Everyday capabilities were a path to resilience during COVID-19: A case study of five countries

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Key Messages:

- Countries with early success controlling COVID-19 struggled to sustain responses and reported feeling unprepared to effectively manage a prolonged epidemic response.
- Political leaders, and the existing public health infrastructure at their disposal, were determining influences on national COVID-19 responses across a diverse sample of five countries.
- Inconsistency in COVID-19 case data challenges cross-country comparisons of pandemic response and underscores significant gaps in global surveillance capacity.
- Emergency preparedness as a dominant or exclusive frame for understanding pandemic response may obscure the continued importance of 'everyday resilience', health systems strengthening, and the influence of political economy in shaping how responses evolve over time.

Author Contribution Statement

1. **Rachel Neill:** Data collection, Data analysis and interpretation, Drafting the article, Critical revision of the article, Final approval of the version to be submitted

1. **Abigail H. Neel:** Conception or design of the work, Data collection, Data analysis and interpretation, Drafting the article, Critical revision of the article, Final approval of the version to be submitted
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Reflexivity Statement:

This paper represents a collective work reflecting the diverse positionalities of the authors. The research team was nearly equally balanced with regards to gender, senior researchers versus early career

researchers, and those with quantitative and qualitative training. Seven authors are based in the United States; of those authors, two are originally from India, one from Bolivia, and four from the United States. Two authors are based in India and are originally from the country.

Researchers from India contributed to the interpretation of India-specific results, and the researcher from Bolivia conducted interviews in Spanish and contributed to the interpretation of the Peru-specific results. Both researchers engaged in qualitative work in Ethiopia have previous experience conducting research in the country.

These differing perspectives allowed for a diversity of views and experiences to be brought into the research. Throughout the study, we utilized a team-based approach, meeting monthly to review our findings, consider how our epistemological perspectives influenced our interpretations, and discuss how our interpretations of each theme varied across the sampled countries.

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ABSTRACT

COVID-19 demanded urgent responses by all countries, with wide variations in the scope and sustainability of those responses. Scholarship on resilience has increasingly emphasized relational considerations such as norms and power and how they influence health systems' responses to evolving challenges. In this study, we explored what influenced countries' national pandemic responses over time considering a country's capacity to test for COVID-19.

To identify countries for inclusion, we used daily reports of COVID-19 cases and testing from 184 countries between January 21st, 2020 to December 31st, 2020. Countries reporting test data consistently and for at least 105 days were included, yielding a sample of 52 countries. We then sampled five countries representing different geographies, income levels, and governance structures (Belgium, Ethiopia, India, Israel, Peru) and conducted semi-structured key informant interviews with stakeholders working in, or deeply familiar, with national responses.

Across these five countries, we found that existing health systems capacities and political leadership determined how responses unfolded, while emergency plans or pandemic preparedness documents

were not fit-for-purpose. While all five countries were successful at reducing COVID-19 infections at a specific moment in the pandemic, political economy factors complicated the ability to sustain responses, with all countries experiencing larger waves of the virus in 2021 or 2022. Our findings emphasize the continued importance of foundational public health and health systems capacities, bolstered by clear leadership and multisectoral coordination functions. Even in settings with high-level political leadership and a strong multisectoral response, informants wished they – and their country's health system – were more prepared to address the pandemic and maintain an effective response over time. Our findings challenge emergency preparedness as the dominant frame in pandemic preparedness and call for a continued emphasis on health systems strengthening to respond to future health shocks—and a pandemic moving to endemic status.

INTRODUCTION

Across the globe, COVID-19 required urgent, cross-sector response. Under conditions of great uncertainty, countries grappled with the immediate need to prevent infections, treat surging cases, reach vulnerable groups, and build trust. Globally, evidence-informed strategies were rapidly established and shared, but these strategies were implemented differently across countries, particularly given the economic consequences of social distancing. Despite a globally shared evidence base, there were dramatic inter-country differences in COVID-19 control and infection rates (Jung et al., 2021; Bollyky et al., 2022).

A common lens for evaluating pandemic response is health systems resilience, the ability of the health system to prepare and respond to crises while maintaining basic services, adapting, and learning from external shocks (Kruk et al., 2015). Health systems resilience is commonly applied to assessments viewing pandemic preparedness and response from an emergency lens, including indices that measure and monitor resilience as an outcome (Kruk et al., 2015; Barasa et al., 2017; Nuzzo et al., 2019; Thomas et al., 2020) . While these indices have conceptual value, they have had limited predictive value in explaining variation in national response strategies and their relative successes or challenges in containing the virus (Abbey et al., 2020; Baum et al., 2021; Bollyky et al., 2022).

One critique of health systems resilience is that it masks structural factors that affect a system's response to both acute and chronic stressors (Pailliard Turenne et al., 2019; Topp, 2020). The political economy of a country determines government prioritization and the availability of resources to control a health emergency, and influences a response's implications for health equity. As other scholars have

noted, health system resilience is not merely an apolitical outcome, but reflects the actors, networks, and institutions managing resilience (Blanchet et al., 2017; Topp, 2020). Understanding this, scholarship has increasingly emphasized relational considerations such as norms and power, and how they influence tangible and intangible components of health systems in response to evolving challenges (Barasa et al., 2017).

In view of dialogue within this literature, our study set out to explore factors, including health system capabilities and political economy considerations, that contributed to national responses in various country settings over time where there was sufficient data for understanding how those experiences related to their COVID-19 case curve in 2020.

Political leadership drove the national response in all sampled countries, and these responses were deeply shaped by existing strengths and weaknesses in the country's health system. However, countries that had relatively successful responses in 2020 struggled to sustain those responses as the pandemic persisted and economic pressures grew. We found that even in settings with high-level political leadership and a strong multisectoral response, informants wished they – and their country's health system – were more prepared to address the pandemic and maintain an effective response over time. Our findings challenge emergency preparedness as the dominant frame in pandemic preparedness and call for a continued emphasis on health systems strengthening to respond to future health shocks—and a pandemic that is moving to endemic status.

MATERIALS AND METHODS

To identify our sample and explore factors that contributed to COVID-19 responses, we utilized a sequential explanatory mixed method design consisting of a quantitative phase followed by a qualitative phase (Creswell et al., 2003). The quantitative phase identified the countries that met our criteria for data quality. We then conducted interviews with officials in five countries to understand factors that shaped their COVID-19 response and how their responses changed over time, including how their perception of the country's resilience evolved from 2020 to 2021.

Quantitative

Our quantitative analysis was based on daily reports of COVID-19 cases retrieved from the Center for Systems Science and Engineering from Johns Hopkins University (Center for Systems Science and Engineering (CSSE) at Johns Hopkins University, 2021). We also retrieved COVID-19 testing data from Our World in Data to assess the quality of reported COVID-19 cases, given that cases can only be identified if the population is tested (Daily COVID-19 tests per thousand people, 2022) . Our sample started with 184 countries with data collected for 345 days from January 21st, 2020 to December 31st, 2020.

Because COVID-19 cases are often underreported, our search was limited to only those countries with adequate reporting of COVID-19 cases. This was so we could reasonably understand the evolution of the COVID-19 case curve. Eligible countries needed to pass two thresholds. Our first threshold required countries to report testing data for at least 105 days. We set this threshold after examining distribution of countries shown in **Panel A of Figure 1**. We observed that the total number of days of reporting COVID-19 data became a normal distribution for countries that had made reports for at least 105 days

out of the maximum of 345 possible days. This was seen as the bare minimum threshold, as the sample could have been further reduced if we considered the number of tests performed per day or accounted for population size in the reports of tests per day. The second threshold required that the number of days reporting testing data be above the 25th percentile of the distribution reported by all countries for all quarters of 2020. The quarterly distribution is shown in **Panel B Figure 1**.

Qualitative data collection and analysis

Within the pool of countries with adequate testing data, we selected five countries for the interview portion of our study using a maximum variation purposeful sampling approach, considered appropriate for case study research that aims to identify patterns across a heterogeneous sample (Patton, 1990) . To ensure diversity of country contexts, we sought representation across geography and income. We also selected countries with both decentralized and centralized governance structures, anticipating that governance arrangements would be important given our focus on national-level responses **(Table 1)**. Given that we had limited funding and could only do a small number of interviews, we also chose countries where we had immediate access to officials, policymakers, and others centrally involved in the response in the country at hand.

We conducted a total of 29 key informant interviews (KIIs), focusing our sample on national-level informants who were actively engaged in, or deeply familiar with, the COVID-19 response in 2020 through government, academic, or implementing organization affiliations. Interviews were conducted by four researchers trained in qualitative methods. All interviews were conducted between April and September 2021 over Zoom, recorded, and transcribed for analysis. The research was explained to

participants as a set of national case studies to understand how countries bent their COVID-19 case curves in 2020, lessons, challenges, and how the response evolved over time. 24 interviews were conducted in English; five interviews were conducted in Spanish by a native speaker, translated, and transcribed in English.

We took an iterative approach to data collection and analysis. We developed an inductive codebook to analyze the interview transcripts which included codes related to what worked well and what did not, contextual details which influenced the response, and how the response evolved over time. Team-based analysis was facilitated by MaxQDA software. A series of analytical memos were developed to elaborate on the emergent cross-country themes presented below. Frequent debriefing sessions were held to discuss findings and adjust the data collection process as our understanding of key topics advanced. Recurring discussions helped to triangulate findings across qualitative and quantitative data, to cross-compare emergent themes across each sampled country, and to promote ongoing reflexivity.

Ethical approval

This study was deemed non-human subjects research by the Institutional Review Board of the author's institute. Informed consent was obtained orally from each key informant prior to the recording of the interview.

RESULTS

Identification of eligible countries

Out of the 184 countries for which we had data, 103 countries reported testing data for at least 105 days during 2020 (first inclusion criteria); of these, 52 countries reported testing data above the 25th percentile of the quarterly distribution reported by all countries (second inclusion criteria). These countries accounted for 56.4% of worldwide COVID-19 cases during 2020. Even in countries that met both criteria **(Figure 2)**, data were reported inconsistently over time.

Importantly, the socioeconomic and demographic characteristics of the 52 countries that passed our testing exclusion rule are different from those that did not. Countries reporting consistent COVID-19 testing data are richer, less densely populated, have lower under-five and cardiovascular mortality rates, and have higher health spending than countries that are not reporting COVID-19 testing data consistently. Hence, the underreporting of COVID-19 cases and deaths is a legacy of health systems working under resource scarcity and underlines that global surveillance capacity —a cornerstone of public health practice—was not adequate in most countries in the world going into 2020.

Selection of candidates for qualitative analysis

Figure 3 shows the 2020 COVID-19 incidence curves of the five countries we chose to include in our qualitative sample. Among the five countries, Belgium was the slowest country to bend its incidence curve and recorded the highest COVID-19 incidence rate at the peak of the curve, with 53,326 cases per 100,000 people on December 13th, 2020. Peru was the fastest country to bend its incidence curve with a peak incidence of 14,430 cases per 100,000 people recorded on August 2nd, 2020. The peak incidence of Peru occupied the middle position out of all five countries. Ethiopia recorded the lowest COVID-19

incidence at the peak of the curve with 615 cases per 100,000 people on October 13th, 2020. The peak incidence rate of India and Israel was 4,344 and 26,137 cases per 100,000 people recorded on October 20th, 2020 and on October 26th, 2020, respectively. These numbers provide a snapshot of the COVID-19 burden countries dealt with in 2020.

What these countries have in common is that they all had adequate testing data (relatively speaking), and that all, also relatively speaking, experienced a "bending" of COVID-19 cases in 2020. The absolute numbers of cases in Figure 2 are not directly comparable—each country had different reporting mechanisms and political dynamics, and the proportion of cases that came through their surveillance systems almost certainly varied—either between countries or over time. But each of these countries seemed, at the end of 2020, to have pandemic control in hand.

Identifying lessons from national COVID-19 responses

While these countries experienced a reduction in COVID-19 cases at the end of 2020, as the pandemic progressed, all experienced subsequent waves of COVID-19, and their responses evolved. Three, interrelated factors drove the evolution of this response – the dependency of national responses on routine health systems capacities, the importance of political leadership, and the influence of political economy. These are summarized across study countries in Tables 2, 3, and 4. We identified that country responses were heavily influenced by 'everyday' factors – from chronic health systems challenges to existing political dynamics – which grew in their significance as the pandemic wore on.

The interdependency of COVID-19 responses and existing health systems capacities

Across the five countries in our qualitative analysis, the two-way relationship between the national COVID-19 response and the health system was a key dynamic **(Table 2**). While pandemic preparedness plans existed in study countries, policymakers and advisors involved in COVID-19 response reported that these plans were not sufficiently fit-for-purpose. Instead, as governments ramped up pandemic response, they relied increasingly on pre-existing health system capacities. As one Belgian health care leader put it:

> *"In crisis time, you fall back on your basic system. If your healthcare system has flaws, then you will pay the cash during crisis. That means also that you need to reform and strengthen healthcare capacities, prevention capacities." (Belgium)*

Areas of strength within each health system – such as strong curative services in Belgium and Israel, and robust community health structures in India and Ethiopia – facilitated an effective response, but system weaknesses were also revealed. Across all settings, responses to COVID-19 depended heavily on everyday public health and primary health care infrastructure – and exposed the gaps in that infrastructure that could not be filled through an emergency response or rapid adaptations.

The importance of public health capacity

Human resources emerged as one critical gap. Public health human resource capacity was found to be severely lacking in several study countries, either because personnel was insufficient, or because healthcare staff did not have sufficient public health training. A health official in Ethiopia commented:

> *The health system was completely overstretched. The most important thing for me was the human resources…it's really frightening. From physicians to public health responders, the COVID pandemic clearly showed that we are not anywhere near to having a sufficient system to respond to any serious emergency. (Ethiopia)*

Building public health capacity was not something that could happen on the fly. As one Israeli expert commented, gaps in health system capacity reflected a long-term trend of disinvestment in public health infrastructure:

> *There were far from enough people to do epidemiological following and to try to break the chain of contact. If you disinvested for 10 or 12 years, then you can't rebuild capacity in a couple of months. (Israel)*

Data and surveillance capacity was critical

Across all settings, data systems and surveillance emerged as critical to an effective response but were felt to be inadequate, even in this sample with relatively good testing capacity. Each country in our qualitative study sample met criterion for regularity and consistency of testing – criteria which only about a quarter of countries in our global dataset were able to meet – and yet, informants described insufficient epidemiological surveillance, challenges in establishing a testing strategy, scaling testing

capacity, and managing fragmented data systems. All of this contributed to underreporting of cases and deaths. As one implementing partner in India said:

> *We knew at any given point of time, 1 in 10, or 1 in 20 numbers were getting caught in PCR. A lot of numbers were getting infected, but not really caught. (India)*

The experience in Belgium underscore the challenges in making global comparisons in the context of inadequate and inconsistent data systems. Remarking on the comprehensiveness of the Belgian surveillance system, one government advisor explained that Belgium appeared to be managing the pandemic poorly compared to its neighbors:

> *We included the probable deaths and probable cases so in [the] first wave we were the highest in the world! But actually, just the most accurate (Belgium)*

This created political pressure in some settings. Informants in India and Peru both reported a lack of data transparency. In Peru, for example, death counts were ultimately tripled after an effort to retroactively revise data for accuracy.

Despite gaps, for country-level decision makers, data systems were critical for adapting the pandemic response strategy. Informants discussed how "data shifted the focus,"; for example, by pushing politicians to center interventions around nursing homes in Belgium and revising community-level activity plans in Ethiopia.

PHC as a critical foundation

In addition to gaps in health infrastructure, some informants described an overreliance on hospital-based care compared to primary health care (PHC) infrastructure. At times, this exacerbated the pandemic by contributing to crowding in hospitals and again, reflected long-term trends in how health system strengthening had been approached. A government official in Peru reflected:

> *First level care…in our country is very weak because we have had the formation of really prioritizing hospital care, which has gone on in many countries as you know, forgetting about the primary health care strategy and the role of first level care. I think if it would have been reinforced effectively, first level of care, we would have had even better results. (Peru).*

Critically, pandemic response could not be managed "patient-by-patient," but needed to be approached with a public health frame of mind, leveraging community-level resources wherever possible. In addition, the response needed to be tailored to each health system.

The Challenge of Mixed Health Systems

In mixed health systems where the private sector plays a significant role in health service delivery, informants described challenges effectively engaging the private sector in the response. India is a key example here. One informant explained:

> *A lot of the preparedness, which was happening only in the government sector, not in the private sector again. The private sector had pretty much shut down because they were scared of COVID and nobody was telling them what to do and how to help them. (India)*

In both Belgium and Israel, largely privatized long-term care centers became an epicenter of disease transmission. Governments grappled with how best to ensure these centers were adequately prepared to implement public health measures and to be held accountable for doing so. One government official in Belgium described it as a "crisis in the nursing homes," saying:

> *Personnel in nursing homes were unprotected. No monitoring, no guidance, no structures. Many people died. (Belgium)*

Notable across these themes is that despite each country's initial success in bending the first wave of COVID-19 cases, informants reported they felt unprepared to mount an effective COVID-19 response. Equally notable is that informants linked their countries' ability to sustain an effective response to 'everyday' health systems capacities – such as pre-existing human resource capacity and public health infrastructure –rather than specific emergency response capacities.

Political leadership was the driving force behind national responses

Across all five countries, informants repeatedly emphasized the importance of political leadership in shaping both the nature of the national response and the public's reaction to it **(Table 3)**. In the words of a Belgian health care leader:

> "*Leadership was the key thing… That was very, very clear*."

While informants mentioned the importance of Ministers of Health and other health experts in coordinating technical components, political leadership was most frequently emphasized as driving the response. Informants across countries emphasized specific politicians as instrumental and described their country's responses within the arc of political transitions, elections, and politicians' perception of public sentiment.

Important characteristics of political leadership were clear and consistent communication, the regular sharing of data, and incorporation of scientific expertise. tInformants emphasized the importance of communication from the head of state, even in decentralized governance structures. Peru provides a key example here. The President's daily briefings during the first wave were seen as critical in encouraging compliance with stay-at-home measures and building trust. This was contrasted with the leadership style of a new President, which informants connected to changes in public perception. One government official commented:

> *The original strong presidential almost daily speeches on the pandemic and the need to really take control were really abandoned after the change of government and therefore I think people really got relaxed, in a way. (Peru)*

Conversely, informants suggested that centralized messaging from political leaders could carry associated costs if it sidelined public health experts. While centralized leadership was seen as universally important in bending the case curve, informants in Israel and India suggested that political leadership crowded out other voices at the beginning of the pandemic. For example, Israeli informants indicated that the initial response was managed by a provisional government with few parliamentary hearings, little consultation of pre-existing pandemic contingency plans, and a lack of inclusion of scientific advisors:

They actually, on purpose, did not allow professionals that may have other opinions to express their opinions. They were also trying to be very centralized in the decision-making. (Israel)

Although the political context differed, a similar dynamic took place in India. One expert commented:

An effective pandemic response requires real honest dialogue between government and independent subject experts. India had done insufficient on engaging the independent subject experts in pandemic response. It was largely politician-driven until some point of time and that has also resulted in a situation where there were shortage of oxygen, there were shortage of medicines, and other aspects. (India)

In these examples, political leaders were seen as taking drastic action to bend the curve without the perceived legitimacy of scientific expertise. This was perceived to have eroded sustainability of the response and reduced public trust. A leading researcher in India shared:

Without that kind of evidentiary foundation, the decision of the policymakers was to roll out the world's most complete lockdown in the country, and that had an adverse impact in many other dimensions. *(India)*

Political leadership also had a large role in determining how the national response was structured, which voices were at the table, and what was prioritized. Initial coordination structures from disaster response were often not fit-for-purpose. In India, for example, the Disaster Management Act centralized the response within the union government; however, many public health functions needed to be implemented at the state and local levels. One researcher commented:

The state governments are like, under this Disaster Management Act, we can't go ahead and do our own sero-surveillance because we've to get permissions from the center, and the center would not give permission because center would say it's really a state subject. (India)

Challenges were seen in Belgium with the initial activation of Celeval, an advisory committee to the federal government, which was designed for shorter-term crises rather than a protracted public health response:

Celeval, no one understood what it was doing, not even the members themselves, always, at the beginning, the first phase, because Celeval was a committee when there would be a nuclear explosion, not a chronic crisis. (Belgium)

As a result, all countries in our qualitative sample eventually created specific coordination mechanisms to guide response efforts. Despite the mixture of centralized and decentralized governance arrangements in our sample, all coordination bodies were at the national level and were either led directly or closely coordinated with top political leadership. These bodies were multisectoral, engaging scientific experts, public health agencies, medical professionals, economic council, and other actors. Over time, informants suggested that the relative importance of these bodies waned in tandem with societal and political pressures to relax measures and an erosion of societal trust in scientific experts. When cases were climbing, political leadership was seen as working in closer collaboration with scientific advisors to 'bend the curve'. When cases were relatively lower and as the pandemic wore on, these newly created bodies were seen to lose some of the relevancy and visibility they originally enjoyed. As one government official suggested:

The government created an expert group, and really they are very good epidemiologists […] I don't know if they have enough influence in the decisions of how to control the pandemic. They

were just making numbers and calculations for getting the [COVID-19 case curve] down to zero. (Peru)

Responses evolved over time and many strategies were not sustainable

Disruptions and changes beyond the health system affected the response in all study countries and created obstacles to converting shorter-term gains into long-term successes **(Table 4).** In some cases (Peru, India, Ethiopia), the 'strongest' national response came during the first wave. In others, a shorter initial response was followed by more sustained public health measures in the second wave (Belgium, Israel). All informants discussed the impact of fatigue, which grew over time.

Fatigue developed in context-specific ways, including a lack of perceived seriousness of COVID-19 (Ethiopia, Peru), a wish to return to normal economic and social activity (Belgium, Peru, Ethiopia, India), projection from national leaders that the pandemic was over (India, Israel), and the importance of gathering for certain socio-cultural events (Belgium, Ethiopia, India, Israel). What was common was the impact this fatigue had on the ability of national governments to sustain strict public health measures and relatedly, the willingness of the public to comply with them as the pandemic became an 'everyday' reality.

In the less wealthy countries in our sample (Peru, Ethiopia, and India) after bending the curve in the first wave of infections, participants indicated that the economic tradeoff of future restrictions was untenable. For example, in Peru, workers in the informal economy were perceived to be under great

economic pressure during the initial lockdown, particularly those in urban areas who migrated back to rural communities in large numbers. Although the Ministry of Development and Social Inclusion and the Ministry of Economy enacted a cash-bonus program to support low-income populations during the lockdown, complexities in identifying eligible households created challenges for the program. The Government of India similarly expanded its programme to provide food grain during the pandemic and to mitigate economic impacts; however, declining fiscal space and identification challenges challenged the long-term viability of the expansion. Informants also expressed real fear that lockdowns would drive inequity and risk citizens' livelihoods. One civil society leader described the risk of long-term lockdowns as such:

> *By June, July, August, it was no longer possible to maintain this…a lockdown is a raft on which you can float till you reach the shore, but reach the shore you must, otherwise, you will die trying. We were in the course of dying while trying. (India)*

In addition to economic pressure and equity concerns, competing political priorities undermined the initial focus on bending the curve. In India, election season marked the return of "politics as usual" and an uptick in partisan bickering which eroded relationships between state and union governments. In Ethiopia, rising security concerns siphoned attention of political leaders and the media. In Peru, a rapid cycle of health sector leadership changes proved challenging for maintaining continuity of the response.

Finally, informants in Peru, India, and Israel worried that the length and severity of the initial lockdowns and a strict enforcement of public health measures undermined trust and support from the population in the long run. In Israel, for example, several informants noted that the initial lockdown, "*was so extreme that people cannot go more than 100 meters*," and that "*the state reached its limits in enforcing quarantines, eventually losing trust of the population*." A similar dynamic existed in Peru:

Peru did a very early and very radical confinement, which apparently worked relatively well at the beginning delivering, I think, acceptable results. In the last instance, I think it was too long, considering the poverty and the informality of our economy. (Peru)

A civil society leader in India postulated:

My guess is that autocratic governments and autocratic measures are good for immediate effects. You can't really sustain them. You need a much greater engagement over a much longer period of time. (India)

In contrast, Belgium was able to sustain longer support for public health measures, which were re-implemented during the second wave of the virus. A change in government and rapidly rising caseload were seen as the tipping points in instituting new measures, which were then sustained in the face of external pressures. Importantly, this was coupled with extensive economic stimulus measures for the population. One government official shared:

We are not the most stringent. But we were steady and slow. That was not easy. We had this leadership, resistant often against many pressures, political pressures, public opinion pressures to open up. (Belgium)

DISCUSSION

It is clear that routine health systems and public health capacity are centrally important in pandemic response, as is political leadership. Informants highlighted specific factors – from leadership and command and control structures to data and surveillance systems – that were important to their initial response and aligned with recommendations from pandemic response and health systems resilience

literatures. However, as we traced the evolution of responses over time, informants increasingly foregrounded political economy considerations and routine health systems capacity as determining factors. Increasing focus on "everyday capacities" in addition to (or even rather than) "emergency preparedness" is a deeply important way to prepare for future pandemics.

Health systems strengthening, resilience, and 'everyday resilience'

'Everyday' factors were critically important in all five of our qualitative study countries, far more than specific pandemic preparedness plans (which generally failed to fit the needs of the moment). True response capacities were embedded in the day- to-day functioning of health systems. Existing strengths and weaknesses of health systems were highlighted and amplified, with everyday stressors such as ineffective data systems, poorly integrated long-term care systems, gaps in human resources, lack of stewardship over private providers, and under-investment in primary health care and public health capacities shaping how the system responded to COVID-19. While governments in our sample did build-up components of their health system to respond to COVID-19 (including more testing capacity, increased surveillance, new hospitals, and intensive care units), they were still constrained by pre-existing capabilities, particularly human resources.

Further, all informants emphasized the foremost importance of political, not technical, leaders in shaping the nature of the response. While the resilience literature does emphasize leadership and governance (Blanchet et al., 2017; Nuzzo et al., 2019; Thomas et al., 2020)(Blanchet et al., 2017; Nuzzo et al., 2019; Thomas et al., 2020) , this conceptualization often focuses on technical capacities. Our

findings highlight the need for an increasing focus on political capacity in pandemic preparedness and response (Kavanagh and Singh, 2020), and echo recent findings from a 177-country analysis that trust in government has a statistically significant association with lower COVID-19 infection rates (Bollyky et al., 2022).

Thinking about everyday resilience capacities is particularly useful as COVID-19 transitions from an acute shock to an endemic stressor. While the five countries in our sample were able to bend their case curves at specific points in the pandemic, all governments in our sample faced challenges maintaining an "exceptional" response to an increasingly "everyday" threat. In many ways, they experienced what Abimbola and Topp have termed 'resilience without robustness,' – succeeding in coping in the near-term with the COVID-19 pandemic but struggling to "make up for weaknesses in the health system in the face of acute shocks or chronic stress" (Abimbola and Topp, 2018) . This manifested in over-extended health system infrastructure, an inability to continue expanding capacity due to lack of human resources, and challenges in weathering economic shocks, societal fatigue, and the erosion of trust.

The responses to COVID-19 were perceived by our informants— all national level actors—to have the greatest negative consequences for the most vulnerable populations. The ability of countries in our sample to mitigate these negative consequences varied. While Belgium and Israel could sustain economic support to populations, informal workers in India, Ethiopia, and Peru faced acute challenges in the face of early restrictions. Peru and India also implemented financial support programs but faced structural challenges delivering and sustaining that support given a lack of pre-existing social safety net infrastructure to target eligible households. This begs the question: who is shouldering the burden of being resilient?

While literature often speaks of a positive resilience dividend (Kruk et al., 2015), the risk of 'maladaptive emergence' in the face of crisis is perhaps less appreciated (Barasa et al., 2017). Recent work has highlighted how frontline actors can display resilience through coping efforts which mask systemic challenges (Gilson et al., 2017; Lee et al., 2019; Saulnier et al., 2020)). Our findings extend this by interrogating whether many successful efforts to bend the curve that we captured in our model were representative of national-level coping, which exerted inequitable challenges on the lives of vulnerable populations in some countries and in all countries, proved to be unsustainable over time.

Therefore, while much of the resilience literature emphasizes absorbing and recovering from shocks (Blanchet et al., 2017; Hanefeld et al., 2018)), a transition to COVID-19 endemicity requires us to further examine what the health system can respond to day-to-day. This evolution in the pandemic challenges emergency preparedness as a dominant – or exclusive – frame. Our findings align with many common resilience capacities, including the importance of leadership, command structures, communication, multi-sectoral coordination, health workforce, and surge capacities (Chamberland-Rowe et al., 2019; Nuzzo et al., 2019) and build on these to emphasize adaptative interactions between the health system and political economy factors (Barasa et al., 2017) . Political economy factors shaped the relative feasibility of control measures over time, the ability of the health system to transform in the face of multiple waves of transmission, and the relative ability of national governments to sustain support to vulnerable populations.

Finally, our findings underscore a need for more research on transformative resilience – transforming the health system in response to a new environment (Blanchet *et al.*, 2017) – which is currently a

neglected conceptual component of the health systems resilience literature (Biddle *et al.*, 2020). Future research can explore the relationship between these political economy factors and the ability of health systems to transform existing capacities in response to crises.

Weaknesses in global COVID-19 case data and its implications

The research presented in this paper started with the following question: what factors in countries' national response contributed to their ability to bend the COVID-19 case curve in 2020? Our findings highlight the need for considerable humility in researchers' ability to forecast successful responses and question the utility in dichotomizing between "successful" and "unsuccessful" cases given underlying challenges in quantifying country performance and the complex dynamics driving the response over time.

Our quantitative model highlighted substantial challenges in comparing national country responses due to the lack of consistent data, varying case definitions, low testing rates, and different definitions of mortality used in national reporting (which, including in Peru, can be a shifting target) (Bustos Sierra et al., 2020; Taylor, 2021). Our simple analysis shows that, in 2020, only 56.4% of COVID-19 cases and 54.3% of deaths are reported by countries performing tests consistently. This finding echoes a recent analysis highlighting a severe under-reporting of COVID-19 mortality from the World Health Organization (The true death toll of COVID-19: estimating global excess mortality, 2022) and further emphasizes the extent of limited case reporting. There is almost certainly severe under-reporting in both cases and deaths which limits the ability to comparatively analyze country case curves, with only

29% of our original sample remaining after the data exclusion process. Our analysis highlights the limited ability of global researchers to conduct accurate comparative analyses with low quality, non-comparable case data, the availability of which has also varied substantively over the course of the pandemic. It also underscores the extent of the challenge for national and subnational actors who are relying on this same data to guide COVID-19 responses.

Our qualitative findings shed light on factors that contribute to pandemic response, how and why pandemic responses evolved over time in our study countries, and the implications for conceptualizing health system resilience. We conducted a relatively small number of interviews with national-level informants; additional inquiry with decentralized government entities, community members, and others would contribute to a fuller picture of how the pandemic evolved in each context.

Additionally, the research team is not currently based in these countries and has varying levels of familiarity with each country's health system. This had advantages in that we were neutral to the policy dynamics of each country's COVID-19 response when analyzing the data, but also limitations in our ability to gain a deep understanding of the broader context. Still, our cross-country data pointed to several robust conclusions which reflect an evolving pandemic experience.

CONCLUSION

In our study countries, preparedness plans were not enough and often went unused in face of the challenge at hand. The political leaders of the moment, and the existing public health infrastructure at their disposal, were more influential in determining how the country mounted and sustained a COVID-19 response. The off-ramp from emergency response to management of endemicity will be context

specific. But like their ability to respond in the first place, the ability of countries to sustain disease control strategies, from vaccination to treatment, will depend on public health capacity and everyday health systems resilience, underpinned by effective leadership.

Preparedness, as it turns out, is less about plans than it is about focus on core governance and essential public health functions which can be relied upon equally for chronic stressors and emergency shocks. Even in a novel crisis, core capacities of the health system remain the bedrock of all public health responses—especially those that test systems in surprising new ways.

DATA AVAILABILITY

Quantitative data is publicly available from Our World in Data and the Coronavirus Resource Center COVID-19 Dashboard provided by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU). Key informants were informed that the raw data from interviews would not be shared.

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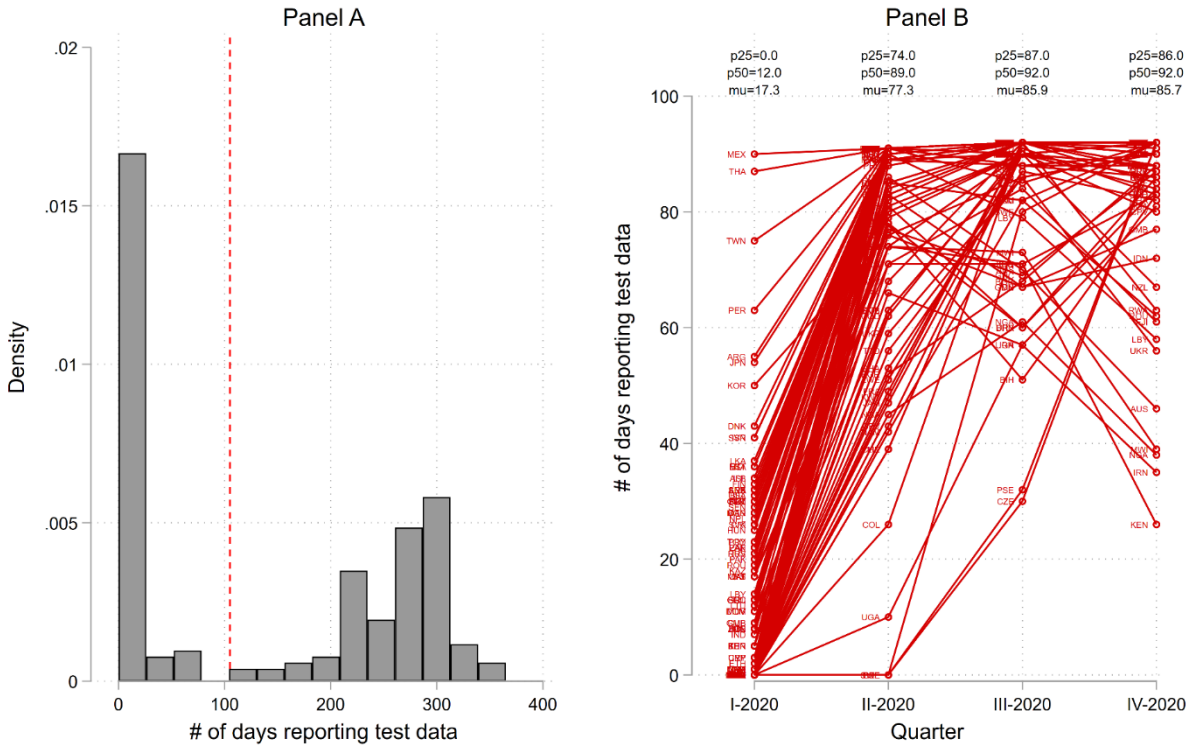
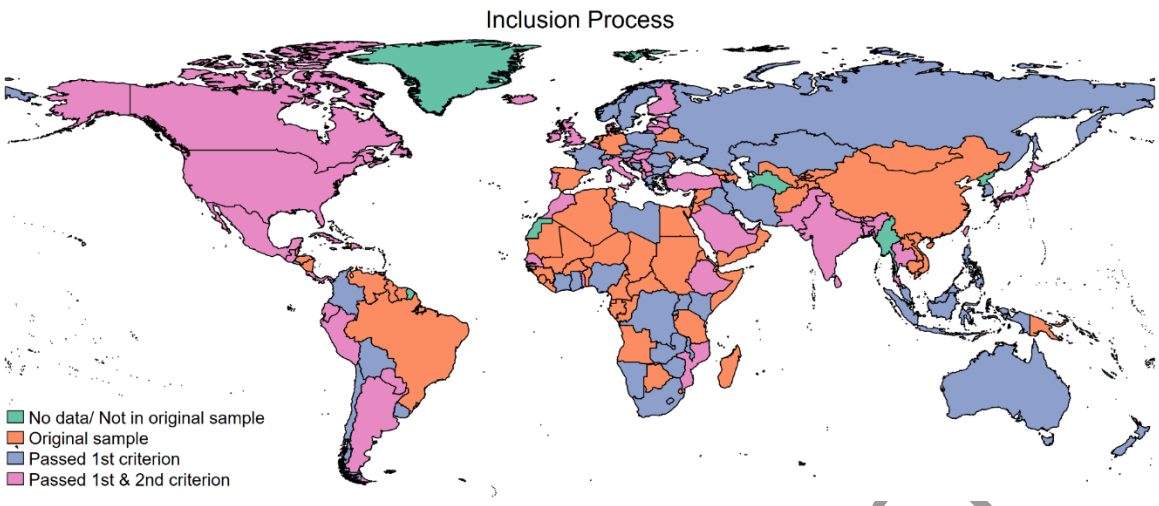
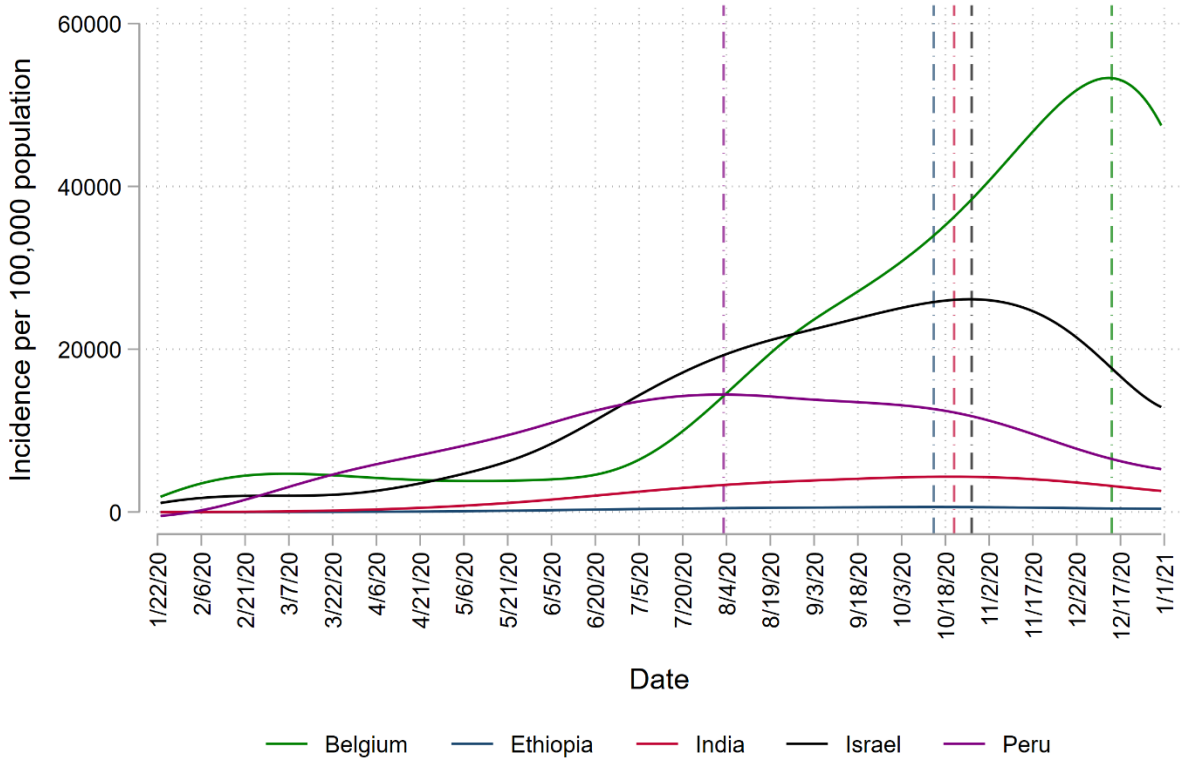
I. Figure 1: Distribution of the number of days reporting test data worldwide between January 21st, 2020 and December 31st, 2020



I. Figure 2: Countries that passed the first and second inclusion criterion



II. **Figure 3: Smoothed COVID-19 incidence rates per 100,000 people, January 22nd, 2020-December 31st, 2020**



Notes: The dashed line in the plot indicates the date when the country bended its COVID-19 incidence curve. Incidence curves were smoothed using a locally weighted regression of cases on days with a span of 0.8.

Manuscript Tables

I. Table 1. Basic Characteristics of Sampled Countries and Number of Key Informant Interviews

Sampled Country	**Income**[1]	**Region**[1]	**Governance Arrangements**	**Key Informant Interviews (n)**
Belgium	High-income	Europe and Central Asia	Decentralized	6

Ethiopia	Low-income	Sub-Saharan Africa	Centralized	5
India	Low-middle income	South Asia	Decentralized	7
Israel	High-income	Middle East and North Africa	Centralized	5
Peru	Upper-middle income	Latin America and the Caribbean	Centralized, with ongoing decentralization reforms	6
Total				**29**

[1] *World Bank Country and Lending Groups. World Bank. https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups (accessed 31 Jan 2021).*

II. Table 2. Summary of key finding on the health system, by country

Finding	Belgium	Ethiopia	India	Israel	Peru
COVID-19 emphasized the importance	*We have a very strong curative system, but*	*The community health system in Ethiopia is very strong,*	*Another problem in India is that, immediately as soon as there is a*	*[For] more than 10 years…the government disinvested in*	*We concentrated all the enforcing in the hospital. You have all*

of public health and primary health care infrastructure for responding to health emergencies.	*a weak preventive system. or example for contact tracing…in all Belgium let's say that we had about 20 doctors and nurses that could do contact tracing. (Belgium 4)* *There weren't enough preventive measures in nursing homes, staff*	*but… this situation actually was overwhelming… That's one of the things we need to think seriously in future, how do we actually prepare, strengthen the community-level health infrastructure in Ethiopia to respond to this kind of situation. (Ethiopia 4)*	*problem, we turned to surgeons and doctors to run public health, to run health systems, but they don't know what to do…We realized that too late…We treated this as any other disease that we would treat patient-by-patient. It didn't work. We made things worse. Hospitals became super-spreading locations. (India 6)*	*the area of public health. There were far from enough people to do epidemiological following and to try to break the chain of contact. If you disinvested for 10 or 12 years, then you can't rebuild capacity in a couple of months. (Israel 3)* *In peaceful times, the public health services were doing okay in*	*people suspected to be sick went to the hospitals. The primary health centers, they had no supplies for receiving patients at the beginning…so hospitals were so crowded and they had not enough space and supplies for everyone. (Peru 2)*

	there not trained [in public health measures], not prepared - this was tragic. (Belgium 6)		*Indian policymakers have over-emphasized healthcare. We have been in the grip of doctors and the world view of a doctor that I'm here to cure people and also some of the biases of international funding organizations who have emphasized healthcare and we have not given enough importance to public health and all these years of*	*Israel, but they didn't have that overlap. They were not prepared well… the primary healthcare is not linked to the public health and to the hospital care well. It's a very fragmented system of universal health coverage. (Israel 4)*	

			poor thinking on public health added up to the outcomes of this crisis. *(India 7)*		
Data and surveillance systems were critical but inadequate in all settings.	*[Belgium has a] complicated federal system, the fact that health is split over the various levels, and that means that some data are collected at the regional level, and some data are*	*Now the problem is now with our testing, it's very, very difficult to interpret. The sampling strategy is not really, very, well-- It's not systematic. When you pick people, travelers, people who are at risk, we don't know*	*One of the challenges has been in the early pandemic response, that lack of availability of data for [the] general public or even to the experts, so the kind of independent advice we expect from the experts is not usually available.* (India 3)	*Testing was horrible during March, April, and lots of criticism (Israel 1)* *Ministry of Health, the Public Health Services had some problem with response in terms of different epidemiological investigation. Not in data*	*I'm sure that many people outside of cities like Lima, probably they were dying and there was not a report, a national record that you can trust. (Peru 2)* *There was also a little bit of negligence of being transparent enough…we use*

	collected at the national level. The structure for them to talk with each other just is not in place and there we suffered a little bit. (Belgium 1)	*who were actually tested…that's a major problem. (Ethiopia 3)*		*collected. Its data collected is very good insight because of the good computerized systems. (Israel 5)*	*now the excess mortality [numbers], well, we tripled the accounting. (Peru 3)*
In mixed health systems, government officials faced challenges in effectively engaging the private sector in the	*The government and the people who were working [in long-term care homes], refused to*		*Rightly so, the private sector was accused of not really participating and being the solution when they had 80%, 90% of the specialists,*	*Acute care, 90 something percent of it is public and long-term care is maybe 60% private. It's much more privatized and fragmented.*	*Those restrictions should have been erased regardless of whether you had insurance or not, whether you had public or private insurance…We*

response.	*see what's really happening, to take the measures that were needed. (Belgium 2)*		*especially the ICU specialists, and the large number of the doctors. (India 3)* *I think a lot of governments were trying hard to create additional capacity, and they were concerned that the private sector was not making those facilities available in a timely manner. (India 6)*	*Some of it belongs to the ministry of health, some of it sponsored by the welfare system. (Israel 1)*	*did not successfully implement a regulatory framework that would erase these intersectoral borders in an emergency. (Peru 5)*

III. Table 3. Summary of key findings on leadership, by country

Finding	Belgium	Ethiopia	India	Israel	Peru
Political leadership drove the response and was a determining factor in the incorporation of scientific expertise and trust building in public health measures.	*The new government came into place and they really turned around, they took a very different tack.* (Belgium 1)	*I was impressed by the ministry's response. One, that they tried to come to the front. Every day, they were on the media reporting, the minister was on giving daily briefing actually on the state of affairs*	*I would say it was fairly top down early on because of this Disaster Management Act, which gave the central government all authorities under all citizens and through departments.*	*There was a problem of self-example, the prime minister and some of the ministers did not follow their own rules. The public lost trust when it saw that the prime minister is not following. He's meeting his*	*The previous president hit an extraordinary level of communication with the people and with his daily TV speeches. I really think that he managed to put the whole country plugged-in with what was* really

		every morning, and then at midday and so on. […] That's assistant information from a high-level leadership was something which I really appreciated to start with at least. (Ethiopia 2)	(India 5)	*son on Passover when all of us were instructed not to meet our family on our holiday of the Passover. He met with his son who does not live with him. That was really breaking trust.* (Israel 2)	needed. (Peru 3)
Multi-sectoral coordination bodies were critical in managing the response, but many existing platforms	The creation of a High Commissioner for Corona, with a dedicated staff to coordinate and prepare the response, was indicated	A National Task Force and committees were convened to manage the response, with leadership from the Prime Minister's office and	The central government initially managed the response, evoking the National Disaster Management Act, and	A COVID czar, called "the integrator", brought together an expert committee to include different voices in the	A scientific advisory council was established, and the Minister of Development and Social Inclusion was engaged in

were not fit-for-purpose.	by participants to be a success factor in coordinating across levels of government and formalizing the inclusion of scientific expertise.	technical direction from the Minister of Health. All Ministries were engaged in health, social, and economic responses; for example, the Minister of Higher Education leveraged Ethiopia's universities to provide scientific inputs.	coordinated with state governments. Respondents highlighted intersectoral participation in these committees.	health system and coordinate with municipalities.	social programs and financial assistance to the population.

IV. Table 4. Summary of key findings on sustainability, by country

Finding	Belgium	Ethiopia	India	Israel	Peru
Economic pressures influenced the longevity of public health measures, especially in lower-income economies	*There was tension between both, because also the economic services want to restart activity so far. I really think the minister is someone who really defends the hospitals and the health*	*Another issue was that people to move from one place to another place to work. That was very difficult to stop or to take a strict measures*. (Ethiopia 1)	*The poor just didn't have any money and didn't have any food. Unlike other countries where the trade-off is between life or not life. Here, it is between dying from hunger or dying from health*. (India 5)		*Something that we didn't see at the beginning was, we have so many people that they need to work every day, to get a little bit of money for eating, for surviving and I think we didn't pay enough*

	system. (Belgium 2)				*attention to these populations […] there was so many families that they can't, even if they want, they can't stay at home*. (Peru 2)
The population's 'pandemic fatigue' limited sustainability of national responses.	*The people they do not support policies anymore, and they are not motivated anymore.* (Belgium 4)	*People have become reluctant, fed up of these interventions, including mask, hand washing, physical distancing, and the people cannot tolerate even the social restrictions.*	*There had been a COVID fatigue because people had been following those behaviors, and people were locked inside the house.* (India 3)	*There was also a pandemic fatigue and compliance became much worse.* (Israel 1)	*The first months, March, April, May, June, July, August, September, but, then, after that, […] People was tired*. (Peru 1)

		(Ethiopia 1)			