About the Milken Institute

CONTENTS

EXECUTIVE SUMMARY

Much has been written about the substantial and troubling deficiencies exposed by the COVID-19 pandemic in the world's ability to respond to major public health crises. We do not aim to restate those deficiencies here. But as we enter the fourth year of the COVID-19 pandemic, it is incumbent on us to continue to reflect on our collective experience and to urge health-care decision makers and policymakers to apply the lessons of the past three years to prepare for future public health threats.

Building on our respective work on lessons learned from COVID-19, Jacobs and FasterCures, a center of the Milken Institute, came together to pursue a research study to examine a paradox of COVID-19: Why did some high-income countries that have historically ranked highly on pandemic readiness indices fare relatively worse in their initial response to COVID-19 than some low- and middle-income countries (LMICs) that have historically ranked lower?

In approaching this work, we acknowledged that a range of factors could be at play in driving differential COVID-19 burden across countries, including differences in demographics and in the quality of data collection systems. While we focus on lessons learned from the experiences of LMICs, further evaluation of the impact of the pandemic on lives, livelihoods, and economies will certainly need to be conducted.

For this study, we sought to surface the more qualitative aspects of international COVID-19 responses, with three objectives in mind:

- highlight indicators of success that may or may not already be captured in current evaluation tools to assess pandemic preparedness,
- facilitate bidirectional learning and dialogue among countries in the Global North and in the Global South, and
- share learnings with state- and federal-level policymakers in the US and internationally.

Through the course of our research, we identified five key attributes that contributt Ê t b ķ ʾ

2. An effective early warning system is dependent on informed and alert clinicians and health practitioners who see patients face-to-face and are able to recognize anomalous cases even before they can be detected by surveillance systems. The health-care workforce must be trained to detect emerging diseases in order to improve a country's ability to respond in real time.

3. In noncrisis times, systems that are utilized for more routine activities such as childhood vaccination delivery, sentinel surveillance for chronic or endemic disease, or processes for disease reporting, should be designed and maintained to be repurposed during crises. In essence, countries that quickly elevated offline (cold) or routine (warm) systems into surge (hot) systems were able to address COVID-19 more rapidly and effectively.

Prior Investments and Public-Private-Academic Partnerships

1. Public health should be prioritized by governments, and adequate infrastructure and resources must be in place prior to an event so that they can be easily repurposed or scaled up to accommodate the next outbreak. In addition, it is important to have a mechanism in place that allows flexible access to and reallocation of funds during times of crises. This can be accomplished through a large reserve fund that is easily accessed and dispersed during an emergency. Relatedly, there should be a mechanism to access financial resources when needed and reallocate them where necessary or triggered by predefined thresholds.

2. Public-Private-Academic Partnerships (PPAPs) are critical for pandemic preparedness and response. Where nonexistent, there must be new mechanisms and legislation that support these multifaceted partnerships between the public, private, academic, and civil sectors to respond to any threat in public health. Mechanisms should account for reorientation of the workforce to fill critical workforce gaps during crises.

3. To ensure investments and PPAPs function as planned during crises, after-action reports should be timely, and countries should regularly train and perform tabletop exercises to enhance each partner's understanding of and performance in their role as well as to identify opportunities to improve capabilities.

1. Risk communication is most effective when coupled with justification, backed by scientific rationale, and locally relevant. Risk communication should be tailored for affected populations by considering their needs, beliefs, culture, and other relevant factors. Communications are most effective when utilizing established and trusted channels to share information with communities, such as technical experts, religious leaders, community health workers, and social influencers.

2. It is important to develop systems to detect disinformation. Such systems would monitor information at the local level and enable the development of targeted communications and engagement strategies to counter inaccurate messages.

3. Community engagement should start at the local level and work from the bo t om up. It is impera t ve to develop trus t ng partnerships with the community by engaging members frequently and transparently especially in noncrisis t mes. This could be achieved by establishing a network of task forces from the regional to the local levels to deliver risk messaging and develop standard opera t ng procedures to address health events.

Whole-of-Government Approach

INTRODUCTION

As of the end of 2022, 6.7 million lives have been lost to COVID-19. This staggering death toll compels us to scrutinize our systems and processes for pandemic preparedness and response continually. With experts already predicting the next pandemic may be worse than COVID-19, we must take urgent action to strengthen our collective ability to confront future public health crises.

With this in mind, FasterCures, a center of the Milken Institute, has brought together a network of global experts in health, finance, data, and technology over the past three years to identify the areas in which investment may be most impactful in preventing future pandemics. This work led to a call for a globally coordinated early warning system that would have the capabilities to detect emerging pathogens and generate insights that can support outbreak response and decision-making. A vision and key considerations for such a system are captured in two Institute reports: A Global Early Warning System for Pandemics: Mobilizing Surveillance for Emerging Pathogens and A Global Early Warning System for Pandemics: A Blueprint for Coordination.

Likewise, Jacobs heavily collaborates with its partners to create and maintain resilient health systems, including health infrastructure, operations, and governance components. During the COVID-19 pandemic, infrastructure and operations projects included rapidly converting medical centers to respond to patient surge, retrofitting manufacturing facilities to support vaccine production, planning and building testing sites, performing public transport network analysis for response, and developing a model to predict transmission rates under various operating scenarios. Health governance projects during the pandemic included supporting national biosafety and biosecurity legislation development in Liberia, Guinea, Senegal, Sierra Leone, and Ukraine; conducting a pandemic preparedness all-hazards needs assessment for Mercy Health System; and designing wastewater surveillance systems in the Middle East. Through these highlighted projects and global partnerships, Jacobs observed life-saving ingenuity and innovative approaches to pandemic preparedness. Further, it documented lessons learned during the pandemic in a panel session titled “Success Attributes from Past Epidemics and Pandemics—What Can Global North Learn from Global South?” during the Global Health Security Conference in Singapore in June 2022.

Building on this previous work on lessons learned, Jacobs and FasterCures came together

income countries (LMICs), further evaluation of the impact of the pandemic on lives, livelihoods, and economies needs to be conducted.

Through this study, we sought to surface the more qualitative aspects of international COVID-19 responses, with three objectives in mind:

1.

Between July and December 2022, FasterCures and Jacobs interviewed nearly 30 international stakeholders across 18 countries (Appendixes 1 and 2). We targeted countries based on a qualitative evaluation of their success during the pandemic and COVID-19-related morbidity and mortality rates. We selected interviewees based on their public health expertise and involvement in pandemic mitigation or overall preparedness activities. We include anonymous quotes from interviewees throughout this report.

Jacobs and Milken Institute (2023)

Pillar	Description	Factors
Overarching	Factors not otherwise considered or highlighted in existing resilience or GHS frameworks that may have significant, but not necessarily quantifiable, impact in pandemic, epidemic, and outbreak management	Influence of Public-Private-Academic Partnerships Localization of Capabilities Recent Outbreak Management
Governance	Effective and participatory leadership with strong vision and communication, coordination of activities across government and key stakeholders, an organizational learning culture that is responsive to crises, effective information systems and flows, and surveillance enabling timely detection of shocks and their impact	Political Will Trust in Health Officials Multisectoral Collaboration Communications Engagement Early Warning Systems
Financing	Sufficient monetary resources in the system and flexibility to reallocate and inject extra funds, ensuring stability of health system funding through countercyclical health financing mechanisms and reserves, purchasing flexibility and reallocation of funding to meet changing needs, and comprehensive health coverage	Health Coverage Long Investments Flexible Access Crisis Funds
Resources	Appropriate level and distribution of human and physical resources, ability to increase capacity to cope with a sudden surge in demand, and motivated and well-supported workforce	Critical Infrastructure Workforce Surge Capacity Equity
Service Delivery	Alternative and flexible approaches to deliver care	Basic Services Maintained Flexible Delivery (e.g., Telehealth)

Jacobs and Milken Institute (2023)

Limitations

Because of the limited scope and accelerated timeline associated with this study, there are limitations to our research that could be addressed in future efforts. First, the study did not include a full academic literature review of pandemic successes; thus, there are likely additional success attributes beyond what we identify in this report. Similarly, our interviewees and associated countries do not represent a statistically significant sample size nor a comprehensive "all country" review, which necessarily implies gaps in our findings. In addition, the information we present may be skewed based on over- or under-representation of particular domains or backgrounds of those on our interviewee list; for example, some pillars such as service delivery or factors such as equity were simply not discussed at length because that expertise and experience were not fully represented among the people we interviewed. Likewise, our interviewees skewed toward industry, academia, and multilaterals, with limited representation from government entities. Therefore, not all viewpoints are represented equally. Despite these limitations, we present our discussion points and learnings as a starting point for further discussion and investigation.

Although we confirmed the well-studied understanding that core capacities such as trained epidemiologists and laboratory networks are critical for pandemic prevention, detection, response, and recovery, we uncovered several additional, somewhat qualitative, attributes that contributed to initial successes in some countries in the Global South. These qualitative attributes primarily fall under our framework's governance pillar and were discussed by many participants as key enhancers of their existing core capacities. Indeed, these factors enabled active utilization of the core capacities that were in existence, something that was not necessarily seen consistently in countries with strong core capacities during COVID-19.

As noted in Figure 2, the success attributes include (1) recent outbreak or epidemic experience that spurred immediate action and understanding of the threat when early warnings were sounded; (2) ability to leverage existing or nascent investments and public-private-academic partnerships at the time of need; (3) strong community engagement, risk communications, and equitable approach that targets, and includes, local communities; (4) a willingness to employ a whole-of-government approach; and (5) the combination of sustained political will, strong leadership, and trust in public institutions.

Interviewees frequently discussed how recent experience managing past outbreaks or epidemics greatly impacted their country's ability to respond to COVID-19 quickly. Moreover, recent experience (whether good or bad) influenced a country's perception and understanding of the threat when international warnings were sounded.

Countries with a history of responding to outbreaks already have necessary outbreak response infrastructure and frameworks in place. For example, countries used Ebola, polio, and avian influenza Emergency Operation Centers and rapid response teams to cover COVID-19-related activities. Furthermore, countries with strong routine vaccination systems, developed in response to past outbreaks, were able to repurpose those systems during COVID for other activities, including distribution of vaccines. Being able to quickly mobilize existing tools, workforce, and materials used to fight previous outbreaks is a significant factor for success. Certain countries described themselves as being "pandemic aware." Past outbreaks have provided policymakers with lessons learned and helped to identify areas that need development and strengthening. Outcomes of previous learnings consist of national response plans, risk

cЏd^ib╣ ḫ ξQξЄ x

The COVID-19 response showcased the benefits of investing in research and science, as well as in public health infrastructure and workforce. In addition, public-private-academic partnerships (PPAPs) contributed to many countries' pandemic preparedness and response. For this study, we utilized several existing definitions of PPAPs to broadly evaluate partnerships of any form that contributes to outbreak and pandemic detection and response.

Prior investments in fundamental resources are critical when dealing with a crisis surge. Adequate public health financing and access to additional funding during crises are directly linked to positive response outcomes. Governments with prior experience managing outbreaks appreciate the importance of preparedness and are willing to allocate funds and resources in anticipation of the next event. Past outbreaks have pushed certain affected countries to set public health financing as a top priority.

The interviews we conducted highlight the need to invest in applied science, surveillance methods, critical infrastructure, and human resource development—resources that cannot be purchased or developed rapidly in the face of a crisis. Interventions such as community engagement and communications must not be overlooked either.

In multiple cases during the COVID-19 pandemic, preexisting infrastructure was repurposed to supplement the pandemic response. For example, exhibition arenas were converted into community care facilities for less severe cases to relieve the hospital surge. Hotels were repurposed as quarantine facilities, and the workforce was reoriented. Hotel receptionists possess the required skills to be effective contact tracers, and they were trained for contact tracing efforts. To combat supply-chain issues, countries focused efforts on localizing capabilities through state-owned enterprises; in one example, 3D printers were used to make swabs and masks within country. All of these successes were possible due to the willingness of the governments, industry, and academic institutions to work together toward a collective solution.

Government should prioritize public health and put in place adequate infrastructure and resources prior to an event so that they can be easily repurposed or scaled up to accommodate the next outbreak. In addition, it is important to have a mechanism in place that allows flexible access to and reallocation of funds during times of crises. This can be accomplished through a large reserve fund that is easily accessed and dispersed during an emergency. Relatedly, there should be a mechanism to access financial resources when needed and reallocate where necessary or triggered by predefined thresholds.

PPAPs are critical for pandemic preparedness and response. Where nonexistent, there must be new mechanisms and legislation that support these multifaceted partnerships among the public, private, academic, and civil sectors to respond to any threat in public health. Mechanisms should account for reorientation of the workforce to fill critical workforce gaps during crises.

3 To ensure investments and PPAPs function as planned during crises, after-action reports should be timely, and countries should regularly train and perform tabletop exercises to enhance each partner's understanding of and performance in their role as well as to identify opportunities to improve capabilities.

information exchange are helpful in this process and local communities play a critical role. For example, a rumor management system where community members monitor local conversations, via a call center or social media platforms, help public health leaders understand the misconceptions circulating in the communities and identify critical information gaps.

While we were unable to examine the full impact of equity during this study, we found that countries that prioritized an equitable approach to community engagement and countermeasures had a larger perceived impact on all segments of the population. Where countermeasures were targeted to local context, our interviewees noted higher compliance and understanding of the threat. Equity in pandemic preparedness, response, and recovery will need to be studied further.

Risk communication is most effective when coupled with justification, backed by scientific rationale, and locally relevant. Risk communication should be tailored for affected populations by considering their needs, beliefs, culture, and other relevant factors. Communications are most effective when utilizing established and trusted channels to share information with communities, such as technical experts, religious leaders, community health workers, and social influencers.

It is important to develop systems to detect disinformation. Such systems would monitor information at the local level and enable the development of targeted communications and engagement strategies to counter inaccurate messages.

3 Community engagement should start at the local level and work from the bottom up. It is imperative to develop trusting partnerships with the community by engaging members frequently and transparently especially in noncrisis times. This could be achieved by establishing a network of task forces from the regional to the local levels to deliver risk messaging and develop standard operating procedures to address health events.

Pandemic response requires a whole-of-government approach which, in many of the countries we included in our interviews, was accomplished through the formation of an intragovernmental task force or steering committee. The main functions of these task forces and steering committees were to provide a coordinated approach to pandemic response, communicate with stakeholders, provide guidance on public health measures, and allocate resources.

In the majority of countries that employed a whole-of-government approach, the main health agency led task forces that convened various government agencies and other organizations in

4 Trust in public health and science cannot be built over a short period of t me and should be a consistent priority before, dus p

CONSIDERATIONS

In addi t on to core competencies, we iden t f ed several success a t ributes through our Global South to Global North conversa t on. By looking at success through a di f erent lens, we can iden t fy what might be a key combina t on of factors to enhance core capaci t es. However, what do we do with such informa t on, and what comes next?

At a high level, it is important to note that none of these a t ributes, or combina t ons thereof, is simple to develop. Certainly, through our conversa t ons we found wide variability in the inten t onality of having one or more of a speci f c a t ribute; a country could have achieved such an a t ribute by design A ʻ ķ ̈A ⌈ ò conv
int e cs na t o ϒ t t bQ Ů es, oru fg oa ʾ Ri l' oC m®ʻ Ḛ
p e % s,r qeBnQ

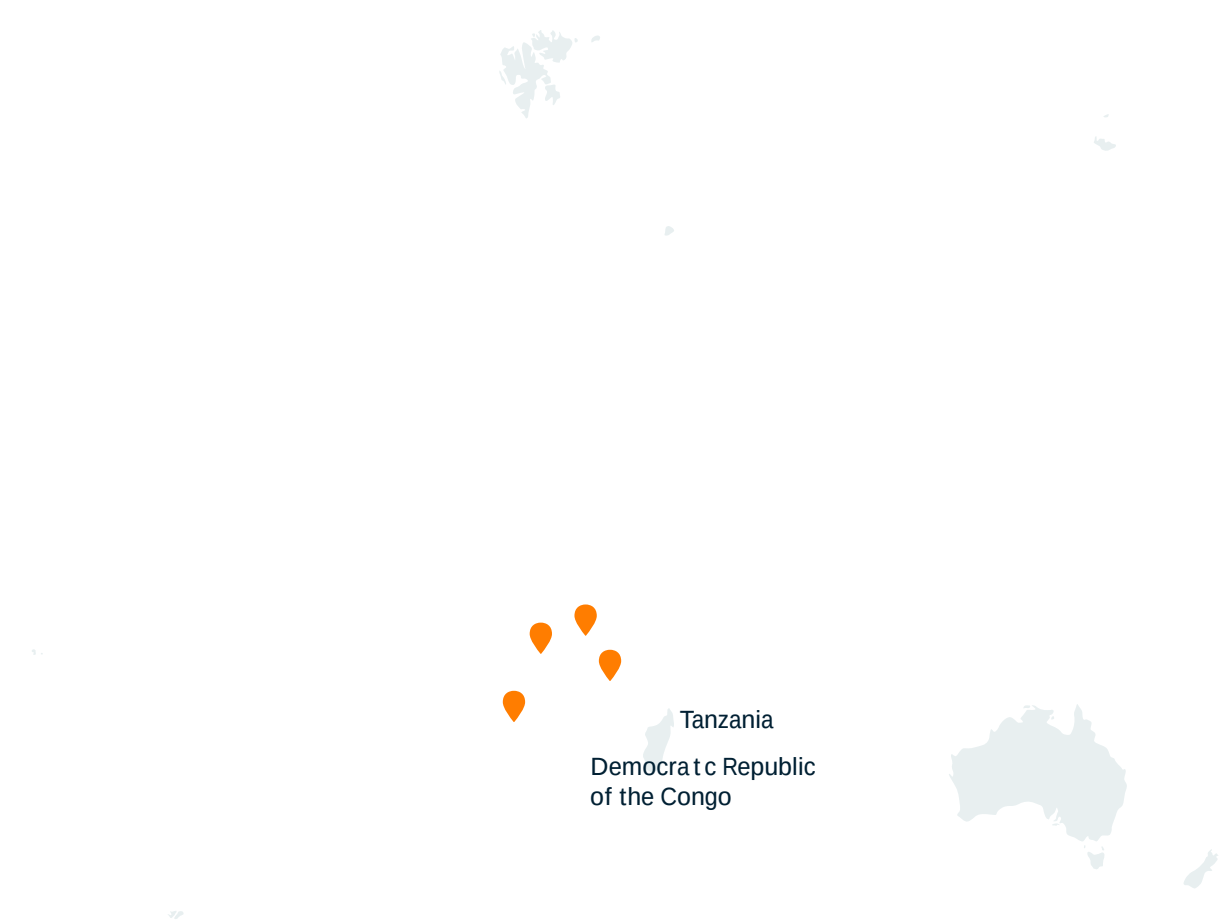
The critical importance and success of **Prior Investments and PPAPs** during the COVID-19 pandemic have been discussed widely; however, we point out that future, long-term investments and PPAPs must employ sustainable approaches, such as task forces, committees, and in-kind partnerships among government and scientists. It may be necessary for countries and/or states to perform a sustainability analysis of COVID-19-related PPAPs and investments.

It is clear that **Recent Experience** had a significant impact on a country's perception of threat and willingness to act. A potential approach to replicating this success factor is ensuring consistent tabletop and field training and exercises; however, it will be important to sustain momentum and ensure that the right people are involved. As such, it may require analysis of pre-COVID-19 pandemic plans against the COVID-19 reality to ensure the identification of gaps in human resources or future plans. In addition, where it is not already, training and exercises should be their own indicator within relevant GHS frameworks.

As the world continues to emerge from the COVID-19 pandemic and adjusts to a heightened awareness of pandemics and their impact, we urge health decision makers and stakeholders to:

- employ an intentional design approach to incorporate lessons learned into future pandemic preparedness roadmaps and frameworks at the international, national/federal, and regional/state levels;
- prioritize and build out PPAPs during noncrisis times, which will allow trust and relationships to be formed well in advance of health events;
- involve communities and diverse groups in the dialogue (response actions and preparedness activities should be designed together with target groups and/or communities);
- maintain bidirectional dialogue and ongoing learning to promote alignment of the global health community in defining next steps after COVID-19; and
- continue supporting financial mechanisms that can provide emergency preparedness funds and resources for health crisis events.

APPENDIX 1: COUNTRIES REPRESENTED IN INTERVIEW PHASE



C	Ą ż	ł

Agency	Participant

We sincerely thank all the participating interviewees and roundtable stakeholders for their suggestions and lessons learned summarized in this report. Your insightful feedback and discussions are invaluable to the success of this project.

ABOUT THE AUTHORS

Jane Blake is Jacobs' global health security director, where she focuses on the intersection of health and international security. She has decades of experience in biodefense, including biosurveillance, biosafety and biosecurity research and operations; Global Health Security Agenda implementation; biological threat reduction program evaluation; and capability and capacity building within the US and internationally. Her experience includes leading research and development teams building biosurveillance tools and models for clients, to include cofounding several startup ventures dedicated to biosurveillance, disease forecasting, and risk modeling for disaster scenarios. Blake received a bachelor of science in foreign service and a master of science in microbiology and immunology from Georgetown University. She has authored multiple papers on global health security, biological threat detection, and biological risk perception in peer-reviewed journals.

Leah Goodman is a consultant for Jacobs, where she supports all global health ac t vi t es. Goodman earned her graduate degree in biohazardous threat agents and emerging infec t ous diseases from Georgetown University. Relevant coursework focused on biosafety and biosecurity, policy, and pandemic management. Her studies highlighted research and analysis as well as the Defense Threat Reduc t on Agency's Coopera t ve Threat Reduc t on (CTR) and Biological Threat Reduc t on Program (BTRP). In conclusion of her studies, Goodman completed a thorough policy analysis focusing on the CTR Program's ability to counter disinforma t on surrounding BTRP and provided recommenda t ons to improve communica t on.

Nino Kharaishvili, MD, is Jacobs' global health director for health system governance, where she focuses on health system resilience and preparedness. As an interna t onal health professional, she has working knowledge of 40 di f erent countries across the former Soviet Union, Africa, Southeast Asi

LOS ANGELES | WASHINGTON | NEW YORK | MIAMI | LONDON | ABU DHABI | SINGAPORE