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Article

Managing the politics of health data during COVID-19: a comparative institutional analysis

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This article investigates the political dynamics of health statistics during COVID-19, a period marked by intensified reliance on quantitative data. It examines how institutional configurations shaped the governance and politics of pandemic data. Using the concept of 'statistical systems', the article presents a comparative typology of formal structures and informal norms for official data production and dissemination, and tests how these influenced data politics during the crisis. Drawing on interviews with health officials and experts in Australia, Sweden, the UK, and the USA, the analysis reveals how technical and political challenges in data use were encountered and addressed. Despite facing similar pressures, countries diverged in managing data-related problems and pursuing structural reforms. The findings demonstrate that institutions critically condition data governance during crises. Efforts to redesign data systems should account for embedded institutional patterns that shape data governance and influence public trust across national contexts.

Keywords: statistical systems; data governance; health statistics; pandemic.

1. Introduction

Statistical data and modelling were pivotal in shaping public discourse and guiding policy responses throughout the COVID-19 pandemic. Governments relied heavily on statistical indicators and predictive models to inform decision-making and communicate and justify their actions. At the same time, statistics became sites of contention and politicization. Persistent data gaps and informational deficiencies—often stemming from the challenging conditions under which data were collected during the pandemic (Fakhruddin 2020)—impeded efforts to fully grasp the rapidly evolving crisis. As the pandemic progressed, the emergence of an 'infodemic'—a rapid and sustained proliferation of information from diverse and often unverified sources—fuelled conflicting narratives about the virus's impact, divergent opinions on appropriate responses, and growing public scepticism towards quantitative health data and expert authority (Zarocostas 2020). These dynamics were further intensified by both governmental and nongovernmental actors who selectively framed and/or manipulated statistical data to advance their political and economic agendas (Adiguzel et al. 2020; Best 2021; Billig 2021; Adam and Tsarsitalidou 2022; Lawson and Lugo-Ocando 2022; Billig and Marinho 2023; Wigley 2024).

The political and methodological challenges associated with data production and use during the COVID-19 pandemic have received considerable attention, but comparatively little focus has been placed on how institutional differences across countries shaped the use of data and the management of related challenges. This gap reflects a broader neglect of comparative institutional analysis within the literature on the politics of statistics (Howard 2021). To address this, the article draws on and elaborates the concept of statistical systems, defined as the prevailing cultural, legal, and organizational arrangements governing the production and use of official data within specific jurisdictions (United Nations Statistical Division 2003)—developing it into a theoretical construct and typology that is then applied to the politics of pandemic data.

A central argument of the article is that distinct types of national statistical systems can be identified and used to explain how different countries manage the political dimensions of data. The study is guided by three core research questions (RQs):

1) What were the key data challenges experienced by policy advisers and decision-makers during COVID-19?
2) How did key actors within and surrounding health data systems respond to data challenges?
3) How did these challenges and responses vary across national contexts?

Empirical evidence is drawn from in-depth interviews with senior health officials and expert advisors in four countries: Australia, Sweden, the UK, and the USA. These cases were selected theoretically to represent a diverse array of institutional arrangements in statistical governance and public health data provision. By focusing on countries with uniformly high levels of health data expertise, the analysis controls for variations in technical capacity, thereby allowing for a clearer examination of how different institutional approaches to embedding expertise influence data politics and management strategies.

The findings of this research offer insights into the politics of statistics during times of crisis, particularly the strategies that key actors may employ to navigate associated challenges. These results are especially pertinent in the context of ongoing efforts to reform national health data systems to enhance preparedness for future pandemics. By developing an institutional framework and applying it through comparative case analysis, this article contributes to a deeper understanding of how national legal, administrative, and political structures shape the politics of statistics and the possibilities for managing them effectively, and contributes to comparative research on how national cultures of official statistical production shape data politics (Desrosières 1998; Prévost 2020).

The article opens with an overview of key themes in the literature on the politics of government statistics, including how these dynamics manifested during the COVID-19 pandemic. It then introduces our conceptual framework and typology for analyzing and comparing the key institutional dimensions of statistical systems. The next section details the study's case selection strategy and the methods of data collection and analysis, followed by a discussion of the four case studies. The discussion addresses differences between the cases, considers the analytical utility of our theoretical framework, and discusses implications for the practical development of data systems and future research.

2. Statistical systems and the politics of data

While few would dispute the importance of data in pandemics, or in public policy more broadly, scholars and practitioners acknowledge that designing government data processes is a complex task involving trade-offs. A central focus is the *technical-performance trade-off*, or the tension between technical rigour and performance demands (cf. Pamuk 2024). This involves balancing the need for accuracy, comprehensiveness, and methodological robustness with pressures for timeliness, cost efficiency, and policy relevance (Alonso and Starr 1987; United Nations Statistical Division 2003). This trade-off became particularly salient during the COVID-19 pandemic, when statistical modellers were required to produce actionable insights under extreme time constraints (Brooks-Pollock et al. 2021). This led to a prevailing ethos that 'an 80% right paper before a policy decision is made is worth ten 95% right papers afterwards' (Whitty 2015: 3). Modellers frequently employed multiple, overlapping models, along with assumptions built on previous influenza work (Brooks-Pollock et al. 2021: 5). The rapid proliferation of diverse modelling approaches generated a wide range of projections and contributed in some cases to public scepticism and a perception that epidemiological modelling was inherently unreliable (Kuhl 2020: 2; Luo 2021).

The second major trade-off identified in the literature on the politics of government statistics concerns the *tension between independence and control*. Data produced by independent, arm's-length institutions, such as official statistical bureaus, academic researchers, and research centres, are typically perceived as more credible, enabling governments to draw on these figures to enhance their legitimacy (Alonso and Starr 1987; United Nations Statistical Division 2003). During the COVID-19 pandemic, the strategic use of case numbers and risk metrics played a central role in securing public compliance and acceptance of unprecedented public health restrictions (Jayasinghe et al. 2021; Leiva Van De Maele et al. 2024). However, independent statistics may be leveraged by opposition parties, civil society organizations, and the media to expose policy shortcomings and contest official narratives (Alonso and Starr 1987; Desrosières 1998; Haggerty 2001).

For scholars and commentators, how these tensions and trade-offs are managed has a decisive influence on the functioning of a country's 'statistical system' (United Nations Statistical Division 2003; Howard 2021). The concept of a statistical system denotes an interconnected and interdependent set of data collection processes, characterized by structured relationships among its components (Howard 2021). This lens on data suggests that specific datasets, such as on public health, do not get produced in isolation from their broader statistical context.

As Desrosières (1998) demonstrates, the functioning of a country's core statistical processes reflects deeply embedded cultural, political, and institutional histories, affected by unique political, economic, and social trajectories. These historical contingencies influence how statistical tensions and trade-offs are managed in intricate and context-specific ways. However, while this observation underscores the contextual specificity of official statistical arrangements, it can hinder cross-national comparison by treating each case as a *sui generis* path-dependent trajectory, thereby obscuring broader institutional patterns that structure the politics of data across countries.

To address these limitations, this article proposes a comparative framework that conceptualizes national statistical systems as dynamic institutional configurations shaped by recurring patterns and institutional logics that structure statistical governance across contexts. We combine existing comparative institutional analysis of official statistics (Howard 2021) with work on cultures of knowledge production and governance (Pielke 2007; Howard and Hyland-Wood 2024) to propose that statistical systems differ along two institutional dimensions.

The first concerns the core shared assumptions about how statistical knowledge is created within the system. In his influential work on the politics of science advice, Roger Pielke (2007) distinguishes between two *principles of knowledge generation*. One is the 'linear' view, which regards science as taking place independently of the influence of societal and political interests, but functioning to automatically serve the broader good through the inevitable translation of knowledge from experts to policymakers and the public. By contrast, a 'stakeholder' model sees science as necessarily tied up with the needs, perspectives, and priorities of nonscientists. In this model, the direction that science takes, the questions it asks, and to some extent its findings, are determined by the interplay of scientists and their stakeholders. For our purposes, the linear view of science would suggest government statisticians should enjoy a high degree of independence and self-direction; a stakeholder approach to statistical knowledge generation would expect statistical experts to be embedded within social and policy processes, working iteratively with data users to solve problems.

The second dimension along which statistical systems vary is the *mode by which they are governed*, that is how actors with authority seek to regulate the behaviours of members

Table 1. Four types of statistical systems.

		Mode of governance	
		Organic	**Orchestrated**
Principle of knowledge generation	***Linear***	*Autonomous* (USA)	*Centralized* (Australia)
	Stakeholder	*Pluralist* (UK)	*Utilitarian* (Sweden)

of statistical communities. At one end of this spectrum is an ‘organic’ approach to data governance. In this model, there is little concerted effort to produce an agreed upon set of questions, methods, or results. Instead, it is assumed that statisticians should be left to sort out the details of their work programmes. By contrast, in the ‘orchestrated’ statistical governance model, key authorities try to steer knowledge systems in particular directions. This may include the promotion of system-wide goals, and/or deliberate allocation and demarcation of responsibilities to avoid duplication and inconsistency. By plotting these two dimensions against each other, we can produce a matrix of four types of statistical systems, along with indicative examples (see Table 1).

The US statistical system exemplifies an autonomous model, with 13 principal agencies and numerous smaller programmes that developed over time, often overlapping and reflecting shifting policy priorities. Despite occasional challenges, these agencies have historically maintained autonomy from each other and from direct political interference (Alonso and Starr 1987; Howard 2021). Australia’s statistical system, by contrast, is organized around a single dominant independent national statistical bureau (UNSD 2003). The UK, meanwhile, exemplifies a pluralistic model: its statistical divisions are mostly embedded within ministries, and the country has historically resisted the centralized orchestration common elsewhere on the grounds that concentration of statistical authority and formal independence limits responsiveness to complex policy needs (Laux et al. 2007; Howard 2022). Finally, Sweden exemplifies the utilitarian model: while statistical units are decentralized to address specific policy needs, their allocation is centrally managed to prevent overlap and ensure clear responsibility (Howard 2021).

We are interested in the role these different statistical system types played during COVID-19, with a particular focus on health data. This study examines whether the prevailing system type influenced how countries experienced and managed data-related challenges, and whether established statistical institutions and norms shaped subsequent reform proposals aimed at strengthening the system for future pandemics.

2.1 Research approach

This study employs a comparative qualitative design to examine how institutional arrangements shaped the politics of statistics during the COVID-19 pandemic. Four countries—Australia, Sweden, the UK, and the USA—were selected to capture variation across the two key dimensions of statistical governance in our conceptual framework. These cases represent contrasting institutional configurations and cultures of knowledge production, enabling structured comparison. Selection was also guided by practical considerations: all four countries demonstrated transparency in COVID-19 advisory processes and openness to researcher access at senior levels during data collection (2023–4).

Importantly, all four countries entered the pandemic with high ratings for pandemic preparedness and are internationally recognized for their strong public health infrastructure and data science expertise. Each possesses well-established institutions with global reputations in epidemiology, modelling, and health data analytics. These shared characteristics allow us to hold constant the baseline availability and quality of technical expertise across cases. As such, we attribute observed differences in the politics of data not to disparities in expert capacity but to the institutional arrangements and norms through which that expertise was embedded, mobilized, and contested.

Our empirical strategy combined analysis of key documents with elite interviews. We began by systematically reviewing national government reviews and inquiries into the handling of COVID-19 where available, including Australia’s *Commonwealth Government COVID-19 Response Inquiry* (2024); Sweden’s *Coronakommissionen* English summary report (2022), and the UK’s *COVID-19 Inquiry* (Thomas 2023; UK Covid-19 Inquiry 2024). These provided a foundational understanding of COVID-era data challenges and recommendations for reform. We then conducted in-depth, semistructured interviews with senior government advisers and technical experts directly involved in the production, analysis, internal use, and/or public dissemination of COVID-19 data.[1] Participants were selected through purposive and snowball sampling, with an emphasis on individuals responsible for epidemiological modelling, advising governments on data use, and communicating projections to the public. The final sample included the following: Australia (n = 16), Sweden (n = 9), the UK (n = 13), and the USA (n = 14). Table 2 provides information on the interviewees cited in the current article, including organizational affiliations and roles.[2]

All the interviews were audio-recorded, transcribed verbatim, and analysed using thematic analysis. Each researcher coded one country’s transcripts independently using a hybrid strategy that combined inductive coding with deductive categories derived from our conceptual framework. Regular team meetings were held to discuss emerging findings, compare interpretations, and refine the thematic structure in relation to the broader theoretical model. This iterative process ensured analytical coherence while allowing for reflexivity and responsiveness to the data. Particular attention was paid to how participants described institutional constraints, political pressures, and strategies for managing data-related controversies, enabling us to map these accounts onto the typology of the statistical systems developed in this study. This methodological approach enabled us to examine not only how statistical systems functioned under crisis conditions but

[1] All interviews were conducted, recorded, and stored according to the project protocol approved by the Griffith University Human Research Ethics Committee (2022/212). Interview questions are provided in Appendix 1.

[2] Roles are described broadly to avoid compromising anonymity.

Table 2. Interviewee affiliations and roles.

#	Australia	Sweden	UK	USA
1.	Australian Public Service employee seconded to the Australian Government response, July 2023 (sa)	National Board of Health and Welfare, October 2023 (pm)	Scientific Advisory Group for Emergencies (SAGE) SPI-B member, November 2023 (a)	National Institutes of Health, former Vaccines and Related Biological Products Advisory Committee (VRBPAC) member, March 2023 (a)(dc)(sa)
2	Former Infection Prevention and Control Expert Group (ICEG) member, July 2023 (pa) (pm)	Member of COVID expert advisory group, October 2023 (a)(dc)(sa)	SAGE SPI-M member, November 2023 (a)	Former VRBPAC member, March 2023 (a)(sa)
3	Former Culturally and linguistically diverse communities (CALD) COVID-19 Health Advisory Group and Aboriginal and Torres Strait Islander Advisory Group on COVID-19, July 2023 (pm)	Former official at Public Health Agency, October 2023 (pm)	Former member of the COVID-19 Taskforce Response, November 2023 (pa) (pm)	Public health association employee, March 2023, (ngo)(pa)
4	Former Aboriginal and Torres Strait Islander COVID-19 Advisory Group member, July 2023 (a) (pa)	Public Health Agency, October 2023 (pm)	SAGE Social Care Working Group member, November 2023 (a)	Centers for Disease Control and Prevention (CDC), former ACIP member, March 2023, (pa)(dc)
5	Former COVID-19 Sports and Health Advisory Committee member, July 2023 (pa)	Ministry of Health and Social Affairs, October 2023 (pm)	New and Emerging Respiratory Virus Threats Advisory Group (NERVTAG) member, November 2023 (a)	Former Advisory Committee on Immunization Practices (ACIP) and VRBPAC member, March 2023 (a)(sa)
6	Former CALD COVID-19 Health Advisory Group member, July 2023 (pm) (dc)	Member of COVID expert advisory group, October 2023 (a)(dc)(sa)	SAGE SPI-M member, November 2023 (a)	White House advisor, April 2023 (a)
7	Former Australian Health Protection Principal Committee (AHPPC) member, July 2023 (pa)(pm)	Former official at National Board of Health and Welfare, October 2023 (pm)	NERVTAG and SAGE member, November 2023 (a)	White House advisor, April 2023 (a)(pa)
8	CDNA member, August 2023 (a)	Public Health Agency, October 2023 (pm)	UK Go Science, November 2023 (pm)	CDC, February 2024 (pa)(dc)(sa)
9	Former Advisory Committee for the COVID-19 Response for People with Disability member, August 2023 (pm)		SAGE SPI-M and NERVTAG member, November 2023 (a) (sa)	CDC, February 2024 (pa)(dc)(sa)
10	Former ICEG member, August 2023 (a) (pa)		Health Security Agency, November 2023 (pm)	CDC, former ACIP member, February 2024 (pa)(dc)(sa)
11	Former ACT Health member, August 2023 (pa)(dc)			

Key: (a) academic adviser; (dc) data collector; (ngo) nongovernment other employee; (pa) practitioner–adviser; (pm) policymaker; (sa) statistical analyst.

also how institutional design shaped governments' capacity to manage the political dimensions of data during the pandemic.

3. Empirical cases

In this section, we examine each of the four country cases in turn, answering our RQs 1 and 2 by focusing on four key challenges identified in our review of the statistical governance literature: data gaps, competing data sources, political interference, and harmonization/orchestration efforts. In the discussion, we return to RQ3 and address systematic differences between our country cases.

3.1 Australia

3.1.1 Data gaps. Australia confronted substantial data gaps during the initial stages of its response. Interviewees highlighted that the early months were marked by a pervasive lack of reliable information and rapidly evolving evidence, which complicated policy decision-making processes. One interviewee described this as 'doing a presentation and you can feel your feet shifting on the sand while you're talking' (Australia #5). As a result, an interviewee noted that early policies were developed solely from 'expert consensus and low-quality evidence' (Australia #3).

In the absence of readily available data, policymakers needed to continuously monitor for new scientific literature and leverage personal and professional networks to obtain preprint versions of research. Interviewees emphasized the need to draw on briefings and data produced by other countries, facilitated through regular teleconferences and consultations with international counterparts. They identified significant deficiencies in domestic data collection, particularly concerning the specific impact of the virus on population groups such as people from diverse backgrounds, and on infection rates of healthcare workers (Australia #s 6, 9). Furthermore, interviewees consistently emphasized the absence of an adequate system for data collection and management at the onset of the pandemic, noting that data had to be processed manually—a method that was both time-consuming and heavily reliant on human resources (Australia #1).

Nevertheless, participants also acknowledged that these critical shortcomings were rapidly recognized and addressed by the Australian Government. One of the most significant and impactful initiatives implemented in response was the establishment of a national network of general practitioner (GP) respiratory clinics, launched in March 2020 just 10 days after its announcement. Ultimately, the initiative resulted in the establishment of 150 respiratory clinics, which served over

800,000 patients and provided coverage to 99% of Australia's postcodes (Davis et al. 2022). The data collected through these clinics (demographic data, along with testing and vaccination numbers) became a critical resource for informing ongoing pandemic measures and was identified as a valuable database for managing future public health emergencies (Australia #9).

3.1.2 Competing data sources. As data on epidemiology and potential treatments gradually became available, conflicting evidence also appeared. One of the most prominent examples cited by interviewees was the issue of mask use (Australia #s 2, 4, 8, 10). Diverging views on mask policy were evident, particularly regarding the use of N95 respirators, as the available evidence remained inconclusive. Interviewees also highlighted the role of bureaucratic politics, with competing sources of data and notable tensions between key advisory bodies. These included the Communicable Diseases Network Australia (CDNA), a body responsible for coordinating national surveillance and public health responses to communicable diseases, and the Australian Health Protection Principal Committee (AHPPC), the key decision-making committee for public health emergencies. One interviewee specifically pointed to a lack of coordination between the CDNA and AHPPC during the early stages of the pandemic, observing that the CDNA was comparatively slow to adopt a 'war footing' in its response (Australia #7). Tensions were also noted between the Infection Control Expert Group (ICEG), which provides specialist advice on infection prevention and control, and the *ad hoc* National Clinical Evidence Taskforce, established to provide up-to-date, evidence-based clinical guidelines during the pandemic. The ICEG found itself in direct competition with the newly established Taskforce, in terms of both funding and data collection/analysis. The ICEG ultimately 'lost ground' to the Taskforce after Health Minister Hunt allocated funding to the latter, effectively allowing it to take over the responsibility for infection control. This shift was driven by mounting criticism from the media and organizations such as the Australian Medical Association (AMA), which questioned the leniency of the ICEG's guidelines (Australia #10).

3.1.3 Political manipulation. There is little substantial evidence of political manipulation of data in the Australian context. Interviewees did not perceive political actors as attempting to mislead the public with data, but did suggest cases of information being withheld (Australia #7). This complements existing research that found that health department officials in some states were reluctant to release health data for use by external modellers for fear of embarrassing their political masters (Howard and Hyland-Wood 2024).

Indirectly linked to concerns about political manipulation of data, several interviewees highlighted a generalized lack of transparency within Australia's data system. As one interviewee remarked, 'The Australian government's default position is not to share data' (Australia #4). Another interviewee framed this as an institutional issue, highlighting the lack of data sharing between the Commonwealth and State governments on the one hand and from the government to stakeholders on the other (Australia #9). Fights for funding drove the lack of data sharing in the former case, and concerns about commentators generating scare campaigns drove this issue in the latter (Australia #9). An additional institutional factor to consider was Australia's 'fragmented' and decentred framework of health data production (Howard and Hyland-Wood 2024). This further hindered state-level authorities already struggling to manage the overwhelming volume of data coming from the clinical care response.

3.1.4 Harmonization of data. Harmonization of data was an important theme in Australia's handling of the pandemic. Through its role in funding GP primary care, the federal government increased its direct collection of data through the centrally managed GP respiratory clinic system. Federal-level harmonization is also evident in the national government's decision to engage one external institution to provide modelling of pandemic scenarios, and the lack of public availability of the assumptions and data supporting this modelling, which allowed for a coherent national approach to forecasting with limited scope for alternative interpretations (Australia #s 2, 6).

Yet the main custodians of primary health and infectious diseases are the Australian states and territories. To coordinate data dissemination, subnational governments reported directly to the Department of Health and Aged Care's National Notifiable Diseases Surveillance System. However, this was complicated by different states and territories employing different definitions and measurement protocols, including the Northern Territory using a different metric for vaccination rates. Interviewees noted that the CDNA played a key role in this harmonization process, serving as a forum for 'learning from each jurisdiction, harmonizing responses, and agreeing on approaches' (Australia #8). Yet this task was not without its challenges. One interviewee noted that the CDNA periodically revised the Series of National Guidelines, which made 'case counting', reporting, and data analysis particularly difficult (Australia #11).

3.2 Sweden

3.2.1 Data gaps. Sweden experienced significant data gaps, particularly in the early stages of the pandemic (Sweden #s 1–7). Interviewees (1, 4) pointed to the decentralization of responsibility for infectious disease testing across the 21 county medical regions. At the outset of the pandemic, the counties demanded extra funding from the central government to conduct COVID-19 testing, leading to a delay in data collection that impacted decision-makers' understanding of the viral spread. While a senior Public Health Agency (PHA) official argued that the counties were underresourced and needed more support, and that Sweden 'later on rallied really and found resources in the national sphere' (Sweden #4), the official Coronakommissionen inquiry was highly critical, describing this episode as a 'complete failure'. It reported that regional authorities 'insisted on generous funding in order to make a start' on testing (Coronakommissionen 2022: 18). Testing was also hampered by a lack of equipment, and the 'scale up of testing was substantially slower in Sweden' than in other Nordic countries (Ludvigsson 2023: 25–6).

Our interviewees highlighted other data gaps and their causes. One external expert, who sat on a COVID-19 advisory committee established by the PHA, noted that routine 'seroprevalence surveys', which could have improved the accuracy of existing models, had been discontinued before the COVID-19 pandemic due to budget constraints (Sweden #2). The same interviewee also pointed out that independent research into the disease was further limited by legal restrictions on collecting biological samples from citizens, and there did not appear to be expedited efforts to amend legislation to allow it.

This reflects two broader themes in our Swedish interviews: the law is a key factor in determining the scope for public health intervention, and established legal and administrative frameworks should be capable of handling crises (Sweden #s 1, 4, 7).

Gaps in data expertise were another challenge. While interviewees from the PHA were generally confident in their in-house expertise, others pointed out that the agency had lost infectious disease knowledge over the preceding decade. This shift was said to be the result of government efforts, starting in 2010, to reorient the organization from a specialized infectious disease research institute into a broader public health policymaking body focused on holistic determinants of health and well-being (Sweden #s 2, 6): 'That is what started this attenuation of competence' (Sweden #2). At the same time, the PHA strongly emphasized data-driven decision-making, which, while generally a sound approach, led to slow action in the face of missing or incomplete data (Olofsson et al. 2022). While an external adviser (Sweden #6) felt the PHA nevertheless had sufficient expertise to handle the pandemic, the Coronakommissionen report, and interviewees from the National Board of Health and Welfare (Sweden #s 1, 7), which oversees Sweden's decentralized hospital system, identified this combination of data gaps and data emphasis as a key factor in Sweden's delayed response (there is an active debate on whether this had a material effect on disease outcomes—Ludvigsson 2020).

3.2.2 Competing data sources. In Sweden, competing data sources were not a major political issue. An interviewee from the National Board of Health and Welfare (Sweden #1) noted some inconsistencies between county- and region-level reports sent to the central government on the health situation, which created tensions between national ministries. However, while there were not significant open political disputes about COVID-related data, inquiries and interviewees suggested this was partly because debates and inconsistencies were kept from public view. Indeed, the official Coronakommissionen inquiry argued that there was *too much consistency* in data sources presented to the public and political decision makers, with few alternative data sources or competing viewpoints (Coronakomissionen 2022: 26).

A key factor keeping data inconsistencies from spilling over into public debates was the government's decision to concentrate responsibility for much of the pandemic response, along with its assessment and management of complex trade-offs, in the PHA. This was made possible by the PHA's aforementioned broad mandate, which allowed it to take a leading role in both data interpretation and policy recommendations across a wide field of possible public health impacts. As a result, critical debates about interpreting competing data sources and balancing competing priorities were largely handled and resolved within a single bureaucratic agency (Sweden #3), and to a lesser extent between agencies, allowing these bodies to present a unified narrative to the government and the public (Coronakomissionen 2022: 16). While multiple interviewees (Sweden #s 3, 4, 8) highlighted the open and genuine debates within the PHA on data interpretation and policy recommendations, there was also a focus on presenting a unified external position, driven by an assumption that conflicting information could confuse public messaging at a time when the government was relying on citizens to voluntarily comply with pandemic advice (although there were some public debates about the data—Sweden #3). This approach limited the visibility of internal discussions and uncertainties of data interpretation (Coronakomissionen 2022). One Health Ministry official suggested the government was aware of the existence of different views, but it also trusted the PHA:

> . . . of course we felt that there was contradicting evidence ... So of course we had our doubts, and of course we looked at the evidence and really asked all the thousand questions ... The first impulse was to, again, basically trust the agency (Sweden #5).

While the PHA acknowledged the value of external expertise by establishing an advisory group, the group's role appears to have been limited to providing feedback on the agency's preferred course of action. One member noted the informality of meetings: 'there was an agenda, but it was not very strict and there were no protocols. They informed us about their views and their ideas, sometimes their plans. They wanted to see if we had any comments or objections'. On other occasions, the group's function was passive: 'Sometimes they were informing us about the plans. But often these plans were quite... I think it was criticised a bit that they were not so open. So, they had their internal discussions and then they'd just present something' (Sweden #6). The Coronakommissionen also suggested that external social science and behavioural expertise was not adequately consulted (Ludvigsson 2023: 28).

One issue raised was the emerging evidence that COVID-19 was significantly more contagious than influenza, particularly when the viral load was high, a finding some advisory group members had identified independently. However, they felt that many within the committee, as well as the PHA, remained anchored to influenza-based data and assumptions. They reflected: 'It took a long time before people realised that. And in this group, we also had this view that we'll let it blow through. Let it just go through the population' (Sweden #2).

3.2.3 Political manipulation. Our research found no evidence of deliberate data manipulation for political purposes in Sweden. Political incentives and opportunities to influence data were limited, primarily because responsibility for much of the data analysis and interpretation was delegated to bureaucratic agencies (Pashakhanlou 2022). Agency officials also assumed a central role in public communication, routinely delivering briefings and advice without the presence of political leaders, an arrangement that contrasted with practices in most liberal democracies, where politicians typically appeared alongside technical experts (Flinders 2021; Byrman and Westum 2023). This approach reflected Sweden's constitutional principle of agency autonomy, which prohibits governments from directing the day-to-day operations of agencies, a constraint acknowledged by political actors during the pandemic: 'from the political side, it could sometimes be frustrating that you don't have the entire mandate' (Sweden #5).

However, the Swedish agency model is not entirely inflexible. Multiple interviewees (4, 5, 8) affirmed the Coronakommissionen's finding of sustained and substantive communication between the government and its agencies, particularly the PHA. One respondent (Sweden #5) highlighted that policy proposals were routinely scrutinized, with ministry officials challenging the PHA to consider alternative interpretations and response strategies, ensuring a comprehensive assessment of options. From this perspective, the formal and public delegation of responsibility to the agency served a dual purpose: it insulated the government from direct accountability for technical judgements while preserving space for constructive, informal engagement with agencies behind the scenes.

3.2.4 Harmonization of data. Harmonization of data has been a complex and debated issue in Sweden's pandemic response. Interviewees overseeing the country's decentralized health system suggested that COVID-19 highlighted the need for better integration between county and national data systems to ensure faster and more consistent reporting, and observed that new high-frequency electronic reporting systems had been established that could be activated quickly in a future pandemic (Sweden #s 1, 7). The Coronakommissionen also recommended establishing a crisis management body that would report directly to the government and have the authority to obtain data from 'all relevant stakeholders' (Coronakomissionen 2022: 25).

At the same time, however, the Coronakommissionen emphasized the importance of greater diversity, rather than uniformity, in the data presented to government. This is reflected in its recommendation to split up responsibility for pandemic data provision at the national level by involving more agencies, because 'it is important that, in future, disease prevention and control in a broad sense are organised in such a way that the government receives adequate data from more than one authority' (Coronakomissionen 2022: 26). Similar points were made about proposals to bring healthcare administration under national control. One agency interviewee spoke of actively lobbying politicians to 'break some good ideas that might come, like we should reorganize the healthcare system', because 'people. .. don't understand how things work. And then they think it's better if [the central government] could just control it all' (Sweden #7). Sweden's response to pandemic-related data challenges was thus conflicted between pushes for greater centralization and efforts to preserve decentralization, but leaned towards keeping the regionalized administrative system while increasing data specialization across agencies at the national level, ensuring that data was handled by those with relevant policy experience and expertise, and also allowing more diverse perspectives rather than consolidating all data responsibilities within a single expert authority.

3.3 United Kingdom

3.3.1 Data gaps. At the early stages of the pandemic, the UK government, the Scientific Advisory Group on Emergencies (SAGE), and devolved administrations faced a severe lack of data, leaving decision-makers 'flying more blind than you would wish to' (UK Covid-19 Inquiry 2024: 97). Civil servants and expert modellers agreed that the first year was marked by incomplete, incorrect, and conflicting data (UK #s 2, 3, 6, 8, 9, 10). During the first lockdown (23 March to 7 July 2020), April was the worst month, with more than 3,000 new cases every day, rising to 5,500 in late April. By 25 April, the UK had surpassed 20,000 deaths (British Broadcasting Corporation 2020). In late May, the UK government established the National Health Service (NHS) Test and Trace Model, but the system struggled to provide reliable weekly infection counts until October 2020 (UK Parliament 2021). Data was crucial and its absence became an 'obsession' with statistical gaps in testing numbers, ICU capacities, and patient treatments (UK #10). In response, reliance on modelling grew (UK #8), but modellers struggled with inadequate data and unclear objectives.

Civil servants' demands for analysis, despite data gaps, created dilemmas for modellers. One member from the Scientific Pandemic Influenza Group on Modelling (SPI-M) regretted answering a persistent government request about evidence on closing football grounds, admitting the models lacked the necessary data (UK #9). Another expert highlighted the lack of transparency in how the government interpreted and applied external modelling, acknowledging that the UK's secrecy conventions created a one-way process where analysis and advice were given, but feedback was rarely received (UK #7). There were also concerns about the transparency of data coming from government departments. As one modeller noted, '[The civil service] did their thing with the data, and we were just consumers. There wasn't much two-way interaction' (UK #2). By late 2020, data availability improved, thanks to increased interdepartmental collaboration and a push from Downing Street to normalize data sharing (UK #8).

3.3.2 Competing data sources. Interviewed modellers highlighted the challenge of multiple competing data streams. In the UK, data sovereignty rests with various agencies and departments rather than with a centralized source. While the COVID-19 Data Dashboard offered a virtual clearinghouse for key indicators, it was built from dissimilar data sources, and decision-making was complicated by fragmented data access and competition (UK #3).

Cabinet decisions were not based solely on health data (Thomas 2023; UK Covid-19 Inquiry 2024; UK #s 3, 8). Early in the pandemic, NHS data lacked the granularity to track local outbreaks, allowing other departments, such as the Treasury, to fill information gaps with their own nonhealth data (e.g. economic impact of shutdowns). Without access to all the available data streams, disease modellers often relied on household behavioural research (stay-at-home and social-distancing behaviours) to inform their advice on projected infections (UK #9).

Under the SAGE structure, departments could request modelling for their own purposes (UK #8). One expert noted that technical questions from departments, such as quarantine duration, were relatively straightforward (UK #7). However, when questions involved value judgements, for example balancing NHS capacity against school closures, modellers deferred to politicians.

Despite increasing access to multiple data sources as the pandemic progressed, not all of these sources carried equal weight in decision-making. Members of the Scientific Pandemic Insights Group on Behaviours (SPI-B), for instance, questioned whether their insights influenced policy. One recalled asking Chief Scientific Officer Patrick Vallance for an example of their impact, to which he responded, 'I think things would have been a lot worse if it hadn't been for you' (UK #1). Data rivalries also extended beyond government. SPI-B and SPI-M members clashed over data use, with SPI-B accusing SPI-M of leveraging their insights without acknowledgement (UK #1). Meanwhile, a SPI-M member dismissed SPI-B data as 'wishy-washy anecdote stuff' (UK #1).

3.3.3 Political Manipulation. Two key concerns arose regarding political use of health data in the UK's first pandemic year: the debate over herd immunity, and the level of data transparency required.

On herd immunity, interviewees highlighted fears that some politicians and media figures had been captured by the 'Swedish model', and assumed herd immunity was possible and required (UK #s 4, 5). This created two risks: reluctance in Cabinet to collect infection data and the spread of misinformation by self-appointed experts. Much of early 2020 was spent ensuring decision-makers, particularly in Cabinet, understood that herd immunity was not a viable strategy. One SAGE member recalled that tests and decisions on lockdowns were 'delay[ed]' due to the 'harmful' persistence of herd immunity theory (UK #5). Experts worked to counteract misinformation circulating from No.10, with both the Chief Medical Officer (CMO) and Chief Scientific Officer (CSO) insisting on clear data to disprove herd immunity as a strategy (Thomas 2023).

The second frustration was the role of figures outside formal advisory processes—MPs, non-SAGE academics, and media personalities—who publicly challenged SAGE advice (UK #s 5, 8, 9, 10). SAGE members exercised caution in publishing, fearing misinterpretation by the media. Some avoided publicity after facing privacy violations and harassment (UK #s 1, 4, 8, 9). One expert regretted not speaking out more, expressing their alarm at policies like the Eat Out to Help Out scheme in June 2020. However, they noted that public caution, with people going out less than expected, suggested some messaging had landed (UK #9).

This reluctance to engage with media fuelled perceptions of secrecy. Government insiders acknowledged the challenge of balancing public disclosure, with SAGE experts facing more public scrutiny than civil servants, who could largely remain anonymous (UK #8, 10).

3.3.4 Harmonization of data. Harmonisation of data occurred during COVID-19, despite the UK's fragmented model of data sovereignty. The Cabinet Office COVID-19 Task Force, established in May 2020, used the summer to align key statistics while allowing departments to maintain policy autonomy. As one interviewee explained, 'The purpose behind this was to say, look, we're all from different departments, [...] but let's, as analysts, all agree on what the numbers are' (UK #8). Both government officials and experts (UK #s 2, 3, 6, 7, 8, 9, 10) observed improved data coordination from late 2020, attributed to Task Force leadership changes, clearer data requirements, and enhanced modelling supported by the Chief Scientific and Medical Officers. An independent review confirmed these improvements (Thomas 2023).

Despite progress, concerns remained. Civil servants interviewed warned that lessons regarding data gaps and inconsistencies remain unlearned. One official stressed that the UK Covid-19 Inquiry must highlight the need for real-time data sharing from local to national levels (UK #10). Future health crises may again see overreliance on models due to persistent data gaps.

3.4 United States of America

3.4.1 Data gaps. Within the USA, data gaps were particularly prominent at the start of the pandemic, though they continued throughout. Interviewees from vaccine advisory committees highlighted significant gaps in vaccine data across various age groups—children, teenagers, and older adults, making it challenging to provide recommendations for these populations (USA #s 1, 2, 4, 5, 8). These gaps derived from the inability to gather sufficient disaggregated data within a short, urgent timeframe and ethical questions concerning placebos during a pandemic. Centers for Disease Control and Prevention (CDC) participants also noted early issues in gathering 'high-quality' data on case numbers, the impacts on children, asymptomatic spread, and specifics around social distancing measurements (USA #s 8, 9, 10). Part of this was due to the novel nature of SARS-CoV-2 and the urgency of the response, but gaps in case data were also largely due to the CDC's own mistakes, particularly in releasing a flawed test kit. Interviewees expressed very different opinions on how to manage these gaps vis-à-vis recommendations. Some, especially within the Food and Drug Administration (FDA)'s Vaccines and Related Biological Products Advisory Committee (VRBPAC), stated that they felt others only voted yes on recommending vaccination/boosters because the risk of inaction in the pandemic was too great (USA #s 1, 5). CDC interviewees justified their own positions here by noting exactly this: inaction, when they were confident that the vaccines and boosters worked, would be a bad public health decision (USA #s 4, 5, 8). Another data gap concerned the waning immune response from vaccination. Some expressed frustration and embarrassment that this information had to come from Israel, laying the blame on the USA's delay in rolling out boosters and the 'fractured' and 'deplorable' data collection system they had to work with (USA #s 6, 8).

To manage these gaps, interviewees highlighted their efforts to bring together as much available data as possible and debate its significance within expert bodies. This included drawing upon 'lower-quality' sources of data (including anecdotal evidence) and pre-print research. The latter required policy actors to conduct their own peer review and encourage reluctant researchers to share their research (at the risk of being 'scooped') (USA #s 8, 9).

3.4.2 Competing data sources. Due to the rapid and urgent nature of the pandemic and the aforementioned issues of data collection, policy actors had to rely on 'lower-quality' data sources such as anecdotal data of asymptomatic spread, smaller and unrepresentative trials of vaccines, and case reporting from hospitals and state health officials, rather than the 'gold standard' randomized control trials that they preferred (USA #s 8, 9). This was particularly noted as a challenge in formulating the kinds of generalizable and concrete recommendations around social distancing, school closures, and mask wearing demanded by policymakers, where interviewees from the CDC stressed issues of 'nuance' that appeared as they 'pieced [the data] together' from these sources (USA #s 8, 9, 10).

Notably, many of those interviewed across different expert agencies also highlighted conflicts in how data was *interpreted*. Most insisted that their colleagues were still premising their positions on 'the science' but were simply coming to different opinions on what it meant for the best policy response. Some perceived this as a benefit for policymaking, where the 'warts' of a decision (or a vaccine or recommendation) are openly debated, leading to more 'confidence in the process' (USA # 1). Others also highlighted how a public health response must consider economic, political, and social aspects in addition to epidemiological data, which was a problem that some of their colleagues failed to grapple with (USA #s 4, 7, 9).

3.4.3 Political manipulation. As extensive public commentary and scholarly analysis has detailed, the Trump administration repeatedly defied its responsibility to produce and provide critical public health data, including undermining data reporting systems (namely those connected to the CDC), refusing to provide data to outside experts and public health officials, and simply not gathering the necessary information to begin with (Rutledge 2020). One interviewee suggested that this was to control the message surrounding COVID-19, to minimize the threat and impact of the pandemic, and to justify early inaction and rapid reopening (USA #8). Meanwhile, the data that the administration did produce and provide was used selectively, including to mislead audiences. Former White House Coronavirus Coordinator Deborah Birx (in Becket 2021) described the White House as 'cut[ting the data] into pieces': only focusing on short periods of case decreases or improvements in mortality that could present a more optimistic, and inaccurate, picture of the pandemic's progression. Political actors thus clearly actively sought to mislead audiences with health data during COVID-19.

However, few interviewees wanted to discuss this explicitly, indicating how contentious this topic remains in the USA. Some did critique the Trump administration more generally for trying to control CDC communications (USA #8), appointing 'whack jobs' to advisory positions (USA #3), and simply being 'not so interested in expert advice' (USA #5), suggesting that these led to political manipulation of data. Some other cases were also mentioned, including Robert F. Kennedy Jr 'twisting' facts to mislead on vaccines (USA #5) and concerns that the Biden administration was seeking a 'good news story' on bivalent vaccines despite little evidence for their benefit (USA #2). Beyond this, however, the explicit connection to political actors was less common. Most instead lamented the general consequences of this misleading use of data, including how extensive misinformation was and how high public uptake of erroneous beliefs appeared to be.

3.4.4 Harmonization of data. For most US interviewees, pressures for harmonization of health data in the USA were largely internal. Having to rely on 'lower-quality' data meant that data had to be drawn from multiple, disparate sources, and some interviewees identified a concern with making 'usable' recommendations out of this. There were also pressures to harmonize vaccine trial data, or to draw together data from trials focusing on one group to draw conclusions about other groups. In one notable case (boosters and bivalent vaccines during Biden), it was suggested by multiple interviewees that there was no data suggesting a benefit for boosters for all age groups (specifically, children) and the bivalent vaccine, with Advisory Committee on Immunization Practices (ACIP) recommending against it. This recommendation, however, was not followed by the CDC director. Some interviewees were particularly annoyed by this, as they saw children as endangered more by potential side effects from the vaccine than by COVID-19 (USA #s 1, 2).

Yet there were also external pressures highlighted. CDC interviewees noted pressures from federal government officials (including from the Departments of Education and Health and Human Services (HHS) to 'simplify' recommendations in a way that harmonized data/interpretations of data and bypassed the nuances and differences between risk groups and settings (USA #s 9, 10). Some interviewees felt that, by succumbing to this pressure, this detrimentally affected public uptake of recommendations, as justifications for the wide-spanning recommendation were weak in key areas. Two interviewees also noted pressure from their colleagues and external expert figures to minimize any debate around vaccine data to bolster public trust in the vaccines, which they observed as a dangerous precedent (USA #s 1, 2).

4. Discussion

This article has explored the data-related challenges governments encountered during COVID-19, both technical and political, and the strategies adopted to address them. In this discussion, we return to our third research question and ask: *to what extent did the different national institutional configurations of statistical systems shape these challenges and responses?* Our conceptual framework distinguishes four types of statistical systems—centralized, organic, pluralistic, and utilitarian—and argues that these configurations influence not only states' technical capacity to meet data demands during crises but also the political dynamics of data interpretation, contestation, and reform. The key question for the theoretical and practical utility of our typology is whether the COVID-19 data challenges and responses reflected the characteristics of these underlying statistical systems.

Australia's response illustrates the enduring influence of a centralized model of data governance. Data collection and analysis were largely entrusted to a small number of expert institutions, with strong government direction and funding. When data gaps emerged, such as the need for information on culturally and linguistically diverse populations, government agencies quickly defined mechanisms to address them. The selective involvement of external actors like the Doherty Institute introduced some new actors but ultimately reinforced the logic of centralization and unification in data analysis. The proposed establishment of an Australian Centre for Disease Control (CDC), as recommended in the Commonwealth Government's COVID-19 Response Inquiry, signals an intensification of centralization in the health data domain. The CDC is expected to house a national communicable disease data repository, harmonize data sharing protocols, increase the pressure on states and territories to share their sensitive data, and ultimately lead to a harmonized policy response across governments to future pandemics (Australian Government 2024).

In contrast, Sweden's experience reflects the logic of a utilitarian statistical system. Here, data governance is shaped by a strong normative commitment to clarity of purpose and efficiency in data use. The pandemic reinforced the value placed on decentralization, even as it exposed its limitations. Coordination challenges, jurisdictional tensions, and gaps in data collection emerged as significant obstacles. The Swedish model's emphasis on minimizing redundancy and maximizing efficiency inadvertently reduced the availability of data that could have supported a more agile pandemic response. Yet, while Australia moved towards greater centralization via its particular take on the CDC model, Sweden's postpandemic review recommended the opposite: more official statistical sources and greater diversity of opinion to mitigate the risks of internalization of conflict and epistemic closure in data analysis.

The UK's management of COVID-19 data reflects a third model: a pluralistic statistical system marked by fragmentation and political contestation, with crises offering (often temporary) opportunities for increased coordination. In the early stages of the pandemic, the absence of a centralized data strategy created confusion among experts and civil servants regarding data sources, reliability, and intended use. Selective data sharing and unclear objectives behind data requests further undermined coherence. Although coordination improved over time, operational oversight remained closely tied to political leadership. Voluntary contributions from external experts not only helped bolster state capacity but also enabled political actors to selectively draw on advice that aligned with their agendas. Postpandemic recommendations in the UK have focused on improving interoperability, standardizing data practices, and clarifying institutional responsibilities, reinforcing the observation that pluralistic systems struggle during crises, when clear authority and coordinated action are essential. Notably, however, the UK has not proposed centralizing the production of key health indicators within a dedicated institution akin to the Australian CDC model.

The USA's COVID-19 response reflects the features of an organic statistical system, characterized by agency autonomy and spontaneous interagency collaboration. Institutions such as the CDC, FDA, and National Institutes of Health (NIH) operated with overlapping but complementary mandates, drawing on established relationships and advisory structures. While this model enabled flexibility, it also exposed weaknesses. This can be observed in the CDC's initial failures in testing and subsequent efforts to aggregate data from fragmented sources, including state and local health departments, private firms, and international bodies, and is also apparent in the internal debates and discontent in ACIP and VRBPAC around vaccine data gaps. These gaps, especially where data did not align with policy needs, slowed response efforts. Political dynamics further complicated governance, as the multiplicity of data sources enabled selective use by political actors, and agency staff were aware that recommendations could be reshaped by political considerations. Despite these challenges, postpandemic reforms have focused not on centralization but on improving data sharing speed and interoperability. The emphasis remains on strengthening the existing framework of independent agencies rather than consolidating statistical authority.

These cases collectively underscore the importance of institutional context in shaping the politics of data during crises. They demonstrate that statistical systems are not neutral infrastructures but are embedded in broader governance arrangements and political cultures. Data politics is thus central to understanding how states mobilize knowledge in times of uncertainty. Whether organic, centralized, pluralistic, or utilitarian, each government statistical system grapples with a set of trade-offs between coordination, legitimacy, responsiveness, and control, and these challenges are heightened during crises.

From a theoretical perspective, this study makes several contributions to scholarship on public policy and data politics. First, it reinforces the argument that institutions are not merely background conditions but active mediators of crisis governance. Second, it underscores the centrality of data politics in shaping policy responses, aligning with interpretive and constructivist approaches that emphasize the contested nature of policy-relevant knowledge. Third, it offers a framework for understanding how cultural assumptions about knowledge production and institutional legacies of data governance shape the prospects for policy learning and reform in the domain of data production and governance.

A limitation of this study is that, in aiming to empirically represent all the ideal types in our framework, we necessarily traded breadth for depth. In addition, our deliberate focus on high-income, high-capacity liberal democracies to control for certain variables means the framework and findings should be generalized with caution to states with different political regimes or lower technical capacity. Nonetheless, this limitation opens an important avenue for future research: exploring how our statistical system framework applies to, and accounts for, data politics and structural responses across varied governance contexts.

5. Appendix 1: List of interview questions

1) How did you become involved in the COVID-19 response?
2) Which advisory and/or decision-making bodies were you part of?
3) In your view, what was the role of the advisory body? How did it fit in the machinery of the government's response?
4) When providing advice and/or making decisions, what sources of evidence did you and your colleagues rely on?
5) Did the advisory body encounter conflicting evidence about the measures to contain the outbreak? How was this managed?
6) Did you feel the advisory body had gaps in particular areas of expertise? Was this addressed?
7) Did the advisory body consider WHO advice and/or the experience/responses of other countries?
8) Were the advisory body's recommendations challenged by other agencies or advisory bodies? How did the advisory body respond?
9) Were the advisory body's recommendations challenged by politicians, external experts, the media, and the general public? How did the advisory body respond?
10) Were there unintended impacts of the advisory body's recommendations? How were these addressed?
11) What was the committee's communication strategy to key stakeholders? And did it evolve over time?

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