Issue Note

Structures and processes for coordinated policy and public health response in federated countries

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Executive summary

The COVID-19 crisis has underlined complexities for governments in establishing efficient mechanisms to respond to the health and health system challenges and determine the path to recovery, particularly for federated countries. In Canada, the health care system is more decentralized than other Organization for Economic Co-operation and Development (OECD) federal states. As the responsibilities are shared across levels of government, coordination challenges become more apparent.[1] The capacity for rapid, coordinated policy and public health efforts between national and sub-national levels of government is critical in the context of a global pandemic to optimize outcomes for populations and health systems. This issue note describes key structures and processes adopted in selected federated countries to promote a coordinated response. Similarities and differences in the approaches instituted by the federal governments are explored, and considerations for Canada are proposed. The evidence for this report draws from the academic and grey literature as well as expert opinion from Australia, Germany, Switzerland, and the United States of America to answer the questions:

How have other federated countries managed/are managing the pandemic? What structures and processes were used to coordinate policy and public health measures?

For the countries included in this review, the federal governments' policies and public health measures to enhance coordinated responses with states and local territories were well described in the literature. The papers retrieved presented detailed accounts of the policy measures and how particular structures and processes enabled coordination. However, evidence was lacking on the effectiveness of these policy measures to promote coordination, which remains bounded by history, the culture of federalism, and governmental capacities in these countries.

Key considerations for coordinated policy and public health measures
- In federated countries, federal governments can act effectively as 'nerve centres' for coordination in health emergencies, where the response and guidance need to be coherent and swift. Cabinets and the offices of prime ministers/chancellors can steer their respective federal responses by outlining the framework for response and providing leadership.
- Evoking emergency legislation or amending or crafting new acts have been the most common measures to enhance the federal role during the COVID-19 pandemic. Such action has enhanced the swiftness of uniform decision-making. However, the need for caution and careful consideration was raised as a new legislative measure may not always suit unique local outbreak situations and could raise potential jurisdictional issues.
- Scientific advisory bodies integrated at a national level enhance a coordinated response by providing coherent, evidence-based scientific knowledge, enabling nimble navigation in an evolving pandemic.
- To overcome misinformation and to gain trust, regular public-facing communication and data transparency are essential.
- The relevance of structures and processes in non-crisis contexts requires careful consideration and more research to understand the associated costs and benefits.
- There are other factors beyond federalism, such as leadership, trust in government, the geographic size of the country, and government capacity that influence the trajectory of efforts to promote a coordinated response.

The conclusions of this paper are limited due to the following:
- Some relevant data may have been missed due to the rapid timelines for developing the paper.
- Most documents in this report described policy recommendations and experiential evidence, and there was limited data or studies to support conclusive statements regarding the effectiveness of policy measures.
- This note captures only the structures and approaches relevant to a coordinated public health response, mainly at the federal level. Therefore, this paper does not cover measures in other sectors, or the measures established at the state and local levels.

Introduction

The COVID-19 pandemic has brought unprecedented challenges for public institutions and has drawn increased attention to the federalist form of government.[2] Canada has been a federation since the mid-1800s and includes the following characteristics commonly shared by other federal systems [3]:

a)   at least two levels of government;
b)   a division of powers between the orders of government defined in the constitution;
c)   a division of revenue sources to ensure each order of government certain areas of autonomy; and
d)   a written constitution, also known as the *Constitution Act,* that cannot be amended unilaterally.

Federalism recognizes the separation of powers between a national government and sub-national levels but relies on mechanisms for cooperation and coordination to deliver public goods. The role, relationship and institutional complexity can complicate developing a rapid, focussed, complementary, and coordinated response in emergencies. The COVID-19 pandemic has highlighted that the specific roles between a federal government and its constituent states or provinces/territories are not always well defined or clear-cut. The constitutional boundaries with the federal authority have become increasingly challenging to navigate in particular contexts. This may lead to inconsistencies, incoherencies, and fragmentation when responding to critical situations. Thus, a coordinated response that engages policy learning, garners trust, increases efficiency, and promotes equity in public service delivery is necessary for emergency situations.

This Issue Note aims to answer the following questions:

How have other federated countries managed/are managing the pandemic? What structures and processes were used to coordinate policy and public health measures in federated countries?

In the following, we present the results of a jurisdictional scan, examining the structures and processes instituted by federal governments to promote a coordinated public health response to the COVID-19 pandemic, focusing on four key countries: Australia, Germany, Switzerland, and the United States of America. These countries were identified as comparable to the Canadian context in terms of health system, and economic and political contexts.

Details about the methods, including our searches and consultations with key country informants, can be found in the Appendix.

What measures were adopted by federated countries to support a coordinated policy and public health response?

This section compares different structures and processes adopted by respective federal governments in Australia, Germany, Switzerland, and the United States to have a coordinated effort to respond to the pandemic. Table 1 summarizes the coordination structures, processes, and approaches in the federated countries under study. This table classifies the structures and processes in five categories: a) Acts and legislations that were employed or amended; b) task forces and advisory bodies constituted to provide scientific advice; c) the central structures like cabinet and coordinating committees; d) presence of dedicated central frameworks and appointed liaisons, and e) other structures which do not fall into classification as mentioned above. Below we provide a brief country summary and the details about each country and its respective structures and processes can be found in the Appendix.

Australia

The Australian response to the COVID-19 pandemic has been characterized by enacting new structures and plans for coordination and joint action like the National Cabinet, National COVID-19 Coordinating Commission, and Health Sector Emergency Response Plan for Coronavirus. The country also relied on

the existing legislative frameworks and utilized existing Acts like the *Biosecurity Act 2015* and the *National Health Security Act 2007* to enact border control powers and impose internal restrictions. The pre-existing whole-of-government decision-making bodies like the National Crisis Committee and National Coordination mechanisms were activated to coordinate the cross-governmental response. The Australian Health Protection Principal Committee played a key role in health sector advisory by providing scientific advice on COVID-19. Given the rapidly evolving pandemic, the Commonwealth government put in processes that were able to respond swiftly and yet remain flexible to adapt. However, there have been challenges. The National Cabinet was challenged for its lack of representation from Australian Local Government Association [4]. The COVID-19 pandemic also amplified the need for centralized data sharing to enable rapid decision making and a creation of a centralized disease control agency.

Germany

The German federal system utilized existing acts and legislation. It used the *Infection Protection Act* and amended the Act for *Protecting the Public in an Epidemic Situation of National Importance* to enable special measures, for example, the medical division provision, laboratory diagnostics, PPE procurement, and strengthening health personnel resources. At the cabinet level, a Corona Cabinet was formed of federal cabinet ministers to enhance coordination. The pre-existing mechanisms at the federal level, the Federal Crisis Committee and high frequency meetings between the Chancellor and the State premier enhanced coordinated decision-making. The Robert Koch Institute, Federal Institute for Vaccines and Biomedicines and the German National Academy of Sciences played an advisory role in promoting guidance and scientific advice. Informal advisory from renowned virologists, immunologists, and academicians were also documented. The ICU capacity database was revived to generate a harmonized ICU capacity mapping, where the numbers of occupied ICU beds receiving intensive care and ventilation, and the empty beds were to be shared within the following 24 hours. Overall, political leadership nested in institutional experience to achieve solutions through a collaborative process has been vital in coordinating the pandemic response in Germany. The public health offices in each federal state faced key challenges in local staffing, namely for contact tracing and outdated digital capacities and technical equipment.

Switzerland

In steering and coordinating the health system's response to COVID-19, Switzerland's Federal Council responded by issuing federal orders[5,6] across the Swiss territory utilizing the existing legal Act, the *Epidemics Act of 2012*, and enacted a new Act to manage the COVID-19 response. The newly established Federal Office of Public Health Task Force (FOPH) and the Swiss National COVID-19 Science Task Force played a role in monitoring and analyzing the spread and outlining and drawing key measures to control and prevent COVID-19. The Swiss Conference of the Cantonal Ministers of Public Health played an important role in generating a coordinated approach to implementation by issuing recommendations to tackle the pandemic at the cantonal level.[7,8] The Federal Council was able to respond and control the spread of the pandemic by issuing and revising ordinances with the evolving pandemic situation. However, the Cantons faced challenges in organizing a coordinated response due to the lack of unified digital tools to implement data pooling and data sharing measures.

United States of America

The United States of America's federal system declared a health emergency supported by existing emergency legislation, e.g. the *Stafford Act* and the *Public Health Services Act*, to hasten mass testing and enact medical supplies and other equipment. The US federal government also announced *Operation Warp Speed* to control the COVID-19 pandemic by advancing the development, manufacturing, and distribution. It was a joint partnership between the Department of Health and Human Services, the Department of Defense, Food and Drug Administration, Centers for Disease Control and Prevention, and private sector. The National Governors Association played an active role in coordinating the state government's response by providing policy and guiding documents. The US was challenged in initiating a quick and adequate country-wide response during a pandemic. As a result, there was an abundance of

advisory bodies and committees at the state, county, and city levels supported by the ecosystem of expertise available in every state, generating non-uniform expert advice.

Table 1: Coordination structures, processes, and approaches in federated countries

Country	Coordination Structures/Processes				
	Acts and Legislations	Task forces/advisory bodies/institutes	Cabinet/sub-cabinet/central agencies/committees	Dedicated liaisons/ central framework	Other
Australia	Biosecurity Act 2015 National Health Security Act 2007	Australian Health Protection Principal Committee	National Cabinet* National Crisis Committee National Coordination Mechanism National COVID-19 Coordinating Commission*	Health Sector Emergency Response Plan for novel Coronavirus* National Health Security Agreement	
Germany	Federal Infection Protection Act Act for Protecting the Public in an Epidemic Situation (Amendments)*	Robert Koch Institute Federal Institute for Vaccines and Biomedicines (Paul Ehrlich Institute) German National Academy of Sciences (Leopoldina)	Corona Cabinet* Chancellor and State Premiers Federal Crisis Committee		Information & data sharing guidance, e.g., ICU capacity* Informal advisory from well-known virologists, immunologists, and other academics in Germany*
Switzerland	Epidemics Act 2012 COVID-19 Act*	Federal Office of Public Health Task Force COVID-19 Task force* Swiss National COVID-19 Science Task Force*	Federal Council		Swiss Conference of the Cantonal Ministers of Public Health
United States	Stafford Act Health Emergency Declaration	CDC		HHS FEMA	Local association and governors* Operation Warp Speed*

Public Health
Services Act

* Blue font denotes new structures or amendments to previous structures

Considerations for Canada

The few federated countries considered in this review have implemented specific structures and mechanisms at the national or central level for coordination between federal and provincial/territorial levels. The apparent strengths and challenges identified in the review for consideration by Canada are summarized here. However, there remains a limitation in assessing the actual impact of these coordination mechanisms. Hence, generalizing these policy and public health measures for coordination needs careful consideration to country contexts as each federation has a unique history, culture, and set of values, and is bounded by governmental capacity, country size, and population.

- **Role of science and scientific advice**: The role of a central advisory body in the form of a committee or a task force can help guide the pandemic response. Advisory bodies put in place were often represented by public health and clinical experts as well as practitioners, providing recommendations informed by available evidence, data-based modelling, and projection studies. Going forward, advisory committees should seek multidisciplinary expertise, including behavioural scientists and extend the membership to diverse epistemic groups to better respond and improve equity, diversity, and inclusion. The transparency about advisory processes and clarity around the values guiding policymaker decision making can enhance public trust in scientific enquiry, which remains fluid during the pandemic.

- **Effective communication strategy**: This pandemic has heightened the need to instill communication practices that can overcome misinformation related to COVID-19. Improved communication pathways to disseminate best practices, guidelines, and training resources, can reduce overlap and conflicting messages. The communication approach needs to be multipronged where scientific advisors, federal health ministers, prime minister/chancellor and respective heads of the province/state government have an essential role, as these public figures can foster public trust. Public communication must be iterative, with a clear message tailored to the audience with an overall aim to provide evidence-based messages thereby maintaining public trust in governmental decision-making.

- **Federal policy response**: Federal governments play a leadership role in orchestrating a proactive policy response and guiding the provinces/territories/states to initiate appropriate action. Countries have used emergency legislation, passed ordinances, modified acts, and constituted central coordinating structures to respond to enable better coordination needs. Coordination has also been led by cabinets, the centres of government, to evoke a prompt action. However, enacting emergency legislation needs to consider the balance of regional variation and jurisdictional authority.

- **Data handling, data sharing, and policy levers**: The pandemic has heightened the gap in available integrated information technology and data-sharing measures. Some federal countries like Germany enacted federal measures and revitalized previous measures, such as ICU data sharing, to provide a central overview of the epidemic and hospital resources. Longer-term investment in developing electronic health data, digital integration, effective data-sharing policies and policy levers, understanding legal jurisdictional issues, and developing a learning process around the pandemic could enable a more coordinated response.

- **Health system preparedness**: Pre-existing pandemic preparedness plans, data-sharing agreements between states and federal government, and integration of digital platforms to share data have influenced data-gathering processes and quick decision-making during the pandemic. The COVID-19 crisis should be considered an opportunity to identify the learning process, leaving aside a narrow crisis management approach and investing in systems development.

Conclusion

This paper summarizes federated countries' key structures and processes instituted or utilized to affect a coordinated public health response. It draws evidence from multiple academic and grey literature sources as well as from consultations with international country informants.

The federated countries included in this review have implemented a broad range of measures, including utilizing existing emergency legislation or introducing new legislation, establishing new task forces and committees, new cabinet and coordination structures, dedicated response plans, and frameworks. In case of an inadequate federal response, state and local leadership mechanisms to intervene or assume leadership for intervention within jurisdictions were also documented. Thus, different federations were able to set up functioning coordination mechanisms in a crisis when consistent joint action was important. Key informants that the federal response requires careful consideration as there is a delicate balance between upholding deliberative democratic decision-making processes that respect the differentiated local needs and the ability to orchestrate a rapid response in health emergencies. This does strain federal societies trying to equilibrate national and sub-national government responsibilities.

Generalizations, especially if extended to non-crisis situations beyond COVID-19 and across other types of federations, needs careful consideration, especially in the Canadian federation, which remains the most decentralized in OECD countries. Further research needs to consider the factors impeding coordination or the extent to which they may undermine the coordination efforts.

Appendix

Methods

This jurisdictional scan involved a search of targeted academic and grey-literature databases as well as consultations with experts. Specific databases focusing on tracking public health COVID-19 policy measures were scanned (European Observatory COVID-19 Health Systems Monitor, IMF Policy Response, OECD Policy Response, Forum of Federations). Additionally, we searched the following university-based websites established to track federal country responses, including the Federalism & the COVID-19 Pandemic Compendium at the Faculty of Law, McGill University, the COVID Comparative Project at the Munk School of Global Affairs and Public Policy, University of Toronto, and the North American COVID-19 Policy Response Monitor at the Dalla Lana School of Public Health, University of Toronto. Specific websites of the federal public health departments, federal agencies, and parliamentary libraries of the selected countries were searched to gather key policy documents and reports. Furthermore, news posts and blogs were checked during the months of June-August 2021 to track key public health policy measures and were included in the list of documents.

An additional search was conducted on Google Scholar in the month of June 2021 using various terms to capture coordination, process, and structures used at the federal level to coordinate the public health response. Documents were included if they described either: a) approaches of coordination adopted by the federal government or agencies, b) factors that enabled coordination, and/or c) identified considerations for coordination. Relevant information was extracted from these documents, and these descriptions of policy initiatives and coordination mechanisms were then discussed and validated by key experts from the respective countries. These experts were identified through the literature and via the CanCOVID scientific and professional network. These consultations were with subject matter experts engaged in research and/or policy analysis as part of the COVID-19 public health response. The list of experts consulted is provided in Table 2 below. These sessions focused on understanding the federal coordination mechanisms and eliciting the specific structures, processes, and approaches instituted or utilized for coordinating the public health response. The contributions from the invited experts were used to triangulate the information retrieved in the documentation and literature (e.g. identified policy initiatives for coordination) and to identify additional policy measures that were not necessarily captured by the scan. The country sections in the note were reviewed by the respective country informants.

The following section shares the detailed description of structures and process institutes in each selected country and is organized by country.

Australia

Australia is constituted as a federation of six states along with two self-governing territories.[9] The responsibility for healthcare operation, management, and funding is shared between the federal government, states, and territories. The federal government provides leadership in developing national health policy, providing funds to states and territories, and providing oversight of Primary Health Networks.[10] The management of public health emergencies is not generally a matter of control under the federal government. The politico-administrative framework is a collaborative, integrated, 'whole-of-government' approach to respond to public health emergencies. The Australian response to the COVID-19 pandemic has been characterized by efficient policies, actions, and leadership practices.[11] The key policy measures and processes employed by the Australian government are described below:

National Cabinet
The National Cabinet was established as a new high-level political body in March 2020 to ensure a coordinated response across the country on the management of the COVID-19 response[12–15]. It is comprised of the prime minister, the state premiers, and the chief ministers of the self-governing territories. This cooperative body is advised by two primary bodies:[13,16,17]
  1. the Australian Health Protection Principal Committee (AHPPC), which uses modelling, research, and data to inform the cabinet; and

2. the National Coordination Mechanism (NCM), which operates through the Department of Home Affairs to coordinate a whole-of-government response. This high-level political body met every week during the peak crisis period and was chaired by the prime minister.

<u>Act & Legislation</u>

The Australian government declared a Human Biosecurity Emergency in March 2020, in accordance with the Biosecurity Act 2015. This Act allowed the federal government to enact broader powers to introduce restrictions and prevent control of the entry and spread of disease, for example, limiting international travel and imposing internal restrictions.[4,13,15,18] The other key COVID-related legislation that enabled a health system response was the National Health Security (NHS) Act 2007. The NHS Act sanctioned the exchange of public health surveillance information between federal, state, and territorial jurisdictions formalizing decision-making processes and promoting coordinated response arrangements in health emergencies.[12,13,17]

<u>Coordination mechanisms</u>

a) *Whole-of-Government Decision-Making*

The National Crisis Committee (NCC) – the NCC is the primary body constituted to coordinate the cross-governmental response and consolidate and coordinate the information exchange and advise ministerial decisions across the Australian government, state, territories, and local bodies. The Australian Government Crisis Committee (AGCC) was also tasked to coordinate the response across the Commonwealth.[12,17]

National Coordination Mechanism (NCM) – the NCM operates through the Department of Home Affairs and along with the states and the territories. It coordinates a whole-of-government response to emergencies and was activated for COVID-19 outside the health management, focusing on dealing with non-health issues arising from the pandemic, for example, education, transport, policing and safety, food and logistics.[12,17]

National COVID-19 Coordinating Commission (NCCC) – the NCCC was formed during the pandemic to generate cooperation and coordinate the response within the public sector, private sector, and between the public and private sector. This commission complemented the capacities of NCC with representation from business executives and public servants.[12,17]

b) *Health Sector Advisory Mechanisms*

The Australian Health Protection Principal Committee (AHPPC) – the AHPPC was constituted by the Australian Health Ministers Advisory Council (AHMAC) to provide advice on health protection matters and ensure a uniform and coordinated response in national health emergencies. During the COVID-19 pandemic, the AHPCC, comprising all state and territory Chief Health Officers and chaired by the Australian Chief Medical Officer, advised the National Cabinet and Australian Health Ministers' Advisory Council on public health action. The Australian Health Ministers' Advisory Council is a permanent body with representation from the Australian Government health department, each state and territory health department.

Agencies like the National Health and Medical Research Council (NHMRC), the Australian Institute of Health and Welfare (AIHW), and the Australian Bureau of Statistics (ABS) are the designated agencies that have collected data to help build models and guidelines to stop the spread of the virus. They have worked and coordinated under a single umbrella of the AHPPC to provide data-driven strategies.[12] Additionally, in April 2020, the national COVID-19 Health and Research Advisory Committee was established. It is a committee with multisectoral and multidisciplinary influence with representation from clinicians and researchers from a variety of disciplines, respected community leaders, and community members. The committee advised the Commonwealth Chief Medical Officer on the country's health response to COVID-19.[19]

Central frameworks and plans

The *Australian Health Sector Emergency Response Plan for Novel Coronavirus* served as a guiding document and was endorsed by the AHPPC in February 2020 and activated by the Australian government by the end of February.[12] Before the pandemic, several intergovernmental plans and frameworks were in place to guide health emergencies; for example, the National Security Health Agreement of 2008 established as a coordination framework between Commonwealth and state responsibilities, Australian Health Management Plan for Pandemic Influenza, and Australian Government Crisis Management Framework.[15]

Considerations for the way forward

From the literature and consultations with country informants, considerations were raised regarding the Australian system's particular strengths and challenges. Given the rapidly evolving pandemic, the Commonwealth government put in processes that were able to respond swiftly and yet remain flexible to adapt. Instituting a high-level body like the National Cabinet enabled meaningful discourse between federal and state governments to enact measures guided by the same principles. This allowed for some leeway to a coordinated response. The Australian government also incorporated scientific expert advice, modelling, and projection studies concerning open economies and national borders, simultaneously investing in allocating research funding on COVID. The government organized press conferences to relay information and explain the situation to the public; this has helped build trust in government decision-making.

However, there have been challenges. The National Cabinet had a strict focus on the pandemic response and coordinated policies related to health responses. At times, The National Cabinet was challenged for its lack of representation from the Australian Local Government Association.[4] The COVID-19 pandemic amplified the need for centralized data sharing and to enable rapid decision making. The formation of a centralized disease control agency was also suggested to enhance coordinated response and to ensure science-based responses.[20]

Germany

The German federal system is a highly interlocked system, where competencies are shared between the federal and Länder (state) governments. Länder's participation through the second legislative chamber (Bundesrat) ensures its influence on major policy domains' key federal legislation, including health. The main responsibility of Länder governments is the implementation of federal legislation, which they perform with a significant degree of autonomy, both legislative and administrative, as seen in the pandemic. A mosaic of pandemic responses was initially observed across different states. This is because health service delivery, and the implementation of public health measures, are within Länder jurisdiction, with respect to education, public schooling, and decisions about certain measures like mask mandates in public spaces and businesses.[21] The federal actions and tools implemented to promote better coordination and harmonize the pandemic response across Germany are discussed below.

Act & Legislation

Act for Protecting the Public in an Epidemic Situation of National Importance
Enacted in March 2020 and subsequently amended three times during May 2020, November 2020, and April 2021. This Act granted expanded powers to the Ministry of Health to take special measures to address the pandemic – including pharmaceutical and medical device provision, laboratory diagnostics, PPE procurement, and strengthening health personnel resources. The introduction of the 'emergency brake' applied under this Act throughout Germany was an attempt to avoid a patchwork of measures and was an attempt to create more uniformity.[21]

Federal Infection Protection Act (FIPA)
FIPA regulates the infection prevention and control in Germany at the national level since introduced in 2001. This Act outlines the advisory responsibilities of key federal agencies in times of crisis and has been amended four times since the start of the pandemic. It enabled the federal, state, and local authorities to take special measures to manage the pandemic, including enacting and implementing the shared set of guidelines negotiated between the federal government and the 16 heads of states/Länder.[18,21,22]

Central Institutes/Bodies

Robert Koch Institute
The Robert Koch Institute (RKI) is a federal agency with an advisory capacity to prevent and detect serious communicable diseases.[21] It quickly became the designated central lead agency for information (epidemiological data) and guidance (best practices) for health providers, state and local authorities across Germany.[22] Other influential RKI publications include the German Influenza Pandemic Preparedness Plan and its COVID-19 supplementary, which provides the basis for pandemic preparedness plans at the regional (federal states) and community level [21]. With endorsement from the FIPA, the RKI also became an inter-level coordination interface between the federal government and local health authorities – especially during high-stake decision making on measures like lockdowns and shutdown.[22,23]

Cabinet

Corona Cabinet (big & small Corona Cabinet)
The Corona Cabinet is the product of reorganizing the chief executive body, the federal cabinet of ministers, and the Chancellor. The small Corona Cabinet is headed by the federal government and includes the (national) ministers of defence, finance, interior, foreign affairs, health, and the German chancellery head. The big Corona Cabinet includes the small cabinet plus all the relevant ministers responsible for topics to be discussed on a given day.[21]

Chancellor and State Premiers

The pre-existing format of the conference of ministers was used to arrange frequent high-level meetings between the Chancellor and the 16 federal state leaders. These meetings were instrumental in enacting uniform measures (social distancing, restricted mass gathering, school closures) throughout the country.[18,22]

Federal Crisis Committee

This committee coordinated several federal agencies to ramp up a joint procurement program for PPE and avoid competition between states.[22]

Data Sharing

Information-sharing
The ICU Capacity Database and its related federal regulations are an interesting example of data-sharing for Germany's coordinated pandemic response. The database was created in 2009 during the H1N1 pandemic to provide a central overview of hospital resources through voluntary reporting and sharing information on vacant and occupied ICU capacity daily. [24] At the pandemic's start, the database was revived through collaboration between medical associations and state authorities, but reporting was not mandatory, which resulted in information gaps. By April 2020, however, the Federal Ministry of Health issued a regulation that made reporting mandatory. The hospitals had to report on their numbers of occupied ICU beds receiving intensive care and ventilation, empty beds, and an estimation of the maximum number of possible new ICU admissions and places available for additional extracorporeal membrane oxygenation (ECMO) within the following 24 hours. A more harmonized ICU capacity mapping was possible with more reporting and information shared into the database.[22] The RKI also rolled out an anonymized contact tracing app (Corona-Warn-App) in June 2020, where users who installed the app on their smartphones would be notified of any exposure to someone diagnosed with COVID-19. The app also allowed users to access their COVID-19 test results electronically and centrally (and later incorporated to display vaccination certificates).

Considerations for the way forward

From the literature and consultations, considerations were raised regarding the particular strengths and challenges of the German system. The German federal structure uses joint decision making, where the federal governments, responsible ministers, and Länder governments come together to find a common solution, providing less leeway for unilateral decision making. However, the coordination mechanisms such as the joint decision-making process between the Chancellor and the 16 state leaders were time-intensive and required lengthy negotiations, which often culminated in the lowest common denominator, which made it difficult to formulate a resolute and pro-active response within the federation. It also entailed, as in April 2021, a complete reversal of decisions on a shut down over the Easter weekend, only hours after the comprise had been struck.[22,23]

Moreover, given Länder autonomy on implementing public health measures, agreed-upon guidelines and measures against COVID-19 were not necessarily uniformly adopted or implemented in all states .[22–24]

Overall, political leadership nested in institutional experience to achieve solutions through a collaborative process has been vital in coordinating the pandemic response in Germany. Regular briefings by scientific experts, the Minister of Health, and the Chancellor herself have been pivotal in conveying the measures and seeking public cooperation. The public health offices in each federal state coordinated with the federal ministry of health for an organized, coordinated response, but also faced key challenges in local staffing, namely for contact tracing and outdated digital capacities and technical equipment.

Switzerland

Switzerland is a confederation of 26 federal states, known as cantons,[25] but is considered a more 'loose' federation than many other federated countries. The two parliamentary chambers elect the federal council members, and the Presidency rotates annually among these members, which tends to limit federal autonomy relative to that of the cantons. The confederation enables the provisioning of information, leading strategy development, providing implementation measures and coordinating cross-cantonal processes. At the same time, the organization and implementation of health measures rest with the cantons.[5] In steering and coordinating the health systems response to COVID-19, Switzerland's Federal Council responded by issuing federal orders across the Swiss territory utilizing the existing legal Act, the *Epidemics Act of 2012*, and enacted a new Act to manage COVID-19 response, although not until September 2020.[18)] Below, we describe the key measures adopted by the Swiss confederation for a coordinated response to COVID-19.

Ordinances and Legislation

The Federal Council responded to the pandemic and swiftly issued ordinances on measures to combat COVID-19. These ordinances were reviewed and amended frequently to respond to the emergence and progression.[5,6]

Epidemics Act
The Federal Council utilized the *2012 Epidemics Act* (Epidemiengesetz, EpG) early in the pandemic to declare a 'particular situation'. The Act has provisions for 'particular situation' and the ultimate remedy of 'extraordinary situation'. Under the 'particular situation', when governments cannot control the disease spread or when WHO declares a health emergency, the Federal Council can enforce confinement measures and introduce country-wide measures in consultation with the cantons. The 'particular situation' was imposed from February to March 2020 and again reinstated in June 2020. However, the Federal Council did declare an 'extraordinary situation' on March 16, 2020, under which the Federal Council could introduce a strict country-wide measure that no longer required consultation with the cantons. This was reversed to a 'particular situation' after June 19, 2020, by the Federal Council.[18,26]

COVID-19 Act
The two chambers of the federal assembly passed the Federal Act on the Statutory Principles for Federal Council Ordinances on Combating the COVID-19 Epidemic (COVID-19 Act) on September 25, 2020. It provides a legal reference point permitting the Federal Council to have special powers to swiftly respond to the effects of the measures to fight the disease. The Act also states that the Federal Council should consult the cantons and shall not use the powers if a regular or emergency legislative process.[26,27] A vote on the COVID-19 Act was held because a referendum had been called against the Act, and 60 percent of voters supported the laws.[28]

Scientific Task Forces

FOPH COVID-19 Taskforce & Swiss National COVID-19 Science Task Force
The Federal Office of Public Health Task Force (FOPH) played a role in monitoring and analyzing the spread to COVID-19 and outlining and drawing key measures to control and prevent on behalf of the Federal Council.[29] It worked closely and in cooperation with cantonal authorities, other federal agencies, and additional stakeholders, coordinating measures and guidelines in line with the Swiss National COVID-19 Science Taskforce and international organizations.[30]

The Swiss National COVID-19 Science Task Force (SN-STF) is an independent expert group. This task force makes scientific and research expertise available to federal and cantonal authorities and comprises research members from across the university landscape.[31,32] The task force has the mandate to provide FOPH and the Federal Department of Home Affairs (FDHA) with scientific knowledge enabling decision making. At the cantonal level, it provides scientific advice and identifies opportunities for research and innovation that enhances understanding of COVID-19.[33]

Other Institutional mechanisms for cooperation

The Swiss Conference of the Cantonal Ministers of Public Health (GDK–CDS) can be seen as a federalist instrument to garner institutionalized cooperation among federal and cantonal governments and key organizations in healthcare settings.[34] The GDK-CDS played a key role in generating a coordinated approach to implementation by issuing recommendations to tackle the pandemic, as its primary goal is to enable coordinated health policies at the cantonal level.[7,8]

Considerations for the way forward
From the literature and consultations, considerations were raised regarding particular strengths and challenges of the Swiss system. The Federal Council was able to respond and control the spread of the pandemic by issuing and revising ordinances with the evolving pandemic situation. The SN-STF adequately represented university experts and public health professionals, who developed guidance for careful decision-making. However, Switzerland's execution of emergency measures has not been

straightforward during the pandemic; only under the "extraordinary situation" (which was relatively short duration), cantons must abide by the federal prescription, reducing their power to maneuver. The FOPH has suggested that the cantons can regulate issues not addressed by specific federal acts. However, there has been a lack of clarity around the comprehensiveness of norms, which has led to a patchwork of cantonal regulations around lockdowns, tourism regulations, and testing.

The Cantons also face challenges in organizing a coordinated response due to the lack of unified digital tools to implement data pooling and data sharing measures. The lack of proper communication measures to convey differential cantonal measures and restrictions for COVID-19 further exacerbated the response. Currently, there is a need for a response to build on health literacy, especially to overcome vaccine hesitancy and to enhance vaccination uptake as the vaccination rates remain low, compared to other regions of Europe.

United States of America

The United States of America's federal system distributes powers between federal and state governments, where the national level provides the overarching policy goals and priorities, and responsibility for the interpretation and implementation lies with the states. The United States of America's response to the COVID-19 pandemic has been viewed as disjointed. Specifically, the response has been characterized as piecemeal efforts primarily driven by the governors, mayors, and local health authorities. The federal administration contributed to a lag in the response with uneven messaging, delays in funding and supply, and uneven assistance to the states.[35] The US Centers for Disease Control and Prevention (CDC) has a critical leadership role in intensifying state resources with the necessary expertise in several areas of disease surveillance, epidemiological response, diagnostic laboratory services, education, and communication, and in developing an overall disease containment and control strategy. However, the federal agencies of the Department of Health and Human Services (HHS), Federal Emergency Management Agency (FEMA), including the Centers for Disease Control and Prevention (CDC), have limited roles and authority for enforcement, as many powers linked to quarantine rest primarily with state and local authorities, with variation across jurisdictions.[36] Moreover, the scientific knowledge and credibility of institutions like the CDC have often been side-lined and discredited by the federal administration,[37] hindering a federally-guided uniform public health response. The pandemic also witnessed a growing political divide in the country, where partisan affiliation was one of the strong predictors of behaviour and attitudes about COVID-19.[38] Below are the details on the example of the coordinated federal response and other local mechanisms that came into force due to the lacuna of central leadership.

Emergency legislation

Many emergency Acts were activated in relation to COVID-19. It was declared as a health emergency on January 31, 2020, under the Public Health Services Act by the HHS. Later, on March 13, 2021, the COVID-19 outbreak was declared a national emergency, hastening mass testing and enacting medical supplies and other equipment.[39,40] Another nationwide emergency ruling instated was the Disaster Relief and Emergency Assistance Act (Stafford Act) for the pandemic to be enacted in all 50 states.[41] Despite issuing orders for a health emergency, the presidential office decentralized primary authority to states during the national emergency, which was unprecedented.[42]

Developing a safe and effective COVID vaccine

Operation Warp Speed (OWS) was announced on May 15, 2020, to control the COVID-19 pandemic by advancing the development, manufacturing, and distribution of vaccines and therapeutics. This was launched as a partnership between the HHS, the Department of Defense (DOD), and the private sector with $1.95 billion from the federal government. It also supported the approval and authorization of vaccines by the CDC, Food and Drug Administration (FDA), HHS, and the vaccine advisory processes within both FDA and CDC. This integrated body for rapid development of COVID-19 vaccine research and development across the US government was based on the experience with the Zika virus.[43]

Local association and governors

In response to a lack of prompt federal guidance, several state governors stepped in to set benchmarks to determine the decisions related to lockdown restrictions for state and local governments. Seventeen different American states came together to form regional partnerships to coordinate the response. For example, California, Oregon, and Washington came together to form the Western States Pact, while seven east coast states and seven Mideastern states also formed similar alliances.[44,45] The National Governors Association played an active role in coordinating the state government's response by providing policy and guiding documents.[40]

Local science advice and decision-making for COVID-19: North Carolina

In the state of North Carolina, as a case example, the ad hoc nature of advisory processes often made it unclear where information was coming from and why policymakers chose to seek the advice of some experts over others prompting the state to build its own science advisory mechanisms to inform their pandemic response. Three key steps facilitated this response:
1. Modelling data to inform public health decision-making: an "informal and independent" group of public health experts, epidemiologists and data scientists came together under the umbrella of the University of North Carolina Sheps Center for Health Services Research. This informal body reviewed data projection models and provided policy guidance for the governor for stay-at-home orders and a three-phased plan for reopening.
2. Centralized state-level database: the state collected data on COVID-19, which was publicly available through a dashboard. These metrics played an important role in interacting directly with the public through media briefings to deliver public health messages.
3. Ethical guidance for vaccine distribution: the State Health and Human Services Department has tasked the North Carolina Institute of Medicine (NCIOM). It convened a task force to advise on the state's vaccination plan by forming a Vaccine Advisory Committee with representation from public health experts, health care and essential workers, and advocacy organizations.[46]

Considerations for the way forward

From the literature and consultations, considerations were raised regarding strengths and challenges of the approach taken in the United States.

The key characteristic of US public governance is federalism, given the vast geography, diversity, and number of states. It was challenged in initiating a quick and adequate country-wide response during the pandemic. The COVID-19 pandemic required a cross-government multi-agency response, which remained out of jurisdictional reach of HHS. As a result, there was an abundance of advisory bodies and committees at the state, county, and city levels supported by the ecosystem of expertise available in every state. Thus, generating non-uniform expert advice partly because of the evolving pandemic, evolving evidence, and associated learning process.

Table 2: List of country informants who were consulted and contributed to this paper

Country	Key Informant & Affiliation
Australia	**Professor Tania Sorrell**, AM, FAHMS Professor of Clinical Infectious Diseases Deputy Dean (Clinical), Sydney Medical School Director, Marie Bashir Institute for Infectious Diseases and Biosecurity Director, Centre for Infectious Diseases and Microbiology, The Westmead Institute for Medical Research
Switzerland	**Sarah Mantwill**, PhD Department of Health Sciences & Medicine, University of Lucerne, Switzerland Research Manager, Swiss Learning Health System (SLHS)

	Stefan Essig, MD, PhD Department of Health Sciences & Medicine, University of Lucerne, Switzerland
Germany	**Juliane Winkelmann**, PhD Chair and Professor of Neurogenetics Technical University of Munich School of Medicine Munich, Germany
	Nathan Shuftan, MS University of Technology Berlin
	Jorg Broschek, PhD Associate Professor Canada Research Chair (Tier 2) in Comparative Federalism and Multi-level Governance Department of Political Science, Wilfred Laurier University, Ontario, Canada
USA	**Professor Roger Pielke**, PhD Director and Founder of the Center for Science and Technology Policy Research and the Sports Governance Center, Environmental Studies, University of Colorado, Boulder, Colorado
	Jessica Weinkle, PhD Department of Public and International Affairs University of North Carolina Wilmington

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