support they need to be effective, including access to protective personal equipment (PPE).

19. Previous global health emergencies, such as the 2014 Ebola outbreak in West Africa, demonstrated the value in being able to mobilise an international pool of health workers to bolster the national workforce in affected countries[17]. Apart from the WHO EMT Initiative, and the Global Outbreak Alert and Response Network (GOARN) there is no international mechanism for the coordinated deployment of a global workforce comprising multidisciplinary teams rapidly deployable nationally, regionally and internationally. There are a variety of national and international regulatory and other issues, including around liability and mutual recognition of qualifications that need to be resolved before medical teams are able to be rapidly deployed internationally.

20. It is estimated that among the 135 million health and care workers around the world, almost 70% are women. The pandemic has exposed deep inequalities that undermine health system performance and global health security. There is a critical and urgent need to address gender inequalities affecting health and care workers in order to protect the health and care workforce and build more resilient health systems and ensure global health security. The Government of France, the World Health Organization and Women in Global Health are partnering in 2021- the International Year of Health and Care Workers- on the Gender Equal Health and Care Workforce Initiative (GEHCWI). This Initiative aims to increase visibility, dialogue, and commitment to action on gender equity in the health and care workforce.

[17] https://elibrary.worldbank.org/doi/10.1596/978-1-4648-1109-8_ch3

21. Following the 2016 report by the UN Commission on Health Employment and Economic Growth, Member States agreed a five-year action plan to implement the report's recommendations to address the global shortage of health workers. The ILO, OECD and WHO have been working to deliver this action plan through the Working for Health Programme. This programme will be reinvigorated following adoption of WHA resolution A74/14/. A Member State-led process will be launched to develop a clear set of actions, a 2022–2030 agenda and implementation mechanism, for accelerating investments in health and care worker education, skills, jobs, safeguarding and protection, building on the joint support of ILO, OECD, and WHO and the existing Working for Health Multi-Partner Trust Fund[18].

22. With health systems moving to embrace the opportunities of digital technologies, there is an urgent need to ensure that the current and future health workforce is equipped with the skills and infrastructure necessary to make the most of these technologies[19]. Further, the pandemic has had significant impacts on the mental health and well-being of frontline and health and care workers. Moving forward, countries will need to consider what mental health and psychosocial supports need to be in place to support the resilience of the health workforce. We should prioritise formalising the role of community health workers in health systems, as well as supporting women, minorities, and groups that have been marginalised in becoming part of the health workforce. Across the globe, women make up the majority of formal and informal health and care workers and yet continue to face inequities in pay and other benefits.

23. G20 Countries have adopted a number of measures to bolster the workforce dealing with COVID-19 cases. For example, Indonesia re-deployed health workers from local to COVID-19 hospitals and also used non-lab health workers to boost testing and tracing. Singapore bolstered support roles for their health workforce by redeploying professionals that usually do not work in health sector, such as the initiative of the "Singapore Airlines Group to support the temporary redeployment of aviation workers into service and nursing support roles." China discussed the importance of redeploying the medical workforce to the hardest hit areas (Table A.5.).

Supply chains

24. The rapid spread of SARS-CoV-2 in early 2020 and the high proportion of cases requiring medical care led to an unparalleled surge in demand for certain medicinal products, medical devices and medical consumables[20], and personal protective equipment (PPE). As well, use of medical devices and consumables expanded rapidly into non-health essential services. From the point of view of medicine and device markets, the COVID-19 crisis can be seen principally as a demand-side shock. As scientific evidence evolved, public health and health care systems' guidance and protocols adjusted frequently through the pandemic causing variable and recurrent demand shocks. At the same time, physical distancing measures, changes in consumer behaviour and the wider economic effects of the crisis reduced the demand for many manufactured goods and services. In addition, trade became more difficult, freight – especially air freight – was disrupted and physical distancing measures in manufacturing resulted in supply side shocks. All these factors put global supply chains under immense strain, increased prices, and escalated financial pressures on health systems.

18 https://apps.who.int/gb/ebwha/pdf_files/WHA74/A74_ACONF6-en.pdf
19 https://www.oecd.org/health/health-systems/Empowering-Health-Workforce-Digital-Revolution.pdf
20 https://www.chathamhouse.org/sites/default/files/2021-04/2021-04-08-trade-policy-medical-supplies-covid-19-evenett.pdf

25. A wide range of products are needed for effective and sustainable responses to infectious disease outbreaks, such as COVID-19, and health-related impacts of other emergencies. **Many countries are working to strengthen supply chains for essential medical goods, including personal protective equipment, medicinal products, and medical devices, as an integral part of strengthening their preparedness to respond to future health emergencies and to enhance the resilience of health, and other essential service, systems more broadly.**

26. No individual country, or region, produces all the health care products it needs in sufficient quantities, and there is a high degree of interdependence in international trade[21] and significant regional vulnerabilities to climatic and other disasters. It is therefore important to address this issue including through international co-operation, as appropriate, to work to improve transparency, collective knowledge and understanding of the structure, nature and sources of supply chain vulnerabilities, in order to identify and mitigate future risks. This is key for building more resilient health systems and economies, while still ensuring the quality, safety, and efficacy of medical devices (e.g. supplies/equipment, diagnostics) and pharmaceuticals, as well as critical inputs and components of their supply chains. Currently, production and exports of items essential in response to the COVID-19 pandemic are concentrated, with over 80% of global exports coming from only 20 countries, most of which are G20 and/or OECD countries. The G20 could therefore play an important role in championing the issue of supply chain security and diversification, and in highlighting the importance of supporting regional manufacturing capabilities for critical medical commodities for future preparedness and in promoting and supporting coordinated action by G20 members to contribute to the collective knowledge base. WHO, EU and the Access-to -COVID-19 Tools Accelerator (ACT-A)[22], which the G20 contributed to the initiation of is a global initiative that promotes the development, production capacities, distribution and equitable access in member states and fair provision and partner countries to facilitate the distribution of safe and effective COVID-19 vaccines, therapeutics and diagnostics. A recently set up 'Manufacturing and Supply Chain Taskforce' within the vaccine column of ACT-A is intended to address short-term bottlenecks and accelerate the production and supply of COVID vaccines, and also to create a long-term platform for the sustainable production of vaccines and to promote regional health improvement and protection.

27. Australia highlighted that supply chains were disrupted by the cessation of regular air transport routes, which introduced delays and additional complexity. Canada discussed the difficulty of being a net importer with shortages in pharmaceuticals and medical devices (supplies, equipment, diagnostics), especially during the early months of the pandemic in Canada. As with most countries, Canada increased domestic production but noted that some manufacturers experienced challenges with quality control and standards. Argentina and Indonesia discussed the potential for technology transfers to aid the resilience of supply chains in recipient countries (Table A.6 and Table A.7).

Strengthening Public Health Functions

28. **The pandemic has truly underscored the importance of investing in public health systems and there has been widespread efforts to bolster key public health functions to support the pandemic response**. For instance, epidemiological surveillance has been essential during the COVID-19

[21] https://www.sciencedirect.com/science/article/pii/S2666412720300015
[22] https://www.who.int/initiatives/act-accelerator/about

pandemic[23]. There has been widespread efforts to bolster these functions, including to strengthen national, regional, and global early warning and alert systems capable of rapidly and transparently sharing information, data, and materials necessary to identify and assess risks and to implement evidence-based public health interventions in real time. The improvements have included additional staff and resources, training, digital technology solutions, widespread use of community based digital apps, and increased cooperation between different agencies and government entities.

29. There remains a need to advance the development of public health intelligence platforms, enhanced predictive modelling and epidemic forecasting, syndromic surveillance, biosurveillance, and early warning technologies[24], all of which will require countries and sectors to rapidly and transparently share and integrate relevant information, data, and materials. The newly launched WHO Hub for Pandemic and Epidemic Intelligence is one initiative seeking to address these issues. Combining AI with large datasets has considerable potential to detect emerging diseases. However, this potential has yet to be translated into practical applications at scale, although some initiatives are being taken forward, for example, Spain is planning to establish a 'National Public Health Center" to provide the technical-scientific analysis of the health situation necessary for decision-making in public health and to assess the options of response and control the health risks and threats (Table A.10). At the global level the newly created International Digital Health and Artificial Intelligence Research Collaborative (I-DAIR) focuses on capacity building, which should be particularly relevant for LMICs. The OECD AI Observatory[25] also contains curated information on AI and health.

30. People living with chronic conditions or in long-term care, are more vulnerable to complications and death from COVID-19. They have also faced significant indirect health impacts as countries have diverted resources away from non-COVID health care services (such as cancer diagnoses, chemotherapy appointments, and ambulatory practices) to manage surges in COVID-19 cases[26]. This underlines the need to strengthen primary care services, with strong links to community services. It also demonstrates the importance of policies to promote healthy lifestyles, and healthy ageing, and reduce the prevalence of non-communicable diseases. Reducing the rate and severity of non-communicable diseases in the population will reduce the pressure on health services during the COVID-19 pandemic and during future health crises. Robust primary care services must be supported by interoperable health data infrastructures so that as individuals move in and out of jurisdictions, their information can travel with them. This is particularly important where it relates to vaccination status and coverage data.

31. It is also **important to integrate mental health with physical health,** to avoid the development of silos, and help reduce stigmatisation. The Presidency has organised a **G20 Side Event** to address this topic, on 3 September. The 3rd World Summit on mental health will be held in Paris, with the support of the WHO, on 5-6 October.

[23] https://www.bmj.com/content/372/bmj.n485
[24] https://www.gov.uk/government/collections/scientific-evidence-supporting-the-government-response-to-coronavirus-covid-19#modelling-inputs
[25] https://www.oecd.ai/
[26] https://academic.oup.com/eurpub/advance-article/doi/10.1093/eurpub/ckab047/6182679

Financing the changes needed

32. Sustainable, flexible, innovative, and agile financing systems for health emergencies are essential elements of health security and pandemic preparedness. During the COVID-19 pandemic, proactive financing was an asset, not only for the implementation of health responses for outbreaks, but also for supporting health and social systems, the economy and communities. In this process, rapid decision making by governments taking account of scientific and political considerations, and proactive communication between health and finance, as well as other, ministries was crucial for timely response.

33. The funding of more resilient health systems was discussed in more detail in the G20 Position paper on 'Healthy and Sustainable Recovery'. Broadly speaking the necessary additional investment amounts to around 1.5% of GDP. COVID-19 has shown the huge costs of failing to invest sufficiently in health systems, nevertheless, with most countries now managing very high levels of national debt, it is imperative that investment decisions are made wisely. The G20 work on value based health initiated during Saudi Arabia's G20 Presidency will be very relevant in this respect.

34. There has been under-investment in the health sector historically, in particular in LMICs, which has severely constrained the ability of health systems to respond to the COVID-19 pandemic[27]. Providing sufficient levels of domestic financing for building health systems is at its core a political decision in all countries. Official development assistance (ODA) for health has also plateaued over the past few years – **all countries, whether low-, middle-, or high-income, benefit when LMICs have resilient health systems. Building back better health systems and economic recovery will depend on sustained global investments in the health sector and ensuring an equitable access to health.** Hence the crucial role of public health in order to guarantee universal and equitable access to health

35. Various financing options are available to countries, but new and innovative approaches are needed to better mobilise resources for country-level preparedness as well as fund rapid response scale ups for potential health emergencies. Reprioritising domestic spending can make more financial resources available, however, this may not be sufficient. Another option is mobilising additional domestic sources to increase public or private resources[28]. In the context of Social Health Insurance systems, options may include adjusting the contribution rates of employees/employers, although this should be considered as part of the impact on labour taxes, or finding alternative sources of income, ultimately leading to a more diverse funding structure.

36. In addition, the May 21st **Global Health Summit , co-hosted by the European Commission and the Italian G20 Presidency, declared the need to, "address the need for enhanced, streamlined, sustainable and predictable mechanisms to finance long-term pandemic preparedness, prevention, detection and response, as well as surge capacity, capable of rapidly mobilising private and public funds and resources in a coordinated, transparent and collaborative manner and with robust accountability and oversight."**

37. The report from the High Level Independent Panel on Financing the Global Commons for Pandemic Preparedness and Response[29], submitted, to G20 Finance and Central Bank

27 https://read.oecd-ilibrary.org/view/?ref=134_134620-xueji119ph&title=Strengthening-health-systems-during-a%20pandemic-The-role-of-development-finance&_ga=2.198531368.647762372.1626163062-38141485.1625045296
28 https://www.euro.who.int/en/publications/abstracts/spending-on-health-in-europe-entering-a-new-era-2021
29 https://pandemic-financing.org/wp-content/uploads/2021/07/G20-HLIP-Report.pdf

Governors, made nine recommendations on improving global health security financing and related governance, accountability, and oversight. Similarly, the IPPPR recommended establishing a new international financing facility for pandemic preparedness and response. . At the Global Health Summit, the Chair of the "Pan-European Commission on Health and Sustainable Development"[30], established by the WHO Regional Office for Europe in August 2020, presented its proposals, as set out in its Call to Action "Rethinking Policy Priorities in the light of Pandemics" of 16 March 2021, with the aim to promote a better assessment of economic and financial health-related risks, coordination and information exchange among authorities responsible for health and sanitary resilience, on prevention, on organisation of resilient health systems, in a One Health perspective, and on crisis situations (contingency planning, early warning, crisis management). Argentina suggested that multilateral organisations should continue to work with Multilateral Development Banks (MDBs) to strengthen financial support for low- and middle-income countries. Turkey suggested the need for stronger international contingency funds to assist developing countries.

Conclusions

Most countries emphasised the importance of a **'whole-of-government'** and 'whole-of-society' approach to pandemic response. For future health security pandemic preparedness there needs to be feasible and applicable emergency preparedness plans; supply chain security, a strong, integrated, interoperable, and real-time surveillance system with transparent and rapid information, data, and material sharing; empowered, and digitally literate, healthcare professionals who can respond agilely to challenges; easy-to-use but innovative digital infrastructure; multi-sectoral governance with effective vertical and horizontal communication (including central and local governments); trust with timely and transparent risk communication; and effective international cooperation.

Collectively, G20 countries have introduced or are planning many innovative solutions in response to the COVID-19 pandemic. Many of these solutions potentially have broader applications. This briefing paper provides a resource to facilitate follow up conversations if countries wish to explore specific initiatives in more detail.

Three broad conclusions can be drawn from the G20 discussions on this topic:

- the importance of continuous learning and sharing experiences;
- sharing the collective G20 experience and taking action on it can result in policy change and improvement to make health systems more resilient with a focus on public health; and at the same time,
- it will be important to ensure that certain innovative practices introduced during the pandemic are reviewed to ensure the learning from such practices are shared more widely.

30 https://www.euro.who.int/en/health-topics/health-policy/european-programme-of-work/pan-european-commission-on-health-and-sustainable-development

Annex 1

Analysis of G20 Health Working Group questionnaire responses

The questionnaire was distributed by the G20 presidency to the G20 Health Working Group. Returns were received from 15 countries: Australia, Canada, China, France, Germany, Indonesia, Italy, Republic of Korea, the Russian Federation, Saudi Arabia, Singapore, Spain, Turkey, United Kingdom and United States. Two international organisations, the Global Fund and GAVI also returned questionnaires. A draft was circulated to the G20 Health Working Group. Comments, clarifications and additional examples were received from 11 countries: Australia, Canada, France, Germany, Indonesia, Singapore, Switzerland, Turkey, United Arab Emirates, United Kingdom and United States. The Global Fund also gave comments on the draft.

Question 1. Direct and Indirect impacts[31] of COVID-19

1.1. What was your top lesson learned from the practices adopted in your country in response to the direct impact of the pandemic? How are you planning to reconfigure your health system (e.g., service delivery, coordination and financing) as a result?

1.2. What was your top lesson learned from the practices adopted in your country in response to the indirect impact of the pandemic and how are you planning to reconfigure your health system (e.g., service delivery, coordination and financing) as a result?

Most countries discussed the essential requirement for hospital beds (e.g., intensive care units [ICU]), trained healthcare professionals and sufficient equipment for infection prevention and treatment of patients, to absorb the direct impacts of pandemic. That is, minimising mortality and morbidity.

Countries also discussed the requirement for adequate detection and epidemiological surveillance. This includes equitable access to rapid and accurate laboratory diagnosis, capacity for tracing and tracking for contacts, and real-time reporting and monitoring systems.

COVID-19 has broad indirect impacts on healthcare service delivery in countries including a reduction of non-COVID health care services such as medico-surgical and preventive service utilisation (especially during initial phase of pandemic in early 2020) such as decreased routine vaccinations and a reduction in cancer screening. Furthermore, supporting the mental health of the population was noted as a priority issue by several countries. especially when social distancing measures were in place.

[31] The COVID-19 pandemic impacts were placed in two categories : (1) 'Direct' (for intensive care unit beds, access to testing services and long term care services etc) (2) 'Indirect' (Delayed cancer screening, Delayed elective surgery, Disruptions in routine follow-up care of people with chronic conditions, Shortages of routine medicines for people with chronic conditions (e.g. due to disruption in pharmaceutical and medical supply chain), Disruptions in routine maternal and reproductive health services , Delayed follow up of child care (e.g. immunisation, national screening programmes), Increased pressure on mental health services (e.g. due to increased cases of substance use or psychological impacts of the pandemic), Other services including dental, optical, etc)

Table A.1. Examples of direct & indirect impacts and policies during the COVID-19 pandemic

Domains	Examples
Encouraging active healthcare activities	**(France)** Invested 19 billion Euros in health system to improve patient care and daily activities of healthcare professionals. **(US)** To ensure service continuity and mitigate the impact on providers experiencing substantial reductions in activity and income, Medicare and other payers implemented a range of flexibilities, including expanding telehealth reimbursement policies, reducing cross-state licensure barriers, and minimising reporting requirements.
Efforts for securing hospital response capacity	**(Argentina)** Argentina built 12 modular emergency hospitals (874 beds) and established more ICU beds, currently up to 27.5 beds per 100,000 population. In addition, other medical supplies also allocated including 4,136 ventilators, 4,121 infusion pumps, 3,408 monitors, 230 ultrasound machines, and personal protective equipment to all provinces. **(Italy)** Three hundred mobile intensive care unit bed were funded. The National Health Service reinforced intensive and sub-intensive care units. **(Germany)** About 13,700 additional intensive care unit beds were funded. **(Singapore)** New capacity in isolation wards and intensive care units were created by repurposing existing beds and hospital facilities and acquiring additional medical equipment such as ventilators. In addition, public hospitals established collaborations with private sector healthcare providers to provide further treatment capacity, and to help care for existing patients with chronic medical conditions. Private hospitals and community hospitals continue to support public hospitals in attending to patients with less serious acute clinical conditions. (Republic of Korea) The government designated several hundred beds in both private and public hospitals, with healthcare professionals and essential medical facilities/devices including negative pressure isolation room, for securing medical response capacity for surging demand of severe cases of COVID-19 **(Turkey)** Severe COVID-19 cases can be covered by public city hospitals, which were established by projects before pandemic. With a legal regulation made to reduce the indirect impact and the burden on the health system, all private hospitals provide compulsory service within the scope of the pandemic.. **(Russian Federation)** At the height of the pandemic 279,000 beds were deployed. During 2020, forty infectious diseases hospitals were built and put into operation.
Efforts for saving long term care (LTC) facilities	**(Canada)** The Government has prioritised protecting vulnerable Canadians, including those in long term care (LTC), and supported provinces and territories extensively. Specifically, this included; • Proposed in federal Budget 2021, funding support over five years to ensure that provinces and territories provide a high standard of care in their long term care homes (starting in 2022-23), • announced the Safe LTC Fund for provinces and territories to support infection prevention and control through making improvements to ventilation, hiring additional staff, and topping up wages, •announced the Age Well at Home initiative to assist community-based organizations in providing practical support that helps low-income and otherwise vulnerable seniors age in place • invested to support training up to 4,000 personal support worker interns through an accelerated 6-week online training program combined with a 4-

Domains	Examples
	month work placement, to address acute labour shortages in long term care and home care, • Invested billions of dollars to procure personal protective equipment (PPE) and continued to work with the provinces and territories to ensure LTC has access to the protection it needs, • proactively purchased and deployed high dose flu vaccine for all LTC residents in Canada, to prevent twin illnesses of seasonal influenza and COVID-19 in LTC homes, • prioritised LTC and congregate living settings for vaccination, with most residents and staff having received two doses, • created volunteer inventories to support public health response, including in the LTC sector, • developed infection prevention and control guidance specific to LTC and public health measures guidance for congregate living settings (e.g. post-secondary institutions, shelters), • deployed the Canadian Armed Forces and the Canadian Red Cross to LTC homes to respond to urgent needs during the pandemic, and • invested in the "LTC+" initiative carried out by Healthcare Excellence Canada to provide direct support to facilities for pandemic preparedness. **(Germany)** To secure nationwide LTC services, new regulations are enacted compulsory reporting obligation for closure or critical situations, adapting personal planning to crisis situations, supporting infection prevention and control guidelines and ensure funding for additional expenditure for COVID-19 response (e.g. PPE)
Reduction of utilisation of medico-surgical services	**(Germany)** At the early stages of the COVID-19 pandemic (from 25.03.2020 to 30.04.2020) the organised, population-based national mammography screening programme withheld written invitations for the eligible population. After the implementation of infection control measures the mammography screening programme resumed normal services in May 2020, at the same time focussing on catching up on postponed appointments. Reopening of services was flanked by an awareness campaign. To this end political decision makers (Federal Ministry of Health and health care providers) reassured the public about the implemented safety measures and warned against the dangers of putting off medical appointments. The running of the organised, population-based national screening programmes for cervical and colorectal cancer were unaffected by the pandemic. However, there are some indications that, despite some catch-up dynamic, the take-up rate of the cancer screening programmes might have decreased due to the pandemic (conclusive data are not available yet). Elective interventions (except emergency care, for example, myocardial infarction) and surgeries were postponed to cope with increased demand for COVID-19 patients. Telemedicine was encouraged in response to disruptions of chronic condition patient care and maternal/reproductive/child health services (e.g., diabetes mellitus). **(Italy)** The increases in waiting lists associated with reductions in non-urgent services has been accompanied by special funding in order to help recovery. **(Switzerland)** On 16th March 2020, the Federal Council decided that healthcare providers (hospitals, clinics, GPs and dentists) could remain open but had to renounce to non-urgent procedures and therapies. This nationwide ban on all elective surgery and non-urgent treatments lasted until 27th April 2020. In total, we assume that more than 30'000 elective surgery procedures were postponed, which had to be caught up afterwards. **(US)** During March through May of 2020, service utilisation declined by 50-60% in response to the mitigation measures taken early in the pandemic. Many screening, preventive and surgical services declined by greater amounts. Other indirect impacts on the

Domains	Examples
	nation's public health includes increased fatal and non-fatal overdoses, reduction in routine vaccinations, avoided medical care, changes in prenatal care utilisation, rates of caesarean delivery and preterm birth, post-COVID conditions, and more. **(Russian Federation)** There was a delay in vaccination programs of approximately 1.5 months. Insurance organisations suspected some planned examinations.
Protecting mental health and psychological support	**(Australia)** Based on a whole-of-society approach scheme, Australia has focused on supporting the economic needs of people, along with improving access to mental health services through measures such as telehealth, and providing targeted mental health and psychosocial supports to those who are most vulnerable. Upon the previous National Suicide and Self-Harm Monitoring Project, additional investment in data, modelling and research for surveillance and monitoring has taken place. **(Canada)** Budget 2021 provides support over three years for mental health: to develop national mental health service standards, in collaboration with provinces and territories, , health organisations and key stakeholders; to support projects for innovative mental health interventions for populations disproportionately impacted by COVID-19, including healthcare workers; frontline workers, youth, seniors, Indigenous people, and racialized and Black Canadians, to support a trauma and post-traumatic stress disorder stream of mental health programming for populations at high risk of experiencing COVID-19 trauma; and additional support for extension of Wellness Together Canada, an online mental health and substance use support portal, which provides free, credible supports available 24/7 to individuals across Canada. **(Germany)** Governmental and non-governmental efforts to inform the public about possibilities for assistance and support, including the many diverse local psychosocial counselling and assistance services as well as supra-regional digital and telephone information and counselling services. For example, online information portal "Psychisch stabil bleiben" ("Mind your mental health") aims to boost coping skills and offers useful information and bridging counselling offers available locally by online or in person as well as easy and practical tips on dealing with stress, worries and fears caused by the pandemic. **(Japan)** Financial support is provided to secure sufficient mental health support for the increased demand on mental health services. (Republic of Korea) Information and consultation for psychological support has been provided to confirmed patients and their families, and persons in self-isolation. Furthermore, support of in-depth counselling for persons who are at high-risk of depression, and stress relief program for healthcare workers have also been available. **(UK)** During the pandemic, psychological therapies have been made available remotely. The NHS in England published a 'Mental Health Recovery Action Plan' to ensure continuing support of people's mental health
Facilitated deployment of telemedicine service	**(France)** During the pandemic, telehealth consultation using digital tools increased 30~40 times compared with pre-pandemic era. (50k (2019) → 15~20m (2020) per month) **(Singapore)** Healthcare institutions and other care services have started teleconsultation services for follow up on their patients. **(Spain)** The Ministry of Health has worked on a 'Digital Health Strategy' to accelerate adoption of digital health solutions and to strengthen infrastructures for data used by healthcare professionals

1.3 How can more international cooperation and coordination help plans to reconfigure your health system (e.g., service delivery, coordination and financing) to build greater health system resilience?

International cooperation is important during pandemics, given that infectious diseases do not respect international borders and can disrupt international travel and trade. However, this pandemic has magnified the importance of international cooperation in areas such as border control, vaccine procurement and supplying essential goods for infection prevention and control.

Most respondent countries and organisations argued that there should be stronger international cooperation in sharing knowledge, experience, and ensuring a reliable supply chain of goods for future health emergencies. Use of international standards and enhanced coordination on policies is crucial for an effective and harmonised global response. In the aspect of supplying chain of the world, increased regulatory cooperation, prioritising increased manufacturing capacity for essential health products, addressing financing and logistical demands for production, procurement, and delivery of safe and effective health products can be included. Through these efforts, the safe reopening of the border for international trade and travel can be facilitated.

2.1 What was the main policy, or guidance introduced in response to COVID-19 to promote:

a) the collection, harmonisation, sharing, reporting and use of health data during the pandemic?

b) the equitable adoption and use of digital health technologies (e.g., telehealth, artificial intelligence, mobile apps, etc.)

2.2 What have been the impact of policies/measures introduced in response to COVID-19 to promote the adoption of digital health technologies and the sharing and use of health data? Where specific budgetary allocations made to support these measures?

a) Please describe, and quantify when possible, the impact of policies/measures to promote the adoption of digital health technologies and the sharing and use of health data in response to COVID-19 (e.g., number of teleconsultations, acceleration of AI, etc.)

Question 2: Digital health and data

The responses received have been divided into four categories: 1) centralisation of data; 2) facilitating uptake of digital technology and exploiting telemedicine; 3) provision of information and tools to the public; and 4) facilitating research.

Centralisation of data for monitoring and operational purposes

Monitoring and coordinating health services during the pandemic required modification of existing data collection systems. Specifically, countries included additional data items and clinical definitions for COVID-19 into their existing information systems. In some countries there was the requirement to adapt or modify data protection laws and regulations.

Most countries adopted an approach of centralising the data from several different sources, for example, in Spain information about COVID cases, hospitalisations, vacant hospital beds, ICU use, and outcomes was centralised to

a daily dashboard. Countries also developed national contact tracing systems. This was especially important for countries with federated or decentralised health systems.

Canada discussed the need for close collaboration between federal and provincial/territorial governments in a federated system. As the pandemic continued Canada launched a pan-Canadian Health Data Strategy whose aim was to identify and address COVID data gaps in the short term and address persistent, long-term issues hindering optimal health data collection, sharing and use. A national COVID-19 case dataset was developed to aid complete collection. Switzerland also discussed introducing digital systems for interested cantons for data collection that also allow the transfer of data to the national contact tracing database.

China discussed the establishment of a special coordination mechanism to gather data. France discussed the adaption of systems for monitoring attacks and exceptional health situations to count patients hospitalised for COVID-19. Indonesia replaced paper based systems with digital versions, allowing greater centralisation and use of data. Australia discussed the strengthening of their Australian Immunisation Register, with changes to include COVID-19 vaccinations. Additionally, a Clinician Vaccine Integrated Platform was developed to allow the inclusion of information from practitioners without clinical software systems to the Australian Immunisation Register. Several countries introduced solutions to capture data and provide quicker access to results for travellers and those crossing borders. For example, Canada introduced ArriveCan, to optimise the collection of information from travellers and increase the sharing of information with provinces and territories.

Singapore uses the TraceTogether application/token to supplement contact-tracing efforts through Bluetooth handshakes. While Bluetooth exchanges are stored in the application/token itself and only released with permission when the need to contact-trace arises, users' identification details and contact numbers are stored in a secure government server.

Republic of Korea developed Epidemiological Investigation Support System (EISS), which is designed as a comprehensive tracing and tracking data collection and analysis, to support rapid and efficient epidemic investigation. 'Smart quarantine system' has also been launched, which digitalised all relevant documents and information submitted from travellers and facilitated those dissemination during the entry process at borders including self-reporting mobile applications.

The Russian Federation discussed their experience with a digitisation project involving drug labelling. From July 2020 all medicines were included in the system allowing detailed knowledge of consumption patterns.

Countries which had recently upgraded their data infrastructure, for example Turkey, found that these changes did not require extra funds.

Table A.2. Examples of funding and programs to centralise data for monitoring and operational purposes.

Country	Examples	Financing
Australia	Expanding ease of gathering data for the immunisation register	
Canada	Pan-Canadian Health Data Strategy to identify gaps. COVID-19 national case dataset development.	
China	Development of a special coordination mechanism to collect data form multiple relevant government departments.	
France	Adapting current systems for administrative monitoring to COVID-19	
Germany	DIVI Registry (https://www.divi.de/). Development of a system to register capacities in intensive care units throughout Germany on a daily basis	
Indonesia	Move from paper based to digital systems with	

Country	Examples	Financing
	regional and central data aggregation.	
Italy	Centralised data for epidemiological monitoring.	
Republic of Korea	Centralised data collection and analysis system for epidemic investigation (Epidemiological Investigation Support System (EISS))	
Russian Federation	Centralised data for epidemiological monitoring. Centralised data for monitoring of vaccinations and vaccine safety.	
Saudi Arabia	Data aggregation with a Command and Control Center (CCC) and a National Health Emergency Center receiving epidemiological and monitoring data.	
Singapore	Although Bluetooth data exchanged using TraceTogether is stored in the app/token and only released on permission when the need for contact tracing arises, users' contact number and identification details are stored in a secure government server.	
Spain	SERLAB: results of all diagnostic PCR and antigen tests done in Spain, received daily. REGVACU: nationwide register of COVID-19 vaccination, updated daily. CMC: National Healthcare capacity dashboard, with the daily updated information on the available resources of 567 public hospitals in Spain (beds, beds in ICU, COVID discharges, masks etc.)	Approximately 5 million euros in cost
Turkey		Investments made prior to the pandemic meant that additional funding was not required
United Kingdom	Development of NHS COVID-19 data store which aggregated data from the NHS, partner organisations and social care in England	
United States	Statues requiring every laboratory to report results to the Secretary of the Department of Health and Human Services.	

Note: The questionnaire focused on the main challenges and most successful strategies. A lack of reporting does not infer the strategy was not enacted.

Facilitating uptake of digital technology and exploiting telemedicine

Countries introduced policies and investments to increase the update of digital technology. All countries reported an increase in the use of telemedicine and other digital technologies to avoid face-to-face consultations. The infrastructure was supported by recent investments (for example, Saudi Arabia) or bringing forward planned investment (France). Most countries described training initiatives associated with the widespread use of telemedicine.

Argentina has launched the program IMPULSA promoting the use of digital technologies. One of the objectives of the IMPULSA program is to reduce the technological gaps between districts. Argentina has also established a National Commission for the Evaluation of Health Technologies (CONETEC) which will issue recommendations on the incorporation, use, financing, and coverage policies for health technologies including digital technologies.

The Government of Canada, in May 2020, announced an investment of $240.5M, of which $200M is helping provinces and accelerate their efforts to meet health care needs through virtual tools and approaches. This funding

will support: secure messaging and information-sharing; secure video-conferencing technology; remote patient monitoring tools; patient access to COVID-19 and other lab results; and, the integration of new tools and approaches into existing digital health systems. In addition, federal, provincial and territorial governments are working collaboratively to develop a shared policy framework, which identifies barriers and opportunities for longer-term adoption of virtual services as a critical aspect of publicly-funded health systems.

The United States Department of Health and Human Services introduced the Strengthening the Technical Advancement & Readiness of Public Health via Health Information Exchange Program (STAR HIE Program) to strengthen and expand the health information exchanges that support public health agencies.

There was the development of specific information technology solutions for monitoring patients, with both COVID and non-COVID related conditions, for example the United Kingdom developed remote monitoring apps for cystic fibrosis, and several countries developed apps for remote monitoring of suspected and recovering COVID cases. The United Kingdom discussed the importance of finding the appropriate technological solutions that are appropriate for people in long term care. Australia discussed the importance of expanding telehealth to rural and remote communities. The United States had provided funding to support telehealth access to rural and underserviced communities.

Germany has established a Future Programme for Hospitals which generates resilience by providing necessary investments in modern emergency response capacities and better digital infrastructure, in health IT and cybersecurity, and in the development and strengthening of regional care structures. €3 billion will be made available from the federal budget for this purpose. Co-financing by the federal states (Länder) or the hospital owners is planned to the tune of €1.3 billion. Because it is a policy priority to achieve a rapid improvement of digitization in hospitals, the respective funding program already applies as of 2021

Funding arrangements were altered to allow a greater number of providers to engage in telehealth. These changes have resulted in a dramatic increase in telehealth consultations, for example, France reported a hundred-fold increase in telehealth consultations, from 10,000 per week to 1 million per week. Other countries reported similar increases, with the United Kingdom reporting that 80-90% of appointments were managed remotely and 99% of the population having video consultation availability with their General Practitioners. Australia reported the delivery of over 56 million telehealth services between March 2020 – April 2021 (with AUD2.9 billion paid in benefits) for COVID-19 telehealth services. There was also an increase in Australia of electronic prescribing. The Russian Federation reported more than a doubling of telemedicine consultations in 2020 compared to the previous year.

Table A.3. Examples of funding and other strategies to support telehealth.

Country	Investment	Changes for providers	Training
Australia	The 2020-2021 budget included a AUD2.4 billion investment in telehealth.	Additional items for telehealth listed on national insurance scheme.	
Canada	CAD240.5 million to accelerate efforts to use virtual and digital tools and approaches.		
France	Pre-existing 2-billion-euro investment in deploying digital health.	Wider variety of providers able to claim 100% coverage of telehealth by compulsory insurance	Online catalogue of digital COVID-19 tools.

Country	Investment	Changes for providers	Training
Germany	Increased reimbursement on case by case basis. Future Programme for Hospitals (3 billion) for the improvement of digitization of hospitals	Insurance funds and providers extended the use of telehealth	Information provided by National Organisation of Statutory Health Insurance Physicians (Kassenärztliche Bundesvereinigung)
Italy	Planned investment of more than 1 billion Euros.	National indications for telemedicine were defined.	
Saudi Arabia		Development of remote clinics for cardiac and diabetic patients	Widespread training
United Kingdom	Over 4,000 laptops and 18,000 smartcard readers have been deployed to clinicians. Funding of GBP15 million was made through the GP Forward View Program. (Data is for England)		
United States	USD15 million to provide training and USD15 million to support telehealth in maternal and child health. USD11.6 million to support rural and underserved communities. USD5 million to assist telehealth clinicians on licensure and credentialing. USD8 million for telehealth broadband capacity.	The US Centers for Medicare and Medicaid expended the eligible standards associated with reimbursement to include more services. Commercial insurers implemented similar changes.	Widespread training

Note: The questionnaire focused on the main challenges and most successful strategies. A lack of reporting does not infer the strategy was not enacted.

Australia discussed how universities and specialist medical colleges switched to using information technology systems for teaching, providing remote clinical supervision and summative assessments. This ensured the progression of health professional students and medical specialists through training and into the workforce.

In the United States the CARES Act provided HHS $4.1 million in funding for Area Health Education Centers to support current recipient's telehealth education and training activities to prevent, prepare for, and respond to

COVID-19. Education and training activities focus on providing telehealth-enabled COVID-19 screening and testing, case management and outpatient care, continuous professional development, and innovative technologies.

Provision of information and tools to the public

Aggregated data was available to the public in most countries. This required developing methods to share the information. Japan described the use of a multidisciplinary centre of excellence approach to developing specified risk communication to the public.

Digital technologies were also used to increase screening participation and to engage in track and trace efforts. Many countries developed mobile phone-based identification and notifications of contact with a positive case. Indonesia used digital health technologies to increase community participation in self-screening for COVID-19.

Facilitating research

Several countries facilitated the use of data associated with the COVID-19 pandemic for research purposes. Policies included making pseudonymised data available for use for research.

China, Germany, Japan and the United Kingdom described the use of Artificial Intelligence (AI) to improve the treatment of patients. Germany described the use of AI to personalised treatments and processes. An AI centre was established at the Robert Koch Institute in Germany. China discussed that the use of AI in diagnosis of COVID-19 has improved the sensitivity of COVID-19 diagnosis and alleviated the work pressure on health workers. The United Kingdom's NHS AI Lab launched the National COVID-19 Chest Imaging Database. Japan used AI in their follow up tools.

Table A.4. Examples of funding and other strategies to support research.

Country	Investments	Policy changes	Other items
Germany	Development of a comprehensive research network with funding of 150 million Euros	Introduction of the instrument a lead data protection authority for health research and health services research projects with participation from several federal states (§ 287a SGB V). Establishment of a comprehensive Research Data Centre at the Federal Institute for Drugs and Medical Devices – BfArM (§ 303a-f SGB V)). Introduction of a voluntary data release scheme for treatment data from electronic health records as of 2023	
United Kingdom	TechForce-19 Awards,		

Country	Investments	Policy changes	Other items
	19 digital innovators funded for GBP25,000 for proposals to support vulnerable people during the pandemic. (Data is for England)		
Canada		Canada is a member of the Global Research Collaboration for Infectious Disease Preparedness (GloPID-R), which in February 2020 partnered with the WHO to identify research priorities and create the COVID-19 Coordinated Global Research Roadmap. GloPID-R has a working group on data sharing and has developed a Roadmap for Data Sharing in Public Health Emergencies to help accelerate effective data-sharing.	

Note: The questionnaire focused on the main challenges and most successful strategies. A lack of reporting does not infer the strategy was not enacted.

International cooperation and coordination was considered to be important to creating efficiencies, maximizing the use of global resources and gaining the most from the data. Common international data standards would increase the comparability of data. This may also allow aggregation of data and cross-border collaboration. An existing mechanism, involving several funding agencies from the G20, that is advancing data sharing policy is the Global Research Collaboration for Infectious Disease Preparedness (GloPID-R).

2.3 How can more international cooperation and coordination facilitate the adoption and use of digital health technologies?

An international forum for sharing best practices and experiences was considered beneficial. Several countries suggested role for the Global Digital Health Partnership.

Some countries discussed the benefits that may arise from technical exchanges, for example, the interoperability issues of COVID apps. The HL7 International Patient Summary was discussed by the United States as a standard for use in cross-border scenarios. Italy discussed the importance of international development of open source tools. Germany discussed the benefits of international cooperation in digital data across the European Union, especially with regard to data on tracing apps.

Several countries discussed that the interoperability of data around vaccination will be important in the future. GAVI suggested that the adoption and use of digital health technologies should be planned and implemented with a long term lens with the capacity that when an emergency occurs adaption occurs rather than building an additional non-

sustainable ad hoc solution. The Global Fund echoed this view, highlighting the importance of integration and leverage of current data systems rather than the creation of new parallel systems.

Question 3: Workforce

> 3.1 What were the innovative solutions and top lesson learned from the practices adopted in the short term in your country to increase health workforce deployment to respond to the growth in during for care during the pandemic?

Countries suggested three main policy levers in the short term.

- Increasing the number of health workers, for example, early release of students to the workforce.
- Deploying the existing health workforce, for example, deploying heath workers from less impacted regions to more impacted regions.
- Protecting and extending the available health workforce, for example, incentives for part-time health workers to work extra hours.

Australia highlighted the need for the workforce to be flexible to be able to address increased needs associated with the pandemic. Specific examples included the formation of response centres to coordinate deployment of the workforce and the use of additional teams (both Australian Defence Force and civilian) to provide medical support and infection control.

China discussed the importance of redeploying the medical workforce to the hardest hit areas “During the outbreak, we dispatched best doctors and nurses to hardest hit cities, and more than 10,000 nursing staff were seconded to isolation wards, intensive care units, etc. We also trained intensive care nurses to improve their nursing services, which has enhanced the treatment capacity of the designated hospitals.”

Germany discussed that available nursing stuff, especially ICU staff, were the limiting factor.

Indonesia highlighted the requirement to have monitoring data on the workforce to facilitate the redistribution of health workers between provinces to balance supply of workers.

Italy discussed that the main lesson learnt was the requirement to invest in a workforce with the right skills, continually investing to ensure that the skills of the workforce are regularly updated.

In Republic of Korea, the government revised the ‘Infectious Disease Control and Prevention Act’ to expand and secure the recruitment of epidemic investigation personnel in the central and local governments. In addition, to mitigate the pressure on healthcare workforce in the hospitals, ‘residential treatment centres’ have been established, which are temporary isolation and close monitoring facilities for mild or asymptomatic COVID-19 patients.

Singapore highlighted some of the differences between the COVID-19 pandemic and the previous SARS pandemic in 2003. The COVID-19 pandemic required a larger, national, response, whereas SARS was managed by selected healthcare institutions. This difference informed the approach to additional recruitment undertaken by Singapore. Singapore has also trained staff in isolation hotels in the use of PPE to mitigate transmission risks from imported cases.

The United Kingdom discussed that at the beginning of the pandemic there was an urgent need to strengthen the health and wellbeing of the workforce, given the demands that were being placed on them.

Table A.5. Cited examples of lessons to increase workforce availability in the short term.

Country	Increasing available health workforce	Deploying existing workforce	Protecting and extending available workforce
Argentina	Volunteer Registry		National Care Plan for Healthcare workers enacted
Australia	Release of students A pandemic sub-register for non-practicing health workers to return to the workforce.	Deployment of the Australian Defence Force and Medical Assistance Teams	
Canada	Recruiting and training volunteers to provide support to long term care facilities. Increased funding to support wages and training for support workers.	Deployment of professionals from non-traditional settings, such as the military to support the overall response. . Other health professionals, such as pharmacists, paramedics, dentists provide surge capacity in areas of response such as vaccination, testing. Federal government employees provided support for contact tracing	The federal government supported the provinces and territories with the provision of PPE, contact tracing and vaccines.
China		Deployment of health workers to areas of need. Increased training of ICU nurses	
France	Increased resources into locating and matching those looking with work with opportunities.	Ensured redeployment of skilled staff with field hospitals. Changes in regulations to allow veterinarians to administer vaccines.	
Germany	Release of students.		Creating incentives for previously part-time healthcare workers to increase their hours.
Indonesia	Central and local governments implemented a volunteer recruitment program and provided incentives for them. Volunteers recruited by Ministry of Health will receive benefits: certificate of merit from Ministry of Health, financial remuneration, transportation reimbursement (for volunteers from different domicile areas), healthcare insurance (BPJS Kesehatan) and social security insurance (BPJS Ketenagakerjaan).	Reallocation of health workforce to COVID hospitals Use of non-laboratory staff for testing and contact tracing	Central and local governments provided the following for the health workforce: prioritized COVID-19 vaccines and testing, appropriate PPE, and a comprehensive contact tracing procedure. The government also provided financial incentives for health workforce stationed in COVID-19 hospitals.
Italy	Increased funding to public healthcare providers to increase recruitment of health workers.		
Japan	Increased resources into locating and matching those looking with work with opportunities.	Redeploy health workers to replace infected workers	Strategies to reduce the physical and mental burden of health workers, including

Country	Increasing available health workforce	Deploying existing workforce	Protecting and extending available workforce
			childcare services, accommodation, and prevention of discrimination
Republic of Korea	Revising the law for more recruiting and securing central and local epidemic investigation personnel		Establishing 'residential treatment centres' for mild and asymptomatic cases substituting hospitals
Russian Federation	Volunteer students from medical organisations were deployed. Additional incentive payments were established for medical staff.	Mobile medical teams were formed for use in the most affected regions.	Recommendations developed to reduce the burden medical workers.
Saudi Arabia	Extending the registration of practitioners that had expired.	Increased training and formation of specialist public health units.	Recall of contacted practitioners.
Singapore	National call to provide reserve heath workforce. Worked closely with Singapore Airlines Group to redeploy aviation workers. Facilitate safe and earlier entry of students into the workforce	Partnership with private providers to deploy workforce to support public institutions. Reskilling existing workforce for anticipated in demand skills, for example, intensive care skills.	Singapore has also trained staff in isolation hotels in the use of PPE to mitigate transmission risks from imported cases.
Spain	- Release of non-specialist doctors. - Recruitment of retired or non-longer practising professionals. - Recruitment of health professionals with non recognised foreign qualifications.	Continuous professional development to maintain core competencies.	Increased annual places in specialist training centres
Switzerland	Recruitment of retired or non-longer practising professionals Recruitment of students	Support from army units and civil defence Coordination between institutions and creation of databases where health professionals could register their intent.	Adjustment of billing regulations to facilitate the provision of online consultations
Turkey	Over 40,000 new personnel were recruited. During the COVID-19 pandemic, number of employed Syrian healthcare workers were increased to provide better health and care services to Syrian people under temporary protection in our country.		Annual leave and resignations of workers postponed during the pandemic.
United Kingdom	Early graduation of medical professionals Brought back staff who had left in last three years. Legislation to allow re-registration.	NHS established National Workforce Supply Routes workers and volunteers in several areas, for instance community pharmacy and	National program of health and wellbeing for staff

Country	Increasing available health workforce	Deploying existing workforce	Protecting and extending available workforce
		general practice[32].[33]	
United States	Additional funding for programs designed to recruit and train healthcare workers for practice in rural and underserved communities.	Funds provided to boost licencing for providers to engage in telehealth across state borders. Changing of criteria to allow providers to receive credit for activities such as COVID-19 testing centres.	

Note: The questionnaire focused on the main challenges and most successful strategies. A lack of reporting does not infer the strategy was not enacted.

GAVI discussed their involvement in providing technical assistance and cold chain equipment to support countries as part of the COVAX advanced market mechanism. Funding of USD$150 million supported these initiatives and 400 staff are being recruited. Due to growing concerns about the lack of delivery support GAVI are taking a more active role in delivery funding to ensure a successful rollout of COVAX vaccines.

3.2 Please describe the main policy priority to increase the availability and flexibility of health workers in the medium-term and longer-term, in primary care, hospitals, and long-term care.

Most countries suggested similar approaches to ensuring a long-term healthcare workforce that can respond to future challenges. These were increasing numbers of training places, increased mutual recognition for foreign health workers, ensuring employment after training, improving pay and conditions, increased training and more defined career paths.

Additional policies were described in the responses.

- Australia is working towards understanding and estimating the capacity of the workforce, especially elements that may not be fully utilised. For example, workers not practicing or working part-time. Australia is intending to remove the barriers so that services can be delivered when required.
- Canada will support provinces and territories in ensuring standards for long-term care are applied and permanent changes are made. To keep seniors safe and improve their quality of life, the federal government will work collaboratively with provinces and territories, while respecting their jurisdiction over health care, including long-term care. This work would ensure seniors and those in care live in safe and dignified conditions.
- China is improving the conditions within healthcare institutions. This includes the improving the protection and working conditions of health workers.
- France is planning to promote continuous professional development, especially in areas identified to be in short supply during the pandemic.
- Germany launched a new generalist carer training scheme in 2020, in which trainees will be qualified to care for all age groups. This approach is expected to increase the flexibility to work in diverse settings.
- Indonesia is working towards increasing the awareness of the importance of workload evaluation of the

[32] https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2021/01/C1067-covid-19-access-to-national-workforce-supply-routes-for-community-pharmacy-v1-27-jan-2021.pdf
[33] Coronavirus » Access to National Workforce Supply Routes for Primary Care Network (PCN) Groupings (england.nhs.uk)

health workforce.

- Italy discussed their multi-pronged approach to ensuring that there is an increase in the medical workforce, accompanied by increased education and training. The objective is to develop integrated care networks are developed replacing the hospital as the centre of the organisation of healthcare.
- Japan has implemented financial support, including special subsidies for hospitals and local governments for recruitment and training.
- Republic of Korea suggested enhancing global cooperation to strengthen health workforce capabilities through, for instance, establishing an online training platform which provides updated information necessary to respond to emergencies.
- The Russian Federation developed interactive courses for medical personnel. Extending their skills and qualifications.
- Saudi Arabia discussed their plan to create programs to train non-specialist doctors for skills that will be required during pandemics, for example, operating and managing ventilators.
- Singapore has Professional Conversion Programmes which trains mid-career individuals allowing them to switch to becoming healthcare professionals.
- The United Kingdom, for eligible students, will provide an additional funding. Each part of the UK has its own bursary offer. For example, in England GBP5,000 funding per academic year and up to GBP3,000 to support students with childcare costs, students studying specialist subjects and in areas struggling to recruit.
- The United States, through the American Rescue Plan of 2021, will provide USD200 million for funding of the Nurse Corps Program. The Department of Health and Human Services allocated USD183 million to support nursing education and training. There was additional funding for Centres of Excellence to train health professions on providing telehealth case management.

3.3. How could more international cooperation and coordination help ensure a sufficient supply of health workers to strengthen health system resilience and effective responses to public health emergencies in all countries?

Most countries suggested that increased international coordination and cooperation involving health workers would benefit health system resilience in the future. Specific examples included sharing of best practice approaches to training and recruitment.

Some countries noted that there was a benefit from moving health workers across national borders to treat and the move COVID patients and this would benefit from a multilateral approach.

Liability and mutual recognition were highlighted by Germany as important factors when considering sending medical teams abroad. The United States discussed the benefits of enabling inter country staff exchanges to assist with outbreak investigations. The United States also discussed the benefits from the field epidemiology training programs. Italy discussed the benefits of a common framework for categorising health workers, identifying equivalent professional profiles.

The Global Fund highlighted the importance of continuing investment in community health workers as the first line in an infectious disease response. The Global Fund explained that most countries they support had challenges, including high turnover, a lack of data and poor working conditions. The Global Fund suggested that four key principles in workforce be adhered to: sustainability, evidence based, invest in competencies and an environment for integrated people centred approaches and strategic partnerships with other global initiatives.

Question 4: Supply chains

4.1 What was the main challenge for your country in procuring and maintaining sufficient supplies of medical products needed to respond to the COVID 19 pandemic?

4.2 What strategy was most successful?

4.3 Has your country modified its trade policies to ensure sufficient supply of medical products during the pandemic?

Most countries discussed the challenges in obtaining supplies during the COVID-19 pandemic.

Australia discussed the rapid increase in demand for selected supplies and their reliance on importation. They estimated that over 90% of medicines were required to be imported. PPE manufacturing was supported by addressing market shortages including expanding domestic production of essential goods.. Disruptions of air and sea freight added complication.

Canada discussed their position as a net importer on pharmaceuticals. Shortages of pharmaceuticals were an issue prior to the pandemic. Canada discussed the difficulty of being a net importer with shortages in pharmaceuticals and medical devices. “For example, during the early months of the pandemic, there were 592 shortages reported in Canada compared to 441 during the same months in 2019. In 2019, Canada experienced 10 critical drug shortages, compared to 47 critical drug shortages since the beginning of the pandemic.” They also identified a limited domestic production capacity as a challenge to be addressed. Canada also discussed the impact that export restrictions had on their supply chains. They also discussed the challenges with inconsistent international standards and certification. Canada noted that retooling and increasing domestic production may be associated with quality control issues. “Canada’s Made in Canada approach mobilised industry partners to ramp-up and re-tool to manufacture medical supplies and equipment, but some manufacturers experienced challenges with quality control and standards.”

France discussed the tensions in the world market and the main challenge was securing orders and mismatches between the quantities ordered and received.

Germany commented that “...at the beginning of the COVID-19 pandemic, all stakeholders were called upon to supply, prescribe or apply the available resources (particularly medicinal products) in an appropriate scope. In addition, the Federal Institute for Drugs and Medical Devices has issued recommendations to pharmaceutical companies and wholesalers on allocation of medicinal products. The competent authorities in Germany are also in constant exchanges with stakeholders in order to take early action against possible supply shortages. For Germany maintaining robust supply chains, especially through diversification, high quality standards and domestic production, are key elements in ensuring adequate supply of medicinal products. Identification of vulnerabilities in pharmaceutical supply chains and solutions to strengthen security of supply is of utmost importance for Germany. In this context, transparency helps to identify vulnerabilities in supply chains and to develop targeted solution options”.

Indonesia discussed the challenges in finding suppliers, especially for PPE and diagnostic equipment. This was because of the limited supply and demand from other countries at the same time. There were also challenges in the regulation associated with importation.

Republic of Korea noted that, the government facilitated local production of personal protective equipment (PPE) and diagnostic equipment to stabilise the domestic supply, with technical and/or financial support for additional development and approval process of medical devices (diagnostic kits, Low Dead Space syringe for vaccine administration, etc.) and pharmaceutical products (e.g. shortening the emergency review period from 180 to 40 days, while

establishing a three-tier system to protect the safety, composed of the Advisory Committee, the Central Pharmaceutical Advisory Committee and the Final Evaluation Committee for a more rigorous examination).

The Russian Federation discussed their introduction of tax incentives co-financing and subsidies for companies.

Switzerland discussed that changes in the type and amount of material required with the pandemic disrupted the established procurement processes. There were no production facilities for some supplies in Switzerland and new suppliers had to be found. The rapid changes in the technology for testing made stockpiling difficult. For the vaccines new distribution systems had be set-up.

Australia discussed that countries in the Indo-Pacific region faced shortages of key supplies. Australia highlighted that "in Pacific Islands, supply chains were disrupted by the cessation of regular air transport routes which introduced delays and additional complexity." The increase in the volume of new procurements also caused difficulty in evaluating the options in relation to appropriate standards and requirements.

Singapore commented that they "had anticipated a severe global mask shortage and ensured sufficient reserves in the national stockpile to provide masks for all 1.3 million households in the country at the start of the pandemic. Apart from increasing local production to ensure the sustainability of its healthcare systems, the stockpile was also carefully managed to meet the needs of our healthcare workers".

Table A.6. Examples of strategies used to address supply chain limitations.

Country	Anticipation and national approach	Diversification of supply chains	Increasing domestic production	Changes in trade policies
Argentina	Established a fund for purchasing supplies and equipment	Donations of supplies from the private sector.		Elimination of tariffs for selected goods.
Australia	Joint approach with industry in understanding supply chain issues and find solutions.	Funding for the International Freight Assistance Mechanism.	Identification and support of local manufacturers in expanding production.	Temporary export controls Tariff concessions
Canada	National approach to inventory acquisition.	Regulatory changes to allow access to disinfectants and hand sanitisers.	Mobilised industry partners to re-tool and increase production.	Special regulations allowing importation in exceptional circumstances.
China	National coordination and an emergency procurement strategy			Tightened the quality supervision of some medical and non-medical anti-epidemic material.
France	Identification of needs in conjunction with a national strategy.			
Germany			Supporting expansion of domestic production for PPE & COVID-19-	

Country	Anticipation and national approach	Diversification of supply chains	Increasing domestic production	Changes in trade policies
			vaccines	
Indonesia	Reserving medical face masks for health workers.	Business expansion/ diversification of some manufacturers to medical devices.	Research acceleration by academic researchers and local manufacturers to develop medical devices used in COVID-19 containment measures.	Provisional simplification of licencing requirements and processes for certain medical devices
Japan	Joint approach with industry in understanding supply chain issues, and establishing a fund for acquiring sufficient supplies and equipment.		Increased domestic production.	
Republic of Korea	Technical and/or financial support for development and approval process of essential medical equipment and pharmaceutical products		Expanding local production of personal protective equipment (PPE) and diagnostic equipment to meet the soaring need	Simplifying the customs process for imported masks
Russian Federation			Increased domestic production.	A temporary export ban. This was not applied to humanitarian aid.
Saudi Arabia		Identification of local resources.		
Singapore	National approach to acquiring supplies and sufficient reserves in the national stockpile to provide masks for all 1.3 million households in the country at the start of the pandemic	Mounting cargo flights to allow non-traditional suppliers.	Stepping up local production of surgical masks and its components (e.g. meltblown polypropylene).	Import licence not required for surgical masks. Elimination of tariffs for essential goods.
Spain	Development of web based	Transformation of some manufacturers to medical	Interaction with the Ministry of Industry to	Extraordinary authorizations to import medical devices in

Country	Anticipation and national approach	Diversification of supply chains	Increasing domestic production	Changes in trade policies
	application for sharing information about essential medicines on a daily basis. For different types of medical device, request information on existing stocks. Identification of all relevant stakeholders and maintenance of a dialogue to identify problems.	devices. Seeking alternative sources of critical components, active ingredients, etc… and providing governmental support to procurement/importation.	identify several manufacturers of medical devices for increasing their production capacity or develop new production lines	Spain
Switzerland	Stockpiling at a national and regional level. Monitoring use of medicines and redistributing			Facilitating authorisation of new medical protective equipment.
Turkey	Pre-existing policies for personal protective equipment reduced impact of supply chain disruptions.			
United Kingdom	International sourcing unit created			
United States	National approach to strategic investments in the US Strategic National Stockpile. Publication of shortages of medical devices.	Project Airbridge chartered aircraft to bring PPE from factories abroad.	Accelerated domestic production of ventilators using private companies (for example Ford, GM and GE)	

Note: The questionnaire focused on the main challenges and most successful strategies. A lack of reporting does not infer the strategy was not enacted.

Other strategies

Switzerland took a combined procurement strategy. Procurement was decentralised but if it was not possible organisations could ask for central assistance and the army pharmacy subsidiary procured the required good under the authority of the Federal Office of Public Health.

Table A.7. Provided quantification of investments in supply chains and acquisition.

Strategy	Quantification
Anticipation and national approach	**(Argentina)** A special fund of ARS1.7 billion for purchasing equipment and supplies
Increasing domestic production	**(Australia)** An AUD1.5 billion strategy Modern Manufacturing Strategy that included $107.2 million for a Supply Chain Resilience Initiative. This initiative aims to strengthen Australia's ability to access critical products including medicines, to better position Australia to respond to future supply chain disruptions
Diversification of supply chains	**(Australia)** Australia committed an additional AUD$241.9 million to continue the International Freight Assistance Mechanism.

Note: The questionnaire focused on the main challenges and most successful strategies. A lack of reporting does not infer the strategy was not enacted.

> 4.4 Where would stronger international cooperation be beneficial in ensuring reliable supplies of goods that are essential to future health emergencies? What form should it take?

Most responses discussed the need to increase transparency of supply chains to allow decision-making to be made with full information.

Argentina discussed that increased local production could be facilitated by increased efforts in technology transfer. They also noted that current speculation and undue stockpiling may be hindering equitable access to safe and effective vaccines.

Australia considered there was a significant role for the WTO in ensuring an open and transparent supply of critical medical products. They noted their advocacy for the Trade and Health Initiative to improve trade in health products.

Canada discussed that increased consistency or reciprocity of recognition of standards may lessen the impact of inconsistency in standards on supply chains. The International Coalition of Medicines Regulatory Authorities (ICMRA) was discussed as an appropriate international forum. Other suggestions included removing trade barriers, international alerts for supply chains and harmonisation of regulatory standard.

China noted, using the example of G20 trade, the requirement to strengthen cooperation in trade rules, trade facilitation, and transparency among other issues.

France discussed the requirement for the Joint Procurement Agreements supported by the European Commission to be more response in the time from need being expressed and the time of arrival of the supplies. They noted the potential for coordination between the EU and G20 to be beneficial in improving supply chains.

Germany discussed the vulnerabilities in the supply chains for pharmaceuticals and highlighted that ensuring transparent supply chains and robustness through diversification is part of the Pharmaceutical Strategy for Europe. Global collaborations such as the "Access to COVID-19 Tools (ACT) Accelerator" help to ensure equitable access to safe, affordable and effective COVID-19 control tools (vaccines, treatments, and diagnostics). Germany supports all pillars of the ACT Accelerator.

Indonesia suggested that stronger international cooperation to ensuring reliable supplies of good was required, to ensure access to goods and to ensure timely supply to LMICs. Some of the suggested mechanisms were technology transfer and local production, exemption to importation tariffs, prompt data and information exchange on supply levels of pandemic related necessities (such as medicines, oxygen, PPE and medical equipment) and bilateral/multilateral cooperation in provision of medical devices.

Republic of Korea stressed that in order to effectively respond to future health crises such as COVID-19, it is required to reinforce mutual assistance and cooperation of the international community for swift approval and distribution of medicinal products and information gathering. Also, sharing information on medicinal products, such as information on approval and development and clinical data, is required to minimise disruptions in distribution caused by differences among countries.

Successful international cooperation examples

Argentina noted their bilateral relationships with reciprocal donations of supplies, equipment and training. They also noted their efforts to harmonise measures and define joint working areas with other countries.

China discussed their joint cooperation with multiple countries on foreign aid, research and development and the production of vaccines. China noted the current actions of G20 which have aided the stabilisation of the global industrial chain. They also noted their work in association with the WHO and UN.

The Russian Federation discussed the Eurasian Economic Union, which approved a list of critical import goods for which a tariff concession was provided when imported into the member states.

Question 5. Financing

> 5.1. What was your top lesson learned from the practices adopted in your country to mobilise additional resources in the context of tight fiscal constraints in response to the pandemic? What are the lessons learnt for long-term financing of resilient health systems?

Building flexible and agile financing systems for health emergencies is an essential element of pandemic preparedness. During this pandemic, countries found proactive financing was an asset, not only for the implementation of health responses for outbreaks, but also for supporting the community. In this process, rapid decision making by governments taking account of scientific and political considerations; and proactive communication between health and other ministries including finance was crucial for timely responses.

Table A.8. Examples and suggestions for financing to mobilise additional resources during the pandemic.

Components	Country experiences and suggestions
Proactive investment and flexible financial support to minimise the impact of pandemic	**(China)** The Ministry of Finance of China quickly developed policies to ensure funds for epidemic prevention and control, and issued a subsidy fund of 56 billion yuan. It was used to provide support for the treatment of patients, temporary work subsidies for public health workers, special equipment for protection, diagnosis and treatment costs, and procurement of rapid diagnostic reagents, etc. In 2020, all levels of financial investment related to epidemic prevention and control in China exceeded 400 billion yuan. **(Germany)** Although the Federal States are responsible for financing the health offices (Gesundheitsämter) on the local level, the Federal Government has allocated a funding of in total

Components	Country experiences and suggestions
	€4 billion for the implementation of the "Pact for the Public Health Service" – especially in order to finance additional jobs in the health offices and digitalisation. **(Saudi Arabia)** The Health Endowment Fund was established which aimed at supporting the government efforts to combat the COVID-19 pandemic. It launched a campaign to attract financial donations for initiatives such as field hospitals, home care services, and mobile clinics. **(Singapore)** Being responsive to the changing needs of households and businesses amidst the pandemic is important. Singapore rolled out five Budgets in quick succession between February 2020 to August 2020 and committed close to S$100 billion to fight COVID-19 - to help preserving jobs and cushioning the pandemic's impact on businesses and households, and supporting the swift and timely implementation of public health measures.
Multisectoral communication and cross-sectoral coordination	**(Indonesia)** It is important to galvanise cross-sectoral coordination's with all the relevant sectors to mobilise additional resources in response to the pandemic. In Indonesia, this has not posed significant problems because the government has initiated this effort since the beginning of the pandemic by requesting all the ministries/bodies to divert and refocus their budget for fighting the pandemic.
Support for international organisation	**(Australia)** There has been an under-investment in WHO's emergency preparedness and response capacities due to a lack of predictable financing. Sustainable, reliable and predicable funding is necessary for WHO to not only respond quickly and effectively to health emergencies, but to also strengthen global health systems. It underpins WHO's ability to strengthen its capabilities across all levels and flexible voluntary contributions may encourage WHO's action to build those capacities by its own prioritisation based on available resources.

Note: The questionnaire focused on the main challenges and most successful strategies. A lack of reporting does not infer the strategy was not enacted.

5.2. How might more international cooperation and coordination assist work to mobilise additional resources?

Most countries suggested that international cooperation is essential to mobilise resources particularly to reduce the gap between high income and low and middle income countries [in preparedness levels and] during the pandemic period. In this regard, the role of the international organisations and international cooperation was emphasised as a prerequisite for improved responses on a global scale.

The importance of supporting low and middle income countries was strongly encouraged in the responses of G20 countries. A variety of proposals were suggested to ensure cooperation - encouraging contributions of G20 countries, alliances for pooling of resources, and utilising contingency funds or developmental banks.

Table A.9. Suggestions for better international cooperation and coordination to mobilise additional resources.

Major components	Suggestions
Affirming the role of international organisations for	**(France)** International cooperation, through the international organisations like WHO and WTO, or the G20, can play a fundamental role to catalyse additional resources: i) by ensuring sustainable financing of institutions playing a central role in preparing the global health response, notably the WHO; ii) by ensuring the development of common standards

Major components	Suggestions
coordinated international response	for multilateral development bank, including on financing health projects, and by working on ways to crowd-in both public and private investments when relevant to develop projects, for instance on health manufacturing capacities. **(Indonesia)** International cooperation and coordination could assist work to mobilise additional resources by engaging relevant international organisations and/or resource-rich countries in mobilising additional resources, and exploring possible international collaborations to mobilise necessary resources, particularly for countries that are in needs.
Urge cooperation among international organisations	**(US)** The leadership of international organisations, especially international financial institutions (IFIs), could be aligned with shared goals and work programs within specific health sectors and countries. There are a lot of initiatives and good ideas to support low and middle income countries, but coordination on issues running from health sector financing and reform to economic support could be improved. **(Germany)** The relevant international Organisations such as WHO, FAO, OIE and UNEP should work closer together. As a first step a One Health High Level Expert Panel (OHHLEP) was established in May 2021. The OHHLEP will give advice to stakeholders and governments on existing gaps on implementing the One Health approach to reduce the risks on emerging zoonosis.
International alliances/funding for additional resources	**(Argentina)** We believe it would be useful that multilateral organisations continue working with Multilateral Development Banks (MDBs) in order to strengthen financial support for low and middle income countries to access COVID-19 tools. **(France)** The need to extend the ODA sources that is still mainly coming from a handful of countries. Non G7 members of the G20 shall increase their financial contributions of multilateral efforts especially in the face of the current pandemic. France hopes for bold G20 commitments in this regard. **(Turkey)** COVID-19 pandemic demonstrated that there is a need for stronger international contingency funds in order to eliminate the damage that underdeveloped and developing countries with fragile economies may suffer during the pandemic. **(UK)** The COVID crisis has demonstrated the importance of large and sustained investment in the research and development of vaccines and other medical technologies outside of crisis periods, and that the cost of dealing with global health threats once they occur could be much greater than the costs of prevention or mitigation. This can be facilitated through continued pooling of resources through international alliances and collaborations, especially where market forces do not encourage investment (e.g. for new antibiotics). **(Russian Federation)** We believe that international organizations like World Bank, IBRD, IMF have to play a core role to mobilize resources for low or middle level income countries.

Note: The questionnaire focused on the main challenges and most successful strategies. A lack of reporting does not infer the strategy was not enacted.

Question 6. Strengthening Public Health Functions

> 6.1. What was your top lesson learned from the practices adopted in your country to build disease surveillance capacity in response to the pandemic?

Many countries noted that timely and trusted public health data was essential to properly respond to outbreaks. Because of the variety in the outbreaks worldwide, proactive utilisation of an adequate testing method is fundamental for surveillance. Many countries suggested that a strong population surveillance system is needed, supported by simple and easy to use reporting and monitoring systems based on digital technology.

Integrated monitoring systems, not only for case reporting, but also to monitor the availability of hospital and human resources were considered crucial to facilitate coordinated and structured responses during the pandemic. Strong commitment for information sharing between central and local governments was emphasised.

Institutionalisation of this capacity was advocated as a solution - for example, Spain will establish a 'National Public Health Center" to provide the technical and scientific analysis of the health situation. This will provide options for responses to health risks and threats for policy makers.

Table A.10. Examples of lessons learned from pandemic and future plans for building disease surveillance capacity in response to the pandemic.

Major components	Examples of lessons learned from pandemic and future plans
Importance of high-quality public health data	**(US)** CDC implements 'Data Modernisation Initiative' to strengthen and modernise its own public health data and surveillance infrastructure, and also supports the efforts of their state, tribal, local and territorial public health partners (e.g. 'National Syndromic Surveillance Program') **(UK)** UK wide unit – Joint Biosecurity Centre (JBC) – was established and brings additional and complementary analytical capacity to build on that already in place at a local and regional level across the UK by; • Accessing a unique and broad blend of health and non-health data • Bringing together multidisciplinary teams of health and non-health experts with modern data science techniques • Using its insights to advise local and national decision-makers on infection rates, the factors driving transmission of the virus and the impact of measures **(Canada)** the pandemic has exemplified the need for access to timely health and public health data to support pandemic response efforts and care delivery. Further, it has shown a spotlight on the long-standing foundational data challenges (standards, interoperability, governance, etc.) that need to be addressed in order to enable data to be used to drive advances in health care. An initiative has begun to scope out how to connect up the different sources of health information and accelerate the shift towards person-centred health data systems. **(Russian Federation)** The speed of information exchange at both the federal and regional levels determines the nature of the response to a pandemic. The pandemic has become a driver for the use of digital technologies in healthcare. **(Germany)** To make use of public health data for research and health policy purposes, we are establishing a nationwide Research Data Center, which enables authorized institutions to use pseudonymised data of statutory health insurance funds.

Expanded surveillance more than case reporting system	**(Spain)** Upon basic case reports, surveillance data needs to be expanded for more wide range of relevant information (e.g. risk behaviours, health determinants, and other health status of population) **(Germany)** In addition to epidemiological surveillance for cases, severity and impact, other situational information (e.g.. available resources and its allocations, intervention implemented in the field) is also crucial for proper response
Information sharing and cooperation between central and local governments	**(Indonesia)** Strong commitment and collaboration between Ministry of Health, Provincial/District Health Offices and other stakeholders to collect and input the data, to do the analysis, disseminate the result, and response promptly to the pandemic situation. A simple, comprehensive and integrated recording and reporting application system for the surveillance system (online) is also essential.
Utilisation of Testing	**(Singapore)** In addition to finding new cases and contact tracing, tests are now widely applied for clearance before patient discharge, start and end timing of quarantine and screening of vulnerable groups and staff working with at-risk groups. PCR test is a gold standard but Singapore combines various testing methods - antigen rapid tests (ARTs) for large scale and higher risk activities and antibody tests for serological surveillance of the population and specific group (e.g. migrant workers).

6.2. What was your top lesson learned from the practices adopted in your country to improve the prevention of priority risk factors, such as obesity?

The COVID-19 pandemic highlighted the importance of the prevention of noncommunicable diseases (NCD), such as diabetes, and of relevant risk factors such as obesity, smoking, substance use and insufficient physical activity. Balancing the epidemic control and providing essential care for vulnerable groups who have chronic conditions was recognised as quite challenging during the pandemic. Addressing NCD is a complex issue that requires a community-wide, multi-faceted approach. Many respondent countries underlined that it should be accompanied with continuing efforts on improving primary healthcare system, encouraging preventive measures, healthy ageing, and structured approach in cooperation with various sectors and stakeholders. Canada also mentioned the importance of integrating mental health with physical health, and that this topic will be covered as a special G20 side event.

Table A.11. Policy examples to improve prevention of risk factors.

Domains	Examples
Promoted online programs for preventive activities	**(Singapore)** When the circuit breaker period was in place, the Singapore government quickly pivoted public health resources and activities from the physical to virtual space - with newly-developed exercise routines and edutainment series uploaded on video sharing platforms or on free-to-air TV. A "stay well to stay strong" campaign was launched online to provide tips and resources on healthier eating, staying active, staying smoke free, and staying mentally positive.
Established a substantial regulation for	**(UK)** In 2020, UK published 'Tackling obesity: empowering adults and children to live healthier lives' which demonstrates an overarching campaign and then presented how England would restrict the promotions on 'high fat, salt and sugar (HFSS)' food and drinks in retailers from April 2022. In 2021, UK government announced £100 million extra funding for healthy weight

controlling risk factors	programmes to support children, adults and families achieve and maintain a healthier weight. **(Russian Federation)** Taking into account the WHO recommendations, the Russian Ministry of Health has established recommendations for enriching wheat and corn flour with folic acid, as well as reduced sugar consumption rates.
Developed a national framework for the future	**(Australia)** The Australian Government, in partnership with Australian states and territories, has developed a National Strategic Framework for Chronic Conditions. This framework promotes coordinated, integrated and multidisciplinary care and highlights the importance of a health system that recognises and values the needs of individuals, their carers and their families, and to provide holistic care and support.

Note: The questionnaire focused on the main challenges and most successful strategies. A lack of reporting does not infer the strategy was not enacted.

Question 7. Overall response to COVID-19 and lessons for the future

> 7.1. What do you consider the most relevant lesson for pandemic preparedness and health system resilience from the practices adopted in your country in response to the pandemic, which other countries could learn from?

The pandemic has demonstrated that the health security of all people in the world is highly connected. Countries emphasised that cooperation between multiple sectors is an essential component of a successful response. Measures included recruiting medical and social resources, socio-economical security for maintaining employment and financial support for vulnerable people, risk communication and information sharing with public, law enactment and enforcement for an effective and sustainable response, manufacturing, procurement, transportation and storage of essential goods. Almost all functions of central and local governments have been engaged in the pandemic response. The importance of coordination and harmonisation to maximise the impact of policy implementation was emphasised by countries.

Building upon these observations a 'whole-of-society' approach was emphasised for future pandemic preparedness. Countries noted the need for: 1) a feasible and applicable emergency preparedness plan 2) a strong, integrated, and real-time surveillance system 3) empowered healthcare professionals 4) easy to use but innovative digital infrastructure 5) multi-sectoral governance with effective vertical and horizontal communication (including central and local governments) 6) building trust with timely and transparent risk communication and, 7) international cooperation.

The pandemic has also shown that human health is closely linked to animal health, climate change and to the loss of biodiversity and natural habitats. Cross-infection of zoonotic pathogens is not a new phenomenon. What is new, is the context, in which these spill-over events occur: high population densities, fast-paced global mobility and the effects of high speed climate change. These are key factors that change the dynamics of diseases. To prevent future pandemics, collaboration across human and veterinary medicine as well as environmental sciences is crucial.

Table A.12. Summary of desirable capacities suggested by respondents for next pandemic preparedness.

Capacities	Examples and suggestions
Emergency preparedness plan which is feasible for real pandemic situation	**(Australia) A series of standing health emergency plans**, ordered from high level policy down to operational detail. Under these plans, state and territory governments have primary responsibility for the management of communicable disease emergencies; however, national (local, state, territory and Australian Government) coordination is activated if a national response is necessary.

Capacities	Examples and suggestions
	(Singapore) Invest in urban health emergency preparedness given that urban settings such as cities increase in size, density and complexity. **(US) Preparedness planning is only useful when coupled with implementation during a response.** Preparedness planning must include a concurrent commitment to implement the actions called for within emergency planning documents to be effective. Implementing preparation and planning efforts: Early preparation, planning, monitoring, and execution of scaling up capabilities for health systems to respond to future pandemics (e.g., having robust supply chains that can be rapidly scaled up in crisis and improve strategies to identify where supply shortages are occurring to ensure appropriate allocation; having a preparedness plan in place and ready to be implemented; having resources available to address mental health resiliency among the workforce; and quickly scaling up and implementing surveillance and laboratory capacity to quickly detect infectious diseases in healthcare systems) can contribute to early detection, containment, and rapidly responding to and mitigating COVID-19 transmission.
Strong, integrated and real-time surveillance system	**(Spain) Standardised health information system** can ensure data homogeneity in a decentralised national health system. Furthermore, interoperability of data at international level is also crucial to avoid duplication and to facilitate international coordination. **(US) Having real-time data on health system capacity** and continuous real-time data on individuals would allow for informed policies on allocating resources and understanding the population health effects, which sub groups in the population are most vulnerable to infection and adverse health consequences. In addition, temporary waiver of various requirements on reporting and etc., can assist providers in maintaining their operations during emergencies. **(Indonesia) Integrated surveillance and data system and strengthening public health and health system capacity**, especially the early detection of and targeted response to asymptomatic transmission among younger populations, contact tracing can control clusters of infection. **(Germany) Expanded surveillance system beyond infectious disease** To reduce the double burden of communicable and non-communicable diseases, increased efforts should be made for NCD prevention and for interventions to ensure access to care for people with NCDs in future pandemics. As an important part of pandemic preparedness, public health surveillance systems should include a dedicated NCD surveillance to better address risks from the interactions between communicable and non-communicable diseases for individuals and health systems. Implementation of NCD surveillance in the public health system. **(Canada) Ensuring data-readiness'** to rapidly respond to urgent questions in a new emergency/pandemic. That is, to clearly understand: 1) **The minimum data sets** that need to be shared between partners in times of pandemic 2**) Accountability to expand the dataset** / change data content standards to collect new data for required insights and key populations 3) **Clarity on the rules for data sharing** across entities that protects privacy and supports insights and 4) Governance that ensures the above is activated at the pace appropriate for pandemic response.

Capacities	Examples and suggestions
Empowered healthcare professionals	**(US)** The need to improve uptake and implementation of **proper infection prevention and control (IPC) practices and implement IPC training for healthcare personnel as part of standards of practice** for the long-run to protect patients and healthcare workers to prevent infections and reduce unnecessary morbidity and mortality in these healthcare settings. This also includes the need to revisit and revise interim guidance for workers when appropriate, optimise testing strategies for workers, return to work strategies, workplace controls, and address essential worker concerns about the COVID-19 vaccine. **(Australia)** Lessons learnt from COVID-19 form part of the **National Medical Workforce Strategy**, particularly in the use of digital technology and flexible ways of working. Embedding positive changes that arose from COVID-19, such as **increased tele-supervision and virtual assessment, to the selection of medical trainees and the workforce as well as teaching and assessments is recommended to be made normal and accepted practice.**
Easy to use but innovative digital infrastructure	**(Germany) Digitise national and international reporting obligations**. Sufficient actual and substitute ITC capacities should be provided for as well as a national health reserve - both in physical and non-physical mode - should be created. **(Canada)** Federal, provincial and territorial (FPT) governments are working together **to ensure the progress made on virtual care is sustained as a permanent feature of health systems** over the long term. There is widespread recognition that virtual care as a core component of integrated health services will be critical to creating more resilient, responsive and adaptive health systems that can better manage patient needs, including in future health crises.
Multi-sectoral governance with effective vertical and horizontal communications	**(France, Indonesia) Improved and stronger collaboration, coordination, integration across sectors and programs, and central and local administrations/associations** is essential **(France, US) Sharing and rapid diffusion of good practices** – in both public health measures and treatment regimens. Both developed rapidly in surge areas as there was more experience with COVID. Having the means to rapidly diffuse best practices across the country as the disease spread was important. **(US) Investment and constant coordination across government agencies and with state and local public health and healthcare partners** to manage a large scale, national pandemic response. Specifically**, state and local health departments have a critical role in combating any infectious disease outbreaks** in healthcare settings by supporting state and local public health infrastructure and also providing assistance to healthcare facilities/systems in their jurisdiction. **(Indonesia) Strong leadership and fast policy-decision-making** could limit the spread of the disease significantly, including enforcement such as large/ small scale social restriction, government policy to use non-medical face mask for citizen that not have high risk to be infected by COVID-19.
Building public trust and private sector partnership	**(Indonesia) Public trust, compliance and private sector cooperation is the most important asset** for government in implementing diseases controlling program. On the contrary is the fear in society, distrust could create chaos and unconducive situation

Capacities	Examples and suggestions
	for any of good policies. **Extensive risk communication strategy** through traditional and social media is need to be implemented. **(US) Unified message on public health measures** – having only a portion of the population believing in and practicing basic public health measures in inadequate to stop the spread of a contagious virus and mitigate its health effects.
International Cooperation that entails international travel and essential goods	**(Germany) Regulations for better communication should be considered** as well as a more coordinated European entry regime. This could add value to alleviate friction at external borders through different derogations in different countries. **(Argentina)** Argentina would **welcome any initiatives aimed at ensuring equitable access, promoting effective technology transfers, increasing local production capacities, and timely distribution of vaccines at global level**. **(GAVI) Negotiating global discounted prices for lower income economies is essential for long term value for money but takes time and early increases in supply are also a priority**; diversifying the supply base will require earlier investment and higher risk tolerance to secure volumes early for prompt deliveries later; and calculated scientific estimates of success to justify not only APAs earlier, but also firm commitments in advance of licensure.

Note: The questionnaire focused on the main challenges and most successful strategies. A lack of reporting does not infer the strategy was not enacted.

Questionnaire

No.	Questions
Q1	**Direct and indirect impact of COVID-19**
Q1.1	What was your top lesson learned from the practices adopted in your country in response to the direct impact of the pandemic? How are you planning to reconfigure your health system (e.g., service delivery, coordination and financing) as a result?
Q1.2	What was your top lesson learned from the practices adopted in your country in response to the indirect impact of the pandemic and how are you planning to reconfigure your health system (e.g., service delivery, coordination and financing) as a result?
Q1.3	How can more international cooperation and coordination help plans to reconfigure your health system (e.g., service delivery, coordination and financing) to build greater health system resilience?
Q2	**Areas where the pandemic has led to substantial health system change: Digital health and data**
Q2.1	What was the main policy, or guidance introduced in response to COVID-19 to promote
Q2.2	What have been the impact of policies/measures introduced in response to COVID-19 to promote the adoption of digital health technologies and the sharing and use of health data? Where specific budgetary allocations made to support these measures?
Q2.3	a) Please describe, and quantify when possible, the impact of policies/measures to promote the adoption of digital health technologies and the sharing and use of health data in response to COVID-19 (e.g. number of teleconsultations, acceleration of AI, etc.)
Q2.4	b) Please quantify if possible the main budgetary allocations or investments associated with these policies.
Q2.3	How can more international cooperation and coordination facilitate the adoption and use of digital health technologies?
Q3	**Workforce**
Q3.1	What were the innovative solutions and top lesson learned from the practices adopted in the short term in your country to increase health workforce deployment to respond to the growth in during for care during the pandemic (e.g. in intensive care units in hospital, in long term care facilities)?
Q3.2	Please describe the main policy priority to increase the availability and flexibility of health workers in the medium-term and longer-term, in primary care, hospitals, and long term care. For example, any plans to:

Q3.3	How could more international cooperation and coordination help ensure a sufficient supply of health workers to strengthen health system resilience and effective responses to public health emergencies in all countries?
Q4	**Supply chain**
Q4.1	What was the main challenge for your country in procuring and maintaining sufficient supplies of medical products needed to respond to the COVID 19 pandemic? Products include, but are not limited to, medicines and medical devices required for patient care in intensive care units; personal protective equipment (PPE); diagnostic equipment and consumables; and vaccines.
Q4.2	What strategy was most successful?
Q4.3	Has your country modified its trade policies to ensure sufficient supply of medical products during the pandemic? (Examples could include, but are not limited to, restricting exports to retain domestically produced goods for domestic use, increasing imports of goods to build national stockpiles). If yes, which policies were modified?
Q4.4	Where would stronger international cooperation be beneficial in ensuring reliable supplies of goods that are essential to future health emergencies? What form should it take?
Q5	**Financing**
Q5.1.	What was your top lesson learned from the practices adopted in your country to mobilise additional resources in the context of tight fiscal constraints in response to the pandemic? What are the lessons learnt for long term financing of resilient health systems?
Q5.2.	How might more international cooperation and coordination assist work to mobilise additional resources?
Q6	**Strengthening public health functions**
Q6.1.	What was your top lesson learned from the practices adopted in your country to build disease surveillance capacity in response to the pandemic?
Q6.2.	What was your top lesson learned from the practices adopted in your country to improve the prevention of priority risk factors, such as obesity?
Q7	**Overall response to COVID-19 and lessons for the future**
Q7.1	What do you consider the most relevant lesson for pandemic preparedness and health system resilience from the practices adopted in your country in response to the pandemic, which other countries could learn from?