

The NUS–Lancet PRIME Commission: transforming pandemic readiness for equity



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Positioning statement

The National University of Singapore (NUS)–Lancet Pandemic Readiness through Institutions, Mobilising Communities, and Equity (PRIME) Commission redefines pandemic readiness and offers a practical blueprint for whole-of-society pandemic planning and implementation. Drawing on the hard lessons of the COVID-19 pandemic, the Commission brings together evidence from 20 countries, including interviews with members of diverse communities and groups, future scenarios, and epidemiological modelling. By integrating lived experience with systems analysis and forward-looking evidence, the Commission sets out how governments, institutions, and communities can move from formal plans to people-centred protection across all stages of a health crisis.

PRIME turns the often-invoked whole-of-society idea into a structured framework for action across sectors and levels of governance. Applying PRIME's recommendations has the potential not only to save lives, but also to strengthen institutions and community trust for future health emergencies and other 21st-century crises.

Executive summary

The COVID-19 pandemic was a massive shock not just to public health institutions and health services worldwide, but also to people's lives, livelihoods, and wellbeing. This far-reaching global health crisis caused more than 7 million reported deaths and an estimated 28 million excess deaths worldwide, accompanied by profound health, economic, and social disruption. Public health measures saved many lives, but the COVID-19 pandemic also revealed that effective protection is not equally feasible for all. People's ability to isolate, access care, sustain income, maintain education, receive trusted information, and recover depended on the institutions, social protections, and community relationships around them.

Recent outbreaks show that these challenges remain immediate. Ebola outbreaks in central and east Africa, including the current outbreak caused by Bundibugyo virus in the Democratic Republic of the Congo and Uganda, are unfolding amid insecurity, population movement, strained health services, and limited countermeasures. The multicountry Andes virus cluster, meanwhile, required rapid notification and coordination

across borders and jurisdictions. Although different in scale and context, these events expose the same underlying challenge: readiness depends not only on formal plans, but on systems capable of detecting threats early, protecting affected populations and health workers, sustaining essential services, building trust, engaging communities, and coordinating under difficult real-world conditions.

The central gap addressed by this Commission is the divide between formal readiness and real protection. Many countries entered the COVID-19 pandemic with plans, indicators, and formal capacities in place, yet protection failed in contexts where housing was overcrowded, work was insecure, administrative systems excluded people, distrust disrupted communication, or health and social systems shifted risk onto households and communities. This Commission argues that the missing element has been a practical and profound whole-of-society approach that connects communities, health systems, social protection, finance, law, education, labour, food systems, environmental governance, and regional and global cooperation.

The NUS–Lancet PRIME Commission was convened to redefine pandemic readiness and translate that redefinition into practical implementation. The Commission's aim is to transform pandemic prevention, preparedness, response, and recovery for the 21st century by identifying situations where protection breaks down, explaining why these failures recur, and setting out actionable recommendations for governments, communities, regional bodies, and global partners. PRIME's objectives are to move readiness from formal plans on paper to practice, make equity operational rather than aspirational, and ensure that success is judged by whether people, communities, and institutions can sustain equitable protection under stress.

We explicitly distinguish between pandemic readiness and pandemic preparedness. Pandemic readiness should be understood as the comprehensive, whole-of-society capacity to prevent, prepare for, respond to, recover from, and redress the impacts of pandemics across the full cycle. Pandemic preparedness refers to the aspect of pandemic readiness that is concerned with the preparation and maintenance of plans, skills, infrastructure, and other core resources for responding to a pandemic.

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Recommendations organised by foundational blocks

Centre protection on people and communities

- 1 Resource and embed community participation and inclusion. Establish funded participation mechanisms, engage trusted community actors, and remove legal, administrative, and digital barriers that prevent equitable protection.
 - Lead actors: national and subnational governments, civil society, and communities
 - Implementation marker: funded participation platform operating and informing readiness decisions

Prevent, anticipate, and detect

- 2 Operationalise One Health and multihazard readiness. Create crossgovernment coordination mechanisms linking human, animal, environmental, and disaster-risk systems. strengthen surveillance and cross-border cooperation.
 - Lead actors: ministries of health, agriculture, and environment, and regional bodies
 - Implementation marker: operational One Health coordination platform and routine joint risk assessment
- 3 Embed readiness in the social conditions that enable protection. Integrate social protection, essential services, and health promotion into preparedness planning.
 - Lead actors: ministries of health and social protection
 - Implementation marker: preparedness plans include funded social protection measures and delivery triggers

Governance for trust and system function

- 4 Strengthen crossgovernment leadership, universal health coverage, health system resilience, and legal frameworks. Establish permanent whole-of-government readiness structures, strengthen universal health coverage through resilient primary care and workforce capacity, and update rights-based emergency laws.
 - Lead actors: heads of government and ministries of health, finance, and justice
 - Implementation marker: operational cross-government readiness mechanism
- 5 Build trust through continuous communication and action against misinformation. Institutionalise two-way communication and coordinated responses to misinformation.
 - Lead actors: governments, public health institutes and civil society
 - Implementation marker: permanent risk communication and misinformation response systems established

Invest, learn, and adapt

- 6 Secure stable, accountable, and predictable financing. Protect and sustain investments in health, social protection, and readiness through transparent financing and accountability mechanisms.
 - Lead actors: ministries of finance and health
 - Implementation marker: funded readiness plan and public financing accountability mechanism in operation
- 7 Measure effectiveness and adapt in real time. Strengthen independent scientific advice, monitor protection in practice, and establish mechanisms for rapid course correction.
 - Lead actors: governments, national public health institutes, and scientific advisory bodies
 - Implementation marker: revised indicators adopted and used to inform policy adjustments

Recover and plan for a better future

- 8 Recover through transformation and community participation. Institutionalise postcrisis learning, restore essential services, strengthen mental health and workforce wellbeing, and support long-term recovery for those most affected by harm.
 - Lead actors: governments across health, education, social protection, and finance sectors
 - Implementation marker: recovery mechanism established with public reporting and funded implementation plans

Recalibrate regional and global governance

- 9 Strengthen regional countermeasure ecosystems. Expand regional manufacturing, diversify supply chains, strengthen regulatory cooperation, and improve equitable access to vaccines, diagnostics, and therapeutics.
 - Lead actors: regional organisations, development banks, manufacturers, and regulatory authorities
 - Implementation marker: financed regional manufacturing or procurement initiative underway
- 10 Recalibrate regional and global governance around subsidiarity, equity, and accountable leadership. Clarify responsibilities across levels of governance, strengthen equitable access arrangements, and establish independent monitoring and accountability for pandemic readiness and equity.
 - Lead actors: WHO, WHO member states, regional organisations, and global financing institutions
 - Implementation marker: agreed monitoring mechanism and implementation roadmap in place

The NUS–Lancet PRIME Commission brought together commissioners from diverse regional and disciplinary backgrounds, including public health, medicine, epidemiology, modelling, economics, social science, behavioural science, health systems, governance, and community-focused research. This work was supported

by a scientific coordination group, next-generation scholars, and 20 country research teams. Commissioners met regularly to review emerging evidence, refine concepts, test policy implications, and co-develop recommendations. This structure enabled continuous dialogue between lived experience, empirical research,

conceptual analysis, modelling exercises, and policy translation.

This executive summary mirrors the structure of the full report. Part 1 sets out the conceptual framework. Part 2 describes the Commission's methods. Part 3 reviews COVID-19 pandemic experiences and reform trajectories across local, national, regional, and global levels. Part 4 examines how systemic vulnerabilities shaped protection in communities, while part 5 identifies interconnected national vulnerabilities across prevention, preparedness, response, and recovery. Part 6 examines how regional and global arrangements enabled or constrained national readiness. Part 7 uses foresight scenarios and modelling to stress test future risks. Part 8 presents the PRIME manifesto, bringing together the Commission's guiding principles and ten integrated recommendations for equitable, people-centred pandemic readiness. These are organised through six adaptable PRIME foundational blocks, which translate structural capacities and relational foundations into practical action. Grounded in evidence from communities and whole-of-society stakeholders, the PRIME test stress-tests policies, plans, and investments across four linked questions and five outcomes: protection; equity; livelihood security; trust and voice; and system resilience, including the wellbeing and opportunities of future generations. Part 8 concludes with the proposed implementation pathway through the PRIME Collective, including roundtables, contextual adaptation, indicators, shared learning, and accountability.

The Commission's guiding principles are people-centred protection, equity, community voice, trust, accountability, intergenerational responsibility, and system resilience and its normative foundation is the protection and expansion of people's capabilities and wellbeing. PRIME builds on Amartya Sen's capability approach to centre the real opportunities people and communities have to protect themselves, access care, sustain wellbeing and livelihoods, participate in decisions that affect them, and recover after crises. The Commission also advances the concept of systemic vulnerabilities: the patterned institutional, legal, social, market, and governance failures that constrain capabilities, undermine wellbeing, and concentrate harm among those with the fewest resources. This framing shifts the narrative from vulnerable people to the systems that produce and distribute vulnerability.

The report's conceptual framework was chosen because we believe that pandemic readiness requires an explanation of how lived conditions, institutional design, and multilevel governance interact. The PRIME framework links pandemic risks, structural and relational foundations, systemic vulnerabilities, capabilities, and lived experience across the full prevention, preparedness, response, and recovery cycle. It places individuals and communities at the centre, while recognising that what is feasible locally is shaped by national institutions and regional and global arrangements. The framework also

guided the Commission's empirical work, providing a common lens for examining how protection was experienced, enabled, or constrained across different contexts and levels of governance. In doing so, it provides a bridge from diagnosis to delivery, showing where approaches to protection have failed and where policy, financing, and governance can intervene.

The Commission's methods combined community-level qualitative research across 20 country case studies; analysis of governance and readiness systems at national, regional, and global levels; and a foresight process involving expert surveys, multistakeholder workshops, and scenario developments towards 2035, alongside epidemiological modelling of future pandemic risks. These strands were complemented by six evidence reviews that informed the Commission's conceptual framework and recommendations, examining health security, preparedness metrics, community-generated indicators, health systems resilience, COVID-19 pandemic response evaluations, and community governance. The combination of these methods reflects the commissioners' view that pandemic readiness cannot be understood through any single level of analysis, but requires attention to how lived experience, systemic vulnerabilities, governance, and future threats interact.

Grounded in community experiences and whole-of-society perspectives across 20 countries, the case studies were anchored in COVID-19 pandemic experiences while also drawing on overlapping health crises and forward-looking reflections on future readiness. One central finding emerged from the analysis: although preparedness was often assessed in terms of technical capacity and assumed community compliance, protection was often not feasible, equitable, or sustained in people's lived realities.

Protection in communities failed along recurring structural vulnerabilities

Across the 20 country case studies, five consistent patterns of systemic vulnerability shaped lived experience: subsistence insecurity that made prevention infeasible; housing conditions that undermined isolation requirements; administrative barriers to accessing support; institutional distrust and information vulnerability that limited uptake of guidance; and system fragilities that shifted risk onto households and communities. In situations where structural foundations were weak, harm was disproportionate and cascading. Community-driven responses were crucial in filling gaps and sustaining protection, but were often under-resourced, unevenly recognised, and insufficiently linked to formal decision making.

Where governance aligned, protection held; where it fragmented, vulnerabilities cascaded

National responses often relied on uniform measures that did not account for differentiated realities, and

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governance structures were frequently too narrow, too technocratic, and insufficiently connected to health and social protection systems. Across the 20 countries, interconnected weaknesses in governance, financing, workforce, supply chains, coordination, trust, leadership, and community voice contributed to delayed detection, unequal access, disrupted essential services, workforce burnout, and longer-term fragility across the pandemic cycle. Recovery often failed to institutionalise learning, allowing vulnerabilities to persist. Countries with stronger cross-sectoral coordination, institutionalised trust, universal health coverage grounded in strong primary health care, and universal social protection were better able to sustain protection over time. Trust emerged as preparedness infrastructure, shaping communication, legitimacy, service use, and collective action. At regional and global levels, overlapping mandates, reporting demands, fragmented financing, and unequal access to countermeasures created duplication and delay, constraining national action. Regional mechanisms were most effective when they translated global commitments into pooled capacity, operational support, and cross-border cooperation. Multilevel governance enabled protection only when it reduced friction, accelerated access, and expanded options under stress. Fragmentation and competition instead amplified constraint and harm.

Institutional choices and collective action, not the pathogen alone, will shape the impact of the next pandemic

Drawing on evidence from the case studies, expert surveys, and multistakeholder foresight workshops involving community representatives, practitioners, and policy makers, the Commission examined how systemic vulnerabilities might evolve under four plausible 2035 modelling scenarios shaped by geopolitical order, climate pressure, economic constraint, and institutional cooperation. In fragmented futures, systemic vulnerabilities are amplified and power, not need, determines who is protected. In more cooperative futures, systemic vulnerabilities are attenuated through stronger coordination, accountability, and information integrity. Novel epidemiological modelling conducted for this Commission simulating a hypothetical 2-year influenza pandemic with global spread already established and contrasting stylised scenarios of coordinated versus fragmented vaccine access show that these differences translate into avoidable loss of life. Equitable, needs-based vaccine allocation could save an additional 2.7 million lives compared with self-interested allocation based on purchasing power. This difference in lives lost reflects the predictable effects of unequal access to vaccines and other countermeasures, where outcomes are shaped less by epidemiology alone than by the strength and fairness of institutions.

Together, the conceptual work, case studies, foresight, and modelling revealed a persistent implementation gap,

and although the sources of systemic vulnerability were increasingly well understood, practical tools for translating whole-of-society readiness into coordinated action remained underdeveloped. In response, the Commission developed recommendations that define what must change, PRIME foundational blocks that organise delivery, and a PRIME test to stress test decisions before and during implementation. Modelling further quantifies the consequences of cooperation or fragmentation. This sequence connects the report's evidence base to implementable action: diagnosis, explanation, stress testing, operational blocks, decision rules, and measurable outcomes.

PRIME does not seek to replace existing pandemic readiness instruments; rather, it provides an operational and equitable delivery lens for translating their commitments into protection in practice. The International Health Regulations, the Joint External Evaluation and related exercises, the Pandemic Accord or agreement process, the Pandemic Fund, Pathogen Access and Benefit-Sharing annex negotiations, and supply-chain initiatives are essential components of the evolving global preparedness landscape. Yet these instruments will only matter if they can be implemented in the lived conditions in which protection succeeds or fails. PRIME complements these efforts by asking whether their commitments can be delivered in lived conditions, whether they reduce systemic vulnerabilities, whether they strengthen capabilities and wellbeing, and whether they create accountable mechanisms for adaptation when harms, inequities, or delivery failures emerge. In doing so, PRIME provides the missing bridge between global reform, national implementation, and community-level protection.

The Commission advances ten integrated recommendations, organised through six PRIME foundational blocks, to strengthen the conditions for feasible, equitable, and sustained protection before, during, and after pandemics. Together, these recommendations provide an implementation pathway for reducing avoidable harm and saving lives, combining long-term investments in institutional and community resilience with actions required during crises and recovery. Key actions, lead actors, and implementation markers are summarised in the recommendations panel. The ten recommendations address complementary dimensions of readiness and are intended to be implemented as an integrated package rather than as standalone interventions.

The PRIME foundational blocks operationalise these recommendations as modular, sequenced packages that bring together the structural and relational conditions required for implementation. Each block integrates core delivery functions, such as financing, workforce, supply chains, legal access, surveillance, universal health coverage, and social protection, with relational foundations of leadership, trust, coordination, participation, and real-time learning. The blocks provide implementation-ready guidance without being a fixed blueprint. They can

be combined and sequenced according to context, allowing countries and communities to prioritise their most binding constraints while preserving a constant standard. Readiness is achieved only when protection works in lived conditions and is sustained across prevention, response, and recovery.

Cutting across all recommendations, the Commission introduces the PRIME test, a practical stress test for any policy, plan, or investment, and a roadmap for operationalising pandemic readiness. The PRIME test asks four linked questions which evaluate five core outcomes: whether a measure reduces avoidable harm and strengthens the capabilities and wellbeing of people and communities (protection and wellbeing; livelihood security); whether the measure reaches those most underserved and removes structural barriers to protection and care (equity); whether communities have shaped the measure's design and whether feedback loops support adaptation, including in response to misinformation (trust and voice); and whether the measure anticipates interactions across systems, prevents cascading effects, and safeguards the wellbeing, capabilities, and opportunities of future generations (system resilience). Applied across design, implementation, and evaluation, the PRIME test embeds these five outcomes as measurable dimensions of readiness across community, national, regional, and global levels. Intergenerational responsibility is incorporated within system resilience through explicit consideration of effects on future generations.

The Commission's next step is implementation through a PRIME Collective that supports countries, communities, and partners to move from recommendations to delivery. PRIME roundtables will help adapt the foundational blocks to specific contexts, bringing together communities, health and policy practitioners, governments, and partners to identify binding constraints and test practical routes to implementation. The collective will also apply the PRIME test to new and existing plans, budgets, legal frameworks, exercises, and investments; develop indicators that measure protection in practice; and build partnerships for regional and global learning, financing, and accountability. The priority is not to create another checklist, but to build a living implementation platform that helps decision makers monitor, learn, and course-correct before avoidable harms become entrenched.

Rather than repeating the cascading vulnerabilities and lasting distrust that defined many COVID-19 pandemic responses, the next era of pandemic readiness can be defined by feasible, equitable, and sustained protection for people in all lived conditions. Reaching that standard depends on pandemic planning that involves communities in transforming the systemic vulnerabilities that shape exposure, constrain choice, and determine whose wellbeing is safeguarded when

systems come under stress, thereby creating protection that can be trusted, adopted, and sustained. PRIME sets out an implementation architecture to translate these principles into coordinated, accountable, and whole-of-society action across community, national, regional and global levels, providing a pathway to more resilient and trusted systems for future outbreaks, the next pandemic, and other 21st century crises.

Introduction

The inequitable health, economic, and social toll of the COVID-19 pandemic

The COVID-19 pandemic was one of the most far-reaching global health shocks in modern history, exposing important limitations in how pandemic preparedness has been conceptualised, operationalised, and evaluated by global health institutions, national governments, and traditional security frameworks. As the crisis unfolded, it became clear that these limitations had profound and unequal consequences for populations worldwide.

The measurable health impacts of the COVID-19 pandemic were substantial. By June, 2024, more than 770 million confirmed infections and over 7 million deaths had been recorded globally, with excess mortality estimates suggesting a true toll approaching 28 million.¹ Between 2019 and 2021, life expectancy globally fell by approximately 1.7 years, erasing nearly a decade of gains.² Health systems across income settings experienced widespread disruption to essential services, including routine immunisation,³ maternal and child health care,⁴ and chronic disease management.⁵ The distribution of these impacts was profoundly inequitable,^{6,7} disproportionately affecting marginalised populations, including low-income communities,⁸ racialised groups,⁹ migrants,^{10,11} women, trans and gender-diverse people,^{12,13} and workers in precarious or front-line employment.^{14,15} These patterns reflected unequal exposure, pre-existing health burdens and differential access to care,^{7,8} as well as broader social, economic, and institutional inequalities that shaped how different groups experienced the pandemic and its consequences. These inequalities in turn reflected longstanding social, political, and economic arrangements that structure exposure to risk and access to protection, which some scholars have described as forms of structural violence and racism embedded in everyday institutions.¹⁶

The economic shock of the COVID-19 pandemic was similarly severe. In 2020, the global economy contracted by roughly 3%, marking the deepest downturn since the Great Depression,¹⁷ with cumulative losses between 2020 and 2024 estimated at nearly US\$14 trillion.^{17,18} An additional 70–100 million people were pushed into extreme poverty, reversing years of poverty reduction.¹⁹ These impacts were unevenly distributed. Workers in informal and service sectors—disproportionately women and low-income groups—experienced greater income loss and instability than higher-income or formal-sector

workers, who were more likely to retain employment through remote work.¹⁸ Similarly, low-income and middle-income countries (LMICs), constrained by limited fiscal space and higher borrowing costs, faced deeper economic shocks and more prolonged recoveries.^{18,19}

As these stark health and economic statistics commanded immediate global attention, the COVID-19 pandemic also produced profound social shock at an unprecedented scale and duration. At its peak, school closures disrupted learning for more than 1.6 billion students, with long-term implications for human capital and inequality.²⁰ Social isolation, care disruptions, housing precarity, food insecurity, digital exclusion, and rising mental health burdens reshaped everyday life, often disproportionately affecting women,²¹ young people,²² older adults,²³ and marginalised communities.^{21,24} Trust in institutions and social cohesion were strained in many settings.^{25,26} Although less easily quantified, these social effects shaped both vulnerability to the virus and people's capacity to respond and might ultimately represent the most enduring legacy of the pandemic. Understanding these social consequences requires rethinking preparedness beyond technical and economic capacities to include the social structures, institutions, and relationships that shape who is protected and who remains vulnerable.

High scores, fragile systems: limitations in pandemic preparedness metrics

Although epidemiological and economic indicators, such as infections, deaths, excess mortality, gross domestic product contraction, and poverty, document the scale and unequal distribution of pandemic harms, they capture only part of the story. These measures describe what happened, but not how or why harm occurred in daily life. Just as health and economic indicators leave much of the lived experience of harm invisible, conventional preparedness metrics do not capture whether technical capacities result in effective, equitable protection. Before the pandemic, many countries were assessed as well prepared according to conventional metrics. However, the pandemic revealed that these measures were insufficient to anticipate or mitigate the multidimensional and cascading impacts of a global health crisis.²⁷

Preparedness metrics are intended to measure national readiness, assessing whether countries have the plans, capacities, and infrastructure necessary to prevent, detect, and respond to a pandemic. In practice, however, they provide only a limited view of how effectively societies can protect populations when under stress.²⁸ Prominent indices, including the Global Health Security Index and the Joint External Evaluation, primarily assess technical inputs such as formal plans, laboratory capacity, surveillance systems, medical supply stockpiles, and coordination mechanisms. These metrics proved to be poor predictors of outcomes during the

COVID-19 pandemic,²⁹ and failed to capture whether interventions could be implemented at speed and scale, delivered equitably, or sustained over time.²⁷ Crucially, they gave insufficient attention to many of the social and political determinants that shaped implementation and the distribution of protection. These determinants included wide-ranging factors such as governance and accountability, institutional trust and risk communication, the reach and resilience of the workforce, and social protection (eg, income support and sick leave) that determined whether people could comply with measures, access care, and accept vaccination.^{27,30} Preparedness assessments often rely on external assumptions about readiness while under-representing front-line experience and community-defined priorities.³¹ Often, formal policies and interventions existed but could not be implemented effectively because people lacked the material supports, social protections, or institutional trust required for adherence.³⁰ The result has been technically coherent but socially misaligned policies, particularly in contexts marked by marginalisation, mistrust, or chronic under-resourcing.³²

The COVID-19 pandemic thus exposed a persistent gap between the types of capacities measured by conventional preparedness metrics and the protections populations actually experienced. By protection, we mean reducing avoidable harm while enabling people and communities to access care, sustain wellbeing and livelihoods, and participate in decisions that affect them.

Commission aims, objectives, and structure

The NUS–*Lancet* PRIME Commission was convened in September 2023 to address this gap, setting out to identify what makes protection effective and equitable under pandemic stress. Based on rigorous analytical and empirical foundations, the Commission has developed actionable recommendations to translate preparedness from formal plans into practice for people and communities and for the institutions responsible at local, national, regional, and global levels. Applying PRIME's recommendations has the potential not only to save lives, but to strengthen institutions and community bonds for future health emergencies and other crises.

PRIME is not proposed as an alternative to existing pandemic preparedness instruments. Instead, it provides an equitable delivery lens for making the International Health Regulations, Joint External Evaluation and simulation exercises, the Pandemic Agreement process, financing reforms, supply-chain initiatives, and national preparedness plans work in the lived conditions where protection succeeds or fails. The Commission's added value is to connect these mechanisms to whole-of-society implementation, community voice, health and social protection, trust, and measurable protection outcomes.

The Commission brings together 41 commissioners from a broad range of disciplinary and regional

For more on the **Global Health Security Index** see <https://ghsindex.org/>

For more on the **Joint External Evaluation** see <https://www.who.int/emergencies/operations/international-health-regulations-monitoring-evaluation-framework/joint-external-evaluations>

For more on the **International Health Regulations** see <https://www.who.int/health-topics/international-health-regulations>

For more on the **simulation exercises** see <https://www.who.int/emergencies/operations/simulation-exercises>

For more on the **Pandemic Agreement** see <https://www.who.int/health-topics/who-pandemic-agreement>

backgrounds. Care was taken to ensure that the composition of this group would capture the true geographical and academic diversity of perspectives needed to produce a truly nuanced and innovative report that could challenge dominant narratives and explanatory models of pandemic readiness. Geographically, the group includes commissioners from all five continents, covering experts from high-income, middle-income, and low-income countries. Together, the commissioners cover a range of disciplines highly relevant for the Commission's agenda, including physicians, epidemiologists, modellers, economists, social scientists, and behavioural researchers.

The Commission's work was supported by a scientific coordination group of early-career and mid-career researchers across public health, medicine, political science, health systems, and statistics, alongside 20 country research teams. The group contributed to methodological design, coordinated evidence generation and synthesis across the Commission's workstreams, and led, together with the co-chairs, the iterative development, drafting, and refinement of the report. Commissioners met regularly to review findings, refine frameworks, and co-develop recommendations, enabling continuous dialogue between evidence, theory, community perspectives, and policy translation. A distinctive feature was the deliberate inclusion of next-generation scholars as co-leads of country case study teams, ensuring emerging perspectives shaped both evidence generation and interpretation.

The Commission aims to transform pandemic prevention, preparedness, response, and recovery (PPRR) for the 21st century by identifying vulnerabilities overlooked by conventional frameworks and advancing actionable recommendations to address them, while promoting protection that is feasible in practice for all people and institutions across diverse contexts. We commit to a long-term perspective guided by two core concepts: systemic vulnerabilities, which identify where protections break down, and capabilities, which define the real opportunities people and institutions have to achieve and sustain protection across the pandemic cycle. These are explored further in part 1.

The Commission envisions an approach in which pandemic readiness is a whole-of-society endeavour that explicitly confronts systemic vulnerabilities, rather than a technical checklist or a set of sector-specific capacities. We explicitly distinguish between pandemic readiness and pandemic preparedness. Pandemic readiness should be understood as the comprehensive, whole-of-society capacity to prevent, prepare for, respond to, recover from, and redress the impacts of pandemics across the full cycle. Pandemic preparedness refers to the aspect of pandemic readiness that is concerned with the preparation and maintenance of plans, skills, infrastructure, and other core resources for responding to a pandemic. As the COVID-19 pandemic underscored, inequality, informal work,

migration status, precarious housing, and uneven societal and institutional trust shape who can access protection, follow guidance, and recover. Preparedness must be built around these lived realities, rather than assuming stable employment, secure housing, or universal access to services. Readiness should be measured by whether systems across health, social, economic, and governance sectors reduce vulnerabilities and protect and expand real opportunities for people and communities to get timely information and care, follow public health measures safely, maintain livelihoods and caregiving responsibilities, and recover after crises. Achieving readiness thus requires addressing the structures and structural drivers that unfairly limit these opportunities.

PRIME is designed as a living Commission that will continue beyond publication to generate evidence, convene relationships through a PRIME collective, and support implementation beyond publication. The intent is to work closely with communities and practitioners while engaging governments and regional and global organisations, using the networks developed through this work to translate lessons into policy, implementation pathways, and accountability mechanisms across settings over time. The Commission's methodological approach is community-centred, whole-of-society, and equity-focused by design, drawing on case studies in 20 countries and 819 interviews, grounded in a conceptual framework and empirical evidence that move beyond description to change how readiness is designed, implemented, and held to account in practice (appendix pp 1–10).

See Online for appendix

This first report of the NUS–*Lancet* PRIME Commission presents the findings, analyses, and recommendations developed to reframe pandemic readiness for the 21st century. The report moves from diagnosis to explanation to action. Part 1 introduces the Commission's conceptual framework, showing how systemic vulnerabilities and capability constraints create unequal pandemic risks and outcomes. Part 2 provides an overview of methods used in the report. Part 3 examines the COVID-19 experience at local, national, regional, and global levels, assessing successes, failures, and persistent gaps in conventional preparedness frameworks through current public health literatures. Parts 4 and 5 form the empirical core; part 4 presents 20 country case studies centred on communities facing concrete constraints, highlighting how vulnerabilities translated into capability loss and documenting sources of resilience, and part 5 broadens the view to whole-of-society stakeholders, exploring how actors across sectors and institutions shaped protection in practice. Part 6 extends the analysis to regional and global systems, examining how international institutions, financing, and policies affect systemic vulnerabilities and influence what is feasible at national level. Part 7 stress tests the Commission's

findings across plausible future scenarios, showing how different systemic vulnerabilities might either deepen or be reduced under varying conditions. This part also uses modelling to examine a prominent pandemic risk when cooperation breaks down, and access depends on power and resources and quantifies the resulting health equity consequences. Part 8 presents the PRIME manifesto, offering actionable recommendations operationalised through modular foundational blocks and assessed via the PRIME test, a novel, whole-of-society approach for evaluating equitable and effective readiness.

Part 1. Conceptual framework: pandemic readiness as a people-centred, community-grounded paradigm

This part sets out the conceptual foundations of the Commission's people-centred approach to PPPRR. It introduces the capability approach as the normative lens through which we understand protection, equity, and readiness, and develops the linked concept of systemic vulnerability to explain how institutional design shapes whose capabilities are safeguarded or constrained. Finally, we build upon these ideas to present the Commission's people-centred, community-grounded PPPRR framework. Although these concepts provide an analytical anchor, their operational meaning is clarified through engagement with both existing scholarship and the empirical evidence presented in subsequent parts.

Panel 1: Core concepts from the capability approach

- Agency: a person's ability to pursue goals they value and to act on what they consider important, including goals that go beyond their own wellbeing such as caring for others or contributing to society
- Capabilities: what individuals are effectively able to do and to be, not just what they have a formal right to do
- Collective capabilities: capabilities that depend on cooperation and collective action, institutions, or shared systems, such as the capability to protect against infectious diseases
- Freedom: the genuine ability to choose between meaningful options; often qualified as substantive or real, referring to real possibilities, not just formal rights
- Functionings: the realised outcomes of capabilities, such as being healthy, being educated, having shelter, or participating in community life
- Means and ends: ends have intrinsic value whereas means are instrumental to achieving the ends; means include material resources and social arrangements (such as income, services, infrastructure, or policies) that help people achieve outcomes; ends are the capabilities and functionings that represent what ultimately matters and the ways people are able to live

1.1 A capability approach for pandemic readiness

Human wellbeing and social progress can be conceptualised in many ways in policy analysis, but the capability approach, particularly in its original iteration developed by economist-philosopher Amartya Sen, offers a clear normative framework (panel 1).^{33–36} Critical of frameworks that focus on economic growth, material possessions, individual happiness or utility, Sen conceptualises wellbeing, justice, and social progress in terms of people's real opportunities to do and be what they have reason to value in life.³³ The capability approach views development as the expansion of people's real opportunities, choices, and substantive freedoms, rather than holding up economic growth as the goal and measure of progress. The approach has become influential in global policy frameworks, including the Sustainable Development Goals (SDGs).^{37,38}

The central idea of the capability approach in public policy is that social arrangements should aim at the expansion of people's freedom—or capabilities—to achieve valued “functionings”, such as being healthy, being secure, maintaining social relationships, or participating in society.³³ Material resources such as income, health services, vaccines, or social protection schemes are so-called means that might or might not translate into functionings, depending on social and institutional conditions.³³ The approach inherently emphasises agency, that is, people's ability to act on goals they value and to participate in shaping the conditions that affect their lives. This concept of agency goes theoretically and empirically beyond the pursuit of narrow self-interest captured by the concept of wellbeing, incorporating the human capacity for altruism and motivation to act for the greater good of the community.^{39,40} Agency effectively precludes top-down assumptions of what people value and rejects policies that regard people as passive recipients of charity.⁴⁰

The capability approach has been criticised as difficult to operationalise,³⁶ with Sen refusing to provide a definite list of capabilities, arguing these should emerge through context-specific participatory deliberation.³³ Sen's long-term collaborator Martha Nussbaum later developed the approach in a more operational direction by compiling a list of explicitly formulated capabilities in a bid to provide ethical and pragmatic guidance for policy and practice.³⁴ The dominant strands of criticisms against the capability approach centre on this tension between operationality and open-ended adaptability.^{36,41} Sen has been criticised for ignoring the requirements of measurability and for not providing clear policy guidance. Some critics also hold that his insistence on leaving any operationalisation to the contextually specific setting means that the approach is inefficient as a critique of injustices inherent to capitalism, and that it is left open for political co-option.⁴² Meanwhile, Nussbaum's contribution is criticised for philosophical paternalism and insufficiently acknowledging pluralism

of values and norms by claiming universality for what critics argue are primarily Western liberal values.⁴³

These critiques are valid and thought-provoking, although we believe that they do not take away from the fundamental utility of the capability approach for the project of building a just and equitable framework for pandemic readiness. In particular, Sen's original contribution, including his refusal to name a closed list of capabilities, resonates with this Commission's project. We believe that a successful framework for just and equitable pandemic readiness must take the form of contextually adaptable guidance rather than a blueprint for action that seeks to claim universality. At the same time, we must be able to name examples, both hypothetical and empirically founded, of how core capabilities can be at stake in a pandemic, and here, Nussbaum's contribution can provide valuable guidance. Thus framed, the capability approach is an appropriate entry point for formulating a theoretically grounded new paradigm for people-centred pandemic readiness that emphasises equity and justice as

normative goals, while remaining contextually adaptable.⁴⁴

The Commission uses the capability approach as an analytical lens, not as a blueprint that can by itself ensure implementation. In a geopolitical context marked by pressure on multilateralism and slow progress against the SDGs, no normative framework, however compelling, is sufficient to deliver change. For PRIME, the capability approach helps centre contextual specificity, equity, justice, and individual and community agency—precisely the dimensions that the COVID-19 pandemic exposed as weaknesses in existing PPPRR systems. The manifesto builds on this approach by offering tools to support contextually adapted changes in policy and practice that can reduce the impact of future pandemics.³³ This capability lens entails asking which real opportunities and choices people and communities have to achieve protection from infection, access care, sustain wellbeing and livelihoods, exercise voice, and sustain core functionings under crisis conditions, and what states and the international community must do to safeguard these

	Interacting structural factors	Example of cascading pathway	PRIME case study example
1. Maintain livelihood and meet basic needs (physical safety, income, food, housing, and essentials)	Income continuity, social protection, food access, and housing conditions	Informal or daily wage-income reliance relating to barriers caused by legal status, housing insecurity, discrimination, and stigma	Uruguay: reliance on informal work and community and municipal support, such as emergency baskets and community kitchens
2. Isolate safely and comply with public health measures without disproportionate harm	Housing, social security and income guarantees, risk communication, public health guidance, and caregiving and support structures	Overcrowding interacting with income and housing precarity for minoritised cultural and linguistic groups, further amplifying challenges to risk communication and eroding trust	China: emphasis on tailoring measures to groups facing diverse vulnerabilities (social, economic, and clinical) and context
3. Access timely, relevant, quality health care for COVID and non-COVID needs	Universal health coverage, primary care continuity in crisis, supply pathways, and immigration or residency status	Challenges from health-care cost and user fees interacting with geography, eligibility status, legal status, and discrimination to amplify difficulty in accessing health care	Tanzania: participants highlighted that costs and payment requirements deterred hospital use
4. Protect oneself from infection in daily life and at work	Personal protective equipment and countermeasure provision, infection prevention resources, standards for safe workplaces, housing, risk communication, and public health guidance	Low-income status correlates with informal workplaces lacking safety standards in contexts in which access to personal protective equipment depends on economic resources; individuals likely to be more vulnerable to infection and less likely to be able to protect themselves	Mozambique: community and front-line responses depended on protection and support for workers and households
5. Access education and learning, including during closures	Remote learning infrastructure, devices and connectivity, housing, teacher skills, and resources	Poverty and rurality interacting with household crowding, caregiving burdens on school-age children, and digital exclusion	England: stakeholders described digital exclusion and cramped homes undermining remote schooling
6. Preserve mental health and psychosocial wellbeing	Social spaces, mental health and bereavement support structures, economic security structures, crisis centres, and other institutions providing protection from violence	Isolation from support systems interacting with gender, domestic conflict risk, precarious work, previous experience of trauma, and financial and logistical barriers of access to support	USA: stress, mistrust, and inequities compounded harms; Japan: stress and loneliness from removal of social space
7. Maintain social and kinship ties, belonging, and dignity, and avoid stigma	Social and community spaces, risk communication, legal structures, and epistemic injustice	Belonging to a stigmatised group cascading through losing access to safe community spaces, increasing exposure to hateful treatment in media or social interactions, risk communication reproducing harmful stereotypes, top-down decision making over-riding trusted local structures, and general erosion of trust	Spain: migrants faced criminalisation and xenophobic narratives and relied on non-government organisations and associations for support and translation
8. Participate and have confidence in the fairness of decisions that affect you, exercise voice and rights, and secure accountability	Public information structures, governance channels, mechanisms for representation in decision making, mechanisms for feedback and redress, and epistemic injustice	Insufficient trusted mechanisms for affected groups' participation in decision making interacting with societal power inequalities, epistemic injustice, class, language, and digital exclusion to cascade vulnerability to harmful policies and erosion of trust, and to undermine local or Indigenous societal or health structures	Mexico: Indigenous communities activated ancestral knowledge and local governance as a primary response strategy, in opposition instead of in collaboration with state-led intervention; England: bereaved groups described exclusion and inadequate lived experience representation in formal processes

PRIME=Pandemic Readiness through Institutions, Mobilising Communities, and Equity.

Table 1: Capabilities commonly at risk during a pandemic

capabilities.⁴⁵ Applied to policy trade-offs, the capability approach shifts questioning from which rule everybody should follow to which capabilities must be in place so people can comply without catastrophic costs.

Table 1 identifies capabilities that were commonly observed to be affected by the COVID-19 pandemic in our data and in existing literature, their interdependencies with other capabilities and structural factors, and examples of how these interdependencies could cause negative cascading effects in a future pandemic. This list should be read as illustrative; it does not claim completeness as capabilities vary contextually by individual and population.

1.2 Systemic vulnerabilities, a narrative shift from vulnerable people to vulnerable systems

Our case studies form the core of this Commission. From our community, governance, practitioner, and expert participants we heard stories about community initiatives, mutual support, and locally grounded solutions. We also heard descriptions of sometimes extremely difficult trade-offs as people lacked the capabilities necessary to comply with mandated public health measures without incurring devastating costs. Community participants described systems that assumed resources and protections they did not have and then judged them for non-compliance, when the problem was fundamentally one of institutional design. Importantly, those facing the greatest capability constraints rarely described themselves as vulnerable. Instead, participants argued that a country is only as ready as the protections available to those with the fewest resources, and that when people cannot follow response measures, the vulnerability lies in the system, not in them.

The Commission is committed to this fundamental narrative shift, and as a result chooses to frame the capability constraints observed through shortcomings and weaknesses of PPPRR as systemic vulnerabilities. We use this term to describe vulnerability produced by system design, where institutions, laws, markets, and governance shape unequal exposure and constrain people's capabilities and agency to safeguard themselves and others across the pandemic cycle. Systemic vulnerability can thus be understood as a patterned and predictable system output that is repeatedly concentrated in the same groups through how institutions, markets, and governance affect capabilities through their allocation of protection and risk.

This framing resonates with scholarship on structural violence, which shows how social, political, and economic arrangements systematically produce unequal exposure to harm.⁴⁶ However, this scholarship is rarely operationalised to inform institutional design and reform. By using the term systemic vulnerabilities, we emphasise that these patterned harms are not accidental or inherent to populations, but arise from remediable features of governance, financing, regulation, and service delivery. The shift is therefore diagnostic as well as

normative. It directs attention to how systems can be redesigned to safeguard capabilities more equitably across the pandemic cycle.

To analyse these patterned failures systematically and to connect lived experience with institutional design, we distinguish two interdependent domains through which protection is organised and delivered, namely structural foundations and relational foundations. Together, these domains constitute the social arrangements through which protection is designed and delivered. Structural foundations describe the system's architecture, including governance and accountability, financing and pooling, legal and regulatory arrangements, service delivery architecture, workforce systems, supply chains, and social protection design. Relational foundations describe the system's operating dynamics, including trust and leadership, coordination across levels and sectors, information and sensemaking, risk communication, learning and adaptation, community engagement, and power relations. Systems are more likely to generate trust when these foundations are transparent, fair, coordinated, and capable of delivering protection in practice.

Systemic vulnerabilities cut across both domains and are often only fully revealed under stress. They arise when weaknesses within or across structural and relational foundations interact with one another, or when these foundations are misaligned with lived conditions, producing cascading failures. These cascades do not simply reduce system performance during a pandemic response, they strip people of necessary capabilities, concentrate harm caused by the pandemic, and reproduce inequities across the pandemic cycle. Integrating an analysis of systemic vulnerabilities can strengthen PPPRR efforts at all levels when undertaken in a contextually specific, inclusive, and participatory manner. It requires attention to the unique interplay of institutions and infrastructure with social, cultural, economic, and demographic factors. This principle of grounded, context-specific analysis underpins the PRIME test, which operationalises systemic vulnerability analysis and is outlined as a part of the Commission's manifesto in part 8.

1.3 A people-centred, community-grounded PPPRR framework

The Commission's framework is an integrative model that links pandemic risks, social arrangements, systemic vulnerabilities, capability protection, and lived experience across the full PPPRR cycle. The framework's purpose is to make visible where and why readiness fails, and to guide more adaptive, whole-of-society PPPRR action that can respond to the challenges and dynamics of the everyday constraints people face.

Grounded in case studies and informed by the capability approach, the framework shows how protection is produced through social arrangements; how systemic

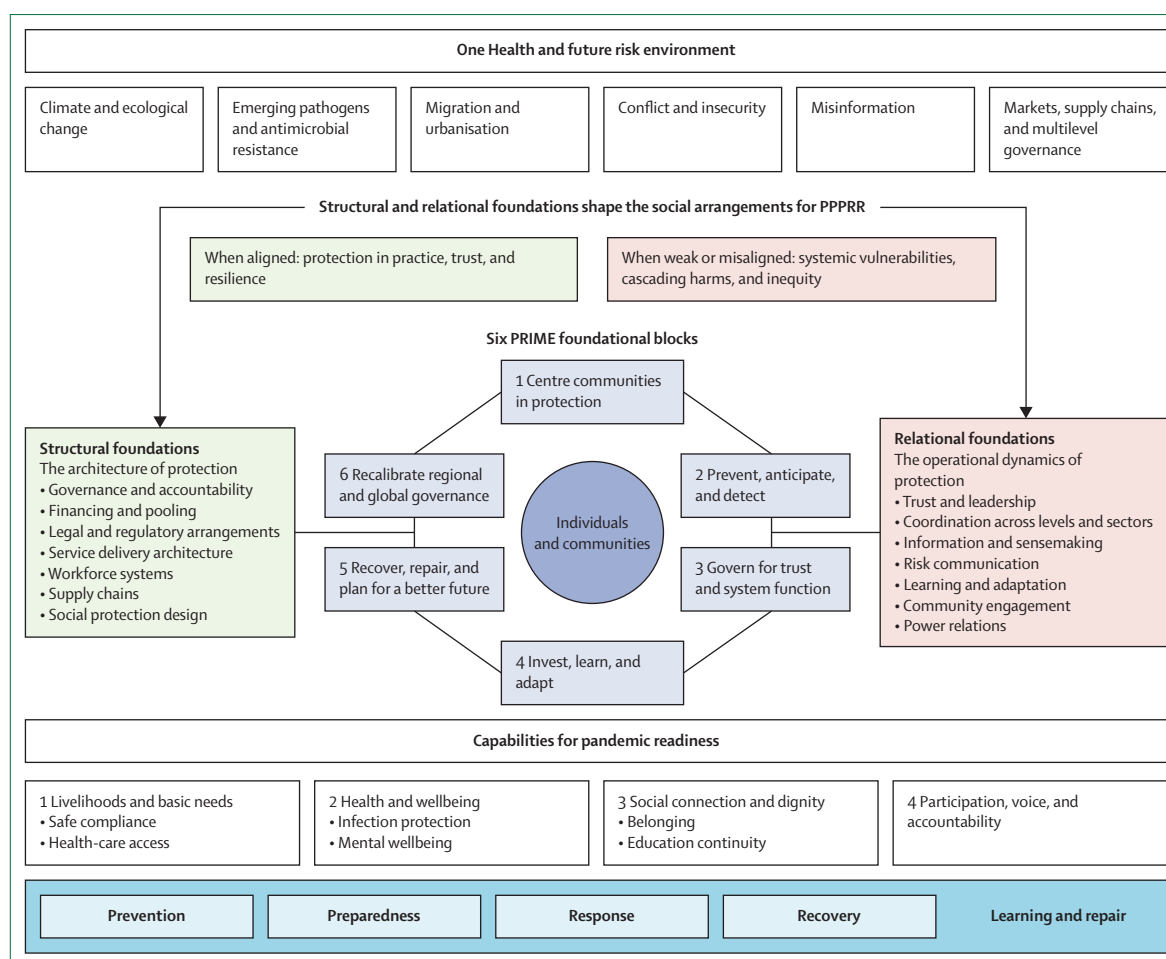


Figure 1: The PRIME Commission's people-centred, equity-oriented, community-grounded PPPRR framework

The framework distinguishes structural and relational foundations as the two domains shaping social arrangements for PPPRR, locates systemic vulnerabilities within each, and shows how their interaction under stress can generate cascading capability loss and inequities. It also identifies the core capabilities that PPPRR should protect across the full cycle. This framework incorporates a One Health perspective on the drivers of pandemic risk, acknowledging that the conditions enabling people to be healthy and secure are inseparable from environmental stability, animal health, and resilient food systems.²⁷ Power and equity shape these dynamics throughout, influencing whose needs are recognised, who is included in decisions, which knowledge is treated as credible, and who receives protection. The six PRIME foundational blocks are the bridge from conceptual analysis to action. These blocks, which are elaborated in detail in part 8, organise the processes through which readiness can be designed, implemented, monitored, adapted, learned from, and repaired across prevention, preparedness, response, and recovery. They should not be read as separate components, but as interdependent domains of action that translate these conceptual foundations into an iterative process of design, implementation, monitoring, adaptation, and learning and repair. The bottom row represents the PPPRR cycle. Learning and repair are iterative processes that operate across all phases of the cycle. PPPRR=pandemic prevention, preparedness, response, and recovery. PRIME=Pandemic Readiness through Institutions, Mobilising Communities, and Equity.

vulnerabilities emerge when the structural and relational foundations on which PPPRR systems rely are weak or misaligned; and how these vulnerabilities cascade into capability loss and inequities for individuals and communities, often those that are already in some way marginalised. Our framework is explicitly multilevel, as visualised in figure 1, centring community realities while connecting them with national institutions and regional and global dynamics. This framework can be traced throughout all the analysis done as part of this Commission. Parts 4, 5, and 6 explore the specific systemic vulnerabilities evident in 20 case studies, and trace how they unfold across contexts and phases of the

pandemic cycle. Parts 4 and 5 show how systemic vulnerabilities translated into concrete response gaps at local and national levels, and how well designed policies and locally grounded initiatives could anticipate or ameliorate them. Part 6 examines how cross-border dynamics, regional and global governance arrangements, and a One Health lens shape both the production of risk and the conditions for effective protection. Part 7 uses foresight to examine how systemic vulnerabilities could be amplified, mitigated, or transformed under plausible future conditions, alongside modelling that quantifies the consequences of coordinated and fragmented action. Finally, part 8 translates these findings into the PRIME

manifesto, foundational blocks, and PRIME test. It is this Commission's hope to support a paradigmatic shift in PPPRR and health security toward policies and practices that are grounded in people's lived experiences, protect basic capabilities for all, and address systemic vulnerabilities through a whole-of-society approach. Diverse methods, integrating qualitative community and expert interviews with systematic reviews, epidemiological modelling, and foresight scenario developments were designed specifically to capture this complexity in the analysis and recommendations. Fundamentally, the goal is to provide a road map for effective PPPRR action that succeeds in providing equitable, inclusive, and appropriate protection for all people in all contexts.

Part 2. Methods

The Commission's work was a multimethods study drawing on four distinct methods: qualitative national case studies, structured foresight and scenario development, transmission modelling, and literature review. The appendix (pp 1–12) provides expanded qualitative detail on the case study methods and analysis, alongside the scenario materials and the equations, assumptions, and parameters of the modelling.

2.1 Qualitative case studies

The authors chose a qualitative case study design to explore experiences, perspectives, and social dynamics surrounding PPPRR. This design enabled an in-depth, multifaceted exploration of complex issues in real-life contexts and qualitative comparisons across cases.^{47,48} 20 countries with representation across all WHO regions were selected, encompassing countries in low, middle, upper-middle, and high-income categories according to the World Bank classification. Our selection includes countries from the WHO regions of Africa (Ethiopia, Mozambique, and Tanzania), the Americas (Mexico, Peru, and Uruguay), the Eastern Mediterranean (Lebanon), Europe (England, Norway, Slovenia, Spain, and Türkiye), South-East Asia (India, Indonesia, and Thailand), and the Western Pacific (China, Japan, Laos, and Singapore). This broad representation allowed us a comparative perspective on system performance and equity outcomes, as PPPRR challenges appeared across all income levels. Moreover, the selection captured the full range of population diversity, from large-population countries (China, India, the USA, and Indonesia) to small states (Laos, Slovenia, Uruguay, Norway, and Singapore) and ensured representation of conflict-affected settings (Mozambique, Ethiopia, Tanzania, and Lebanon). We intentionally included positive and negative outliers in WHO-reported COVID-19 deaths per capita among large-population countries, alongside countries with intermediate reported COVID-19 mortality rates.⁴⁹ Authors' previous connections and collaborations with

academic institutions in some of the countries facilitated the sampling process.

Each national case study combined desk reviews with individual interviews, small group interviews, and focus group discussions. Semistructured topic guides, developed by the Commission's scientific team based on pilot interviews and reviewed by country coordinators, were locally piloted and adapted for relevance while maintaining core questions and areas of focus. Flexible modules enabled exploration of context-specific issues, supported by regular cross-country discussions to balance adaptation with comparability. The core domains, questions, and probes were identical to ensure full comparability across countries and stakeholder groups.

We used purposive, maximum variation, and snowball sampling to recruit stakeholders across sectors, institutional roles, and governance levels. The stakeholders included policy makers within and beyond the health sector, civil society organisations, the private sector, media, and academia. Each country case study further focused on a specific community group shaped by local histories of inequality that was disproportionately affected during the pandemic in different ways. These case studies were selected to reflect locally relevant forms of marginalisation, such as geographic and infrastructural exclusion (ie, rural older residents in China and periurban farming communities in Laos), overlapping crises and structural fragility (ie, internally displaced people in Ethiopia and healthcare workers in Lebanon's context of polycrisis), and exclusion from formal protection systems (ie, domestic workers in Peru and people living on the streets in Indonesia and Uruguay), and the institutional and social structures producing vulnerability in each setting. The consensus on community group selection was reached in each country based on brainstorming, reviewing the available evidence, and conducting several rounds of meetings with local academics. Depending on the context, these groups were defined by occupations (eg, health-care workers and informal workers), social identities (eg, older adults, LGBTQI+ people, and people with disabilities), or spatial or administrative units (eg, peri-urban communities, farming communities, and people living on the streets). Selection criteria in each context drew on rigorous local evidence of disproportionate harms and capability losses across one or more physical, social, or economic dimensions during the pandemic, including quantitative epidemiological data and national statistics (appendix pp 4–7). To complement the country-level evidence, the Commission sought to ensure that a diverse range of population groups disproportionately affected by the pandemic was represented across the case studies. Consultation with community leaders (in Ethiopia, Mozambique, and Uruguay), civil society organisations (including Bereaved Families for Justice in the UK, Disability Thailand and the Independent Living

Foundation in Thailand, and Yogyakarta in Indonesia), or a District Health Department (Laos) also supported the refinement of these boundaries and provided input for the identification and recruitment of eligible community participants. This contextual variation explains why specific themes or experiences are emphasised differently across countries. Groups included health-care workers, people living on the streets, older adults, women, youth, LGBTQI+ persons, domestic and informal workers, communities affected by crises, Indigenous and minoritised groups, people with disabilities, peri-urban and farming communities, migrant agricultural workers, and bereaved families (appendix pp 4–7).

Government-related interviews, which were analysed as part of the integrated qualitative dataset, included respondents from ministries, agencies, and public bodies responsible for health policy and administration, finance, environment and agriculture, education, justice and law, emergency management, local government, and other cross-government functions at local, subnational, and national levels where relevant. Interviews explored decision-making authority, coordination across sectors and levels, financing, implementation bottlenecks, equity, community engagement, evidence use, communication, and lessons for future PPPRR. Country teams used stakeholder mapping to identify officials and policy actors with direct experience of the COVID-19 pandemic or overlapping crises. These interviews were analysed together with community, civil society, private sector, academic, and international organisation data, allowing perspectives to be compared across stakeholder groups rather than treating government accounts as official institutional positions.

Gender representation was considered in sampling all categories, as balanced participation helps avoid systematic bias and produces findings that reflect the full range of pandemic-related vulnerabilities and experiences across the population. Across the 20 countries, the sample comprised 831 participants, including 476 key informants and 355 community members. The decision to end data collection was guided by agreed thematic saturation in each country by the case study team, assessed through routine debriefs and iterative review of when additional interviews no longer generated substantively new data for the themes and subthemes identified, consistent with previous qualitative work.⁵⁰ Interviews (across all formats) conducted in local languages were transcribed verbatim and translated into English. Local languages were chosen by each country team based on the primary language or languages used within the participating community and the need to ensure culturally grounded data collection. Transcription and translation were carried out by trained research team members or qualified professional services familiar with PPPRR terminology. Two to three transcripts per non-English

speaking country underwent reverse translation to verify fidelity to the original meaning.

Analysis proceeded in two linked stages. First, country teams conducted thematic analyses informed by the Commission's conceptual framework using a shared protocol and template, with framework-informed deductive coding and inductive analysis within domains to identify patterns and mechanisms. Early transcripts were coded line-by-line, based on which the teams iteratively refined the coding frame, discussed irregular cases, and tested interpretations against subsequent interviews and group discussions. Disagreements in coding were resolved through iterative discussion and consultation with the Commission's scientific team when needed, ensuring consistent interpretation across settings. Data were analysed using qualitative software (eg, NVivo and Dedoose) or manually, depending on the context. Country teams then produced structured country reports. Second, the Commission scientific team, together with Commissioners, country coordinators, and next generation scholars, conducted a qualitative metatheme analysis. Themes were subjected to systematic comparisons and syntheses to identify important patterns of capability loss and inequity, examine how these patterns arose from systemic vulnerabilities across cross-cultural datasets, and describe these patterns in rich, context-specific ways. This work involved identifying, describing, comparing, and grouping themes (based on similarities and differences) to identify higher-level themes that were replicated across datasets. Quote selections were guided by considerations of functionality (quotes that best fulfil the intended purposes), ethics (reflecting broader patterns rather than data that align with the researchers' agenda), and inclusivity (of various respondents to prevent over-reliance on specific interviews).^{51,52} These considerations were applied both to the country reports and to the overall report.

The aggregate analysis of the case studies followed a qualitative approach that privileges context-specific, heterogeneous findings over cross-country metrics. This approach reflects the Commission's aim to foreground lived experience and limit comparisons to qualitative parallels that preserve fidelity to the original data. Because epidemiological and economic indicators vary substantially in definition and availability across the 20 settings, the case studies were not designed to generate cross-country comparative correlations. Instead, they are intended as rich and nuanced qualitative insights that complement existing metrics-based analyses.

Reporting of sex, gender, race, and ethnicity followed equity-oriented principles. Sex and gender categories were considered in sampling and interpretation where relevant and available, but were not harmonised across countries because categories, meanings, and data availability varied by context. We use the terms reported by participants, country teams, or source documents.

Race and ethnicity are treated as sociocultural and political constructs shaped by history, law, institutions, and discrimination, not as biological traits. Where findings concern racialised, Indigenous, migrant, gender-diverse, or other marginalised groups, interpretation focuses on structural drivers of exposure, exclusion, and protection rather than deficit framings of communities.

2.2 Foresight and scenario development

The Commission used a structured foresight methodology to explore divergent pandemic futures and translate scenario-based insights into practical policy recommendations. First, we developed an initial list of 16 drivers of change relevant to PPPRR and pandemic redress, drawing on global megatrend analysis and triangulating these drivers with evidence from the Commission's whole-of-society qualitative work across 20 country case studies. The full list of the 16 drivers of change is included in the appendix (p 20). Megatrend analysis refers to the identification and assessment of substantial, transformative societal drivers that are likely to shape the future global landscape in the long term. We draw on megatrends identified by the EU Joint Research Centre, which provides a structured evidence base for selecting relevant megatrends across different analytical scopes and policy contexts.

Drivers were refined and prioritised based on an online survey of 121 experts from 39 countries, conducted in August and September, 2025. Global experts in PPPRR were identified through a targeted stakeholder mapping exercise informed by existing professional networks, consortium partnerships, published literature, and relevant academic and non-governmental organisations working in the field. An intensity ratio was employed to assess the importance of alternative pathways and shortlist the ten drivers with the most consequential trajectories. In a multistakeholder virtual workshop involving 58 participants from 18 countries and with civil society representation, we examined how these drivers might evolve and interact, identifying reinforcing and compounding dynamics that informed the development of four internally coherent scenarios set in 2035. We used these scenarios to stress test systemic vulnerabilities and examine implications for equitable pandemic preparedness. In December, 2025, a virtual scenario workshop with 42 participants, including community representatives, explored the main challenges, opportunities, affected stakeholders, and policy implications associated with each scenario. To further ground the scenarios in lived experience, we held focused discussions within selected case studies, including with older adults in Singapore and young people in Slovenia. These settings were chosen to capture variation across age groups and contexts, providing contrasting perspectives across regions and generations, and enabling us to test assumptions against lived experiences

of risk, inequality, and feasibility. These discussions were used to refine and calibrate the narratives against community perspectives.

2.3 Transmission modelling

We conducted a transmission modelling study of a hypothetical 2-year influenza A pandemic across 173 countries, incorporating country-specific demographics, age-structured severity risks, phased non-pharmaceutical interventions (NPIs), and five vaccine distribution approaches inspired by two hypothetical future global pandemic scenarios that feature later (the pathogens of war and renaissance of solidarity scenarios), as well as the perceived importance of vaccine hesitancy. Each country was modelled independently, assuming the spread of the pandemic was detected only after it had already become established globally, and hence it could not be contained at its global foci. We started the pandemic with 0.01% of the population in the infectious state and a further 0.01% of the population in the latent state, to represent an early stage in community transmission. These initial individuals were distributed equiprobably among age groups in the country at large, although differential mixing in the population means the eventual burden of disease will not be uniform across age groups. The model used defined epidemiological parameters (including reproduction number $R_0=2.5$, 7-day infectious period with or without symptoms, 4-day latent period, and a 278-day refractory period), age bands in 5-year increments to older than 75, and income-adjusted hospitalisation and fatality rates to reflect health system capacity in different World Bank country bands, which are tabulated together alongside additional details in the appendix (pp 31–39). NPIs were assumed to start on day 45, reducing transmission by 60% for 90 days and 40% for a further 269 days. Vaccine demand was based on historical COVID-19 vaccine-uptake data; however, it is worth noting that in a hypothetical influenza pandemic of very different severity, vaccine uptake might be better or worse than during the COVID-19 pandemic, and acceptance might be higher for influenza vaccines that are based on established influenza vaccine technologies. Five allocation scenarios were modelled: income-based self-interest (in which wealthier countries get priority allocation of vaccines by offering better terms and use these to vaccinate their own populations first), proportional equitable sharing (where vaccines are provided to all countries simultaneously), no vaccination, and two reduced-hesitancy scenario variants. Vaccine production was assumed to begin after 100 days, scale up over 150 days to 30 million doses per day, and continue until 8 billion single-dose vaccinations were produced, with vaccination and previous infection reducing subsequent risk and severity. We assumed all countries implemented

non-pharmaceutical interventions after one and a half months (45 days) of the epidemic, with several phases of reduced stringency. The age-structured compartmental model, implemented in R using the *odin* package, generated country-level and global-level estimates of infections, hospitalisations, and deaths, aggregated overall and by income group. Full technical details are provided in the appendix (pp 31–39).

2.4 Literature review

Six reviews were undertaken to complement the Commission's primary data sources and provide additional conceptual and empirical evidence. Four background papers were commissioned by the Commission, and two additional reviews were conducted by the Commission scientific team and collaborators. Together, these reviews used systematic, scoping, integrative, umbrella, and narrative review approaches to synthesise evidence across six domains central to pandemic readiness: contemporary debates and operational interpretations of health security; indicator-based frameworks for monitoring preparedness and response; conceptual and methodological issues in grassroots and community-generated indicators; the evolution and application of health systems resilience; national COVID-19 pandemic response evaluations across Organisation for Economic Co-operation and Development (OECD) countries; and community engagement and governance collaboration during the pandemic in LMICs. Across all six reviews, the teams applied structured search strategies and predefined inclusion and exclusion criteria. Findings were synthesised to identify conceptual patterns, operational gaps, and implications that informed and strengthened the Commission's broader evidence base (appendix pp 40–56).

2.5 Quality assurance, reporting standards, ethics, and limitations

The Commission embedded quality assurance through shared sampling and consent procedures, regular debriefs, periodic accuracy checks on transcription and translation by country-level research leads and the coordinating team, and multicountry coordination meetings to maintain fidelity while allowing for contextual adaptation. All countries followed the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines to structure and document qualitative methods including interviewer characteristics, sampling, data collection, and analysis. Public and community involvement included feedback discussions with partner civil society organisations or community representatives. Ethical approval for primary data collection was obtained from local ethics review committees (appendix p 2). All data were collected between August, 2024, and February, 2026. Written or verbal informed consent depending on the interview

format (in-person or virtual) was obtained from all participants. Data were anonymised and stored on secure, access-restricted servers in accordance with country-specific data protection requirements.

The Commission's multimethods design was intended to capture complexity across lived experience, governance, foresight, and modelling, but several limitations should be acknowledged. The 20 country case studies were purposively selected and were not designed to produce statistically representative estimates or between-country correlations; rather, they provide comparative qualitative insight into recurring patterns of systemic vulnerability. Differences in context, languages, and locally defined categories of identity and marginalisation might have shaped what was reported and how findings were interpreted, despite shared protocols, translation checks, and quality assurance procedures. The foresight work and transmission modelling should also be read as stress tests rather than predictions: scenarios depend on expert judgement and deliberation, and modelling necessarily uses simplified assumptions about pathogen behaviour, interventions, vaccine production, uptake, and allocation. Taken together, these methods are strongest for identifying plausible mechanisms, recurring vulnerabilities, and policy implications, rather than for estimating the precise magnitude of effects in each setting.

Part 3. Governing protection: a review of COVID-19 experiences and reform trajectories

The COVID-19 pandemic has generated an unprecedented body of scholarship, policy evaluations, independent reviews, and reform proposals spanning communities, national governments, regional organisations, and global institutions. This part synthesises literature across four interconnected levels of governance. It begins at the local level, examining community engagement as a foundation for resilience and exploring how depth of community participation shaped feasibility, equity, and sustainability during the pandemic. It then turns to the national level, analysing leadership, health system resilience, social protection, and postcrisis reform trajectories. The regional level considers the promise and limits of solidarity, highlighting pooled procurement, surveillance coordination, and emerging efforts to institutionalise preparedness. Finally, the global level examines fragmented governance, structural inequities in financing and intellectual property, and the evolving reform agenda aimed at subsidiarity, equity, and fiscal sustainability. The review draws on peer-reviewed literature and the Commission background papers, national COVID-19 evaluation reports, and regional policy analyses published between 2020 and 2025, alongside the Commission's own reviews, organised across four levels of governance. The review provides essential context for our subsequent empirical work, which examines how these dynamics played out in

For more on COREQ see
<https://www.equator-network.org/reporting-guidelines/coreq/>

practice. Together, this approach underscores how protection is governed across levels, and why future reform must be conceived as an integrated project rather than a set of isolated technical fixes.

3.1 Local level: community engagement as a foundation

Community refers to connected groups who share lived conditions and whose collective action during crises can shape exposure, protection, and recovery.^{53,54} Community engagement is the structured involvement of community actors in the design, implementation, and decision making of public health interventions, extending beyond service delivery to include influence over priorities, strategies, and resource use.^{54–57} Community engagement is central to effective public health responses, strengthening governance through empowerment, collaboration, and local participation. It can improve service accessibility and acceptability, mobilise resources, and enhance institutional resilience.^{54–56,58} The Commission examines how depth of participation shaped local outcomes during the COVID-19 pandemic, how communities often compensated for systemic gaps despite structural constraints, and how participation can be institutionalised to embed trust, accountability, and resilience within PPPRR.

3.1.1 Translating policy into practice in communities: depth of participation and local outcomes

PPRR is practically realised at the local level.^{55,58,59} The COVID-19 pandemic exposed systemic vulnerabilities in how policy was translated into everyday life as feasibility, adherence, and trust determined alignment with lived realities.^{60–63} Community actors were often the first to detect implementation failures and were front-line enablers of uptake and equity.^{55,64,65} A systematic review of 21 studies in LMICs conducted as part of this Commission (Bakhi R and colleagues, unpublished) highlighted the importance of depth of participation, which operates along a continuum shaped by power, resources, and institutional context.⁶⁶ Community participation commonly included risk communication, vaccine delivery, targeted outreach, and provision of essential goods and social support. High-depth participation was characterised by communities exercising decision-making influence, such as co-designing strategies, managing resources, and shaping priorities using local knowledge.^{67–75} Examples included Zambia's UNICEF Community Rapid Assessment Human-Centred Design project, which cocreated vaccination strategies with residents. High-depth participation was associated with clearer benefits: higher vaccine uptake, cost-efficient delivery of goods, improved reach to marginalised populations, and continuity beyond the acute phase. Medium-depth participation, limited to consultation or operational support without decision-making authority, was common in resource-constrained or humanitarian settings, yielding more mixed or inconsistent outcomes.^{76–81}

Across contexts, mismatches between responsibility and authority, weak institutional support, and insufficient legal or financial backing constrained sustainability. High-depth participation was associated with stronger and more durable gains, but success depended on shared power, accountability mechanisms, and institutional support.^{66,82}

3.1.2 Community engagement: compensating for gaps, constrained by structures

Broader evidence indicates that community engagement often emerged as a compensatory response rather than a core preparedness feature.^{82–85} Mobilisation without representation (in which communities provided essential labour without participating in decision-making bodies), and participation without power (in which local groups attended consultative forums but lacked policy-making authority) emerged as recurring dynamics.^{86,87} During the pandemic, communities mobilised through both formal structures and informal initiatives; for example, community health workers' expanded roles in surveillance, contact tracing, health education, vaccine promotion, and service continuity.^{88,89} In South Africa, more than 30 000 community health workers supported testing and contact tracing in marginalised communities.⁹⁰ Non-governmental and civil society organisations filled gaps where state capacity faltered, delivering food, medicines, and essential services.⁹¹ Informal mutual-aid initiatives, community kitchens, solidarity funds, and volunteer networks emerged across south and southeast Asia and Latin America.^{67,83,92}

Community engagement, however, remained constrained by structural barriers, including unclear mandates, minimal formal authority, centralised fiscal and policy control, and reliance on short-term funding.^{66,68,93–95} Structural barriers, including constrained financing, weak integration into formal systems, and resource shortages, restricted sustainability and equity; this was exemplified by chronic underfunding in Palestinian refugee camps,⁷⁶ as well as persistent food insecurity,⁷⁵ health worker shortages, and inadequate personal protective equipment (PPE) that left communities exposed without commensurate capabilities or protection elsewhere in the world.^{96,97} Weak accountability, local inequalities—including socioeconomic, gender, and migration-related inequities—and misinformation further undermined responses, while internal community hierarchies often reinforced exclusion, sidelining youth, women, and migrants.^{59,83,87,98–101} Some engagements therefore achieved short-term effectiveness but failed to build durable relationships, accountability, or institutional memory for recovery and future preparedness.^{84,102} Strengthening preparedness requires moving beyond episodic mobilisation towards sustained and institutionalised participation, embedding high-depth participation within governance structures.

3.1.3 Towards community-centred reform: embedding communities in preparedness

The COVID-19 pandemic reinforced how community-centred reform is crucial for system resilience. Civil society coalitions showed how non-state actors can channel political attention and resources to front-line actors. The COVID-19 Action Fund for Africa, for example, distributed nearly 86 million pieces of PPE to 500 000 community health workers and community members across 18 countries between June, 2020, and May, 2021.¹⁰³ The Pandemic Action Network (now RANI) was formed during COVID-19 as a global partnership that coordinated and amplified civil society advocacy on pandemic action. National reforms, including the strengthening of national public health institutes and emergency coordination systems, and regional initiatives, such as the Africa Centres for Disease Control and Prevention (Africa CDC)'s New Public Health Order, represent opportunities to embed community-centred approaches in workforce development, planning, surveillance, and health security.¹⁰⁴ Emerging priorities for health-system leaders and policy makers must emphasise actively involving communities in monitoring, evaluation, and accountability for PPPRR, including by co-developing locally relevant indicators, integrating grassroots knowledge with formal epidemiological data, and establishing participatory feedback loops to guide policy and resource allocation. Lessons from Indigenous health systems and ways of knowing, participatory action research, and community-driven surveillance can strengthen early warning, feasibility, and trust, by incorporating diverse knowledge systems, addressing context-specific needs, and reducing exclusion in decision making, ensuring interventions are contextually appropriate and equitable. However, institutionalising participation requires clear chains of authority, sustained financing, formal representation, and integration across national and regional structures. When these elements are in place, community-centred reform enhances system responsiveness and resilience, whereas their absence leaves vulnerabilities at the local level that undermine effectiveness across scales.

Research on how communities interpreted, adapted, or resisted national and global guidance is fragmented, with little insight into how local realities can modify national policy intent. The empirical sections that follow explore these lived experiences, highlighting the structural constraints communities confront around authority, sustainability, and power asymmetries and how these shape health outcomes during pandemics, as illustrated by the COVID-19 pandemic.

3.2 National level: leadership, systems resilience, and the politics of trust

National responses to the COVID-19 pandemic involved coordination of pandemic measures, the maintenance of essential services, and efforts to sustain public trust, all

shaped by governance structures, legal frameworks, health system resilience, and social protection capacity. The national level refers to the legal, political, and operational authorities held by national governments to coordinate public health measures, mobilise resources, maintain essential services, and integrate evidence across sectors. This section outlines the core functions of the national response during the pandemic, reviews what shaped effectiveness and impact, and identifies remaining gaps.

National authorities held the legal and operational mandate to enact public health measures, mobilise resources, and align cross-sectoral actions, but the effectiveness of these powers varied widely.^{49,59,105} What was often labelled compliance largely reflected whether citizens had the means to comply; isolation and quarantine succeeded only when policies ensured access to care, income protection, and support for caregiving responsibilities.^{49,106} Where these supports were uneven, adherence predictably faltered.¹⁰⁶ Trust followed the same pattern, being built or lost according to how burdens were shared, resources allocated, and communities involved in decision-making.^{106–108} Here, we synthesise evidence from both peer-reviewed literature and a comparative review of national COVID-19 evaluations in order to assess early pandemic responses, governance, health system resilience, and social protection (Almoualem C, Legido-Quigley H, and Bakhti R, unpublished). We explore the timing and coordination of public health interventions, governance and leadership structures, health system resilience, social protection measures, and postcrisis reforms. By integrating operational, equity-focused, and system-based insights, the section highlights patterns of success and vulnerability and identifies lessons for strengthening future pandemic preparedness.

3.2.1 Early action matters: delays and long-term impacts

Early delays in implementing a coordinated public health and policy response and fragmented action substantially amplified the health and societal toll of the pandemic. Despite WHO's declaration of a Public Health Emergency of International Concern on Jan 30, 2020, many governments outside the Western Pacific region postponed decisive measures until cases and pressure on hospitals were already rising. Comparative evaluations and epidemiological analyses show that countries implementing early, comprehensive strategies including rapid triage, systematic contact tracing, isolation facilities, and socioeconomic support, experienced markedly lower mortality, as seen in countries such as New Zealand, South Korea, Taiwan, and Singapore, whereas isolated measures such as mask mandates or business closures were insufficient without coordinated, multilayered responses and community engagement.^{109,110} National evaluations indicate that delays were compounded by operational weaknesses, including inadequately

For more on the COVID-19 Action Fund for Africa see <https://cafafrica.org/>

For more on RANI see <https://rani.co/>

stress-tested preparedness plans, insufficient logistics and surge capacity, PPE shortages, and fragmented governance.^{49,59,106,111} These shortcomings increased acute mortality, increased the risk of long-term consequences (eg, post-COVID-19 condition also known as long COVID), disrupted chronic care, delayed diagnoses, caused educational losses, and widened inequalities.^{112–115} Social protections were often introduced reactively, leaving informal workers, migrants, and other marginalised groups disproportionately exposed, and insufficient public participation contributed to blind spots in response design. Overall, effective early action required timely epidemiological measures, operationalised preparedness, clear governance, resilient supply chains, and inclusive engagement, with countries integrating these elements to varying degrees often achieving better health and social outcomes (eg, New Zealand and Singapore).^{105,106,111}

3.2.2 *Diverse tools, unequal protection*

The tools and approaches deployed by national systems were highly heterogeneous. Testing and contact tracing often lagged due to fragmented data systems and delayed infrastructure investment,^{107,116} whereas some countries leveraged pre-existing public health infrastructure to establish rapid response programmes.^{107,117} Japan used backward contact tracing to dismantle transmission clusters.^{116,118} Quarantine and isolation measures ranged from mandatory lockdowns in New Zealand and Norway^{107,108} to voluntary approaches in Sweden, associated with higher mortality among older populations.¹¹⁹ Spain and France achieved transmission control through strict lockdowns, but at considerable social and economic cost, with support mechanisms lagging behind restrictions.^{120,121} Educational disruptions were widespread, with 138 countries implementing nationwide school closures, widening learning gaps due to digital inequities and pedagogical disparities.^{122,123} Surveillance systems varied: some countries repurposed existing laboratory and syndromic surveillance, whereas others, including China, Fiji, India, Japan, and Viet Nam deployed real-time digital reporting for immediate data sharing.⁴⁹ Vaccination roll-out introduced further heterogeneity, reflecting inequities in vaccine development, production, distribution and access, and health system capacity within and between countries.¹²⁴ Across OECD countries, national evaluations confirmed that preparedness plans existed but were often insufficiently operationalised; stockpiles, workforce surge capacity, and logistics were undertested, and PPE shortages affected front-line health care and long-term care.^{49,59}

3.2.3 *Governance, trust, and the leadership factor*

Governance, leadership, and communication were decisive in shaping compliance and pandemic outcomes. Centralised systems with clear crisis authority, such as seen in Luxembourg, New Zealand, and Japan, enabled rapid nationwide measures, coherent messaging, and

coordinated fiscal support.^{108,125,126} In contrast, fragmented federal or devolved systems in Switzerland, Germany, and the UK faced delayed decisions, intergovernmental friction, and inconsistent implementation,^{127–129} challenges further intensified in Mexico and the UK by political instability and polarisation.^{129,130} National evaluations highlighted that despite formal preparedness plans, inadequate execution constrained timely and coordinated early action.^{49,59,131} Trust and collaboration between political leaders and scientific advisors also strongly influenced effectiveness.^{132,133} Countries such as Iceland, Norway, Belgium, and Luxembourg that communicated clearly, consistently, and empathetically, drawing on transdisciplinary scientific advice, achieved higher adherence to public health measures and lower mortality.^{105,107,125,134} However, advisory bodies were frequently dominated by biomedical expertise, limiting attention to social, behavioural, and equity dimensions (Ang C, unpublished).^{135–137} Weak or ambiguous emergency legal frameworks in several European countries, including the UK and Spain, and some Pacific island states, sometimes failed to balance authority with accountability, creating governance gaps and risks of corruption.^{138–140} Overall, effective governance depended on centralisation and legal clarity, interdisciplinary expertise, and trust-building through transparent communication.^{105,106,131}

3.2.4 *Health system resilience and social safety nets*

Health system resilience and social protection capacity were central to national pandemic outcomes. Countries with universal health coverage and primary care-centred systems, such as New Zealand, South Korea, Finland, and Bhutan, were better able to scale emergency services while maintaining routine care. Under-resourced or fragmented systems, particularly in LMICs, disrupted essential services including sexual and reproductive health and routine immunisation.^{59,106} Many systems expanded capacity through rapid facility construction, infrastructure repurposing, and home-care protocols.^{49,141–143} Long-term care facilities proved especially vulnerable, with severe outbreaks exposing structural weaknesses in care for older people. Workforce shortages were addressed through mobilising volunteers, trainees, retirees, and students, alongside supportive measures such as adjusted work shifts, childcare support, financial incentives, and psychological counselling.^{49,59,144} Social protection policies, for example wage subsidies, furlough schemes, and emergency benefits, improved adherence to public health measures and reduced socioeconomic disruption.^{108,121,145} Similarly, income stability and health-care and educational continuity helped mitigate long-term impacts, such as long COVID-related disability, job loss, mental distress, and learning setbacks.¹⁰⁶ Overall, national evaluations underscore that resilience depends on integrated social protection, operational readiness, and equity-sensitive

planning to buffer immediate and downstream impacts.^{49,59}

3.2.5 Learning from select national experiences and building towards the future

National evaluations and postcrisis reform efforts highlight persistent gaps and key learning opportunities. Across 16 OECD countries, national evaluations found that preparedness plans were often formal but untested, governance was legally defined but operationally fragmented, health systems were resilient in parts but fragile at the margins, and social protections were uneven.^{49,59} Recommendations emphasised updating pandemic plans, strengthening health systems, clarifying governance roles, improving communication, embedding equity, and modernising data systems, yet most lacked enforceable mechanisms to monitor and ensure implementation.^{59,105,106} Engagement with regional and global actors, including joint procurement and guidance from WHO or EU frameworks, occurred but rarely resulted in integrated, multilevel governance, limiting crossnational learning and operational coherence. Postpandemic reforms prioritised technical and operational capacity, including central coordination mechanisms, stockpiles, laboratories, surveillance, and modelling, with slower progress on governance recalibration, oversight, community participation, and equity-centred protections.^{49,106,108,124} Evaluations underline that embedding equity, inclusive participation, and operational accountability is essential to convert technical gains into resilient national systems capable of mitigating long-term health, social, and economic impacts.^{106–108} Without these complementary reforms, improvements in infrastructure and capacity risk remain insufficient to address systemic vulnerabilities revealed by the pandemic.

Despite national evaluations and reform proposals, gaps remain in understanding how preparedness architectures are being recalibrated in practice. Existing literature often maps technical systems, surveillance, and legal frameworks, but provides little insight into how power, trust, and accountability shifted during the pandemic and how they are being reshaped postpandemic. As a result, we have less clarity on how reforms are unfolding on the ground, for whom they are designed, and whose experiences remain marginalised.

3.3 Regional level: the promise and barriers to solidarity

The regional level of PPPRR acts as a crucial intermediary between national systems and global frameworks. We use regional level to refer to cooperation arrangements among neighbouring or politically aligned countries that exercise distinct collective functions, such as procurement, surveillance, and emergency coordination. Regional institutions do not implement policies directly for populations, but coordinate across countries to align strategies, pool resources, share surveillance data, and

strengthen operational capacity, thereby amplifying the effectiveness and equity of national responses. Regional action is interconnected with national systems and dependent on domestic implementation capacity while also shaping supply chains, financing, workforce deployment, and legal frameworks that influence how countries respond to health emergencies. We examine regional cooperation as a strategic governance intermediary, explore political and operational barriers to collective action, review postpandemic progress in regional readiness and protection, and conclude with emerging reform priorities that aim to institutionalise regional preparedness and strengthen interconnected systems.

3.3.1 Regional cooperation as a governance intermediary

Regional organisations provided a strategic layer for pandemic coordination, leveraging smaller actor networks, shared historical ties, and collective identity to align responses. The Africa CDC, with continent-wide political backing, exemplified this approach, embedding solidarity and regional cooperation into health sovereignty frameworks. Previous experience with outbreaks, including SARS and Ebola, facilitated early convergence and rapid mobilisation of surveillance, policy guidance, and technical support across Association of Southeast Asian Nations (ASEAN) and African Union member states. Regional entities also enhanced equity through pooled procurement, joint financing, and coordinated vaccine distribution, exemplified by the African Union's Vaccine Acquisition Task Team, Pan American Health Organization (PAHO) Revolving Fund, and ASEAN Vaccine Security initiatives, which improved access, reduced prices, and strengthened planning capacity.^{146,147} ASEAN's Vaccine Security initiative focused more on policy coordination and future regional production ambitions than on large-scale procurement during the COVID-19 pandemic. The EU's early joint vaccine procurement strengthened coordination and accelerated a shift toward deeper health integration across member states.¹⁴⁸ Such platforms functioned as capacity-building infrastructure, enabling predictable delivery, market leverage, and operational resilience, contingent on governance clarity, standing financing, and shared decision making.¹⁴⁹

3.3.2 Political and operational barriers

Despite these advantages, regional cooperation often faltered at the implementation stage due to misaligned authority, discretionary mandates, and domestic political pressures.^{150,151} In the Southern Common Market, South Asia, and Europe, powerful member states prioritised national needs over collective action, delaying resource mobilisation and weakening cohesion.^{151,152} Institutional complexity, overlapping mandates, and fragmented authority, including among Africa CDC, WHO regional offices, and regional financial bodies, further constrained coordination, while private-sector dynamics and reliance

on external suppliers constrained regional autonomy and innovation.^{153–156} Structural inequities in the global health architecture, including donor-driven priorities and weakened fiscal and data sovereignty, compounded these challenges, highlighting that regional capacity was as much a political achievement as a technical one (Lee K, unpublished).¹⁵⁷

3.3.3 Postpandemic progress in regional readiness

Following the COVID-19 pandemic, regional bodies have increasingly institutionalised preparedness, emphasising surveillance, procurement, financing, regulatory capacity, and crossborder coordination. In the Americas, PAHO strengthened pooled procurement, supply chain resilience, and regional production platforms.^{149,158,159} Europe consolidated emergency-era innovations into the European Health Union, expanding Health Emergency Preparedness and Response Authority, European Centre for Disease Prevention and Control, and European Medicines Agency mandates, and embedding preparedness into legal and operational frameworks.^{160,161} Africa advanced the Africa Health Security and Sovereignty Agenda, integrating surveillance, emergency coordination, pooled procurement, digital systems, and local manufacturing alongside climate and financing initiatives.^{104,162,163} In the Middle East and Central Asia and Asia-Pacific regions, regional efforts have focused on coordination, workforce development, integrated surveillance, and linking preparedness to broader development and climate policy, with WHO regional offices playing convening and technical roles.^{157,159,164,165}

3.3.4 Emerging reform priorities

Current debates frame the regional level as a key site for standing mandates, operational capacity, and accountability. Recommendations highlight preauthorised financing, pooled procurement, supply diversification, and market-shaping mechanisms to reduce dependence on global crisis markets.^{149,153,157,166–168} Information governance and surveillance are increasingly treated as core regional public goods, requiring interoperability, standardised data, One Health approaches, laboratory networks, and transparent digital infrastructure.^{157,158,162,167,169–171} Although models differ by region, the overarching shift emphasises strengthening regional authority, institutionalising capacities, research, development, and manufacturing, and ensuring collective readiness as a complement to national and global systems. Yet the literature remains thin on how regional arrangements function during shocks, and national stakeholders are rarely asked how they perceive or navigate the regional layer.

3.4 Global level: fragmented governance and structural inequity

At the global level, PPPRR is shaped by multilateral institutions, international legal frameworks, financing

architectures, and transnational markets. These arrangements govern the reporting of pathogens, the sharing of scientific knowledge, the production and distribution of vaccines and medical countermeasures, and the flow of financial resources across countries. Yet the pandemic exposed deep fragmentation and structural inequities within this architecture. Legal instruments lacked enforceable authority, financing mechanisms were often voluntary and donor-driven, manufacturing and intellectual property regimes concentrated power in a small number of countries and companies, and coordination across the UN system and global health agencies remained reactive.

These weaknesses reverberated downstream, shaping what regional platforms could coordinate, what national governments could finance or procure, and what local systems were able to deliver. This section examines the political economy dynamics that defined the global pandemic response, including limitations of the International Health Regulations, financing asymmetries, inequities in access to scientific advances, and the challenges of translating multilateral commitments into operational solidarity. It then reviews postpandemic legal, financial, and institutional reform efforts, situating current debates on equity, subsidiarity, accountability, and fiscal justice.

3.4.1 Limitations of global governance

The COVID-19 pandemic exposed structural constraints in global governance, particularly within the International Health Regulations and WHO's operational framework. Weak enforcement authority, procedural requirements, and reliance on national discretion delayed early signalling, declaration of a Public Health Emergency of International Concern, and guidance on essential public health measures.^{91,153,172–174} WHO's ability to coordinate responses was hindered by insufficient political backing, financing, and convening power, compounded by slow decision making through the World Health Assembly and inadequate representation of non-health policy levers.^{91,106,172–174} Fragmentation extended across the broader UN system, where delayed convening and reactive coordination slowed integrated responses to PPE and diagnostic supply shortages. These deficits revealed a misalignment between global normative guidance and operational authority, leaving the world vulnerable to rapid transnational threats.

3.4.2 Global financing for response and recovery

The pandemic triggered an unprecedented surge in global health financing, with development assistance for health rising 34.6% between 2019 and 2020, largely directed toward COVID-19 pandemic response.¹⁷⁵ Agencies including regional development banks, Gavi, the Vaccine Alliance, WHO, the World Bank, the Global Fund, and UN agencies supported country-level coordination, treatment, logistics, and rapid service

For more on the Africa Health Security and Sovereignty Agenda see <https://khub.africacdc.org/forums/thread/africa-health-security-and-sovereignty-agenda>

scale-up. Yet resource allocation was often poorly aligned with disease burden, particularly in Latin America.¹⁷⁵ Pre-existing mechanisms, such as the World Bank's Pandemic Emergency Financing Facility and pandemic-era platforms such as COVAX, proved inadequate due to complex triggers, reliance on voluntary donations, and inequitable distribution.^{176–178} More broadly, donor-driven, project-based financing reinforced fragmentation, limited recipient voice, and emphasised short-term, vertical interventions, weakening LMICs' capacity to sustain protection or coordinate multisectoral responses.^{152,168,175,179} Recovery financing reflected similar asymmetries: high-income countries deployed large domestic stimulus packages, whereas many LMICs faced debt constraints and higher borrowing costs, entrenching pre-existing disparities in health system resilience and social protection.^{18,19}

3.4.3 Scientific progress and translation gaps

Global scientific mobilisation was unprecedented. Mechanisms such as WHO's R&D Blueprint, Coalition for Epidemic Preparedness Innovations funding, and large-scale trials (eg, RECOVERY and Solidarity), alongside substantial public, private, and public-private R&D investment enabled the development of vaccines within 8 months alongside rapid evidence building on therapeutics.^{180–184} Advisory systems expanded, integrating modelling, epidemiology, and public health expertise into policy making (Ang C, unpublished). However, translation into timely and equitable protection was uneven. Narrow definitions of credible evidence, which prioritised clinical and epidemiological evidence over findings from aerosol science, delayed incorporation of knowledge on airborne transmission despite emerging interdisciplinary evidence, and inconsistent integration of social and behavioural sciences slowed precautionary action and limited adherence-focused interventions (Ang C, unpublished).^{59,135,185–188} Concentration of manufacturing capacity, intellectual property constraints, and insufficient technology transfer further constrained access, as some high-income countries and multinational firms dominated production and distribution, while LMICs struggled to develop local capacity or secure equitable allocation.^{168,169,189–194}

3.4.4 Postpandemic reforms and legal innovation

The postpandemic global health landscape reflects both momentum for reform and fiscal constraints. Declining development assistance, rising debt, and ongoing health system pressures challenge the predictability of funding.^{195–197} Legal reforms have advanced, including amendments to the International Health Regulations (2005) that strengthen equity, solidarity, and time-bound obligations, and the WHO Pandemic Agreement, which establishes legally binding cooperation on preparedness, One Health, workforce protection, and equitable access. The agreement also embeds equity as a goal, principle,

and outcome of PPPRR, and includes explicit provisions on community engagement and whole-of-government and whole-of-society approaches (article 15).^{198–202} The Accra Political Declaration, often described as the first global reset of the health architecture since the COVID-19 pandemic, led by heads of state, further underscores the growing political momentum behind equity-centred and regionally grounded reform.²⁰³ As of May, 2026, key operational gaps remain. The PABS Annex is still unfinished, delaying signature and ratification of the Pandemic Agreement, and leaving benefit sharing, compliance monitoring, and financing unresolved.^{204–207} The Pandemic Fund and other financing initiatives provide targeted support for preparedness but remain below recommended levels, often emphasising competitive allocation over predictable, formula-based funding.^{176,208,209} Parallel reform efforts, including the Sevilla Platform, UN80 Initiative, Gavi Leap, and the modernisation of The Global Fund to Fight AIDS, Tuberculosis and Malaria, seek to enhance country ownership, reduce fragmentation, and align resources with national priorities.^{210–213}

3.4.5 Emerging global debates and reform priorities

Current debates are shaped by both the postpandemic recovery phase and a wider crisis in multilateralism that has exposed structural weaknesses in the global health architecture. Proposals emphasise subsidiarity, with global institutions focusing on core public goods, norms, standards, surveillance, R&D coordination, and pooled procurement, while operational authority shifts toward national and regional actors.^{214–218} Reform discussions highlight fiscal sustainability, equity, and benefit-sharing for pathogen data and countermeasures, alongside strengthening domestic resource mobilisation, progressive taxation, and debt management.^{162,166,214,217} Technology and knowledge governance are central concerns; more geographically distributed and expanded manufacturing, enforceable technology transfer, strategic intellectual property reforms, and investments in workforce and regulatory capacity are essential to reduce dependence on a few suppliers and improve LMIC access.^{168,219,220} Debates converge on creating a more polycentric, accountable, and equity-driven global health architecture that aligns financing, governance, and scientific capacity with practical readiness and long-term resilience. However, the available literature remains largely normative and often shaped by scholars and institutions in high-income settings, even as LMIC voices are increasingly influential. National and front-line stakeholders are still rarely asked how they experience the global layer in practice.

3.5 From the local to the global: toward a coherent and equity-driven multilevel architecture for pandemic resilience

Across levels, the pandemic revealed that resilience is built through alignment from the local to the

For more on COVAX see <https://www.who.int/initiatives/act-accelerator/covax>

For more on WHO's R&D Blueprint see <https://www.who.int/teams/blueprint/who-r-and-d-blueprint-for-epidemics>

global. Community-centred reforms showed that trust, feasibility, and early-warning capacity originate at the front line, yet depend on formal authority, sustained financing, and institutional integration within national and regional systems.²²¹ National evaluations showed that technical capacity without operational accountability, inclusive participation, and equity-centred governance leaves preparedness plans weak in practice.⁵⁹ Regional debates now emphasise standing mandates, pooled procurement, inter-operable surveillance, and preauthorised financing as mechanisms to stabilise markets and coordinate action across countries. At the global level, reform discussions increasingly focus on subsidiarity, clarifying which functions must remain global public goods, particularly norm setting, surveillance, R&D coordination, and equitable benefit sharing. Simultaneously, financing and support are shifting downstream to strengthen national and community systems, alongside efforts to expand distributed manufacturing, advance fiscal justice, and promote polycentric governance to reduce structural inequities.

These insights point toward a multilevel architecture in which each tier performs distinct but interdependent roles; communities anchor legitimacy and contextual intelligence; national governments institutionalise preparedness and social protection; regional bodies consolidate operational capacity and collective bargaining power; and global institutions steward rules, financing frameworks, and equitable access to shared goods. Weakness at any point is felt across the system. A future-ready agenda therefore lies in strengthening capacities at all levels and intentionally linking them, embedding accountability, equity, and shared authority across levels to ensure that preparedness is operational, inclusive, and sustainable. Although this literature provides important insight into system design and reform priorities, it must be complemented by an exploration of lived realities at all levels to understand how these structures function in practice.

Part 4. Protection in practice: community realities during the pandemic

In this part, we will draw primarily on the community-level data from the 20 country case studies to look at protection in practice during the COVID-19 pandemic, supported by insights from interviews with decision makers, health and policy practitioners, and experts. Data from these key stakeholder interviews are analysed in depth in parts 5 and 6.

The literature reviewed in part 3 shows that preparedness plans often existed but were insufficiently operationalised, and that persistent gaps in formal systems left communities to absorb and compensate for systemic shortcomings amid substantial structural constraints. This insight illustrates the necessity of the Commission's effort to work directly with diverse

communities to find ways of addressing these gaps in PPPRR for the future. Our empirical evidence shows that many communities lost the basic capabilities needed to function under pandemic conditions; in these settings, failure to comply was often a structural impossibility, not a behavioural problem.

Here, we first examine how pre-existing systemic vulnerabilities shaped lived experiences of protection during the pandemic, highlighting recurring patterns of capability loss across diverse social, economic, and governance contexts. We then explore how communities acted to fill gaps, showing how local networks, grassroots initiatives, and informal support systems mitigated harms, preserved essential capabilities, and connected people to formal services where possible. The findings show that these adaptive responses were contingent and uneven, and that they cannot substitute for state responsibility. This synthesis moves beyond tracking formal policy adoption to reveal how protection functioned or failed to function in practice, and to identify the institutional, social, and community factors that influenced who was able to access it.

We conducted cross-country syntheses through a metatheme analysis, which was facilitated through standardised protocols and data collection procedures alongside iterative, cross-case comparisons to identify patterns. Trustworthiness was ensured through triangulation across diverse data sources (including literature reviews), diversification of research participants, investigator triangulation, consultations across research teams, and repeated analytical reviews of emerging interpretations (appendix pp 11–12). As far as the Commission has been able to ascertain, this is the most wide-ranging exploration of experiences and lessons learned from the COVID-19 pandemic and from other intersecting crises, including climate-related shocks, conflict, economic insecurity, displacement, and health-system disruption, that explicitly explores different stakeholders' visions, expectations, and lessons for the future. This contribution is important and novel to PPPRR knowledge and insight in several ways. First, it integrates lived experience across 20 countries into a typology of protection failures covering subsistence, housing, administrative, information, and system fragility. Second, it identifies mechanisms through which systemic vulnerability is converted into risks and capability deprivations for people, households, and communities. Third, we explicitly reconceptualise communities not merely as coping actors, but as co-producers of protection including service provision, trust mediation, and contextual advocacy and knowledge production.

4.1 Community groups and exposure to structural vulnerabilities

The research engaged a diverse range of community groups whose lives were shaped by structural disadvantage, marginalisation, or front-line exposure during the

	Community group	Data collection methods (N)	Data collection language
China	Rural older residents living in cold regions	2 FGDs (16 total)	Mandarin Chinese
England	Members of the Bereaved Families for Justice organisation including participants with diverse ethnic backgrounds and experiences of loss	2 FGDs (14 total)	English
Ethiopia	Internally displaced people affected by conflict and displacement, alongside rural community members in a drought-affected setting	2 FGDs (12 total)	Amharic and Afaan Oromo
India	Communities exposed to overlapping crises, the COVID-19 pandemic, and climate-related disasters (notably cyclones)	6 FGDs (22 total)	Bengali
Indonesia	People living in street situations	3 FGDs (18 total)	Bahasa Indonesia
Japan	Snack bar mamas, the women who own or manage <i>sunakku</i> , distinctive small-scale Japanese drinking establishments and their regular customers, including older men living alone	14 interviews	Japanese
Laos	Peri-urban farming communities living on the margins of the capital	2 FGDs (16 total)	Lao
Lebanon	Health-care professionals, examined within a context of polycrisis (economic collapse, political instability, the COVID-19 pandemic, and the Beirut port explosion)	2 FGDs (13 total)	English and Arabic
Mexico	Indigenous communities	6 interviews, 2 FGDs (n=20; 26 total)	Spanish
Mozambique	Women across the life course	2 FGDs (14 total)	Portuguese and Changana
Norway	LGBTQI+ populations	4 SGIs (10 total)	English and Norwegian
Peru	Domestic workers, many women working informally	15 interviews, 1 SGI (n=3; 18 total)	Spanish
Singapore	Older adults	4 interviews and 6 SGIs (n=12; 16 total)	English or Mandarin Chinese
Slovenia	Young people aged 18–24 years	2 FGDs (11 total)	Slovenian
Spain	Migrant agricultural workers	3 interviews and 4 SGIs (n=12; 15 total)	Spanish, Catalan, or French
Tanzania	Health-care workers and older adults	4 FGDs (34 total)	Kiswahili
Thailand	People with disabilities	4 FGDs (32 total)	Thai
Türkiye	Health-care workers	2 FGDs (20 total)	Turkish
Uruguay	People living in street situations	2 interviews, 1 SGI (n=5), 1 FGD (n=8; 15 total)	Spanish
USA	Migrant farmworkers and racially or ethnically minoritised groups	2 FGDs (19 total)	English

FGD=focus group discussion. SGI=small-group interview.

Table 2: Participating community groups by country

pandemic (table 2). The varied choice of groups reflects the complex, intersectional way in which systemic vulnerability operates in a health crisis, showcasing how these systemic vulnerabilities cascade capability deprivation for already marginalised groups in a way that resists easy, quantified delimitation of group categories. Each country's case study centred on a locally selected specific population group with a history of marginalisation or who were known to have been particularly affected by the COVID-19 pandemic, encompassing a wide range of groups experiencing different forms of vulnerability (see appendix pp 4–7). Data were collected through focus group discussions, small-group interviews, and individual interviews conducted in local languages. Together, this work provides insight into how pandemic protection functioned across varied social, economic, and political contexts.

Centring communities facing concrete constraints, including insecure work, precarious housing, marginalisation, and weakened trust in the state, the analysis examines how structural conditions across labour markets, social protection, health systems, governance, and information environments translated

into capability deficits throughout the PPPRR cycle. Five recurring patterns of systemic vulnerability emerged from the data: subsistence insecurity that made prevention structurally infeasible; housing insecurity and crowding that undermined public health measures such as social distancing; administrative barriers that blocked access to health and social support; institutional distrust and information vulnerability; and system fragilities that constrained the system's capacity to act in a surge situation and thus transferred risk onto households and communities.

These systemic weaknesses did not operate in isolation. Vulnerabilities in governance, health systems, social protection, information environments, and community engagement interacted and reinforced one another, constraining people's capabilities to prevent infection, comply with public health measures, access care, maintain livelihoods, and manage wider social and economic shocks. As figure 2 illustrates, these interconnected vulnerabilities translated into capability losses, producing unequal exposure, unequal protection, and disproportionate harm among communities already facing structural disadvantage.

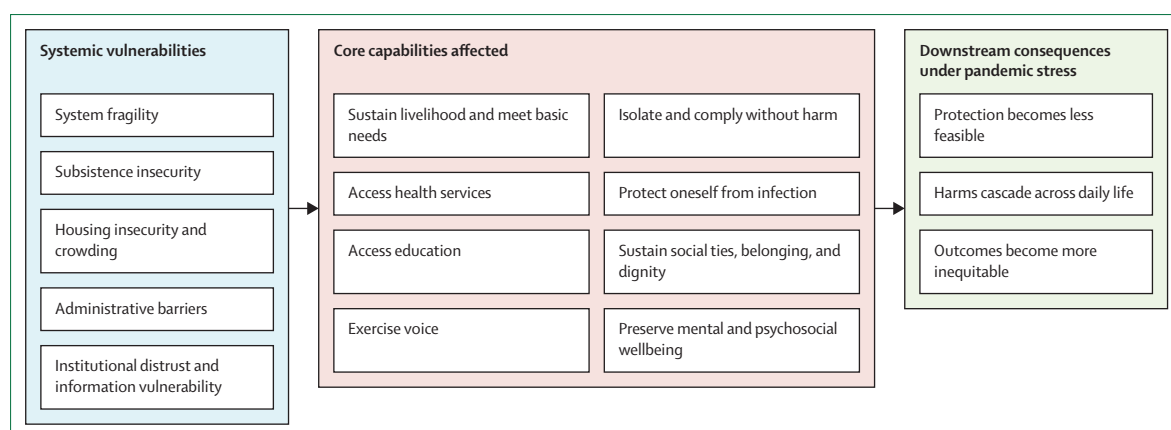


Figure 2: Conceptual model of systemic vulnerabilities and correlated capability losses across the country case studies
Pathways pictured are illustrative of broader patterns observed across the case study data; relationships are dynamic and context-specific.

4.1.1 Subsistence insecurity makes prevention structurally infeasible

Across the case studies, participants reliant on daily or informal work spoke about how they were unable to comply with public health restrictions because survival depended on continued income. Although most countries initiated various schemes to (partially) compensate for sudden wage losses, compensation was often only available to those in formal, regulated employment. With as much as 60% of the global workforce engaged in precarious informal work that positions them outside of labour legislation and many other social protection structures,²²² this approach created severe response gaps that were further exacerbated by power inequities. People in informal work are often severely under-represented in political positions and politically marginalised and are less likely to be politically engaged due to resource constraint and trust issues,²²³ leaving this large population without power to influence how eligibility for social protection is understood and assigned. Immediate financial insecurity following sudden wage loss, rooted in structural labour market features in which informal work is unregulated, lacks social protection, and depends on unstable day-to-day earnings, reduced the feasibility of prevention, deepened inequities, and eroded basic capabilities such as nutrition and hygiene. As one participant from Ethiopia put it, “if we don’t work, we cannot buy bread”.

When restrictions threatened subsistence, people faced an immediate survival trade-off: “We need to eat and survive, so we still go out to find food”, an Indonesian street vendor explained in a focus group discussion. Three types of subsistence insecurity emerged across the data, primarily through community and civil society interviews: acute subsistence collapse, in which the loss of daily income translated directly and immediately into hunger; moderate subsistence insecurity with periodic access to food, in which hunger was real but partly

softened by irregular, short-term sources of help; and structurally embedded subsistence deprivation, in which the pandemic intensified longstanding and chronic inequities. This third category was notably illustrated in Mexico, where structural inequities manifested as nutritional deprivation rather than absolute food scarcity. One Mexican participant spoke of widespread food deserts, in which access to fresh and nutritional food was structurally impeded, alongside the ubiquity of unhealthy food forced a reliance on cheap calories over fresh produce (non-government organisation [NGO] representative, interview). This environment, driven by economic structures rather than individual choice, exacerbated the metabolic comorbidities that substantially drove higher mortality rates during the pandemic. Findings highlight that subsistence insecurity is a systemic vulnerability and when livelihoods collapse, protective measures become structurally infeasible and inequities widen, pointing to a systemic governance failure in labour and social-protection schemes. In informal and precarious labour markets, public health measures such as isolation or reduced mobility can only be possible if protection policies that compensate income for workers outside the formal labour system are in place.

The data showed how income insecurity created mobility necessity, which in turn heightened exposure, invited sanctions or stigma for non-compliance, and ultimately depleted households’ coping capacity. Timing and adequacy of social protection were decisive: where support arrived late, was insufficient, or excluded informal workers, the mechanism intensified; where protection was timely and comprehensive, the chain was interrupted, and compliance became materially possible.

4.1.2 Housing insecurity and crowding that undermined public health measures

Pandemic policies frequently assumed that people could stay home and isolate safely within private, stable, and

uncrowded housing. However, 2·8 billion people globally are deprived of adequate housing in what UN Habitat refers to as a global housing crisis.²²⁴ Many participants lived in overcrowded, shared, temporary, employer-controlled, or street-based settings. This mismatch revealed a systemic disconnect between public health guidance and the material conditions required to make isolation feasible in practice. A spectrum of housing security that mapped directly onto isolation capability emerged across the data, consisting of severe housing insecurity (people living on the street or experiencing homelessness); transitional housing; conditional housing; shared housing; and independent housing. This spectrum highlights that ability to isolate safely during a pandemic was not evenly distributed: only those in independent housing could reliably comply, whereas most participants lived in conditions that structurally constrained isolation feasibility.

Although there is a substantial overlap between subsistence insecurity and housing insecurity, examples of how housing conditions created challenges for participants' ability to follow social distancing measures were found in almost all case studies, including in high-income countries. The sheer scale of pre-existing housing insecurity meant that many people were unable to follow guidance, revealing gaps in preparedness planning and public-health guidance and underscoring that public-health policies cannot assume universal access to private, stable spaces. These accounts point to deeper failures in housing governance, in which overcrowding, unstable housing, and unaffordable rental markets made isolation practically impossible, showing that adequate, uncrowded housing must be integrated into the foundations of health infrastructure. In some countries, the effect of housing insecurity on infection rates might have worked as a catalyst for increased focus on the need for safe and stable housing for all, including through public housing provisions. In Spain for example, municipalities reliant on migrant agricultural workers in the harvest season established municipal housing facilities for seasonal workers during the pandemic and have maintained and further developed the initiative in the aftermath.

4.1.3 Administrative barriers systematically block access to health and social support

Administrative barriers emerged as a key protection vulnerability, evident in varying forms across the data. Access to emergency aid, vaccination, and essential services often depended on being visible to the state through identification cards or documents, addresses, registration, or local recognition. This requirement created a systemic gap between need and administrative visibility, leaving people who were undocumented, highly mobile, living informally, or not thought of as in need of support least likely to be captured by the systems meant to support them. Gaps like these are partly the product of

system design that takes place far from the influence of those most at risk of exclusion. Consequently, when a crisis occurs, assistance flows to those already registered or locally recognised, while equally or more vulnerable groups are excluded, triggering reduced access to care, deepening precarity, and cascading unmet needs. Three interconnected layers of exclusion emerged from the data: administrative access barriers; relational barriers, reflecting stigma, and degree of belonging; and foundational barriers, related to systematic exclusion in laws, policy frameworks, or governance structures. Interactions between these layers further shaped access

Panel 2: Community examples of interactions between barriers

- The Indonesia case study data illustrate how the first layers of barriers combine to exclude populations who are mobile or living in street situations. People without a national identification number (*Nomor Induk Kependudukan*; *NIK*) were unable to access vaccines, "those without *NIK* simply could not get vaccinated" (member of CSO serving people living in street situations, interview), and those not socially close to the *Rukun Tetangga* or *Rukun Warga* community-level administrative division leaders were repeatedly missed in distributions: "People in the village still received support... mine was repeatedly missed" (person living in a street situation, FGD).
- Interview data from Peru show how administrative access barriers interact with foundational barriers rooted in informality. Domestic workers were excluded from emergency cash transfers because targeting relied on census data, insurance records, and employer-controlled addresses. As one domestic worker explained, "my boss's mother received it twice, while people who really needed it didn't get it" (domestic worker, interview). Informality, absence of contracts, outdated insurance records, and employer-controlled address data made workers invisible to administrative systems, while the absence of any dedicated mechanism for domestic workers meant the state had no way to identify or respond to their vulnerability.
- Community organisation interview data from Spain illustrate how the three interconnected layers of exclusion reinforced one another among agricultural migrant workers. Administrative barriers included difficulties obtaining municipal registration: "Municipal registrations cost between €600 and €700. There are incredible criminal networks involved" (member of CSO serving agricultural migrant workers, interview). Relational barriers reflected stigma and limited belonging, while foundational barriers arose from rules linking access to administrative status and their inconsistent implementation across centres.
- Community organisation interviews from the USA represent the deepest form of systemic exclusion, where immigration status, historical labour exclusions, and powerful industry lobbies combine to block access to services. Fear generated by federal immigration policy prevented workers from seeking basic care: "It's hard to overstate how much of a barrier that is" (lawyer, FGD). Dairy workers, disproportionately undocumented, faced weak regulatory oversight and hazardous conditions, while being excluded from labour protections.
- Interview data from community organisers in Mexico illustrate how bureaucratic gatekeeping exacerbates territorial voids. Rigid identification requirements of the National Electoral Institute barred marginalised individuals from state care, while civil society was hindered by frameworks where "regulations are becoming increasingly rigid" (member of CSO, interview). This created a so-called double lockout as "regulatory issues hit hard in a very negative way, not only because you stop helping the population in need but also because you affect those who want to join in" (member of CSO, interview), leaving vulnerable groups in a support vacuum.

CSO=civil society organisation. FGD=focus group discussion.

to health and social support during the pandemic (panel 2).

Most country case studies exhibited at least one of these layers; several showed two; and a smaller group, including Peru, Spain, and the USA, displayed all three, producing deeper and more entrenched exclusion (panel 3). The case studies also showed how the effect of existing barriers to access (seen in the roll out of pandemic response measures) could lead the state or local authorities to put in place gap-bridging measures. In Indonesia, push from non-government organisations led to an effort to enter people living in street situations into the civil register so that they would be eligible for vaccination. Although local community organisers described this effort as “reactive and unsustainable” (NGO, civil society, interview) in interviews, such ad hoc adjustments might nevertheless be harnessed to bridge access gaps more permanently. These patterns illustrate how institutional design can reduce the feasibility of emergency response, widen inequities, and erode core capabilities such as health, income security, and mobility. They also show how the global goal of universal health care will remain out of reach if administrative visibility remains a requirement for health system access. Impacts of these barriers varied across settings, depending on both the configuration of barriers and the social position of affected groups. Where these barriers intersected with pre-existing marginalisation, such as insecure migration status, discrimination, informal work, or housing precarity, they amplified cascading systemic vulnerabilities. Exclusion was thus not incidental but structurally produced through the interaction between institutional rules and social inequality.

4.1.4 Institutional distrust and information vulnerability

The pandemic also highlighted vulnerabilities in how information is produced, disseminated, communicated, trusted, and controlled. Many communities faced systemic barriers to understanding, believing, or using health information, and to health literacy generally. These vulnerabilities represented inequities and gaps in institutional legitimacy and integrity, related not only to access to information but also to the ability to establish the relative legitimacy and relevance of the information available. Three vulnerabilities were identified across the data: trust and legitimacy vulnerabilities; information access vulnerabilities; and communication design vulnerabilities (panel 3). Trust and legitimacy vulnerabilities were linked to existing trust issues based on power inequities or a history of stigmatisation, such as transgender people in Norway or people living in street situations in Indonesia and Uruguay, or other forms of pre-existing weakened trust in the state, such as among bereaved families in England or people who are internally displaced in Ethiopia. Information access vulnerabilities were seen in countries where information infrastructure didn't reach remote or resource-deprived

areas and households, including in Mexico, Mozambique, and Laos. Digital divides were seen to create information silos in the case of senior citizens in Japan. Examples from Singapore and Norway illustrate the importance of maintaining multiple avenues of risk communication, informed by differing media habits and differences in who and what are seen as trustworthy and reliable sources of information. In Singapore, older community members felt trusted messaging came from long-established television news programmes. In Norway, public health officials proactively appeared on news broadcasters that were used and trusted by immigrant communities who were hard to reach through Norwegian media channels. In India, the existence of a long-standing inclusive and equity-focused immunisation programme helped build trust in the COVID-19 vaccination drive, mitigating the effect of misinformation and doubt.

Communication design vulnerabilities were observed where messaging was perceived as confusing, inconsistent, or alienating for communities, as reported by bereaved families in England, youth in Slovenia, and people with disabilities in Thailand. In Mexico, this design failure was detrimental for Indigenous populations, where the reliance on Spanish-language, internet-based messaging ignored linguistic diversity and local worldviews, rendering official guidance structurally unintelligible. This oversight connects to structural failures to tailor messages and dissemination modes to different types of community needs. These patterns show that information systems themselves constitute a domain of systemic vulnerability; when trust, access, and communication design are fragile, prevention becomes structurally less feasible. In such contexts, protective guidance might exist, but people lack the real opportunity to interpret, trust, and act on it. Information failures therefore directly shape capability and establish whether public health measures translate into effective and equitable protection.

4.1.5 System fragilities that limit capacity to act in a surge situation, thus transferring risk onto households and communities

Several of the countries entered the COVID-19 pandemic with insufficient system buffers, weak primary care, fragile social-care interfaces, and uneven service capacity. When health and social systems cannot absorb shocks, responsibility shifts downward, forcing households, communities, and health-care workers to compensate for structural gaps. This substitution often exceeds their capacity, generating capability losses such as reduced access to timely care, and erosion of mental and physical wellbeing for both communities and health-care workers. Three patterns of state presence and community substitution were identified: present state systems with weaknesses, in which services continue but are partly underfunded or uneven, requiring communities to fill gaps (eg, England and Japan); weak state presence

Panel 3: Systemic vulnerabilities shaping community experiences during the COVID-19 pandemic

Subsistence insecurity

This vulnerability made basic survival incompatible with public health measures. In Ethiopia, Indonesia, Mozambique, Tanzania, and Lebanon mobility restrictions triggered an immediate collapse of subsistence, with households falling into hunger within days. Internally displaced people in Ethiopia described surviving on almost nothing: "We would survive the night after eating a piece of bread in the morning" (internally displaced person, FGD, Ethiopia). In Uruguay, those living in street situations captured the absence of state support: "Figure it out however you can" (person living on the street, FGD). Even where subsistence was threatened, effective social protection could buffer the impact of the pandemic. In India, the public distribution system enabled "the poorest of the poor to have their basic needs met" (member of a communities exposed to overlapping crises, FGD). Elsewhere, coping remained improvised. In Indonesia, a participant described "looking for help on the side of the road...anywhere. Just getting some food is enough to make ends meet" (person living on the street, FGD). Structural deprivation persisted even with employment, as in Flint (USA), where leaders rejected behavioural blame: "The premise that people are hungry because they don't work is not true...COVID just changed the whole spectrum" (member of a CSO in a racially or ethnically minoritised community, FGD).

Housing insecurity

Housing situations shaped whether isolation was feasible. Severe insecurity made distancing impossible. In Ethiopia, "600 households live together" (internally displaced person, FGD), and in Uruguay migrants were left with nowhere to go (members of CSOs serving people experiencing homelessness, SGI). Transitional and conditional housing offered shelter but no autonomy; India's slum residents noted that "ten people are cramped in a single room...if one gets infected, the other nine also get infected" (member of a CSO focused on gender equity and education, interview). US migrant workers were described to live in communal settings in which "advice like isolating when you exhibit symptoms is impossible" (attorney, FGD). Even shared housing constrained compliance, as in Peru, where "the whole family is together...that also allowed for more contagions" (domestic worker leader, interview). Only regulated independent housing, such as Spain's municipal accommodation, enabled adherence: "They give you accommodation and transportation...a washing machine, everything" (agricultural worker, interview).

Access barriers

Barriers to accessing care determined who entered the eligibility pipeline for protection. In Indonesia, not owning a national identification number excluded people from vaccination and all social assistance; in Spain, municipal registration was required for a health-card; and in Thailand, "unregistered persons with disability received almost nothing...no assistance reached them locally" (person with visual impairment, FGD). Relational

gatekeeping further filtered access. An Indonesian participant noted that "assistance usually goes to people who are already close to the *Rukun Tetangga* or *Rukun Warga* [neighbourhood-level administrative and community leaders]. Those who are most vulnerable are often not acknowledged at all" (person living in street situations, FGD). In Mexico, front-line staff delayed care based on Indigenous appearance or language. Foundational exclusions, such as Peru's inability to identify domestic workers or the USA's immigration-linked restrictions, created pervasive fear: "There are restrictions...prohibiting individuals without legal immigration status from accessing certain services" (migrant farmworker, FGD).

Information vulnerability

This vulnerability shaped whether guidance was trusted, understood, or actionable. In Laos, unfulfilled promises undermined legitimacy: "They took down all my details...in the end, they never showed up" (member of a peri-urban farming community, FGD). Moreover, digital divides produced information silos; for example, older adults in China and Japan struggled to use online systems. Poor communication design amplified inequities; a participant from England reported "there was no communication to start with...no strategy to keep us informed" (member of Bereaved Families, FGD). Mozambique's rural areas were left behind: "Groups more towards the interior did not have as much access to information" (journalist, interview). In India, gaps in risk communication left space for sensationalist media and misinformation, with one participant describing how "people were terrified, and that terror was also exploited...they feed on the public panic" (community member, FGD).

System fragility

The strength of the system determined whether states could absorb shocks or shifted risk downward. In England, chronic underfunding meant "the system keeps cutting funds, expecting people to do more with less" (member of Bereaved Families, FGD). In the USA, Detroit's health department was "not fully back to 100% strength when the pandemic started" (academic, interview). Where state presence weakened further, communities substituted for government; Mexico's Indigenous communities established their own sanitary cordons, and in Peru, one interviewee recalled "there are always lines, there are never appointments" (domestic worker leader, interview), pushing people toward self-medication. In contexts approaching collapse, households bore the full burden; one Lebanese health worker reported: "We didn't sleep. We didn't take vacations" (nurse and infection control officer, FGD). In Ethiopia, families sold belongings to survive: "They were unable even to pay rent...couldn't afford any treatment at all" (health-care professional, interview).

FGD=focus group discussion. CSO=civil society organisation. Bereaved Families=Bereaved Families for Justice. SGI=small-group interview.

with community substitution, where the state is administratively passive and civil society or informal networks become primary responders, often with a disproportionate burden on some groups, especially women, in some or all periods and areas (eg, Mozambique); and state absence or system collapse, where formal systems are overwhelmed or absent, leaving communities and health-care workers to sustain essential functions entirely on their own (panel 3). Most cases fell into the first and second category. Still, although the pandemic exposed some structural or system fragility in all countries, we see many examples of innovative and flexible solutions that manage to ameliorate the effect of these weaknesses. One

example is Uruguay, where new crossdepartmental ways of working emerged in recognition of the complex way in which the pandemic affected society. A tangible outcome of this approach is contingency centres that were established in border regions to assist migrants arriving in situations of extreme vulnerability, linking epidemiological surveillance with humanitarian assistance, including health care, in novel ways.

Near system collapse was rare, but occurred in Lebanon, Türkiye, and Ethiopia, where multiple crises compounded risk and trauma. In Lebanon, health system collapse, economic breakdown, and the Beirut harbour explosion of 2020 with its catastrophic impact on people and infrastructure converged. Lebanese health-care workers interviewed for the case study described extreme stress and improvisation: "We cross-trained staff from [the] operating room to [work in the] intensive care unit" (health-care worker, interview). Exposure to compound crises was also important for Türkiye, where the pandemic was followed by devastating earthquakes and widespread internal displacement in 2023. Interviews with health-care managers identified natural disaster risk as a compounding factor for pandemic vulnerability, emphasising that maintaining the structural integrity of health-care facilities in a seismically active country adds an essential layer to health-system resilience planning: "Honestly, the most important thing is the natural disasters we witness in Türkiye...nature's power is greater than anyone's, with a higher potential for destruction. The most important thing is maintaining the structural integrity of hospitals." In extreme situations of overlapping crises, community support and peer solidarity might become the only stabilising forces due to incapacitation of formal structures, although limited by the resource base, expertise, geographical presence, and community connection of the responding actors. This was seen in the case studies from Lebanon and Ethiopia. Overall, the case studies reveal a spectrum of state presence and community substitution that show how system fragility directly influences capability loss, shapes lived experience, exacerbates inequities, and determines where protection fails in practice. Some countries, like Peru, faced periods in which they were in near system collapse status and other periods with weak state presence with community substitution.

4.2 Communities as levers for change and community-driven responses

Community-level interviews across case studies showed how communities frequently acted as essential agents in sustaining protection when formal systems were incomplete, slow, or inaccessible. Their efforts were lifesaving for many, yet were often unevenly distributed, constrained by resource scarcity, and, in some cases, inhibited by public health restrictions or elevated local infection rates. Marginalised or stigmatised groups faced

Panel 4: Community functions during the COVID-19 pandemic

Direct provision of services and support

This function emerged where formal systems were absent, delayed, or insufficient. Civil society actors in Mozambique described their role as gap-fillers rather than substitutes: "We complemented government action. We did not replace it, but we filled gaps" (member of a CSO serving children, youth, and women; interview). In England, volunteers absorbed front-line risk without protection: "They were given no PPE...we were buying it out of our own pockets" (member of Bereaved Families, FGD). Communities also mobilised for compound crises; in India's Sundarbans, residents strengthened embankments collectively when they got the warning about an impending cyclone (members of communities exposed to overlapping crises, FGD). In Uruguay, community kitchens replaced closed institutional dining halls, sustained by neighbourhood mobilisation (members of CSOs serving people experiencing homelessness, SGI). In rural China, village committees became de facto public health infrastructure, with cadres "going household to household to make sure people understood the situation" (older rural resident, FGD).

Operational and trust bridging

This function addressed gaps in governance, communication, and credibility. In England, community organisations created simple, accessible mechanisms, for example voucher systems for supermarkets, to support those excluded from formal schemes. In Thailand, disability organisations substituted for the state: "Those who really helped us were the blind association...They found survival bags, masks, alcohol for us" (person with visual impairment, FGD). In Mozambique, "community activists were the ones who explained things" (young woman, FGD). In China, community health workers countered misinformation by sharing advice: "We would then communicate to residents and ask them to follow official guidance, listen to the government, and not to believe other sources" (community health worker, interview).

Contextual advocacy and knowledge generation

This function enabled communities to identify system failures and push for responsive action, even when structural change remained elusive. In Indonesia, civil society described policy engagement that produced only temporary fixes: "It was just a compromise due to urgency...not a sustained policy" (member of a CSO serving people living in street situations, interview). In Peru, domestic worker leaders documented harms and petitioned multiple ministries, receiving only "24 baskets...very complicated to deliver" (domestic worker leader, interview). In Norway, civil society highlighted how service backlogs exposed longstanding inequities, noting that "it built to a giant backlog in a health service that already had zero capacity" (member of a CSO in the transgender community, interview).

Bereaved Families=Bereaved Families for Justice. CSO=civil society organisation. FGD=focus group discussion. PPE=personal protective equipment. SGI=small group interview.

additional barriers, sometimes being excluded from these community support structures.

Analysis of these responses reveals three primary functions that communities served during the pandemic: direct provision, delivering social protection, basic services, and preparedness infrastructure when formal systems fell short; operational and trust bridging, connecting people to formal systems and compensating for gaps in governance, communication, or institutional credibility; and contextual advocacy and knowledge generation, using local insight to shape responses, identify emerging risks, and adapt interventions to lived realities (panel 4). This section examines how these functions emerged, how they mitigated capability loss, and how they highlight the potential of community-centred approaches to complement and strengthen PPPRR.

4.2.1 Direct provision of services and support

For many communities, the direct health threat of COVID-19 was secondary to the immediacy of subsistence insecurity. Community-level capabilities emerged most strongly where the primacy of material survival, food, livelihoods, and basic services was recognised as a prerequisite for health protection. As a young person in Mozambique noted, “the hospital talked about COVID, but no one talked about food. Community activists were the ones who explained things.” Across contexts, organically organised groups and civil society organisations filled gaps left by formal systems: in Ethiopia, social workers mobilised additional financial support; in Indonesia and Uruguay, neighbourhood collectives sustained food access for people living in street situations; in Mozambique, civil societies provided digital resources to bridge connectivity gaps; in Slovenia, students volunteered in the homes for older people, and municipalities arranged accommodation for them to minimise their risk of infection; in Thailand, communities and temples provided daily replenishments of food pantries to mitigate hunger; and in Lebanon, professionals such as dentists pivoted to deliver emergency aid among the dual crises of the pandemic and the Beirut explosion. In Mexico, Indigenous communities provided direct services not only in response to an absence of state provisions, but in direct opposition to unwanted or untrusted state measures, which they organised to keep the state out of the Indigenous territories. By addressing subsistence imperatives first, these community infrastructures created the conditions for public health guidance to be actionable and for protective measures to be feasible in practice.

Another central and under-rated function of communities was to recognise the mental health impact the pandemic would have and address it both through psychosocial support and by actively nurturing social connectivity as a cornerstone of resilience. In Uruguay, a participant from a faith organisation recalled how this

was a core priority for them: “There were quite a few months with no activities, because they weren’t allowed. The first thing we reopened was a listening space with a psychologist.” Isolation prompted deliberate efforts to strengthen kinship, peer networks, and relational health, as seen in Singapore and among marginalised queer populations in Norway, where participants described renewed efforts to “reconnect with community” (non-binary person, small group interview). This finding, however, was not uniform, as it significantly depended on the capacity for the community to find a way to function during lockdowns.

When well functioning, these networks also acted as self-equilibrating systems, compensating for long-standing service gaps and institutional neglect. As a community worker in Thailand explained, “communities will step in and help anyway, without needing to be formally included, because communities struggle to survive; they refuse to die”. Yet these informal mechanisms operated through relational logics; access often depended on social ties, local recognition, or proximity to power, producing what participants called network serendipity. In Indonesia and Thailand, people with weaker or more transient connections were less likely to benefit, revealing that even effective community provision can inadvertently leave the most marginalised exposed to compounded capability loss. These findings highlight that although community-led direct provision is essential for survival, it is inherently uneven and shaped by existing social hierarchies.

4.2.2 Operational and trust bridging

Across the case studies, it appeared that formal systems were in place but did not reach communities comprehensively. Community leaders, organisations, and peers often took on roles as intermediaries, building trust and operational connections between official channels and people at risk of exclusion. In Laos and Mozambique, participants explained that their confidence in pandemic response measures came less from government messaging and more from interactions with local health workers, peer observation, and lived experience, exemplified by the young woman in Mozambique who said that “vaccines came, but it was local people who convinced us”. Communities also bridged gaps in material and informational support; in Mozambique, Thailand, Laos, and Spain, local civil society organisations relayed essential health information to remote areas with minimal radio, internet, or official outreach. In England, volunteer groups mobilised rapidly to disseminate vaccination information, staff vaccination centres, and support residents in accessing services. In the USA, community organisers spoke about setting up mobile centres for vaccination and other health services to reach rural migrant workers with a low level of trust in official structures and services: “This year, we only held two [events] on clinic, otherwise we used the mobile

health unit. So, you know, we have to shift to what the environment is [and] how the trust factor has really been shaken" (migrant farmworker community, focus group discussion). In Mexico, a hospital-centric response led to the systematic neglect of primary healthcare, which left rural and indigenous areas in an institutional vacuum. In this context, traditional midwives (*parteras*) became essential trust brokers as the first level of care for both Indigenous and non-Indigenous populations who feared so-called COVID-only hospitals.

Community efforts were similarly crucial in compensating for shortcomings in formal livelihood support. In Peru, domestic workers faced cascading vulnerabilities driven by insecure employment, gendered and racial inequities, withheld pay, and heightened exposure to violence. Local organisations quickly provided essentials such as food baskets and psychosocial support, often with backing from international partners. In Thailand, civil society and disability-focused organisations enabled people with disabilities to access information, comply with regulations, and obtain necessities, including vaccines and PPE, as recognised by a participant with hearing impairment: "For vaccines, if the association had not arranged transportation and bookings, we would not have been vaccinated at all. Government agencies did not prioritise PWD sufficiently." Yet these initiatives were themselves fragile: in Singapore, pandemic restrictions disrupted pre-existing community programmes, including digital literacy initiatives for seniors, amplifying capability deprivations. Collectively, these examples show that communities served as both operational conduits and trust brokers, sustaining protection where formal systems overlooked or inadvertently amplified systemic vulnerabilities.

4.2.3 Contextual advocacy and knowledge generation

Across the case studies, community actors and grassroots civil society organisations functioned as early warning systems, knowledge generators, and knowledge translators, building on contextual knowledge to support their communities both practically and by seeking to make this knowledge available to the formal system. Crucially, community actors identified unmet needs, blind spots, and unintended consequences in formal pandemic responses that were systemically invisible. Their embedded knowledge enabled them to pre-empt capability gaps that could prevent community members from accessing or following critical public health measures. In Peru, England, Thailand, and Indonesia civil society groups intervened where formal systems, such as vaccine distribution or income support schemes, relied on incomplete or inappropriate data, leaving highly clinically vulnerable populations unprotected. In England, interviewees at the community as well as government and expert levels described how the furlough scheme failed those with weak or informal

ties to employment, while in Peru, domestic workers who were registered as living in employer homes in wealthy neighbourhoods described how they were excluded from government sustenance support. In Mexico, the civil society organisation *Un Kilo de Ayuda* leveraged the volunteer commissioner, a highly trusted grassroots authority often linked to local and traditional health promotion, to bridge information voids left by the state regarding the needs of remote and Indigenous populations. This helped the organisation, other local responders, and sometimes municipal authorities, to fill both information and response gaps in formal efforts.

Many community organisations made concerted efforts to enter into dialogue with authorities, providing contextual knowledge and translating it into policy priorities and advocating for access and coverage. Community organisers saw this role as a crucial part of the pandemic response, and sought recognition, resources, and accountable structures for long-term collaboration. In Mozambique, civil society actors described themselves as "the bridge to communities" (civil society organisation, interview) and called on the government to formalise and support this role. In practice, however, these efforts were unevenly successful. In England, organisers turned to media pressure to have their concerns heard: "The only way we've been heard is by pressuring the government through the media...otherwise, it's ignored" (community member, focus group discussion). In Indonesia, community support organisations advocated for vaccine access for people without civil registration, achieving some solutions but remaining sceptical about systemic change. Marginalised groups faced additional barriers; in Norway, interviewees from the transgender community reported refraining from advocating for gender-affirming care during the pandemic due to stigma and fear of public backlash, even though interruptions in care could be life-threatening. These examples illustrate how community-based knowledge systems are vital for detecting and responding to systemic vulnerabilities, yet their capacity to influence formal policy remains constrained by structural inequities, recognition gaps, and social marginalisation.

4.3 Reconsidering preparedness through lived realities in communities

Our analysis of community, expert, and practitioner interviews from 20 country case studies show that formal preparedness frameworks often assume stable housing, secure livelihoods, accessible services, and trusted institutions, conditions that do not reflect the lived realities of many communities.²²⁵ As a result, structural vulnerabilities constrained people's ability to act on public health guidance, making protective measures not simply ignored but structurally infeasible and

concentrating harm among those facing intersecting disadvantages.

At the same time, community-driven responses played a crucial role in sustaining protection. Through direct provision of essentials, bridging operational and trust gaps, and generating context-specific knowledge, communities preserved core capabilities and connected people to formal systems where possible. Yet these efforts were uneven, limited by resources, and shaped by pre-existing social hierarchies. These patterns underscore that measuring preparedness solely by formal capacities or technical plans is insufficient, as it reveals a fundamental epistemic mismatch between theoretical capacity and implementation feasibility. Technical preparedness often fails when it encounters social distrust and administrative exclusion. These findings suggest that true preparedness is not merely an inventory of assets, but a function of relational infrastructure, the strength of the social contract, and the depth of social and institutional trust.

Where this infrastructure is neglected, even the most advanced technical systems remain ineffective and insufficient, rendering preparedness a purely symbolic exercise for those at the margins. Effective readiness requires designing policies and systems that align with lived realities, ensuring that people and communities have the material, relational, and institutional capabilities to follow guidance, maintain livelihoods, and recover from shocks. Community resilience absorbed shocks that institutions failed to prevent, but it cannot compensate for structural mechanisms;

readiness must ultimately be judged by whether governments and systems create the conditions that enable protection.

Part 5. Lessons from national systemic vulnerabilities with a whole-of-society approach

We have now seen how formal preparedness capacities, plans, and technical indicators often failed to translate into effective protection when not aligned with lived realities, social trust, administrative access, and material conditions. Now, we shift perspective from community experiences to the national systems that shaped them through PPPRR policy and practice.

This part presents a cross-country synthesis of national-level PPPRR across 20 case studies, drawing on interviews with stakeholders from health, finance, social protection, agriculture, environment, education, law, civil society, academia, the private sector, and international organisations (table 3; panel 5), against the backdrop of community-level perspectives. The data provide a whole-of-society view of how systems were designed, governed, and operationalised under stress.

The analysis identified 20 systemic vulnerabilities spanning the full PPPRR cycle. In figure 3, these vulnerabilities are presented as part of a dynamic process where weak structural and relational foundations, such as governance, financing, coordination, trust, leadership, and community voice, shaped phase-specific weaknesses across all phases of PPPRR. When these weaknesses interacted with lived realities, they produced breakdown points, including delayed detection, poor coordination,

	Number of participants	Countries represented
Health policy and administration	90	China, England, Ethiopia, India, Indonesia, Japan, Laos, Lebanon, Mexico, Mozambique, Norway, Peru, Spain, Singapore, Slovenia, Tanzania, Thailand, Türkiye, Uruguay, and USA
Health-care professionals and managers	85	China, England, Ethiopia, India, Indonesia, Japan, Laos, Lebanon, Mexico, Mozambique, Norway, Peru, Singapore, Slovenia, Spain, Tanzania, Thailand, Türkiye, Uruguay, and USA
Environment and agriculture policy and administration	20	China, England, Ethiopia, India, Japan, Lebanon, Mexico, Norway, Singapore, Spain, USA, and Uruguay
Finance policy and administration	12	China, Ethiopia, Japan, Laos, Mozambique, Norway, Singapore, Spain, Türkiye, Uruguay, and USA
Other policy and administration	26	China, England, Ethiopia, India, Indonesia, Japan, Lebanon, Mexico, Norway, Singapore, Slovenia, Spain, Türkiye, USA, and Uruguay
Private business sector	22	China, England, Japan, Laos, Lebanon, Mexico, Mozambique, Norway, Singapore, Slovenia, Spain, Türkiye, USA, and Uruguay
Civil society organisation	72	China, England, Ethiopia, India, Indonesia, Japan, Laos, Lebanon, Mexico, Mozambique, Norway, Peru, Singapore, Slovenia, Spain, Thailand, Türkiye, USA, and Uruguay
Academia	73	China, England, Ethiopia, India, Indonesia, Japan, Laos, Lebanon, Mexico, Mozambique, Norway, Peru, Singapore, Slovenia, Spain, Türkiye, USA, and Uruguay
Education	20	China, England, Ethiopia, Indonesia, Japan, Laos, Mozambique, Slovenia, USA, Türkiye, and Uruguay
Justice and law	17	China, England, Japan, Mozambique, Norway, Peru, Singapore, USA, Türkiye, Uruguay, and Spain
International organisations	16	China, Ethiopia, India, Japan, Laos, Lebanon, Mozambique, Mexico, Peru, Singapore, Türkiye, and Uruguay
Media and digital technology	23	China, England, Ethiopia, Indonesia, Japan, Laos, Mexico, Mozambique, Norway, Peru, Singapore, Slovenia, Spain, Türkiye, and Uruguay

Table 3: Participating stakeholder groups by sector

Panel 5: Summaries of stakeholders' perspectives on PPPRR

Stakeholders across sectors shared diverse perspectives on PPPRR, reflecting their unique roles and experiences during the COVID-19 pandemic.

- Health policy and administration participants noted that prevention depends on public health surveillance, early detection, and risk assessment, yet unclear leadership and siloed governance limited effectiveness. They emphasised whole-of-government preparedness through domestic production of diagnostics, vaccines, personal protective equipment, and investments in universal health systems. In recovery, they stressed consolidating gains in laboratory and digital health capacity and fostering inclusive community engagement.
- Health-care professionals and managers highlighted that prevention relies on resilient primary care, robust infection control, adequate supplies, and health literacy. Preparedness requires infrastructure, workforce training, simulations, and protection of staff mental health. Participants reported that responses improved with standardised protocols, telemedicine, triage systems, rapid response teams, and digital surveillance, although heavy workloads and service backlogs persisted. Recovery priorities include addressing burnout, fair compensation, workforce protections, surge capacity, and restoring routine services.
- Environment and agriculture policy and administration actors emphasised a One Health approach linking human, animal, and environmental surveillance, as well as biosafety measures. Preparedness requires cross-sector coordination, sustainable implementation beyond projects, and strengthened leadership and communication. During the response, actors maintained essential services, expanded laboratory capacity, and strengthened zoonotic surveillance, while recovery focused on long-term resilience and institutionalised collaboration.
- Finance and other policy participants underscored flexible financing, integration of preparedness into fiscal and disaster frameworks, and rapid resource deployment. They noted that responses included large-scale fiscal mobilisation and support for health care and affected communities, but long-term sustainability remains a challenge. Recovery should invest in infrastructure, adaptive social protection, and equity-focused systems.
- Private sector respondents described their role in logistics, vaccine procurement, and supply chain support, advocating for stronger government partnerships in recovery.
- Civil society organisations emphasised community engagement, health education, trust building, and support for marginalised groups, framing recovery as addressing social inequities and restoring community wellbeing.
- Academia highlighted the need for interoperable data, research infrastructure, and evidence-based communication, with recovery seen as an opportunity for interdisciplinary knowledge strengthening.
- Education, justice, media, and disproportionately affected communities underscored the importance of school-based surveillance, digital literacy, equitable legal frameworks, culturally appropriate communication, and social protection. Recovery priorities included learning continuity, rights protection, and inclusion in future preparedness planning.
- International organisations stressed coordinated global action, technical guidance, and equitable distribution of vaccines and resources, contributing to resilient and inclusive national systems.

These perspectives illustrate that pandemic management requires multisectoral collaboration, equitable inclusion, and integration of lessons learned across PPPRR.

PPPRR=pandemic prevention, preparedness, response, and recovery.

unequal access to services, disrupted continuity of care, and reduced trust or compliance. These breakdowns could cascade into capability losses and inequitable harms, including increased morbidity and mortality, widening inequalities, workforce burnout, system overload, and long-term health system fragility. We highlight examples of effective practice, showing how coordination, trust, inclusive governance, sustained investment, and learning can mitigate risk and strengthen resilience. Recovery appears as a moment for institutionalising learning, and when learning fails, vulnerabilities are reproduced in the next cycle.

5.1 Prevention in pieces: how structural gaps amplify pandemic risk

For national governments, the goal of pandemic prevention is to reduce the likelihood of pathogen emergence and limit early transmission before outbreaks escalate. This goal relies on integrated

One Health systems, anticipatory surveillance, routine immunisation, health promotion, cross-sectoral coordination, and sustained community engagement.²²⁶ Yet, as part 4 shows, prevention depends on whether these capacities are operationalised in ways that reflect lived realities and institutional constraints.²²⁷ Across case studies, six systemic vulnerabilities constrained countries' ability to anticipate and mitigate infectious threats: siloed One Health operationalisation, reactive and fragmented surveillance, weak cross-sectoral governance, crisis-driven prevention financing, low levels of trust and community engagement, and weak health literacy and routine prevention systems. Together, these vulnerabilities obscured early risks, delayed detection, and limited the feasibility of preventive action (panel 6).

A recurring weakness was the gap between countries' formal commitment to, and their practical operationalisation of, One Health. In Peru for example,

proximity to forested areas increased zoonotic exposure; yet, in the absence of integrated surveillance, threats remained largely undetected. In Laos, weak coordination with meteorological services constrained early warning, and in Uruguay, planetary health remained largely conceptual rather than operational: “I think the importance of health and the environment became clear... In other words, we have the theory, but we do not have the practice” (health-care professional, interview). With institutionalised coordination, however, prevention was more effective. In Singapore, antimicrobial resistance platforms facilitated collaboration during the pandemic, functioning as pre-existing coordination infrastructure. Similarly, Norway’s formalised agreements across animal and public health sectors enabled effective zoonotic surveillance and strengthened institutional trust.

Similar patterns characterised detection and early warning systems. In most contexts, surveillance remained largely reactive, relying on clinical case detection rather than anticipatory or respiratory illness tracking at the primary care and community levels. It was further constrained by fragmented reporting, weak digitalisation,

and poor integration between routine and emergency data systems. Workforce constraints and inadequate interoperability further delayed reporting across primary care facilities and national disease registries. For example, in Japan, reliance on paper-based systems slowed early data flows, and in Ethiopia integration gaps hindered real-time surveillance. Governance instability, as seen in Indonesia and Lebanon, additionally disrupted continuity. Although some countries have begun to address these gaps, progress remains uneven. Postpandemic reforms in Uruguay and Laos have introduced anticipatory approaches that can strengthen early warning, including genomic surveillance, wastewater surveillance, and multihazard systems.

Across case studies, financing and governance structures typically emerged as crisis-driven, limiting long-term investment in surveillance, workforce, and cross-sectoral coordination. Weak institutional trust and minimal levels of community engagement also reduced the effectiveness of early warning systems, as communities were often positioned as passive recipients. Across contexts, stakeholders emphasised that trust,

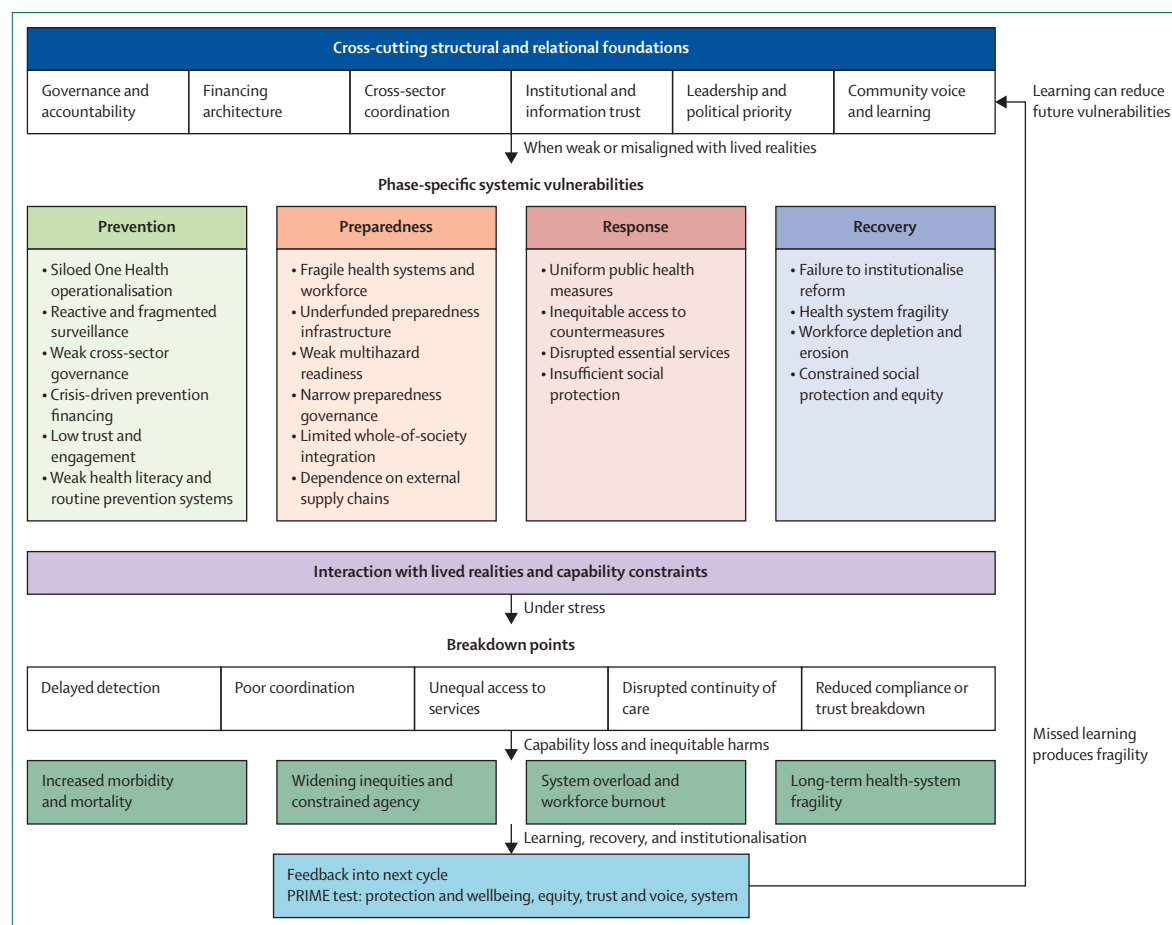


Figure 3: Systemic vulnerabilities, breakdown points, and capability losses across the PPPRR cycle

This figure illustrates how weak foundations interact with lived realities and feed into the next PPPRR cycle. PRIME=Pandemic Readiness through Institutions, Mobilising Communities, and Equity. PPPRR=pandemic prevention, preparedness, response, and recovery.

Panel 6: Systemic vulnerabilities in pandemic prevention

Siloed operationalisation of the One Health approach

The implementation of One Health remained fragmented and poorly integrated across the human, animal, and environmental sectors, which constrained early detection of zoonotic threats, reduced shared risk interpretation, and undermined coordinated prevention. Environmental and climate-related risk factors were particularly weakly incorporated, which increased vulnerability to emerging infectious diseases. As described by one Mexican academic in an interview: "Climate change is crucial for public health, but it is not articulated in an integral way."

Fragmented and reactive surveillance systems

Surveillance systems were mostly fragmented and largely reactive, with weak digital reporting, poor integration with routine health information systems, and delayed or incomplete detection. Without integrated and anticipatory systems, emerging threats might escalate before appropriate responses can be mobilised. Reflecting a broader challenge in One Health surveillance, a participant in China noted that some risks can fall between existing human and animal health systems: "...but pets are not included...this is a blind spot" (academic from the environment sector, interview)

Weak cross-sectoral governance and accountability

Joint decision making across sectors was hindered by divergent regulations, unclear leadership, and fragmented accountability. Stakeholders explained how governance gaps delayed preventive action and reduced trust among institutions, which hindered countries' ability to respond to early warning signals. One interviewee from the health and policy sector in Indonesia reported how threats from the health sector were not the focus of other sectors: "...this represents a high-risk threat, but in practice only our team was aware of it. When we invited colleagues from other sectors to discuss control strategies, the response was limited...If it does not affect livestock, food production, or agricultural outputs, then it does not become their focus."

Underfunding and crisis-driven financing cycles

Prevention systems were repeatedly described as inconsistent, underfunded, and reactive, with resources mobilised during emergencies but rarely sustained in the routine capacities needed to detect and reduce risk before outbreaks escalate. These financing gaps weakened surveillance, stockpiles,

workforce capacity, One Health coordination, and community outreach, increasing the likelihood that local outbreaks could become wider crises. As one interviewee from the health-care sector in Norway observed, preparedness was often treated as inefficient until a crisis exposed the cost of neglect: "The health services are run on a market logic, and then preparedness becomes a waste of money. A bed that is empty is an unproductive bed. There are no margins."

Low levels of trust and community engagement

Communities were often positioned as passive recipients rather than active contributors, with some countries reporting weak trust between authorities, institutions, and communities, alongside insufficient two-way engagement. This low trust and poor community engagement hindered risk communication efforts and exacerbated inequities in prevention and access to information, as described in countries like England, Slovenia, and India. A member from the Bereaved Families for Justice organisation in England reported: "The government, no one's got faith in the government, I know I haven't, because of the lies that were told, the partying that went on, all that's inequality. You stay at home, you do as you're told, yet we're gonna drink, party, and have fun."

Weak embedding of health literacy, capacity building, and routine prevention systems

Across several countries, stakeholders reported insufficient public and workforce education on disease prevention, One Health concepts, and early warning signals, resulting in these being overlooked or misinterpreted. Routine immunisation was also highlighted as a requirement to prepare for future pandemics, as the decline in vaccine coverage threatens public health. In Peru, one participant highlighted, "we are at risk of re-entry of diseases we considered eradicated like polio, measles...we have had measles cases, imported, not autochthonous. Why? Because people don't vaccinate" (health policy and administration professional, interview). Another informant from Türkiye raised the need for public education: "Societal literacy is needed...health literacy, media literacy...televisions and newspapers are no longer as popular as they used to be...everyone gets information from social media...the struggle of accurate information against falsehood is very difficult. This needs to be provided through education" (journalist and health reporter, interview).

two-way communication between government and communities, and sustained health education and promotion were needed to increase system effectiveness through stronger community participation.

5.2 Preparedness under pressure: structural vulnerabilities limit readiness

Pandemic preparedness is a continuous process of building, testing, and operationalising systems to

anticipate and respond to emerging threats.²²⁸ It depends on countries' resilient health systems, protected and adequately staffed workforces, robust infrastructure and supply chains, interoperable data systems, and coordination across sectors and society. Yet, as with prevention, preparedness is determined not by plans alone, but by whether systems can function under real-world conditions. Across case studies, six systemic vulnerabilities constrained preparedness: fragile health

Panel 7: Systemic vulnerabilities in pandemic preparedness**Fragile health-care systems and workforce constraints**

In most contexts, stakeholders described overstretched and under-resourced health-care systems with weak baseline capacity and workforce shortages. These factors combined to amplify morbidity, mortality, and system strain during crises. In Lebanon, informants reported challenges in supply chain and shortages in resources “...we needed N95, isolation gowns, we went into new workflows of reprocessing of masks. Reengineering workflows to do more with less. Resources allocated to fight COVID while we were still learning about COVID. Optimise resource utilisation, goggles reusable, N95 reprocessing. We had restrictions on funding because of the crisis, suppliers wanted cash” (nursing manager, interview). Similar problems were also reported in India, where government primary health-care centres did not have basic services.

Reactive and underfunded preparedness infrastructure

Pandemic preparedness financing was described as reactive and relying on short-term, crisis-driven funding. Some countries reported insufficient durable infrastructure such as vaccine stockpiles, medical countermeasures, supply chains, and data systems, leading to delays in response. In Slovenia, preparedness plans were either absent or underdeveloped before the COVID-19 pandemic. In Japan, a health and policy administration interviewee reported a lag in the development of domestic vaccines due to underinvestment in research and development during non-crisis periods.

Preparedness systems are not tailored for multihazards and polycrises

Multihazards and polycrises emerged as a systemic vulnerability in several countries. Preparedness frameworks frequently overlooked the likelihood of co-occurring hazards and polycrises, limiting their ability to anticipate and manage compounded risks across health, economic, and social systems. These gaps were further intensified by weak cross-sectoral coordination, political context, and fragile trust between the different actors. These examples were particularly highlighted in Lebanon, where multiple crises co-occurred at the time of the pandemic: “Lebanon at that time was passing through very peculiar circumstances, because at the end of 2019, Lebanon passed through a financial meltdown...the currency lost more than 90% of its value, the GDP [gross domestic product] went down by more than 50%. There were severe currency shortages” (public health ministry official, interview).

Weak governance and narrow decision making for preparedness

Preparedness was also constrained by top-down governance and insufficient inclusion of non-biomedical expertise, which

undermined anticipatory capacity and reduced attention to social determinants of health, further exacerbating inequities. One example from Norway was the failure to prioritise minoritised groups in the early stages of the pandemic. In Thailand, one informant involved in coordinating and strengthening capacity of community leaders highlighted: “The EOC [Emergency Operation Centre] was dominated by technocrats, with no NGO [non-government organisation] or community voices. Decisions were driven by theory, not on ground realities. Communities proved home isolation could work, but they were never formally given space to present their proposals” (member of civil-society organisation focused on HIV/AIDS, interview).

Limited whole-of-society integration

Preparedness efforts lacked sustained engagement across social sectors, communities, and local authorities. Without whole-of-society integration, essential services such as education, caregiving, and livelihoods are disrupted, and communities are left as passive recipients of top-down decisions instead of being active partners in the response. In Thailand, a community worker interview revealed that the state only turns to communities when it has no other choice. A similar issue was reported in Uruguay through an interview with a civil society representative: “...but I think there is a component there that was not invested in, there was a bet on a centralised vision and it was not decentralised. And the strength that the community and local governments could contribute in that sense was not incorporated. They had institutional strengths that the national government does not have. They have capacities to influence in the territory, to act on problems; starting with transport, continuing with housing, with waste disposal. In many of the problems that make up the life of a community, local governments have great competencies. Well, in this case they were not incorporated because that part of the approach was not prioritised either” (member of CSO network focused on social participation in health, interview).

Structural reliance on external supply chains and weak domestic production capacity

The issue of reliance on external supply chains surfaced as a systemic vulnerability in countries such as Ethiopia, Indonesia, Peru, and Spain. In Peru, the absence of manufacturing emerged as a main problem: “We are a country that doesn’t develop technology, that doesn’t manufacture anything, not even the needle. We are net importers of everything, including basic medicines. When the pandemic comes, we depend on the international market for everything—masks, personal protective equipment, even alcohol” (policy and health administration professional, interview).

systems and workforce attrition; reactive infrastructure; minimal multihazard readiness; weak governance; limited whole-of-society integration; and dependence on external supply chains. These vulnerabilities limited

countries’ ability to absorb shocks, scale responses, and sustain essential functions during crisis (panel 7).

Constraints were most visible in the fragility of health systems and workforce capacity. Workforce constraints

were identified as a major barrier to preparedness with health-care workers facing shortages, burnout, occupational risk, and inadequate institutional support: “The most challenging time I lived through my 20 years

in health care” (health-care worker, interview, Lebanon). In several contexts, emergency hiring and staff redeployment addressed immediate gaps but contributed to longer-term attrition, further weakening preparedness. Some countries, however, used the crisis to strengthen workforce protection and system readiness. Ethiopia introduced risk compensation, PPE provision, and isolation accommodation for front-line staff, and China expanded fever clinics beyond tertiary hospitals to improve early detection. These examples suggest that preparedness depends on how systems protect, support, and adapt the workforce over time, including through sustained investment and institutional capacity.

In several countries, foundational public health and pandemic preparedness infrastructure—including emergency operations centres, stockpiles, and data systems—was established or scaled only during the crisis, highlighting the reactive nature of preparedness investment. Vaccines, therapeutics, and supply chains were often deprioritised in prepandemic periods, leaving systems vulnerable when demand surged. Dependence on global supply chains further exposed structural vulnerabilities. Countries with minimal domestic manufacturing capacity faced delays and inequitable access to essential countermeasures. These challenges were often compounded by bureaucratic and political constraints, as noted in Indonesia: “Preparedness depends on politics...the system and bureaucracy make it difficult” (academic, interview). Although some countries, including Indonesia, Uruguay, Peru, Spain, and Singapore, expanded laboratory or diagnostic capacity during the pandemic and some also strengthened domestic production of diagnostics or essential supplies, these advances were unevenly embedded within long-term preparedness systems and remained vulnerable to shifting political and financial priorities.

Preparedness was further constrained by national systems’ constrained capacities to manage multihazard and polycrisis scenarios. The COVID-19 pandemic frequently coincided with other shocks, including climate events, conflict, displacement, economic instability, political disruption, and pre-existing health-system pressures, amplifying system strain and exposing the limits of preparedness frameworks designed around single hazards. In India, COVID-19 overlapped with severe cyclones, disrupting infrastructure and compounding social and economic impacts, and in Lebanon, Türkiye, Ethiopia, and Mozambique, the pandemic unfolded alongside broader economic, political, conflict related, or displacement pressures. In these contexts, overlapping crises stretched institutional and health-system capacity beyond what existing preparedness arrangements could absorb, undermining continuity, coordination, and the ability to sustain response efforts.

Panel 8: Systemic vulnerabilities in pandemic response

Uniform public health measures insufficiently adapted to differentiated realities

Several countries reported uniform interventions during the COVID-19 pandemic such as lockdowns, school closures, and mobility restrictions. These interventions did not account for diverse social, economic, and cultural realities, which can exacerbate pre-existing vulnerabilities, deepen inequalities, disrupt social cohesion, and reduce compliance. Several countries such as Slovenia, Ethiopia, Thailand, the USA, Spain, and Türkiye provided examples. In the USA, one informant reported the lack of internet access for families with low incomes: “Really, really low-income families didn’t have internet access...so the go-to solution, is...helping with connectivity and hotspots. So we put in a large order for laptops, like Chromebooks, to just try to get a supply of them in Michigan that we could then give to school districts, as well as hotspots for home internet access, so students could still plug into their learning” (president of an organisation in the education sector, interview).

Inequitable access to medical countermeasures, essential health services, and information

Pandemic response was frequently undermined by disruption of vaccines, diagnostics, treatments, and health services. This disruption frequently reflected pre-existing social, geographic, and economic disparities with digitalised or centralised systems reinforcing inequities. One example from Mozambique revealed that “the real diagnosis became elitised, because PCR was expensive. Many people were sent home with COVID without knowing it, simply because they could not afford proper testing” (employer of private company for medical equipment, interview). Additionally, the erosion of public trust and the spread of misinformation undermined response efforts and contributed to increased vaccine hesitancy.

Disrupted essential systems and continuity of care

Pandemic response measures such as the repurposing of health services and introduction of containment measures led to a disruption in essential services such as education, health care, food supply, and other essential systems. These disruptions can create long-term health and social consequences, which increase morbidity and mortality from non-COVID conditions and weaken societal resilience. Examples were seen in Peru, Ethiopia, India, Mozambique, and the USA. In Ethiopia, “many people... were...giving birth at home...out of fear...[despite a] directive...that these essential services should not be interrupted...” (health policy and administration professional, interview).

Insufficient social protection to buffer socioeconomic shock

The COVID-19 pandemic unveiled that existing social protection systems were reactive, temporary, and limited in scope. These systems failed to address prolonged economic disruption and structural vulnerabilities, and amplified poverty, food and housing insecurity, and inequities, reducing the effectiveness of public health measures and increasing population vulnerabilities during crises. Stakeholders also reflected on how economic vulnerability was structurally rather than individually produced. This was reported in countries such as Uruguay, Singapore, Indonesia, and Japan. In Indonesia, an informant from a civil society organisation serving people living in street situations highlighted the impact of the Omnibus Law, a wide-ranging deregulation law passed during the pandemic that amended existing laws to attract investment and ease business restrictions, while reducing labour protections: “The emergence of the Omnibus Law... from a macroeconomic perspective had an impact, and during the pandemic the wealth of the high-income group actually increased, while the poor became more depressed and the middle class faced the risk of reduced social mobility.”

Integration across governance and societal structures emerged as a cross-cutting determinant of preparedness. Narrow, technocratic decision making and low levels of engagement with civil society contributed to siloed and reactive approaches. In Mozambique, for instance, the contribution of academic institutions was recognised conceptually but not integrated into preparedness structures. Language barriers and digital exclusion among minoritised populations in England, and geographic isolation alongside top-down messaging for rural ethnic groups in Laos, limited effective community engagement and left marginalised groups underserved. Where whole-of-society approaches were institutionalised, preparedness was more durable. Uruguay formalised expert advisory groups to sustain multisectoral collaboration; Singapore emphasised trust and long-term institutional relationships; and Norway's universal social protection systems provided a scalable foundation during the crisis.

5.3 Response in reality: when plans meet societal complexity

Pandemic response refers to the set of actions implemented once sustained transmission is established, including public health and social measures, clinical care, testing and surveillance, deployment of countermeasures, and economic and social interventions. It reflects the ability of national systems to translate plans into timely, equitable, and context-sensitive action. Case studies revealed four systemic vulnerabilities that constrained response and amplified pre-existing inequalities: uniform measures insufficiently adapted to differentiated realities; inequitable access to countermeasures and services; disruption of essential systems; and insufficient social protection (panel 8).

A key manifestation of these vulnerabilities was the widespread application of uniform public health measures across highly unequal contexts. Interventions such as lockdowns, mobility restrictions, and school closures often assumed stable housing, secure livelihoods, and access to digital infrastructure. As shown in part 4, these assumptions were not justified for many populations, making compliance structurally constrained rather than behaviourally determined. In Slovenia and Ethiopia, overcrowding and social norms (such as multigenerational households and collective communal practices) limited the feasibility of distancing, and in Thailand and the USA, differential access to work, mobility, and digital infrastructure produced uneven impacts.

Inequities in access to medical countermeasures, essential services, and information further constrained response effectiveness. Distribution systems often reinforced existing social and geographic inequalities, with centralised or digitalised models excluding populations with minimal connectivity, financial resources, or administrative visibility. In Mozambique,

the cost of PCR testing restricted access, and in England, vaccine uptake reflected patterns of deprivation and inequality.

Prioritisation of acute infection control often led to the suspension or reduction of routine health care, education, and social services, which translated into delayed care, worsening chronic conditions, and broader social harms. In the USA and Peru, reduced access to primary and emergency care led patients to present later to care with more severe illness, and in Ethiopia and India, disruptions to maternal health services and interruptions to food systems contributed to worsening health and nutritional insecurity. In Mozambique and Singapore, where coordination across sectors was stronger, collaboration between government, civil society, and scientific actors supported ongoing service delivery and clearer communication. These examples highlight that continuity depends on inclusive governance and cross-sectoral coordination, beyond health system capacity.

Finally, social protection systems were often insufficient to buffer the socioeconomic impacts of response measures. Many programmes were reactive, temporary, and poorly aligned with informal labour markets and marginalised populations, reducing the feasibility of compliance with public health measures and reinforcing the link between economic vulnerability and health risk. In Japan and Indonesia, administrative and structural barriers limited access to support, and in Uruguay and other contexts, communities relied on informal networks to meet basic needs. By contrast, Singapore's wage support and business continuity schemes helped stabilise livelihoods and maintain economic function, strengthening the feasibility, equity, and sustainability of response measures.

5.4 Recovery in the balance: rebuilding systems beyond the crisis

Pandemic recovery can be defined as a whole-of-society process undertaken with communities to rebuild, rehabilitate, and transform the effects of pandemics on people, places, and systems, and to restore capabilities lost at individual, community, and institutional levels.²²⁹ It encompasses the restoration of essential services, the strengthening of health systems, and the mitigation of long-term social and economic impacts. However, evidence across the case studies shows that recovery is not only shaped by the speed of restoration, but by whether systems sustain improvements and address underlying vulnerabilities over time. This gap was reflected in four systemic vulnerabilities that constrained recovery: failure to institutionalise reforms; persistent health-system fragility; workforce depletion; and inadequate integration of social protection and equity (panel 9).

The country case studies show that pandemic recovery efforts were uneven, shaped by both the scope of reforms

Panel 9: Systemic vulnerabilities across pandemic recovery

Failure to institutionalise structural and social reforms

Emergency-driven innovations in governance, surveillance, social services, and preparedness were often temporary, under-resourced, or not sustained, limiting the translation of crisis lessons into lasting structural and social reforms. Recovery efforts also frequently overlooked the importance of integrating bioconservation, pollution control, and climate action, which are essential to reducing compound risks from pandemics, environmental change, and climate-related hazards. As a result, in the absence of sustained institutionalisation, gains achieved during the crisis risk erosion, leaving countries vulnerable to recurring or overlapping health emergencies. An agricultural worker community member from Spain reported in an interview that today's biggest problem for foreign populations is access to housing: "Prices are very high, and demand is extremely high...They set up a temporary shelter during COVID as an emergency measure, but the permanent one has not been built for political reasons, even though they had over five million euros from the [regional] government, and now it has been set aside."

Persistent health system fragility

Health systems entered recovery with overstretched capacity and insufficient prepandemic investment in infrastructure, supply chains, and essential services, leaving foundational readiness limited. As a result, fragile systems struggle to reliably deliver routine care or respond effectively to future crises, contributing to increased morbidity and mortality during emergencies. In Norway, LGBTQI+ community members reflected on the issue of constrained resources and the importance of building a health system that can provide care needed by various kinds of people.

Persistent workforce depletion and human capital erosion

Health-care workers experienced cumulative stress, burnout, and mental health challenges during recovery, often compounded by inequitable protection, inadequate compensation, and insufficient institutional support. This resulting workforce fragility undermines health system resilience, weakens operational capacity, and erodes trust, making it more difficult to respond effectively to ongoing and future crises. In Laos, interviews with the health policy and administration sector revealed that medical personnel are leaving the public sector; in Lebanon, health-care professionals reported no proper mental health support following the pandemic: "I don't think proper management was done following the pandemic...they did not bring a specialist psychologist and said we should sit down. They did a survey on whether you had PTSD [post-traumatic stress disorder] or not" (health-care professional, interview).

Failure to integrate social protection and equity measures

Recovery efforts often failed to systematically integrate social protection or address underlying socioeconomic vulnerabilities, leaving marginalised populations exposed to ongoing hardship. These gaps deepen inequities, limit engagement with health interventions, and exacerbate vulnerability, undermining resilience during subsequent crises. As reported by a person living on the streets in Uruguay during an FGD, "...four people had to die this winter from hypothermia for shelters to start opening 24 h a day on a broad scale".

FGD=focus group discussion.

undertaken and the structural determinants underpinning them. Recovery has frequently been constrained by weak institutionalisation of reforms, persistent system fragility, and workforce burnout, although countries vary in whether emergency-era innovations were consolidated into durable, long-term improvements. Many new approaches to governance, surveillance, and service delivery introduced during the pandemic were ultimately temporary, underfunded, or reversible. This temporality reflects a broader pattern of restoration without transformation, where systems revert to precrisis conditions rather than consolidating gains. In Uruguay, tracing systems were dismantled postcrisis, and in Mozambique, hygiene and crowd-control infrastructure introduced during the pandemic was not maintained. In Spain, temporary housing solutions for vulnerable populations were not translated into permanent policy. Yet some countries showed that institutionalisation is possible. Singapore's modular preparedness framework, China's expanded investment in infectious disease capacity, and Lebanon's application of COVID-19 lessons

to cholera response illustrate how crisis learning can be embedded into durable systems.

Persistent fragility within health systems further constrained recovery. Surge capacity during the pandemic was often achieved through overextension rather than structural strengthening, leaving systems with diminished resilience once the acute phase subsided. In many contexts, access barriers, long waiting times, and uneven service provision continued to constrain routine care and recovery efforts. In Peru, participants reported ongoing difficulties accessing care, and in Norway discussions emphasised the need for systems capable of maintaining routine services alongside crisis response. Targeted reforms were seen in Ethiopia's strengthened infection prevention and control systems across facilities, China's expanded primary care capacity, and Tanzania's improved facility-level preparedness through designated outbreak areas and clearer protocols.

Workforce depletion and burnout emerged as substantial and persistent constraints on recovery. Health-care workers across multiple country case studies,

including England, the USA, Lebanon, Laos, and Tanzania, reported mental health impacts, exhaustion, and insufficient institutional support. Inequities in protection, compensation, and decision-making authority

further amplified vulnerabilities among minority and less senior or lower-paid staff. Targeted measures such as surge staffing, enhanced training, improved working conditions, and timely remuneration were unevenly

Panel 10: Trust as infrastructure across all the pandemic cycles

Trust is the belief that a person or institution will act to produce positive outcomes even when you cannot be sure. It implies vulnerability, accepting risk under uncertainty, and expecting the other will not harm you. Trust can be relational (ie, A trusts B to do X), or general (ie, confidence an institution will do the right thing across situations). It differs from reliability, which is primarily related to predictability, whereas trust adds perceived intent, integrity, legitimacy, and competence.²²¹ Social and institutional trust support social cohesion, enabling cooperation and reciprocity under stress. Trustworthiness is earned through transparency, care, competence, and visible accountability.

How trust operates across levels

Interpersonal and community trust: the fastest pathway to uptake of public health measures

Uptake of health advice and interventions depends on who carries the message and whether people feel recognised.

Trusted intermediaries translate risk and counter rumours.

This pattern was seen in comments from Ethiopia: "When they [messages] are channelled through religious leaders...they have more acceptance" (education researcher, interview); China: "We tell them [village residents] to listen to the government, because government information is real" (community health worker, interview); and Indonesia, where the absence of trust in institutions led to outright dismissal of official information: "I've never believed government information before...it's never real" (person living in street situation, FGD).

Organisational trust: whether services feel present, fair, and usable

People judge institutions through lived encounters and whether they follow through on commitments. This sentiment was evident in interviewee reflections from Laos: "They came and took down all my details...In the end, they never showed up" (member of a periurban farming community, FGD) and Peru: "If your national ID showed you lived in Miraflores...of course you didn't get food supplies" (domestic worker leader, interview). Trust is produced by access to services that work for real lives, and by services that deliver consistently.

Political and institutional trust: legitimacy and willingness to comply at scale

Trust falls when leaders are perceived as exempt, inconsistent, or to be downplaying public health risks. This was seen in comments from respondents in England: "No one's got faith...because of the lies...the partying" (a member of Bereaved Families, FGD); and Uruguay, where public health stay-at-home guidance failed to account for the realities of people living in street situations: "Stay in your house...where?" (member of a CSO serving people experiencing homelessness, SGI). These accounts signal measures that did not fit lived constraints, did not share burdens fairly, or did not respect the public as capable partners.

Information trust: coherence, speed, and honesty about uncertainty

Information becomes trusted when it is consistent across channels and transparent about uncertainty. At the same time, trust is shaped by how societies respond to both misinformation—false or inaccurate information shared without intent to mislead—and disinformation, which is deliberately disseminated to deceive or manipulate. For example, in Tanzania, one interviewee said of timely, consistent, and coherent messaging across platforms that "the information was similar...you naturally believe it" (female member of urban community, FGD), and in an interview in Lebanon, a public health ministry official described the establishment of dedicated communication units and use of social media to disseminate information to the public: "provide the numbers...and being honest...that allowed us to become trusted". Trust grows when communication is treated as an ongoing public function, rather than a performance during crisis.

Social trust and social cohesion: essential to collective action

Cohesion sustains mutual aid when formal systems are delayed or uneven, as reflected by a respondent from Laos: "Let's protect each other. Help each other" (member of a peri-urban farming community, FGD). Reflections also suggested cohesion is stress tested by feasibility and fairness, for example, the chief executive officer of a rural health centre from the USA said "...our farm worker migrant community...they're dealing with a lot of other stuff that is political...fear for deportation...we are trying to figure out how to maintain their trust and keep them connected to health care". Preparedness should treat social cohesion as infrastructure to protect and invest in.

Regional and global trust: cooperation under pressure

Cross-border cooperation depends on confidence that commitments will hold when they are most costly. For example, a health policy and administration professional from Singapore said, "trust...will make or break [pandemic preparedness and response plans]...[trust is] built in peacetime". In Mozambique, an official from the finance ministry audit body said, "if donors know that funds were misused...we should expect a loss of confidence". Weak stewardship becomes a preparedness vulnerability, not only a governance concern.

Implications

Trust is a multilevel system property that can buffer shocks or accelerate failure. It is built through fairness, feasibility, and accountability in everyday policy, not only through crisis messaging. When trust and cohesion are treated as infrastructure, preparedness becomes faster, more adaptive, and more equitable, because people cooperate, share information, and course correct together.

CSO=civil service organisation. FGD=focus group discussion. SGI=small group interview.

implemented. In countries where institutional attention to workforce wellbeing and financing mechanisms was inadequate, recovery risks reproduced a model of resilience dependent on exceptional effort rather than sustainable capacity.

Recovery efforts also frequently failed to integrate social protection and address structural inequities. Many programmes remained narrow, reactive, or limited to populations already recognised within formal systems, leaving marginalised groups exposed to ongoing hardship. In Indonesia and Uruguay, gaps in support for informal workers and people experiencing homelessness highlighted the limits of existing systems, and in other contexts administrative barriers continued to restrict access to services.

5.5 Systemic vulnerabilities, trust, and lessons from prevention to recovery

The systemic vulnerabilities observed across PPPRR in our case studies are deeply interconnected. Structural and relational foundations, such as financing mechanisms, cross-sectoral coordination, institutional trust, and governance prioritisation shape both the effectiveness and durability of health system interventions. Patterns recurred across phases, emergency measures outpaced long-term system strengthening, workforce constraints and burnout undermined operational capacity, and social and economic inequities amplified the differential impacts of health policies. Countries that embedded lessons from past crises into institutional frameworks, integrated multisectoral governance, and invested in community engagement were better positioned to sustain both preparedness and recovery.

Trust was a salient theme in our participants' accounts, shaping experiences of protection, access to services, communication, compliance, social cohesion, and recovery (panel 10). Participants described trust as important across multiple levels: interpersonal and community trust in messengers and local intermediaries; organisational trust that services would be available, fair, and usable; political and institutional trust in the legitimacy and consistency of leadership; information trust in coherent, timely, and honest communication; social trust and cohesion within communities; and regional and global trust in cooperation, financing, and stewardship.

Trust also shaped how misinformation and disinformation circulated and could be resisted. Misinformation found fertile ground where public confidence was weakened by institutions' inconsistent communication, where uncertainty was undercommunicated, and where institutions failed to follow through on promised actions or ignored people's lived constraints. Conversely, trusted intermediaries, transparent data, and accountable services were crucial in enabling communities to interpret risk, challenge

rumours, and sustain collective action. Trust thus acts as a preparedness infrastructure, shaping whether people believe guidance, perceive measures as legitimate and feasible, use services, and support institutions. Readiness depends not only on the existence of plans, but on institutions having earned the trust needed to make those plans work under pressure.

Part 6. Systemic vulnerabilities across the global and regional governance levels of pandemic readiness

Part 5 showed that systemic vulnerabilities in PPPRR are deeply interconnected and shaped by structural and relational factors within countries. This part extends the analysis beyond national systems to examine how global and regional arrangements shape what is feasible in practice. Part 6 synthesises data from across the same multisectoral case studies, including national policy makers, civil society, and community-level stakeholders, focusing specifically on how these actors experience, navigate, and absorb the downstream effects of global and regional governance. Drawing on stakeholder perspectives across the case studies, we analyse how country-level actors experience and engage with these levels from within their own systems. Participants did not describe global and regional governance as abstract or external, but as sets of arrangements that directly influence national decision making, resource allocation, and operational capacity.

Empirically, there is insufficient understanding of how national stakeholders perceive and navigate global and regional PPPRR mechanisms. By examining both levels through the lens of country-level actors, this analysis shows how ostensibly complementary governance spaces are experienced in practice. Across contexts, participants reported that global and regional mechanisms often overlap, creating congestion, duplication, and misalignment. We therefore identify systemic vulnerabilities that cut across both levels, tracing how formal governance structures, global market dynamics, diplomacy, and financing arrangements interact with national PPPRR. These recurring vulnerabilities and illustrative country examples are summarised in panel 11.

6.1 Congestion, layering, and coordination across levels

Across countries, participants described minimal agility as a recurring barrier shaping whether global and regional support could be converted into timely national action. At the global level, stakeholders reported an increasingly dense PPPRR landscape, with proliferating funding mechanisms, initiatives, reporting requirements, and negotiation tracks that carried overlapping mandates and unclear role differentiation. Even when financing or procurement mechanisms existed, activation relied on administrative steps and documentation that were difficult to navigate under crisis conditions. Administrative speed was unevenly distributed and

Panel 11: Systemic vulnerabilities in global and regional pandemic preparedness**Congestion, layering, and coordination across levels**

Participants described a dense and fragmented governance landscape in which overlapping mandates and complex procedures slowed response. In Uruguay, stakeholders contrasted the speed of outbreaks with slow global processes, noting delayed pooled deliveries and a preference for more agile bilateral routes. Across settings, global resources were often perceived as formally available but difficult to access in practice. In Ethiopia, one participant explained: “The funds are there, but it’s not easy to access them...the World Bank had a very large fund...but it couldn’t be liquidated...Institutional capacity is a deciding factor” (emergency services manager, interview). In Peru, fear of audits and sanctions further constrained uptake, creating institutional reluctance to accept internationally provided resources and delaying response.

Superficial compliance and fragmented implementation

Formal adherence to preparedness frameworks often masked weak operational capacity. Across Lebanon, Laos, and Tanzania participants described plans that could not be implemented under crisis conditions due to feasibility constraints. Concerns were also raised in Singapore and Laos that regional platforms lacked mechanisms to translate commitments into sustained capacity. In Indonesia, this gap was described starkly: “On paper, everything is checked...But what happens in reality? The standard operating procedures become lip service” (academic, interview). In India, a participant similarly emphasised: “We are very good at producing documents...But following through and implementing it...does not happen very well” (academic, interview).

Diplomatic norms and constrained coordination

Diplomatic norms and power asymmetries shaped how coordination occurred across levels, often limiting open disagreement and slowing decision making. In Singapore, ASEAN’s consensus-based model was described as non-confrontational but slow. In Peru, participants highlighted how diplomatic considerations constrained public disagreement within regional institutions. On the contrary, in Slovenia, a national crisis response centre was developed with “intensive advising” and “complete know-how” (health administration professional, interview) from the European Centre for Disease Prevention and Control, demonstrating the potential of multilevel collaboration.

Markets, intellectual property, and supply chain fragility

Participants consistently described global market dynamics as prioritising purchasing power over equity. In Peru, the scramble for vaccines was characterised as: “full sanitary cannibalism” (health policy professional, interview). In India, export

restrictions exposed global dependence on concentrated manufacturing: “All countries in Africa were dependent on what’s produced in India...But then India stopped its export” (international organisation professional, interview). At the same time, efforts to build regional manufacturing and procurement systems were seen as necessary but incomplete. Stakeholders in Singapore emphasised that resilience remains constrained by global interdependence: “Unless you want to own the entire supply chain...there’s always something that gets imported” (pharmaceutical company employee, interview).

Distrust, transparency, and the turn to self-reliance

Experiences of scarcity, delayed access, and perceived so-called country-first behaviour eroded trust in global systems and shifted strategies toward self-reliance. In Singapore, a participant described the need to develop domestic guidance as external recommendations shifted: “Maybe we should start writing more of our own guidance” (health policy and administration professional, interview). In Uruguay, distrust in pooled mechanisms reinforced a push for diagnostic sovereignty. Participants also described how punitive responses to outbreak reporting discouraged transparency. In Singapore, a participant recalled being unable to return home after countries worldwide shut their borders to South Africa in response to its reporting of the Omicron variant, noting that this behaviour “shuts down the cross-country exchange” (medical doctor, interview). Across China and Japan, stakeholders emphasised the importance of routine, trusted communication channels to support early warning and coordination.

Episodic financing and persistent dependency

External financing was widely described as volatile and insufficient for sustaining preparedness. In Laos, heavy donor reliance left systems vulnerable to funding shifts: “We rely on donors for nearly 90% of our funding...support from the US Centers for Disease Control and Prevention has been cut” (health policy and administration professional, interview). In Lebanon, assistance was described as reactive: “When something happens, you won’t have time” (public health ministry official, interview). This reactivity was described as undermining continuity and limiting investment in prevention, including One Health and crosshazard integration. In Mozambique, external financing was seen to shape national priorities: “Our research agendas continue to be directed by external interests” (academic, interview), and in Mexico, misalignment between global funding streams and national priorities was reported to fragment the health system and public health response.

ASEAN=Association of Southeast Asian Nations. FGD=focus group discussion.

became an equity issue; for example, formal pathways were slow and some actors sought bilateral workarounds, illustrating how congestion privileges those able to bypass bureaucracy. These experiences, illustrated through

country examples in panel 11, echo longstanding concerns about pandemic financing instruments that are poorly suited to fast-moving outbreaks. The World Bank’s prepandemic Pandemic Emergency Financing Facility

and associated bonds were criticised for having complex trigger criteria and delayed payouts,¹⁷⁶ and similar debates now surround the Pandemic Fund. Although it supports core International Health Regulations capacities, the Pandemic Fund relies on competitive allocation, remains below estimated global need, and is not designed for rapid surge financing. In practice, the gap between preparedness funding and emergency liquidity reinforces the very agility constraints stakeholders described.

Regionalisation was often framed as a pragmatic response to this congestion. Regions could, in principle, function as more operationally coherent intermediaries between global norm setting and national delivery. Yet participants cautioned that the speed with which the COVID-19 pandemic catalysed new regional platforms risked privileging short-term technical coordination over deeper strategic integration. The rapid creation of mechanisms such as the ASEAN Centre for Public Health Emergencies and Emerging Diseases was seen by some as reinforcing surveillance and information exchange functions without necessarily clarifying governance authority, financing sustainability, or accountability pathways. Without structural integration, regionalisation risks adding another layer to an already congested system. For many stakeholders, the core problem was layering without integration; global, regional, and national systems existed in parallel but did not reliably function as a coordinated chain.

6.2 Nominal compliance and fragmented implementation across global and regional frameworks

There was broad agreement across government stakeholders that a persistent gap existed between formal compliance and operational capacity. At the global level, preparedness instruments created a strong appearance of readiness (ie, nominal compliance), yet national delivery depended on feasibility, workforce, infrastructure, and political context. Multiple frictions emerged, with plans that could not be operationalised under crisis conditions due to feasibility constraints. Participants in Spain and the UK noted that global indicators often failed to capture subnational heterogeneity, requiring continual adaptation that created new burdens. Communities and intermediaries frequently acted as brokers translating global guidance into workable local practice. For stakeholders, preparedness became meaningful only when standards met delivery conditions.

Crucially, similar translation gaps were visible at the regional level. Although new regional platforms were welcomed, stakeholders questioned whether technical commitments were embedded in operational capacity. The ASEAN Centre for Public Health Emergencies and Emerging Diseases was viewed as a major step, yet participants in Laos and Singapore highlighted disparities in technical expertise, infrastructure, and regulatory capacity across member states. Monitoring and evaluation mechanisms to assess whether regional

cooperation translated into local readiness were often weak or absent. Both global and regional preparedness risked becoming formally complete but operationally thin. Several participants argued for stronger feedback loops across levels, so that locally generated adaptations could systematically refine global and regional norms rather than remain isolated innovations, as was the case with Thailand's so-called mix-and-match vaccine evidence (combining Sinovac and AstraZeneca) that informed WHO guidance.

6.3 Diplomatic norms, political constraints, and the limits of multilevel coordination

Across both global and regional levels, diplomatic culture shaped the speed of coordination and the boundaries of what was politically feasible. Participants framed many coordination gaps as structural features of multilateral governance. Regional organisations, like global institutions, remain bound by sovereignty concerns, economic protection, and political caution. Participants described how disagreements are often managed privately to preserve relationships and credibility, which can narrow public debate and delay collective action. Similarly, at the global level, multilateral processes continued to reflect underlying power asymmetries, agenda-setting privilege remained uneven, and collective commitments could stall where economic interests or geopolitical competition intervened. Improving preparedness therefore requires not only institutional reform, but attention to the political cultures and incentive structures that shape how global and regional bodies operate in practice.

These tensions are also visible in the postadoption phase of the WHO Pandemic Agreement. Although it institutionalises equity through mechanisms such as PABS, key operational elements remain under negotiation, and countermeasure allocation continues to depend largely on bilateral purchasing.²⁰⁵ In parallel, bilateral memorandums of understanding, linking rapid outbreak notification and pathogen sharing to short-term infrastructure investment, have raised concerns that powerful states might shape access arrangements outside multilateral frameworks.²⁰⁶ Such dynamics illustrate how diplomatic asymmetries can reassert themselves even within reform processes intended to strengthen collective governance.

6.4 Markets, intellectual property, and the limits of collective protection

Participants repeatedly framed PPPRR objectives as incompatible with market-based rules that prioritise efficiency, scarcity pricing, and purchasing power over collective protection needs. These dynamics became most visible when countries reverted to so-called country-first behaviour, export controls, and concentration of supply among those able to pay. Several case studies described this clash as a predictable outcome of

underlying incentive structures. Participants argued that global rules governing intellectual property rights, licensing, and manufacturing capacity limited rapid scaling and diversified production, reinforcing dependence on a small number of patent-holding firms and production sites. The limitations of pooled mechanisms such as the Access to COVID-19 Tools Accelerator (ACT-A) and COVAX, designed to promote risk-sharing and equitable allocation,^{177,178} further exposed how equity-oriented distribution instruments remained structurally subordinate to bilateral advance purchase agreements, export restrictions, and voluntary donation models that enabled vaccine hoarding and relegated many LMICs to delayed and unpredictable supply.²⁰⁶

These market dynamics were compounded by the fragility of highly globalised supply chains. Pharmaceutical production depends on layered international inputs with minimal visibility beyond first-tier (direct product manufacturer) and second-tier (raw materials and component providers) supply chains. When countries imposed border closures and export controls, cascading disruptions affected essential medical goods and PPE. The grounding of passenger aircrafts removed crucial cargo capacity just as demand surged, and mobility restrictions constrained logistics workforces across ports, customs, and transport. Preparedness systems rely on openness, trade, and movement, yet crisis governance defaults to closure, revealing a structural paradox at the heart of global interdependence.

This experience catalysed renewed attention to technology transfer, regional manufacturing, and so-called countermeasure sovereignty (in which countries were self-reliant for the production and dissemination of countermeasures such as vaccines, therapeutics, and PPE). Uruguay and others described the need for a strategic turn toward domestic or regional production to reduce reliance on constrained global supply chains. Across regions, including ASEAN, initiatives advanced pooled procurement, technology transfer, workforce training, and manufacturing cooperation to build end-to-end countermeasure ecosystems. Yet participants cautioned that regionalisation does not eliminate global dependency. Essential inputs remain internationally sourced, talent and infrastructure are unevenly distributed, and internal regional equity tensions persist. Regulatory fragmentation further constrains resilience. Without reliance frameworks or convergent approval pathways, manufacturing capacity does not translate automatically into timely access.

At the global level, Japan and Indonesia highlighted the relevance of negotiations on the Pandemic Agreement and PABS. However, participants cautioned that without operational and binding commitments to technology transfer, diversified manufacturing, and equitable licensing, pathogen access risks remaining decoupled from timely and affordable countermeasure access.

Accountability provisions within the agreement remain limited, provisions on compliance monitoring are weak, and implementation costs will likely vary widely across countries without clear financing pathways to support national obligations.^{204,207} Regional manufacturing strategies therefore remain embedded within global markets and power structures. Without enforceable commitments and governance arrangements that protect equity in situations of scarcity, production capacity alone cannot guarantee collective protection.

6.5 Distrust, transparency disincentives, and the turn to self-reliance

Across countries, participants described growing disappointment with global operating frameworks and the institutions meant to sustain them. Although pandemics were widely recognised as transnational threats, the lived experience of scarcity, delayed access, perceived country-first behaviour, and geopolitical friction eroded confidence that global commitments would translate into protection when it mattered. Politicised narratives and misinformation surrounding WHO guidance further strained trust and complicated the maintenance of institutional neutrality in polarised environments.

A central concern was the fragility of transparency. Participants described structural disincentives to early reporting, noting that countries identifying new variants or outbreaks could face punitive consequences such as border closures or economic disruption. In such contexts, delayed reporting or limited data sharing becomes rational risk management rather than moral failure. The cascading consequence is slower global risk assessment, fragmented coordination, and delayed countermeasure deployment. Stakeholders emphasised that surveillance, sequencing, and epidemiological reporting are inherently interdependent global functions; national capacities only contribute meaningfully when embedded in trusted international exchange. Reciprocity, however, depends on protection from punitive responses and sustained investment in relationships and technical networks beyond periods of active pandemics.

Many countries intensified emphasis on regional collaboration and domestic capability as hedging strategies. Self-reliance was not framed as isolationism, but as risk mitigation in an environment of uncertain reciprocity. Yet participants stressed that self-reliance generates substantial new demands (ie, regulatory systems aligned with WHO maturity standards, specialised workforce and training pipelines, resilient infrastructure, and sophisticated engagement with industry and supply chains). Emerging regional debates increasingly acknowledge that meeting these demands requires institutional reforms that strengthen regional authority and coordination functions, backed by sustained investment in regulatory capability, workforce development, and standing crossborder surveillance and data systems.^{153,157,166–169,214,230,231} Without

For more on the Access to COVID-19 Tools Accelerator see <https://www.who.int/initiatives/act-accelerator>

these reforms and resources, regionalisation risks expanding expectations without delivering the operational capacity and legitimacy needed under strain.

6.6 Episodic financing and the reproduction of dependency

International financing was frequently described as episodic, with substantial inflows during emergencies followed by sharp contraction once attention shifts, creating a structural readiness vulnerability across both global and regional levels. Capacities built in crisis-surveillance systems, workforce pipelines, emergency operations, and partner networks proved difficult to sustain without predictable funding. Participants framed this volatility as a recurring feature of external financing rather than an anomaly and noted that broader shifts in the global health landscape, including changing donor priorities, geopolitical tensions, and institutional restructuring, have intensified uncertainty about future funding streams. Funding was often tied to external political cycles and skewed toward visible response rather than sustained prevention and systems strengthening. This reactive logic undermined multisectoral preparedness, including One Health integration, and reinforced power asymmetries by limiting the autonomy of highly donor-dependent countries.

Participants' accounts echoed longstanding critiques of donor-driven, project-based development assistance for health.¹⁷⁹ External financing has often prioritised short-term, disease-specific deliverables over sustained health system strengthening, with insufficient recipient voice in agenda setting or resource allocation.¹⁶⁸ Only a small share of assistance has supported system-wide resilience, and an even smaller fraction was allocated to pandemic preparedness, weakening many LMICs' starting positions entering the COVID-19 pandemic and constraining their practical autonomy to adapt under strain.¹⁷⁵ Development assistance for health has declined sharply since its 2021 peak, major donors have reduced commitments, and rising debt burdens and fiscal constraints limit domestic capacity to compensate.^{195,196} In response, financing debates increasingly call for a shift from volatility to predictability, from fragmented aid to coordinated investment, and from donor–recipient hierarchies toward partnership models grounded in country ownership and fiscal justice.^{214,217}

6.7 Cascading effects and reform directions across levels

Across the global and regional levels, stakeholders valued global and regional frameworks as essential spaces for cooperation, yet they described systemic vulnerabilities that arise from how multilateral institutions, markets, and political relationships align in practice. Participants emphasised that congestion at the global level can slow crisis translation and widen inequities when administrative complexity becomes a

barrier. Regionalisation can provide pragmatic coordination platforms yet can reproduce fragmentation or privilege short-term technical solutions over strategic capability. Furthermore, participants stressed that nominal compliance could generate reassurance while masking weak operational embedding. Diplomatic norms can preserve cohesion but delay decisive action. Market rules can over-ride solidarity. Punitive responses can discourage transparency. Episodic financing can entrench reactive response and dependency. Crucially, participants observed that these vulnerabilities are not isolated; they interact and cascade.

Participants repeatedly implied that addressing these vulnerabilities requires more than adding new initiatives. They emphasised simplification, clearer division of labour, and stronger coordination mechanisms between global and regional actors. Regional mechanisms should not simply replicate global reporting burdens, but translate norms into operational support, strengthen cross-border cooperation, and build long-term capability. Participants emphasised the need for credible reciprocity, so that reporting and cooperation are rewarded rather than punished. Whether multilevel structures amplify resilience or reproduce vulnerability depends less on the number of mechanisms created and more on whether institutions, markets, and political incentives are aligned to deliver protection in practice. Yet the question is not only how these arrangements performed during the pandemic, but how they might evolve under different future conditions. Part 7 uses foresight methods to stress test how systemic vulnerabilities could amplify or attenuate under plausible 2035 pathways.

Part 7. Exploring plausible futures

We extend the Commission's empirical analysis by situating the qualitative findings from preceding chapters within a forward-looking foresight framework. Foresight approaches are widely employed in public health and policy to explore plausible future developments, anticipate emerging risks, and guide strategic planning.²³²

Drawing on evidence from our qualitative inquiry, we employed a foresight approach to examine how systemic vulnerabilities might evolve under alternative configurations of geopolitical, economic, ecological, and informational change. We identified key drivers of change and mapped the pathways through which they could interact with, amplify, or mitigate existing mechanisms of capability loss. We then constructed and stress-tested a set of internally coherent scenarios, interrogating them through the lens of systemic vulnerabilities to assess how different system conditions could reshape protective opportunities. This approach explicitly links lived realities and national and global evidence to plausible futures, providing an anticipatory

Panel 12: Overview of the four scenarios describing plausible futures for PPPRR**Scenario 1—Pathogens of war: pandemic readiness in a fragmented and securitised world**

A world shaped by unmitigated climate disruption, rising nationalism, and declining public trust. Geopolitical tensions intensify as resource scarcity fuels conflict and migration. Health becomes increasingly treated as an issue of national security to be managed through border control and national defence, with defence spending prioritised over social investment and unequal access to advanced countermeasures. Global cooperation weakens, information sharing fragments, and misinformation proliferates. Vulnerabilities deepen, particularly among displaced and low-income populations, while grassroots resilience emerges in the absence of reliable institutional protection.

Challenges include misinformation and trust breakdown, which undermine adherence to public health measures; gaps in surveillance and crossborder data sharing, delaying detection and response; and persistent health system fragility exacerbated by inequitable and unstable funding. Rising conflict and biosecurity risks further increase exposure to emerging threats and constrain international cooperation. Opportunities emerge through adaptive local responses, including rapid civilian–military coordination and community-led action, which can partly compensate for gaps in formal systems. Fragmentation also encourages domestic investment in research and preparedness, with some gains in compliance under stricter national measures. Alternative financing and localised investment might support resilience, although they cannot fully substitute for coordinated global systems.

Scenario 2—The health mosaic: patchwork regional blocs as the core of pandemic response

Global governance fragments into regional systems and community-led networks. Regional blocs become the primary vehicles for pandemic preparedness and response, often showing agility and shared capacity within their membership. However, protection is uneven; non-members and marginalised populations face persistent exclusion, and urban–rural divides widen. Selective solidarity strengthens resilience within blocs but leaves gaps in addressing transregional and global threats.

Challenges arise from fragmented coordination between blocs, delaying early warning and exacerbating global inequities. Disruptions to value chains constrain access to essential countermeasures. Within blocs, power asymmetries concentrate control among dominant states, reinforcing regional hierarchies, while countries outside major blocs face widening preparedness gaps and internal disparities. Opportunities include strengthened regional coordination and context-specific policy adaptation, which can enhance trust and operational relevance. Bloc cohesion might amplify

international influence and provide smaller states with greater voice and integration. However, these gains remain uneven and depend on governance alignment within and across regions.

Scenario 3—Trading immunity: pandemic preparedness in an age of power concentration

A multipolar, competitive, and fiscally constrained world in which health is shaped by geopolitical rivalry and market concentration. Governments face trade-offs between climate action, defence, and health investment, and private and state actors with concentrated resources exert growing influence over innovation and access. Pandemic preparedness becomes politicised and commodified, deepening inequalities between and within countries. Health is simultaneously a strategic asset and a casualty of global competition.

Challenges include stigma, blame, and anti-science movements that erode trust and transparency; persistent inequities and uneven health system capacity that constrain access to countermeasures; and geopolitical rivalry that undermines coordination, resource allocation, and data sharing. Opportunities centre on leveraging private-sector innovation and strengthening access to medical countermeasures. Community-led responses and regional cooperation might enhance resilience, and improvements in data sharing and collective problem solving can support capability development. However, gains are uneven and contingent on equitable governance and sustained institutional support.

Scenario 4—Renaissance of solidarity: pandemic preparedness as a global public good

Renewed multilateralism and shared stewardship underpin a reformed and strengthened system of global cooperation. Governments recognise pandemic preparedness, climate action, and health equity as interdependent global public goods. Institutional accountability improves, cross-sector collaboration deepens, and public trust is gradually rebuilt. Although climate pressures persist, coordinated action reduces spillover risks and antimicrobial resistance, and sustained investment in health systems enhances equitable access and resilience across regions.

Challenges persist despite cooperation, including unilateral actions and administrative barriers that limit equitable access, as well as misinformation and climate pressures. Inconsistent institutionalisation of lessons learned continues to weaken long-term preparedness. Opportunities include strengthening regional and local health systems, integrating health education and traditional knowledge, and building sustained system capacity. Increased community leadership and youth engagement enhance adaptive capacity and resilience, and environmentally sustainable technologies help address ecological drivers of health risk.

foundation for strategic recommendations to strengthen equitable PPPRR.

7.1 Drivers of change: structural forces shaping future pandemic risk

Drivers of change, foundational elements of foresight analysis, are the structural forces and emerging trends that shape the operating environment of institutions, communities, and systems over time, influencing both the risks populations face and the capacities that systems can mobilise to protect them.²³³ By altering the structural and relational conditions that underpin protection, these drivers directly contextualise systemic vulnerabilities, determining whether existing weaknesses are amplified, mitigated, or transformed. Advancing pandemic justice and resilient preparedness, therefore, requires systematic identification of those drivers most likely to shape future health emergencies.

An initial list of 16 drivers relevant to PPPRR was developed drawing on the European Commission Joint Research Centre megatrend framework, which outlines 34 drivers across 14 megatrends.²³⁴ Each driver was assessed for its potential to shape pandemic risk, response capacity, equity, and systemic vulnerability and triangulated with empirical evidence from the Commission's 20 country case studies. Interviews and focus groups with community members, front-line health-care providers, public health actors, policy makers, and civil society actors surfaced structural forces shaping exposure, protection, and capability loss in practice. Drivers that appeared consistently across both global megatrend analysis and lived experience were retained for further prioritisation through a survey of 121 experts from 39 countries working across public health, emergency response, policy, and community practice. We calculated an intensity ratio from survey responses to identify ten drivers with the most consequential trajectories and implications for future PPPRR. These include climate change, regional cooperation, antimicrobial resistance, emerging health threats, ecological degradation, inequalities in health-care access, support for multilateral institutions, resource-related conflict, defence spending, and urbanisation and migration (appendix pp 20–22).

To deepen and contextualise these findings, we convened a multistakeholder workshop involving 58 participants from 18 countries selected through purposive sampling to ensure geographic and institutional diversity. Participants included Commissioners, country research teams, and community and civil society representatives engaged through the case studies, alongside practitioners and policy actors involved in pandemic readiness. The workshop examined how the prioritised drivers could evolve and interact under alternative conditions, and mapped reinforcing and compounding dynamics. This analysis provided the foundation for scenarios set in 2035, enabling systematic exploration of how different

configurations of drivers could amplify, mitigate, or transform systemic vulnerabilities and reshape the feasibility of equitable protection.

7.2 Scenarios to 2035: stress-testing systemic vulnerabilities

In foresight practice, scenarios are structured, plausible narratives that explore how different combinations of drivers and pathways might interact to produce alternative future contexts.^{235,236} Their purpose is to illuminate uncertainty, surface trade-offs (ie, navigating tensions between national resource prioritisation, economic stability, operational speed, and global health equity), and test the resilience of current strategies under divergent conditions. These scenarios intentionally stylise complex dynamics, recognising that future conditions might emerge as hybrid or combined configurations rather than aligning neatly with any single narrative. The Commission used scenarios to explore how systemic vulnerabilities and patterns of capability loss embedded in social, institutional, and ecological systems might evolve, amplify, or be mitigated under alternative futures and policy choices. The approach comprised three linked components: scenario development around the shortlisted drivers of change; systematic exploration of challenges, opportunities, and risks for PPPRR within each scenario; and back casting (a process of working backward from future scenarios) to identify the policy choices and institutional reforms required today to avoid unjust futures or enable more equitable ones.

Four scenarios set in 2035 were developed through this process (panel 12). Inputs from the driver workshop informed their construction, with driver pathways organised into four thematic clusters that shaped the narrative architecture. A subsequent scenario workshop convened 42 participants from multiple regions, including Commissioners, country research teams, policy makers, public health practitioners, and community and civil society representatives, to assess each scenario's implications, challenges, and opportunities. To further refine and contextualise the scenarios, focused discussions were conducted with older adults in Singapore and young people in Slovenia (panel 13).

Across futures, recurring challenges included inequitable access to countermeasures, erosion of trust in public health institutions, misaligned incentives across multilevel governance, and disproportionate exposure of marginalised populations. These risks reflect structural and relational vulnerabilities embedded in institutions, markets, and political relationships that, under stress, amplify capability loss among those with the fewest resources. Power asymmetries, fragmented cooperation, constrained health system capacity, and misinformation repeatedly emerged as mechanisms through which formal preparedness fails to translate into real-world protection.

Participants also identified practical levers for mitigation. Strengthening community-led action, enhancing regional cooperation, embedding equity safeguards into allocation systems, and aligning innovation and private-sector investment with public goals were seen as pathways to reinforce systemic capabilities. The effectiveness of these levers, however, depends on institutional alignment, credible governance, and sustained investment. The scenarios underscore a central conclusion: improving readiness requires directly addressing the structural mechanisms that produce vulnerability, rather than treating inequitable outcomes as episodic failures or contextual anomalies. They show how systemic vulnerabilities are both persistent and contingent, manifesting differently depending on the configuration of drivers, although the underlying mechanisms remain consistent. We thus identify which vulnerabilities are robust across plausible futures and which institutional or governance interventions are most likely to prevent cascading losses in capability.

7.3 Integrating foresight and quantitative modelling to assess pandemic vulnerabilities

To complement the foresight and scenario analyses, we conducted an epidemiological modelling exercise to explore how systemic vulnerabilities could affect outcomes during a hypothetical human influenza A pandemic strain (full details and methods published in the appendix pp 13–29). As with any modelling study, this was heavily reliant on assumptions (on transmission routes, severity, etc); unlike modelling studies undertaken during an outbreak, the model related to a hypothetical future pandemic and hence could not be parametrised by actual outbreak data. The modelling therefore allowed us to quantify plausible impacts of systemic vulnerabilities under the premise of two scenarios explored above: pathogens of war, characterised by fragmented and securitised cooperation and self-interest, and renaissance of solidarity, characterised by coordinated burden sharing. The modelling examines a systemic vulnerability across the countermeasure cycle, from R&D and manufacturing through procurement, allocation, and delivery. In the absence of enforceable arrangements for timely, needs-based access, vaccine distribution is shaped by market dynamics, purchasing power, and procurement leverage, producing predictable equity deficits. The analysis contrasts allocation by ability to pay versus allocation proportional to population size as stylised representations of fragmented versus coordinated access.

The model simulated a hypothetical pandemic caused by a novel influenza A human pandemic strain, assuming global spread had already occurred at the time of detection, rendering border measures ineffective. Each country was modelled independently, with the epidemic initiated in 0.02% of the population and run over 2 years. Key epidemiological parameters included a basic reproduction number of 2.5, a 7-day infectious period,

and a 4-day latent period. Individuals who recovered from infection were assumed to have temporary immunity for approximately 9 months before becoming susceptible again. Infection severity and age-specific hospitalisation fatality rates were derived from US influenza data (2010–19) adjusted upward for LMICs to account for weaker health systems. Populations were structured into 5-year age bands up to age 75 years, with individuals 75 years and older grouped together.

Vaccination and previous infection were assumed to reduce the risk of infection, hospitalisation, and death by 80%, reflecting the potential effect of rapidly developed,

Panel 13: Community reflections refining scenario narratives

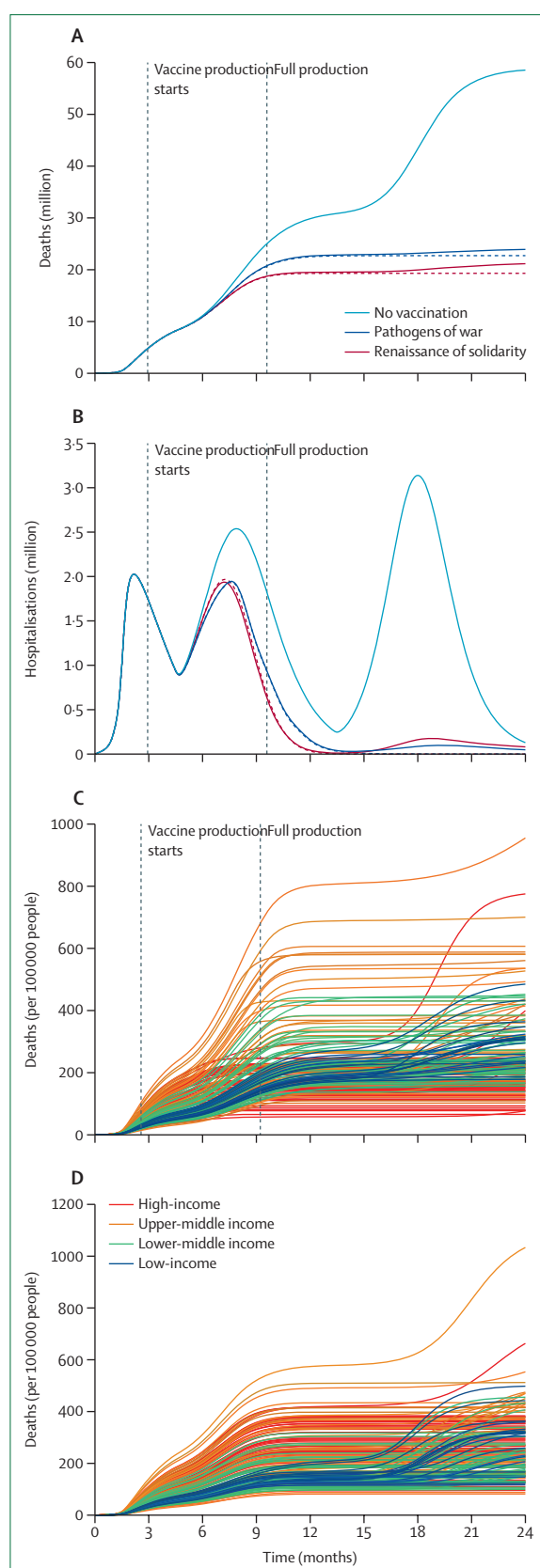
Singapore: fragmentation as lived reality, solidarity as aspiration

Older adults (aged 60 years and older) frequently described elements of scenario 1 (pathogens of war) and scenario 3 (trading immunity) as already unfolding, citing geopolitical tensions and supply chain fragility. Discussions of market-driven or power-concentrated futures focused on corruption, inequitable distribution of aid, and vaccine hoarding. Participants emphasised the need for vigilance, adaptability, and education to sustain long-term resilience, while also acknowledging feelings of helplessness or limited agency in the face of global power dynamics: “I think [there is] not much we can do as an individual because the big brothers are not doing their part” (65 year-old male, SGI). Scenario 4 (renaissance of solidarity) was widely supported in principle but seen as difficult to realise: “It’s an ideal society...If even half could be achieved, that would already be very good” (70-year-old female, SGI). Support for multilateral cooperation coexisted with scepticism about feasibility and concerns about misinformation and declining trust in media.

Slovenia: inequality as baseline condition

Young participants (aged 18–24 years) viewed scenario 2 (health mosaic) and scenario 3 (trading immunity) as most realistic, often arguing that wealth concentration already shapes differential access to preparedness and response. Inequality between countries, and within regions such as the EU, was seen as a defining feature of likely futures. Access to countermeasures and health protection was perceived as dependent on economic strength and geopolitical positioning: “Richer countries will have access. If you are in a poorer country, you won’t” (23-year-old male student, FGD). Scenario 4 was consistently described as desirable but unlikely: “Very optimistic...most ideal. But not likely” (22-year-old female student, FGD). Discussions with young people reinforced the centrality of inequality in the scenarios, highlighting that differential access to protection is widely perceived as a structural feature of the global system rather than a temporary or incidental outcome.

SGI=small group interview. FGD=focus group discussion.



targeted vaccines. This approach provided a baseline for a well matched pandemic vaccine protecting against severe disease, as opposed to the use of seasonal influenza vaccines which are subject to antigenic drift. Non-pharmaceutical interventions were assumed to begin after 45 days, initially reducing transmission by 60% for 3 months, followed by a 9-month period at 40% reduction, before being fully lifted. Although country responses during the COVID-19 pandemic were highly heterogeneous, the model assumed a uniform, moderately effective response across all countries.

Five vaccination scenarios were considered to examine how different distribution strategies and levels of vaccine hesitancy might influence outcomes. In the pathogens of war scenario, higher-income countries received priority access, with vaccines allocated within countries to older age groups first, in line with the assumed severity profile, and hesitancy leaving some doses unused. The renaissance of solidarity scenario, in contrast, distributed doses proportionally by population. For both scenarios, secondary analyses with reduced hesitancy assumed that 50% of previously hesitant individuals were converted to vaccine-confident before vaccine roll-out. A no-vaccination scenario served as a reference. Vaccine production was assumed to begin after 100 days, ramping up to a maximum of 30 million doses per day over 150 days, until a total of 8 billion doses had been produced. Willingness to be vaccinated in each country was inferred from historic COVID-19 vaccination uptake, with substitutions made for countries without data. The epidemic was represented using an age-stratified compartmental model tracking susceptibility, exposure, infection, hospitalisation, and death, with vaccination and previous infection incorporated. This model represents only a partial account of pandemic impact, which extends to livelihoods, dignity, social cohesion, and broader wellbeing that lie beyond the scope of epidemiological modelling. Contact patterns between age groups were based on published social mixing data, and the vaccination rate within each country was applied dynamically as supplies became available. Model assumptions are necessarily stylised and pathogen-specific. Different threats might vary in transmissibility, lethality, age gradients, public-risk perception, vaccine confidence, and the heterogeneity of national responses,

Figure 4: Modelled deaths, hospitalisations, and country-level mortality from a hypothetical influenza pandemic

(A) Modelled total number of deaths over the first 2 years of a hypothetical influenza pandemic. (B) Corresponding number of people in hospital due to the disease. Time indicates months since the point of global pandemic detection. Dashed lines indicate the outcomes when vaccine hesitancy is also reduced. (C) Country-level mortality when vaccines are apportioned based on the ability to pay (the pathogens of war scenario). (D) Country-level mortality when vaccines are apportioned based on population size (the renaissance of solidarity scenario). Each country is represented by one line. Colours indicate the income status of each country as defined by the World Bank.

such that absolute magnitudes would differ under alternative scenarios.

In the model, a 2-year novel influenza pandemic without vaccination causes 58.5 million deaths globally, with recurrent waves as interventions relax. With vaccination introduced from day 100, the pathogens of war scenario (operationalised as allocation by ability to pay) reduces global mortality by 59%, to 23.9 million deaths, equivalent to 34.6 million deaths averted. The renaissance of solidarity scenario (operationalised as allocation proportional to population) reduces global mortality by 64%, to 21.2 million deaths, equivalent to 37.3 million deaths averted, saving a further 2.7 million lives relative to the pathogens of war scenario (figure 4; table 4). The equity gradient is pronounced; under the pathogens of war scenario, high-income countries experience up to an 81% reduction in mortality, whereas low-income countries experience only a 28% reduction (appendix p 38). Table 4 also shows the distributional asymmetry underpinning this pattern: relative to proportional allocation (renaissance of solidarity), self-interest (pathogens of war) reduces deaths in high-income countries by 1.5 million (2.4 million *vs* 3.9 million) while increasing deaths elsewhere by 4.2 million. When vaccine confidence is increased, deaths fall further to 22.7 million under pathogens of war and 19.3 million under renaissance of solidarity (figure 4; appendix p 38).

These results raise an important ethical and political dilemma. Proportional vaccine allocation saves more lives globally, but in the model, it also requires high-income countries to accept less relative advantage than under self-prioritisation. This is not only a technical allocation problem, but a question of solidarity, reciprocity, legitimacy, and public acceptability under scarcity. The reverse is true; when high-income countries prioritise themselves, excess deaths are displaced onto families and communities in lower-income settings. The ethical question is not whether trade-offs exist, but whose lives, capabilities, and wellbeing are made more vulnerable by the allocation system.

Overall, these results link scenario narratives to measurable equity outcomes and underline the need for measures that secure equitable access to countermeasures under crisis conditions. By putting the foresight findings on systemic vulnerabilities into conversation with the quantitative assessment of pandemic outcomes, the modelling underscores how structural weaknesses, such as uneven health-care capacity, variations in public health infrastructure, and differing levels of vaccine confidence, can magnify the impact of a pandemic. The results illustrate that national-level decisions on vaccine allocation and hesitancy do not occur in isolation: inequitable distribution and delayed uptake can substantially increase morbidity and mortality in lower-income countries, even as higher-income countries achieve substantial reductions. These results suggest that

	Total	HIC	UMIC	LMIC	LIC
No vaccination	58.5 M	12.5 M	25.1 M	18.8 M	2.1 M
Pathogens of war	23.9 M	2.4 M	10.4 M	9.6 M	1.5 M
Pathogens of war (vaccine confident)	22.7 M	2.2 M	10.2 M	9.2 M	1.0 M
Renaissance of solidarity	21.2 M	3.9 M	9.1 M	6.7 M	1.5 M
Renaissance of solidarity (vaccine confident)	19.3 M	3.8 M	8.8 M	6.0 M	0.7 M

HIC=high-income country. UMIC=upper-middle-income country. LMIC=lower-middle-income country. LIC=low-income country. M=million.

Table 4: Deaths over the first 24 months of a hypothetical influenza pandemic overall and by income status

equitable allocation is politically demanding as a reduction in global mortality might require wealthier countries to forego some relative advantage.

7.4 Linking systemic vulnerabilities, scenarios, and measurable risks

The Commission's findings underscore that pandemic readiness must move beyond assessment of emergency plans, stockpiles, or surveillance systems towards an understanding of people's substantive capabilities (their genuine opportunities to protect themselves, maintain livelihoods, and preserve wellbeing) and how these are shaped by systemic stressors. Across communities and countries, interacting systemic vulnerabilities emerge when institutional and social arrangements assume access to resources, stable services, and trusted information that are absent for large populations, producing predictable and cascading losses of capability.

Foresight scenarios provide a structured lens for understanding how these vulnerabilities might evolve under plausible future conditions. In highly fragmented and transactional futures, systemic vulnerabilities are amplified through rule fragmentation, securitised or commodified supply chains, and attenuated crossborder information sharing, producing inequities that favour power rather than need. In patchwork regional futures, vulnerabilities are partly mitigated within blocs through pooled capacity and executable cooperation, yet selective solidarity and cross-bloc fragmentation continue to expose non-members and marginalised populations. In reform and solidarity futures, systemic vulnerabilities are more likely to be attenuated through routinised cooperation, enforceable allocation rules, accountable institutions, shared financing, and strengthened information integrity, showing that governance and institutional design are crucial determinants of equitable protection. Quantitative modelling formalises why inequities endure without enforceable cooperation, highlighting an asymmetric dilemma in which rational actors could optimise national outcomes even when collective losses are larger. Moreover, it underscores that access alone is insufficient and that protection of capabilities is contingent on trust, inclusion, and perceived fairness.

Centre communities in protection	Prevent, anticipate, and detect		Govern for trust and system function		Invest, learn, and adapt		Recover, repair, and plan for a better future	Recalibrate regional and global governance	
1	2	3	4	5	6	7	8	9	10
Community participation and inclusion	One Health and multihazard readiness	Social conditions that enable protection	Cross-government leadership and accountable systems	Trust, voice, and information integrity	Financing and resource mobilisation	Evidence, metrics, and real-time adaptation	Recovery, repair, and restoration	Regional countermeasure ecosystems	Global governance for equity and accountability
• Meaningful, resourced participation • Safe dialogue and listening • Remove legal, digital, and administrative barriers	• Integrated One Health governance • Early warning and surveillance • Cross-border One Health coordination	• Act on social determinants of health • Health promotion and public health education • Protect livelihoods and financial security	• Whole-of-government leadership • Primary health care and essential services • Rights-based emergency legal frameworks	• Two-way risk communication • Detect and counter misinformation • Community trust and feedback systems	• Expand domestic fiscal space • Invest in public goods with accountability • Predictable and accountable financing	• Independent scientific advice • Practical metrics that matter • Real-time monitoring and course correction	• Institutionalise postcrisis learning • Restore essential services with equity • Mental health and workforce wellbeing	• Regional manufacturing and supply resilience • Equitable technology transfer and market shaping • Regional financing and rapid access	• Enforceable and financed agreements • Aligned mandates and subsidiarity • Independent global monitoring and accountability
The PRIME test: a continuous stress test for policies, plans, and investments									
Protection and wellbeing Does this reduce avoidable harm and strengthen capabilities and wellbeing?		Equity Does this reach those most underserved and remove structural barriers?		Trust and voice Have communities shaped design and can feedback loops support adaptation?		System Does this anticipate interactions and safeguard future generations?			
Outcomes: protection in practice <i>Effective and safe protection for all</i> People are protected from avoidable harm and can access care and support		<i>Equitable access for all</i> Everyone, especially marginalised groups, can access protection and services		<i>Livelihood and financial security</i> People and businesses can maintain and recover livelihoods with dignity		<i>Trust and voice strengthened</i> People trust institutions, are informed, and can influence decisions		<i>System resilience for recovery and restoration</i> Systems learn, adapt, and recover stronger with sustained investment	

Figure 5: From recommendation to delivery: PRIME foundational blocks and the PRIME test

Ten recommendations organised under six interlocking foundational blocks across the pandemic cycle. PRIME=Pandemic Readiness through Institutions, Mobilising Communities, and Equity.

Taken together, qualitative evidence, foresight scenarios, and targeted modelling converge to show that systemic vulnerabilities are patterned, predictable, and modulated by structural and relational foundations at community, national, and global levels. This provides an actionable basis for the Commission's recommendations on which institutional reforms and policy choices can most effectively interrupt cascading capability loss and advance equitable PPPRR. Our integrated approach provides a map of systemic vulnerability that can be leveraged towards a framework for intervention, establishing that advancing PPPRR and equity requires deliberate design of systems that embed enforceable cooperation, equitable allocation, and robust relational foundations across all levels of governance.

Part 8. The NUS–Lancet PRIME Commission manifesto

8.1 Recommendations

The COVID-19 pandemic revealed a pattern of systemic vulnerabilities that cut across prevention, preparedness, response, and recovery, linking community realities to national governance and to regional and global arrangements. Technical capacity alone proved insufficient in regions where delivery systems were weak, inequities were entrenched, trust was fragile, or financing was episodic and reactive. Resilience depended less on formal plans than on whether structural, social, and institutional foundations were aligned to protect people in practice.

This Commission advances a set of integrated recommendations that move beyond checklist preparedness towards operational, equity-oriented, and system-level reform. The recommendations are organised across six interdependent foundational blocks (figure 5): centring protection on people and communities; preventing, anticipating, and detecting risk; strengthening governance for trust and effective system function; investing, learning, and adapting; recovering and planning for the future; and recalibrating regional and global governance. These foundational blocks provide the organising architecture through which recommendations are designed, sequenced, and implemented, linking diagnosis directly to delivery. Our recommendations seek to shift pandemic readiness from episodic emergency response to durable protection, grounded in community partnership, institutional accountability, sustained financing, and achievable equity at national, regional, and global levels. The focus is on building strong national foundations for whole-of-society readiness, with the regional and global recommendations enabling the conditions to support national and community-level systems to function under stress. The appendix (pp 58–70) outlines actions required, lead actors, and 12-month milestone deliverables against each block.

Block A: centre protection on people and communities

The community level is where PPPRR take place in practice, and individuals and communities are central agents across the pandemic cycle. No society is better

prepared, or better able to respond, than its most marginalised member, because effective response depends on everyone being able to act on public health guidance. Communities also play a crucial role in filling gaps in formal responses, providing peer support, and generating essential contextual knowledge for targeted and effective action.

Future PPPRR needs a people-centred approach that centres the protection of people's and communities' capabilities, bringing into focus individual and communal agency and what works in practice at the very local level. Community action through consultative processes, knowledge generation, liaising, and service delivery is a valuable and essential contribution to whole-of-society PPPRR. Our case studies reveal how community initiatives can pre-empt and respond to context-specific needs with agility and efficiency, and act as key partners in knowledge generation, decision making, and the design of contextually appropriate policies and measures. Yet these initiatives are often under-resourced, unequally dispersed, and can lack accountability. These initiatives cannot substitute for effective governance and should not be expected to compensate for systemic gaps.

The Commission's findings further show that vulnerability is produced through wider political, legal, and regulatory environments. Although some countries are expanding investment in community engagement and participation, others are moving in the opposite direction—tightening migration policies, linking access to services to legal status or documentation, expanding digital surveillance, and reinforcing administrative barriers that exclude or deter marginalised groups from seeking care. These trends directly undermine the feasibility of protection and amplify risk, entrenching the very vulnerabilities exposed during the COVID-19 pandemic. Ensuring effective community-centred protection requires not only resourcing participation, but shifting the legal, administrative, and discursive frameworks that legitimise exclusion through deliberate political choice and collective action, so that equitable access to care and public health measures becomes possible in practice.

Drawing on these findings, the Commission advances recommendation 1: resourcing and embedding community participation and inclusion, including assessing and strengthening legal, administrative, and digital enablers that drive PPPRR, especially for migrants and marginalised groups.

Block B: prevent, anticipate, and detect

Across 20 case studies, the COVID-19 pandemic laid bare systemic weaknesses in pandemic prevention. Failures were evident in the operationalisation of One Health, in poor interoperability and fragmented surveillance systems within and across borders, and in the chronic underprioritisation of public health

prevention, particularly in contexts of polycrisis in which competing political and fiscal pressures diverted attention from long-term risk reduction. Despite growing recognition of interconnected risks across human, animal, and environmental systems, governance and financing remain largely siloed, and current geopolitical and fiscal pressures continue to hamper efforts toward integrated, multihazard coordination. Prevention also remained too narrowly focused on detecting and controlling infectious threats, without sufficient attention to the social and material conditions that drive exposure and people's access to protection. The case studies showed how insecure livelihoods and inadequate or overcrowded housing could render public health measures infeasible in practice. Addressing the social determinants of health is therefore integral to prevention strategies that intervene on the structural drivers through which pandemic risk is generated and amplified.

The Commission advances this prevention framework through recommendations 2 and 3: operationalising One Health and multi-hazard readiness through integrated surveillance, cross-government national authorities, and cross-border coordination; and preventing the harms of infection by strengthening health promotion and addressing the social determinants of health.

Block C: governance for trust and system function

A pandemic of the magnitude of COVID-19 stress-tested preparedness and response, exposing structural and systemic weaknesses that require coordinated and sustained action. Many countries entered the crisis with overstretched health-care systems, under-resourced public health institutions, and little capacity to manage multihazard and polycrisis environments. During the response phase, measures were often rigid and insufficiently adapted to diverse community needs, reflecting weak whole-of-society integration, unclear or overly centralised legal frameworks, and emergency powers that were either inadequate to enable timely action or insufficiently safeguarded to prevent exclusion and rights violations. These shortcomings were compounded by fragile communication strategies, erosion of trust, and the rapid spread of misinformation.

Addressing these failures requires preparedness and response plans that operate as integrated systems rather than parallel silos. Universal health coverage, health system readiness, strong public health institutions, and resilient social care must be reinforced, with particular attention to service reach and continuity through primary care and a supported, flexible workforce. Cross-sector collaboration must be institutionalised through clear and predefined legal frameworks that delineate roles, safeguard accountability, and enable rapid yet proportionate emergency action. Communication must be regarded as a core system function, requiring sustained

investment in two-way engagement, culturally grounded messaging, and coordinated approaches to misinformation that strengthen, rather than assume, public trust.

The Commission advances this systemic approach through recommendations 4 and 5: strengthening cross-government leadership, health system resilience, workforce capacity, and robust legal foundations to sustain care and protection through crises; and building trust through continuous, two-way risk communication and safeguarding information integrity across borders.

Block D: invest, learn, and adapt

The COVID-19 pandemic exposed weaknesses in how preparedness is financed and evaluated. Financing systems were episodic and insufficient, marked by underinvestment in peacetime and reactive scrambling and surges during crisis. Funding mechanisms were complex and slow, limiting agility and disadvantaging lower-capacity settings, and fragmented instruments were often misaligned with operational priorities, constraining autonomy and exacerbating inequities. These arrangements were reinforced by how readiness was defined and measured, privileging formal compliance over implementation capability. As a result, preparedness frequently appeared stronger in formal documentation than in practice. Case studies revealed persistent documentation–practice gaps: investments translated weakly into front-line capability, protocols proved infeasible, and regulations were undermined by implementation constraints. This disconnect generated false reassurance, delayed course correction, and prioritised compliance over capability. Evidence and front-line experiences were incompletely integrated into policy, slowing adaptive response.

Addressing these weaknesses requires a shift from episodic financing to stable, sustained, and sufficient investment, and from checklist preparedness to implementation capability. Measurement must focus on operational performance, equity, capability, and wellbeing, ensuring that identified gaps trigger corrective financing and reform rather than symbolic compliance. Learning systems must integrate technical, social, and community knowledge to enable real-time adaptation across cycles and crises.

The Commission advances this shift through recommendations 6 and 7: securing stable, accountable, and predictable financing for PPPRR across cycles and crises; and using practical metrics and real-time learning, guided by communities and independent science, to update PPPRR and test implementation for equity and wellbeing.

Block E: recover, repair, and plan for a better future

Recovery from pandemics requires joint efforts with communities to transform and address structural weaknesses exposed during crises, rather than merely restoring lost capacities. Yet many countries remain behind in achieving meaningful recovery from the

COVID-19 pandemic. Our case studies reveal that structural and social reforms were not consistently institutionalised, health systems remain fragile, workforce depletion and human capital erosion persist, and social protection and equity measures have not been systematically embedded into preparedness and response frameworks.

Recovery must therefore move beyond restoration toward transformation. It requires a whole-of-government and whole-of-society approach, with communities as active partners, and must prioritise those most harmed. This means rebuilding and advancing resilient health and social care systems, restoring and safeguarding essential services such as education, supporting livelihoods and small and medium-sized businesses, strengthening and supporting the health workforce including by addressing mental health needs, and embedding social protection and equity as enduring components of preparedness rather than temporary crisis measures.

The Commission advances this approach through recommendation 8: recovering through transformation and community participation to strengthen essential services, mental health, workforce wellbeing, and long-term support for those most at risk of harm.

Block F: recalibrate regional and global governance

Effective pandemic readiness requires coordinated action across borders, beginning at the regional level and reinforced globally. Yet multilevel cooperation throughout the COVID-19 pandemic often remained congested, fragmented, and unevenly aligned with national realities. Formal frameworks proliferated, but administrative complexity, weak operational embedding, diplomatic constraints, market concentration, supply-chain fragility, and episodic financing restricted the extent to which global and regional arrangements translated into timely and equitable support. Across our case studies, a persistent disconnect emerged between international advancements and national implementation: progress at regional and global levels was not always visible, understood, or operationally relevant to national stakeholders, limiting uptake and impact. In many settings, these dynamics widened inequities and reinforced incentives for bilateralism or self-reliance rather than collective protection.

Rebuilding cooperation requires leaner, better-integrated functions with a clear division of labour between global norm-setting, regional policy harmonisation, and country-based operational delivery. Cross-border coordination should prioritise equity in countermeasures, regulatory convergence, predictable and rapid financing, protected transparency, and resilient supply systems capable of withstanding political and market pressures. The COVID-19 pandemic demonstrated that achieving equitable access will require expanding and diversifying manufacturing capacity. Developing geographically distributed production,

including end-to-end capabilities in currently underserved regions, reduces structural dependency, strengthens supply resilience, and increases overall global capacity. Regional coordination is central to this effort, enabling shared-manufacturing ecosystems, technology transfer, and pooled procurement, while bridging global commitments and national delivery. Communication channels between global, regional, and national levels must be strengthened to ensure that international decisions are translated into actionable national guidance, and that national realities inform global deliberations. Multilevel governance should be assessed not by the number of initiatives launched or reports produced, but by whether it reduces friction, accelerates access, and expands feasible options for countries under stress.

The Commission advances this approach through recommendations 9 and 10: strengthening regional countermeasure ecosystems; and rewiring regional and global governance around subsidiarity, equity, accountable leadership, and predictable financing.

The recommendations are designed to overcome one of the most persistent barriers in pandemic readiness: the gap between formal plans and operational reality. They provide a framework for aligning structural, institutional, and community-level capacities, ensuring that preparedness is coherent, connected to communities, and adaptable to evolving risks. By embedding equity, accountability, and community engagement into operational practice, the recommendations create mechanisms to monitor, assess, and adapt readiness in real time, linking governance, financing, and learning systems to tangible outcomes and enabling system-wide resilience.

These priorities are aligned with ongoing global efforts to strengthen pandemic preparedness, including the 2025 WHO Pandemic Accord, updates to the International Health Regulations, the establishment of the Pandemic Fund, and negotiations around a PABS system. Although these milestones signal unprecedented political commitment to cooperation, financing, and equitable access, implementation gaps, uneven operationalisation, and ongoing negotiations around benefit-sharing highlight persistent challenges. In parallel, the resurgence of bilateral health security agreements illustrates the ongoing tension between multilateral frameworks and state-driven approaches to pandemic governance. The Commission's recommendations speak directly to these tensions, setting a clear direction towards equitable access, shared benefit, and accountable multilateralism as central conditions for effective pandemic readiness. They complement these global initiatives by translating high-level commitments into actionable, locally relevant strategies that strengthen protection and enable meaningful measurement of readiness.

PRIME should therefore be read as implementation architecture rather than a substitute for existing reforms.

The Commission asks a complementary question: once legal commitments, financing instruments, exercises, supply-chain plans or national strategies exist, do they reach people in practice, remove structural barriers, strengthen capabilities and wellbeing, maintain trust and voice, and adapt when harms or inequities appear? This is the gap the foundational blocks and PRIME test are designed to fill.

There are important issues this Commission does not address, primarily because robust data are not yet available and because key areas of pandemic readiness remain characterised by uncertainty and rapid change. These include the full scope of private-sector roles in pandemic readiness, detailed operational guidance for specific hazard types beyond viral threats, and long-term economic and geopolitical dynamics that shape global supply chains and access to countermeasures. Although these limitations do not diminish the relevance of the recommendations, they highlight areas for future inquiry, ongoing monitoring, and iterative refinement of preparedness strategies.

8.2 From recommendation to delivery, the PRIME foundational blocks and the PRIME test

The recommendations outlined in section 8.1 define what needs to change. The PRIME foundational blocks and the PRIME test set out how these changes can be delivered in practice, translating priorities into feasible, sequenced action across community, national, regional, and global levels. Together, they provide an operational framework to close the persistent gap between formal plans and real-world protection.

These deliverables were chosen because the Commission's evidence identified three linked implementation needs: to organise complex recommendations into sequenced packages that countries and partners can act on; to test each policy, plan, or investment against feasibility, equity, trust and voice, and system effects; and to quantify, through modelling, the consequences of cooperation or fragmentation. They connect diagnostic findings on vulnerability to real-world delivery, rather than adding another static checklist.

The foundational blocks function as modular components that organise delivery across the full pandemic cycle, and the PRIME test operates alongside them as a continuous decision-making tool. Used together, they shift implementation from static planning to adaptive management, enabling policy makers and practitioners to identify binding constraints, align actions across systems, and adjust in real time as conditions evolve. This modular approach draws on experience from Singapore's Pandemic Preparedness and Response Framework,²³⁷ which shifts from pathogen-specific planning toward a disease-agnostic model and organises preparedness around modular measures that can be tailored, scaled, and combined across different threats and contexts. This allows for

Panel 14: The PRIME test, assessing protection in practice

The PRIME test is a practical framework designed to assess whether policies, plans, and investments deliver protection in practice. It comprises four assessment domains: protection and wellbeing, equity, trust and voice, and system, providing a structured way to interrogate whether proposed measures are feasible, equitable, trusted, and system aware, and to identify where adjustments might be needed before or during implementation.

- Protection and wellbeing examine whether a measure reduces avoidable harm and strengthens the capabilities and wellbeing of people and communities, including access to care, livelihood security, and sustained wellbeing across the cycle. Suggested questions include: can this measure be complied with by all individuals and communities without incurring substantial capability losses; and what complementary measures are required to mitigate foreseeable harms and protect wellbeing?
- Equity considers whether a measure reaches those most under-served and removes structural barriers to protection and care, including barriers related to legal status, affordability, financing, documentation, discrimination, geography, or digital access. Suggested questions include: what known access barriers may exclude segments of the population from health care, public health measures, financial support, or social protection; and how will marginalised groups, informal workers, or undocumented people specifically access protection, support, and services?
- Trust and voice assess whether communities and front-line actors have shaped priorities and design, and whether two-way communication and feedback loops support

adaptation, including transparent communication of uncertainty and timely detection and response to misinformation and disinformation. Suggested questions include: has this measure been designed with affected populations and key stakeholders; is the definition of relevant stakeholders sufficiently broad and inclusive, particularly of marginalised groups; and are there mechanisms to ensure that people experiencing gaps and exclusions can be heard, and that these gaps can be addressed in a timely manner?

- System examines whether a measure anticipates interactions across systems, prevents cascading effects, and safeguards the wellbeing, capabilities, and opportunities of future generations. It asks whether policies have been designed with cross-sectoral input, whether they anticipate secondary impacts across the PRIME foundational blocks, and whether they strengthen system resilience, recovery, and redress. Suggested questions include: have the measures been designed with cross-sectoral and multilevel input; do they include monitoring for secondary impacts that could amplify inequity or system strain; will they strengthen recovery and the capacity of systems to learn and adapt after a crisis; and do they protect the wellbeing, capabilities, and opportunities of future generations?

Applied iteratively, the PRIME test supports decision making across design, implementation, and evaluation, helping ensure that preparedness measures translate into protection that is feasible, equitable, trusted, and sustained in practice.

PRIME=Pandemic Readiness through Institutions, Mobilising Communities, and Equity.

flexible, context-specific implementation while maintaining a consistent standard for protection. It recognises that implementation will unfold under varying degrees of political commitment, fiscal space, and institutional capacity, requiring prioritisation, negotiation, and adaptation rather than uniform adoption. The foundational blocks described in section 8.1 provide the core architecture for organising action across pandemic readiness, linking domains from community protection and prevention to governance, financing, recovery, and regional and global coordination. As shown in figure 5, the blocks move from recommendation to delivery: they are tested by the PRIME test, driven by communities, delivered through systems, and ensure accountability for outcomes. Crucially, they integrate structural capacities, such as financing, workforce, supply chains, legal access, surveillance, and regional countermeasure systems, with relational foundations including leadership, trust, coordination, community participation, information integrity, and real-time learning.

Complementing these blocks is the PRIME test, a practical stress test for any policy, plan, or investment,

and a roadmap for operationalising pandemic readiness. The PRIME test is both the guiding principle for the design of the foundational blocks and a core mechanism for guiding their implementation. It shifts the focus from formal compliance to protection in practice by evaluating five core outcomes: effective and safe protection for all; equitable access to protection, support, and essential care; livelihood and financial security; strengthened trust and voice; and system resilience for recovery and restoration. Four linked questions align with the core outcomes (panel 14): does the measure reduce avoidable harm and strengthen the capabilities and wellbeing of people and communities (protection and wellbeing; livelihood security)? Does the measure reach those most underserved and remove structural barriers to protection and care (equity)? Have communities shaped the measure's design and will feedback loops support adaptation, including in response to misinformation (trust and voice)? Does the measure anticipate interactions across systems, prevent cascading effects, and safeguard the wellbeing, capabilities, and opportunities of future generations (system)? The five core outcomes were developed

iteratively from the Commission's capability-based conceptual framework and synthesis of evidence across the country case studies, community and stakeholder research, and foresight work. They were subsequently refined through discussion and review with Commissioners and collaborators to capture the principal dimensions against which pandemic readiness measures should be assessed.

Applied at the stages of design, implementation, and evaluation, the PRIME test embeds protection, equity, participation, wellbeing, intergenerational responsibility, and system resilience as measurable outcomes rather than aspirational principles. It functions as a rule for decision making across governance levels throughout the policy cycle, shaping priorities at the design stage, guiding sequencing during implementation, and defining triggers for course correction in monitoring and evaluation. In this way, the PRIME test ensures that feasibility, equity, participation, wellbeing, intergenerational responsibility, and system resilience are built into decisions prospectively rather than assessed retrospectively.

The foundational blocks and the PRIME test provide an integrated framework for implementation, linking system design, decision making, and delivery. Through their interaction, they enable actions to be aligned, tested, and adapted in ways that reduce systemic vulnerabilities and sustain protection in practice. Figure 5 summarises these relationships, illustrating how the PRIME framework moves from foundational blocks, through the PRIME test, to protection in practice.

8.2.1 How to implement the PRIME foundational blocks and PRIME test

Implementation follows a structured, repeatable sequence that countries can use whether establishing preparedness architecture for the first time or recalibrating existing plans. The aim is to identify binding constraints to protection and remove them in ways that are feasible, equitable, and sustainable.

First, map the current system against the PRIME foundational blocks. This step involves consolidating existing plans, institutions, legal frameworks, financing streams, and operational capacities into a single functional map. The purpose is not to produce a descriptive inventory but a stress assessment to identify what already works under pressure, what fragments, and where structural or relational weaknesses constrain feasible and equitable protection. The central task is to generate an operational view of readiness across the full cycle.

Second, convene structured validation dialogues. These dialogues should bring together communities, front-line health-care and service providers, civil society organisations, public health leaders, and cross-government actors. They serve two functions: to test whether the mapped system reflects lived and operational

reality, and to surface gaps, contested assumptions, and implementation barriers. Validation ensures that the map reflects real constraints rather than formal intent and identifies when plans assume compliance without enabling it.

Third, translate the validated map into a sequenced action plan. Working across blocks, stakeholders identify actions that can be strengthened rapidly, areas requiring structural redesign or sustained investment, and elements dependent on regional or global coordination. For each priority action, the plan should define clear ownership, delivery channels, financing sources, legal enablers, and a targeted set of operational milestones achievable within 6–12 months. The objective is to assemble a minimum viable configuration of foundational blocks that removes the most binding constraints to protection, rather than producing an exhaustive but undeliverable reform agenda.

Fourth, apply the PRIME test as the decision-making rule throughout design and implementation. The test functions as a structured stress check on each major policy choice and on the overall package. It assesses whether actions reduce harm, expand equitable access, sustain trust and meaningful participation, and anticipate cross-sectoral system effects. In situations for which the test signals foreseeable harms, inequities, trust erosion, or operational strain, the package should be revised before scale-up. In this way, feasibility, equity, and system resilience are built in prospectively rather than assessed retrospectively.

Fifth, embed monitoring, learning, and course correction into delivery. Monitoring should focus on whether capabilities hold under stress and whether access gaps are widening, essential services remain continuous, and workforce and institutional strain are reaching unsafe thresholds. Indicators should be paired with explicit triggers for adaptation, for example persistent uptake gaps among disproportionately affected groups or rising disruption to routine care. Monitoring thus shifts from compliance reporting to real-time protection management.

Finally, implementation should be articulated as a coherent theory of change. The foundational blocks define the structural and relational inputs required for protection. The PRIME test provides safeguards to ensure actions are feasible, equitable, trusted, and system sensitive. The implementation logic remains consistent across contexts: identify constraints to protection, align the foundational blocks to remove them, apply the PRIME test to prevent predictable harms, and adapt through continuous feedback until protection is effective for those most at risk.

This approach recognises heterogeneity across countries while preserving a stable core architecture. The sequence is modular, but the standard is constant; readiness is achieved only when protection works in lived conditions and is sustained across PPPRR.

Conclusion: PRIME's contribution to pandemic readiness and next steps

PRIME redefines pandemic readiness as the capacity of societies and systems to protect people and sustain wellbeing across prevention, preparedness, response, and recovery. It shifts assessment from formal compliance and technical capacity toward whether capabilities are preserved and systemic vulnerabilities reduced under real-world conditions. PRIME's contribution is reflected in four advances in paradigm, methods, findings, and translation.

To advance a people-centred, community-grounded paradigm, PRIME links lived conditions in communities to national delivery systems and to the regional and global arrangements that shape feasibility, trust, and equity. It treats pandemic readiness as inseparable from multihazard governance and conceptualises vulnerability and protection as dynamic pathways operating across levels and over time.

The Commission conducted 20 national qualitative case studies involving 819 participants across community and institutional sectors, using shared protocols that enabled structured cross-country comparison while preserving contextual depth. Qualitative comparison, participatory scenarios, and modelling were deliberately integrated to interrogate the same mechanisms across levels and plausible futures, linking lived experience to quantified consequences for equity and avoidable harm. Across settings, five recurrent patterns of systemic vulnerability were identified: subsistence insecurity; housing insecurity and crowding; administrative exclusion from health and social protection; institutional distrust and information vulnerability; and system fragilities that transfer risk to households. The evidence shows that readiness depends on alignment between structural foundations (financing, workforce, supply chains, and legal access) and relational foundations (trust, legitimacy, communication, and coordination). Prevention and recovery consistently emerged as underdeveloped domains despite their central role in reducing future risk.

Finally, PRIME moves beyond diagnosis of vulnerabilities or problems to translating evidence into implementation architecture. The PRIME foundational blocks provide a modular, sequenced approach to delivery, and the PRIME test offers a practical stress test for policies and investments. Together, they introduce a delivery, feasibility, and equity lens to existing preparedness metrics and explicitly assess system effects. Composed of a multidisciplinary network of partners, commissioners, and researchers who led this work, the PRIME collective aims to extend these efforts into sustained learning and accountability beyond publication. PRIME thus reframes readiness from a static inventory of capacities to a dynamic test of whether systems can protect people equitably, legitimately, and sustainably under stress.

Next steps for the PRIME collective

The PRIME collective will move from evidence to implementation through a coordinated dissemination and accountability strategy. The Commission's recommendations, the PRIME test, and the implementation foundational blocks will be released as an integrated policy package, supported by practical tools, country and regional briefs, and facilitation guides to enable adoption and delivery.

Implementation will begin with practical country and regional roundtables that bring together communities, practitioners, public authorities, funders, and partners to adapt the foundational blocks, apply the PRIME test to concrete plans and budgets, identify binding constraints, and define measurable protection indicators. This gives the next phase a clear route from publication to use: convene, diagnose, stress test, prioritise, finance, monitor, and adapt.

The global launch at the UN General Assembly in September, 2026, aligned with the UN high-level meeting on pandemic prevention, preparedness and response, will be paired with national and regional launches led by country teams and partners. Each launch will convene structured, whole-of-society dialogues using the PRIME test and foundational blocks to identify context-specific priorities, sequence action, define monitoring approaches, and establish accountability mechanisms.

To sustain implementation, a PRIME implementation and learning network with schools of public health and partner institutions will provide technical support, peer learning, shared monitoring methods, and mentorship for next-generation scholars. PRIME will also contribute to regional and global accountability debates, including advancing a global monitoring and accountability function for pandemic readiness and equity to strengthen coherence, transparency, and alignment between global commitments and delivery on the ground.

PRIME starts and ends with the people who experience crises first and for longest, and we thank the communities and participants across diverse settings who shared their time, insight, and concerns. Their accounts show that many failures are not isolated or unexpected, but predictable cascades that arise when prevention is weak, when trust and communication are not addressed, when access is blocked by administrative and social barriers, and when recovery and restoration are neglected.

Drawing on the hard lessons of the COVID-19 pandemic, the NUS–Lancet PRIME Commission redefines pandemic readiness by analysing lived experiences from communities across 20 countries and integrating this analysis with future scenarios and epidemiological modelling. In doing so, the Commission offers a practical blueprint for whole-of-society pandemic planning and implementation. The next phase must

For more on the UN High Level Meeting see <https://www.un.org/en/civil-society/2026-pandemic-prevention-preparedness-response>

therefore be one of coordinated action across communities, institutions, and borders, using the PRIME test, the PRIME foundational blocks, and the Commission's recommendations to turn commitments into delivered protection, equity, participation, and sustained wellbeing in practice. By applying the Commission's manifesto and tools, governments and communities can move from plans on paper to people-centred protection across the full cycle, from prevention through recovery. In this way, PRIME offers a pathway to transform recurring vulnerabilities into a stronger and more resilient foundation for future health crises and to reshape pandemic readiness for the 21st century.

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Contributors

AQC, HOV, LF, ME, MTE, PS, RB, SC-L, and SH were involved in conceptualisation, data curation, formal analysis, investigation, methodology, project administration, and writing (original draft, review, and editing). ALG-B, AN, ARC, AR-S, A-SJ, DH, EE, HC, LYH, ISLN, JW, JMV, KL, KR, MK, MS, MTE, MT, OA, SF-P, VH, VL, VT, YM, Y-SL, and Y-YT were involved in the conceptualisation of the study and reviewing the final draft. HL-Q was involved throughout all stages of the Commission, including conceptualisation, methodology, investigation, formal analysis and interpretation, project administration, supervision, and writing (original draft, review, and editing), and provided overall scientific and strategic leadership for the research and preparation of the Commission report. HL-Q also contributed across the conceptual, methodological, and editorial work of the Commission, including the integration and interpretation of findings across the different workstreams and the development and revision of the final Commission report. AR-S, A-SJ, EE, HL-Q, KL, MTE, PS, and SH were involved in the background papers and reviews working group, contributing to the conceptualisation, data curation, formal analysis, investigation, methodology, and writing of the original and final drafts of the background papers that informed this report. ALG-B, AQC, HL-Q, HOV, JW, LF, ME, MS, MT, MTE, PS, RB, SC-L, SH, VT, and YM were involved in the formal analysis, investigation, methodology, and project administration for the country case studies, and the writing (original draft, review, and editing) of the country case study reports. AQC, HOV, LF, ME, PS, RB, SC-L, and SH contributed to the formal analysis, investigation, methodology, project administration, and writing of original and final drafts of country case study reports, as well as the review of the final draft of this report. DH, KL, and SF-P were involved in the conceptual, methodological, and editorial working group, contributing to the conceptualisation and writing of the original and final drafts of this report. HL-Q, LYH, PS, and Y-YT were additionally involved in funding acquisition for the Commission.

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Board Oversight Committee at the Consortium for Clinical Research and Innovation Singapore; and member of the Ministry of Health Singapore Precision Medicine. ISLN is a member of the National Research Foundation Singapore Board and Audit Committee, National Medical Research Council (NMRC) Singapore Translational Research Investigator Award Review Panel, NMRC Open Fund Large Collaborative Grant Review Panel, Singapore Management University Board of Trustees, Academic Affairs Committee and Finance and Remuneration Committee at Singapore Management University, Duke-NUS Governing Board (Academic and Research Committee), Development and Investment Committee at Duke-NUS Medical School Singapore, and is an advisory member of the Tsinghua Academic Advisory Council at Tsinghua University, China. ISLN also serves as a paid senior advisor for SingHealth Board at Singapore Health Services. MK has served on the Data Safety Monitoring Board of the IMAGINE trial and is the chair of the Tuberculosis Vaccine Initiative. HC declares receiving consultancy fees from The George Institute for Global Health for the Commission work and is a former Prime Minister of New Zealand. DH and LYH declare no competing interests.

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