GPMB
GLOBAL PREPAREDNESS MONITORING BOARD

A world on the edge

Priorities for a pandemic-resilient future

2026 GPMB REPORT & ANALYTICS

GPMB

GLOBAL PREPAREDNESS MONITORING BOARD

A world on the edge

Priorities for a pandemic-resilient future

2026 GPMB REPORT & ANALYTICS

A world on the edge — Priorities for a pandemic-resilient world, 2026 GPMB report. Launch version.

Suggested citation. A world on the edge — Priorities for a pandemic-resilient world, 2026 GPMB report. Global Preparedness Monitoring Board, Geneva: World Health Organization; 2026. Licence: CC BY-NC-SA 3.0 IGO.

Cataloguing-in-Publication (CIP) data. CIP data are available at *http://apps.who.int/iris*.

Acknowledgements

We would like to thank Dr Tedros Adhanom Ghebreyesus, WHO Director-General, and Mr Ajay Banga, President of the World Bank, for convening the GPMB. We express our deep appreciation to the GPMB Secretariat for supporting the development of this report. We are also grateful to the World Health Organization for hosting the GPMB Secretariat and making the work of the GPMB possible. Finally, we are grateful for the financial support provided to the GPMB Secretariat by the Gates Foundation and the Institute of Philanthropy that has facilitated the development of this report.

Table of contents

Foreword

Our final report on global preparedness is both hopeful and sobering. Its message is stark.

Eight years ago, the GPMB was created to help ensure the world would never again experience a devastating crisis like the West African Ebola epidemic. Five new Public Health Emergencies of International Concern and numerous outbreaks have since tested countries and institutions alike, including a pandemic that reshaped societies, economies, and politics across the globe. Important reforms have followed: the WHO Health Emergencies Programme, Pandemic Fund, WHO Pandemic Agreement, United Nations High-Level Meetings, and billions invested in prevention, preparedness and response.

But the world we address today is very different from the one we confronted in 2018. It is a world of greater volatility, uncertainty, fragmentation and interconnected shocks with far-reaching consequences.

In this final report, we answer the fundamental question of whether our world is safer than it was a decade ago.

Our conclusion is grounded in an examination of the evidence. And that evidence is clear: health, economic, social and political impacts of health emergencies have not diminished, and in important areas are growing. In short, **reforms have not kept pace with rising pandemic risk — the world is not yet meaningfully safer**.

At the heart of this reality is a profound erosion of trust and unresolved inequities in access to basic services and medical countermeasures.

The world is now on the edge — a further fracturing of public trust, and rupturing of the collective action needed to address inequities, will leave all countries even more deeply exposed to the grave, inevitable health, social and economic impacts witnessed in the last pandemic.

However, we conclude our mandate convinced that political leaders, stakeholders and industry can rapidly change the trajectory of global preparedness by embracing the **three concrete priorities of this report—independent monitoring, equitable access to countermeasures and sustainable financing**. The GPMB emphasizes that advancing trust and equity ultimately requires multistakeholder accountability—across public, private and civil society actors—to translate commitments into measurable progress. Accordingly, our lead recommendation: independent monitoring must continue—**the world needs a holistic, uncompromising view from outside the system, that can speak uncomfortable truths, and anchor the ongoing innovation and investment needed to be truly prepared, globally**.

The GPMB is honored to have helped advance global preparedness over the past eight years and trusts that leaders will seize upcoming opportunities to act on our recommendations and ensure the world is better equipped to anticipate, withstand and respond to future health crises.

HE Kolinda Grabar-Kitarović
GPMB Co-Chair and former President of Croatia

Ms Joy Phumaphi
GPMB Co-Chair and former Minister of Health of Botswana

Key messages

1 GLOBAL PREPAREDNESS IS FAILING TO KEEP PACE WITH PANDEMIC RISK

- Within months of the **GPMB's first report warning that the world was not prepared for a fast-moving pandemic**, COVID-19 struck, the deadliest respiratory pandemic since 1918. Despite considerably more knowledge, tools and resources, the **trajectory of pandemic risk is moving in the wrong direction**.
- Climate change and armed conflict are exacerbating risk; geopolitical fragmentation, the erosion of civic space, and commercial self-interest are undercutting collective action. The enormous potential of advanced AI tools and digital technology to transform PPR is being compromised and —without safeguards and effective governance—could reduce health security and accelerate the access gaps that defined COVID-19.

2 THE EVIDENCE IS ALARMING—TRUST IS ERODED & INEQUITY EXPOSED

- **Public health emergencies of the past 10 years—from Ebola to mpox—demonstrate that the world is not substantially safer from their impact**, with rising economic and social costs, weakening access to medical countermeasures, declining financing, and societies emerging poorer, more unequal and more divided. Critical areas are neglected, from One Health and multisectoral approaches to calibrating public health and social measures and confronting misinformation.
- **Most critical, the bedrock of PPR—trust and equity—is collapsing**. Trust is eroding: between governments and citizens; between countries; in multilateral organizations; in industry. Deep-rooted inequity is exposed: in access to information, knowledge, financing, and countermeasures, from personal protective equipment to life-saving vaccines.

3 PRIORITIES FOR ACTION

- Broad-based, enduring trust and sustainable equity can be advanced, even while confronting misinformation, by establishing:
  - ***independent, multisectoral and comprehensive pandemic risk monitoring***, powered by cutting-edge, ethical AI and digital tools, directly accountable to the World Health Assembly (WHA), and reporting, through the WHA, to the UN General Assembly and relevant international and regional fora, especially on trade, financing, security, agriculture and animal health;
  - ***equitable access to countermeasures***, through finalization, ratification and full implementation of the WHO Pandemic Agreement, and robust regional manufacturing capacity, supported by technology transfer, workforce development and targeted investment;
  - ***sustainable financing***, with robust 'Day 0' financing mechanisms, standing commitments to the Pandemic Fund, and the obligation of domestic resources, enabled by a financial architecture that strengthens national investment capacity.

4 POLITICAL ATTENTION IS VITAL

- Pandemic and broader, multi-hazard PPR is no longer only constrained by capacities but by challenges to collective action that only political leaders can resolve.
- Sustained, unwavering political engagement is vital, beginning with two exceptional opportunities in 2026: to finalize the WHO Pandemic Agreement and to agree on new, meaningful commitments at the 2nd UN High-Level Meeting on PPPR to advance independent monitoring, equitable access and sustainable financing.

GPMB
GLOBAL PREPAREDNESS MONITORING BOARD

Pandemic risk is moving in the wrong direction

The Global Preparedness Monitoring Board (GPMB) was established in 2018 following the devastating 2014–2016 West Africa Ebola epidemic, to assess global preparedness and drive reforms to make the world safer from health emergencies. Ten years after the end of the epidemic, the world has shifted profoundly, becoming more volatile, uncertain, complex, and ambiguous (VUCA). The decade has been marked by successive public health crises, most notably the COVID-19 pandemic, which triggered the deadliest pandemic since 1918, the sharpest global economic contraction since the Great Depression, and the most far-reaching disruption since World War II. **COVID-19 was not an isolated event, but the result of converging global trends that are driving increased pandemic risk, including climate change, ecological disruption, increased mobility, and armed conflict.**[1] At the same time, new technologies have advanced at unprecedented speed, including novel vaccine platforms, breakthroughs in diagnostics and genomics, and the rapid expansion of artificial intelligence and digital tools. Yet their enormous potential to transform PPR risks being undermined by misinformation, as well as legitimate concerns around data security, governance and privacy. In parallel, growing geopolitical fragmentation, nationalism and commercial self-interest are weakening the collective action on which PPR depends.

Together, these trends have contributed to profoundly weakening trust and exposing deep-rooted inequities, eroding the very foundations of effective PPR.

PPR has become more challenging, as the systems and conditions required for effective action are increasingly under strain. Preparedness financing remains highly dependent on political attention: declining between crises and constrained by rising debt burdens, fiscal pressures and shifting priorities. Health systems are weakening with reduced capacity to maintain essential services and respond to shocks. Inequities in access to medical countermeasures persist, and sustained political commitment remains uneven.

Over the past decade, new initiatives and mechanisms have emerged in response to these challenges, including the Pandemic Fund, the WHO Pandemic Agreement, the Africa CDC, the African Vaccine Manufacturing Accelerator (AVMA) and the 100 Days Mission. These efforts reflect a growing recognition of the need for faster, more coordinated and more equitable responses to health emergencies. Yet it is not clear that these investments are translating into a world that is measurably safer from the impacts of pandemics and other health emergencies, especially in this changing, VUCA world.

Building on the 2025 GPMB Report, ***The New Face of Pandemic Preparedness***, this report examines how this new environment has shaped the impacts of health emergencies over the past decade and what accelerating complexity, shifting geopolitical dynamics, and transformative technological change mean for strengthening preparedness and reducing risks in the years ahead. **This report uses the GPMB Monitoring Framework to assess how the impacts of the six new Public Health Emergencies of International Concern (PHEICs) of the past decade have evolved and identifies the areas where they are now most acute.**[2]

The year 2026 represents a capstone moment for GPMB as it concludes its mandate. It coincides with critical global processes that will help shape the future of PPR. Through this analysis, the Board seeks to bring authoritative evidence into global discussions at a time when aligning political commitments with real-world risk is more important than ever.

The Impact dimension of the GPMB Monitoring Framework evaluates how the immediate and long-term consequences of health emergencies evolve. This report assesses these impacts across the six public health emergencies of international concern (PHEICs) that were declared in the last 10 years.

The heatmap below summarizes the Board's assessment across the Impact indicators.

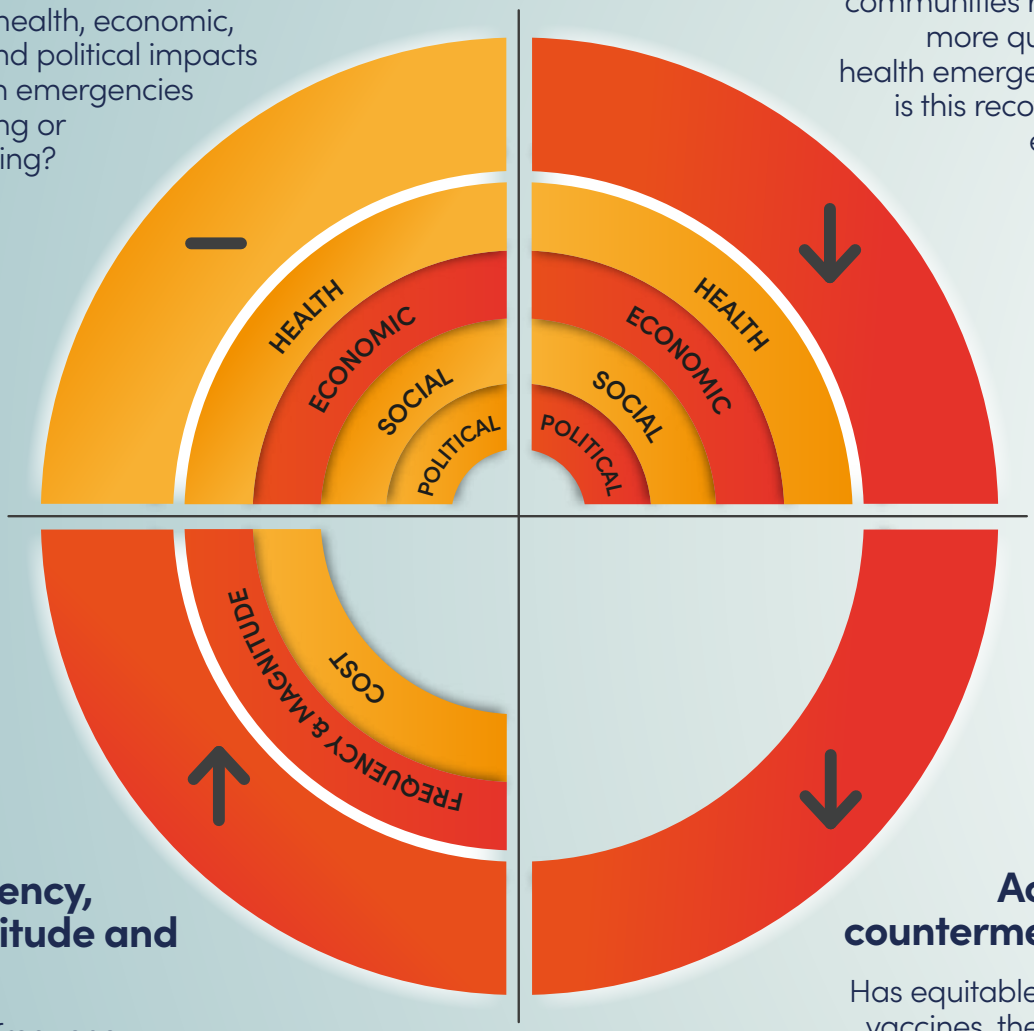
Figure 1. Impact of recent Public Health Emergencies of International Concern on global pandemic risk

Health, economic, social and political impacts

Are the health, economic, social and political impacts of health emergencies increasing or decreasing?

Speed and equity of recovery

Are countries and communities recovering more quickly from health emergencies and is this recovery more equitable?



Frequency, magnitude and costs

Are the frequency, magnitude and cost of health emergencies increasing or decreasing?

Access to countermeasures

Has equitable access to vaccines, therapeutics, diagnostics and other countermeasures improved or declined?

Worsening

No change

Improving

A decade on, the world is not safer from health emergencies

Multiple impacts signal mounting concerns

There are alarming signs that resilience could be weakening rather than strengthening, despite recent investments. Even impacts that appear stable over time continue to drive significant societal disruption.

This analysis finds that:

- **Infectious disease outbreaks are becoming more frequent and more consequential in terms of the number of cases and/or deaths**, reflecting the changing risk landscape, including shifts in global mobility patterns, agricultural practices and farming, climate change, and urbanization.[3]
- **The short- and long-term economic impacts of health emergencies[4] are increasing and driving important structural shifts in economies**, with the greatest impacts seen in outbreak responses that rely heavily on public health and social measures.
- **The timeliness and equity of access to medical countermeasures have declined.** A worrying "equity fatigue" is emerging, marked not only by reduced political and financial commitment, but by diminishing action to sustain equitable access as a global priority.
- Following the surge in COVID-19 response financing, overall development assistance for health has returned to levels last seen in 2009[5] and has decreased as a share of overall development assistance.[6]

Investments in preparedness have strengthened since the COVID-19 pandemic, but shifting geopolitical priorities now threaten to undermine this progress.

- **Many societies have emerged from major health emergencies poorer, more unequal, and more divided.** This is particularly concerning because previous Board analyses[7] identified these very factors as key drivers of pandemic risk, creating a vicious cycle in which post-crisis fragility fuels a spiraling pandemic threat.

PPR is not keeping pace with changing risks.

Taken together, these trends suggest that preparedness efforts are being outpaced by new and more complex stressors, including pandemic risks[8], geopolitical instability, and rapidly evolving information ecosystems. They point to a future in which pandemics and other public health emergencies may become more frequent, more disruptive, and harder to manage, in a world that is more vulnerable, more uncertain, and marked by declining trust and widening inequities. Without a step change in PPR capacities to explicitly address pandemic drivers, improve declining commitment to equity and collective action, and rebuild trust, the world risks entering a cycle of accelerating health crises, where each new shock further erodes resilience and widens existing fractures.

What a decade of PHEICs reveals about the impact of health emergencies

The GPMB developed the first-ever comprehensive monitoring framework to assess the state of pandemic risk, looking at drivers of pandemics and health emergencies, preparedness capacities to mitigate these drivers, and their impacts over time, including the world's capacity to recover. The Board has been testing this framework since its publication in May 2023, first assessing preparedness capacities in 2023[9], then reviewing pandemic drivers in 2024[10]. This assessment of impacts completes the framework's first full review cycle.

The Impact dimension of the GPMB Monitoring Framework evaluates how the immediate and long-term health, economic, social, and political consequences of health emergencies evolve over time. It assesses whether preparedness investments are effectively reducing risk and mitigating harm, using four composite indicators[11]:

GPMB Impact Indicators

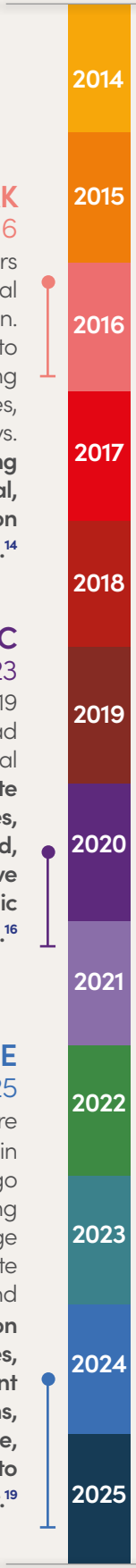
1. whether the frequency, magnitude and cost of health emergencies are stable, increasing or decreasing;
2. whether the health, economic, social and political impacts of health emergencies are increasing or decreasing;
3. whether equitable access to vaccines, therapeutics, diagnostics and other countermeasures has improved or declined;
4. whether countries and communities are recovering more quickly from health emergencies and if this recovery is more equitable.

To review progress in mitigating these impacts over time, this report assesses these four areas across the six public health emergencies of international concern (PHEICs) that were declared in the last 10 years[12]: starting with the 2014–2016 West African Ebola epidemic, which led to the creation of GPMB; the 2016 Zika epidemic, largely concentrated in Latin America; to the 2018–2020 Ebola outbreaks in the Democratic Republic of Congo, the COVID-19 pandemic, and the recent multi-country mpox outbreaks and surge (2022-2025). While this analysis is limited by the small number of PHEICs, the different nature of those PHEICs, and the relatively short time since several major PPR reforms were put in place (e.g. Pandemic Fund, WHO Pandemic Agreement, Africa CDC, AVMA, and the 100 Days Mission), it identifies clear trends and areas for improvement.

Each of these events began with only a handful of cases that encountered the right conditions to spread rapidly and, in some instances, explosively. Although caused by four different pathogens, all had the potential to generate high mortality and/or morbidity and to trigger profound health, economic, social, and political disruption. The difference between a localized outbreak, a swiftly contained epidemic, and a global pandemic depends not only on pathogen characteristics but on the resilience of countries, institutions, and communities and on their PPR capacities. In all six cases, the trajectory of the initial outbreaks could potentially have been changed through more timely, coordinated action supported by an ecosystem of strong capacities, effective institutions, and trust.

Understanding the impacts of these crises enables us to assess whether years of commitments and investments in preparedness have delivered genuine protection, or whether substantive vulnerabilities remain.

Six Public Health Emergencies of International Concern (PHEICs) 2014–2025



WEST AFRICA EBOLA EPIDEMIC

8 August 2014 to 29 March 2016

This epidemic began in rural Guinea before spreading rapidly across borders into Liberia and Sierra Leone, ultimately becoming the largest Ebola outbreak ever recorded. **Weak health systems, dense mobility networks, and delayed international support allowed the virus to overwhelm national capacities, resulting in more than 28,000 cases and 11,000 deaths.**[13]

ZIKA VIRUS OUTBREAK

1 February to 18 November 2016

This PHEIC was declared in response to clusters of microcephaly and other neurological disorders in areas with Zika virus transmission. Infection during pregnancy was found to cause Congenital Zika Syndrome, including microcephaly, brain and eye abnormalities, seizures, and profound developmental delays. **Thousands of babies were born with lifelong disabilities, placing sustained medical, financial, and psychosocial burdens on families and health and social-care systems.**[14]

DRC EBOLA OUTBREAK

17 July 2019 to 26 June 2020

These outbreaks occurred primarily in North Kivu and Ituri in the east of the country, unfolding in an active conflict zone where insecurity, mistrust, and attacks on health workers severely hindered the response. Despite the rapid deployment of medical countermeasures that helped contain the outbreak, there were more than 3,400 cases and 2,300 deaths. **The crisis highlighted both the advances in Ebola preparedness since the West African epidemic and the persistent fragility of health systems and response operations in complex humanitarian settings.**[15]

COVID-19 PANDEMIC

30 January 2020 to 5 May 2023

Caused by the SARS-CoV-2 virus, COVID-19 emerged in December 2019 and rapidly spread worldwide, triggering an unprecedented global health, economic, and social crisis. **Despite remarkable advances in diagnostics, vaccines, and therapeutics developed at record speed, over 20 million deaths were estimated to have occurred, with the largest global economic contraction since World War II.**[16]

MPOX MULTI-COUNTRY OUTBREAKS

23 July 2022 to 11 May 2023

The rapid, global spread of clade IIb mpox, beginning in May 2022, affected more than 120 countries, the vast majority of which had no previous history of the disease. **This was the first sustained, multi-continent transmission of mpox, driven largely by close-contact networks and international travel.** The event exposed major gaps in surveillance, risk communication, and equitable access to vaccines, diagnostics, and treatment.[17]

2024 MPOX SURGE

14 August 2024 to 5 September 2025

From 2023, an upsurge of the more severe clade I/Ib mpox emerged, centered in the Democratic Republic of the Congo and extending into several neighbouring countries. This more virulent lineage had a markedly higher case fatality rate and substantial impact on children and underserved populations.[18] **Transmission spread through households, communities, and health-care settings, placing significant strain on already fragile health systems, highlighting persistent gaps in surveillance, cross-border coordination, and access to diagnostics, vaccines, and treatment.**[19]

Key evidence and insights from the GPMB analysis

Assessing the four impact dimensions of the GPMB Monitoring Framework across the six PHEICs reveals clear and concerning trends. The section below highlights the key findings, with the full analysis presented in the *Annex—Monitoring the impacts of PHEICs over the past decade: Evidence, analysis and insights.*

Is the frequency, magnitude and cost of health emergencies increasing or decreasing?

The frequency and magnitude of health emergencies are increasing, and the cost of response vs preparedness remains approximately the same.

Frequency and magnitude

In 2024, WHO detected almost twice as many health emergency events as in 2015. Although faster detection may have reduced the proportion of outbreaks that evolve into large epidemics, those that do break through have become high-impact events, as demonstrated by the scale of recent PHEICs. Overall, global deaths due to infectious diseases had fallen from 25% of all deaths in 2000 to 15% in 2015, but jumped back to 23% in 2021[20], due to the profound effect of COVID-19. Without the pandemic, infectious diseases would have accounted for only 11% of global mortality.[21] At the same time, **new drivers of risk are fueling a marked rise in emerging infectious diseases and zoonoses.**[22] In short, while the routine burden of infectious diseases is declining, **the frequency and severity of large-scale health emergencies are increasing**.

Response cost vs preparedness investments

Excluding COVID-19, **the cost of responding to health emergencies has remained stable** in the last decade. COVID-19 triggered the most expensive health emergency response on record but also catalyzed a step-up in preparedness funding that is still visible today. However, these gains are at risk due to shifting geopolitics, economic realities and fiscal priorities pushing spending downward. At the same time, WHO's financial and political footing has weakened, alongside a broader decline in international cooperation. As countries invest less in global health and systemic resilience, the potential impact of future outbreaks becomes significantly greater.

Are the health, economic, social and political impacts of health emergencies increasing or decreasing?

The health, social, and political impacts of health emergencies have remained largely unchanged, while the economic impacts are increasing.

Health

Health systems have accumulated response experience and internalized some lessons but **the systemic toll of pandemics and epidemics on health has seen limited improvement**. Across the PHEICs, an estimated one-third to one-half of survivors experienced mental health impacts. During both the West African Ebola epidemic and COVID-19 pandemic, the ratio of direct to excess mortality reached more than 30%[23], and access to antenatal care dropped by close to 40%[24]. Even low-fatality outbreaks such as Zika caused significant harm, with Congenital Zika Syndrome contributing to a measurable rise in infant mortality. These patterns reflect deep, persistent structural weaknesses in health systems that remain unaddressed, leaving them vulnerable to severe disruption—and, in some contexts, collapse—when crises occur.

Economic

As outbreaks expand and responses rely more heavily on public health and social measures (PHSM), economic impacts tend to rise in parallel. Responses that relied more on PHSM, such as the West African Ebola epidemic and the COVID-19 pandemic, saw worse economic outcomes. **Across both events, these effects followed a similar pattern, though they were far more pronounced during COVID-19 due to its global reach and prolonged disruptions.** During the West African Ebola epidemic and the COVID-19 pandemic, GDP declined by 5.1% and 2.9%,[25,26] public debt burdens rose by 13.7pp and 16pp,[27,28] and inflation increased by 5.1%,[29] respectively. In the first year of the COVID-19 pandemic, foreign direct investment fell dramatically (by 51% [30]), marking the steepest decline ever recorded. **Encouragingly, most economies have shown notable resilience, often rebounding faster than expected. However, these shocks came with longer-term structural shifts, including changes in trade patterns, fiscal deficits and widening inequalities. These effects were considerably more profound during the COVID-19 pandemic.**

Calibrating public health and social measures appropriately remains a persistent challenge. During both the West African Ebola epidemic and the COVID-19 pandemic, limited surveillance capacity, delayed case detection, and insufficient contact tracing led to the widespread use of highly disruptive, population-wide measures such as lockdowns and movement restrictions. These measures, while often necessary in the absence of timely and targeted interventions, carried high economic costs (as well as social and political consequences), and disproportionately affected vulnerable populations. They also exposed weaknesses in governance, including challenges in transparent decision-making, risk communication, and the provision of adequate social protection, factors which, in some contexts, contributed to declining public trust in the public health responses.

Social

Regardless of scale, **the social impacts of Ebola, Zika and COVID-19 have been remarkably similar**. In all three crises, the most vulnerable populations (women, children, informal workers, and marginalized groups) bore the greatest burdens. Where social protection systems were weak and trust in institutions was low, the consequences were far more severe: millions were pushed into poverty, educational progress was reversed (with ~50% of children out of school during Ebola in West Africa,[31] 20% in affected areas during Ebola in the DRC[32], and 80% globally during COVID-19[33]), millions of jobs were lost (83% of mothers with children affected by Zika left the labour market)[34], and child marriage increased (~ 2–3 million additional marriages during the COVID-19 pandemic).[35] Across contexts, weak information ecosystems and rising misinformation further magnified these harms by undermining trust and fragmenting social cohesion.

Political

From Ebola to COVID-19, the impact on governance and politics has grown significantly, with expanded state authority, rising polarization, and populist narratives increasingly eroding trust in institutions and weakening multilateral cooperation. During the West African Ebola epidemic, the Ebola outbreak in the DRC, and the COVID-19 pandemic, elections were postponed and governments relied heavily on border closures, movement restrictions, and emergency powers. The COVID-19 pandemic also brought a global reduction in media freedoms. These dynamics deepened societal divisions and undermined the consensus needed for effective crisis response.

Has equitable access to vaccines, therapeutics, diagnostics and other countermeasures improved or declined?

Equitable access to vaccines, therapeutics, diagnostics and other countermeasures has declined.

Despite the stark inequities in access to medical countermeasures during the COVID-19 pandemic, and subsequent efforts to address this problem, **momentum towards achieving equitable access may have begun to reverse**. During the recent mpox outbreaks, access was even slower: vaccines took 24–27 months to reach affected low-income countries, compared with 17 months for low-income countries during the COVID-19 pandemic.[36]

These setbacks reflect persistent structural failures: vaccines and treatments for priority pathogens do not yet exist or remain in early clinical development; global manufacturing is limited and concentrated; and early supplies are locked up through advance purchase agreements, stockpiling and export restrictions by high-income countries. LMICs also face delayed and unpredictable financing, regulatory and logistical hurdles, and weak delivery systems, all of which slow rollout even when tools finally become available.

There are increasing signs of a waning willingness to prioritize and finance equitable access ("equity fatigue"). This shift reflects a convergence of political fatigue, rising domestic pressures, and the perception that delivering equity is too complex, resource-intensive, or politically costly. As governments turn inward and the brief surge of solidarity seen during the COVID-19 pandemic recedes, momentum behind equity-focused reforms is weakening. This retreat risks cementing inequities as an accepted norm in global health, eroding hard-won progress, further marginalizing vulnerable populations, and undermining the foundations of future PPR.

Are countries and communities recovering more quickly from health emergencies and is this recovery more equitable?

Recovery is not faster or more equitable; the rate of health and social recovery is unchanged, and economic and political recovery has declined.

Health

Ebola, Zika, COVID-19, and mpox have all left lasting health impacts—many of which are still only partially understood, including long-term complications among survivors and a significant, enduring mental health burden. Although health systems have demonstrated resilience across these events, the long-term consequences of service disruptions, particularly during Ebola in West Africa and the COVID-19 pandemic, have persisted well beyond the acute phases. Interruptions to immunization, elective surgeries, and preventive care have increased disease burdens and widened existing health gaps, with recovery often taking years. The West African Ebola epidemic resulted in up to 16,000 additional measles deaths in the 18 months following the end of the PHEIC,[37] and COVID-19 is projected to cause 49,000 additional deaths due to missed immunizations between 2020 and 2030.[38] Health systems worldwide remain vulnerable, and their ability to recover from these broader health impacts does not appear to have fundamentally improved since 2016.

Economic

While economies recovered after recent PHEICs, the most fragile countries struggled to regain lost ground, falling further behind their pre-crisis trajectories and contributing to widening global inequalities. In West Africa, Ebola led to prolonged setbacks in growth, poverty reduction, and fiscal stability, whereas the DRC's outbreaks had more localized and shorter-lived economic impacts. The COVID-19 pandemic, far more than Ebola, reshaped the global economy in ways that will influence development for decades. Its effects on debt, labour markets, trade patterns, and supply chains are likely to redefine economic interdependence and resilience for a generation. Post-COVID, inflation remains half a percentage point higher (2025),[39] the world is projected to experience more than US$ 50 trillion in lost output between 2020 and 2030, and surveys show a 20% increase in companies regionalizing their supply chains.[40,41] The pandemic also weakened public finances over the long term (with a 12% increase in general gross government debt from 2019 to 2025), constraining governments' ability to invest in health and social systems and potentially reshaping the role of the state in economic and social policy.

Social

Ebola and COVID-19 both left deep and enduring social scars, from widespread orphanhood and mental-health challenges to widened educational and income disparities. More than 22,000 children were orphaned in West Africa during the Ebola epidemic,[42] and over 10.5 million children lost a caregiver during the COVID-19 pandemic,[43] leading to long-term trauma and vulnerabilities. The Zika outbreaks caused lasting educational exclusion for children with Congenital Zika Syndrome, limiting their long-term developmental and socioeconomic potential. Informal employment has continued to rise in the wake of both crises, growing by 3% in Liberia between 2010 and 2017 following the Ebola epidemic[44] and increasing globally after the COVID-19 pandemic by about 1% compared with 2019 levels.[45] Recovery has been uneven and inequitable, shaped by countries' differing capacities to close these gaps and stabilize social systems. These impacts have further entrenched long-standing structural inequalities.

Political

Health emergencies can erode democratic norms and strain governance for years, with prolonged states of emergency, restrictions on civil liberties, and heightened polarization often outlasting the crises themselves. In West Africa, many indicators of political recovery (such as those measured by V-Dem[46] and the Economist Democracy Index[47]) showed only partial improvement even five years after the Ebola epidemic. The COVID-19 pandemic has had an even more severe and enduring impact. By 2024, key indicators of democracy, civil liberties, polarization, and trust had still not returned to pre-pandemic levels. Trust in government, in particular, has been slow to rebound, undermined by sustained polarization, politicized public health responses and attacks on scientific institutions.

This democratic erosion has direct consequences for preparedness: weakened institutional trust, politicized governance, and diminished civil society space make it harder to sustain the cross-sectoral planning, public investment, and community engagement that effective preparedness requires. Countries entering the next health emergency with these pre-existing democratic deficits are less likely to have preparedness strategies that are politically sustained, subject to adequate oversight, or trusted by the populations they are meant to protect.

Looking ahead: PPR priorities for the next decade

More than 10 years after the Ebola epidemic in West Africa, the world is increasingly shaped by volatility, uncertainty, complexity and ambiguity.[48] Rapidly shifting risks, competing crises, fragmented geopolitics, and unpredictable global dynamics are making threats harder to anticipate, responses more difficult to coordinate, and vulnerabilities quicker to escalate. At the same time, resilience has been weakened by the cumulative effects of recent PHEICs: health systems have been severely strained; education losses persist; long-term health consequences continue to undermine population well-being; public debt has risen sharply; and mistrust and polarization remain deeply entrenched.

The greatest and most consequential casualty of these trends has been the profound erosion of trust and equity — the absolute bedrock of effective PPR.

Trust has been deeply compromised across all levels, between governments and citizens, among countries, and across multilateral institutions and industry, while profound inequities persist in access to information, knowledge, financing, health services and medical countermeasures. These dynamics are deeply intertwined: where equity is absent, trust cannot endure and where trust breaks down, the cooperation needed to correct inequities becomes much harder to sustain. The root causes lie within both the larger geopolitical and societal context where trust is increasingly compromised and localized[49], and within the health system itself, in part due to the residual effects of the COVID-19 response, including inequities in access to medical countermeasures, information, essential health services and social protection measures.

Together, these pressures make the world not only more likely to face epidemics and pandemics going forward, but also more vulnerable to their cascading impacts.

At the same time, scientific, technological, and operational capabilities have advanced dramatically, from rapid vaccine development and real-time genomic surveillance to AI-driven analytics and agile global communication systems. These advances, however, coexist with rising inequalities, geopolitical fragmentation, public distrust and security concerns, and mounting systemic strain, leaving the world paradoxically better equipped technologically while increasingly exposed socially, economically and politically.

This VUCA world is making PPR harder, but more important than ever.

Significant investments over the past decade have strengthened preparedness systems and capacities, yet GPMB's analysis shows that gains remain uneven and inadequate to reliably reduce the impacts of health emergencies or close persistent gaps. And because the world has shifted so dramatically, today's risk landscape requires new preparedness strategies capable of operating amid low trust, tight fiscal space, and growing unpredictability.

In this context, building broad-based, enduring trust and advancing sustainable equity are now the urgent priorities for multi-hazard PPR. This is possible, even in this increasingly VUCA world and in an environment that is increasingly shaped by misinformation. But it will require sustained political leadership and a commitment to evidence-based decision-making, directing resources to where they are most needed, and safeguarding accountability as political and fiscal pressures intensify.

To rebuild the trust needed to advance equity, this report points to four critical areas for action at the national and international levels.

RECOMMENDATION

1 ESTABLISH AN INDEPENDENT, COMPREHENSIVE AND MULTISECTORAL PANDEMIC RISK MONITORING MECHANISM REPORTING TO THE WORLD HEALTH ASSEMBLY

Current pandemic monitoring is fragmented, under-resourced, and structurally vulnerable to political and institutional interference. Closing this gap requires an independent monitoring mechanism that is empowered and directly accountable to the World Health Assembly and that can provide a trusted basis for action and help rebuild confidence in health systems and public institutions.

The World Health Assembly should establish an **independent, credible, transparent and comprehensive risk monitoring mechanism, powered** by cutting-edge, reliable AI and digital tools, and formally linked to the UN General Assembly and all relevant international policy fora for trade, finance, security, agriculture and animal health.

Monitoring architecture

- The pandemic risk monitoring mechanism should be established through a **WHA resolution with a defined mandate**, governance structure, and a sustainable funding stream that is not subject to annual political negotiation and ensures its independence.
- The scope of monitoring should be **multisectoral** (including **One Health**, R&D, finance, trade, tourism and travel, transportation, security, education, agriculture and food systems) **and comprehensive** (from assessing pandemic threats to vulnerability, risk and advancing action). It should **support implementation of the amended IHR and the WHO Pandemic Agreement**.
- The mechanism should operate through a **federated model**, accessing, coordinating and synthesizing information from all relevant existing national, regional, and international efforts, rather than duplicating existing infrastructure. These inputs should be integrated to provide a holistic analysis of pandemic risk, linking threat, vulnerability, preparedness, and response, and generating independent global insights and clearer signals for action.
- The mechanism should **formally report to the WHA, and through the WHA to the UN General Assembly** and governing bodies of agencies that are central to a multisectoral response, especially FAO, IMF, UNEP, UNICEF, WIPO, WOAH, the World Bank and WTO.

AI and digital tools

- The pandemic risk monitoring mechanism should be **powered by advanced and ethical AI** to enable risk modelling and early warning.
- Appropriate and ethical **AI governance must be embedded** in the mechanism from the outset, to ensure transparency, equity, and accountability in how data are used, algorithms are applied, and risk signals are translated into policy action. AI-supported analyses must be clearly evidenced and documented, auditable, and with human-in-the-loop oversight and a transparent methodology.
- All countries must have meaningful access to the mechanism's analytical outputs, not just its warnings.

RECOMMENDATION

2 ENSURE EQUITABLE ACCESS TO MEDICAL COUNTERMEASURES IN THE WHO PANDEMIC AGREEMENT WITH REGIONALLY DISTRIBUTED MANUFACTURING

Vaccine inequity during the COVID-19 pandemic was not a market failure: it was a governance failure, enabled by the absence of binding obligations on both states and the private sector. The WHO Pandemic Agreement offers a structural opportunity to correct this, but that opportunity will be lost if governments ratify the Agreement without meaningfully implementing its equity provisions.

To withstand supply chain disruptions, export restrictions, and geopolitical fragmentation, equitable access also requires building more resilient access to countermeasures globally, through distributed manufacturing and regional production capacities, with pre-agreed technology and knowledge transfer and licensing mechanisms to enable it.

Governments must establish binding obligations, predictable financing, and globally distributed capacities to enable timely access to countermeasures by all countries, particularly low- and middle-income countries, rather than relying on voluntary arrangements or market mechanisms alone.

WHO Pandemic Agreement and Benefit-Sharing

- WHO Member States should **finalize, ratify and fully implement the WHO Pandemic Agreement, including the Pathogen Access and Benefit-Sharing system,** as a vital element of the global strategy to ensure equity in access to countermeasures and effective pandemic containment.
- Global mechanisms should be established to implement the WHO Pandemic Agreement and ensure equitable allocation, reliable supply chains, and coordinated procurement.

Regionalized manufacturing capacity, technology transfer & the private sector

- Countries and international partners should strengthen **sustainable regional and distributed manufacturing capacities for personal protective equipment, diagnostics, vaccines and therapeutics, supported by technology transfer,** workforce development, regulatory harmonization, and digital and AI-enabled forecasting and production optimization tools.
- **Pharmaceutical companies** receiving public R&D funding, regulatory fast-tracking, or liability protections **should be required** — as a condition of those benefits — **to participate in equitable allocation mechanisms**. Governments should require that **publicly funded R&D agreements include provisions for technology transfer** to regional manufacturing hubs, ensuring that public investment results in more equitably distributed global manufacturing capacity.
- Access to medical countermeasures should not depend on ad hoc voluntary licensing negotiations during crises. **Pre-agreed mechanisms for licensing, technology transfer, and the use of TRIPS flexibilities** should be established through the WTO, WIPO, and WHO.
- Equitable access to countermeasures should be included as a core metric of preparedness performance in the future pandemic risk monitoring mechanism to assess whether availability, affordability, and timely delivery are achieved during crises.

RECOMMENDATION

3 ESTABLISH FINANCING FOR PPR THAT IS SUSTAINED BETWEEN CRISES AND CAN ENABLE IMMEDIATE 'DAY 0' ACTION

Preparedness financing that depends on sustained political attention is inherently fragile: it is prioritized immediately after crises and neglected between them. With political attention shifting and fiscal pressures increasing, preparedness financing is declining, and recent gains are at risk of being reversed. Predictable financing for core PPR and essential health measures is fundamental to rebuilding trust and equity, both of which require a sustained approach over the long term. Financing mechanisms must be designed so that preparedness is sustained, even when political attention declines. As importantly, immediate financing must be available for early action and emergency response, with mechanisms that reduce the economic and political costs for countries that report outbreaks early or implement rapid containment measures.

Governments, donors, and international and regional financial institutions should **establish sustainable financing for PPR, with a coordinated financing architecture** that can mobilize rapid response resources while sustaining long-term preparedness investments.

Day 0 financing

- Countries and regional and international partners should **establish reliable "Day 0" surge financing mechanisms** with pre-authorized disbursement procedures and triggers, enabling the immediate deployment of resources upon detecting a pandemic-prone pathogen. These mechanisms should finance vital early action, including crucial public health measures (i.e. case finding and isolation, contact tracing and quarantine) and deployment of medical countermeasures. They should not depend on political approval during crises.
- **The WHO Contingency Fund for Emergencies should be maintained at a minimum capitalization level of US$100 million** through predictable and secured financing commitments. Emergency response financing should not depend on voluntary fundraising during crises.

Domestic financing

- National governments must **ensure predictable domestic investment in PPR that strengthens the broader health system, integrates One Health and multisectoral risk management, and maximizes the efficiency and impact of existing resources.** They should establish dedicated, ring-fenced domestic financing streams, protected from budget reallocation during non-emergency periods.
- The future pandemic risk monitoring mechanism should track domestic PPR investment as a standard preparedness metric, with public disclosure of allocation and expenditure.

International financing

- Donors, including governments, philanthropies and the private sector, should **make standing financial commitments to the Pandemic Fund,** not pledges renewed on a discretionary cycle.
- Regional institutions should establish financing mechanisms for cross-border preparedness functions, including surveillance, laboratory networks, and distributed manufacturing, as these are regional public goods that cannot be sustainably financed through national budgets.
- The G20 should **prioritize reforms to the global financial architecture** that enable low-income countries to invest in preparedness without sacrificing debt sustainability. This requires addressing structural barriers that limit fiscal space for preparedness and resilience by increasing access to concessional financing, reforming lending conditionalities, and expanding the use of international financial instruments to support sustained investment in PPR.

CROSS-CUTTING RECOMMENDATION

SUSTAIN POLITICAL ATTENTION ON PANDEMIC PREPAREDNESS AND RESPONSE

The main barriers to PPR are no longer only capacity gaps — they are also the barriers to collective action and political economy challenges that only political leaders can resolve. The recommendations above require difficult, binding decisions that have been repeatedly deferred. Rebuilding trust between countries and advancing equity in PPR requires resolving these issues.

The GPMB calls on heads of government to **use the 2026 UN High-Level Meeting on PPPR and the finalization of the WHO Pandemic Agreement to resolve these outstanding political issues and deliver the commitments required to strengthen global preparedness** through independent pandemic risk monitoring, equitable access to all vital countermeasures, and sustainable financing for both preparedness and 'Day 0' response. Political forums such as the G20 and coalitions of committed countries and partners should maintain momentum and support implementation.

Finally, at a time when pandemic risks are increasing, the GPMB is alarmed that geopolitical developments are fragmenting global health cooperation and stresses that effective pandemic PPR depends on the continued participation and commitment of all countries. The GPMB urges all countries to maintain, strengthen, and, where necessary, renew their commitment to multilateral health cooperation, recognizing that global health security ultimately depends on collective action and shared responsibility.

CONCLUSION

Many important reforms have been introduced since the COVID-19 pandemic[50], and their full impact will only become evident in the coming years. For example, finalization and implementation of the WHO Pandemic Agreement, including its pathogen access and benefit-sharing (PABS) annex, will help to address some of the issues identified in this report. However, as investments in PPR slow and important reforms stall, this report's findings offer a clear warning that sustained momentum is essential to prevent preparedness from slipping backward.

This year, 2026, offers a pivotal moment for the multilateral system, UN and WHO Member States to confront the systemic weaknesses highlighted in this report with ambition and unity. If successful, the 2nd UN HLM on PPPR, the PABS negotiations, and wider discussions on the global health architecture can lay the foundations for a more resilient, equitable, and coordinated global approach to PPR.

The decade ahead is likely to see the emergence and amplification of infectious hazards intensify; the world is not going back to the pre-pandemic era. Climate change, demographic shifts, geopolitical volatility, and other converging pressures will continue to drive the challenges facing global health security. At the same time, rapid technological advances offer powerful tools to help, but only if they are harnessed effectively and equitably. To navigate this new era, countries will need to enhance their multilateral collaboration as they invest more strategically and efficiently, directing their resources—both nationally and internationally—towards the capacities and systems that genuinely strengthen global security and reduce the escalating human, economic, and political toll of future health emergencies.

The GPMB's expectation is that the years ahead will be defined by renewed trust and meaningful progress towards equity, as the foundations of a more resilient and effective global system.

References

1 The Changing Face of Pandemic Risk. Geneva: Global Preparedness Monitoring Board (GPMB); 2024 (https://www.gpmb.org/reports/report-2024, accessed April 2026).

2 GPMB Monitoring Framework for Preparedness. Geneva: Global Preparedness Monitoring Board (GPMB); 2023 (https://gpmb.org/reports/m/item/gpmb-monitoring-framework-full, accessed April 2026).

3 See 2024 GPMB assessment of pandemic risk, The Changing Face of Pandemic Risk. Geneva: Global Preparedness Monitoring Board (GPMB); 2024 (https://www.gpmb.org/reports/report-2024, accessed April 2026).

4 These include impacts on GDP, public debt, inflation, trade, foreign investment flows, and commercial flights.

5 Financing Global Health 2025: Cuts in Aid and Future Outlook. Seattle: Institute for Health Metrics and Evaluation (IHME); 2025 (https://www.healthdata.org/sites/default/files/2025-07/FGHReport_2025_2025.07.15_0.pdf, accessed April 2026).

6 Penn C, Morgan D, Ahmad Y, Elgar K, James C. Smart spending to combat global health threats: Tracking expenditure on prevention, preparedness, and response, and other global public goods for health (Health Working Paper No. 175). Paris: Organisation for Economic Co-operation and Development (OECD); 2024. Doi: 10.1787/166d7c57-en.

7 The Changing Face of Pandemic Risk. Geneva: Global Preparedness Monitoring Board (GPMB); 2024 (https://www.gpmb.org/reports/report-2024, accessed April 2026).

8 Ibid.

9 A Fragile State of Preparedness: 2023 Report on the State of the World's Preparedness. Geneva: Global Preparedness Monitoring Board (GPMB); 2023 (https://gpmb.org/reports/m/item/a-fragile-state-of-preparedness-2023-report-on-the-state-of-the-worlds-preparedness, accessed April 2026).

10 The Changing Face of Pandemic Risk. Geneva: Global Preparedness Monitoring Board (GPMB); 2024 (https://www.gpmb.org/reports/report-2024, accessed April 2026).

11 The GPMB Monitoring Framework, which comprises 90 indicators, was developed through an extensive two-year consultation process with more than 100 experts and institutions from all regions and income groups.

12 The GPMB Monitoring Framework assesses impacts arising from all health emergencies arising from infectious hazards; the subset of health emergencies that constitute PHEICs were used in this analysis as they present a clearly defined subset with best data availability.

13 Ebola: West Africa, March 2014-2016. In: World Health Organization (WHO) [website]. Geneva: WHO; 2025 (https://www.who.int/emergencies/situations/ebola-outbreak-2014-2016-West-Africa; accessed April 2026).

14 Zika virus. In: World Health Organization (WHO) [website]. Geneva: WHO; 2025 (https://www.who.int/news-room/fact-sheets/detail/zika-virus, accessed April 2026).

15 Ebola: North Kivu/Ituri, Democratic Republic of the Congo, August 2018 - June 2020. In: World Health Organization (WHO) [website]. Geneva: WHO; 2025 (https://www.who.int/emergencies/situations/Ebola-2019-drc-; accessed April 2026).

16 Coronavirus disease (COVID-19) pandemic. In: World Health Organization (WHO) [website]. Geneva: WHO; 2025 (https://www.who.int/europe/emergencies/situations/covid-19, accessed April 2026).

17 Mpox (monkeypox) outbreak – 2022. In: World Health Organization (WHO) [website]. Geneva: WHO; 2026 (https://www.who.int/emergency/situations/monkeypox-oubreak-2022, accessed April 2026).

18 Mpox outbreak. In: World Health Organization (WHO) [website]. Geneva: WHO; 2023 (https://www.who.int/emergencies/situations/mpox-outbreak, accessed April 2026).

19 Fifth meeting of the International Health Regulations (2005) Emergency Committee regarding the upsurge of mpox 2024. In: World Health Organization (WHO) [website]. Geneva: WHO; 30 October 2025.

20 Global Health Estimates 2021 Summary Tables: Global Deaths by Cause, Age and Sex, 2000-2021. Geneva: World Health Organization; 2024. (https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/ghe-leading-causes-of-death; accessed April 2026.)

21 Ibid.

22 Preventing the Next Pandemic: Zoonotic Diseases and How to Break the Chain of Transmission. Nairobi; United Nations Environment Programme (UNEP); 2020 (https://www.unep.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and, accessed April 2026).

23 See Annex for more information. Parpia AS, Ndeffo-Mbah ML, Wenzel NS, et al. Effects of Response to 2014–2015 Ebola Outbreak on Deaths from Malaria, HIV/AIDS, and Tuberculosis, West Africa. Emerging Infectious Diseases. 2016; 22(3). doi:10.3201/eid2203.150977.

24 See Annex: *Monitoring the Impacts of PHEICs Over the Past Decade: Evidence, Analysis and Insights.*

25 Steepest decline in 2020.

26 See Annex for more information. The Economic Impact of the 2014 Ebola Epidemic. Washington (DC): World Bank Group; 2014. doi: 10.1596/978-1-4648-0438-0.; Stacy B. Rebuilding economies after COVID-19: Will countries recover?. In: World Bank Data Blog [website]. Washington (DC): World Bank Group; 6 September 2023 (https://blogs.worldbank.org/en/opendata/rebuilding-economies-after-covid-19-will-countries-recover, accessed April 2026).

27 Percentage point. Steepest decline due to COVID-19 was observed 2020.

28 See Annex for more information. General government gross debt. In: International Monetary Fund (IMF) [website]. Washington (DC): IMF; 2026 (https://www.imf.org/external/datamapper/GGXWDG_NGDP@WEO/OEMDC/ADVEC/WEOWORLD/VEN/BFA/GIN, accessed April 2026); Gaspar V, Medas P, Perrelli R. Global Debt Reaches a Record $226 Trillion. In: International Monetary Fund (IMF) Blog [website]. Washington (DC): IMF; 15 December 2021 (https://www.imf.org/en/blogs/articles/2021/12/15/blog-global-debt-reaches-a-record-226-trillion, accessed April 2026).

29 See Annex for more information. Inflation rate, average consumer prices. In: International Monetary Fund (IMF) [website]. Washington (DC): IMF; 2026 (https://www.imf.org/external/datamapper/PCPIPCH@WEO/SLE/GIN/LBR, accessed April 2026); Inflation, consumer prices (annual %). In: World Bank Data. Washington (DC): World Bank Group; 2025 (https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG, accessed April 2026).

30 See Annex for more information. Foreign direct investment: Inward and outward flows and stock, annual. In: UN Trade and Development (UNCTAD) [website]. Geneva: UNCTAD; 2025 (https://unctadstat.unctad.org/datacentre/dataviewer/US.FdiFlowsStock, accessed April 2026). World Investment Report 2021: Investing in Sustainable Recovery. Geneva: UN Trade and Development (UNCTAD); UNCTAD; 2021 (https://unctad.org/system/files/official-document/wir2021_en.pdf, accessed April 2026).

31 How the Ebola Crisis is Affecting Education in West Africa. Global Partnership for Education (GPE) [website]. Washington (DC): GPE; 19 November 2014 (https://www.globalpartnership.org/blog/how-ebola-crisis-affecting-education-west-africa, accessed April 2026).

32 80 per cent of school children returned to school in Ebola-affected areas of the Democratic Republic of the Congo. In: United Nations Children's Fund (UNICEF). Kinshasa/Dakar/New York/Geneva: UNICEF; 12 October 2018 (https://www.unicef.org/wca/press-releases/80-cent-school-children-returned-school-ebola-affected-areas-democratic-republic, accessed April 2026).

33 One year into COVID-19 education disruption: Where do we stand?. In: United Nations Educational, Scientific and Cultural Organization (UNESCO). Paris: UNESCO; 19 March 2021 (https://www.unesco.org/en/articles/one-year-covid-19-education-disruption-where-do-we-stand, accessed April 2026).

34 De Oliveira FA, da Silva AM, da Hora SS, de Oliveira SA, da Silva Junior AG, Cardoso CAA. Healthcare for children with congenital Zika syndrome: analysis of access to social rights. Ciência & Saúde Coletiva. 2022; 27(9):3679-3688. doi: 10.1590/1413-81232022279.02972022.

35 The Global Girlhood Report 2020: How COVID-19 is putting progress in peril. London: Save the Children; 2020 (https://resourcecentre.savethechildren.net/pdf/global_girlhood_report_2020_africa_version_2.pdf, accessed April 2026).

36 See Annex: *Monitoring the Impacts of PHEICs Over the Past Decade: Evidence, Analysis and Insights*, chapter Far-reaching impact on lives, systems, and economies.

37 Takahashi S, Metcalf CJ, Ferrari MJ, et al. Reduced vaccination and the risk of measles and other childhood infections post-Ebola. Science. 2015; 347(6227):1240-2. doi: 10.1126/science.aaa3438.

38 Hartner AM, Li X, Echeverria-Londono S, et al. Estimating the health effects of COVID-19-related immunisation disruptions in 112 countries during 2020-30: a modelling study. Lancet Global Health. 2024; 12(4):e563-e571. doi: 10.1016/S2214-109X(23)00603-4.

39 International Monetary Fund. *World Economic Outlook Database: Inflation rate, average consumer prices, annual percent change*. April 2026 edition. Washington, DC: IMF; 2026. Available from: IMF DataMapper, World Economic Outlook.

40 United Nations Department of Economic and Social Affairs (UN DESA), *World Social Report 2024: Social Development in Times of Converging Crises: A Call for Global Action* (New York: United Nations, 2024), accessed April 2026..

41 Alicke K, Foster T, Hauck K, Trautwein V. Tech and regionalization bolster supply chains, but complacency looms. In: McKinsey & Company [website]. New York: McKinsey & Company; 2023 (https://www.mckinsey.com/capabilities/operations/our-insights/tech-and-regionalization-bolster-supply-chains-but-complacency-looms, accessed April 2026).

42 UN declares end to Ebola virus transmission in Guinea; first time all three host countries free. In: UN News [website]. New York: United Nations; 29 December 2015 (https://news.un.org/en/story/2015/12/519082-un-declares-end-ebola-virus-transmission-guinea-first-time-all-three-host, accessed April 2026).

43 Children: The Hidden Pandemic, September 2022, Orphanhood and Caregiver Loss Based on Excess COVID-19 Death Estimates. Global Reference Group on Children Affected by COVID19: Joint Estimates and Action; 2022 (https://www.spi.ox.ac.uk/files/hidden_pandemic_report_september_2022_update_pdf, accessed April 2026).

44 Indicators and data tools. In: ILOSTAT [website]. Geneva: International Labour Organization (ILO); 2026 (https://ilostat.ilo.org/data/?cat_mode=subject, accessed April 2026).

45 Ibid.

46 Country Graph. In: Varieties of Democracy (V-Dem) [website]. Gothenburg: V-Dem; 2025 (https://www.v-dem.net/data_analysis/CountryGraph/, accessed April 2026).

47 Democracy index. In: Our World in Data [website]. Economist Intelligence Unit; 2025 (https://ourworldindata.org/grapher/democracy-index-eiu?tab=table&time=2022..latest, accessed April 2026).

48 The Changing Face of Pandemic Risk. Geneva: Global Preparedness Monitoring Board (GPMB); 2024 (https://www.gpmb.org/reports/report-2024, accessed April 2026).

49 Edelman. *2026 Edelman Trust Barometer: Global Report*. New York: Edelman; 2026. Available from: Edelman Trust Institute.

50 A Fragile State of Preparedness: 2023 Report on the State of the World's Preparedness. Geneva: Global Preparedness Monitoring Board (GPMB); 2023 (https://gpmb.org/reports/m/item/a-fragile-state-of-preparedness-2023-report-on-the-state-of-the-worlds-preparedness, accessed April 2026).

Annex

Monitoring the impacts of PHEICs over the past decade: evidence, analysis & insights

INCREASING

Monitoring Framework Indicator
C.1.1

Is the frequency and magnitude of health emergencies increasing or decreasing?

More events and greater risks, but faster detection and response

Summary

This indicator measures whether the frequency and magnitude of health emergencies are changing over time, asking whether outbreaks are becoming more common and whether they are causing greater morbidity and mortality. Reliable assessment of this indicator remains difficult, however, because many countries face gaps in data collection, inconsistent reporting, and limited analytical capacity.

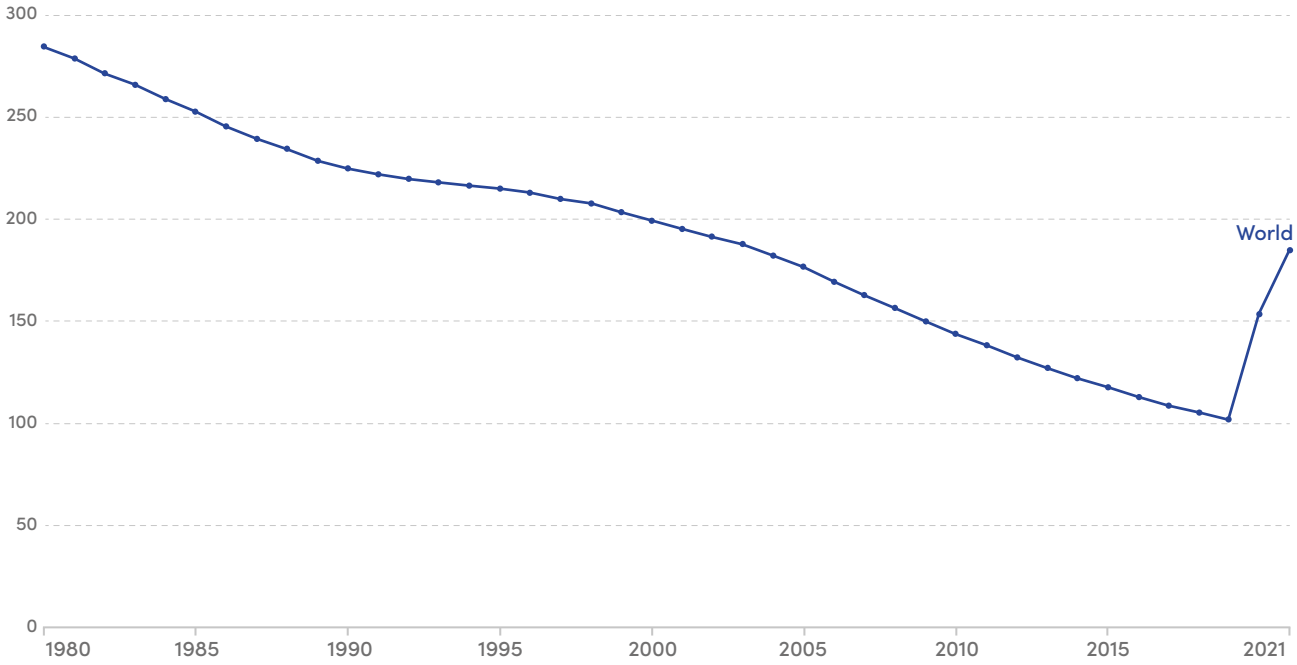
The global burden of infectious diseases has fallen sharply over the past two decades thanks to vaccines, treatments, and stronger health systems, with HIV/AIDS and diarrhoeal deaths declining steeply. Yet, COVID-19 reversed recent gains and showed how fragile this progress is, causing at least 7 million reported deaths, health system breakdowns, and the largest global health shock in modern history. While improved surveillance has helped countries contain many outbreaks earlier, new drivers such as climate change, mobility, and human–animal interactions are increasing both the frequency and potential impact of epidemics.[1] Overall, infectious disease deaths are decreasing, but the risk of high-impact health emergencies is rising.

Analysis

Mortality from pandemics and epidemics in the 21st century has been staggering (see Figure 1), with an estimated 30–60 million deaths collectively attributed to HIV/AIDS[2], COVID-19[3], Ebola[4], Zika[5], MERS[6], Mpox[7], SARS[8], and dengue[9]. HIV/AIDS has accounted for the greatest cumulative toll among all infectious causes of death (14%)[10,11] over several decades, while fast-moving events like COVID-19 and Ebola have shown how quickly new pathogens can overwhelm health systems, cause mass casualties, and disrupt societies.

At the same time, there has been important progress in reducing the overall burden of infectious diseases. Over the last 25 years, global mortality from infectious diseases has declined significantly, with deaths falling by nearly 50% between 2000 and 2019.[12] This progress reflects advances in vaccines, diagnostics, and treatment, as well as broader gains in primary care, sanitation, and socioeconomic development. However, COVID-19 reversed this trend in the short term, underscoring that global improvements are fragile and can be quickly undermined by the emergence of new pathogens.

Figure 1. Death rate from infectious diseases



Estimated annual number of deaths from HIV_AIDS, diarrhea, malaria, respiratory infections, and all other infectious diseases per 100,000 perople.

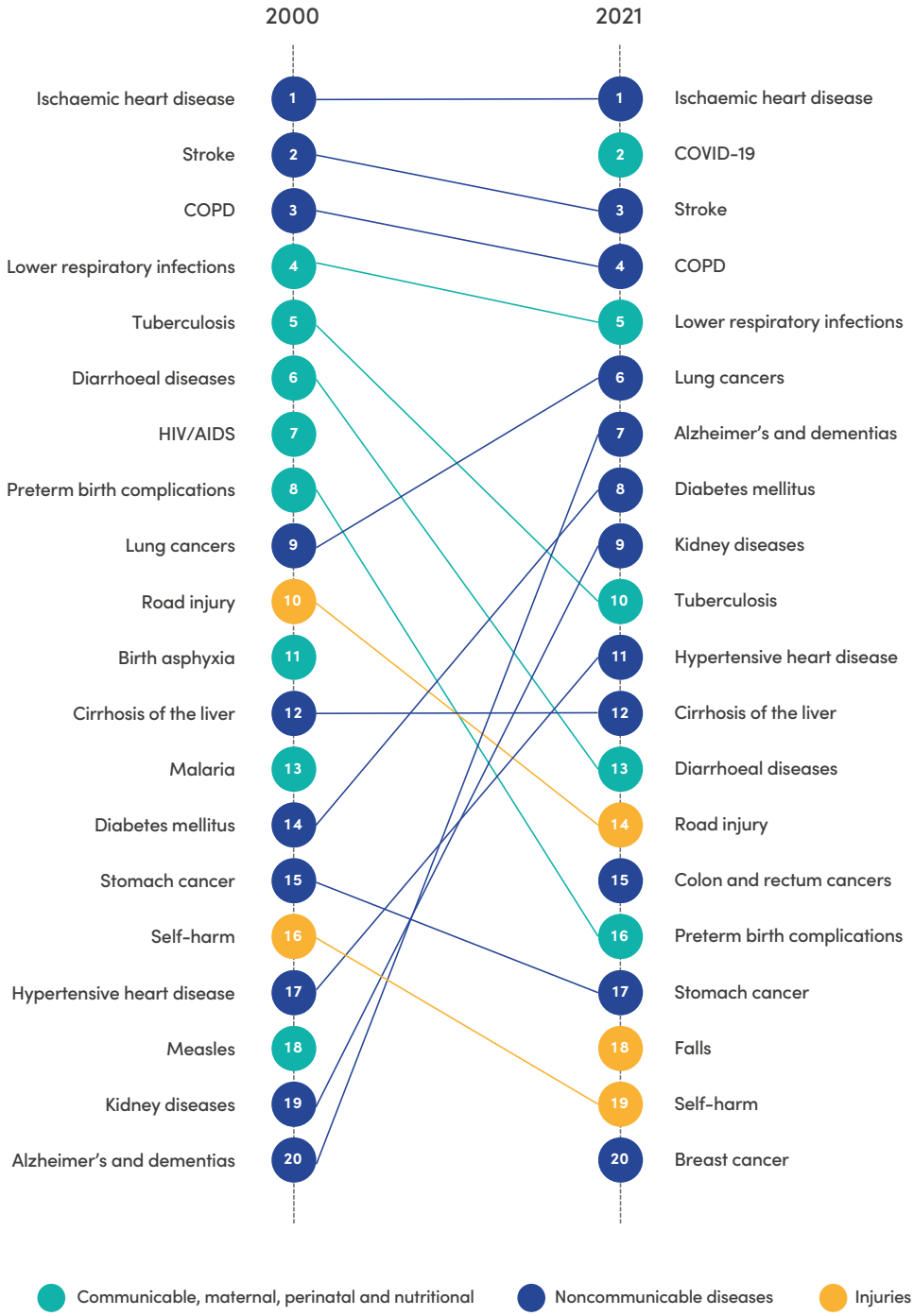
Data source: IHME, Global Burden of Disease (2024), OurWorldinData.org/burden-of-disease

Note: To allow for comparisons between countries and over time, this metric is age-standardized. Age standardization is an adjustment that makes it possible to compare populations with different age structures, by standardizing them to a common reference population.

Shifts in the global burden of disease further illustrate this dynamic (see Figure 2). In 2000, infectious diseases made up 25% of all deaths worldwide, representing nearly 12.5 million people, with six infectious diseases among the top 20 causes of mortality. By 2015, the share had gone down significantly to 15% (8.5 million deaths). But by 2021, it had increased to 23% due to the COVID-19 pandemic which added nearly 8.7 million deaths that year. Without COVID-19, infectious diseases would have accounted for just 11% of all deaths, or about 7.5 million people, with only four infectious diseases among the top 20 causes. Lower respiratory infections remain the most deadly communicable disease apart from COVID-19, ranking fifth in 2021, but deaths have declined from 2.9 million in 2000 to 2.5 million in 2021. Deaths from HIV/AIDS have fallen even more dramatically (61% since 2000), moving from the seventh to the twenty-first leading cause of death, while diarrhoeal diseases have seen a 45% reduction, falling from the sixth to the thirteenth leading cause of death over the same period.[13]

These data highlight both the scale of recent progress with infectious disease prevention and control, and the vulnerability of that progress to sudden, high-impact epidemic events.

Figure 2. Global leading causes of death: 2000 vs 2021



Source: WHO Global Health Estimates

While countermeasures such as vaccines, treatments, and improved sanitation have reduced cases and deaths from several major infectious diseases, new drivers of risk are fueling a significant rise in emerging diseases and zoonoses (see table 1), increasing the likelihood of high-impact events. COVID-19 is the most striking example, spreading globally within weeks and causing millions of deaths. Similarly, the 2014–2016 Ebola epidemic in West Africa marked the first time the virus amplified in densely populated urban areas, triggering an unprecedented explosion of cases. More recently, the 2022-2023 mpox multi-country outbreak became the largest documented in both scale and geographic reach, demonstrating how rapidly pathogens can cross borders and spread in an interconnected world. Shifting social, technological, economic, environmental and political ('STEEP') drivers are amplifying epidemic risks despite gains made against traditional infectious killers.[14]

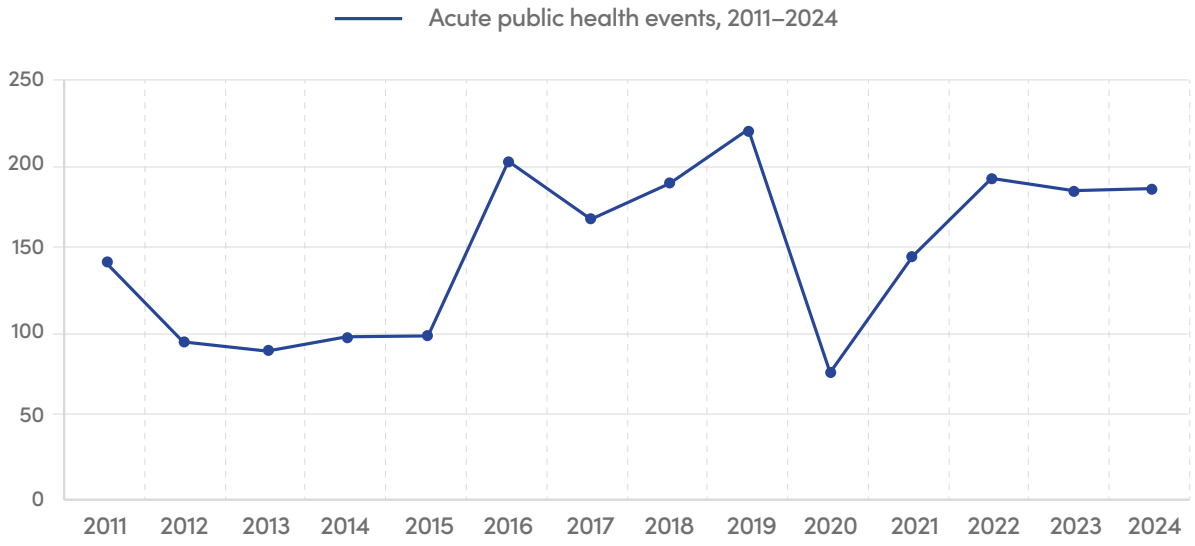
Table 1. Direct health impacts of the last six PHEICs

Sub-indicators	Ebola in West Africa (2014–2016)	Zika virus in Brazil, Colombia & Venezuela (2016)	Ebola in DRC (2018–2020)	COVID-19 (2020–2022)	Mpox (2022–2023, 2024–2025)
Cases * No. of reported confirmed cases	≥ 28,600[15]	Total: ~178,000[16] CZS: ≥2300[17]	3481[18]	~765 million[19]	Total: 146,894[20] (clade IIb: 87,679, United States: 30,154)[21] (clade I/Ib: ~59,215; DRC: ~25,341)[22]
Direct mortality * No. of reported deaths	11,325[23]	15[24]	2299[25]	~7 million reported/ ≥20 million estimated[26]	383[27] (Clade IIb: 169; US: 56)[28] (clade I/Ib: 214)[29]

LAC: Latin America and the Caribbean. DRC: Democratic Republic of the Congo. CZS: congenital Zika syndrome.
* Case and death counts are reported from the start of the outbreak to the date that the PHEIC is declared over.

Importantly, detection of outbreaks has become significantly faster in the years since the International Health Regulations (2005) were adopted (see Figure 3), allowing many events to be contained at their source. As a result, while the number of health events detected has increased, reflecting stronger surveillance and reporting, the proportion that escalates into large outbreaks or epidemics has decreased.[30] Improvements in surveillance have also led to better mortality tracking during outbreaks, enhancing detection, verification, and assessment capabilities and empowering responders with more credible information for decision-making. Faster identification and response have reduced the overall health impact of many of these events, reflecting how investments in surveillance, laboratory capacity, and information sharing can translate into more effective containment and fewer lives lost.

Figure 3. Acute public health events, 2011–2024



Source: The New Face of Pandemic Preparedness: 2025 GPMB Report. https://gpmb.org/reports/report-2025

Assessment

The overall burden of infectious-diseases has declined over the past two decades due to vaccines, better treatments, stronger health systems, and increases in overseas development assistance (ODA), with the notable exception of a sharp, time-limited surge in deaths during COVID-19. However, the frequency of health emergencies has increased, reflecting improved detection as well as the rise of drivers such as climate change, mobility, and closer human–animal interactions.[31] While many events are now contained more quickly, the risk of high-impact events has grown, with COVID-19 unleashing devastating health, economic, social, and political consequences worldwide. In short, the ***magnitude*** of routine infectious disease burden is decreasing, but the ***frequency and potential impact*** of large-scale emergencies is increasing.

Opportunities & challenges

- Progress has been made in assessing the health impact of epidemics in real time. During COVID-19, significant strides were made in real-time mortality tracking and cross-country comparisons of epidemiological data.

- Technological innovations, such as vaccines, can decrease the magnitude of a health emergency. For example, there were notably fewer deaths in the 2018 Ebola outbreak in the DRC compared to the 2014-2016 West Africa Ebola outbreak. In order for these innovations to be effective, there must be ample resources for research and development, and they must be allocated equitably.

- Accurately measuring the full impact of epidemics and pandemics remains a challenge. Underreporting, limited surveillance and laboratory capacity, and variations in case definitions contribute to gaps in data. As a result, key indicators such as total cases, deaths, and outbreak duration are often incomplete or imprecise, limiting the ability to draw meaningful conclusions.

- A particularly critical issue has been the difficulty of assessing disease severity with certainty in the early stages of an outbreak. To improve our ability to compare the health impact of epidemics over time and the efficiency of control measures, a more robust global system is needed – one that integrates real-time data on mortality, disease severity, and long-term consequences. Without such a system, decision-makers risk underestimating the true burden of emerging diseases and failing to understand trends and allocate resources effectively.

References

1 The Changing Face of Pandemic Risk: 2024 Report. Geneva: Global Preparedness Monitoring Board; 2024. (https://gpmb.org/reports/report-2024; accessed [April 2026]).

2 HIV – Number of people dying from HIV-related causes. In: World Health Organization (WHO) [website]. Geneva: WHO; 2024. (https://www.who.int/data/gho/data/indicators/indicator-details/GHO/number-of-deaths-due-to-hiv-aids; accessed [April 2026]).

3 WHO COVID-19 dashboard. In: World Health Organization (WHO) [website]. Geneva: WHO; 2024. (https://data.who.int/dashboards/covid19/deaths; accessed [April 2026]).

4 Barbiero VK. Ebola: A Hyperinflated Emergency. Global Health: Science and Practice. 2020: 8(2). doi: 10.9745/GHSP-D-19-00422.

5 Cardona-Ospina JA, Henao-SanMartin V, Acevedo-Mendoza WF, et al. Fatal Zika virus infection in the Americas: A systematic review. International Journal of Infectious Diseases. 2019; 88. doi: 10.1016/j.ijid.2019.08.033.

6 MERS situation update, August 2025. In: World Health Organization Eastern Mediterranean Region (EMRO) [website]. Cairo: EMRO; 2025. (https://www.emro.who.int/health-topics/mers-cov/mers-outbreaks.html; accessed [April 2026]).

7 Global Mpox Trends. In: World Health Organization (WHO) [website]. Geneva: WHO; 20 March 2026. (https://worldhealthorg.shinyapps.io/mpx_global/; accessed [April 2026]).

8 SARS Basic Fact Sheet. In: U.S. Centers for Disease Control and Prevention (CDC) [website]. Atlanta: CDC; 2017. (https://archive.cdc.gov/www_cdc_gov/sars/about/fs-sars.html; accessed [April 2026]).

9 World Health Organization & Our World in Data. Dengue fever deaths [dataset]. (https://ourworldindata.org/grapher/dengue-fever-deaths; accessed [April 2026]).

10 HIV – Number of people dying from HIV-related causes. In: World Health Organization (WHO) [website]. Geneva: WHO; 2024. (https://www.who.int/data/gho/data/indicators/indicator-details/GHO/number-of-deaths-due-to-hiv-aids; accessed [April 2026]).

11 Institute for Health Metrics and Evaluation & Our World in Data. Deaths from infectious diseases [dataset]. (https://ourworldindata.org/grapher/deaths-from-infectious-diseases; accessed [April 2026]).

12 Institute for Health Metrics and Evaluation & Our World in Data. Death rate from infectious diseases [dataset]. (https://ourworldindata.org/grapher/infectious-disease-death-rates; accessed [April 2026]).

13 Global Health Estimates 2021 Summary Tables: Global Deaths by Cause, Age and Sex, 2000-2021. Geneva: World Health Organization; 2024. (https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/ghe-leading-causes-of-death; accessed [April 2026].

14 The Changing Face of Pandemic Risk: 2024 Report. Geneva: Global Preparedness Monitoring Board; 2024. (https://gpmb.org/reports/report-2024; accessed [April 2026]).

15 Ebola: West Africa, March 2014-2016. In: World Health Organization (WHO) [website]. Geneva: WHO. (https://www.who.int/emergencies/situations/ebola-outbreak-2014-2016-West-Africa; accessed [April 2026]).

16 Zika cases and congenital syndrome associated with Zika virus reported by countries and territories in the Americas, 2015-2016: Cumulative cases. Pan American Health Organization, 2016. (https://www.paho.org/sites/default/files/2016-nov-30-phe-ZIKV-cases.pdf; accessed [April 2026]).

17 Ibid.

18 Ebola: North Kivu/Ituri, Democratic Republic of the Congo, August 2018 - June 2020. In: World Health Organization (WHO) [website]. Geneva: WHO. (https://www.who.int/emergencies/situations/Ebola-2019-drc-; accessed [April 2026]).

19 Weekly epidemiological update on COVID-19 – 4 May 2023. In: World Health Organization (WHO) [website]. Geneva: WHO; 4 May 2023. (https://www.who.int/publications/m/item/weekly-epidemiological-update-on-covid-19---4-may-2023; accessed [April 2026]).

20 Global Mpox Trends. In: World Health Organization (WHO) [website]. Geneva: WHO; 20 March 2026. https://worldhealthorg.shinyapps.io/mpx_global/; accessed [April 2026]).

21 Ibid.

22 Ibid.

23 Ebola: West Africa, March 2014-2016. In: World Health Organization (WHO) [website]. Geneva: WHO. (https://www.who.int/emergencies/situations/ebola-outbreak-2014-2016-West-Africa; accessed [April 2026]).

24 Zika cases and congenital syndrome associated with Zika virus reported by countries and territories in the Americas, 2015-2016: Cumulative cases. Pan American Health Organization, 2016. (https://www.paho.org/sites/default/files/2016-nov-30-phe-ZIKV-cases.pdf; accessed [DATE]).Ebola: North Kivu/Ituri, Democratic Republic of the Congo, August 2018 - June 2020. In: World Health Organization (WHO) [website]. Geneva: WHO. (https://www.who.int/emergencies/situations/Ebola-2019-drc-; accessed [April 2026]).

25 Ebola: North Kivu/Ituri, Democratic Republic of the Congo, August 2018 - June 2020. In: World Health Organization (WHO) [website]. Geneva: WHO. (https://www.who.int/emergencies/situations/Ebola-2019-drc-; accessed [April 2026]).

26 WHO Director-General's opening remarks at the media briefing – 5 May 2023. In: World Health Organization (WHO) [website]. Geneva: WHO; 5 May 2023. (https://www.who.int/news-room/speeches/item/who-director-general-s-opening-remarks-at-the-media-briefing---5-may-2023; accessed [April 2026]).

27 Global Mpox Trends. In: World Health Organization (WHO) [website]. Geneva: WHO; 20 March 2026. https://worldhealthorg.shinyapps.io/mpx_global/; accessed [April 2026]).

28 Ibid.

29 Ibid.

30 The New Face of Pandemic Preparedness: 2025 GPMB Report. Geneva: Global Preparedness Monitoring Board; 2025. (https://gpmb.org/reports/report-2025; accessed [April 2026]).

31 The Changing Face of Pandemic Risk: 2024 Report. Geneva: Global Preparedness Monitoring Board; 2024. (https://gpmb.org/reports/report-2024; accessed [April 2026]).

UNCHANGED

Monitoring Framework Indicator
C.1.2

Is the cost of health emergency response increasing or decreasing, compared to investments in preparedness?

Response cost continues to outpace investment in preparedness

Summary

A better prepared world should spend less on responding to events. This indicator assesses how much the world is spending on response, including by comparing response to preparedness spending. Optimally, the ratio of response to preparedness spending should be decreasing. Preparedness is widely seen as more cost-effective, with the World Bank estimating it costs just 1% of the potential economic impact of a pandemic.[1] A persistent bias toward response spending signals reactive crisis management and insufficient preparedness, while sustained investment in preparedness reflects stronger, more forward-looking systems and, ultimately, smaller, less costly crises.

Assessing this indicator is difficult because preparedness and response spending are not comprehensively or consistently tracked. Key gaps include: limited domestic reporting; fragmented reporting across bilateral, multilateral, NGO, private and philanthropic channels (with double counting as funds pass through intermediaries); inconsistent definitions and scope of PPPR (e.g., whether PHC surge, IPC/WASH, AMR, or R&D are included); inconsistent accounting bases (e.g. commitments vs. disbursements vs. expenditures; capital vs. recurrent; in-kind support); timing and coverage issues (reporting lags, partial-year, missing private sector spending); and currency/price distortions that hinder comparability.

Historically, spending has consistently favoured emergency response over sustained preparedness. Even before the exceptional surge in spending during the COVID-19 pandemic, the costs of responding to health emergencies showed little sign of declining after the West African Ebola epidemic, suggesting that lessons from previous crises did not translate into sustained efficiency gains. COVID-19 then triggered the deadliest and most expensive crisis response on record.

Before that pandemic, preparedness funding was more limited and uneven, leaving core capacities underdeveloped and countries vulnerable.[2] COVID-19 spurred an expansion of preparedness efforts and the creation of new financing mechanisms. However, these gains remain fragile, threatened by shifting geopolitics, competing priorities, and donor retrenchment. Preparedness funding is already beginning to decline, and the overall share of development assistance allocated to health is weakening as resources are redirected elsewhere.

Table 2. Comparing response to preparedness spending – 2014–2025

	2014–2015	2016–2017	2018–2019	2020–2021	2022–2023	2024–2025
Total spending on PPR as global public goods for health (OECD methodology)[3,a] (US$)	N/A	**226B** 113B (2016) 113B (2017)	**242B** 116B(2018) 126B(2019)	**416B** 169B (2020) 267B (2021)	230B (2022) Unavailable (2023)	N/A
RESPONSE SPENDING[b]						
WHO expenditures for response to health emergencies	**763.4M**[4,c]	**753.5M**[5,d]	**1.34B**[6,e]	**2.5B**[7,f]	**2.4B**[8,g]	**1.6B**[9,h]
Development assistance for health estimated spending to response (US$)	DAH to Ebola response: **3.33B** FTS[i] for health: **7.78B**[10]	DAH to Ebola + Zika responses: **788M** FTS for health: **2.67B**[11]	DAH to Ebola response: **580M** FTS for health: **2.94B**[12]	DAH to COVID-19 response: **49.5B** FTS for health: **6.25B**[13] + Fiscal: **15–17T**[14]	DAH to COVID-19 response: 21.03B FTS for health: **10B**[15]	No comprehensive DAH data FTS for health: **7.4B**
PREVENTION & PREPAREDNESS SPENDING						
WHO biennial expenditure for prevention and preparedness[j] (US$)	**156.8M**[16,k]	**182M**[17,l]	**240.4M**[18,m]	**691.5M**[19,n]	**653.4M**[20,o]	**647.2M**[21,p]
Development assistance for health estimated spending for pandemic preparedness (IHME methodology)[22,23,q] (US$)	**853M** 406M (2014) 447M (2015)	**760M** 410M (2016) 350M (2017)	**972M** 438M (2018) 534M (2019)	**2.25B** 1.13B (2020) 1.12B (2021)	**1.78B** 1.02B (2022) 778M (2023)	**1.856B** 1.03B (2024) 853M (2025)

M: million, B: billion, T: trillion

Source: SARS[24], H1N1[25], West African Ebola[26], Zika[27], Ebola DRC[28], COVID-19[29], Mpox[30]

[a] This includes: "spending from public sources (e.g., government spending), private sources (e.g., out-of-pocket expenditures by individuals or private insurance), and external sources (e.g., contributions from international organizations or development agencies)." See OECD 2025, Smart spending to combat global health threats, p.20.

[b] There is no comprehensive data on response spending and very few sources allow consistent tracking over time. The table shows three sources: WHO spending, development assistance spending for specific emergency responses, and financial tracking service (FTS) data, which only includes financing to coordinated plans for humanitarian crises. A major gap is domestic spending.

[c] This includes expenditures under the following categories: emergency risk and crisis management and outbreak and crisis response.

[d] This includes expenditures under the following categories: emergency operations, emergency core services, and outbreak and crises responses.

[e] This includes expenditures under the following categories: emergency operations, emergency core services, and outbreak and crises responses.

[f] This includes expenditures under the following categories: health emergencies rapidly detected and responded to and emergencies operations and appeals.

[g] This includes expenditures under the following categories: health emergencies rapidly detected and responded to and emergencies operations and appeals.

[h] This includes expenditures under the following categories: health emergencies rapidly detected and responded to and emergencies operations and appeals.

[i] Financial Tracking Service (FTS) tracks financing to coordinated plans for humanitarian crises. It may not include all funding for pandemic and epidemic response, and includes health expenditures unrelated to outbreaks, epidemics and pandemics.

[j] This spending goes to global, regional and national activities. This includes expenditures from prevention and preparedness objectives from each annual WHO General Programme of Work. However, differences in objectives and outcome frameworks limit comparability across years.

[k] This includes expenditures from the following categories: 5.1 alert and response capacities, 5.2 epidemic-prone and pandemic-prone diseases.

[l] This includes expenditures from the following categories: Infectious Hazard Management, Country Health Emergency Preparedness and the IHR (2005), and Health Emergency Information and Risk Assessment.

[m] This includes expenditures from the following categories: Infectious Hazard Management, Country Health Emergency Preparedness and the IHR (2005), and Health Emergency Information and Risk Assessment.

[n] This includes expenditure under the following categories: countries prepared for health emergencies, epidemics and pandemics prevented, countries operationally ready to assess and manage identified risks and vulnerabilities, proven prevention strategies for priority pandemic-/epidemic-prone diseases implemented at scale.

[o] This includes expenditures under the following categories: Countries prepared for health emergencies, Epidemics and pandemics prevented; countries operationally ready to assess and manage identified risks and vulnerabilities; and Proven prevention strategies for priority pandemic-/epidemic-prone diseases implemented at scale.

[p] This includes expenditures under the following categories: Countries prepared for health emergencies, Epidemics and pandemics prevented; countries operationally ready to assess and manage identified risks and vulnerabilities; and Proven prevention strategies for priority pandemic-/epidemic-prone diseases implemented at scale.

[q] This includes DAH flows categorize as HSS-pandemic preparedness.

[r] These values are estimates of varying accuracy to provide an idea of the scale of each event.

Analysis

Cumulatively, health emergency response has cost the world more than US$ 17 trillion in the 21st century (see Figure 4). Chronic underinvestment in preparedness has repeatedly translated into broader and more costly crisis responses.[31] The response to COVID-19 exemplifies this imbalance: nearly 20 times more was spent on the health response than on preparedness, and an estimated 7,000 times more went toward fiscal responses in 2020–2021 (see table 2). Health response funding for COVID-19 marked the largest single increase in development assistance for health ever recorded, reflecting both the unprecedented scale of the crisis and a lack of preparedness.

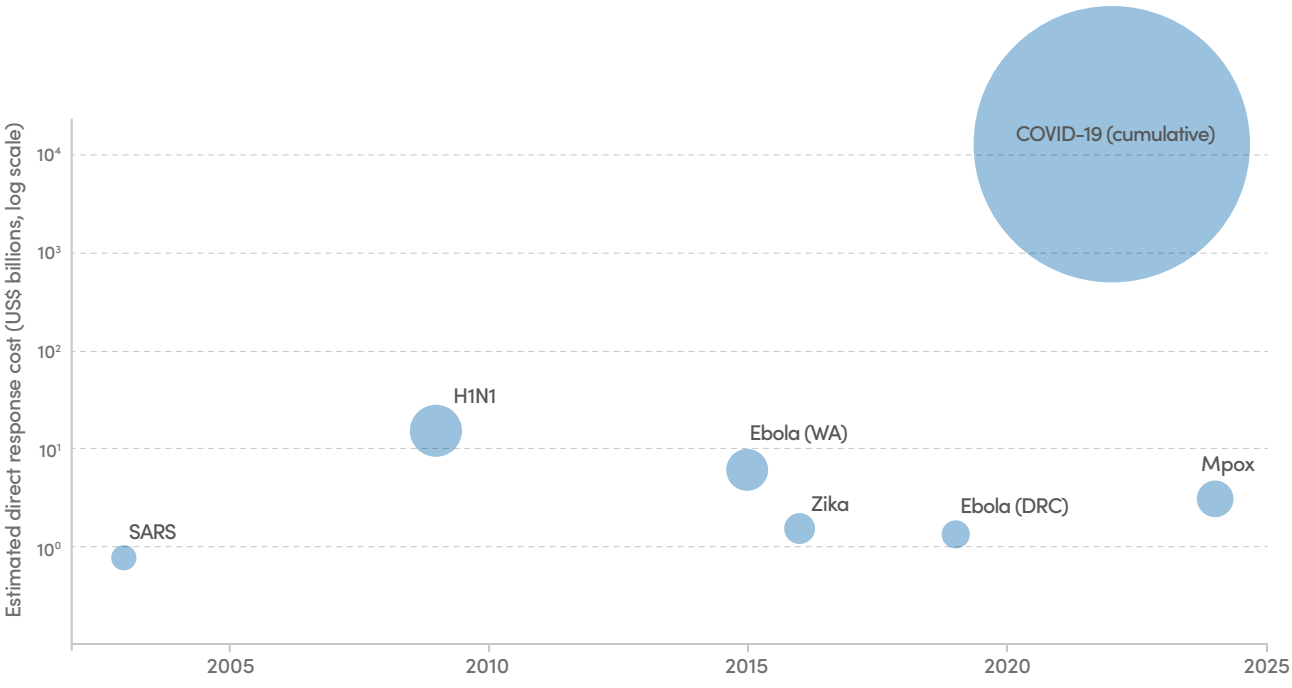
Response financing

Response financing data show no overall decline in annual spending on health emergency response since the West African Ebola epidemic, with expenditures peaking in 2021 during the COVID-19 pandemic (see Table 2). Each of the PHEICs reviewed required at least US$ 1 billion in response financing, while COVID-19 alone generated an estimated US$ 17 trillion in combined health and broader fiscal response spending globally.

The West African Ebola epidemic exposed how delayed and fragmented response financing can allow outbreaks to escalate and significantly increase overall costs. In its aftermath, new mechanisms were established to enable faster funding, notably the World Bank's Pandemic Emergency Financing Facility (PEF) and WHO's Contingency Fund for Emergencies (CFE). The PEF introduced an insurance-based approach but was constrained by complex trigger criteria and disbursement that came too late to contain early spread of a dangerous pathogen. The CFE proved more flexible and rapidly deployable, but remained limited in scale and dependent on voluntary contributions.

The COVID-19 pandemic brought an increase in the scale and speed of financing, but did not fundamentally change the underlying architecture. Multilateral development banks rapidly deployed emergency financing through instruments including the World Bank's Fast Track COVID-19 Facility and IMF emergency financing (Rapid Credit Facility and Rapid Financing Instrument), alongside expanded grant financing from global health initiatives such as the Global Fund and Gavi. However, these were largely scaled-up or repurposed instruments rather than pre-arranged pandemic-specific mechanisms, and financing continued to rely primarily on reactive, crisis-driven measures rather than predictable, rapidly deployable systems. In 2023, a survey conducted for the G20 Joint Finance-Health Task Force indicated that only 40% of G20 countries had domestic contingency funds that could be deployed in a health emergency. [32]

Figure 4. Response costs of major health emergencies of the 21st century



Post-COVID reforms have focused primarily on strengthening preparedness financing, most notably through the creation of the Pandemic Fund, with comparatively less progress on dedicated response financing mechanisms. As a result, a core gap identified since the Ebola epidemic remains unresolved: the lack of timely, predictable, and accessible financing for early response.

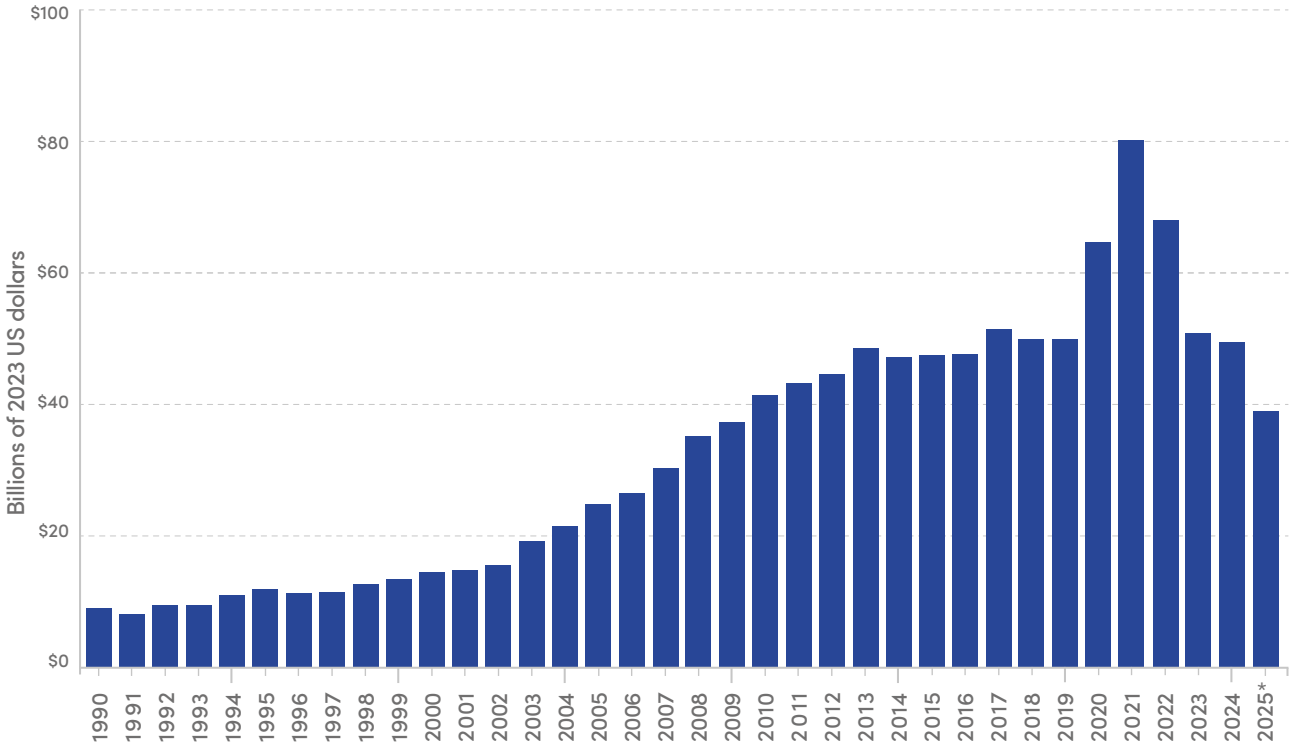
Preparedness financing

Global spending on pandemic preparedness before the COVID-19 pandemic was limited and uneven, with investments falling far short of identified needs.[33] From 2016–2019, domestic PPR spending increased by approximately 4% per year on average.[34] In many LMICs, only a small share of health budgets was allocated to core functions such as surveillance, laboratories, emergency operations, and workforce training. Donor instruments were modest and reactive, focused on response (e.g., World Bank PEF, WHO Contingency Fund for Emergencies). Multiple pre-2020 assessments identified annual preparedness financing gaps in the tens of billions of US dollars, with preparedness frequently deprioritized relative to immediate service delivery, leaving countries vulnerable to systemic shocks when COVID-19 struck.[35,36,37]

COVID-19 led to a substantial increase in investments. OECD estimates indicate that PPR expenditure increased approximately 40% between 2019 and 2021, but that was followed by a 20% decline in 2022. High-, upper-middle-, and lower-middle-income countries more than doubled per-capita PPR spending over 2019–2021. In low-income countries, spending remained broadly flat in 2020–2021, before rising by ~50% in 2022 from a low base.[38] Increases were often episodic, tied to emergency appropriations, and not locked into multi-year budget frameworks.

Over the last decade, Development Assistance for Health (DAH) has remained broadly the same (excluding the COVID-19 years and a drop in 2025), but health's share of total ODA has decreased consistently since the West African Ebola epidemic (see Figures 4 and 5).

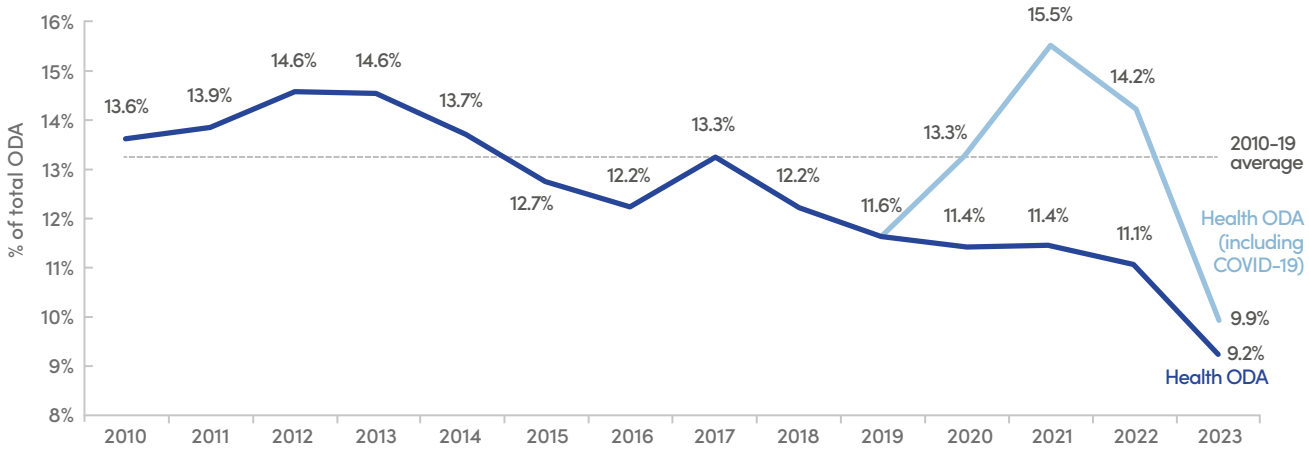
Figure 5. Development assistance for health, 1990–2025



Development assistance for health is measured in 2023 real US dollars.
**2025 estimates are preliminary.*

Source: IHME- Financing Global Health 2025: Cuts in Aid and Future Outlook. https://www.healthdata.org/sites/default/files/2025-07/FGHReport_2025_2025.07.15_0.pdf.

Figure 6. Trends in health ODA spending as a share of total ODA

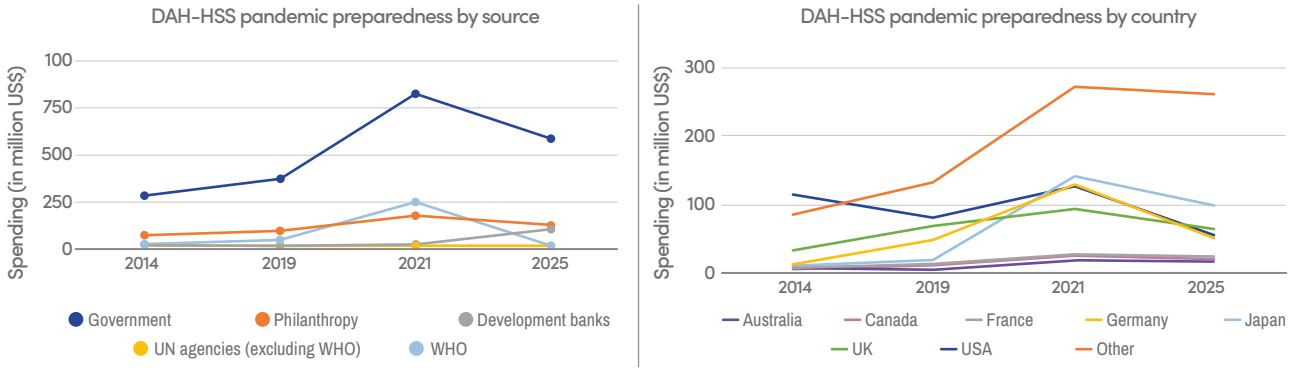


Note: Health includes CRS sector (120) Health and (130) Population policies/Programmes & reproductive helath. COVID-19 related refers to projects reported under the COVID-19 control sector code (12264). Source: Creditor Reporting System, OECD-DAC statistics

The COVID-19 pandemic led to a temporary surge in DAH, which reached an unprecedented peak of $80.3 billion in 2021. While DAH initially declined back toward pre-pandemic levels in 2023–2024, new IHME estimates now show a steep contraction in 2025: DAH has now dropped to $39.1 billion, its lowest level in more than 15 years. Between 2024 and 2025 alone, DAH fell by over 20%. Today, global health financing stands at less than half its 2021 peak.[39]

The same pattern is observed for DAH directed to pandemic preparedness. Funding increased after 2014 and peaked during the COVID-19 pandemic across all major donors: governments, development banks, WHO, other UN agencies, and philanthropy. Since then, funding has declined across most sources, with the sharpest reductions from governments and WHO. These trends largely reflect the significant contraction in funding from the United States, Germany, Japan and the United Kingdom, both as direct donors and as major contributors to WHO.

Figure 7. Trends in development assistance for health to pandemic preparedness



From 2014 to 2025, governments provided the majority of DAH for pandemic preparedness, ranging from 71% in 2014 to 64% in 2021, and back to 69% in 2025. Encouragingly, contributions from countries beyond major donors shown in figure 7 (i.e. excluding Australia, Canada, France, Germany, Japan, United States, and United Kingdom) tripled between 2014 and 2025, suggesting that more countries are investing in PPR. The post-COVID era also saw the emergence of development banks as a major funder for PPR.

The COVID-19 pandemic led to the creation of new financing mechanisms to help close the preparedness gap, most notably the Pandemic Fund. While its creation signals recognition of preparedness as a global public good, the Fund remains underfinanced relative to need, with pledges covering 15% (US$ 2.3 billion) of the estimated US$ 15 billion[40] required to ensure sustained PPR capacities.

More recently, preparedness financing has been weakening. WHO spending on preparedness was US$647 million in 2024–2025, but the 2026–2027 budget allocates only US$392.48 million, nearly back to pre-COVID-19 levels.[41] Donor retrenchments, including the termination of 86% of USAID's global health security programs, have led to hospital closures and suspended immunization campaigns in countries heavily dependent on international support.[42,43] Unfortunately, nearly half of DAH to PPR was financed through the United States in recent years, and therefore, US retrenchment is likely to significantly impact preparedness financing for the coming years.[44]

Experience shows that a substantial release of funds for response will often divert resources from preparedness, a consequence of the cycle of panic and neglect. Following the West African Ebola epidemic, disbursements for global health, including preparedness, declined and returned to pre-crisis levels for approximately two years,[45] despite evaluations calling for sustained investment in community-based detection, cross-border coordination, and resilient primary health care. This reversion pattern undermines long-term preparedness and often means that gains made during the crisis cannot be maintained. Post-COVID, this trend is being compounded by geopolitics and competing crises.[46]

Assessment

Before the COVID-19 pandemic, global spending on health emergency response remained stable across successive outbreaks. During the pandemic, however, response costs escalated dramatically, reaching tens of billions of dollars in direct health spending and trillions in broader fiscal measures to stabilize economies and societies. Response expenditures today remain similar to pre-COVID-19 levels, suggesting that the cost of responding to health emergencies has not declined despite accumulated experience and lessons from past crises.

By contrast, funding for preparedness increased since 2018-2019, due in part to a more diversified and larger pool of resources, providing a stronger foundation to close long-standing preparedness gaps. However, the sustainability of this funding is already threatened by budget cuts due to geopolitical pressures and competing priorities. These cuts present a serious risk to global health security, undermining both national and international capacity to prevent, prepare for, and respond to future health emergencies. If preparedness continues to be deprioritized, the world is likely to repeat the cycle of underinvestment, catastrophic outbreaks, and costly emergency responses. To break this pattern, sustained and predictable financing for preparedness, particularly at the primary care and surveillance levels, must be treated as a global public good, ensuring that investments made after COVID-19 are not lost but consolidated into long-term resilience.

Opportunities & challenges

- It is very difficult to measure spending on health emergency preparedness over time adequately. Improved financial metrics are essential to assess the return on investment in preparedness and to build the economic case for sustained funding of global health security.

- Without clear, credible data on the costs and benefits of PPR measures, it will remain difficult to attract and maintain the attention of policy-makers and investors.

- In an environment of shrinking international development assistance, it is crucial that international financing mechanisms that support pandemic preparedness are streamlined to maximize their synergy and effectiveness and to incentivize domestic investment in public health.

References

1 Approach Paper – Preparedness for Epidemics and Pandemics: Evaluation of the World Bank Group's Support. Washington (DC): World Bank; 2025 (https://ieg.worldbankgroup.org/sites/default/files/Data/reports/report-AP-Preparedness_for_Epidemics_and_Pandemics.pdf, accessed April 2026).

2 A World at Risk: Annual Report on Global Preparedness for Health Emergencies. Geneva: Global Preparedness Monitoring Board; 2019 (https://www.gpmb.org/reports/annual-report-2019, accessed April 2026).

3 Penn C, Morgan D, Ahmad Y, Elgar K, James C. OECD Health Working Papers No. 175– Smart spending to combat global health threats: Tracking expenditure on prevention, preparedness, and response, and other global public goods for health. Paris: Organisation for Economic Co-operation and Development (OECD); 2025. doi: 10.1787/166d7c57-en.

4 WHO Programmatic and Financial Report for 2014-2015 including audited financial statements for 2015. Geneva: World Health Organization (WHO); 2016 (A69/45; https://apps.who.int/gb/ebwha/pdf_files/wha69/a69_45-en.pdf, accessed April 2026).

5 The WHO Programme Budget Portal: 2016-17. In: World Health Organization (WHO) [website]. Geneva: WHO (https://open.who.int/2016-17/home, accessed April 2026).

6 The WHO Programme Budget Portal: 2018-19. In: World Health Organization (WHO) [website]. Geneva: WHO (https://open.who.int/2018-19/home, accessed April 2026).

7 The WHO Programme Budget Portal: 2020-21. In: World Health Organization (WHO) [website]. Geneva: WHO (https://open.who.int/2020-21/home, accessed April 2026).

8 The WHO Programme Budget Portal: 2022-23. In: World Health Organization (WHO) [website]. Geneva: WHO (https://open.who.int/2022-23/home, accessed April 2026).

9 Ibid.

10 Humanitarian Aid Contributions. In: Financial Tracking Service [website]. Istanbul: United Nations Office for the Coordination of Humanitarian Affairs; 2015/2016 (https://fts.unocha.org/home/2018/donors, accessed April 2026).

11 Humanitarian Aid Contributions. In: Financial Tracking Service [website]. Istanbul: United Nations Office for the Coordination of Humanitarian Affairs; 2018 (https://fts.unocha.org/home/2018/donors, accessed April 2026).

12 Ibid.

13 Health Financing Collaborator Network. Global investments in pandemic preparedness and COVID-19: development assistance and domestic spending on health between 1990 and 2026. The Lancet Global Health. 2023; 11(3):e385-e413. doi: 10.1016/S2214-109X(23)00007-4.

14 Fiscal Monitor: Helping People Bounce Back. Washington (DC): International Monetary Fund (IMF); 2022 (https://www.cef.imf.org/content/dam/CEF-IMF/CEF-IMF-NewSite/4-Publications/2-RegionalPublications/English/Fiscal%20monitor%20December%202022.pdf, accessed April 2026).

15 Humanitarian aid contributions. In: Financial Tracking Service (FTS) [website]. New York: United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA); 2026 (https://fts.unocha.org, accessed April 2026).

16 WHO Programmatic and Financial Report for 2014-2015 including audited financial statements for 2015. Geneva: World Health Organization (WHO); 2016 (A69/45; https://apps.who.int/gb/ebwha/pdf_files/wha69/a69_45-en.pdf, accessed April 2026).

17 WHO Health Emergency Programme. In: World Health Organization [website]. Geneva; WHO; 2017 (https://open.who.int/2016-17/our-work/category/12/about/about, accessed April 2026).

18 WHO Results Report - Programme Budget 2018-2019: Health Emergencies Programme. Geneva: World Health Organization; 2020 (https://www.who.int/about/accountability/results/2018-2019/health-emergencies-programme, accessed April 2026).

19 The WHO Programme Budget Portal: 2020-21. In: World Health Organization (WHO) [website]. Geneva: WHO (https://open.who.int/2020-21/home, accessed April 2026).

20 Programme Budget Web Portal: Figures by Outcome. In: World Health Organization (WHO) [website]. Geneva: WHO; 2023 (https://open.who.int/2022-23/our-work/category/02/programme/02.001/about/key-figures, accessed April 2026).

21 Programme Budget Web Portal: Figures by Strategic Objective. In: World Health Organization (WHO) [website]. Geneva: WHO; 2025 (https://open.who.int/2024-25/our-work/category/02/about/key-figures, accessed April 2026).

22 Financing Global Health. In: Institute for Health Metrics and Evaluation (IHME) [website]. Seattle: IHME – University of Washington; 2025 (https://vizhub.healthdata.org/fgh/, accessed April 2026).

23 Health Financing Collaborator Network. Global investments in pandemic preparedness and COVID-19: development assistance and domestic spending on health between 1990 and 2026. The Lancet Global Health. 2023; 11(3):e385-e413. https://doi.org/10.1016/S2214-109X(23)00007-4.

24 "The SARS Epidemic and Its Aftermath in China: A Political Perspective." In: Learning from SARS: Preparing for the Next Disease Outbreak. Washington, DC: National Academies Press; 2004. Available from:

25 European Court of Auditors. Dealing with serious cross-border threats to health in the EU: important steps taken but more needs to be done. Special report no. 28/2016. Luxembourg: Publications Office of the European Union; 2016. Available from: https://www.eca.europa.eu/en/publications/SR16_28; OECD. Future global shocks: improving risk governance. Paris: OECD Publishing; 2011. Available from: https://doi.org/10.1787/9789264114586-en; United States Government Accountability Office. Influenza pandemic: lessons from the H1N1 pandemic should be incorporated into future planning. GAO-11-632. Washington, DC: GAO; 2011. Available from: https://www.gao.gov/products/gao-11-632; Pasquini-Descomps H, Brender N, Maradan D. Financing the crisis: public expenditure on the A(H1N1) influenza pandemic in Switzerland, Japan and the United States. In: Bourrier M, Brender N, Burton-Jeangros C, editors. Managing the global health response to epidemics: social science perspectives. London: Routledge; 2019:182–206.

26 Bali SR, Carletto AL, Clark JP, Hersey SH, Hetzner AJ, Samaha HN, et al. Lessons learned in financing rapid response to recent epidemics in West and Central Africa: a qualitative study. Washington, DC: World Bank Group; 2019. Available from: https://documents1.worldbank.org/curated/en/241811559646029471/pdf/Lessons-Learned-in-Financing-Rapid-Response-to-Recent-Epidemics-in-West-and-Central-Africa-A-Qualitative-Study.pdf; Huber C, Finelli L, Stevens W. The economic and social burden of the 2014 Ebola outbreak in West Africa. J Infect Dis. 2018;218 Suppl 5:S698–S704. doi:10.1093/infdis/jiy213

27 Wexler A, Oum S, Kates J. The status of funding for Zika: the President's request, congressional proposals, & final funding. San Francisco: Kaiser Family Foundation; 2016. Available from: https://www.kff.org/global-health-policy/the-status-of-funding-for-zika-the-presidents-request-congressional-proposals-final-funding/; World Bank. World Bank provides $150 million to combat Zika virus in Latin America and the Caribbean. Washington, DC: World Bank; 2016. Available from: https://www.worldbank.org/en/news/press-release/2016/02/18/world-bank-provides-150-million-to-combat-zika-virus-in-latin-america-and-the-caribbean

28 Zeng W, Samaha H, Yao M, Ahuka-Mundeke S, Wilkinson T, Jombart T, et al. The cost of public health interventions to respond to the 10th Ebola outbreak in the Democratic Republic of the Congo. BMJ Glob Health. 2023;8(10):e012660. doi:10.1136/bmjgh-2023-012660. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC10583089/

29 Independent Evaluation Office of the International Monetary Fund. The IMF's emergency response to the COVID-19 pandemic: evaluation report 2023. Washington, DC: International Monetary Fund; 2023. Available from: https://ieo.imf.org/en/evaluations/completed/2023-0313-imfs-emergency-response-to-the-covid-19-pandemic

30 World Health Organization. Mpox global strategic preparedness and response plan. Geneva: World Health Organization; 2024. Available from: https://cdn.who.int/media/docs/default-source/documents/health-topics/monkeypox/jmo_who_sprp-mpox_2024_final_digital.pdf; Africa Centres for Disease Control and Prevention. Mpox response plan envisions support across 22 countries. Addis Ababa: Africa CDC; 2024. Available from: https://africacdc.org/news-item/mpox-response-plan-envisions-support-across-22-countries/; United States Mission to International Organizations in Geneva. Addressing the global mpox outbreak. Geneva: U.S. Mission to International Organizations in Geneva; 2024. Available from: https://geneva.usmission.gov/2024/09/25/u-s-commitment-to-address-the-global-mpox-outbreak/; Pandemic Fund. Statement on the Pandemic Fund's decision to fast-track US$128.89 million to combat mpox in 10 countries. Washington, DC: Pandemic Fund; 2024. Available from: https://www.thepandemicfund.org/news/statement/decision-to-fast-track-us128_89-million-to-combat-mpox-in-10-countries

31 Robertson H, Graeden E, Kerr J, Van Maele M, Katz R. Follow the money: a global analysis of funding dynamics for global health security. Health Affairs Scholar. 2024; 2(6):qxae083. doi: 10.1093/haschl/qxae083.

32 World Health Organization and World Bank Group. Mapping Pandemic Response Financing Options and Gaps. 2023. JFHTF Response Financing.pdf (g20.org).

33 A World at Risk: Annual Report on Global Preparedness for Health Emergencies. Geneva: Global Preparedness Monitoring Board; 2019 (https://www.gpmb.org/reports/annual-report-2019, accessed April 2026).

34 Penn C, Morgan D, Ahmad Y, Elgar K, James C. OECD Health Working Papers No. 175– Smart spending to combat global health threats: Tracking expenditure on prevention, preparedness, and response, and other global public goods for health. Paris: Organisation for Economic Co-operation and Development (OECD); 2025. doi: 10.1787/166d7c57-en.

35 A World at Risk: Annual Report on Global Preparedness for Health Emergencies. Geneva: Global Preparedness Monitoring Board; 2019. (https://www.gpmb.org/reports/annual-report-2019, accessed April 2026).

36 Protecting Humanity from Future Health Crises: Report of the High-level Panel on the Global Response to Health Crises. New York: United Nations; 2016 (https://www.aidsdatahub.org/resource/protecting-humanity-future-health-crises-report-high-level-panel-global-response-health, accessed April 2026).

37 Global Health Crises Task Force: Final Report. New York: United Nations; 2017 (https://www.un.org/en/pdfs/Final%20Report.Global%20Health%20Crises%20Task%20Force.pdf, accessed April 2026).

38 Penn C, Morgan D, Ahmad Y, Elgar K, James C. OECD Health Working Papers No. 175– Smart spending to combat global health threats: Tracking expenditure on prevention, preparedness, and response, and other global public goods for health. Paris: Organisation for Economic Co-operation and Development (OECD); 2025. doi: 10.1787/166d7c57-en.

39 IHME- Financing Global Health 2025: Cuts in Aid and Future Outlook. Institute for Health Metrics and Evaluation (IHME). Seattle: IHME; 2025 (https://www.healthdata.org/sites/default/files/2025-07/FGHReport_2025_2025.07.15_0.pdf, accessed April 2026).

40 A Global Deal for Our Pandemic Age: Report of the G20 High Level Independent Panel on Financing the Global Commons for Pandemic Preparedness and Response. Toronto: G20; 2021 (https://www.g20.utoronto.ca/2021/G20-HLIP-Report.pdf, accessed April 2026).

41 Ibid.

42 Cavalcanti DM, de Oliveira Ferreira de Sales L, da Silva AF, et al. Evaluating the impact of two decades of USAID interventions and projecting the effects of defunding on mortality up to 2030: a retrospective impact evaluation and forecasting analysis. Lancet. 2025; 406(10500):283-294. doi: 10.1016/S0140-6736(25)01186-9.

43 Impact of the US funding cuts: A snapshot on HIV commodity availability and management risks. In: Joint United Nations Programme on HIV/AIDS (UNAIDS) [website]. Geneva: UNAIDS; 16 August 2024 (https://www.unaids.org/en/resources/presscentre/featurestories/2025/may/hiv-commodity-availability-and-management-risks, accessed April 2026).

44 Penn C, Morgan D, Ahmad Y, Elgar K, James C. OECD Health Working Papers No. 175– Smart spending to combat global health threats: Tracking expenditure on prevention, preparedness, and response, and other global public goods for health. Paris: Organisation for Economic Co-operation and Development (OECD); 2025. doi: 10.1787/166d7c57-en.

45 Financing Global Health. Institute for Health Metrics and Evaluation (IHME). Seattle: IHME; 2017 (https://www.healthdata.org/sites/default/files/files/infographics/FGH_2017_Summary_infographic.pdf, accessed April 2026).

46 Financing Global Health 2025: Cuts in Aid and Future Outlook. Institute for Health Metrics and Evaluation (IHME). Seattle: IHME; 2025 (https://www.healthdata.org/sites/default/files/2025-07/FGHReport_2025_2025.07.15_0.pdf, accessed April 2026).

UNCHANGED

Monitoring Framework Indicator
C.1.3

Are the health, economic, social and political impacts of health emergencies increasing or decreasing?

Far-reaching impact on lives, systems, and economies

Summary

This indicator assesses how societies are affected by the broader health, economic, social, and political impacts of health emergencies. The central question is whether the world is becoming better at mitigating these impacts when crises occur.

Epidemics and pandemics continue to exert far-reaching effects across multiple dimensions. Although health systems have accumulated experience and internalized some lessons, available evidence shows that the broader consequences of crises remain substantial, with only modest progress in reducing their systemic toll.

On the health front, Ebola, COVID-19, and mpox all left impacts extending well beyond their immediate toll, exposing persistent weaknesses in health systems (see Table 3 below). Survivors faced long-term complications, such as post-Ebola syndrome, long COVID, and widespread psychological distress. Routine health care was severely disrupted, delaying vaccinations, maternal care, and chronic disease management and leading to excess deaths and setbacks in child health. The Ebola epidemic in West Africa collapsed health systems and killed large numbers of health workers, while COVID-19 overwhelmed even strong systems, suspending essential services and causing millions of excess deaths, indirectly related to the pandemic. Maternal health and immunization also suffered sharp declines, though lessons from West Africa helped the DRC sustain some services. Mortality among health workers during Ebola and COVID-19 further weakened resilience, underscoring systemic gaps in protection and preparedness. Overall, while there has been some progress in integrating essential services in response, these crises show that health systems worldwide remain vulnerable, and the capacity to manage broader population health impacts has not fundamentally improved.

Such health disruptions translated into profound economic consequences, though on different scales. Ebola in West Africa led to billions of dollars in GDP losses, rising debt, disrupted trade, and sharp drops in investment in the three affected countries, with recovery slowed by fragile fiscal systems and heavy reliance on external borrowing.[1] COVID-19 produced a systemic global shock: GDP contracted by 2.9% in 2020, debt soared to historic highs, supply chains and trade collapsed, and global FDI fell by more than one-third, with recovery uneven across sectors and regions. Inflationary pressures were shorter-lived and localized under Ebola but widespread and prolonged under COVID-19, severely eroding real incomes worldwide.[2] Mpox's impacts were far smaller, causing localized productivity losses and fiscal pressures but no systemic shock thanks to targeted containment.[3] Despite innovations in emergency financing since Ebola, COVID-19 revealed how quickly even improved mechanisms can be overwhelmed. Across all crises, low-income countries bore the heaviest burden, facing deeper GDP losses, limited fiscal space, and weaker safety nets, underscoring persistent global inequalities in economic resilience.[4]

The social consequences of these crises were equally severe, with the poorest and most vulnerable populations consistently hit hardest. Ebola in West Africa pushed hundreds of thousands into poverty, drove food insecurity through quarantines and market closures, and caused steep job losses among informal workers and household heads.[5] COVID-19 magnified these dynamics globally: it triggered the largest rise in extreme poverty in decades, exacerbated food insecurity for over 120 million more people, wiped out 114 million jobs, and deepened gendered and generational inequalities, especially for women, youth, and migrant workers.[6] Both crises disrupted education: Ebola closed schools for months in West Africa, while COVID-19 kept 1.6 billion children out of classrooms worldwide, fueling long-term learning losses, child labour, and higher risks of child marriage and gender-based violence. Mpox was smaller in scale but still intensified stigma, misinformation, and access barriers for marginalized groups. Across all three events, misinformation eroded trust and undermined effective response. At the same time, the most disadvantaged households consistently bore the brunt of income shocks, service disruptions, and social harms, showing that the underlying drivers of vulnerability remain largely unchanged even as the scale of impacts has grown.

Finally, these health emergencies also reshaped political landscapes. Ebola disrupted elections in West Africa, concentrated authority under emergency decrees, imposed border closures, and sometimes restricted journalists' reporting. In the DRC, Ebola outbreaks led to localized emergency powers and controls that complicated trade and humanitarian access. COVID-19 amplified these dynamics globally: elections were postponed or adapted, executives assumed sweeping emergency powers, borders shut worldwide, and press freedoms were curtailed in many countries. Mpox, on the other hand, produced fewer restrictions, including targeted travel measures instead of widespread border closures. Overall, however, health crises consistently enabled governments to expand authority, restrict movement, and shape information, with COVID-19 demonstrating how such impacts become more extensive and visible in large-scale, interconnected events. However, some lessons from COVID-19, especially around mobility and communication, seem to have been applied during the mpox outbreaks.

Health impacts

UNCHANGED —

Table 3. Measuring the health impacts across six sub-indicators

Sub-indicators[a]	Ebola in West Africa (2014–2016)	Zika virus in Brazil, Colombia & Venezuela (2016)	Ebola in DRC (2018–2020)	COVID-19 (2020–2022)	Mpox (2022–2023, 2024–2025)
Case fatality ratio Percent of confirmed cases	**39.5%**[7]	**~0%**	**75%**[8]	**≤1% to ≥7%**[9,10,11]	**.5%** (clade Ib-IIb)[12] ---- **3.6%** (clade Ia) [13]
Excess mortality Difference between number of deaths that occurred during event compared to expectations (i.e. had the crisis not occurred) & ratio direct/excess mortality	~25,000–30,000 [14,15,b] **Ratio: 37–44%**	No excess mortality among general population. ---- **11.3–13x** in children with CZS[16,c] ---- IMR: **↑5%** (2016)[17]	No data available	~21.73M[18,d] **Ratio: 32%**	No data available

[a] Unless otherwise indicated, the review period corresponds to the dates of the PHEICs shown in the table.

[b] No actual estimate of excess mortality is available; however, several studies estimate additional deaths from increased maternal and infant mortality, malaria, HIV and TB, and other diseases due to the reduction in services during Ebola. See Endnotes 14 and 15.

[c] Compared to uninfected children.

[d] The range of the estimated excess mortality is 16.33 million to 127.53 million deaths.

Sub-indicators[a]	Ebola in West Africa (2014–2016)	Zika virus in Brazil, Colombia & Venezuela (2016)	Ebola in DRC (2018–2020)	COVID-19 (2020–2022)	Mpox (2022–2023, 2024–2025)
Mental health burden Anxiety, PTSD depression and/or mental illness prevalence during the event	PTSD: **21.8%**[19] **–45.7%** [20] of survivors (2017→2020)	Severe/extremely severe depression: **18%**, anxiety: **27%**, stress: **36%** in mothers of affected children[21]	PTSD: **24.3%**[22] **–45.6%**[23] of survivors	PTSD: **15%** in general population[24], **25–34%** in HCW[25,26] ---- **35–47%** of general population with anxiety and depression[27,28]	**25–50%** of infected individuals with anxiety and/or depression[29,30]
Maternal health Change in the proportion of women accessing antenatal care visits compared to pre-event year	**↓36.3%**[31,32,33,34]	**↑1.26%**[35]	No decline, **↑50%** in targeted zones[36]	2019→2021: **↓ 38.6%**[37]	No data available
Immunization Changes in DPT3 coverage compared to pre-event year	**↓11.7%**[38,39]	2015→2016: **↓3.3%**[40,e]	**↓1%** ---- ↑3% (2019) ↓4.11% (2020)[41,f]	**↓1%**[42] ---- Peak: ↓ 4%[43] (2021)	2021→2024: **↑3%** globally and in DRC, stable in US[44]
Health worker mortality Percentage of HCW who died from the infectious hazard	Sierra Leone: **6.85%** Guinea: **1.45%**[45]	0	**0.3%** (300 deaths)[46]	**~ 0.17–0.18%**[47,g]	No mortality data; **3.8%** HCW cases[48]

PTSD: post-traumatic stress disorder. HCW: healthcare workers. DPT3: diphtheria, pertussis, and tetanus-containing vaccine. IMR: Infant mortality rates, CZS: Congenital Zika syndrome.

[e] No evidence of decrease related to Zika.
[f] Loss of coverage in 2020 most likely linked to COVID-19 disruptions.
[g] 115,500 healthcare workers died worldwide.

Analysis

Disease burden

Beyond their immediate toll of illness and death, pandemics and epidemics have far-reaching health consequences that can persist after the acute outbreak. Studies indicate that at least a quarter of people directly affected experienced significant psychological distress during the height of these crises, overwhelming already fragile mental-health services and compounding the overall health burden (see Table 3). Survivors may experience post-infection complications such as long COVID, post-Ebola syndrome, post-Zika neurological complications or chronic respiratory and cardiac issues– that increase long-term morbidity and strain already burdened health services. For example, despite a very low case fatality rate, Zika imposed a substantial disease burden, with children born with Congenital Zika Syndrome experiencing an estimated 11.3–13-fold higher risk of mortality, which contributed to a documented increase of approximately 5% in the infant mortality rate during the peak year of the epidemic (2016) (see Table 3). Across the six PHEICs, millions of survivors have experienced long-term, often debilitating post-infection conditions that diminish quality of life and place pressure on health systems beyond the end of the emergency.

Health systems

Epidemics and pandemics place immense strain on health systems, diverting staff and resources away from routine care. These crises disrupt vaccinations, maternal and child health services, and treatment for chronic diseases, causing delays that trigger secondary outbreaks and excess mortality. The West Africa Ebola epidemic offers a stark example: already-fragile systems collapsed as hundreds of health workers died and essential programmes for maternal care,

immunization, malaria, HIV, and TB were interrupted; secondary mortality from preventable diseases approached the toll of Ebola itself, multiplying the broader impacts of the epidemic. COVID-19 showed how even well-resourced systems can be overwhelmed. During the first wave, many secondary and tertiary hospitals suspended surgeries and routine consultations to cope with surges, with serious consequences for conditions such as stroke, diabetes, and HIV. By contrast, during the DRC outbreak, action by the Ministry of Health and a more organized international response helped keep many essential services running, though insecurity and community mistrust remained significant challenges.[49,50,51,52] During the Zika epidemic, neurological, developmental and long-term care needs far exceeded existing capacity in affected countries.[53] With mpox, many clinicians reported disruption in regular services due to the added burden of mpox patients.[54]

The indicators of health system resilience in Table 3 show that not much progress has been made globally in strengthening health systems and mitigating primary and secondary health impacts. Excess mortality, a broad, system-level indicator, was similar across Ebola in West Africa and COVID-19. Another indicator, case-fatality rates (CFR), is directly correlated to health system capacity.[55] During COVID-19, mortality surged when hospitals were overwhelmed (as seen early on in Italy where the CFR reached nearly 7%)[56] but declined sharply where effective in-patient care was maintained. The Ebola outbreaks in the DRC recorded higher CFRs than in West Africa, reflecting both fragile health infrastructure and the added strain of ongoing conflict, despite the availability of a vaccine authorized for use.[57, h] Similarly, the comparatively low number of health-worker deaths in the DRC during the 2018–2020 Ebola outbreak, despite ongoing conflict and fragile infrastructure, suggests that the health system had strengthened its preparedness and infection-prevention capacities and benefitted from the rapid implementation of ring vaccination.[58,59] Experience with previous Ebola events meant that protective equipment, triage protocols, and rapid training were in place earlier, and local health staff were more familiar with strict infection-control measures than their West African counterparts were at the start of the 2014–2016 epidemic.[60]

Maternal health

Both the Ebola epidemic in West Africa and the COVID-19 pandemic had profound impacts on maternal health, in large part through disruptions to antenatal care (ANC). In West Africa, fear of infection, movement restrictions, and overwhelmed health systems led to sharp declines in ANC visits, institutional deliveries, and emergency obstetric services, which contributed to excess maternal and neonatal deaths.[61,62,63,64,65] Similarly, COVID-19 caused a global drop in ANC coverage, with studies estimating declines of up to nearly 40% in some settings, as women faced barriers to accessing care, such as lockdowns, transport disruptions, and reduced facility capacity.[66,67] Beyond reduced access, the quality and timeliness of ANC were also affected, with missed screenings, fewer in-person consultations, and delays in managing complications.[68,69] By contrast, in the DRC, where Ebola outbreaks were more localized, ANC services showed no significant decline and, in some cases, even improved, supported by government subsidies that reduced financial barriers to care. Evidence from a study of the Free Care Policy implemented during the outbreak shows that the policy helped maintain or boost overall clinic attendance and common illness treatment, while ANC utilization remained largely stable.[70] Similarly, during the Zika epidemic, governments strengthened pregnancy surveillance and risk monitoring, such as enhanced reporting, expanded ultrasound follow-up, and targeted guidance for pregnant women, as part of public health efforts to detect infections early and mitigate adverse maternal and neonatal outcomes. However, care was not equally accessible: specialized services for congenital Zika syndrome were concentrated in urban centres, and many low-income and rural families faced substantial geographic, financial, and health-system barriers to both initial diagnosis and long-term care.[71,72]

Immunization

Preventive services, including childhood immunization campaigns, were severely disrupted during both the West African Ebola epidemic and the COVID-19 pandemic, triggering resurgences of vaccine-preventable diseases. While Sierra Leone fared slightly better, Guinea and Liberia experienced a severe drop in DPT3 vaccination coverage in 2014 (see Table 3), increasing the likelihood of outbreaks, preventable deaths, and additional stress on already fragile health systems.[73] Coverage for all antigens dropped by nearly 50 percent in Liberia.[74] Even after Ebola transmission ended, it took several years of catch-up campaigns and community-trust rebuilding to return to pre-crisis vaccination levels.

[h] Vaccine was deployed in the DRC under emergency or expanded-access protocols.

During the DRC Ebola outbreaks on the other hand, immunization continued because the response deliberately integrated essential health services alongside Ebola control. National authorities, with WHO, UNICEF, Gavi and others, prioritized sustaining routine vaccination to avoid secondary epidemics, drawing on lessons from West Africa.[75] Greater local experience with Ebola and targeted donor funding also helped keep immunization running despite insecurity and community mistrust.[76,77] Regardless, large numbers of children unvaccinated due to weak health systems, poverty, conflict, and poor access to care over the years led to one of the largest recorded measles outbreaks in DRC with well over 6000 deaths in 2019-2020 due to health-system disruptions.[78,79]

Routine vaccination programmes during COVID-19 were disrupted in nearly every region of the world, with an estimated 25 million children worldwide missing at least one essential vaccine dose in 2021 alone– the largest backslide in three decades.[80] Lockdowns, supply chain disruptions, health worker shortages, and fear of infection reduced service delivery and uptake.[81] Catch-up efforts have since been launched, but coverage has yet to return to pre-pandemic levels in many countries, leaving persistent immunity gaps and raising the risk of large outbreaks of measles, polio, and other vaccine-preventable diseases. The scale and duration of these setbacks underscore how COVID-19 reversed years of progress on child health and revealed the vulnerability of even well-resourced immunization systems.

Health workforce

When healthcare workers are not adequately protected, they face a heightened risk of infection and death, with consequences that extend far beyond the immediate crisis. During the Ebola epidemic in West Africa, the loss of many doctors, nurses, and midwives in the early weeks of the epidemic crippled already fragile systems, also making outbreak response more challenging. In Sierra Leone, an estimated 6.85% of all health workers died, while Guinea lost approximately 1.45% of its workforce (see Table 3), leaving some districts without access to essential care for years. By contrast, the DRC experienced far fewer health worker deaths during its Ebola outbreaks, reflecting more localized transmission and stronger outbreak preparedness.[82] The COVID-19 pandemic had a devastating impact on health workers, with about 115,500 deaths worldwide.[83] Mpox, though less widespread, also affected frontline staff: health workers made up 3.8% of reported cases.

The heavy toll of pandemics and epidemics on healthcare workers highlights deep structural weaknesses in health systems. High mortality among frontline staff reflects chronic shortages of protective equipment, inadequate infection prevention and control measures, and weak surveillance systems that fail to detect and isolate cases early. In fragile settings like West Africa during Ebola, where health worker density was already among the lowest in the world, these vulnerabilities translated into catastrophic losses that took years to recover from.[84] Even in stronger systems, as seen during COVID-19, gaps in preparedness, supply chains, and workforce support left health workers exposed and underscored the fragility of health systems globally. The repeated pattern across Ebola, COVID-19, and mpox illustrates that without sustained investment in workforce protection, training, and system resilience, health systems remain vulnerable to collapse when crises strike.

Assessment

- The health impacts of health emergencies remain severe because underlying vulnerabilities persist such as weak primary care systems, limited surge capacity, inequitable access to medical countermeasures, and delays in outbreak detection. These systemic gaps allow epidemics to drive excess morbidity and mortality even when response plans and protocols are in place.

- There is evidence of some improvements during the Ebola response in the DRC, where lessons from West Africa helped sustain essential services and mitigate secondary health crises. However, the COVID-19 pandemic demonstrated how even stronger health systems can be rapidly overwhelmed.

- Taken together, these experiences show that despite incremental improvements, the world has not fundamentally strengthened its ability to manage the broader health impacts of pandemics and epidemics.

Opportunities & challenges

- Timely detection, effective coordination, and rapid action are critical determinants in reducing the health burden of epidemics. Investments in primary health care and surveillance systems are crucial for mitigating impacts. For example, the West Africa Ebola epidemic's burden was catastrophic largely because of delayed detection, lack of tools, weak systems, and fragmented governance.[85,86] The DRC outbreak burden was significantly lower because of faster detection, availability of vaccines and therapeutics, and improved response structures, despite a more complex security context. Lessons learned from West Africa helped ensure that the response would be more effective.

- Responses that deliberately integrate routine services show that epidemic control can be paired with sustaining health systems and essential services, reducing secondary health crises. Targeted financial and programmatic support can preserve access to essential maternal health and immunization services during epidemics, although complementary interventions are still required to overcome socioeconomic and structural barriers to care.

- Epidemics have spurred innovations such as digital health tools, telemedicine, and community-based service delivery. When coupled with strong community engagement, these approaches can build trust, improve equity, and create lasting system resilience.

Economic impacts

INCREASING 

Table 4. Measuring the economic impacts across six sub-indicators

Sub-indicators[i]	Ebola in West Africa (2014–2016)	Zika virus in Brazil, Colombia & Venezuela (2016)	Ebola in DRC (2018–2020)	COVID-19 (2020–2022)	Mpox (2022–2023, 2024–2025)
Gross domestic product (GDP) Observed change in GDP compared to pre-event year	**↓5.1%**[87] ---- US$ 2.8B estimated output loss[88]	Brazil: **↓4.0%** Colombia: **↑1.1%** Venezuela: **↓17.6%**[89,j] ---- Estimates of GDP loss due to Zika in LAC: ↓0.05–0.12%[90,91]; ↓US$ 3.5B[92]	**↑1.4%**[93]	**↑15.6%**[94] ---- Global: ↓2.9% HICs: ↓2.7% LICs: ↓3.6% (2020) ---- ↓5.6% compared to pre-COVID projections (↓US$ 4.7T loss in 2020)[95]	US: 2021→2023: **↑5.49%**[96,k] ---- Insufficient data for DRC
Public debt burden Change in general government gross debt-to-GDP ratio compared to pre-event year, percentage point (pp)	**↑13.74pp**[97]	Brazil: **↑5.7pp** Colombia: **↓0.5pp** Venezuela:**↑8.6pp**[98,l]	**↑0.5pp**	**↑7.1pp** ---- ↑ 16pp (peak in 2020)[99]	US: 2021→2023: **↓5.2pp**[k] ---- DRC: 2023→2025: **↓7.9pp**
Inflation Change in average consumer price compared to pre-event year	**↑5.1%**[100]	Brazil: **↓0.3%** Colombia: **↑2.5%** Venezuela: **↑133.2%**[101,m]	**↓24.3%**[102]	**↑5.1%**[103]	Global: **↓8.9%**[104,n] ---- 2021→2023:US: **↓0.6%** ---- DRC: 2023→2025: **↓11.1%**

[i] Unless otherwise indicated, the review period corresponds to the dates of the PHEICs shown in the table.
[j] Impact largely unrelated to Zika.
[k] Continued COVID-19 recovery.
[l] No evidence links increased public debt to zika.
[m] Increase unrelated to Zika.
[n] This shows continuing COVID-19 recovery.

Sub-indicators[i]	Ebola in West Africa (2014–2016)	Zika virus in Brazil, Colombia & Venezuela (2016)	Ebola in DRC (2018–2020)	COVID-19 (2020–2022)	Mpox (2022–2023, 2024–2025)
Commercial flights Percentage of suspended passenger seats	**↓ ~51–85%** (Aug-Oct 2014)[105]	Some demand impacts and disruptions but no extensive cancellations[106]	**↓ ~71%°**	**↓ 50-90%** (2020)[107]	No indication of flights suspended due to mpox
Trade Change in trade flows during event compared to pre-event year (total and per year)	Guinea: **Exports: ↑103.9%** **Imports: ↓4.1%** ----- 2013→2014: Exports: ↑9.4% Imports: ↑4.5% 2014→2015: Exports: ↓ ~43% Imports: ↓ ~15% 2015→2016: Exports: ↑~227% Imports: ↑ ~8%[108,109]	Brazil : **Exports: ↓3.9%** **Imports: ↓19.5%**[110] Colombia : **Exports: ↓13%** **Imports: ↓17%**[111, P] No data for Venezuela	**Exports: ↑15.7%** **Imports: ↑9.7%** ---- 2017→2018: Exports: ↑62.7% Imports: ↑36.7% 2018→2019: Exports: ↓~33.1% Imports: ↑~11.3% 2019-2020: Exports: ↑~6.3% Imports: ↓~21.4%[112]	**Exports: ↑26.7%** **Imports: ↑32.5%** ---- 2019→2020: Exports: ↓6.6%; imports: ↓7.52% Global merchandise trade: ↓ 7.4% ; Global services trade: ↓ 20% 2020→2021: Exports: ↑25.3%; Imports: ↑26.6% Global merchandise trade: ↑ 27% ; Global services trade:↑16% 2021→2022: Exports: ↑8.26%; Imports: ↑12% Global merchandise trade: ↑10%; Global service trade: ↑15%[113]	**Exports: ↑15.1%** **Imports: ↑8%**[k] ---- 2021→2023: US: Exports: ↑15.1%; Imports: ↑8% 2021 → 2022: Exports: ↑17.6%; Imports: ↑15% 2022 → 2023: Exports: ↓2.1%; Imports: ↓6.1% Insufficient data for DRC
Foreign Direct Investment (FDI) flows Change in foreign direct investments compared to previous years	**↓21%**[114] ---- 2013 →2014: ↓69.3% 2014 →2015: ↓33.0% 2015 →2016: ↑284.5%	Brazil: **↑49.3%** Colombia: **↑7.1%** Venezuela: **↑160.9%**[115]	2018-2020: **↑22.9%** (with dip in 2019)[116]	2019→2020: **↓ ~51.3%** 2020→2021: **↑~195.1%** 2021→2022: **↓~18.0%** [117,118,119,120,121]	US: 2021 → 2022: **↑25.3%** 2022 → 2023: **↑19.0%**[122,k]

M: million, B: billion, T: trillion

° Some disruptions, no important impact reported due to Ebola. 2020 data shows impact of COVID-19.

P Decrease largely unrelated to Zika.

Analysis

During both the Ebola epidemic in West Africa and the COVID-19 pandemic, economies suffered significant GDP losses, stemming not only from the direct toll of illness and mortality but also from the broader economic disruptions caused by containment measures. Quarantines, social distancing, and lockdowns led to sharp declines in consumer spending, halted production in key sectors, and disrupted both domestic and international trade (see Table 4). Policy interventions such as emergency fiscal support and social protection programmes, while critical to mitigating the immediate human impact, also placed additional strain on public finances, further influencing macroeconomic performance. The Ebola epidemic caused West Africa's GDP to contract by billions of dollars, with estimates suggesting losses of US$ 2.8 billion (see Table 4). By contrast, Ebola in the DRC was more localized, producing modest changes in GDP and temporary upticks in debt and poverty.[123,124] COVID-19's impact was much broader: global GDP fell by 2.9% in 2020, 5.6% lower than projections (see Table 4), hitting emerging markets particularly hard as households and businesses struggled with prolonged income shocks. The pandemic revealed deep structural vulnerabilities: many households had limited savings, informal workers lacked social safety nets[125] and small and medium-sized enterprises operated with minimal liquidity.[126] As a result, pandemic shocks cascaded into prolonged economic stress, exposing the fragility of economies ill-prepared for large-scale, sustained disruptions in income and demand.[127]

The economic impact of mpox and Zika has been modest compared with Ebola or COVID-19 but still significant for the affected regions and specific sectors. Despite relatively low mortality and morbidity, Zika is estimated to have cost Latin American countries close to US$ 3.5 billion in 2016, reflecting increased healthcare costs alongside significant losses in tourism revenues and labour productivity.[128] The multi-country mpox outbreaks led to temporary productivity losses, increased public-health expenditures, and some disruptions in travel and hospitality, particularly in cities that reported clusters.[129,130,131] However, because mpox has a lower transmission rate and was largely contained through vaccination campaigns and targeted public-health measures, its macroeconomic effect was limited, manifesting more as short-term fiscal and sectoral burdens than as a systemic economic shock.

Government debt burdens rose significantly during both the West African Ebola epidemic and the COVID-19 pandemic (see Table 4). Guinea, Liberia, and Sierra Leone faced sharp increases as governments rushed to finance treatment centres, health workers, and surveillance systems.[132,133,134,135,136] At the same time, economic contractions driven by deaths, trade disruptions, and containment measures reduced revenues and widened fiscal deficits.[137] Pre-existing fiscal fragilities forced heavy reliance on external borrowing through IMF credit, World Bank support, and bilateral budget assistance, which amplified debt levels.[138,139,140] In contrast, the DRC saw only limited increases in public debt during its Ebola outbreaks, in part because the outbreaks were regionally contained and financed mainly through grants and concessional facilities.[141]

The scale of COVID-19's fiscal impact was far greater. In the first wave, many governments launched rapid and innovative policies not only to address health needs but also to cushion economic and social shocks of lockdowns. These responses, combined with collapsing revenues from the global recession, drove debt levels to historic highs: in 2020, public debt reached 123% of GDP in advanced economies (the highest since 1970) and 63% of GDP in emerging markets and developing economies, the highest since 1987.[142] Unlike the more localized Ebola crises, COVID-19 represented a systemic global shock, forcing countries across all income levels into unprecedented borrowing to sustain both their health systems and economies.

COVID-19 and the West Africa Ebola outbreaks triggered inflationary pressures of similar levels, though through different channels. COVID-19 disrupted global supply chains, reduced labour availability, and fueled demand shifts, leading to sharp increases in food, energy, and essential goods prices worldwide.[143,144] By contrast, Ebola's inflationary impact was more localized, with movement restrictions, trade disruptions, and heightened uncertainty driving food and commodity price spikes in affected West African economies.[145,146]

In West Africa, border closures, reduced workforce capacity, and transport disruptions slowed the movement of essential goods, constrained regional trade, and curtailed agricultural exports, while mining operations in countries like Guinea and Liberia suffered from labour shortages and logistical bottlenecks that reverberated through global commodity markets.[147,148,149] COVID-19 amplified these challenges on a far larger scale: lockdowns, factory closures, and export restrictions. These measures disrupted global supply chains, causing billions of dollars in canceled contracts and widespread shortages of critical goods, from medical equipment to consumer products.[150,151,152] In both cases, trade flows and production eventually resumed, but the recovery was faster and more localized after Ebola,

while post-COVID recovery was slower, uneven across regions, and revealed persistent fragilities. Most importantly, COVID-19 exposed structural vulnerabilities in global supply chains such as overreliance on limited production hubs and just-in-time manufacturing, which remain a challenge today.[153] While the Zika epidemic did not trigger border restrictions, fear of infection and travel advisories for pregnant women nonetheless resulted in measurable losses for the tourism and travel sectors, impacting services trade in the region.[154]

The Ebola epidemic precipitated a widespread suspension of commercial air services to West Africa, significantly constraining regional connectivity and impeding the movement of goods and people, with some routes experiencing reductions in flights of up to 85% (see Table 4). This disruption not only hindered business operations and humanitarian logistics but also exacerbated the economic isolation of affected countries, limiting access to critical imports and exports. Similarly, during the COVID-19 pandemic, international travel and tourism declined sharply, as restrictions and heightened risk perceptions extended far beyond directly affected regions. The collapse in global air traffic (estimated at a 50% reduction in passenger flights in 2020) triggered cascading effects on international trade, cargo movement, and service industries. Because much medical cargo moves in the holds of passenger aircraft, the suspension of commercial flights sharply reduced lift capacity; rerouted shipments onto longer, costlier paths; strained cold-chain integrity; and contributed to delays and stockouts of PPE, diagnostics, oxygen equipment, and later vaccines.[155]

Pandemics and epidemics affect foreign direct investment (FDI) by generating uncertainty and risk perceptions that deter investors, particularly in sectors requiring long-term commitments such as infrastructure, energy, and manufacturing.[156,157] Because they cause economic contractions, reduce consumer demand, and disrupt supply chains, they lower the expected returns on investment. Government responses such as border closures, lockdowns, or emergency fiscal measures may further constrain business operations and discourage new inflows of capital.[158,159] Evidence from the Ebola epidemic in West Africa shows that FDI projects were often delayed, scaled back, or outright cancelled due to perceived political and economic instability, heightened health risks, and uncertainty over operational continuity.[160] The outbreak disrupted not only local markets but also investor confidence across the region, particularly in sectors reliant on labour mobility and logistics, such as mining, agriculture, and infrastructure development. During the COVID-19 pandemic, global FDI inflows fell by more than one-third in 2020, reflecting widespread uncertainty, volatile financial markets, and the reallocation of capital to less-risky or more resilient sectors.[161] The impacts have been highly uneven: industries such as digital technology, e-commerce, and healthcare (particularly vaccine production, diagnostics, and telemedicine) experienced increased investment, demonstrating that crises can simultaneously constrain some forms of capital while accelerating growth in sectors aligned with emergent needs. Unlike Ebola, which had smaller, localized effects on FDI concentrated in West Africa, COVID-19 reshaped investment flows across virtually all sectors and regions. FDI patterns in both cases showed signs of rebound once outbreaks subsided, with West Africa regaining investor confidence after Ebola's containment and global FDI recovering more strongly in 2021–2022 as markets stabilized, though unevenly across sectors and regions.

Assessment

The West African Ebola epidemic produced a profound economic shock across all indicators reviewed. By contrast, Zika, the Ebola outbreak in the DRC and Mpox appear to have had more limited macroeconomic effects. Across these three events, impacts are difficult to isolate from concurrent economic and political crises, commodity shocks, insecurity and other structural pressures. In the case of the COVID-19 pandemic, severe GDP contraction, soaring public debt, and widespread disruptions to trade and supply chains revealed that the scale of the pandemic quickly overwhelmed response strategies. While some measures such as FDI flows, trade volumes, and GDP rebounded relatively quickly as restrictions eased, the overall depth and breadth of the economic shock were unprecedented.

In relative terms, the macroeconomic shock from COVID-19 was broadly comparable to that of the West African Ebola epidemic in the most affected countries. However, COVID-19 produced more severe and lasting structural effects because of its global scale, duration and cross-sectoral disruption, including higher debt burdens, reduced fiscal space, labour-market reconfiguration, altered investment patterns and supply-chain restructuring.

Economic impacts have also been deeply unequal. Low-income and emerging economies faced disproportionately more severe economic shocks, compounded by limited fiscal space and weaker safety nets. Unlike advanced economies, which can deploy massive stimulus packages to protect households and businesses, many low-income countries were unable to cushion the blow from the COVID-19 pandemic, forcing reliance on external assistance that often arrived too slowly or at insufficient scale. This uneven capacity to mitigate economic fallout from health

emergencies highlights that, while progress has been made since Ebola, it is still patchy, leaving the most vulnerable economies exposed to the greatest risks in future health emergencies.

Opportunities & challenges

- The original estimate of economic output loss from Ebola in West Africa was much higher and wider than the actual numbers. This is because the national and international response was able to implement effective containment measures that slowed the epidemic and prevented further spread within the region.[162]

- Perceived risk is a powerful driver of economic decision-making; each surge in uncertainty can dampen investment appetite and fuel significant volatility in stock markets. Just as the health impact of COVID-19 varied across time and regions, its economic fallout was marked by sharp fluctuations and unpredictability. These dynamics underscore the urgent need for strategies that reduce uncertainty during pandemic shocks, as more stable and coordinated public health responses can help mitigate wider economic disruptions.

- Looking ahead, economic policy must account for the possibility of multiple health crises occurring simultaneously, as well as the "open-ended" uncertainties of pandemics driven by viral evolution and unpredictable human responses. Unless new technologies and approaches can be leveraged to reduce the severity and duration of health crises, and to make societal responses more predictable, these uncertainties will continue to undermine economic stability.

- The ability to address the impacts of pandemics is closely tied to fiscal capacity. During COVID-19, high-income countries were able to draw on robust social safety nets and large-scale fiscal stimulus packages, while low-income countries could mobilize only a fraction of what was needed. In fact, fiscal stimuli in low-income settings during COVID-19 amounted to just 13% of the resources required to offset total working-hour losses, leaving populations far more exposed to economic and social hardship.[163] Looking ahead, shrinking fiscal space, driven by rising debt burdens and tighter global financing conditions, poses a critical challenge. Without new approaches to expand fiscal capacity, many countries will be even less able to respond effectively to future pandemics.

- Future preparedness must recognize that PHSM will remain an important part of the response against emerging pathogens, especially before vaccines and treatments are available. To protect both health and economies, governments must design PHSM that are smarter and more adaptive, i.e. targeted geographically and temporally, guided by real-time data, and supported by robust social safety nets. Investments in digital surveillance, income protection, and continuity planning for essential services can reduce the trade-offs between containment and economic stability.

Social impacts

Trend is UNCHANGED —

Table 5. Measuring the social impacts across seven sub-indicators

Sub-indicators[q]	Ebola in West Africa (2014–2016)	Zika virus in Brazil, Colombia & Venezuela (2016)	Ebola in DRC (2018–2020)	COVID-19 (2020–2022)	Mpox (2022–2023, 2024–2025)
Extreme poverty Change in no. of people who fell into extreme poverty compared to pre-event years	2014→2015: **↑~6.8%** (~1.5M)[164]	No evidence available	No impact documented	**↑~0.3%** (~23M)[165,166] ---- ↑~0.9% (~70M) peak (2020)	2021→2023: US: **↑0.9%** (2M)[167,r]
Food insecurity Change in no. of food-insecure people compared to pre-event years	2014→2015: **↑~520,000**[168]	No data available on Brazil Colombia: **↓0.6M** Venezuela: **↑4.1M**[169,s]	**↑~6.2M** with acute food insecurity (late 2020)[170]	**↑~122M**[171]	No evidence of direct impact so far
Labour market changes No. of jobs lost compared to pre-event	Sierra Leone: **↑~179,000** by early 2015[172] ---- Liberia: 41% of household heads unemployed[173]	Brazil: **83%** of mothers with children affected by Zika (≥2300)[174]	No comprehensive data	2019→2020: **↑~114M**[175]	No data available
Children out of school No. of children out of school during the event	**≥ 2M** (~ 50%) in West Africa[176]	No evidence of impact	**20%** in Ebola-affected areas[177] (2018)	**≥ 1.6B** (over 80%) (2020)[178]	No data available
Child marriages and child violence Rate of increase in child pregnancy/ marriage	**↑65%** in child pregnancy in Sierra Leone[179]	No evidence of impact	Little disaggregated data	**~ 2–3M** additional marriages	No data available
Gender-based violence or discrimination Rate of gender-based violence/ discrimination	Guinea: **↑4.5%**[180]	Evidence of increased gender inequality[181,182]	No direct data available	**45%** of surveyed women[183]	**85%** of diagnosed MSM experienced mpox-related stigma[184] ---- Stigma across media: **81.7%**, healthcare: **34.8%**, **33%** avoided care[185]
Misinformation and disinformation spread Rate of misinformation on diverse social media	**55%** tweets contained false/ partially false information **63.5%** YouTube top-viewed videos[186]	**12%** of posts misleading[187] ---- **~20%** believe ≥ one Zika conspiracy theory[188]	No data on social media spread. ---- **25.5%** believed that Ebola was not real[189]	**0.2%–28.8%** posts[190] **≥ 25%** Youtube videos[191] **≥50%** posts on Instagram's "Explore" page[192]	**82%** tweets[193] **15%** Instagram posts[194]

M: million, B: billion, T: trillion

[q] Unless otherwise indicated, the review period corresponds to the dates of the PHEICs shown in the table.

[r] No evidence of direct impact; continuing COVID-19 impact.

[s] No evidence of broad, direct impact from Zika.

Analysis

Both the Ebola epidemic in West Africa and the COVID-19 pandemic sharply increased poverty. In Guinea, Liberia, and Sierra Leone, Ebola triggered quarantines and widespread fear of infection that collapsed local markets, cut agricultural output, and wiped out jobs, pushing hundreds of thousands into extreme poverty in each of the three countries (see Table 5). COVID-19's global reach had an even greater effect: lockdowns, supply-chain disruptions and the broader economic shock caused massive job losses, reduced remittances,[195] and strained public finances, leading to the first worldwide rise in extreme poverty in decades and the largest one-year increase on record.[196] In both crises, the poorest households (lacking savings, social protection, and reliable access to healthcare) were least able to withstand income shocks, resulting in deepening inequalities and slowing recovery long after the health emergencies ended. In the case of Zika, 83% of mothers with affected children did not return to the labour market after childbirth, resulting in persistent income losses, heightened financial vulnerability, and long-term barriers to women's labour force participation.[197,198,199]

During the West African Ebola epidemic, quarantines, market closures, and income losses pushed an estimated 520,000 additional people in Guinea, Liberia, and Sierra Leone into food insecurity (approximately 2.1% of the three countries' population at the time) (see Table 5). In the DRC, overlapping shocks, including Ebola, COVID-19 and conflict, left 6.2 million more people facing acute food insecurity by late 2020 (about 6.9% of the population). COVID-19 triggered a global surge: 122 million more people (approximately 1.5% of the world's population) were food-insecure in 2022 as job losses, supply-chain disruptions, and inflation widened vulnerability. In low-income countries, evidence shows that roughly 60% of adults experienced moderate or severe food insecurity during the pandemic, driven by restricted physical access under stay-at-home orders, reduced availability due to supply disruptions, and sharp increases in food prices.[200,201]

In West Africa, Ebola-related quarantines and travel bans seriously disrupted small-scale farming, cross-border trade, and mining. Because most workers were in the informal sector, even short shutdowns translated into lasting income losses and rising food insecurity. In Liberia, about 41% of household heads were unemployed at the peak of the outbreak, a particularly damaging shock because household heads were typically the primary earners, driving immediate cuts to consumption, spikes in food insecurity, and negative coping (e.g. asset sales, borrowing). In Sierra Leone, roughly 179,000 jobs (also household heads) were lost by early 2015, reflecting steep contractions in urban services, petty trade, transport, and mining-linked activities (see Table 5). These losses also impacted government revenues through weaker taxes and royalties, constraining the fiscal response.[202] The COVID-19 pandemic magnified these dynamics globally: an estimated 114 million jobs disappeared in 2020 as lockdowns and supply-chain failures hit hospitality, retail, and manufacturing sectors (see Table 5). Women, young people, and migrant workers, who are overrepresented in these sectors and often lack social protection, were more likely to exit the workforce entirely or return only to part-time, lower-paid roles, prolonging income losses and recovery lags.[203,204,205]

During the West African Ebola epidemic, classrooms in Liberia, Sierra Leone, and Guinea were shut down for up to eight months with about 50% of children out of school, leading to significant learning losses and child labour as families struggled economically (see Table 5). COVID-19 closed schools worldwide for far longer, at its peak affecting more than 1.6 billion students (over 80%) and widening digital divides between children with reliable internet access and those without. In both crises, the poorest children, especially girls, were least likely to return to class, compounding existing inequalities and threatening long-term human capital development.

School closures and economic stress during Ebola in West Africa and COVID-19 drove increases in child marriages and gender-based violence, leaving many girls and women at heightened risk of exploitation and long-term harm (see Table 5). Lockdowns and quarantines limited their access to teachers, health workers, or social services who might normally detect and report abuse. The combination of lost income, social isolation, and weakened safety nets created conditions where early marriage, sexual exploitation, adolescent pregnancy and gender-based violence became more likely to happen and less likely to be addressed.[206] COVID-19 produced a worldwide "shadow pandemic,"[207] with lockdowns, job losses, and school closures trapping survivors with abusers and straining shelters and hotlines just as demand for help surged. Although the mpox outbreaks were smaller in scale, stigma and fear limited access to care and support for survivors, and disruptions in sexual-health services heightened risks for marginalized groups, including LGBTQ+ communities.[208,209]

Misinformation has clearly increased with each successive crisis, peaking with COVID-19. Unlike other social harms, which scale with the size of the outbreak, misinformation has intensified in reach, speed, and influence over time, creating a more pervasive challenge for health authorities.

In West Africa, rumors that Ebola treatment centres were deliberately spreading the virus or that traditional healing was more effective than conventional treatments fueled distrust in health authorities, leading some communities to avoid care and even attack healthcare workers.[210] For instance, in Guinea, Red Cross volunteers were beaten while conducting safe burials.[211] During Zika, belief in conspiracy theories led to erosion of public confidence in official guidance and hindered effective risk communication.[212] Similarly, during the DRC Ebola outbreaks, misinformation about the virus and distrust of authorities led to attacks on health workers, complicating containment efforts.[213,214] COVID-19 saw misinformation reach a global scale, with false claims about the virus's origins, cures, and vaccines spreading rapidly through social media, undermining adherence to public-health measures and contributing to vaccine hesitancy (see Table 5).[215,216,217,218,219] Likewise, mpox outbreaks were accompanied by stigma and misconceptions about modes of transmission, particularly targeting LGBTQ+ communities.[220,221] In all four events, misinformation disproportionately affected vulnerable populations with limited access to reliable information, eroded trust in institutions, and hindered effective outbreak control.

Assessment

Across these crises, the social impacts have remained broadly the same or deteriorated. In each event, the most vulnerable populations – women, children, informal workers, and marginalized groups – bore the heaviest burdens. School closures disrupted education, economic shocks pushed families into poverty, overburdened social and health systems increased the risks of gender-based violence, and marginalization further limited access to health care. While COVID-19 affected far more people globally, resulting in larger absolute numbers, the underlying patterns of social vulnerability and harm were similar to those observed during the Ebola outbreaks, suggesting that the underlying dynamics driving social consequences have not fundamentally changed.

Opportunities/challenges

- Paradoxically, many countries cut health and education budgets in the wake of COVID-19, although investing in health and education is among the most effective ways to reduce pandemic vulnerability.

- There has been some notable progress in managing misinformation in recent years. Organizations like WHO, UNICEF, and local health authorities in countries such as the DRC have implemented community engagement strategies, developed practical guidelines, and monitored social media to counter false narratives. While these efforts have improved awareness and vaccine acceptance, misinformation and stigma remain increasing challenges, highlighting the need for ongoing, targeted communication.

Political impacts

UNCHANGED –

Table 6. Measuring the political impacts across five sub-indicators

Sub-indicators[t]	Ebola in West Africa (2014–2016)	Zika virus in Brazil, Colombia & Venezuela (2016)	Ebola in DRC (2018–2020)	COVID-19 (2020–2022)	Mpox (2022–2023, 2024–2025)
Use of emergency powers No. of countries that implemented emergency powers	**4** (In Guinea, Liberia, Sierra Leone and Nigeria) [222,223,224,225,226]	**1** (Brazil)[227]	Localized measures but no national state of emergency [228,229,230]	**101** [231] (2020)	**1** [232]
Border closures and freedom of movement No. of countries with border closures or other border restrictions	**≥15** [233,234,235,236,237,238]	No evidence of border closures or restrictions; enhanced measures targeting 14 countries[239]	**1** (limited closure)[240]	**174** (border restrictions) **19** (complete border closures) (2020)[241]	No evidence of border closures/ restrictions; enhanced surveillance in several countries[242]
Elections postponed No. of elections postponed during the crises	**2** (Liberia[243] and Guinea[244])	No evidence of elections postponed.	**1** [245,246]	**~80** jurisdictions had ≥1 [247]	No evidence available
Political violence and repression Excessive use of force and use of coercive measures by the government	**≥1** death and **≥ 4** injured in Liberia[248,u] ---- No data/info available for Guinea and Sierra Leone	No evidence of repression or violence	**~80** political violence events, **~140** fatalities (Beni) ---- **40** violent events against health and aid workers in North Kivu and Ituri (2019)[249]	**≥ 59** countries with reported police violence against civilians[250]	Some reports of politicians using mpox to restrict rights of LGBTQ+ individuals[251]
Media freedoms V-Dem score before vs during event: Government censorship effort – Media (Lower score = higher levels of censorship)	**↑0.12** [252]	**↓0.347** [253,v]	**↑0.08** [254]	World: **↓0.11** [255] ---- **≥ 62** countries with laws and measures affecting freedom of expression[256]	US: **↓0.02** [257] DRC: **↑0.37** [258]

M: million, B: billion, T: trillion

[t] Unless otherwise indicated, the review period corresponds to the dates of the PHEICs shown in the table.

[u] These are only some reports, not all events were recorded.

[v] Changes unlikely to be related to Zika

Analysis

Governments in Liberia, Sierra Leone, and Guinea imposed quarantines, curfews, and movement restrictions under emergency decrees to contain Ebola, concentrating authority in the executive and sometimes limiting civil liberties.[259,260,261] Brazil's response to Zika relied on a declaration of a Public Health Emergency of National Importance, which activated emergency powers focused on surveillance, vector control, health-system coordination, and intergovernmental action.[262,263] These measures, however, were administrative and health-specific, designed to expedite response efforts without imposing border closures, movement restrictions, or suspending civil liberties.[264] In the DRC, the Ebola outbreak prompted localized use of emergency powers that allowed health authorities and the military to enforce quarantines and control movement.[265,266,267] COVID-19 saw a far broader, more stringent global use of emergency powers: many countries enacted lockdowns, restricted gatherings, and implemented surveillance measures, often granting executives temporary authority to bypass normal legislative processes (see Table 6).

During the West Africa Ebola epidemic, Liberia, Sierra Leone, Guinea, and several neighbouring countries closed their borders to limit cross-border transmission, disrupting trade, restricting movement, and at times complicating the delivery of humanitarian assistance (see Table 6). During the Zika outbreaks, fourteen affected countries enacted enhanced surveillance measures, but there were no border closures. In the DRC, Ebola-related border and movement controls were applied primarily to affected provinces. While the aim was containing transmission, closures also complicated market access, vaccination operations, and election logistics.[268] COVID-19, in turn, triggered one of the most extensive global border shutdowns in history, with widespread travel bans, quarantines, and visa suspensions that disrupted supply chains, delayed migration, and affected electoral processes in some regions. During the mpox outbreaks, most countries avoided broad travel bans, though some implemented entry screening, travel advisories, or limited restrictions for travellers from affected areas, particularly in early 2022 when cases emerged outside of Africa. Several countries and regional bodies issued guidance explicitly stating that travel restrictions were unnecessary for mpox.[269,270,271]

Ebola and COVID-19 significantly affected elections by disrupting voting processes, limiting campaign activities, and influencing voter turnout.[272] Liberia and Sierra Leone faced delays and logistical challenges in holding elections during Ebola,[273] with some voters avoiding polling stations due to fear of infection.[274,275] COVID-19 caused widespread disruptions globally: lockdowns, social distancing, and public-health restrictions forced several countries to postpone elections, shift to mail-in or electronic voting, and change campaigning methods, which in some cases affected voter participation and campaign dynamics.[276]

Health emergencies have at times been associated with political violence and repression, particularly where governments have relied on police or military forces to enforce public health measures. During the Ebola epidemic, authorities in West Africa sometimes used coercive quarantines and cordons that sparked clashes, deepening mistrust.[277] By contrast, during the Zika outbreak in Brazil, the government deployed the military at large scale to support vector-control and community outreach activities, but this involvement remained largely non-coercive and was not associated with systematic violence or repression. In eastern DRC, armed groups attacked Ebola treatment centres and health workers, repeatedly disrupting care. During COVID-19, several governments used violent or heavy-handed enforcement, such as abusive policing, harsh crowd control, and punitive crackdowns on protests, occasionally resulting in severe injuries and deaths.[278] Mpox was smaller in scale but revealed stigma-driven harms: discriminatory narratives targeting LGBTQ+ communities deterred access to testing and care, while in parts of Europe political actors sought to cancel Pride events citing mpox (see Table 6). Since COVID-19, international and national public health guidance has explicitly mentioned the obligation to respect human rights standards in the response to health emergencies and to eliminate stigmatizing messaging.

During the Ebola epidemic in West Africa, journalists faced intimidation, both from authorities and from communities, and encountered reporting restrictions in areas where officials sought to control narratives, either to prevent panic and misinformation or to downplay the severity of the outbreak.[279,280,281,282] Governments, however, relied heavily on radio and other media channels for risk communication, making independent outlets essential for public-health messaging. This unfolded against a broader backdrop of gradually expanding media openness in Guinea, Liberia, and Sierra Leone in the early 2010s. As a result, while incidents of censorship and harassment were well documented, expert assessments (see Table 6) indicate that overall, routine government censorship efforts declined during this period. A similar pattern is observable in the DRC, where journalists covering the 2018–2020 Ebola outbreaks in North Kivu and Ituri reported localized harassment, intimidation, and constraints on reporting. Yet nationally, the media environment was becoming somewhat less systematically censored following the 2019 political transition, contributing

to a slight improvement in media-freedom indicators despite serious local abuses during the epidemic.[283,284] In several countries during COVID-19, governments limited press coverage, censored reporting on case numbers or health system failures, and imposed fines or arrests for "false" or "alarmist" information, constraining independent journalism, going further than during Ebola.[285,286,287,288] This mark a more restrictive trajectory worldwide: many governments imposed nationwide limits on press access, censored reporting on case numbers and health-system failures, and arrested or fined journalists for allegedly "false" or "alarmist" information, resulting in a sharper decline in media-freedom scores than during Ebola. During the mpox outbreaks, public-health agencies and UN bodies called for non-stigmatizing coverage, particularly regarding LGBTQ+ communities, but there is no evidence that governments systematically pressured the media or sought to reshape the narrative through censorship.[289]

Assessment

The patterns of political impact have stayed broadly consistent over the past decade: governments have used health emergencies to expand authority, manage movement, and influence information. However, the magnitude and global visibility of political consequences increased with COVID-19, and political violence during the pandemic was especially concerning. With mpox, there is evidence that some lessons were learned from COVID-19 around movement restrictions: instead of broad travel bans, many authorities prioritized risk communication strategies and targeted measures like advisories and entry screenings.

These dynamics are gradually reshaping governance and citizen–state relations, as prolonged emergency powers and reduced civic space influence how institutions are perceived and trusted.

These have also influenced broader political trends. Ebola and COVID-19 intensified polarization and, in some contexts, fueled populist narratives that frame public health measures as threats to personal freedom or national sovereignty. Misinformation and distrust have been leveraged for political gain, weakening consensus and undermining confidence in scientific and multilateral institutions. Over time, such dynamics risk entrenching divisions, complicating coordinated responses, and eroding the social cohesion needed for effective crisis management.

Opportunities & challenges

- Preventing the political impacts of health emergencies requires building trust and resilience before crises occur. Transparent communication and inclusive governance help counter misinformation and polarization, while strong legal safeguards ensure emergency powers remain temporary and proportionate. At the same time, investing in social protection systems cushions vulnerable groups from economic shocks, reducing the risks of unrest and declining confidence in institutions.

- Reliance on police and military to enforce public-health measures tends to erode trust, deter care-seeking, and disproportionately harm marginalized groups, shifting a health response into a security confrontation that can escalate tensions and undermine compliance.

- Unfortunately, repeated crises, often poorly managed, have led to deep mistrust, as citizens become less willing to follow public health measures, governments face heightened scrutiny and resistance, and opportunities for misinformation and polarization grow. This cycle of eroding trust undermines recovery efforts and makes future outbreak responses more difficult, as skepticism and weakened social cohesion reduce compliance and delay effective action.

References

1 The Economic Impact of the 2014 Ebola Epidemic. Washington (DC): World Bank Group; 2014. doi: 10.1596/978-1-4648-0438-0.

2 See Table 3.

3 See Table 3.

4 See Table 3.

5 The Economic Impact of the 2014 Ebola Epidemic. Washington (DC): World Bank Group; 2014. doi: 10.1596/978-1-4648-0438-0.

6 See Table 3.

7 Ebola: West Africa, March 2014-2016. In: World Health Organization (WHO) [website]. Geneva: WHO. (https://www.who.int/emergencies/situations/ebola-outbreak-2014-2016-West-Africa, accessed April 2026).

8 Ebola virus disease – Democratic Republic of the Congo. In: World Health Organization (WHO) [website]. Geneva: WHO; 16 December 2021. (https://www.who.int/emergencies/disease-outbreak-news/item/2021-DON351, accessed April 2026).

9 Green MS, Peer V, Schwartz N, Nitzan D. The confounded crude case-fatality rates (CFR) for COVID-19 hide more than they reveal-a comparison of age-specific and age-adjusted CFRs between seven countries. PLoS One. 2020; 15(10). doi: 10.1371/journal.pone.0241031.

10 Onder G, Rezza G, Brusaferro S. Case-Fatality Rate and Characteristics of Patients Dying in Relation to COVID-19 in Italy. JAMA. 12 May 2020; 323(18). doi: 10.1001/jama.2020.4683. Erratum in: JAMA. 28 April 2020; 323(16). doi: 10.1001/jama.2020.6122.

11 Hasan MN, Haider N, Stigler FL, Khan RA, McCoy D, Zumla A, Kock RA, Uddin MJ. The Global Case-Fatality Rate of COVID-19 Has Been Declining Since May 2020. American Journal of Tropical Medicine and Hygiene. 21 April 2021; 104(6). doi: 10.4269/ajtmh.20-1496.

12 Fourth meeting of the International Health Regulations (2005) Emergency Committee regarding the upsurge of mpox 2024. In: World Health Organization (WHO) [website]. Geneva: WHO; 10 July 2025. (https://www.who.int/news/item/10-07-2025-fourth-meeting-of-the-international-health-regulations-%282005%29-emergency-committee-regarding-the-upsurge-of-mpox-2024, accessed April 2026).

13 First meeting of the International Health Regulations (2005) Emergency Committee regarding the upsurge of mpox 2024. In: World Health Organization (WHO) [website]. Geneva: WHO; 19 August 2024. (https://www.who.int/news/item/19-08-2024-first-meeting-of-the-international-health-regulations-%282005%29-emergency-committee-regarding-the-upsurge-of-mpox-2024, accessed April 2026).

14 Parpia AS, Ndeffo-Mbah ML, Wenzel NS, et al. Effects of Response to 2014–2015 Ebola Outbreak on Deaths from Malaria, HIV/AIDS, and Tuberculosis, West Africa. Emerging Infectious Diseases. 2016; 22(3). doi:10.3201/eid2203.150977.

15 Sochas L, Channon AA, Nam S. Counting indirect crisis-related deaths in the context of a low-resilience health system: the case of maternal and neonatal health during the Ebola epidemic in Sierra Leone. Health Policy and Planning. 2017; 32(suppl_3). doi: 10.1093/heapol/czx108.

16 Paixao ES, Cardim LL, Costa MCN, et al. Mortality from Congenital Zika Syndrome - Nationwide Cohort Study in Brazil. New England Journal of Medicine. 2022; 386(8). doi: 10.1056/NEJMoa2101195.

17 Collucci C. Brazil's child and maternal mortality have increased against background of public spending cuts. BMJ. 2018; 362. doi: 10.1136/bmj.k3583.

18 Our World in Data. Cumulative excess deaths during COVID-19, from The Economist. Based on estimates from The Economist. Available from: https://ourworldindata.org/grapher/excess-deaths-cumulative-economist-single-entity. Accessed 1 May 2026.

19 Bah AJ, James PB, Bah N, Sesay AB, Sevalie S, Kanu JS. Prevalence of anxiety, depression and post-traumatic stress disorder among Ebola survivors in northern Sierra Leone: a cross-sectional study. BMC Public Health. 2020; 20(1). doi: 10.1186/s12889-020-09507-6.

20 Schindell BG, Fredborg B, Kowalec K, Shaw S, Kangbai JB, Kindrachuk J. The state of mental health among Ebola virus disease survivors through a cross-sectional study in Sierra Leone. BMJ Global Health. 2024; 9(5). doi: 10.1136/bmjgh-2024-015098.

21 Kuper H, Lopes Moreira ME, Barreto de Araújo TV, Valongueiro S, Fernandes S, Pinto M, Lyra TM. The association of depression, anxiety, and stress with caring for a child with Congenital Zika Syndrome in Brazil; Results of a cross-sectional study. PLoS Neglected Tropical Diseases. 2019; 13(9). doi: 10.1371/journal.pntd.0007768.

22 Kaputu-Kalala-Malu C, Musalu EM, Walker T, Ntumba-Tshitenge O, Ahuka-Mundeke S. PTSD, depression and anxiety in Ebola virus disease survivors in Beni town, Democratic Republic of the Congo. BMC Psychiatry. 2021; 21(1). doi: 10.1186/s12888-021-03343-7.

23 Cénat JM, Rousseau C, Bukaka J, Dalexis RD, Guerrier M. Severe Anxiety and PTSD Symptoms Among Ebola Virus Disease Survivors and Healthcare Workers in the Context of the COVID-19 Pandemic in Eastern DR Congo. Front Psychiatry. 2022; 13. doi: 10.3389/fpsyt.2022.767656.

24 Zhang L, Pan R, Cai Y, Pan J. The Prevalence of Post-Traumatic Stress Disorder in the General Population during the COVID-19 Pandemic: A Systematic Review and Single-Arm Meta-Analysis. Psychiatry Investigation. 2021; 18(5). doi: 10.30773/pi.2020.0458.

25 Yuan K, Gong YM, Liu L, et al. Prevalence of posttraumatic stress disorder after infectious disease pandemics in the twenty-first century, including COVID-19: a meta-analysis and systematic review. Molecular Psychiatry. 2021; 26(9). doi: 10.1038/s41380-021-01036-x.

26 Andhavarapu S, Yardi I, Bzhilyanskaya V, et al. Post-traumatic stress in healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. Psychiatry Research. 2022; 317. doi: 10.1016/j.psychres.2022.114890.

27 Zhu C, Zhang T, Li Q, Chen X, Wang K. Depression and Anxiety During the COVID-19 Pandemic: Epidemiology, Mechanism, and Treatment. Neuroscience Bulletin. 2023; 39(4). doi: 10.1007/s12264-022-00970-2.

28 Delpino FM, da Silva CN, Jerônimo JS, et al. Prevalence of anxiety during the COVID-19 pandemic: A systematic review and meta-analysis of over 2 million people. Journal of Affective Disorders. 2022; 318. doi: 10.1016/j.jad.2022.09.003.

29 Jaleel A, Farid G, Irfan H, Mahmood K, Baig S. A Systematic Review on the Mental Health Status of Patients Infected With Monkeypox Virus. Journal of the Korean Academy of Child and Adolescent Psychiatry. 2024; 35(2). doi: 10.5765/jkacap.230064.

30 Linares-Navarro R, Sanz-Muñoz I, Onecha-Vallejo V, et al. Psychosocial impact and stigma on men who have sex with men due to monkeypox. Frontiers in Public Health. 2025; 13. doi: 10.3389/fpubh.2025.1479680.

31 Camara BS, Delamou A, Diro E, et al. Effect of the 2014/2015 Ebola outbreak on reproductive health services in a rural district of Guinea: an

ecological study. Transactions of the Royal Society of Tropical Medicine and Hygiene. 2017; 111(1). doi: 10.1093/trstmh/trx009.

32 Delamou A, Ayadi AME, Sidibe S, et al. Effect of Ebola virus disease on maternal and child health services in Guinea: a retrospective observational cohort study. Lancet Global Health. 2017; 5(4). doi: 10.1016/S2214-109X(17)30078-5.

33 Jones SA, Gopalakrishnan S, Ameh CA, White S, van den Broek NR. 'Women and babies are dying but not of Ebola': the effect of the Ebola virus epidemic on the availability, uptake and outcomes of maternal and newborn health services in Sierra Leone. BMJ Global Health. 2016;1(3). doi: 10.1136/bmjgh-2016-000065.

34 Shannon FQ 2nd, Horace-Kwemi E, Najjemba R, et al. Effects of the 2014 Ebola outbreak on antenatal care and delivery outcomes in Liberia: a nationwide analysis. Public Health Action. 2017; 7(Suppl 1). doi: 10.5588/pha.16.0099.

35 Lo Ré MM, do Nascimento ACAS, da Fonseca MRCC. Caracterização da assistência pré-natal no Brasil segundo diferenças regionais e fatores associados às características maternas (Characterization of prenatal care in Brazil according to regional differences and factors associated with maternal characteristics). Research, Society and Development. 2022; 11(4). doi: 10.33448/rsd-v11i4.27180.

36 Hung YW, Law MR, Cheng L, et al. Impact of a free care policy on the utilisation of health services during an Ebola outbreak in the Democratic Republic of Congo: an interrupted time-series analysis. BMJ Global Health. 2020; 5(7). doi: 10.1136/bmjgh-2019-002119.

37 Townsend R, Chmielewska B, Barratt I, et al. Global changes in maternity care provision during the COVID-19 pandemic: A systematic review and meta-analysis. EClinicalMedicine. 2021; 37. doi: 10.1016/j.eclinm.2021.100947.

38 Immunization coverage estimates dashboard. In: United Nations Children's Fund (UNICEF) [website]. New York: UNICEF; July 2025 (https://data.unicef.org/resources/immunization-coverage-estimates-data-visualization/, accessed April 2026).

39 Masresha BG, Luce R Jr, Weldegebriel G, Katsande R, Gasasira A, Mihigo R. The impact of a prolonged ebola outbreak on measles elimination activities in Guinea, Liberia and Sierra Leone, 2014-2015. Pan African Medical Journal. 2020; 35. doi: 10.11604/pamj.supp.2020.35.1.19059.

40 Immunization coverage estimates dashboard. In: United Nations Children's Fund (UNICEF) [website]. New York: UNICEF; July 2025 (https://data.unicef.org/resources/immunization-coverage-estimates-data-visualization/, accessed April 2026).

41 Ibid.

42 Ibid.

43 Ibid.

44 Ibid.

45 Disproportionate deaths among health care workers from Ebola could lead to sharp rise in maternal mortality last seen 20 years ago – World Bank report. In: World Bank. Washington (DC): World Bank Group; 8 July 2015 (https://www.worldbank.org/en/news/press-release/2015/07/08/disproportionate-deaths-among-health-care-workers-from-ebola-could-lead-to-sharp-rise-in-maternal-mortality-last-seen-20-years-ago---world-bank-report, accessed April 2026).

46 Shears P, Garavan C. The 2018/19 Ebola epidemic the Democratic Republic of the Congo (DRC): epidemiology, outbreak control, and conflict. Infection Prevention in Practice. 2020 Jan 24; 2(1). doi: 10.1016/j.infpip.2020.100038. Erratum in: Infection Prevention in Practice. 2021 Jan 23; 3(1). doi: 10.1016/j.infpip.2021.100119.

47 COVID-19: Health workers face 'dangerous neglect', warn WHO, ILO. In: UN News. New York: United Nations; 21 February 2022 (https://news.un.org/en/story/2022/02/1112352, accessed April 2026).

48 Global Mpox Trends. In: World Health Organization (WHO) [website]. Geneva: WHO; 10 April 2026 (https://worldhealthorg.shinyapps.io/mpx_global/; accessed April 2026).

49 Hung YW, Law MR, Cheng L, Abramowitz S, et al. Impact of a free care policy on the utilisation of health services during an Ebola outbreak in the Democratic Republic of Congo: an interrupted time-series analysis. BMJ Global Health. 2020; 5(7). doi: 10.1136/bmjgh-2019-002119.

50 Wisniewski J, Worges M, Lusamba-Dikassa PS. Impact of a free care policy on routine health service volumes during a protracted Ebola virus disease outbreak in the Democratic Republic of Congo. Social Science & Medicine. 2023; 322. doi: 10.1016/j.socscimed.2023.115815.

51 Guetiya Wadoum RE, Sevalie S, Minutolo A, et al. The 2018-2020 Ebola Outbreak in the Democratic Republic of Congo: A Better Response Had Been Achieved Through Inter-State Coordination in Africa. Risk Management and Healthcare Policy. 2021; 14. doi: 10.2147/RMHP.S327616.

52 Ebola: North Kivu/Ituri, Democratic Republic of the Congo, August 2018 - June 2020. In: World Health Organization (WHO) [website]. Geneva: WHO (https://www.who.int/emergencies/situations/Ebola-2019-drc-, accessed April 2026).

53 Peiter PC, Pereira RDS, Nunes Moreira MC, et al. Zika epidemic and microcephaly in Brazil: Challenges for access to health care and promotion in three epidemic areas. PLoS One. 2020; 15(7). doi: 10.1371/journal.pone.0235010.

54 Hayes R, Dakin F, Smuk M, et al. Cross-sectional survey of sexual health professionals' experiences and perceptions of the 2022 mpox outbreak in the UK. BMJ Open. 2024; 14(1). doi: 10.1136/bmjopen-2023-080250.

55 Case-fatality rates are influenced by multiple factors, including pathogen characteristics, population risk profiles, access to care, and surveillance practices. Pathogen virulence is typically the primary determinant, while health system capacity influences the ability to detect, treat, and manage severe cases.

56 Onder G, Rezza G, Brusaferro S. Case-Fatality Rate and Characteristics of Patients Dying in Relation to COVID-19 in Italy. Journal of the American Medical Association (JAMA). 2020 May 12; 323(18). doi: 10.1001/jama.2020.4683. Erratum in: JAMA. 2020 Apr 28; 323(16). doi: 10.1001/jama.2020.6122.

57 Diarra T, Okeibunor J, Diallo AB, et al. Epidemic Response amidst Insecurity: Addressing the Ebola Virus Epidemic in the Provinces of North Kivu and Ituri. Journal of Immunological Sciences. 2023; Suppl 3. doi: 10.29245/2578-3009/2023/S3.1102.

58 Ilunga Kalenga O, Moeti M, Sparrow A, Nguyen VK, Lucey D, Ghebreyesus TA. The Ongoing Ebola Epidemic in the Democratic Republic of Congo, 2018-2019. New England Journal of Medicine. 2019; 381(4). doi: 10.1056/NEJMsr1904253.

59 Shears P, Garavan C. The 2018/19 Ebola epidemic the Democratic Republic of the Congo (DRC): epidemiology, outbreak control, and conflict. Infection Prevention in Practice. 2020 Jan 24; 2(1). doi: 10.1016/j.infpip.2020.100038. Erratum in: Infection Prevention in Practice. 2021 Jan 23;3(1):100119. doi: 10.1016/j.infpip.2021.100119.

60 Ibid.

61 Yerger P, Jalloh M, Coltart CEM, King C. Barriers to maternal health services during the Ebola outbreak in three West African countries: a

literature review. BMJ Global Health. 2020; 5(9). doi: 10.1136/bmjgh-2020-002974.

62 Camara BS, Delamou A, Diro E, et al. Effect of the 2014/2015 Ebola outbreak on reproductive health services in a rural district of Guinea: an ecological study. Transactions of the Royal Society of Tropical Medicine and Hygiene. 2017; 111(1). doi: 10.1093/trstmh/trx009.

63 Delamou A, Ayadi AME, Sidibe S, et al. Effect of Ebola virus disease on maternal and child health services in Guinea: a retrospective observational cohort study. Lancet Global Health. 2017; 5(4). doi: 10.1016/S2214-109X(17)30078-5.

64 Jones SA, Gopalakrishnan S, Ameh CA, White S, van den Broek NR. 'Women and babies are dying but not of Ebola': the effect of the Ebola virus epidemic on the availability, uptake and outcomes of maternal and newborn health services in Sierra Leone. BMJ Global Health. 2016;1(3). doi: 10.1136/bmjgh-2016-000065.

65 Shannon FQ 2nd, Horace-Kwemi E, Najjemba R, et al. Effects of the 2014 Ebola outbreak on antenatal care and delivery outcomes in Liberia: a nationwide analysis. Public Health Action. 2017; 7(Suppl 1). doi: 10.5588/pha.16.0099.

66 Townsend R, Chmielewska B, Barratt I, et al. Global changes in maternity care provision during the COVID-19 pandemic: A systematic review and meta-analysis. EClinicalMedicine. 2021; 37. doi: 10.1016/j.eclinm.2021.100947.

67 Singh NS, Rodo M, Sing L, Russell N. Futures at Risk: The Impact of COVID-19 on Maternal, Newborn, and Child Health in Fragile and Conflict-Affected Settings. London: United Nations Children's Fund (UNICEF); 2021 (https://www.unicef.org.uk/wp-content/uploads/2021/09/UNICEFuk_ResearchReportFCASandCOVID-19_MNCH_2021.pdf, accessed April 2026).

68 Townsend R, Chmielewska B, Barratt I, et al. Global changes in maternity care provision during the COVID-19 pandemic: A systematic review and meta-analysis. EClinicalMedicine. 2021; 37. doi: 10.1016/j.eclinm.2021.100947.

69 Singh NS, Rodo M, Sing L, Russell N. Futures at Risk: The Impact of COVID-19 on Maternal, Newborn, and Child Health in Fragile and Conflict-Affected Settings. London: United Nations Children's Fund (UNICEF); 2021 (https://www.unicef.org.uk/wp-content/uploads/2021/09/UNICEFuk_ResearchReportFCASandCOVID-19_MNCH_2021.pdf, accessed April 2026).

70 Wisniewski J, Worges M, Lusamba-Dikassa PS. Impact of a free care policy on routine health service volumes during a protracted Ebola virus disease outbreak in the Democratic Republic of Congo. Social Science & Medicine. 2023; 322. doi: 10.1016/j.socscimed.2023.115815.

71 Albuquerque MSV, Lyra TM, Melo APL, et al. Access to healthcare for children with Congenital Zika Syndrome in Brazil: perspectives of mothers and health professionals. Health Policy and Planning. 2019; 34(7). doi: 10.1093/heapol/czz059.

72 Marbán-Castro E, Enguita-Fernàndez C, Romero-Acosta KC, et al. "One feels anger to know there is no one to help us!". Perceptions of mothers of children with Zika virus-associated microcephaly in Caribbean Colombia: A qualitative study. PLoS Neglected Tropical Diseases. 2022; 16(4). doi: 10.1371/journal.pntd.0010328.

73 See Immunization coverage estimates dashboard. In: UNICEF [website]. New York: UNICEF; July 2025 (https://data.unicef.org/resources/immunization-coverage-estimates-data-visualization/, accessed April 2026).

74 Wesseh CS, Najjemba R, Edwards JK, Owiti P, Tweya H, Bhat P. Did the Ebola outbreak disrupt immunisation services? A case study from Liberia. Public Health Action. 2017; 7(Suppl 1). doi: 10.5588/pha.16.0104.

75 Lame P, Milabyo A, Tangney S, et al. A Successful National and Multipartner Approach to Increase Immunization Coverage: The Democratic Republic of Congo Mashako Plan 2018-2020. Global Health: Science and Practice. 2023; 11(2). doi: 10.9745/GHSP-D-22-00326.

76 Ilunga Kalenga O, Moeti M, Sparrow A, Nguyen VK, Lucey D, Ghebreyesus TA. The Ongoing Ebola Epidemic in the Democratic Republic of Congo, 2018-2019. New England Journal of Medicine. 2019; 381(4). doi: 10.1056/NEJMsr1904253.

77 Shears P, Garavan C. The 2018/19 Ebola epidemic the Democratic Republic of the Congo (DRC): epidemiology, outbreak control, and conflict. Infection Prevention in Practice. 2020 Jan 24; 2(1). doi: 10.1016/j.infpip.2020.100038. Erratum in: Infection Prevention in Practice. 2021 Jan 23; 3(1):100119. doi: 10.1016/j.infpip.2021.100119.

78 Deaths from Democratic Republic of the Congo measles outbreak top 6000. In: World Health Organization (WHO) African Region [website]. Kinshasa: WHO African Region; 7 January 2020 (https://www.afro.who.int/news/deaths-democratic-republic-congo-measles-outbreak-top-6000, accessed April 2026).

79 On Life Support: A battered health system leaves DRC children at the mercy of killer diseases. Kinshasa: United Nations Children's Fund (UNICEF) DRC; 2020 (https://www.unicef.org/sites/default/files/2020-03/On-life-support-DRC-2020.pdf, accessed April 2026).

80 COVID-19 pandemic fuels largest continued backslide in vaccinations in three decades. In: World Health Organization (WHO) [website]. Geneva/ New York: WHO and United Nations; 15 July 2022 (https://www.who.int/news/item/15-07-2022-covid-19-pandemic-fuels-largest-continued-backslide-in-vaccinations-in-three-decades, accessed April 2026).

81 COVID-19 continues to disrupt essential health services in 90% of countries. In: World Health Organization (WHO) [website]. Geneva: WHO; 23 April 2021 (https://www.who.int/news/item/23-04-2021-covid-19-continues-to-disrupt-essential-health-services-in-90-of-countries, accessed April 2026).

82 Shears P, Garavan C. The 2018/19 Ebola epidemic the Democratic Republic of the Congo (DRC): epidemiology, outbreak control, and conflict. Infection Prevention in Practice. 2020 Jan 24; 2(1). doi: 10.1016/j.infpip.2020.100038. Erratum in: Infection Prevention in Practice. 2021 Jan 23; 3(1):100119. doi: 10.1016/j.infpip.2021.100119.

83 COVID-19: Health workers face 'dangerous neglect', warn WHO, ILO. In: UN News [website]. New York: United Nations; 21 February 2022 (https://news.un.org/en/story/2022/02/1112352, accessed April 2026).

84 McPake B, Dayal P, Herbst CH. Never again? Challenges in transforming the health workforce landscape in post-Ebola West Africa. Human Resources for Health. 2019; 17(1). doi: 10.1186/s12960-019-0351-y.

85 Bell BP, Damon IK, Jernigan DB, et al. Overview, Control Strategies, and Lessons Learned in the CDC Response to the 2014–2016 Ebola Epidemic. Morbidity and Mortality Weekly Report Supplement. 2016; 65(Suppl-3). doi: 10.15585/mmwr.su6503a2.

86 Sealy TK, Erickson BR, Taboy CH, et al. Labouratory Response to Ebola - West Africa and United States. Morbidity and Mortality Weekly Report Supplement. 2016; 65(3). doi: 10.15585/mmwr.su6503a7.

87 GDP (current US$) - Guinea, Liberia, Sierra Leone. In: World Bank Data. Washington (DC): World Bank Group; 2025 (https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=BR-CO-VE, accessed April 2026).

88 World Bank. 2014–2015 West Africa Ebola crisis: impact update. Washington, DC: World Bank, 2016.

89 GDP (current US$) - Brazil, Colombia, Venezuela, RB. In: World Bank Data. Washington (DC): World Bank Group; 2025 (https://data.worldbank.

org/indicator/NY.GDP.MKTP.CD?locations=BR-CO-VE, accessed April 2026).

90 A Socio-economic Impact Assessment of the Zika Virus in Latin America and the Caribbean: with a focus on Brazil, Colombia and Suriname. New York: United Nations Development Programme (UNDP); 2017 (https://info.undp.org/docs/pdc/Documents/R46/UNDP-Zika-03-14-2017.pdf, accessed April 2026).

91 World Bank Provides $150 Million to Combat Zika Virus In Latin America and the Caribbean. In: World Bank [website]. Washington (DC): World Bank Group; 18 February 2016 (https://www.worldbank.org/en/news/press-release/2016/02/18/world-bank-provides-150-million-to-combat-zika-virus-in-latin-america-and-the-caribbean, accessed April 2026).

92 World Bank Provides $150 Million to Combat Zika Virus In Latin America and the Caribbean. In: World Bank [website]. Washington (DC): World Bank Group; 18 February 2016 (https://www.worldbank.org/en/news/press-release/2016/02/18/world-bank-provides-150-million-to-combat-zika-virus-in-latin-america-and-the-caribbean, accessed April 2026).

93 GDP (constant LCU) - Congo, Dem. Rep., United States. In: World Bank Data. Washington (DC): World Bank Group; 2024 (https://data.worldbank.org/indicator/NY.GDP.MKTP.KN?locations=CD-US, accessed April 2026).

94 World Bank. GDP (current US$). World Bank Open Data [online database]. Accessed 3 May 2026. Available from: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD.

95 Stacy B. Rebuilding economies after COVID-19: Will countries recover?. In: World Bank Data Blog [website]. Washington (DC): World Bank Group; 6 September 2023 (https://blogs.worldbank.org/en/opendata/rebuilding-economies-after-covid-19-will-countries-recover, accessed April 2026).

96 GDP (constant LCU) - Congo, Dem. Rep., United States. In: World Bank Data [website]. Washington (DC): World Bank Group; 2024 (https://data.worldbank.org/indicator/NY.GDP.MKTP.KN?locations=CD-US, accessed April 2026).

97 General government gross debt. In: International Monetary Fund (IMF) [website]. Washington (DC): IMF; 2026 (https://www.imf.org/external/datamapper/GGXWDG_NGDP@WEO/OEMDC/ADVEC/WEOWORLD/VEN/BFA/GIN, accessed April 2026).

98 Ibid.

99 Ibid; Gaspar V, Medas P, Perrelli R. Global Debt Reaches a Record $226 Trillion. In: International Monetary Fund (IMF) Blog [website]. Washington (DC): IMF; 15 December 2021 (https://www.imf.org/en/blogs/articles/2021/12/15/blog-global-debt-reaches-a-record-226-trillion, accessed April 2026).

100 Inflation rate, average consumer prices. In: International Monetary Fund (IMF) [website]. Washington (DC): IMF; 2026 (https://www.imf.org/external/datamapper/PCPIPCH@WEO/SLE/GIN/LBR, accessed April 2026).

101 Ibid.

102 Ibid.

103 Inflation, consumer prices (annual %). In: World Bank Data. Washington (DC): World Bank Group; 2025 (https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG, accessed April 2026).

104 Inflation rate, average consumer prices. In: International Monetary Fund (IMF) [website]. Washington (DC): IMF; 2026 (https://www.imf.org/external/datamapper/PCPIPCH@WEO/SLE/GIN/LBR, accessed April 2026).

105 Bogoch II, Creatore MI, Cetron MS, et al. Assessment of the potential for international dissemination of Ebola virus via commercial air travel during the 2014 west African outbreak. Lancet. 3 January 2015; 385(9962). doi: 10.1016/S0140-6736(14)61828-6. Erratum in: Lancet. 3 January 2015; 385(9962).

106 Fox News. Two U.S. airlines offer refunds to travelers to destinations with Zika virus outbreaks. Fox News; 27 January 2016, updated 4 January 2017. Available from: https://www.foxnews.com/health/two-u-s-airlines-offer-refunds-to-travelers-to-destinations-with-zika-virus-outbreaks. Accessed 1 May 2026; Dastin J. Airlines worry Zika may be hurting Americas travel – IATA CEO. Reuters; 25 February 2016. Available from: https://www.reuters.com/article/world/airlines-worry-zika-may-be-hurting-americas-travel-iata-ceo-idUSKCN0VY30F/. Accessed 1 May 2026.

107 Economic Impacts of COVID-19 on Civil Aviation. In: International Civil Aviation Organization (ICAO) [website]. Montréal: ICAO; 2022 (https://www.icao.int/economic-impacts-covid-19-civil-aviation, accessed April 2026).

108 Guinea Trade Summary 2016. In: World Integrated Trade Solution (WITS) [website]. Washington (DC): World Bank; 2016 (https://wits.worldbank.org/CountryProfile/en/Country/GIN/Year/2016/SummaryText, accessed April 2026).

109 Sierra Leone Trade Summary 2014. In: World Integrated Trade Solution (WITS) [website]. Washington (DC): World Bank; 2014 (https://wits.worldbank.org/CountryProfile/en/Country/SLE/Year/2014/SummaryText, accessed April 2026).

110 Brazil Trade Summary 2015. In: World Integrated Trade Solution (WITS) [website]. Washington (DC): World Bank; 2015 (https://wits.worldbank.org/CountryProfile/en/Country/BRA/Year/2015/SummaryText, accessed April 2026).

111 Colombia Trade Summary 2015. In: World Integrated Trade Solution (WITS) [website]. Washington (DC): World Bank; 2015 (https://wits.worldbank.org/CountryProfile/en/Country/COL/Year/2015/Summary, accessed April 2026).

112 Congo, Dem. Rep. Trade Summary 2021. In: World Integrated Trade Solution (WITS) [website]. Washington (DC): World Bank; 2021 (https://wits.worldbank.org/CountryProfile/en/Country/ZAR/Year/2021/SummaryText, accessed April 2026).

113 Global Trade Outlook and Statistics 2023. Geneva: World Trade Organization (WTO); 2023 (https://www.wto.org/english/res_e/booksp_e/trade_outlook23_e.pdf, accessed April 2026).

114 World Bank. Foreign direct investment, net inflows (BoP, current US$) – Guinea, Liberia, Sierra Leone. World Development Indicators. Available from: https://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD?locations=GN-LR-SL. Accessed 1 May 2026.; Anyanwu JC, Yameogo ND. What Drives Foreign Direct Investments into West Africa? An Empirical Investigation [conference paper]. Boston: African Development Review; 2015 (https://www.researchgate.net/publication/273499796_What_Drives_Foreign_Direct_Investments_into_West_Africa_An_Empirical_Investigation, accessed April 2026).

115 Foreign direct investment, net inflows (BoP, current US$) - Brazil, Colombia, Venezuela, RB. World Bank Data [website]. Washington (DC): World Bank; 2024 (https://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD?locations=BR-CO-VE, accessed April 2026).

116 Foreign direct investment: Inward and outward flows and stock, annual. In: UN Trade and Development (UNCTAD) [website]. Geneva: UNCTAD; 2025 (https://unctadstat.unctad.org/datacentre/dataviewer/US.FdiFlowsStock, accessed April 2026).

117 World Investment Report 2021: Investing in Sustainable Recovery. Geneva: UN Trade and Development (UNCTAD); UNCTAD; 2021 (https://

unctad.org/system/files/official-document/wir2021_en.pdf, accessed April 2026).

118 World Investment Report 2022: International Tax Reforms and Sustainable Investment. Geneva: UN Trade and Development (UNCTAD); UNCTAD; 2022 (https://unctad.org/system/files/official-document/wir2022_en.pdf, accessed April 2026).

119 World Investment Report 2023: Investing in Sustainable Energy for All. Geneva: UN Trade and Development (UNCTAD); UNCTAD; 2023 (https://unctad.org/publication/world-investment-report-2023, accessed April 2026).

120 Foreign direct investment: Inward and outward flows and stock, annual. In: UN Trade and Development (UNCTAD) [website]. Geneva: UNCTAD; 2025 (https://unctadstat.unctad.org/datacentre/dataviewer/US.FdiFlowsStock, accessed April 2026).

121 Global foreign direct investment projected to plunge 40% in 2020. In: UN Trade and Development (UNCTAD) [website]. Geneva: UNCTAD; 16 June 2020 (https://unctad.org/news/global-foreign-direct-investment-projected-plunge-40-2020, accessed April 2026).

122 Foreign direct investment: Inward and outward flows and stock, annual. In: UN Trade and Development (UNCTAD) [website]. Geneva: UNCTAD; 2025 (https://unctadstat.unctad.org/datacentre/dataviewer/US.FdiFlowsStock, accessed April 2026).

123 Kiniati JF, Mundala JO, Bokele LI, Masasi DM, Mabika CM. Household Vulnerability and Poverty in the Bikoro Territory in Democratic Republic of Congo: Analysis of the Macro and Microeconomic Shocks of the 2018 Ebola Epidemic. Social Sciences. 2023; 12(6):260-268. doi: 10.11648/j.ss.20231206.11.

124 IMF Country Report No. 19/285: Democratic Republic of the Congo. Washington (DC): International Monetary Fund (IMF); 2019 (https://www.imf.org/-/media/files/publications/cr/2019/1codea2019001.pdf, accessed April 2026).

125 Chen MA, Rogan M, Sen K. Introduction. In: Chen MA, Rogan M, Sen K, editors. COVID-19 and the Informal Economy. Oxford: Oxford Academic; 2024:147–67. doi: 10.1093/oso/9780198887041.003.0001.

126 Adian I, Doumbia D, Gregory N, Ragoussis A, Reddy A, Timmis J. Small and Medium Enterprises in the Pandemic: Impact, Responses and the Role of Development Financing. Washington (DC): International Finance Corporation, World Bank Group; 2020 (https://documents1.worldbank.org/curated/en/729451600968236270/pdf/Small-and-Medium-Enterprises-in-the-Pandemic-Impact-Responses-and-the-Role-of-Development-Finance.pdf, accessed April 2026).

127 Global Economic Prospects. Washington (DC): World Bank; 2022 (https://thedocs.worldbank.org/en/doc/cb15f6d7442eadedf75bb95c4fdec1b3-0350012022/original/Global-Economic-Prospects-January-2022.pdf, accessed April 2026).

128 syndrome in Brazil: Study protocol and rationale for a mixed-methods study. Wellcome Open Research. 2019; 3:127. doi: 10.12688/wellcomeopenres.14838.2.

129 Manirambona E, Musa SS, Shomuyiwa DO, et al. The monkeypox virus: A public health challenge threatening Africa. Public Health Challenges. 2022; 1(4). doi: 10.1002/puh2.33.

130 Mpox Emergency May Add to Economic, Fiscal Challenges in Some African Sovereigns. In: Fitch Wire [website]. Hong Kong/ London: Fitch Ratings; 28 August 2024 (https://www.fitchratings.com/research/sovereigns/mpox-emergency-may-add-to-economic-fiscal-challenges-in-some-african-sovereigns-28-08-2024, accessed April 2026).

131 Oregbesan P. The Shocking Economic Impact of Mpox Outbreaks—What You Need to Know. In: Slum and Rural Health Initiative (SRHIN) [website]. Ibadan: SRHIN; 2025 (https://srhin.org/the-shocking-economic-impact-of-mpox-outbreaks-what-you-need-to-know/, accessed April 2026).

132 Guinea: Requests for Disbursement Under the Rapid Credit Facility and for Modification of Performance Criteria Under the Extended Credit Facility Arrangement—Staff Report; Press Release; and Statement by the Executive Director for Guinea– Country Report No. 14/298. Washington (DC): International Monetary Fund (IMF); 2014. doi: 10.5089/9781484340288.002.

133 Liberia: Ad Hoc Review under the Extended Credit Facility Arrangement and Request for Augmentation of Access and Modification of Performance Criteria—Staff Report; Press Release; and Statement by the Executive Director for Liberia– Country Report No. 14/299. Washington (DC): International Monetary Fund (IMF); 2014. doi: 10.5089/9781498399463.002.

134 Sierra Leone: Second Review Under the Extended Credit Facility Arrangement and Financing Assurances Review, and Requests for Augmentation of Access Under the Extended Credit Facility and Debt Relief Under the Catastrophe Containment and Relief Trust– Country Report No. 2015/076. Washington (DC): International Monetary Fund (IMF); 2015. doi: 10.5089/9781475531121.002.

135 Socio-economic impact of the Ebola Virus Disease in Guinea, Liberia and Sierra Leone. New York: United Nations Development Programme (UNDP); 2014 (https://files.acquia.undp.org/public/migration/africa/Ebola_policy_note_EN.pdf, accessed April 2026).

136 Update on the Economic Impact of the 2014 Ebola Epidemic on Liberia, Sierra Leone, and Guinea. Washington (DC): World Bank; 2014 (https://openknowledge.worldbank.org/server/api/core/bitstreams/10780743-035d-5526-ab42-e4781d5ec565/content, accessed April 2026).

137 The Economic Impact of the 2014 Ebola Epidemic. Washington (DC): World Bank Group; 2014. doi: 10.1596/978-1-4648-0438-0.

138 Sierra Leone: Staff Report for the 2013 Article IV Consultation and Request for a Three-Year Arrangement Under the Extended Credit Facility– Debt Sustainability Analysis– IMF Country Report 13/330. Washington (DC): International Monetary Fund (IMF); 2013. doi: 10.5089/9781475513998.002.

139 Liberia: Second Review Under the Extended Credit Facility Arrangement and Request for Waiver of Nonobservance of Performance Criteria and Modification of a Performance Criteria– IMF Country Report No. 13/365. Washington (DC): International Monetary Fund (IMF); 2013. doi: 10.5089/9781484311523.002.

140 Guinea: Second Review Under the Three-Year Arrangement Under the Extended Credit Facility, Requests for Modifications of Performance Criteria and Waiver of Nonobservance of Performance Criterion, and Financing Assurances Review– IMF Country Report No. 13/192. Washington (DC): International Monetary Fund (IMF); 2013. doi: 10.5089/9781484390375.002.

141 See for example: Fact Sheet: The World Bank Support to the 10th Ebola Outbreak in Democratic Republic of Congo. In: World Bank [website]. Washington (DC): World Bank Group; 24 July 2019 (https://www.worldbank.org/en/topic/pandemics/brief/fact-sheet-world-bank-support-to-10th-ebola-outbreak-in-democratic-republic-of-congo, accessed April 2026).

142 Kose MA, Nagle P, Ohnsorge F, Sugawara N. What Has Been the Impact of COVID-19 on Debt?: Turning a Wave into a Tsunami. Washington (DC): World Bank Group; 2021 (https://documents1.worldbank.org/curated/en/801991638297695658/pdf/What-Has-Been-the-Impact-of-COVID-19-on-Debt-Turning-a-Wave-into-a-Tsunami.pdf, accessed April 2026).

143 Liu Z, Nguyen TL. Global Supply Chain Pressures and U.S. Inflation. In: Federal Reserve Bank of San Francisco (FRBSF) [website]. San Francisco: FRBSF; 2023 (https://www.frbsf.org/research-and-insights/publications/economic-letter/2023/06/global-supply-chain-pressures-and-us-inflation/, accessed April 2026).

144 COVID-19 and global value chains: Policy options to build more resilient production networks. Paris; Organisation for Economic Co-operation

and Development (OECD); 2020 (https://www.oecd.org/content/dam/oecd/en/publications/reports/2020/06/covid-19-and-global-value-chains-policy-options-to-build-more-resilient-production-networks_f2e0f3b6/04934ef4-en.pdf, accessed April 2026).

145 The Economic Impact of the 2014 Ebola Epidemic. Washington (DC): World Bank Group; 2014. doi: 10.1596/978-1-4648-0438-0.

146 Ebola Virus Disease Outbreak - West Africa Executive Brief. Rome: Food and Agriculture Organization of the United Nations (FAO); 2014 (https://www.fao.org/fileadmin/user_upload/emergencies/docs/FAO_EVD_ExecutiveBrief_20141022.pdf, accessed April 2026).

147 The Economic Impact of the 2014 Ebola Epidemic. Washington (DC): World Bank Group; 2014. doi: 10.1596/978-1-4648-0438-0.

148 Grave food security concerns following the Ebola outbreak in Liberia, Sierra Leone and Guinea. Rome: Food and Agriculture Organization of the United Nations (FAO); 2014 (https://openknowledge.fao.org/server/api/core/bitstreams/77c7e4ab-d687-4e6f-8015-33b145840204/content, accessed April 2026).

149 FAO/WFP Crop and Food Security Assessment – Guinea. Rome: Food and Agriculture Organization of the United Nations (FAO) and World Food Programme (WFP); 2014 (https://openknowledge.fao.org/server/api/core/bitstreams/fe16ea47-f778-4501-839f-f18e1b8ca23b/content, accessed April 2026).

150 Securing Medical Supply Chains in a Post-Pandemic World. Paris; Organisation for Economic Co-operation and Development (OECD); 2024 (https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/02/securing-medical-supply-chains-in-a-post-pandemic-world_3c8cef7c/119c59d9-en.pdf, accessed April 2026).

151 COVID-19 and global value chains: Policy options to build more resilient production networks. Paris; Organisation for Economic Co-operation and Development (OECD); 2020 (https://www.oecd.org/content/dam/oecd/en/publications/reports/2020/06/covid-19-and-global-value-chains-policy-options-to-build-more-resilient-production-networks_f2e0f3b6/04934ef4-en.pdf, accessed April 2026).

152 Anner M. Abandoned? The Impact of Covid-19 on Workers and Businesses at the Bottom of Global Garment Supply Chains. University Park: Penn State Center for Global Workers' Rights (CGWR); 2020 (https://workersrights.org/app/uploads/2020/03/Abandoned-Penn-State-WRC-Report-March-27-2020.pdf, accessed April 2026).

153 World Trade Report 2021: Economic resilience and trade – Executive Summary. Geneva: World Trade Organization (WTO); 2021 (https://www.wto.org/english/res_e/booksp_e/wtr21_e/01_c_wtr21_e.pdf, accessed April 2026).

154 Gallivan M. Zika's impact on tourism. International Travel & Health Insurance Journal. 2019; 219 (https://www.itij.com/latest/long-read/zikas-impact-tourism, accessed April 2026).

155 The Economic Impact of the 2014 Ebola Epidemic. Washington (DC): World Bank Group; 2014. doi: 10.1596/978-1-4648-0438-0.

156 Hayakawa K, Lee H, Park C. The Effect of COVID-19 on Foreign Direct Investment (ADB Economics Working Paper Series No. 653). Mandaluyong City; Asian Development Bank (ADB); 2022 (https://www.adb.org/sites/default/files/publication/781381/ewp-653-effect-covid-19-foreign-direct-investment.pdf, accessed April 2026).

157 Zhan JX. Impact of pandemic on prospects for foreign direct investment. In: Focus [website]. London: The World Federation of Exchanges; 2020 (https://focus.world-exchanges.org/articles/impact-pandemic-global-prospects-foreign-direct-investment, accessed April 2026).

158 Sztajerowska M. Supply-chain disruptions and new investment policies in the post-COVID-19 world: Initial insights from project-level data. Paris; Organisation for Economic Co-operation and Development (OECD); 2023. doi: 10.1787/5fcc2892-en.

159 OECD investment policy responses to COVID-19. Paris; Organisation for Economic Co-operation and Development (OECD); 2020. doi: 10.1787/4be0254d-en.

160 Sy A, Copley A. Understanding the Economic Effects of the 2014 Ebola Outbreak in West Africa. Washington (DC): Brookings Institution; 2014 (https://www.brookings.edu/articles/understanding-the-economic-effects-of-the-2014-ebola-outbreak-in-west-africa/, accessed April 2026).

161 World Investment Report 2021: Investing in Sustainable Recovery. Geneva: United Nations Conference on Trade and Development (UNCTAD); 2021 (https://unctad.org/system/files/official-document/wir2021_en.pdf, accessed April 2026).

162 Ebola: Most African Countries Avoid Major Economic Loss but Impact on Guinea, Liberia, Sierra Leone Remains Crippling. In: World Bank [website]. Washington (DC): World Bank Group; 20 January 2015 (https://www.worldbank.org/en/news/press-release/2015/01/20/ebola-most-african-countries-avoid-major-economic-loss-but-impact-on-guinea-liberia-sierra-leone-remains-crippling, accessed April 2026).

163 Statement by Mr Guy Ryder, Director-General, International Labour Organization, to the IMFC. In: International Monetary and Finance Committee Forty-Second Meeting, Washington (DC), 15 October 2020. Geneva: International Labour Organization (ILO); 2020 (https://meetings.imf.org/en/-/media/amsm/files/am2020/imfc/ilo.pdf, accessed April 2026).

164 Ebola Response Strategy for Guinea, Liberia and Sierra Leone. New York: United Nations Development Programme (UNDP); 2015 (https://www.undp.org/sites/g/files/zskgke326/files/publications/UNDP-CPR-EbolaStrategy-2015.pdf, accessed April 2026).

165 Global Progress in Reducing Extreme Poverty Grinds to a Halt. In: World Bank [website]. Washington (DC): World Bank Group; 5 October 2022 (https://www.worldbank.org/en/news/press-release/2022/10/05/global-progress-in-reducing-extreme-poverty-grinds-to-a-halt, accessed April 2026).

166 End Poverty in All Its Forms Everywhere. In: UN Stats [website]. New York: United Nations Statistics Division; 2022 (https://unstats.un.org/sdgs/report/2022/goal-01/, accessed April 2026).

167 Hasell J, Rohenkohl B, Arriagada P, Ortiz-Ospina E, Roser M. Poverty. Our World in Data [website]. Accessed 1 May 2026. Available from: https://ourworldindata.org/poverty.

168 FAO/WFP Crop and Food Security Assessment – Liberia, Sierra Leone and Guinea. Rome: Food and Agriculture Organization of the United Nations (FAO) and World Food Programme (WFP); 2015 (https://openknowledge.fao.org/server/api/core/bitstreams/d4686d85-e4e2-44d1-b7a0-e9c7a6fd6844/content, accessed April 2026).

169 Suite of Food Security Indicators. In: FAOSTAT [website]. Rome: Food and Agriculture Organization of the United Nations (FAO); 2025 (https://www.fao.org/faostat/en/#data/FS, accessed April 2026).

170 Democratic Republic of the Congo (DRC): Acute Food Insecurity Situation July - December 2019 and Projection for January - May 2020. In: Integrated Food Security Phase Classification (IPC) [website]. Rome: IPC; 2020 (https://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1152131/?iso3=COD, accessed April 2026).

171 Food Security and Nutrition Around the World. In: The State of Food Security and Nutrition in the World 2023. Rome: Food and Agriculture

Organization of the United Nations (FAO); 2023 (https://openknowledge.fao.org/server/api/core/bitstreams/f1ee0c49-04e7-43df-9b83-6820f4f37ca9/content/state-food-security-and-nutrition-2023/food-security-nutrition-indicators.html, accessed April 2026).

172 Ebola Hampering Household Economies across Liberia and Sierra Leone. In: World Bank [website]. Washington (DC): World Bank Group; 12 January 2015 (https://www.worldbank.org/en/news/press-release/2015/01/12/ebola-hampering-household-economies-liberia-sierra-leone, accessed April 2026).

173 Graham E. As Ebola Ebbs, Liberia Focuses on Getting Back to Work. In: World Bank Blogs [website]. Washington (DC): World Bank Group (https://blogs.worldbank.org/en/health/ebola-ebbs-liberia-focuses-getting-back-work, accessed April 2026).

174 De Oliviera FA, da Silva AM, da Hora SS, de Oliviera SA, da Silva Junior AG, Cardoso CAA. Healthcare for children with congenital Zika syndrome: analysis of access to social rights. Ciência & Saúde Coletiva. 2022; 27(9):3679-3688. doi: 10.1590/1413-81232022279.02972022.

175 ILO: Uncertain and uneven recovery expected following unprecedented labour market crisis. In: International Labour Organization (ILO) [website]. Geneva: ILO; 25 January 2021 (https://www.ilo.org/resource/news/ilo-uncertain-and-uneven-recovery-expected-following-unprecedented-labour, accessed April 2026).

176 How the Ebola Crisis is Affecting Education in West Africa. Global Partnership for Education (GPE) [website]. Washington (DC): GPE; 19 November 2014 (https://www.globalpartnership.org/blog/how-ebola-crisis-affecting-education-west-africa, accessed April 2026).

177 80 per cent of school children returned to school in Ebola-affected areas of the Democratic Republic of the Congo. In: United Nations Children's Fund (UNICEF). Kinshasa/Dakar/New York/Geneva: UNICEF; 12 October 2018 (https://www.unicef.org/wca/press-releases/80-cent-school-children-returned-school-ebola-affected-areas-democratic-republic, accessed April 2026).

178 One year into COVID-19 education disruption: Where do we stand?. In: United Nations Educational, Scientific and Cultural Organization (UNESCO). Paris: UNESCO; 19 March 2021 (https://www.unesco.org/en/articles/one-year-covid-19-education-disruption-where-do-we-stand, accessed April 2026).

179 Jackson-Garrett D. Sierra Leone's Girls in the Aftermath of Ebola. In: Council on Foreign Relations (CFR) [website]. Washington (DC): CFR; 11 May 2016 (https://www.cfr.org/articles/sierra-leones-girls-aftermath-ebola, accessed April 2026).

180 Caspani M. Violence against women rises in Ebola-hit nations. In: Thomson Reuters Foundation News [website]. London; Thomson Reuters Foundation; 18 March 2015 (https://news.trust.org/item/20150318231945-7muis/, accessed April 2026).

181 Coutinho RZ, Villanueva A, Weitzman A, Marteleto LJ. Zika virus public health crisis and the perpetuation of gender inequality in Brazil. Reproductive Health. 2021; 18(1):40. doi: 10.1186/s12978-021-01067-1. Erratum in: Reproductive Health. 2024; 21(1):120. doi: 10.1186/s12978-024-01846-6.

182 Gurman T, Ballard Sara A, Villanueva Lorenzo F, et al. The role of gender in Zika prevention behaviors in the Dominican Republic: Findings and programmatic implications from a qualitative study. PLoS Neglected Tropical Diseases. 2020; 14(3):e0007994. doi: 10.1371/journal.pntd.0007994.

183 Measuring the shadow pandemic: Violence against women during COVID-19. New York: UN Women; 2021 (https://data.unwomen.org/sites/default/files/documents/Publications/Measuring-shadow-pandemic.pdf, accessed 18 May 2025).

184 Paterson A, Cheyne A, Tulunay H, et al.; Outbreak Stigma Assessment Expert Group. Mpox stigma in the UK and implications for future outbreak control: a cross-sectional mixed methods study. Oxford Global Health. 2025; 23(1):422. doi: 10.1186/s12916-025-04243-3.

185 Linares-Navarro R, Sanz-Muñoz I, Onecha-Vallejo V, et al. Psychosocial impact and stigma on men who have sex with men due to monkeypox. Frontiers in Public Health. 2025; 13:1479680. doi: 10.3389/fpubh.2025.1479680.

186 Fung IC, Fu KW, Chan CH, et al. Social Media's Initial Reaction to Information and Misinformation on Ebola, August 2014: Facts and Rumors. Public Health Reports. 2016; 131(3):461-73. doi: 10.1177/003335491613100312.

187 Sharma M, Yadav K, Yadav N, Ferdinand KC. Zika virus pandemic-analysis of Facebook as a social media health information platform. American Journal of Infection Control. 2017; 45(3):301-302. doi: 10.1016/j.ajic.2016.08.022.

188 Klofstad, C.A., Uscinski, J.E., Connolly, J.M. et al. What drives people to believe in Zika conspiracy theories?. Palgrave Communications. 2019; 5(36). doi: 10.1057/s41599-019-0243-8.

189 Vinck P, Pham PN, Bindu KK, Bedford J, Nilles EJ. Institutional trust and misinformation in the response to the 2018-19 Ebola outbreak in North Kivu, DR Congo: a population-based survey. Lancet Infect Diseases. 2019; 19(5):529-536. doi: 10.1016/S1473-3099(19)30063-5.

190 Gabarron E, Oyeyemi SO, Wynn R. COVID-19-related misinformation on social media: a systematic review. Bulletin of the World Health Organization. 2021; 99(6):455-463A. doi: 10.2471/BLT.20.276782.

191 Li HO, Bailey A, Huynh D, Chan J. YouTube as a source of information on COVID-19: a pandemic of misinformation? BMJ Global Health. 2020; 5(5):e002604. doi: 10.1136/bmjgh-2020-002604.

192 Quinn EK, Duffy RT, Larsen K, Dalton M, Peters CE. Anti-masking Posts on Instagram: Content Analysis During the COVID-19 Pandemic. Safety and Health at Work. 2025; 16(1):27-35. doi: 10.1016/j.shaw.2024.11.002.

193 Knudsen B, Høeg TB, Prasad V. Analysis of tweets discussing the risk of Mpox among children and young people in school (May-October 2022): a retrospective observational study. BMJ Paediatrics Open. 2024; 8(1):e002236. doi: 10.1136/bmjpo-2023-002236.

194 Dalton ME, Duffy R, Quinn E, et al. A qualitative review of social media sharing and the 2022 monkeypox outbreak: did early labelling help to curb misinformation or fuel the fire? Sexual Health. 2024 Feb; 21:SH23158. doi: 10.1071/SH23158.

195 Sayeh A, Chami R. Lifelines in Danger. Washington (DC): International Monetary Fund (IMF); 2020 (https://www.imf.org/-/media/files/publications/fandd/article/2020/june/covid19-pandemic-impact-on-remittance-flows-sayeh.pdf, accessed April 2026).

196 End Poverty in All Its Forms Everywhere. In: UN Stats [website]. New York: United Nations Statistics Division; 2022 (https://unstats.un.org/sdgs/report/2022/goal-01/, accessed April 2026).

197 De Oliviera FA, da Silva AM, da Hora SS, de Oliviera SA, da Silva Junior AG, Cardoso CAA. Healthcare for children with congenital Zika syndrome: analysis of access to social rights. Ciência & Saúde Coletiva. 2022; 27(9):3679-3688. doi: 10.1590/1413-81232022279.02972022.

198 Marbán-Castro E, Enguita-Fernàndez C, Romero-Acosta KC, et al. "One feels anger to know there is no one to help us!". Perceptions of mothers of children with Zika virus-associated microcephaly in Caribbean Colombia: A qualitative study. PLoS Neglected Tropical Diseases. 2022; 16(4). doi: 10.1371/journal.pntd.0010328.

199 A Socio-economic Impact Assessment of the Zika Virus in Latin America and the Caribbean: with a focus on Brazil, Colombia and Suriname.

New York: United Nations Development Programme (UNDP); 2017 (https://info.undp.org/docs/pdc/Documents/R46/UNDP-Zika-03-14-2017.pdf, accessed April 2026).

200 Sustainable Development Goal 2.1: Undernourishment and Food Insecurity. In: Near East and North Africa – Regional Overview of Food Security and Nutrition: Statistics and trends. Cairo: Food and Agriculture Organization of the United Nations (FAO), International Fund for Agricultural Development (IFAD), United Nations Children's Fund (UNICEF), World Food Programme (WFP), World Health Organization (WHO), United Nations Economic and Social Commission for Western Asia (UNESCWA); 2023. doi: 10.4060/cc8039en.

201 Josephson A, Kilic T, Michler JD. Socioeconomic impacts of COVID-19 in low-income countries. Nature Human Behavior. 2021; 5(5):557-565. doi: 10.1038/s41562-021-01096-7.

202 Update on the Economic Impact of the 2014 Ebola Epidemic on Liberia, Sierra Leone, and Guinea. Washington (DC): World Bank; 2014 (https://openknowledge.worldbank.org/server/api/core/bitstreams/10780743-035d-5526-ab42-e4781d5ec565/content, accessed April 2026).

203 Three ways to contain COVID-19's impact on informal women workers. UN Women Women Count [website]. New York: UN Women; 18 May 2020 (https://data.unwomen.org/features/three-ways-contain-covid-19s-impact-informal-women-workers, accessed April 2026).

204 Locked down and in limbo: The global impact of COVID-19 on migrant worker rights and recruitment. In: International Labour Organization (ILO) [website]. Geneva: ILO; 2021 (https://www.ilo.org/publications/locked-down-and-limbo-global-impact-covid-19-migrant-worker-rights-and, accessed April 2026).

205 Bateman N, Ross M. The pandemic hurt low-wage workers the most—and so far, the recovery has helped them the least. In: Brookings Institution [website]. Washington (DC): Brookings Institution; 28 July 2021 (https://www.brookings.edu/articles/the-pandemic-hurt-low-wage-workers-the-most-and-so-far-the-recovery-has-helped-them-the-least/, accessed April 2026).

206 Bakrania S, Chavez C, Ipince A, Rocca M, Oliver S, Stansfield C, et al. Impacts of pandemics and epidemics on child protection. Florence: UNICEF Office of Research – Innocenti; 2020. Available from: https://www.unicef.org/innocenti/media/6131/file/UNICEF-Impacts-Pandemics-Child-Protection-2020.pdf

207 The Shadow Pandemic: Violence against women during COVID-19. In: UN Women [website]. New York: UN Women (https://www.unwomen.org/en/news/in-focus/in-focus-gender-equality-in-covid-19-response/violence-against-women-during-covid-19, accessed April 2026).

208 Sah R, Mohanty A, Reda A, Padhi BK, Rodriguez-Morales AJ. Stigma during monkeypox outbreak. Frontiers in Public Health. 2022; 10:1023519. doi: 10.3389/fpubh.2022.1023519.

209 Biesty CP, Hemingway C, Woolgar J, et al. Community led health promotion to counter stigma and increase trust amongst priority populations: lessons from the 2022-2023 UK mpox outbreak. BMC Public Health. 2024; 24(1):1638. doi: 10.1186/s12889-024-19176-4.

210 Manguvo A, Mafuvadze B. The impact of traditional and religious practices on the spread of Ebola in West Africa: time for a strategic shift. PanAfrican Medical Journal. 2015; 22 Suppl 1(Suppl 1):9. doi: 10.11694/pamj.supp.2015.22.1.6190.

211 Muzembo BA, Ntontolo NP, Ngatu NR, et al. Misconceptions and Rumors about Ebola Virus Disease in Sub-Saharan Africa: A Systematic Review. International Journal of Environmental Research and Public Health. 2022; 19(8):4714. doi: 10.3390/ijerph19084714.

212 Simas C, Penn-Kekana L, Kuper H, et al. Hope and trust in times of Zika: the views of caregivers and healthcare workers at the forefront of the epidemic in Brazil. Health Policy and Planning. 2020; 35(8):953-961. doi: 10.1093/heapol/czaa042.

213 Vinck P, Pham PN, Bindu KK, Bedford J, Nilles EJ. Institutional trust and misinformation in the response to the 2018-19 Ebola outbreak in North Kivu, DR Congo: a population-based survey. Lancet Infectious Diseases. 2019; 19(5):529-536. doi: 10.1016/S1473-3099(19)30063-5.

214 As Ebola rages in DRC, survey highlights wide mistrust. In: Center for Infectious Disease Research & Policy (CIDRAP) News. Minneapolis: University of Minnesota; 28 March 2019 (https://www.cidrap.umn.edu/ebola/ebola-rages-drc-survey-highlights-wide-mistrust, accessed April 2026).

215 Loomba S, de Figueiredo A, Piatek SJ, de Graaf K, Larson HJ. Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA. Nature Human Behavior. 2021 Mar; 5(3):337-348. doi: 10.1038/s41562-021-01056-1. Erratum in: Nature Human Behavior. 2021 Mar; 5(3):407. doi: 10.1038/s41562-021-01088-7. Erratum in: Nature Human Behavior. 2021 Jul; 5(7):960. doi: 10.1038/s41562-021-01172-y.

216 Singh K, Lima G, Cha M, Cha C, Kulshrestha J, Ahn YY, Varol O. Misinformation, believability, and vaccine acceptance over 40 countries: Takeaways from the initial phase of the COVID-19 infodemic. PLoS One. 2022; 17(2):e0263381. doi: 10.1371/journal.pone.0263381.

217 Li HO, Bailey A, Huynh D, Chan J. YouTube as a source of information on COVID-19: a pandemic of misinformation? BMJ Global Health. 2020; 5(5):e002604. doi: 10.1136/bmjgh-2020-002604.

218 Rocha YM, de Moura GA, Desidério GA, de Oliveira CH, Lourenço FD, de Figueiredo Nicolete LD. The impact of fake news on social media and its influence on health during the COVID-19 pandemic: a systematic review. Zeitschrift fur Gesundheitswissenschaften. 2021:1-10. doi: 10.1007/s10389-021-01658-z.

219 Kisa S, Kisa A. A Comprehensive Analysis of COVID-19 Misinformation, Public Health Impacts, and Communication Strategies: Scoping Review. Journal of Medical Internet Research. 2024; 26:e56931. doi: 10.2196/56931.

220 Edward M, Shadrack O, Engmann ST, Jubilate A. Global Mpox transmission and stigma: addressing barriers in affected communities. Discover Public Health. 2025; 22:82. doi: 10.1186/s12982-025-00470-4.

221 Boutzoukas AE, Serrano PA, Cortez A, et al. Mpox epidemiology, barriers to treatment and prevention, and perceived stigma: a cross-sectional study. BMC Public Health. 2025; 25(1):3176. doi: 10.1186/s12889-025-24416-2.

222 Liberia declares state of emergency over Ebola virus. In: BBC News [website]. London: BBC News; 7 August 2014 (https://www.bbc.com/news/world-28684561, accessed April 2026).

223 Sierra Leone | Global Ebola Response;

224 Ebola in Sierra Leone- A slow start to an outbreak that eventually outpaced all others. In: World Health Organization (WHO) [website]. Geneva: WHO; 2015 (https://www.who.int/news-room/spotlight/one-year-into-the-ebola-epidemic/ebola-in-sierra-leone-a-slow-start-to-an-outbreak-that-eventually-outpaced-all-others, accessed April 2026).

225 Ebola outbreak: Guinea declares emergency. In: BBC News [website]. London: BBC News; 14 August 2014 (https://www.bbc.com/news/world-africa-28787025, accessed April 2026).

226 Ebola outbreak: Nigeria declares national emergency. In: BBC News [website]. London: BBC News; 9 August 2014 (https://www.bbc.com/news/world-africa-28715939, accessed April 2026).

227 Lowe R, Barcellos C, Brasil P, et al. The Zika virus epidemic in Brazil: from discovery to future implications. Int J Environ Res Public Health. 2018;15(1):96. doi:10.3390/ijerph15010096.

228 Fostering Behavior Change During Disease Outbreaks: Insights from Ebola Response in Africa. In: EveryCRSReport [website]. Washington (DC): Congressional Research Service; 2020 (https://www.everycrsreport.com/files/20200327_IN11285_af6453bce686fb0af3cf47af517a3a7ce62ade16.pdf, accessed April 2026).

229 Larson K, Kudra Maliro A. Congo soldiers, police to enforce Ebola emergency measures. In: Medical Xpress [website]. Science X Network; 18 July 2019 (https://medicalxpress.com/news/2019-07-congo-soldiers-police-ebola-emergency.html, accessed April 2026).

230 Kleinfeld P. Briefing: How Congo's Ebola epidemic became the world's second deadliest. In: The New Humanitarian [website]. Goma: The New Humanitarian; 2 July 2019 (https://www.thenewhumanitarian.org/news/2019/07/02/Ebola-outbreak-congo-epidemic-attacks-community, accessed April 2026).

231 Lundgren M, Klamberg M, Sundström K, Dahlqvist J. Emergency Powers in Response to COVID-19: Policy Diffusion, Democracy, and Preparedness. Nordic Journal of Human Rights. 2021; 38(4):305-318. doi: 10.1080/18918131.2021.1899406.

232 Cham K, McMakin W. Sierra Leone declares emergency after confirming 2nd mpox case in 4 days. In: AP News [website]. Dakar: AP News; 13 January 2025 (https://apnews.com/article/sierra-leone-mpox-state-of-emergency-d0bc49b47145d5f5bc9280bfb0e982a5, accessed April 2026).

233 Guinea closes borders over Ebola outbreak. In: Al Jazeera [website]. Doha: Al Jazeera; 9 August 2014 https://www.aljazeera.com/news/2014/8/9/guinea-closes-borders-over-ebola-outbreak, accessed April 2026).

234 Desclaux A, Badji D, Ndione AG, Sow K. Accepted monitoring or endured quarantine? Ebola contacts' perceptions in Senegal. Social Science & Medicine. 2017; 178:38-45. doi: 10.1016/j.socscimed.2017.02.009.

235 The Economic Impact of the 2014 Ebola Epidemic. Washington (DC): World Bank Group; 2014. doi: 10.1596/978-1-4648-0438-0.

236 Chirawurah D, Santuah N, Apanga S. Interactions Among Cross-Border Contiguous Communities and Implications for Managing Pandemics - The case of Ghana and Burkina Faso During the Ebola Outbreak in West Africa: A Qualitative Study. Annals of Global Health. 2022; 88(1):40. doi: 10.5334/aogh.3807.

237 Anderson M. Ebola: airlines cancel more flights to affected countries. In: The Guardian [website]. London: The Guardian; 2 August 2014 (https://www.theguardian.com/society/2014/aug/22/ebola-airlines-cancel-flights-guinea-liberia-sierra-leone, accessed April 2026).

238 Cohen NJ, Brown CM, Alvarado-Ramy F, et al. Travel and Border Health Measures to Prevent the International Spread of Ebola. Morbidity and Mortality Weekly Report Supplement. 2016; 65(Suppl-3):57–67. doi: http://dx.doi.org/10.15585/mmwr.su6503a9.

239 Oussayef NL, Pillai SK, Honein MA, et al. Zika Virus —10 Public Health Achievements in 2016 and Future Priorities. Morbidity and Mortality Weekly Report (MMWR). 2017; 65:1482-1488. doi: 10.15585/mmwr.mm6552e1.

240 Vieira A. Angola shuts border to contain DRC Ebola. In: The EastAfrican [website]. Nairobi: Nation Media Group; 18 August 2020 (https://www.theeastafrican.co.ke/news/africa/Angola-shuts-border-over-Ebola/4552902-4597214-mcmwxcz/index.html, accessed April 2026).

241 Li Z, Wang X, Chen S, et al. Assessing global border controls in response to COVID-19 pandemic using real-world data and target trial emulation. Journal of Infection. 2025; 91(3):106578. doi: 10.1016/j.jinf.2025.106578.

242 Mpox Travel Restrictions. In: International SOS [website]. London/ Singapore; International SOS (https://pandemic.internationalsos.com/Mpox-Travel-Restrictions, accessed April 2026).

243 Mark M. Liberia suspends elections due to Ebola outbreak. In: The Guardian [website]. Lagos: The Guardian; 9 October 2014 (https://www.theguardian.com/world/2014/oct/09/liberia-suspends-elections-ebola-outbreak, accessed April 2026).

244 Butty J. Ebola Crisis Prompts Suspension of Special Elections in Liberia. In: VOA News [website]. Washington (DC): Voice of America; 10 October 2014 (https://www.voanews.com/a/liberias-president-suspends-next-weeks-special-elections/2479083.html, accessed April 2026).

245 Mahamba F. Frontline: the Ebola response in the lead up to DR Congo's presidential elections. Lancet. 2019; 393(10168). doi: 10.1016/S0140-6736(19)30081-9.

246 Mohamed, H. Protesters in DRC's Beni target Ebola centre over election delay. In: Al Jazeera [website]. Kinshasa: Al Jazeera; 27 December 2018 (https://www.aljazeera.com/news/2018/12/27/protesters-in-drcs-beni-target-ebola-centre-over-election-delay, accessed April 2026).

247 Global overview of Covid-19: Impact on elections. In: International Institute for Democracy and Electoral Assistance (IDEA). Stockholm: IDEA; 2022 (https://www.idea.int/news-media/multimedia-reports/global-overview-covid-19-impact-elections, accessed April 2026).

248 Ebola quarantine in Liberia's capital sparks violence in slum. In: The Guardian [website]. Agence France-Presse; 21 August 2014 (https://www.theguardian.com/society/2014/aug/21/ebola-quarantine-violence-west-point-monrovia-liberia, accessed April 2026).

249 ACLED Fact Sheet: Conflict in the DRC. In: Armed Conflict Location & Event Data (ACLED). Madison: ACLED; 2019. (https://acleddata.com/sites/default/files/wp-content-archive/uploads/2019/07/ACLED_-Fact-Sheet-Conflict-in-the-DRC_7.2019.pdf, accessed April 2026).

250 Repucci S, Slipowitz A. Democracy under Lockdown. In: Freedom House [website]. Washington (DC): Freedom House; 2020 (https://freedomhouse.org/report/special-report/2020/democracy-under-lockdown, accessed April 2026).

251 März JW, Holm S, Biller-Andorno N. Monkeypox, stigma and public health. The Lancet Regional Health Europe. 2022; 23:100536. doi: 10.1016/j.lanepe.2022.100536.

252 Country Graph. In Varieties of Democracy (V-Dem) [dataset]. Gothenburg: V-Dem; 2025 (https://www.v-dem.net/data_analysis/CountryGraph/; accessed April 2026).

253 Ibid.

254 Ibid.

255 Ibid.

256 COVID-19 Civic Freedom Tracker. In: International Center for Not-for-Profit Law (ICNL). Washington (DC): ICNL; 2022 (https://www.icnl.org/covid19tracker/?location=&issue=&date=&type=, accessed April 2026).

257 Country Graph. In Varities of Democracy (V-Dem) [dataset]. Gothenburg: V-Dem; 2025 (https://www.v-dem.net/data_analysis/CountryGraph/; accessed April 2026).

258 Ibid.

259 Ebola – human rights in West Africa - Case study. In: GOV.UK [website]. London: United Kingdom Foreign & Commonwealth Office; 2015 (https://www.gov.uk/government/case-studies/ebola-human-rights-in-west-africa, accessed April 2026).

260 Calain P, Poncin M. Reaching out to Ebola victims: Coercion, persuasion or an appeal for self-sacrifice? Social Science & Medicine. 2015; 147. doi: 10.1016/j.socscimed.2015.10.063.

261 Operation UNITED ASSISTANCE: The DOD Response to Ebola in West Africa. In: Joint Chiefs of Staff [website]. Suffolk: Joint and Coalition Operational Analysis; 2016 (https://www.jcs.mil/portals/36/documents/doctrine/Ebola/oua_report_jan2016.pdf, accessed April 2026).

262 Oliveira CVS, Pepe VLE, Reis L, et al. The Zika virus emergency in Brazil and the federal response of the National Public Health Surveillance and Brazilian Health Regulatory Systems. Physis. 2024;34(Suppl 1):e34SP104. doi:10.1590/S0103-7331202434SP104en.

263 Lowe R, Barcellos C, Brasil P, et al. The Zika virus epidemic in Brazil: from discovery to future implications. Int J Environ Res Public Health. 2018;15(1):96. doi:10.3390/ijerph15010096.

264 Mendes A. Saúde declara fim da emergência nacional para zika e microcefalia. In: Agência FIOCRUZ de Notícias [website]. Rio de Janeiro: Fundação Oswaldo Cruz - Ministério da Saúde; 11 May 2017 (https://agencia.fiocruz.br/saude-declara-fim-da-emergencia-nacional-para-zika-e-microcefalia, accessed April 2026).

265 Fostering Behavior Change During Disease Outbreaks: Insights from Ebola Response in Africa. In: EveryCRSReport [website]. Washington (DC): Congressional Research Service; 2020 (https://www.everycrsreport.com/files/20200327_IN11285_af6453bce686fb0af3cf47af517a3a7ce62ade16.pdf, accessed April 2026).

266 Larson K, Kudra Maliro A. Congo soldiers, police to enforce Ebola emergency measures. In: Medical Xpress [website]. Science X Network; 18 July 2019 (https://medicalxpress.com/news/2019-07-congo-soldiers-police-ebola-emergency.html, accessed April 2026).

267 Kleinfeld P. Briefing: How Congo's Ebola epidemic became the world's second deadliest. In: The New Humanitarian [website]. Goma: The New Humanitarian; 2 July 2019 (https://www.thenewhumanitarian.org/news/2019/07/02/Ebola-outbreak-congo-epidemic-attacks-community, accessed April 2026).

268 Ssuuna I, Doshi V. Panic and confusion as Rwanda closes border with DRC over Ebola outbreak. In: The Guardian [website]. Kigali: The Guardian; 1 August 2019 (https://www.theguardian.com/global-development/2019/aug/01/rwanda-closes-border-with-dr-congo-over-deadly-ebola-outbreak-goma, accessed April 2026).

269 Statement against Travel Restrictions in Response to Mpox and Marburg Virus Outbreaks. In: Africa CDC [website]. Addis Ababa: Africa CDC; 8 October 2024 (https://africacdc.org/news-item/statement-against-travel-restrictions-inresponse-to-mpox-and-marburg-virus-outbreaks/, accessed April 2026).

270 Rapid scientific advice on public health measures for mpox (2024-2025). In: European Centre for Disease Prevention and Control (ECDC) [website]. Solna: ECDC; 14 January 2025 (https://www.ecdc.europa.eu/en/infectious-disease-topics/mpox/rapid-scientific-advice-public-health-measures-mpox-2024-2025, accessed April 2026).

271 Traders on Congo border count losses over Ebola. In: Daily Monitor [website]. Kampala: Nation Media Group; 11 September 2020 (https://www.monitor.co.ug/uganda/news/national/traders-on-congo-border-count-losses-over-ebola-1857840, accessed April 2026).

272 Elections During Emergencies and Crises: Lessons for Electoral Integrity from the Covid-19 Pandemic. Stockholm: International Institute for Democracy and Electoral Assistance (IDEA); 2023. doi: 10.31752/idea.2023.24.

273 Final Report: Republic of Sierra Leone Presidential, Parliamentary and Local Council Elections 2018. European Union Election Observation Mission; 2018 (https://www.eeas.europa.eu/sites/default/files/eu_eom_sl_2018_final_report_4.pdf, accessed April 2026).

274 Giahyue, JH. Liberian voter turnout low as Ebola overshadows senate election. In: Reuters [website]. Monrovia: Reuters; 20 December 2014 (https://www.reuters.com/article/world/liberian-voter-turnout-low-as-ebola-overshadows-senate-election-idUSKBN0JY0N0/, accessed April 2026).

275 Crisman B. Working Paper No. 174: Disease, disaster, and disengagement: Ebola and political participation in Sierra Leone. Princeton: Afrobarometer; 2017 (https://www.afrobarometer.org/wp-content/uploads/2022/02/afropaperno174_ebola_and_political_participation_in_sierra_leone.pdf, accessed April 2026).

276 Elections During Emergencies and Crises: Lessons for Electoral Integrity from the Covid-19 Pandemic. Stockholm: International Institute for Democracy and Electoral Assistance (IDEA); 2023. doi: 10.31752/idea.2023.24.

277 MacDougall C, Giahyue JH. Liberia troops fire on protesters as West Africa's Ebola toll hits 1,350. In: Reuters [website]. Monrovia: Reuters; 27 August 2014 (https://www.reuters.com/article/business/healthcare-pharmaceuticals/liberia-troops-fire-on-protesters-as-west-africas-ebola-toll-hits-1350-idUSKBN0GR12W/, accessed April 2026).

278 COVID-19 crackdowns: Police abuse and the global pandemic. London: Amnesty International; 2020 (https://www.amnesty.org/en/documents/act30/3443/2020/en/, accessed April 2026).

279 Dunham J, Nelson B, Aghekyan E. Harsh Laws and Violence Drive Global Decline. In: Freedom House [website]. Washington (DC): Freedom House; 2015 (https://freedomhouse.org/report/freedom-press/2015/harsh-laws-and-violence-drive-global-decline, accessed April 2026).

280 Nkanga P. In attempts to contain Ebola, Liberia censors its press. In: Committee to Protect Journalists (CPJ) [website]. New York: CPJ; 2014 (https://cpj.org/2014/09/in-attempts-to-contain-ebola-liberia-censors-its-p/, accessed April 2026).

281 Journalists killed while covering Ebola education campaign in Guinea. In: Committee to Protect Journalists (CPJ) [website]. Abuja: CPJ; 2014 (https://cpj.org/2014/09/journalists-killed-while-covering-ebola-in-guinea/, accessed April 2026).

282 Is freedom of information a collateral victim of Ebola virus?. In: Reporters Without Borders (RSF) [website]. Paris: RSF; 2014 (https://rsf.org/en/freedom-information-collateral-victim-ebola-virus, accessed April 2026).

283 Threat to DRC journalists who cover measures to combat Ebola. In: Reporters Without Borders (RSF) [website]. Paris: RSF; 2019 (https://rsf.org/en/threat-drc-journalists-who-cover-measures-combat-ebola, accessed April 2026).

284 East and Southern Africa: Attacks on journalists on the rise as authorities seek to suppress press freedom. In: Amnesty International [website]. London: Amnesty International; 2023 (https://www.amnesty.org/en/latest/news/2023/05/east-and-southern-africa-attacks-on-journalists-on-the-rise/, accessed April 2026).

285 COVID-19 crackdowns: Police abuse and the global pandemic. London: Amnesty International; 2020 (https://www.amnesty.org/en/documents/act30/3443/2020/en/, accessed April 2026).

286 Jacobsen, K. Amid COVID-19, the prognosis for press freedom is dim. Here are 10 symptoms to track. In: Committee to Protect Journalists (CPJ) [website]. New York: CPJ; 2020 (https://cpj.org/reports/2020/06/covid-19-here-are-10-press-freedom-symptoms-to-track/, accessed April 2026).

287 Over 600 COVID-19 related press freedom violations in past year. In: International Press Institute (IPI) [website]. Vienna: IPI; 14 April 2021 (https://ipi.media/over-600-covid-19-related-press-freedom-violations-in-past-year/, accessed April 2026).

288 Silenced and Misinformed: Freedom of Expression in Danger during COVID-19. London: Amnesty International; 2021 (https://www.amnesty.org/en/wp-content/uploads/2021/11/POL3047512021ENGLISH.pdf, accessed April 2026).

289 UNAIDS warns that stigmatizing language on Monkeypox jeopardises public health. In: UNAIDS [website]. Geneva: UNAIDS; 22 May 2022 (https://www.unaids.org/en/resources/presscentre/pressreleaseandstatementarchive/2022/may/20220522_PR_Monkeypox, accessed April 2026).

DECLINING

Monitoring Framework Indicator
C.1.4

Has equitable access to vaccines, therapeutics, diagnostics and other countermeasures improved or declined?

Progress in equity undone by persistent structural and political barriers

Summary

This indicator measures equity in access to medical countermeasures, through supply, speed of access, and population coverage.

Access to medical countermeasures (MCMs), such as vaccines, therapeutics, diagnostics, oxygen, and personal protective equipment (PPE), remains a central constraint to effective epidemic and pandemic response. The persistent bottlenecks affect supply volumes, timeliness, affordability, and suitability for different settings. Weak and geographically concentrated manufacturing, fragile supply chains, and limited technology transfer slow scale-up; advance purchase agreements and market monopolization constrain global availability and equity, while opaque procurement and pricing further impede fair allocation; and gaps in regulatory agility, cold-chain, last-mile delivery, and data systems delay uptake.[1]

From Ebola to mpox, improvements in equitable access to medical countermeasures have been modest at best. For many years, Ebola responses lacked biomedical tools. Even after vaccines and treatments became available, they were still deployed in limited, case-by-case ways rather than through a stable, scalable system for production, authorization, and delivery. The COVID-19 pandemic brought unprecedented R&D speed and volume, but allocation was deeply uneven and dependent on purchasing power, advance market commitments, political decision-making, and export controls. The stark inequities in access during the pandemic shocked the world, reflecting shortcomings in the global health architecture, insufficient global solidarity, and structural barriers that have not been addressed.

Mpox exposed those same faults. Despite the existence of licensed tools, access was slower than during COVID-19 due to limited global stockpiles, single-source manufacturing, complex regulatory and data requirements (e.g. compassionate use, trial evidence), fragmented procurement, and weak demand signaling. Logistical constraints were compounded by stigma and under-detection, which led government and procurement agencies to underestimate the size of the outbreaks. [2]

In short, without predictable financing, diversified manufacturing, streamlined regulatory reliance, and fair allocation rules and mechanisms (including pathogen access and benefit-sharing systems), the global community struggles to get the right products to the right people at the right time.

Table 7. Measuring equitable access to medical countermeasures (MCMs)

Sub-indicators[†]	Ebola in West Africa (2014–2016)	Zika virus in Brazil, Colombia & Venezuela (2016)	Ebola in DRC (2018–2020)	COVID-19 (2020–2022)	Mpox (2022–2023, 2024–2025)
Accessibility Global supply accessible (% doses needed) to LICs vs HICs within 100 days of PHEIC declaration/ development/ manufacture	*Vx: Only via clinical trials *PPE: Limited access	*Vx: None available *Dx: Limited data	*Vx: **100%** (for ring strategy), but some supply constraints[3,4]	*Vx: Purchased: HICs: **54%**; UMICs:**18%**; LMICs: **12%**; LICs: **3%**+COVAX: **13%** (Mar 2021)[5] Distributed: HICs: **81%**; LICs: **0.3%** (Apr 2021)[6] *PPE (medical facilities fully equipped): LIC: **43%**; U.S./Canada: **~95–100%** of hospitals; other HICs: **~75–90%** depending on region[7] (Mid-2020)	*Vx: HICs: **~70–80%** supply via stockpiles/ APAs[8]; LICs: **~50%** delivered (~3M/6.4M needed), not within 100 days[9] *PPE: No data
Speed of access Time to access by HICs vs LICs after detection/ development/ manufacture	*Vx: **~7 months**, via clinical trials (Feb–Apr 2015)[10,11] *PPE: **6–9 months**[12]	*Dx: Immediately through national laboratories and CDC, in Nov 2016 through limited access to commercial assays[13]	*Vx: **7–13**[14,15] **days**[16] *PPE: within **a week to a month**[17,18]	*Vx: HICs: **11 months** (Dec 2020)[19]; LICs: **17 months** (mid 2021)[20] *PPE: HICs: **days to weeks**; LICs: **2–6 months**[21]	*Vx: HICs: **2–6 weeks**[22]; LICs: **24–27 months**[23,24,25] *PPE: No data
Population coverage Target population vaccinated in LICs vs HICs by end of PHEIC	*Vx: Via clinical trial only	*Vx: None available *Dx: Limited data	*Vx: **99.4%** (305,841 people)[26] (May 2020)	*Vx: LICs: **25%**; HICs: **73%**[27] (May 2023)	*Vx: LICs: **43%** (600,000 people) with ≥1 dose[28,29]; HICs: **60–90%** (2025)[30,31,32]

*Vx: vaccine, Dx: diagnostics

Analysis

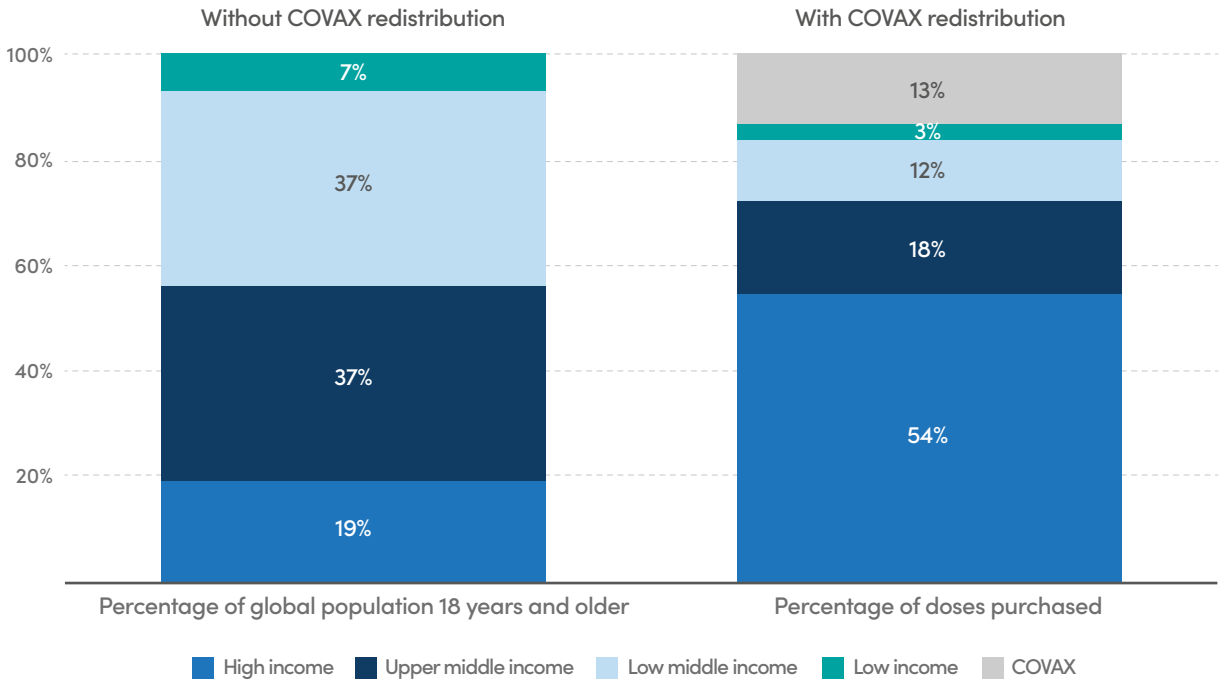
Access to medical countermeasures has remained deeply inequitable, with low- and middle-income countries consistently facing higher rates of delays and shortages compared to high-income countries. During the 2009 H1N1 influenza pandemic, for example, wealthier countries secured large vaccine supplies through advance purchase agreements, while many poorer countries waited months for limited, inconsistent deliveries.[33] This pattern has persisted across subsequent crises, revealing systemic weaknesses in the global health architecture and showing that key barriers to timely, effective, and equitable outbreak response remain unresolved.

The response to the West African Ebola epidemic struggled with slow access to PPE. Experimental vaccines and therapeutics were deployed late in the outbreak and primarily through small-scale trials, leaving most affected communities without timely protection. During the Zika outbreak, several vaccine candidates entered early-stage clinical trials beginning in 2016, but none progressed to authorization or use, meaning affected populations had no access to licensed vaccines or therapeutics throughout the epidemic.

Some progress was made during the Ebola outbreaks in the DRC, with rapid vaccine deployment (within days to weeks) demonstrating improved responsiveness. A localized, pre-positioned response enabled the start of a ring vaccination nearly one week after the outbreak was declared.[34]

The COVID-19 pandemic magnified the inequities already exposed during Ebola (see table 7 and figure 8). Early in the crisis, wealthier countries used their purchasing power to stockpile masks, gloves, and gowns, while export bans further constrained access elsewhere, leaving many LMICs without adequate PPE for frontline health workers. These shortages persisted well beyond the initial shock: in the early phase of the pandemic, approximately 43% of health facilities in low-income countries had sufficient PPE, with significant gaps continuing into 2021[35], reflecting chronic supply and financing constraints. As a result, many health workers were forced to reuse or improvise protective equipment, contributing to high rates of infection and mortality among health care workers. Similar inequities shaped access to diagnostics and vaccines. High-income countries secured early supplies through large bilateral deals, while COVAX and other global mechanisms struggled to meet demand in LMICs. On average, LMICs gained access to vaccines six months later, and by the end of the PHEIC in May 2023, only 25% of LMIC target populations had been vaccinated, compared with 73% in high-income countries.

Figure 8. COVID-19 vaccine doses purchased by income level



Source: Global COVID-19 Vaccine Access: A Snapshot of Inequality. https://www.kff.org/covid-19/global-covid-19-vaccine-access-snapshot-of-inequality/.

began within 2–6 weeks in HICs, while many LICs waited 18–24 months for access. Although some low-income settings ultimately vaccinated a larger share of their at-risk populations relative to their need, overall time to access was longer than during COVID-19. Key reasons for this were: limited global supply of third-generation smallpox/mpox vaccines concentrated in a small number of producers; donation-driven, ad hoc allocation rather than pre-negotiated access; slow financing mobilization; weak surveillance; and stigma, which complicated targeting and rollout. These lags meant preventive vaccination campaigns often started after transmission was already established.

Assessment

There has been mixed progress in improving the speed and equity of access to medical countermeasures. LMICs face longer lead times to secure vaccines, therapeutics, diagnostics, and PPE because of concentrated manufacturing and supply chains, advance purchase agreements with high-income buyers, export restrictions, and financing. Delays are compounded by regulatory bottlenecks, logistics hurdles, and deployment challenges. The result is missed windows to blunt transmission, higher morbidity and mortality, and prolonged social and economic disruption, even when global stock exists.

The West African Ebola response was slow, and the COVID-19 response was highly inequitable. By contrast, the DRC Ebola outbreaks showed that faster and more equitable responses are possible when countermeasures, financing, and delivery systems are mobilized rapidly. The mpox response, however, underscored how limited progress has been: delays persisted, and timelines and coverage were in some respects worse than during the COVID-19 pandemic. Although equity improved in terms of eventual reach, it did not improve in terms of speed to first dose. Without pre-arranged financing, diversified regional manufacturing, streamlined regulatory pathways, and epidemiology-driven allocation, inequitable access will persist.

Opportunities & challenges

- Many LMICs remain dependent on imports from a small number of producers and are therefore vulnerable to supply disruptions, export restrictions, delayed financing, and weak delivery systems. Intellectual property barriers and limited technology transfer further constrain the ability to expand or regionalize production during crises. Addressing these barriers requires sustained investment in regional manufacturing, voluntary licensing and technology transfer, predictable procurement financing, and last-mile delivery capacity.
- Access to medical countermeasures during localized outbreaks presents different challenges than during pandemics. When pre-positioned stockpiles and contingency financing are available, countermeasures can be deployed rapidly and more equitably. The main challenge in localized outbreaks is often reaching the last mile. Pandemics require a different playbook. Simultaneous global demand turns equitable allocation and distributed manufacturing into the central bottlenecks. Addressing them requires diversified regional production, advance market commitments for LMICs, technology transfer and voluntary licensing, export discipline to prevent hoarding, and pre-agreed allocation rules that activate automatically.
- Addressing vulnerabilities in PPE requires sustained investment in regional production hubs, the maintenance of strategic stockpiles, and transparent procurement systems. Building stronger regional supply chains can reduce dependence on a handful of global suppliers, while stockpile management and timely replenishment are essential to avoid shortages during crises. Equally important, transparent and accountable procurement practices help ensure equitable access, prevent price gouging, and strengthen public trust in emergency response systems.
- Without binding global rules, diversified production, and stronger regional supply chains, future outbreaks will likely reproduce the same inequities, prolonging both health and economic crises in the most vulnerable settings. The WHO Pandemic Agreement represents a significant step forward. If countries adopt its annex on a Pathogen Access and Benefit-Sharing System and move to ratify and implement the agreement, it will help address critical gaps and establish more structured, equitable mechanisms for international cooperation. Its emphasis on equity, technology sharing, strengthened supply chains, and transparent oversight helps to address many of the shortcomings that undermined the COVID-19 response.

References

1 The Changing Face of Pandemic Risk: 2024 Report. Geneva: Global Preparedness Monitoring Board; 2024. (https://gpmb.org/reports/report-2024; accessed April 2026).

2 Tovani-Palone MR, Doshi N, Pedersini P. Inequity in the global distribution of monkeypox vaccines. World Journal of Clinical Cases. 2023; 11(19). doi: 10.12998/wjcc.v11.i19.4498.

3 Kallay R, Doshi RH, Muhoza P, et al. Use of Ebola Vaccines - Worldwide, 2021-2023. Morbidity and mortality weekly report. 2024; 73(16). doi: 10.15585/mmwr.mm7316a1.

4 WHO rationing Ebola vaccines as outbreak still not under control in Democratic Republic of Congo. In: Médecins Sans Frontières (MSF) [website]. Geneva; 23 September 2019 (https://www.doctorswithoutborders.org/latest/who-rationing-ebola-vaccines-outbreak-still-not-under-control-democratic-republic-congo; accessed April 2026).

5 Rouw A, Wexler A, Kates J, Michaud J. Global COVID-19 Vaccine Access: A Snapshot of Inequality. Washington (DC): KFF, 2021. (https://www.kff.org/covid-19/global-covid-19-vaccine-access-snapshot-of-inequality/; accessed April 2026).

6 ACT now, ACT together 2020-2021 Impact Report. Geneva: WHO, 2021. (https://www.who.int/publications/m/item/act-now-act-together-2020-2021-impact-report; accessed April 2026).

7 Iyer RS, Matava C, Alessandro V, et al. A global cross-sectional survey of personal protective equipment practices from 125 institutions in 37 countries during the COVID-19 pandemic. Journal of Clinical Anesthesia. 2022; 80. doi: 10.1016/j.jclinane.2022.110881.

8 Danladi NP, Agboola P, Olanivi P. Challenges in Global Distribution and Equitable Access to Monkeypox Vaccines. Viruses. 2024; 16(12). doi: 10.3390/v16121815.

9 Cullinin K. Africa CDC Appeals for More Mpox Vaccines, as Ethiopia Reports First Cases. In: Health Policy Watch [website]. Geneva: Health Policy Watch; 29 May 2025 (https://healthpolicy-watch.news/africa-cdc-appeals-for-more-mpox-vaccines-as-ethiopia-reports-first-cases/; accessed April 2026).

10 World on the verge of an effective Ebola vaccine. In: World Health Organization (WHO) [website]. Geneva: WHO; 30 July 2015 (https://www.who.int/news/item/30-07-2015-world-on-the-verge-of-an-effective-ebola-vaccine; accessed April 2026).

11 National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Health Sciences Policy; Board on Global Health; Committee on Clinical Trials During the 2014-2015 Ebola Outbreak. Assessment of Vaccine Trials. In: Busta ER, Mancher M, Cuff PA, et al., editors. Integrating Clinical Research into Epidemic Response: The Ebola Experience. Washington (DC): National Academies Press (US); 2017: 113-154.

12 Ebola Outbreak: Taking Action From Response to Recovery. Geneva: World Health Organization (WHO); 2015 (https://cdn.who.int/media/docs/default-source/ebola/ebola-response-recovery.pdf; accessed April 2026).

13 Theel ES, Hata DJ. Diagnostic Testing for Zika Virus: a Post-outbreak Update. Journal of Clinical Microbiology. 2018; 56(4). doi: 10.1128/JCM.01972-17. ; Correio. Teste rápido de zika será disponibilizado pelo SUS. Salvador: Jornal Correio; 26 October 2016. Available from: https://www.correio24horas.com.br/saude/teste-rapido-de-zika-sera-disponibilizado-pelo-sus-1016

14 Ebola virus disease – Democratic Republic of the Congo. In: World Health Organization (WHO) [website]. Geneva: WHO; 23 May 2018 (https://www.who.int/emergencies/disease-outbreak-news/item/23-may-2018-ebola-drc-en; accessed April 2026).

15 Ebola virus disease – Democratic Republic of the Congo. In: World Health Organization (WHO) [website]. Geneva: WHO; 17 August 2018 (https://www.who.int/emergencies/disease-outbreak-news/item/17-august-2018-ebola-drc-en; accessed April 2026).

16 Soucheray S. Ebola vaccine arrives in DRC; campaign to begin within days. In: Center for Infectious Disease Research & Policy (CIDRAP) [website]. University of Minnesota; 16 May 2018 (https://www.cidrap.umn.edu/ebola/ebola-vaccine-arrives-drc-campaign-begin-within-days; accessed April 2026).

17 National Plan for the Response to the Ebola Virus Disease Epidemic in North Kivu Province. Kinshasa: Democratic Republic of the Congo Ministry of Health National Coordination Committee; 2018 (https://www.who.int/docs/default-source/documents/spr-ebola-2019/srp1-drc-ebola-disease-outbreak-response-plan.pdf; accessed April 2026).

18 New Ebola outbreak declared in North Kivu. In: Médecins Sans Frontières (MSF) [website]. Geneva: MSF; 5 September 2018 (https://www.msf.org/tr/node/45296; accessed April 2026).

19 Landmark moment as first NHS patient receives COVID-19 vaccination. In: National Health Service (NHS) England. Leeds: NHS; 8 December 2020 (https://www.england.nhs.uk/2020/12/landmark-moment-as-first-nhs-patient-receives-covid-19-vaccination/; accessed April 2026).

20 First COVID-19 COVAX vaccine doses administered in Africa. In: World Health Organization (WHO) [website]. Geneva/ New York/ Oslo: WHO; 1 March 2021 (https://www.who.int/news/item/01-03-2021-first-covid-19-covax-vaccine-doses-administered-in-africa; accessed April 2026).

21 Access to Essential Supplies: Background paper 7 by The Independent Panel for Pandemic Preparedness and Response (IPPPR). Geneva: IPPPR; 2021 (https://theindependentpanel.org/wp-content/uploads/2021/05/Background-paper-7-Access-to-Essential-Supplies.pdf; accessed April 2026).

22 Kriss JL, Boersma PM, Martin E, et al. Receipt of First and Second Doses of JYNNEOS Vaccine for Prevention of Monkeypox — United States, May 22–October 10, 2022. MMWR Morbidity and Mortality Weekly Report. 2022; 71. doi: 10.15585/mmwr.mm7143e2.

23 First-ever delivery of mpox vaccines in Africa outside of clinical trials arrives in Nigeria. In: World Health Organization (WHO) Regional Office for Africa [website]. Abuja/ Brazzaville: WHO; 27 August 2024 (https://www.afro.who.int/countries/nigeria/news/first-ever-delivery-mpox-vaccines-africa-outside-clinical-trials-arrives-nigeria; accessed April 2026).

24 First delivery of mpox vaccine doses arrives in the Democratic Republic of Congo. In: European Union (EU) Directorate-General for Health and Food Safety [website]. Brussels: EU; 5 September 2024 (https://health.ec.europa.eu/latest-updates/first-delivery-mpox-vaccine-doses-arrives-democratic-republic-congo-2024-09-05_en; accessed April 2026).

25 Searchinger C, Krugman A. Mpox Vaccine Tracker: Millions Pledged, Millions Still to Be Delivered. In: Think Global Health [website]. Washington (DC): Council on Foreign Relations; 24 February 2025 (https://www.thinkglobalhealth.org/article/mpox-vaccine-tracker-millions-pledged-

millions-still-be-delivered; accessed April 2026).

26 Ebola Virus Disease Democratic Republic of the Congo: External Situation Report 98. Brazzaville; World Health Organization Regional Office for Africa; 2020 (https://iris.who.int/server/api/core/bitstreams/35043163-d3eb-4861-8024-cdb4c14ece10/content; accessed April 2026).

27 Mathieu E, Ritchie H, Rodés-Guirao L, et al. Coronavirus (COVID-19) Vaccinations. In: Our World in Data [website]. Oxford: Our World In Data; 2024 (https://archive.ourworldindata.org/20260410-064224/covid-vaccinations.html; accessed April 2026).

28 Fourth meeting of the International Health Regulations (2005) Emergency Committee regarding the upsurge of mpox 2024. In: World Health Organization (WHO) [website]. Geneva: WHO; 10 July 2025 (https://www.who.int/news/item/10-07-2025-fourth-meeting-of-the-international-health-regulations-%282005%29-emergency-committee-regarding-the-upsurge-of-mpox-2024; accessed April 2026).

29 Searchinger C, Krugman A. Mpox Vaccine Tracker: Millions Pledged, Millions Still to Be Delivered. In: Think Global Health [website]. Washington (DC): Council on Foreign Relations; 24 February 2025 (https://www.thinkglobalhealth.org/article/mpox-vaccine-tracker-millions-pledged-millions-still-be-delivered; accessed April 2026).

30 Charles H, Thorley K, Turner C, Bennet KF, Andrews N, Bertran M, et al. Mpox Epidemiology and Vaccine Effectiveness, England, 2023. Emerging Infectious Diseases. 2024; 30(10). doi: 10.3201/eid3010.240292.

31 Kang H, Rovelsky S, Kang NH, Talbot EA, Murphy RA.Variation in Mpox Vaccine Coverage in the United States: Influence of Political Orientation and Public Health Resources. Open Forum Infectious Diseases. 2024; 11(10). doi: 10.1093/ofid/ofae567.

32 Ogaz D, Enayat Q, Brown J, Phillips D, Wilkie R, Jayes D, et al. Mpox Diagnosis, Behavioral Risk Modification, and Vaccination Uptake among Gay, Bisexual, and Other Men Who Have Sex with Men, United Kingdom, 2022. Emerging Infectious Diseases. 2024; 30(5). doi: 10.3201/eid3005.230676.

33 Fidler DP. Negotiating Equitable Access to Influenza Vaccines: Global Health Diplomacy and the Controversies Surrounding Avian Influenza H5N1 and Pandemic Influenza H1N1. PLoS Medicine. 2010; 7(5). doi: 10.1371/journal.pmed.1000247.

34 Ebola vaccination begins in North Kivu. In: World Health Organization (WHO) [website]. Mangina/ Geneva: WHO; 8 August 2018 (https://www.who.int/news/item/08-08-2018-ebola-vaccination-begins-in-north-kivu; accessed April 2026).

35 McMahon DE, Peters GA, Ivers LC, Freeman EE. Global resource shortages during COVID-19: Bad news for low-income countries. PLoS Neglected Tropical Diseases. 2020; 14(7). doi: 10.1371/journal.pntd.0008412.

DECLINING

Monitoring Framework Indicator
C.1.5

Are countries and communities recovering more quickly from health emergencies and is this recovery more equitable?

Resilience amid lasting damage

Summary

This indicator assesses progress made in our collective capacity to recover from health emergencies. Across health, economic, social and political dimensions, it looks at whether recovery is now faster and more equitable.

It is challenging to isolate the direct, long-term consequences of epidemics and pandemics because pre-existing and concurrent economic, social, and health trends compound their effects. However, data show clearly that the consequences of major epidemics and pandemics are not transient shocks but structural challenges with lasting implications for health, economic, social and political development trajectories. Both Ebola and COVID-19 exerted clear and enduring effects that extended well beyond the acute phase of the outbreaks, including persistent declines in economic growth, increased public debt burdens, protracted disruptions to health systems and social services, as well as political polarization. In the case of Ebola, affected West African countries experienced years of reduced investment, weakened infrastructure, and lasting psychosocial impacts, while COVID-19 generated global repercussions such as long-term labour market distortions, learning losses, and widening inequalities. Overall, both Ebola and COVID-19 revealed similar patterns of sharp disruption followed by gradual, uneven and often inequitable recovery, while in the DRC the impacts were more contained and progress in health outcomes continued even during the Ebola outbreak.

Ebola, COVID-19 and mpox survivors have faced long-term physical and mental health challenges, while service disruptions during these crises contributed to excess deaths, temporary declines in life expectancy, and stalled progress on infant mortality. Although many indicators eventually rebounded, backlogs in care, missed vaccinations, and uneven health spending reveal how recovery remains fragile and incomplete.

In West Africa, Ebola caused prolonged losses in economic growth, poverty reduction, and fiscal stability, while the DRC's outbreaks were more localised, with modest and shorter-lived economic impacts. COVID-19's global reach was unprecedented: output collapsed in 2020 but rebounded rapidly in advanced economies, leaving many low- and middle-income countries struggling with lasting scars from higher debt, disrupted education, and weaker labour markets. Poverty, trade, and investment trends showed rapid rebounds in some areas but persistent inequality in others. Inflation, which had been more moderate and localised after Ebola, declined steadily after peaking in 2022, easing pressure on households but leaving lasting effects on real incomes. Both crises left governments with elevated debt burdens and fiscal pressures, constraining social spending and long-term growth. By contrast, Ebola in DRC and mpox generated far smaller disruptions, with targeted vaccination and surveillance enabling most affected countries to stop the outbreaks before major economic or social systems were disrupted, underscoring how scale and response capacity determine the durability of recovery.

Both Ebola and COVID-19 left enduring social scars, including orphanhood, disrupted education, the growth of informal employment, rising inequality, and erosion of social cohesion, with recovery remaining uneven across countries and communities. In West Africa, Ebola created lasting trauma for orphans and survivors, slowed human development, and widened gender and income gaps, though some communities eventually rebuilt trust and cohesion. COVID-19 produced far broader and more systemic shocks: prolonged school closures, greater learning loss, and a surge in informal employment and polarization that continue to shape societies. While structural inequalities and informal employment have shown signs of improvement, recovery in education and social cohesion remains fragile, especially in low-income countries with weaker safety nets. Overall, both crises highlight how health emergencies magnify vulnerabilities, entrench long-standing inequalities, and leave lasting effects on human capital and community resilience.

The long-term political impacts of COVID-19 are reshaping societies in profound ways, altering how citizens engage with politics and weakening the legitimacy of traditional governance structures. They have redefined state-society relations, with many citizens now questioning established institutions and demanding new, more inclusive and accountable forms of democratic engagement. Political expectations have shifted, triggering profound realignments within political parties and reshaping the broader political landscape. At the global level, fractured cooperation and geopolitical rivalry are redefining alliances and influencing how societies perceive collective security and solidarity. In addition to straining existing political systems, COVID-19 has set in motion deeper social, economic, and governance shifts that will shape the future for decades.

Health recovery

UNCHANGED –

Table 8. Measuring health recovery across seven sub-indicators

Sub-indicators[a]	Ebola in West Africa (2014–2016)	Zika virus in Brazil, Colombia & Venezuela (2016)	Ebola in DRC (2018–2020)	COVID-19 (2020–2022)	Mpox (2022–2023, 2024–2025)
Long-term mortality and morbidity Long-term health consequences after infection or exposure, including elevated mortality risk, chronic symptoms, disability, congenital conditions, scarring or other lasting impairments	↑ **5x** mortality risk following infection[1]	Pregnancy affected by Zika infection: **5–15%** with CZS and other neuro-developmental impairment with long-term consequences[2]	No DRC-specific data available but likely similar to West African Ebola survivors	**≥1 million** deaths after PHEIC ended[3] ---- **~6%** cases lead to long COVID[4]	**47.5%** patients develop disfiguring scars[5]
Long-term life expectancy changes Difference in the average annual rate of life expectancy 5 years after the event or latest available year. *(years per year; ↑ = faster increase or recovery; ↓ = slower increase or decline)*	**↓0.09/year**[6]	**↑0.10/year**[7]	**↑0.51/year**[8,b]	**↓0.08/year** [9]	Insufficient data

[a] Unless otherwise indicated, the review period corresponds to 2–3 years before the event (baseline) vs 2–3 years after the event (recovery). For Ebola in West Africa the period is 2010–2013 vs 2017–2019; for Zika, the period is 2012–2015 vs 2017–2019; for Ebola in DRC, the period is 2015–2018 vs 2021–2023; for COVID-19, the period is 2016–2019 vs 2022–2025; for mpox, the period is 2019–2022 vs 2023–2025.

[b] Important COVID-19 impact.

Sub-indicators[a]	Ebola in West Africa (2014–2016)	Zika virus in Brazil, Colombia & Venezuela (2016)	Ebola in DRC (2018–2020)	COVID-19 (2020–2022)	Mpox (2022–2023, 2024–2025)
Post-crisis mental health burden Anxiety, depression and mental illness prevalence after the crisis	**45.7%** had PTSD **3.9%** had major depression **12%** reported substance use disorder (2021–2022)[10]	**~2,500** children affected with long-term mental effects of Congenital zika syndrome[11] ---- **41%** of mothers of 5–6-year-old children with CZS[12]	Insufficient data.	**>20%** above baseline by 2030[13,d]	Insufficient data
Post-crisis infant mortality rate [c] Change in the average annual rate of infant mortality 5 years after the event or latest available year. *(deaths per 1,000 live births; ↓ = faster decline/improvement; ↑ = slower decline or worsening)*	**↓0.26/year**[14]	**↓0.07/year**[15,d]	**↓0.33/year**[16]	**↓0.23/year**[17]	Insufficient data
Post-crisis immunization impact Measured impact and/or excess death due to reduced immunization during crisis	**↑2,000 -16,000** measles deaths after 18 months[18]	No evidence of impact	Insufficient data	2020→2030: **↑~49,000** deaths/year[19]	Insufficient data
Post-crisis hospital waiting times Median % of patients waiting more than 3 months before and after the event	No data available	Insufficient data	Insufficient data	2019→2023: **↑4.8%**[20]	Insufficient data
Post-crisis vaccine acceptance Change in share who believe vaccines are safe and/or effective five years after the event (or latest available year)	2015→2021: Guinea: **↓10–21%** [21,22,23,24] Liberia: **↓8–10%**[25,26] Sierra Leone: **↓2%**[27,28]	2015→2020: Brazil: **↓7%** 2015→2019: Colombia: **1.2%** Venezuela: No data[29]	**57%** (outbreak response)-**90%** (routine vaccines) (2021)[30]	2019→2023: **↓13%**[31]	Global: **↑6.3%**[32,e] DRC: **↑8%**[33]

CZS: Congenital Zika syndrome.

[c] For infant mortality, a lower rate indicates improvement. Downward arrows therefore indicate a faster decline in infant mortality after the event compared with the pre-event baseline, while upward arrows indicate a slower decline or worsening trend.

[d] Venezuela has been excluded due to data collection gaps.

[e] Only a subset of countries has data available in both periods.

Analysis

Ebola, Zika, COVID-19 and mpox have all had health consequences with broad societal impacts that persisted long after the PHEICs were declared over, complicating recovery. Long COVID, affecting an estimated 6% of those infected,[34] reduces workforce participation, productivity, and educational engagement while driving up healthcare costs, disability claims, and reliance on social protection systems. Symptoms can be persistent, lasting on average up to 1-2 years after infection, placing additional strain on health services and economies alike.[35] With an estimated 400 million long COVID cases globally in 2024,[36] the cost of long COVID has been estimated to be approximately US$ 1 trillion per year in OECD countries.[37] Ebola's sequelae are multidimensional, encompassing physical, mental, and social challenges for survivors, and highlighting the need for sustained post-epidemic care and monitoring. The cost of supportive care and productivity losses for survivors in West Africa has been estimated to be approximately US$ 12 million.[38] Zika also carries substantial long-term impacts: among pregnancies affected by infection, an estimated 5–15% result in congenital Zika syndrome or other lasting neurodevelopmental impairments, creating lifelong care needs for families and persistent social and economic burdens for health systems. Across these outbreaks, lingering effects undermine individual well-being and productivity while creating lasting demand for rehabilitation and social support long after the acute phase has passed.

The Ebola epidemic and the COVID-19 pandemic have left profound and lasting mental-health impacts on affected populations. Survivors, healthcare workers, and communities experienced sustained anxiety, depression, post-traumatic stress, and grief, often compounded by social stigma and disruptions to health and social services. Evidence shows that these psychological effects persisted long after the acute phases of the crises had passed (see Table 8). Mpox and Zika generated similar, though generally smaller-scale, mental-health impacts. Zika, however, had uniquely severe consequences for children exposed in utero. Congenital infection led in some children to lifelong neurodevelopmental disabilities, including microcephaly, epilepsy, and significant functional impairment, which imposed enduring psychological, social, and economic burdens on families, particularly mothers. A decade after the outbreak, the cumulative economic impact of caring for children with moderate and severe congenital Zika syndrome in Brazil is estimated at US$ 273.5 million for households and US$ 215.6 million for the public sector.[39] Although the full long-term consequences are still emerging, mpox has resulted in persistent stigma and discrimination, mental-health burdens, and evidence of prolonged morbidity among some survivors, including chronic pain, scarring, and functional limitations, that continue to affect well-being well beyond the infection period.

Life expectancy experienced significant declines during the Ebola epidemic in West Africa and the COVID-19 pandemic. Ebola led to substantial but localised reductions in life expectancy in affected countries, while COVID-19 caused the largest global decrease in modern history, with life expectancy falling by 1.8 years between 2019 and 2021. These declines reflected both direct mortality and indirect effects such as disruptions to health services and deterioration in key social determinants of health. Despite these unprecedented setbacks, however, life expectancy rebounded in both cases. In Guinea, Liberia and Sierra Leone, life expectancy continued to improve after Ebola, though at a slower average annual pace than before the epidemic. Globally, life expectancy returned to, and exceeded, pre-pandemic levels by 2023–2024, although recovery-period gains were slower than the pre-COVID baseline. This rebound likely reflected falling infection rates, reduced disease severity for COVID-19, restoration of essential health services, improved clinical management, and broader social and economic recovery. The slower pace of recovery, however, suggests that, while the acute mortality shocks receded in the recovery period, their effects may have continued to affect health gains after the emergency phase passed.[40]

While the rate of decline of infant mortality slowed during the West African Ebola epidemic and the COVID-19 pandemic, reflecting the disruptions these events caused to maternal and child health services, it recovered rapidly once the immediate impacts subsided. During Ebola, reductions in healthcare access, immunization coverage, and facility-based deliveries temporarily slowed progress in affected regions. After the epidemic ended, rapid restoration of routine health services, renewed investment in maternal and child health programmes, and the return of skilled health workers enabled infant mortality rates to rebound more quickly, returning to their pre-Ebola decline trajectory (see Table 8). Research shows, however, that areas that were more affected by Ebola took more time to recover.[41]

Zika contributed to localised increases in infant mortality, largely due to severe congenital infections and associated complications.[42] However, once transmission subsided, infant outcomes improved as the incidence of congenital Zika syndrome fell and pregnant women continued to access, and in some areas increased their use of, routine antenatal and newborn care services.[43] On the contrary, progress towards reducing infant mortality in DRC was sustained even during Ebola due to government support.

Similarly, COVID-19 caused short-term disruptions to essential maternal and child health services, leading to a temporary plateau in improvements in infant mortality. However, as health systems adapted and services were restored, infant mortality rates quickly resumed their downward trajectory (see Table 8).

Missed vaccinations during the COVID-19 pandemic and the Ebola epidemic in West Africa resulted in high excess deaths from preventable diseases, compounding the direct toll of the epidemics. Even after services resumed, the backlog and delayed coverage sustained elevated risks for outbreaks for many years, leading, for example, to a high burden of death from measles.[44]

By 2023, health systems had started to recover from the shock of the COVID-19 pandemic.[45] Certain indicators of health system performance, such as patient waiting times, reveal that while emergency and critical-care pressures eased, prolonged delays in outpatient and elective care persisted in several countries, reflecting ongoing workforce shortages, backlogs, and strained infrastructure.

In Guinea, Liberia, and Sierra Leone, confidence in routine childhood vaccines was broadly strong before Ebola (especially in Sierra Leone). The 2014–16 epidemic damaged trust in health services and vaccination campaigns, but acceptance of Ebola vaccines was higher than routine childhood vaccination, particularly among those directly affected by the epidemic and when delivered by trusted channels.[46] Through 2017–2019, confidence and uptake of routine vaccines partly rebounded, though the hardest-hit districts showed lingering deficits 2-3 years after the epidemic.[47] COVID-19 then triggered a second downturn: from 2019 to 2022, attitudes toward vaccine safety and importance fell and services were disrupted.[48] Since 2023, coverage has begun to recover in Guinea, Liberia and Sierra Leone, and high-profile introductions (e.g., malaria vaccine pilots, continued Ebola vaccination for frontline workers) have helped in places, but overall vaccine confidence in these countries remains below 2018–2019 highs and is uneven (see Table 8). It is stronger where trust in institutions and community engagement are robust and weaker where scars from past crises persist.

Globally, vaccine confidence generally climbed through 2019,[49] then fell sharply in 2020–2022 as rapid vaccine rollout, politicization, misinformation, and service disruptions due to COVID-19 eroded perceptions of safety and importance in many countries.[50,51] The declines were uneven and largest where institutional trust was already low. Attitudes became more polarized, with confidence holding or rising among those who trusted science and health systems while hardening hesitancy in other groups.[52,53] Since 2023, routine coverage has rebounded in many places, but confidence indicators have recovered more slowly; global trust remains below the highs of the late-2010s in many regions, and confidence is more variable and fragile, increasingly shaped by local trust in institutions and the information environment.[54]

Assessment

- Overall, the six PHEICs demonstrated the resilience of health systems and affected populations, as communities adapted and services gradually recovered. At the same time, these events exposed similar long-term impacts and vulnerabilities, including persistent mental-health burdens, prolonged service disruptions and declining confidence in vaccines.
- Across the West African Ebola epidemic and the COVID-19 pandemic, recovery in health and social systems followed a similar arc: essential services were sharply disrupted and key health-system indicators fell, then rebounded gradually, but often unevenly. By contrast, in Brazil, Colombia and Venezuela, and the DRC, impacts were more limited, and many indicators continued to improve over the same period.
- Setbacks in vaccination, treatment, and preventive care have taken years to resolve, prolonging excess disease burdens and widening health inequities well beyond the outbreak period.

Opportunities & challenges

- Epidemics can act as catalysts for reform, spurring investments in health systems, mental health services, and universal health coverage. Recognizing and addressing these lasting impacts offers a chance to build more resilient, equitable, and responsive health systems for the future.
- Tracking how quickly health systems restore vaccination, treatment, preventive care, mental-health support and maternal and child health services after an emergency can help identify where resilience is weakest and where targeted investments are needed before the next crisis.

Economic recovery

DECLINING 

Table 9. Measuring economic recovery across six sub-indicators

Sub-indicators	Ebola in West Africa (2014–2016)	Zika virus in Brazil, Colombia & Venezuela (2016)	Ebola in DRC (2018–2020)	COVID-19 (2020–2022)	Mpox (2022–2023, 2024–2025)
GDP per capita recovery Post-crisis GDP per capita, % change 5 years after crisis (or latest available year). ---- Output change (total change of GDP) due to the event	**↑24.4%**[55] ---- US$ 53.19B loss, 2015-beyond[56]	**↓16.9%**[57,f]	2020→2024: **↑33.5%**[58]	2022→2024: **↑6.5%**[59] ---- **↓≥USD$ 50T** (2020–2030)[60,b]	Insufficient data
Household consumption recovery Difference in average annual growth in household final consumption expenditure 5 years after the event (or latest available year). *(percentage points; ↑ = faster consumption growth; ↓ = slower growth or contraction)*	Guinea & Sierra Leone: **↓7.21 pp**[61]	Brazil & Colombia: **↑9.97 pp**[62]	**↑3.45 pp**[63]	No global data available ---- 2022→2024: OECD countries: **↓2.3 pp**[64]	Insufficient data
Post-crisis inflation Change in inflation rate from the crisis/end year to 5 years after the crisis, or latest available year. *(percentage-point change)*	**↑1.5pp**[65,66]	**↑443.6pp**[67,g]	2020→2024: **↑8.4pp**[68,h]	2022→2024: **↓4.5pp**[69]	Insufficient data
Post-crisis foreign direct investment trends Percentage change in FDI inflows from the crisis/end year to five years after the crisis, or latest available year	**↑33.3%**[70]	**↓59%**[71,i]	Insufficient data	**↓21.6%**[72,73]	Insufficient data

[f] Change not driven by Zika, rather due to economic collapse in Venezuela.
[g] Driven by hyperinflation in Venezuela.
[h] Likely driven by broader macroeconomic and security conditions in DRC.
[i] Likely driven by broader macroeconomic conditions, especially in Venezuela.

Sub-indicators	Ebola in West Africa (2014–2016)	Zika virus in Brazil, Colombia & Venezuela (2016)	Ebola in DRC (2018–2020)	COVID-19 (2020–2022)	Mpox (2022–2023, 2024–2025)
Re-shoring/ regionalization Shifts in production or sourcing from global supply chains toward domestic or regional suppliers to strengthen resilience and reduce external dependencies	No documented evidence of re-shoring or regionalization	No documented evidence of re-shoring or regionalization	No documented evidence of re-shoring or regionalization	2022–2023: **↑20%**[74]	Insufficient data
Post-crisis public debt Change in general government gross debt from the crisis/end year to five years after the crisis, or latest available year (percentage-point)	**↑10.92pp**[75]	**↑48.95pp**[76,j]	**↓5.55pp**[77]	**↑~1pp**[78,79]	Insufficient data

M: million, B: billion, T: trillion

[j] Change not driven by Zika, rather due to economic collapse in Venezuela.

Analysis

The six PHEICs had long-term economic impacts but on very different scales.

Since the Ebola epidemic, Liberia and Sierra Leone have struggled to return to their pre-Ebola growth trends, challenged by lingering fiscal pressures and lost human capital. Guinea's overall economy recovered more quickly, supported by mining investment and regional trade, but household consumption growth in both Guinea and Sierra Leone slowed five years after the epidemic, suggesting that recovery was uneven and not fully sustained at the household level.[80] This suggests that GDP gains did not fully translate into household income, reflecting the long-term damage done by Ebola but also the impact of COVID-19.

While Zika did not have large macroeconomic impacts, affected households suffered severe and persistent economic hardship due to lifelong caregiving needs for children with congenital Zika syndrome, foregone maternal employment, increased healthcare and rehabilitation costs, and inadequate social support.[81]

Globally, the sharp contraction caused by the COVID-19 pandemic in 2020 was followed by rapid expansion, with world output surpassing pre-pandemic levels by 2022 and continuing moderate growth through 2024–2025 (see Table 9). Yet this recovery masks disparities: advanced economies generally regained lost output faster, while many low- and middle-income countries still face persistent scarring from higher debt, disrupted education, and weakened labour markets.[82]

Inflation, another lasting consequence of the West African Ebola epidemic and the COVID-19 pandemic, amplified the economic burden on vulnerable households and complicated recovery. In Ebola-affected West African countries, localised price spikes for food and essential goods persisted well after the epidemic, eroding purchasing power and slowing recovery (see Table 9). Similarly, the COVID-19 pandemic contributed to global supply-chain disruptions and sharp increases in food and energy prices, with inflationary pressures persisting through 2022–2023. Ebola's inflationary effects were largely concentrated in a few West African economies and were more limited in duration and geographic reach. COVID-19, by contrast, contributed to a prolonged global inflation surge, later intensified by the war in Ukraine and rising food, energy and fertilizer prices. This pushed inflation in many advanced economies to multi-decade highs and strained real incomes across both high- and low-income countries. While inflation has since eased in many economies, the longer-term impact remains visible in higher costs of living, reduced purchasing power and deeper inequalities,[83] especially in low-income settings where food and energy account for a larger share of household spending.

Both Ebola in West Africa and COVID-19 impacted trade and investment but on different scales. In West Africa, the shock was concentrated in the three affected countries and largely time-bound; quarantines, border controls and

transport disruptions constrained regional commerce, but trade routes, transport corridors and ports reopened as restrictions eased and transmission subsided. By 2021, foreign direct investment flows had recovered and grown in Liberia and Sierra Leone, while Guinea experienced decreased investment largely due to challenges unrelated to lingering Ebola effects.

COVID-19 was a synchronized global shock that reshaped trade, investment and supply chains. FDI flows fell sharply in 2020, with developed economies experiencing the steepest decline, falling by 69% to an estimated US$229 billion.[84] In the first two quarters of 2020, global trade contracted by 16%, surpassing the shock of the 2008 global financial crisis. In 2021 and 2022, it recovered rapidly, growing by 12.8% and 5.5% respectively and reaching pre-pandemic levels by the first quarter of 2021.[85] Goods trade rebounded quickly, while services trade lagged, and supply chains were increasingly redesigned to strengthen resilience through greater diversification, regional sourcing and redundancy.[86]

The longer-term impact of COVID-19 was less a sustained collapse in trade than a reconfiguration of trade and investment patterns. Supply chains were redesigned to support resilience, more regional sourcing and redundancy,[87] while FDI shifted toward larger, more predictable markets and resilience-related sectors, including logistics, digital infrastructure and health. At the same time, tighter financing conditions steered capital away from fragile economies, slowing recovery. By 2024, trade in goods remained high but growing more slowly, services had mostly recovered (tourism and business travel remain uneven), and FDI was slightly above pre-COVID levels but concentrated in big markets and friend-shored hubs[88] with high interest rates keeping financing tight for many emerging markets and developing economies.[89]

Today, protectionist policies, supply-chain diversification and reshoring continue to gain momentum, although overall cross-border flows remain high, suggesting that globalization is slowing and adapting rather than fully reversing.[90] These shifts are particularly visible in the pharmaceutical sector, where countries and regions are seeking to strengthen capacity to produce medical countermeasures, including vaccines, therapeutics and diagnostics. This includes efforts to expand regional manufacturing and self-reliance in emerging economies, such as the ASEAN Vaccine Security and Self-Reliance initiative and the WHO-supported mRNA technology transfer programme anchored by the South African mRNA hub.[91]

Ebola in West Africa and COVID-19 have left a lasting imprint on public finances, with many countries carrying persistent fiscal deficits well beyond the acute phase. The initial surge in emergency expenditures (health, cash transfers, business support) was followed by weaker growth, disrupted trade, and tax-base erosion, while rising global interest rates and weaker currencies made it more expensive to refinance debt. In several low-income and fragile states, grants gave way to more expensive borrowing, debt service consumed a larger share of revenues, and governments accumulated domestic arrears to suppliers, tightening financial conditions for the private sector.

These crises left countries with more constrained and riskier public finances. In Ebola-affected West Africa, fiscal pressure was linked to the economic slowdown, weaker revenues and reliance on sectors vulnerable to commodity shocks. During COVID-19, countries dependent on tourism and contact-intensive services faced especially severe and prolonged revenue losses as restrictions reduced activity and tourism recovered slowly. In the DRC, the direct impact on public debt was more limited because much of the Ebola response was financed through grants and in-kind assistance. However, heavy reliance on off-budget donor funding created other risks, including cash shortages, weaker government control over spending and difficulties planning recovery.[92]

Assessment

The long-term economic impact of these crises has varied depending on how severe the event was, how strong the economy was to start with, how effective the health response and international support were, and how well each country managed its recovery through diversified growth, strategic investments and budgeting. West Africa's Ebola epidemic drove sharp declines in living standards, higher debt and poverty, and inflation that took years to stabilize. On the other hand, the DRC's economy recovered quickly after the Ebola outbreaks. Once the localised health crises were contained, growth rebounded as mining activity resumed, inflation stabilised, and fiscal pressures eased, despite COVID-19's impact.[93] COVID-19's global reach was unparalleled, triggering massive output losses, record public-debt burdens, and a surge in extreme poverty. Recovery has been uneven: quick in many advanced economies with strong fiscal support and vaccine access, but slower in emerging and tourism-dependent countries constrained by tighter financing, inflation and rate hikes. Many countries continue to face output gaps, high debt, and lasting scars in jobs, learning, and health, further affecting their economies.

Beyond the near-term damage, these crises left structural scars. While Ebola's footprint allowed a faster, localised normalization, COVID-19 durably reconfigured trade and FDI. High debt and fiscal gaps from both Ebola and COVID-19 have constrained public investment and social spending, slowing growth and, in some cases, threatening macro-stability. This is likely to have a long-term drag on economic growth, human capital, and resilience because high debt makes borrowing costlier, discourages private investment, and leaves less room for spending on health and education, and responding to future crises.

Evidence to date suggests that macroeconomic disruption from mpox appears to have been far more limited than from Ebola or COVID-19, largely because mpox outbreaks were smaller, less disruptive, more containable, required no widespread lockdowns, and relied on targeted vaccination, surveillance and other public health measures. This limited disruptions to travel, trade, and jobs, allowing most affected economies to rebound within months.

Opportunities & challenges

- Post-recovery economic difficulties heighten the risk of future pandemics and epidemics by deepening the vulnerabilities of the countries most affected.
- Debt burdens left by crises such as the West African Ebola epidemic and the COVID-19 pandemic slow recovery and weaken future emergency response capacity. With global debt at record highs, fiscal space is limited and borrowing costs are rising, constraining both advanced and low- and middle-income countries. Replicating the scale of the 2020–2021 fiscal response would be difficult.
- Sustaining resilience against future shocks will require continued innovation, coordinated international action, and sound economic management to reduce vulnerabilities and protect recovery gains.

Social recovery

UNCHANGED –

Table 10. Measuring social recovery across seven sub-indicators

Sub-indicators	Ebola in West Africa (2014–2016)	Zika virus in Brazil, Colombia & Venezuela (2016)	Ebola in DRC (2018–2020)	COVID-19 (2020–2022)	Mpox (2022–2023, 2024–2025)
Orphanhood No. of children who lost parents or caregivers from the infectious hazard	**22,000** children lost 1 or both parents (~0.18%)[94]	No documented large-scale orphanhood	**1,380** confirmed orphans[95]	**10.5M** children lost parents or caregivers (~0.48%)[96]	Insufficient data
Structural inequalities Change in Gini coefficient or equivalent inequality measure 5 years after the crisis (or latest available year; higher values indicate greater inequality)	2014–2016 : Liberia: **↑2.1** ---- 2011–2018 : Sierra Leone: **↑1.7**[97] Limited data available	**↑2.0**[98] (Brazil, Colombia)	2012–2020: **↑2.5**[99,k]	2022-2024: Global Gini: **↓0.4**[100] ---- Within-country inequality (MLD): ↓2.0 (2019–2022); 0.0 (2022–2024); EMDEs ↑0.3 (2020)[101,102,l] ---- Between-country (MLD): ↑3.3 (2019–2022)[103]; ↓0.009 (2022–2024)	Insufficient data

[k] This is most likely due to the ongoing security situation.
[l] 34 countries

Sub-indicators	Ebola in West Africa (2014–2016)	Zika virus in Brazil, Colombia & Venezuela (2016)	Ebola in DRC (2018–2020)	COVID-19 (2020–2022)	Mpox (2022–2023, 2024–2025)
Post-crisis labour market informality Change in the proportion of informal employment 5 years (or latest available data) after the crisis (percentage-point change; higher values indicate greater labour-market informality)	2010–2017: Liberia: **↑2.92pp**[104]	2016–2021: **↑0.75pp**[105]	2010–2020: **↓0.58pp**[106]	2022–2024: **↑0.3pp**[107] For LICs: **↓0.3pp**[108]	Insufficient data
Long-term poverty and economic scarring Change in poverty rates or household welfare after the event	Insufficient data	No evidence of structural impact due to Zika but affected household impact	Insufficient data	↑300–350M (by 2030)[109]	Insufficient data
Post-crisis education losses Change in school dropout rates after the crisis, with disaggregation by sex or socioeconomic status where available	2013–2017: Guinea: Primary age – overall: **↑10.2%**; poorest **↓4.6%**; girls: **↑18.0%**;[110] ---- Sierra Leone: Primary age - overall: **↑6.73%**; orphans: **↑44%**; poorest: **↑62.8%**[111]	No evidence of increase in dropout rates	Insufficient data	LMICs: **↑5–6%** in 2021[112]	Insufficient data
Social capital index[113] Change in social cohesion, human development, security, freedom and equality five years after the crisis, or latest available year	**↑1.7**[114]	**↑3.37**[115,116]	**↑0.84**[117,118]	2022–2025: **↑1.25**[119]	Insufficient data
Human development index[120] Change in composite measure of health, education and income outcomes five years after the crisis, or latest available year	**↑0.015**	**↓0.024**	2020–2023: **↑0.016**	2022–2023: **↑0.004**	N/A

EMDE: Emerging Markets and Developing Economies; MLD: Mean Log Deviation

Analysis

The West African Ebola epidemic and the COVID-19 pandemic created a staggering orphan crisis with far-reaching social consequences. An estimated 22,000 children in Guinea, Liberia, and Sierra Leone lost one or both parents. By 2023, studies based on excess-mortality data suggest over 10 million children worldwide had lost a parent or primary caregiver from COVID-19.[121] These losses disrupt traditional kinship networks and community safety nets, leaving many children vulnerable to poverty, malnutrition, child labour, and early marriage.[122] Grief and social stigma can deepen isolation and mental-health struggles, while uneven access to schooling, healthcare, and psychosocial services makes long-term recovery especially difficult without sustained community support and access to essential services. Over time, these disadvantages can compound, reducing educational attainment, limiting economic opportunities, and perpetuating cycles of intergenerational poverty.

School closures in Guinea, Liberia, and Sierra Leone during the Ebola epidemic lasted about 6–9 months and led to sharp increases in dropout rates in the post-epidemic years, especially among adolescent girls, many of whom have since then faced early marriage or pregnancy and never returned to class (see Table 10). The COVID-19 pandemic caused far wider and longer global school closures, affecting over 1.6 billion learners at its peak, but many countries had stronger remote-learning options and recovery programmes. The COVID-19 disruptions drove significant learning loss and higher dropout in low-income countries in the following years, especially among marginalized groups. The overall percentage of permanent dropouts in LMICs appears higher than in Ebola-affected areas. Individuals who left school early typically face lower lifetime earnings, higher unemployment, and poorer health outcomes, which in turn slow national economic growth and widen inequality. In West Africa, the Ebola-era surge in adolescent pregnancies and child marriages has created a generation of young women with reduced access to formal employment and limited political participation.[123] After COVID-19, many low-income countries risk a "lost generation" of learners whose foundational skills never fully recovered, leading to persistent productivity gaps and weaker social mobility. These effects compound over decades, straining public health systems, social protection programs, and overall human capital development. It is estimated that lifetime earnings losses due to COVID-19 will amount to around 17 trillion dollars.[124,125] However, COVID-19 also accelerated digital learning, remote schooling, and hybrid education models that can improve access in the long term. While the response to Zika did not require school closures, infection with the virus has resulted in significant long-term educational exclusion among children with congenital Zika syndrome.[126] Many affected children face delayed school entry, limited access to inclusive education, and inadequate support services, placing sustained caregiving and economic burdens on families, particularly caregivers, and reinforcing long-term social and educational inequities.

The West African Ebola epidemic and the COVID-19 pandemic exposed and, in many affected settings, deepened income and welfare inequalities. In West Africa, Ebola disrupted employment, cross-border trade and livelihoods, disproportionately affecting informal workers, rural households and women engaged in informal cross-border commerce. Although economic activity resumed after the epidemic, Gini values increased in Liberia and Sierra Leone in the years following the crisis, suggesting that recovery gains were unevenly distributed. This indicates that economic normalization did not necessarily translate into equal improvements in household welfare, particularly for informal workers, rural households and women engaged in informal cross-border commerce.

Globally, COVID-19 was responsible for the largest increase in global income inequality in at least three decades.[127] In emerging markets and developing economies, income disparities widened modestly between 2019 and 2021, with the average Gini index rising by approximately 0.3 points. This reflected disproportionate job losses among low-wage workers in the service industry and manufacturing, while higher-income groups were more likely to retain earnings through remote work or financial assets. Women, low-skilled workers, and people in the urban informal sector bore the brunt of job losses and income shocks, while wealthier and more educated groups were better able to work remotely or draw on savings. Stimulus measures in wealthier economies cushioned some impacts but were unevenly distributed. In many developing countries, limited fiscal space meant safety nets reached only a fraction of those in need. Since the end of the COVID-19 PHEIC, inequality has eased partially,[128] but real incomes for the poorest have been squeezed by inflation and the withdrawal of emergency support and re-employment has been slower for women and informal workers.[129] Although its overall impact on inequality was less noticeable, Zika also created long-term social-protection needs, as families caring for children with Congenital Zika Syndrome required sustained financial support, specialised health care, and inclusive education beyond what existing systems could provide.

Both Ebola and COVID-19 pushed many people into informal employment, reversing years of progress in formal job creation.[130] This expansion of informal labour erodes tax bases, weakens worker protections, and risks deepening inequality unless governments pair economic recovery measures with stronger labour-market regulation and social

safety nets. During the Ebola epidemic, quarantines, business closures, and a collapse in cross-border trade in West Africa led to the loss of formal wage jobs in sectors such as mining, manufacturing, and services, forcing displaced workers to rely on petty trade, subsistence farming, and other unregistered activities for survival. The expansion of informal labour seems to have continued following the end of the Ebola epidemic (see Table 10), as the structural conditions that had driven workers into informality (i.e. weak labour market institutions, compressed fiscal space, and limited access to credit) remained largely unchanged. Recovery plans in all three countries explicitly prioritised rebuilding formal employment as a key objective, acknowledging that the formal job market had not recovered spontaneously.[131]

COVID-19 triggered a similar dynamic on a global scale: lockdowns and supply-chain disruptions caused widespread layoffs in hospitality, retail, and small manufacturing, while limited social protection and the rise of non-standard forms of employment like digital platform work made informal self-employment the only option for millions of people. Data show that in low- and middle-income countries, the share of workers in informal jobs increased after 2020, especially among women and youth, but recovered after the pandemic. Globally, however, informal employment remains above pre-pandemic levels: the share of workers in informal jobs rose by 0.3 percentage points between 2022 and 2024, reversing the slow but steady decline in informality that had characterised the pre-COVID decade, and translating into millions of additional workers without social protection, labour rights, or stable income. While Zika did not trigger a society-wide labour shock or a broad shift toward informal employment, affected households, particularly primary caregivers, experienced increased unemployment, reduced labour-force participation, and sustained income losses linked to long-term caregiving demands.[132,133,134,135,136]

The West African Ebola epidemic and the COVID-19 pandemic caused sharp, sudden increases in poverty, with recovery uneven and, in some settings, still incomplete beyond the immediate crisis period. The spikes in poverty rates in Guinea, Liberia, and Sierra Leone experienced during the Ebola epidemic only gradually declined as economies stabilised, leaving some rural areas with lasting income losses.[137] COVID-19 pushed an estimated 70 million people into extreme poverty globally in 2020, reversing decades of progress. By 2024–2025, most high-income and many middle-income countries had regained pre-pandemic poverty levels, but many low-income nations, especially those facing high debt, inflation, and conflict, remain above their 2019 rates. Overall, poverty has fallen from its crisis peaks, but persistent inflation, uneven jobs and earnings recovery, and shrinking fiscal space mean the world has not fully returned to its pre-COVID trajectory (see Table 10).

Social capital helps us understand how well societies can hold together, especially during crises. High levels of social capital usually mean people trust each other and their institutions, cooperate more easily, and recover faster from shocks like epidemics, natural disasters, or economic downturns. Low social capital, on the other hand, can signal division, mistrust, or weak community support, which makes recovery harder and can even fuel conflict or instability.[138]

The Ebola epidemic profoundly affected social ties in West Africa. Longstanding traditions of community support and caregiving were disrupted, survivors and affected families faced stigma, and social gatherings were cancelled. Fear of transmission led people to avoid contact not only with strangers, but sometimes even with relatives and neighbours. At the same time, Ebola also strengthened some community bonds, as people relied on one another to survive amid weak institutions, even as trust in government often deteriorated. In many places, this community-driven solidarity provided a foundation for gradually rebuilding social capital once the epidemic ended.

On the social capital index, Guinea showed steady gains from 2014 onward, indicating that despite the crisis, community trust and cohesion strengthened over the longer term. By contrast, Liberia experienced a decline during the epidemic and failed to recover, pointing to a more persistent erosion of collective ties. Sierra Leone's stability and modest improvement suggest relative resilience, though at a lower growth trajectory than Guinea. The reductions seen in Liberia and, more moderately, in Sierra Leone can be linked to factors such as greater disruption of social networks during the Ebola epidemic, weaker institutional trust, and slower economic recovery, all of which undermined people's ability to rely on community and state structures for support.

At the global level, COVID-19 reversed earlier upward momentum on the social capital index: after a modest rise in the late 2010s, social capital fell post-2020, underscoring how the pandemic strained trust, solidarity, and institutional legitimacy worldwide.[139] COVID-19 simultaneously eroded both interpersonal trust and institutional confidence, fueling polarization and disinformation.[140,141,142] This dual erosion has made long-term recovery of social cohesion slower and more uncertain, since divisions persisted well beyond the acute phase of the pandemic. Ebola's impact was more contained and, in some cases, reversible, while COVID-19 left deeper, more widespread fractures in trust that continue to shape societies years later.

Changes in the Human Development Index (HDI) after Ebola and COVID-19 highlight how crises affect recovery differently depending on the context. In West Africa, the Ebola epidemic slowed or reversed progress in already low-scoring countries, with Sierra Leone facing setbacks before eventually regaining momentum. Liberia stagnated almost entirely during the epidemic, underscoring how fragile development gains can be when institutions are weak and shocks are severe. By contrast, the DRC, where the Ebola outbreak was smaller and more contained, maintained a steady upward trajectory in its Human Development Index, showing that localised crises have less lasting impact when they do not overwhelm national systems. COVID-19 told a different story: although it caused a temporary decline in human development worldwide, the dip was relatively short-lived, and recovery came faster because most countries had higher baseline capacity and broader international support. Ebola left deeper scars in West Africa because it hit already vulnerable societies, while COVID-19 strained even high-HDI countries but without permanently derailing their progress. These patterns show that the long-term impact of pandemics and epidemics on human development does not depend on the scale of the event alone but also on the underlying resilience and recovery capacity of affected societies.

Assessment

- The six PHEICs left enduring social scars, ranging from orphanhood and mental health challenges to widened educational and income gaps, but the depth and duration of these impacts varies considerably across events and contexts. In West Africa, the Ebola epidemic caused deep community trauma and severe disruption to schooling and livelihoods, with education losses falling disproportionately on girls, orphans, and the poorest households. Social capital recovered over time, but aggregate gains masked persistent gaps in economic opportunity for survivors and female-headed households. The Zika epidemic produced more limited documented social disruption, though human development outcomes in affected countries declined in the years following the epidemic, reflecting the difficulty of isolating epidemic effects from concurrent economic and political crises. In the DRC, the more contained Ebola outbreak produced comparatively limited social disruption, though pre-existing structural inequalities persisted throughout and beyond the response.

- COVID-19's global reach produced the broadest social impacts of the PHEICs reviewed. Millions of children lost parents or caregivers, school dropout rates rose sharply in low- and middle-income countries, and inequality between countries widened significantly even as domestic redistribution partially offset shocks within them. Social recovery has been uneven: nations with robust social protection systems have closed education gaps and stabilised employment faster, while poorer countries continue to struggle with learning loss, mental health burdens, and entrenched poverty.

- The data present a mixed picture across the events. Where outbreaks were contained, social disruption was more bounded and recovery faster. Where events were prolonged or global in reach, impacts were deeper and more persistent, with the most vulnerable groups consistently bearing the greatest burden. Across all events, aggregate improvements in social capital and human development coexisted with persistent gaps for the poorest households, a pattern that highlights the limits of recovery measures that restore national levels without addressing structural disadvantage.

Opportunities & challenges

- Shorter-term impacts such as loss of caregivers, disrupted schooling, increased informal employment and rising poverty can erode human capital and entrench inequality for a generation if left unaddressed. The death of caregivers creates immediate emotional and economic hardship and places long-term strains on household stability and child development. Disrupted schooling and the shift toward informal work reduce lifetime earnings potential and weaken social mobility, while rising poverty compounds these effects by limiting access to essential services. Left unresolved, these dynamics risk locking vulnerable populations into cycles of disadvantage, undermining both national development and social cohesion.

- Rising global debt, constrained development aid, and competing priorities, such as climate change, conflict, and energy security, are limiting governments' capacity to fund social recovery programmes. Fragmentation of international cooperation, shifts toward nationalist policies, and reduced trust in multilateral institutions further hinder coordinated responses.

Political recovery

DECLINING

Table 11. Measuring political recovery across four sub-indicators

Sub-indicators	Ebola in West Africa (2014–2016)	Zika virus in Brazil, Colombia & Venezuela (2016)	Ebola in DRC (2018–2020)	COVID-19 (2020–2022)	Mpox (2022–2023, 2024–2025)
Public trust in government Change in public confidence in government institutions five years after the crisis, or latest available year	2012–2015: Sierra Leone: **↓~11.6%–33.6%**[143] ---- Liberia: **↓40%**[144,145]	**↑6.5pp**[146]	Insufficient data	2021–2023: **↓2pp** (OECD countries) (2023)[147] ---- **↓7pp** in trust in parliament & **↓4pp** in trust in president in Africa[148]	Insufficient data
Polarization Change in the degree of division between political groups five years after the crisis, or latest available year (V-Dem Political Polarization Model Estimates; higher values indicate greater polarization)	**↓0.32**[149]	**↑0.37**[150]	2020–2024: **↓1.89**[151]	2022–2024: **↑0.06**[152] ---- Increased in 22/34 EU countries and other large democracies between 2019–2024[153]	Insufficient data
Civil liberties Change in freedoms of expression, association, movement and personal integrity after the crisis *(V-Dem estimates; higher values indicate stronger protection of civil liberties)*	**↓0.06**[154]	**↓0.16**[155]	2020–2024: **↓0.04**[156]	2022–2024: **↓0.01**[157]	Insufficient data
Democracy Change in democratic performance five years after the crisis, or latest available year, based on electoral process and pluralism, functioning of government, political participation, political culture and civil liberties. (EIU Democracy Index; 0–10 scale, higher scores indicate stronger democracy)	**↓0.11**[158]	**↓0.93**[159,m]	2020–2024: **↑0.79**[160]	2022–2024: **↓0.35**[161]	Insufficient data

[m] Change unrelated to Zika.

Analysis

Ebola, Zika, COVID-19 and mpox left enduring effects on public trust in government, though recovery trajectories differed in this regard. In West Africa, Ebola triggered widespread fear, misinformation, and perceptions of inadequate state response, eroding confidence in authorities. Even after the crisis subsided, trust recovery was uneven; in areas hardest hit, skepticism toward official health systems persisted, and civil society and international actors often stepped in to fill credibility gaps. Zika similarly contributed to declining trust in government, as delayed recognition of risks, weak coordination, and inconsistent communication deepened public skepticism in several affected countries.[162,163] COVID-19 strained trust globally, as governments faced challenges with shifting public health measures, vaccine rollouts, and economic relief. In some countries, confidence in government improved as the crisis receded, while in others, polarization, dissatisfaction with economic support and contested vaccine policies left a more durable legacy of skepticism toward public institutions.

The six PHEICs have contributed to increased social and political polarization to different degrees. During the Ebola epidemics in West Africa, disagreements over government interventions, quarantine measures, and vaccine campaigns often divided communities, with mistrust toward authorities fueling tensions, though the effects varied by country. Guinea saw an increase in polarization during the height of the epidemic. This suggests that the crisis amplified existing political and social divisions, likely driven by widespread fear, mistrust of government responses, and the circulation of rumors and misinformation. The long-term effect on political polarization was more pronounced in Guinea, whereas Liberia and Sierra Leone saw a post-crisis reduction in political polarization, possibly reflecting post-epidemic stabilization and institutional recovery. Ebola acted as a stressor that exposed, and sometimes intensified, underlying political, regional, and social divides, with the magnitude and persistence of polarization differing across the three countries. DRC saw an increase in polarization during the Ebola outbreaks, but by 2024, the index dropped sharply to 1.83, a decline influenced mostly by broader political dynamics, including ongoing peacebuilding efforts, shifts in local power structures, and changes in national governance (see Table 11).

While there was a general positive trend in Brazil and Colombia following the end of the PHEIC, evidence shows that the Zika epidemic exposed and intensified political conflicts over reproductive rights, prompting sustained debates and legal challenges over abortion and contraception access that persisted in Brazil and other affected countries beyond the acute phase of the outbreak.[164]

Polarization remained elevated in the post-COVID period, reflecting the lingering political and social after-effects of disputes over lockdowns, mask mandates, vaccination campaigns and other public-health measures.[165] Even after most emergency measures were lifted, disagreements over the legitimacy, proportionality and consequences of government responses continued to align with partisan, ideological and cultural identities, deepening divisions within and between countries.[166,167] Misinformation and conspiracy theories continued to fuel skepticism toward public institutions,[168] vaccines and expert advice, while differing experiences of risk, economic hardship and trust in government shaped how communities interpreted the pandemic's legacy. Uneven economic consequences, including job losses, business closures, inflation and gaps in social protection, further intensified societal divides, particularly among groups that felt excluded from or harmed by government responses. In some countries, these tensions persisted after emergency measures ended, reflected in continued vaccine refusal, contentious public debate and reduced trust in public-health authorities. Compared with the more localised Ebola epidemics, COVID-19 intensified polarization at both national and international levels, with lasting implications for governance, public trust and the effectiveness of future health interventions.

The long-term impact of Ebola on civil liberties has varied across West African countries. In Guinea, civil liberties declined markedly following the epidemic according to the V-Dem Civil Liberties Index, reflecting restrictions on freedom of movement, assembly, and public expression imposed during and after the event, but also political conditions beyond Ebola. In 2010 the country transitioned to civilian rule following a 2008 military coup and decades under authoritarian regimes but has continued to experience political instability, weak institutions and challenges to civil liberties and human rights. By contrast, Liberia and Sierra Leone maintained relatively stable or slightly improved civil liberties, suggesting that pre- and post-Ebola governance reforms and institutional resilience helped protect citizens' rights despite the public health crisis.

The COVID-19 pandemic has had a significant and lasting impact on civil liberties worldwide through increased restrictions on freedoms of movement, assembly, and expression in many countries. Some measures, including lockdowns, travel restrictions and emergency powers to enforce quarantines or mandates, were adopted as public-health tools to limit transmission. However, their scope, duration and enforcement raised concerns in some

contexts about reduced transparency, weakened checks and balances, restrictions on civic space and the risk that emergency powers could normalize more authoritarian forms of governance. While many countries were able to maintain a balance between public health protection and civil liberties, others experienced a decline in democratic practices, including limitations on political expression and media freedoms. Data show that civil liberties have not yet fully recovered from the impact of COVID-19, with several indicators continuing to record lower levels of civic freedom and democratic participation than before the pandemic. In some countries, emergency powers introduced during the crisis remain in place or have reshaped governance practices, highlighting how temporary responses to health emergencies can produce lasting institutional and political effects.[169] For example, the Economist Democracy Index, which covers five key elements of a functioning democracy (including electoral processes, government functioning, political participation and culture and civil liberties), has continued to decline globally following the COVID-19 pandemic.[170] Overall, the pandemic underscored the vulnerability of civil liberties during times of crisis and the importance of safeguarding democratic institutions, including to prevent temporary emergency measures from having lasting effects on democratic governance.

Assessment

- The West African Ebola epidemic and the COVID-19 pandemic illustrate how health emergencies can erode democratic norms and strain governance well beyond the immediate public health response. Prolonged states of emergency, restrictions on civil liberties, and heightened polarization often outlast the crisis itself, creating space for executive overreach and weakening institutional checks and balances. In many countries, trust in government and confidence in electoral processes have been slow to rebound, while misinformation and populist rhetoric have further undermined consensus. The impact of COVID-19 has been even more severe and enduring than that of Ebola, affecting every region and producing deeper and longer-lasting declines in civil liberties, political trust, and democratic performance.

- Data indicate a significant challenge in political recovery, with impacts persisting for many years. Across indicators, the evidence shows a marked decline between the post-Ebola period and the COVID-19 era, underscoring how recovery has become more challenging and increasingly fragile.

Opportunities & challenges

- Political recovery requires not only economic stabilization but also sustained efforts to rebuild transparency, strengthen independent institutions, and foster inclusive civic engagement, all of which are processes that can take years or decades to complete.

- One positive aspect of the political impact of COVID-19 was the strengthening of state capacity and social protection systems in many countries. Faced with the crisis, governments rapidly expanded cash transfers, unemployment benefits, and health coverage, often reaching populations previously excluded from formal safety nets. In some contexts, this accelerated long-overdue reforms, demonstrated the feasibility of large-scale social spending, and created public momentum for more resilient welfare systems.

- Despite their devastating consequences, both Ebola and COVID-19 generated important political shifts that carried positive legacies. In West Africa, Ebola spurred the strengthening of governance capacity and health institutions, greater regional cooperation through ECOWAS and the African Union, and deeper recognition of the role of communities and civil society in crisis response. During and after the crisis, health security was placed firmly on the international political agenda, leading to new financing mechanisms and reforms such as the WHO Health Emergencies Programme, although global political attention and resources toward this issue have declined in recent years. Similarly, COVID-19 accelerated the expansion of social protection systems, demonstrated the feasibility of large-scale emergency spending, and fostered political momentum for stronger safety nets. In many countries, the crisis also drove digital innovation in governance and created public demand for more accountable leadership. Together, these experiences show that while outbreaks erode trust and strain institutions, they can also catalyze reforms, strengthen state capacity, and generate political will for more resilient governance.

References

1 Fleming M. Ebola Survivors Experience Increased Mortality Risk in Year Following Recovery. In: ContagionLive [website]. Cranbury: MJH Life Sciences; 9 September 2019 (https://www.contagionlive.com/view/ebola-survivors-experience-increased-mortality-risk-in-year-following-recovery, accessed April 2026).

2 Zika virus. In: World Health Organization (WHO) [website]. Geneva: WHO; 2025 (https://www.who.int/news-room/fact-sheets/detail/zika-virus, accessed April 2026).

3 WHO Director-General's opening remarks at the media briefing – 5 May 2023. In: World Health Organization (WHO) [website]. Geneva: WHO; 2023 (https://www.who.int/news-room/speeches/item/who-director-general-s-opening-remarks-at-the-media-briefing---5-may-2023, accessed April 2026).

4 Post COVID-19 condition (long COVID). In: World Health Organization (WHO) [website]. Geneva: WHO; 2025 (https://www.who.int/news-room/fact-sheets/detail/post-covid-19-condition-%28long-covid%29, accessed April 2026).

5 Grau-Echevarría A, Labrandero-Hoyos C, Peñuelas-Leal R, et al. Prospective observational study on scar sequelae after MPOX infection: an analysis of 40 patients. International Journal of Dermatology. 2024; 63(12):1767-1773. doi: 10.1111/ijd.17500.

6 Life expectancy at birth, total (years). In: World Bank Data360. Washington (DC): World Bank Group; 2024 (https://data360.worldbank.org/en/indicator/WB_WDI_SP_DYN_LE00_IN?country=&view=trend&average=WLD, accessed April 2026).

7 Ibid.

8 Ibid.

9 Ibid.

10 Schindell BG, Fredborg B, Kowalec K, Shaw S, Kangbai JB, Kindrachuk J. The state of mental health among Ebola virus disease survivors through a cross-sectional study in Sierra Leone. BMJ Global Health. 2024; 9(5):e015098. doi: 10.1136/bmjgh-2024-015098.

11 Zika: the unknown epidemic and PAHO's swift response. In: Pan American Health Organization (PAHO) [website]. Washington (DC): PAHO; 2022 (https://www.paho.org/en/stories/zika-unknown-epidemic-and-pahos-swift-response, accessed April 2026).

12 Tavares CSS, Marques RS, Martins-Filho PR. High prevalence of common mental disorders in mothers of children with congenital Zika syndrome at the end of early childhood. Experimental and clinical sciences journal. 2024; 23:1020-1022. doi: 10.17179/excli2024-7591.

13 Comprehensive mental health action plan 2013–2030. Geneva: WHO; 2021. (https://iris.who.int/bitstream/handle/10665/345301/9789240031029-eng.pdf; accessed 21 May 2025).

14 Mortality rate, infant (per 1,000 live births. In: World Bank Data360 [website]. Washington (DC): World Bank Group; 2024 (https://data360.worldbank.org/en/indicator/WB_WDI_SP_DYN_IMRT_IN?country=&view=trend&average=WLD, accessed April 2026).

15 Mortality rate, infant (per 1,000 live births. In: World Bank Data360 [website]. Washington (DC): World Bank Group; 2024 (https://data360.worldbank.org/en/indicator/WB_WDI_SP_DYN_IMRT_IN?country=&view=trend&average=WLD, accessed April 2026).

16 Ibid.

17 World Bank Data360, "Mortality rate, infant (per 1,000 live births)," World Bank Group, accessed 10 May 2026.

18 Takahashi S, Metcalf CJ, Ferrari MJ, et al. Reduced vaccination and the risk of measles and other childhood infections post-Ebola. Science. 2015; 347(6227):1240-2. doi: 10.1126/science.aaa3438.

19 Hartner AM, Li X, Echeverria-Londono S, et al. Estimating the health effects of COVID-19-related immunisation disruptions in 112 countries during 2020-30: a modelling study. Lancet Global Health. 2024; 12(4):e563-e571. doi: 10.1016/S2214-109X(23)00603-4.

20 Waiting times. In: OECD Data Explorer [website]. Paris: Organisation for Economic Co-operation and Development (OECD); 2024 (https://data-explorer.oecd.org/vis?lc=en&pg=0&tm=waiting&snb=3&vw=tb&df[ds]=dsDisseminateFinalDMZ&df[id]=DSD_HEALTH_PROC%40DF_WAITING&df[ag]=OECD.ELS.HD&df[vs]=1.1&dq=..PT_PAT_WAIT_M_GT3.CM131_138.....WTSP...&pd=2010%2C&to[TIME_PERIOD]=false, accessed April 2026).

21 Kpanake L, Sorum PC, Mullet É. Willingness to get vaccinated against Ebola: A mapping of Guinean people positions. Human Vaccines & Immunotherapeutics. 2018; 14(10):2391-2396. doi: 10.1080/21645515.2018.1480236.

22 Leno NN, Toure A, Kadio KJJO, Kouame SSA, Delamou A, Camara A. Evaluation of COVID-19 Vaccination Acceptance in Guinea: Evidence from a Cross-Sectional Study of 1087 Students from 10 Public and Private Universities in Conakry in 2021. Central African Journal of Public Health. 2022; 8(4):163-171. doi: 10.11648/j.cajph.20220804.15.

23 Toure AA, Traore FA, Camara G, et al. Facilitators and barriers to COVID-19 vaccination among healthcare workers and the general population in Guinea. BMC Infectious Diseases. 2022; 22(1):752. doi: 10.1186/s12879-022-07742-3.

24 Röbl K, Fischer HT, Delamou A, et al. Caregiver acceptance of malaria vaccination for children under 5 years of age and associated factors: cross-sectional household survey, Guinea and Sierra Leone, 2022. Malaria Journal 2023; 22(1):355. doi: 10.1186/s12936-023-04783-0.

25 de Figueiredo A, Simas C, Karafillakis E, Paterson P, Larson HJ. Mapping global trends in vaccine confidence and investigating barriers to vaccine uptake: a large-scale retrospective temporal modelling study. Lancet. 2020; 396(10255):898-908. doi: 10.1016/S0140-6736(20)31558-0.

26 Share that agrees that vaccines are safe – 2021. In: Our World in Data [website]. Vaccine Confidence Project; 2025 (https://ourworldindata.org/grapher/share-agree-vaccines-are-safe-wellcome?time=2021, accessed April 2026).

27 Jalloh MF, Sengeh P, Monasch R, et al. National survey of Ebola-related knowledge, attitudes and practices before the outbreak peak in Sierra Leone: August 2014. BMJ Global Health. 2017; 2(4):e000285. doi: 10.1136/bmjgh-2017-000285.

28 Vaccine confidence in Sierra Leone. In: Vaccine Confidence Project [website]. London: Vaccine Confidence Project; 2023 (https://www.vaccineconfidence.org/vci/country/sl/, accessed April 2026)

29 Share that agrees that vaccines are safe, 2019 to 2022. In: Our World in Data [website]. Vaccine Confidence Project; 2025 (https://ourworldindata.org/grapher/share-agree-vaccines-are-safe-wellcome?tab=table&time=2019..2022, accessed April 2026).

30 Perera SM, Garbern SC, Mbong EN, et al. Perceptions toward Ebola vaccination and correlates of vaccine uptake among high-risk community members in North Kivu, Democratic Republic of the Congo. PLOS Global Public Health. 2024; 4(1):e0002566. doi: 10.1371/journal.pgph.0002566.

31 Share that agrees that vaccines are safe – 2019. In: Our World in Data [website]. Vaccine Confidence Project; 2025 (https://ourworldindata.org/grapher/share-agree-vaccines-are-safe-wellcome?time=2019, accessed April 2026).

32 Ibid.

33 Ibid.

34 Post COVID-19 condition (long COVID). In: World Health Organization (WHO) [website]. Geneva: WHO; 2025 (https://www.who.int/news-room/fact-sheets/detail/post-covid-19-condition-%28long-covid%29, accessed April 2026).

35 OECD, Addressing the Costs and Care for Long COVID: The Long Shadow of the Pandemic, OECD Health Policy Studies (Paris: OECD Publishing, 2026), https://doi.org/10.1787/87a0c171-en.

36 Al-Aly Z, Davis H, McCorkell L, et al. Long COVID science, research and policy. Nature Medicine. 2024; 30(8):2148-2164. doi: 10.1038/s41591-024-03173-6.

37 Gonzalez AE, Suzuki E. The impacts of long COVID across OECD countries (Health Working Paper No. 163). Paris: Organisation for Economic Co-operation and Development (OECD); 2024 (DELSA/HEA/WD/HWP(2024)3, https://one.oecd.org/document/DELSA/HEA/WD/HWP(2024)3/en/pdf, accessed April 2026).

38 Bartsch SM, Gorham K, Lee BY. The cost of an Ebola case. Pathogens and Global Health. 2015; 109(1):4-9. doi: 10.1179/2047773214Y.0000000169.

39 Fernandes S, Pinto M, Barros L, et al. The economic burden of congenital Zika Syndrome in Brazil: an overview at 5 years and 10 years. BMJ Global Health. 2022; 7(7):e008784. doi: 10.1136/bmjgh-2022-008784.

40 New survey results show health systems starting to recover from pandemic. In: World Health Organization (WHO) [website]. Geneva: WHO; 2 May 2023 (https://www.who.int/news/item/02-05-2023-new-survey-results-show-health-systems-starting-to-recover-from-pandemic, accessed April 2026).

41 Kim YE. Child mortality after the Ebola virus disease outbreak across Guinea, Liberia, and Sierra Leone. International Journal of Infectious Diseases. 2022; 122:944-952. doi: 10.1016/j.ijid.2022.06.043.

42 Mortality rate, infant (per 1,000 live births). In: World Bank Open Data [website]. Washington (DC): World Bank Group; 2024 (https://data.worldbank.org/indicator/SP.DYN.IMRT.IN, accessed April 2026).

43 Lautharte, I. and Rasul, I., 'Household responses over the course of the Zika epidemic in Brazil', Journal of Health Economics 101 (2026): 102997, https://doi.org/10.1016/j.jhealeco.2026.102997

44 Masresha BG, Luce R Jr, Weldegebriel G, Katsande R, Gasasira A, Mihigo R. The impact of a prolonged ebola outbreak on measles elimination activities in Guinea, Liberia and Sierra Leone, 2014-2015. Pan African Medical Journal. 2020; 35(Suppl 1):8. doi: 10.11604/pamj.supp.2020.35.1.19059.

45 New survey results show health systems starting to recover from pandemic. In: World Health Organization (WHO) [website]. Geneva: WHO; 2 May 2023 (https://www.who.int/news/item/02-05-2023-new-survey-results-show-health-systems-starting-to-recover-from-pandemic, accessed April 2026).

46 Irwin KL, Jalloh MF, Corker J, et al. 2015 Guinean Household Survey of Ebola Virus Disease Project Group. Attitudes about vaccines to prevent Ebola virus disease in Guinea at the end of a large Ebola epidemic: Results of a national household survey. Vaccine. 2017; 35(49 Pt B):6915-6923. doi: 10.1016/j.vaccine.2017.06.026.

47 Das U, Fielding D. Higher local Ebola incidence causes lower child vaccination rates. Scientific Reports. 2024; 14(1):1382. doi: 10.1038/s41598-024-51633-3.

48 Share that agrees that vaccines are safe – 2019. In: Our World in Data [website]. Vaccine Confidence Project; 2025 (https://ourworldindata.org/grapher/share-agree-vaccines-are-safe-wellcome?time=2019, accessed April 2026).

49 de Figueiredo A, Simas C, Karafillakis E, Paterson P, Larson HJ. Mapping global trends in vaccine confidence and investigating barriers to vaccine uptake: a large-scale retrospective temporal modelling study. Lancet. 2020; 396(10255):898-908. doi: 10.1016/S0140-6736(20)31558-0.

50 State of Vaccine Confidence in the EU (2022). In: European Commission [website]. Brussels: Directorate-General for Health and Food Safety; 2022 (https://health.ec.europa.eu/publications/state-vaccine-confidence-eu-2022_en, accessed April 2026).

51 New data indicates declining confidence in childhood vaccines of up to 44 percentage points in some countries during the COVID-19 pandemic. In: United Nations Children's Fund (UNICEF) [website]. New York: UNICEF; 20 April 2023 (https://www.unicef.org/press-releases/sowc_2023_immunization, accessed April 2026).

52 Krastev S, Krajden O, Vang ZM, et al. Institutional trust is a distinct construct related to vaccine hesitancy and refusal. BMC Public Health. 2023; 23(1):2481. doi: 10.1186/s12889-023-17345-5.

53 Larson HJ, Eagan RL, Bowers AP, Smilingyte I, de Figueiredo A, Coulter A. Building public trust in preparation for future health shocks: a research agenda. BMJ. 2024; 387:e078464. doi: 10.1136/bmj-2023-078464.

54 The State of the World's Children 2023: For every child, vaccination. Florence: UNICEF Innocenti – Global Office of Research and Foresight; 2023 (https://www.vaccineconfidence.org/our-work/reports/the-state-of-the-worlds-children-2023/, accessed April 2026).

55 GDP per capita (current US$). In: World Bank Open Data [website]. Washington (DC): World Bank Group; 2024 (https://data.worldbank.org/indicator/NY.GDP.PCAP.CD, accessed April 2026).

56 Huber C, Finelli L, Stevens W. The Economic and Social Burden of the 2014 Ebola Outbreak in West Africa. Journal of Infectious Diseases. 2018; 218(suppl_5):S698-S704. doi: 10.1093/infdis/jiy213.

57 GDP per capita (current US$). In: World Bank Open Data [website]. Washington (DC): World Bank Group; 2024 (https://data.worldbank.org/indicator/NY.GDP.PCAP.CD, accessed April 2026).

58 Ibid.

59 Ibid.

60 United Nations Department of Economic and Social Affairs (UN DESA), World Social Report 2024: Social Development in Times of Converging Crises: A Call for Global Action (New York: United Nations, 2024), accessed April 2026.

61 World Bank, World Development Indicators, "Households and NPISHs final consumption expenditure growth (annual %)", accessed 10 May 2026.

62 Ibid.

63 Ibid.

64 OECD, OECD Economic Outlook, Volume 2024 Issue 1: Statistical Annex (Paris: OECD Publishing, 2024), Annex Table 4, "Real private consumption expenditure", reporting annual percentage changes for Total OECD; 2024 values are OECD estimates and projections.

65 World Economic Outlook (April 2025) - Inflation rate, average consumer prices. In: International Monetary Fund (IMF) [website]. Washington (DC): IMF; 2026 (https://www.imf.org/external/datamapper/PCPIPCH@WEO/SLE/GIN/LBR, accessed April 2026).

66 Flomo AZB, Papyrakis E, Wagner N. Evaluating the economic effects of the Ebola virus disease in Liberia: A synthetic control approach. Journal of International Development. 2023; 35(6):1478-1504. doi: 10.1002/jid.3736.

67 World Economic Outlook (April 2025) - Inflation rate, average consumer prices. In: International Monetary Fund (IMF) [website]. Washington (DC): IMF; 2026 (https://www.imf.org/external/datamapper/PCPIPCH@WEO/SLE/GIN/LBR, accessed April 2026).

68 Ibid.

69 Inflation, consumer prices (annual %). In: World Bank Open Data [website]. Washington (DC): World Bank Group; 2024 (https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG, accessed April 2026).

70 Alicke K, Foster T, Hauck K, Trautwein V. Tech and regionalization bolster supply chains, but complacency looms. In: McKinsey & Company [website]. New York: McKinsey & Company; 2023 (https://www.mckinsey.com/capabilities/operations/our-insights/tech-and-regionalization-bolster-supply-chains-but-complacency-looms, accessed April 2026).

71 Foreign direct investment, net inflows (BoP, current US$). In: World Bank Open Data [website]. Washington (DC): World Bank Group; 2024 (https://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD, accessed April 2026).

72 Ibid; World Investment Report 2024: Investment facilitation and digital government. New York: United Nations Conference on Trade and Development; 2024 (https://unctad.org/system/files/official-document/wir2024_en.pdf, accessed April 2026).

73 Global foreign direct investment falls for the second consecutive year, posing acute challenges to developing countries. In: United Nations Trade and Development (UNCTAD) [website]. Geneva: UNCTAD; 19 June 2025 (https://unctad.org/news/global-foreign-direct-investment-falls-second-consecutive-year-posing-acute-challenges, accessed April 2026).

74 Alicke K, Foster T, Hauck K, Trautwein V. Tech and regionalization bolster supply chains, but complacency looms. In: McKinsey & Company [website]. New York: McKinsey & Company; 2023 (https://www.mckinsey.com/capabilities/operations/our-insights/tech-and-regionalization-bolster-supply-chains-but-complacency-looms, accessed April 2026).

75 World Economic Outlook Database. In: International Monetary Fund (IMF) [website]. Washington (DC): IMF; 2025 (https://www.imf.org/en/publications/weo/weo-database/2025/april/weo-report?c=656%2C668%2C724%2C&s=GGXWDG_NGDP%2C&sy=2013&ey=2030&ssm=0&scsm=1&scc=0&ssd=1&ssc=0&sic=0&sort=country&ds=.&br=1, accessed April 2026).

76 Ibid.

77 Ibid.

78 Executive Summary. IMF Fiscal Monitor, October 2024. Washington (DC): International Monetary Fund (IMF); 2024 (https://www.imf.org/-/media/files/publications/fiscal-monitor/2024/october/english/execsum.pdf, accessed April 2026).

79 Public Debt | IMF Annual Report 2023. In: International Monetary Fund (IMF) [website]. Washington (DC): IMF; 2023 (https://www.imf.org/external/pubs/ft/ar/2023/in-focus/public-debt/, accessed April 2026).

80 World Bank, Guinea Economic Update: Leveraging Natural Resource Wealth for Inclusive Growth (Washington, DC: World Bank, 2025).

81 Fernandes S, Pinto M, Barros L, et al. The economic burden of congenital Zika Syndrome in Brazil: an overview at 5 years and 10 years. BMJ Global Health. 2022; 7(7):e008784. doi: 10.1136/bmjgh-2022-008784.

82 World Bank, Global Economic Prospects, January 2026 (Washington, DC: World Bank, 2026), https://doi.org/10.1596/978-1-4648-2309-2.

83 Adarov A. Global income inequality and the COVID-19 pandemic in three charts. In: World Bank Blogs [website]. Washington (DC): World Bank Group; 7 February 2022 (https://blogs.worldbank.org/en/developmenttalk/global-income-inequality-and-covid-19-pandemic-three-charts, accessed April 2026).

84 Trade and investment challenges and opportunities in the post-pandemic world. London: The Economist Intelligence Unit; 2021 (https://futuretradeandinvestment.econ-asia.com/files/EIU_Trade_and_investment_challenges_and_opportunities_2021_eng.pdf, accessed April 2026).

85 Attinasi MG, Boeckelmann L, Hespert L, Linzenich J, Meunier B. Global trade in the post-pandemic environment. European Central Bank; 2024 (ECB Economic Bulletin, Issue 1/2024, https://www.ecb.europa.eu/press/economic-bulletin/focus/2024/html/ecb.ebbox202401_01~d1c3b1b0a5.en.html, accessed April 2026).

86 Ramirez D. COVID-19: Global trade and supply chains after the pandemic. London; The International Institute for Strategic Studies; 2020 (https://www.iiss.org/globalassets/media-library---content--migration/files/research-papers/covid-19---global-trade-and-supply-chains-after-the-pandemic.pdf, accessed April 2026).

87 Devesa T, Seong J, White O, Leung N, Birshan M, Mischke J, Lamanna C, Ally M. The FDI shake-up: How foreign direct investment today may shape industry and trade tomorrow. Washington (DC); McKinsey Global Institute; 2025 (https://www.mckinsey.com/mgi/our-research/the-fdi-shake-up-how-foreign-direct-investment-today-may-shape-industry-and-trade-tomorrow, accessed April 2026).

88 Global Investment Trends Monitor, No. 47. Geneva: UN Trade and Development (UNCTAD); 2024 (https://unctad.org/publication/global-investment-trends-monitor-no-47, accessed April 2026).

89 Debt Vulnerabilities And Financing Challenges In Emerging Markets And Developing Economies—An Overview Of Key Data. Washington (DC): International Monetary Fund (IMF); 2025. doi: 10.5089/9798229002264.007.

90 UNCTAD, 'Global trade in 2025: Resilience under pressure', 14 March 2025; UNCTAD, Trade and Development Foresights 2025: Under Pressure: Uncertainty Reshapes Global Economic Prospects (Geneva: UNCTAD, 2025); ASEAN, ASEAN Vaccine Security and Self-Reliance Strategic and Action Plans 2021–2025 (Jakarta: ASEAN Secretariat, 2021).

91 World Health Organization, 'mRNA Technology Transfer Programme', accessed May 2026; World Health Organization, 'FAQ: The mRNA vaccine technology transfer hub', accessed May 2026.

92 Fiscal Monitor: A Fair Shot. Washington (DC): International Monetary Fund (IMF); 2021 (https://www.imf.org/en/publications/fm/issues/2021/03/29/fiscal-monitor-april-2021#Full%20Report, accessed April 2026).

93 Democratic Republic of Congo Economic Update: Harnessing Growth Through Digital Connectivity to Create Jobs and Reduce Poverty. In: World Bank [website]. Washington (DC): World Bank Group; 7 October 2022 (https://www.worldbank.org/en/news/press-release/2022/10/07/democratic-republic-of-congo-economic-update, accessed April 2026).

94 UN declares end to Ebola virus transmission in Guinea; first time all three host countries free. In: UN News [website]. New York: United Nations; 29 December 2015 (https://news.un.org/en/story/2015/12/519082-un-declares-end-ebola-virus-transmission-guinea-first-time-all-three-host, accessed April 2026).

95 Number of children orphaned or left unaccompanied by Ebola in the Democratic Republic of the Congo rising fast. In: United Nations Children's Fund (UNICEF) [website]. Kinshasa/Dakar/Geneva/New York: UNICEF; 13 August 2019 (https://www.unicef.org/press-releases/number-children-orphaned-or-left-unaccompanied-ebola-democratic-republic-congo, accessed April 2026).

96 Children: The Hidden Pandemic, September 2022, Orphanhood and Caregiver Loss Based on Excess COVID-19 Death Estimates. Global Reference Group on Children Affected by COVID19: Joint Estimates and Action; 2022 (https://www.spi.ox.ac.uk/files/hidden_pandemic_report_september_2022_update_pdf, accessed April 2026).

97 Gini index. In: World Bank Open Data [website]. Washington (DC): World Bank Group; 2024 (https://data.worldbank.org/indicator/SI.POV.GINI, accessed April 2026).

98 Ibid.

99 Ibid.

100 World Bank, Global Inequality and Economic Growth (Washington, DC: World Bank, 2025), Table A1, global Gini, total mean log deviation, within-country mean log deviation and between-country mean log deviation estimates through 2024; 2023–2024 values are based on Poverty and Inequality Platform nowcasts.

101 Yonzan N, Mahler DG, Lakner C. The end of an era of global income convergence. In: World Bank Blogs [website]. Washington (DC): World Bank Group; 15 December 2022 (https://blogs.worldbank.org/en/developmenttalk/end-era-global-income-convergence, accessed April 2026).

102 Adarov A. Global income inequality and the COVID-19 pandemic in three charts. In: World Bank Blogs [website]. Washington (DC): World Bank Group; 7 February 2022 (https://blogs.worldbank.org/en/developmenttalk/global-income-inequality-and-covid-19-pandemic-three-charts, accessed April 2026).

103 Garcia D, Yonzan N, Lakner C. Income growth of the poor matters for reducing global income inequality. In: World Bank Blogs [website]. Washington (DC): World Bank Group; 1 April 2025 (https://blogs.worldbank.org/en/opendata/income-growth-of-the-poor-matters-for-reducing-global-income-ine, accessed April 2026).

104 Indicators and data tools. In: ILOSTAT [website]. Geneva: International Labour Organization (ILO); 2026 (https://ilostat.ilo.org/data/?cat_mode=subject, accessed April 2026).

105 Adult informal employment rate (%). In: Human Capital Data Portal [website]. Washington (DC): World Bank Group, International Labour Organization (ILO); 2026 (https://humancapital.worldbank.org/en/indicator/WB_HCP_EMP_NIFL_A, accessed April 2026).

106 Indicators and data tools. In: ILOSTAT [website]. Geneva: International Labour Organization (ILO); 2026 (https://ilostat.ilo.org/data/?cat_mode=subject, accessed April 2026).

107 Ibid.

108 Informal employment rate. In: ILOSTAT [website]. Geneva: International Labour Organization (ILO); 2026 (https://ilostat.ilo.org/data/snapshots/informal-employment-rate/, accessed April 2026).

109 Alfani F, Aron DV, Atamanov A. June 2025 Update to the Poverty and Inequality Platform (PIP): Global Poverty Monitoring Technical Note 44. Washington (DC): World Bank Group; 2025 (https://documents1.worldbank.org/curated/en/099510306052516849/pdf/IDU-eb272b02-ecd1-4633-9e37-9297e20a711c.pdf, accessed April 2026).

110 Smith WC. Consequences of school closure on access to education: Lessons from the 2013-2016 Ebola pandemic. International Review of Education. 2021; 67(1-2):53-78. doi: 10.1007/s11159-021-09900-2.

111 Ibid.

112 Moscoviz L, Evans DK. Learning Loss and Student Dropouts during the COVID-19 Pandemic: A Review of the Evidence Two Years after Schools Shut Down. Washington (DC): Center for Global Development (CGD); 2022 (Working Paper 609, https://www.ungei.org/sites/default/files/2022-04/learning-loss-and-student-dropouts-during-covid-19-pandemic-review-evidence-two-years.pdf, accessed April 2026).

113 Social Capital Index. In: SolAbility [website]. Ilsan: SolAbility; 2026 (https://solability.com/the-global-sustainable-competitiveness-index/social-capital-index, accessed April 2026).

114 The Global Sustainable Competitiveness Index 2016. Ilsan: SolAbility; 2016 (https://solability.com/pdfs/The%20Global%20Sustainable%20Competitiveness%20Index%202016.pdf, accessed April 2026).

115 The Global Sustainable Competitiveness Index 2014. Ilsan: SolAbility; 2014 (https://solability.com/pdfs/The%20Sustainable%20Competitiveness%20Index%202014.pdf, accessed April 2026).

116 The Global Sustainable Competitiveness Index 2017. Ilsan: SolAbility; 2017 (https://solability.com/pdfs/The%20Global%20Sustainable%20Competitiveness%20Index%20Report%202021.pdf, accessed April 2026).

117 Ibid.

118 The Global Sustainable Competitiveness Index 2025. Ilsan: SolAbility; 2025 (https://solability.com/pdfs/The%20Global%20Sustainable%20Competitiveness%20Index%20Report%202025.pdf, accessed April 2026).

119 Ibid.

120 Human Development Index. In: Human Development Reports [website]. New York: United Nations Development Programme (UNDP); 2026 (https://hdr.undp.org/data-center/human-development-index#/indicies/HDI, accessed April 2026).

121 Hillis S, N'konzi JN, Msemburi W, Cluver L, Villaveces A, Flaxman S, Unwin HJT. Orphanhood and Caregiver Loss Among Children Based on New Global Excess COVID-19 Death Estimates. JAMA Pediatrics. 2022 Nov 1; 176(11):1145-1148. doi: 10.1001/jamapediatrics.2022.3157. Erratum in: JAMA Pediatrics. 2022 Oct 3. doi: 10.1001/jamapediatrics.2022.4054.

122 COVID-19: A threat to progress against child marriage. New York: United Nations Children's Fund (UNICEF); 2021 (https://data.unicef.org/wp-content/uploads/2021/03/UNICEF-report-_-COVID-19-_-A-threat-to-progress-against-child-marriage-1.pdf, accessed April 2026).

123 Kostelny K, Lamin D, Manyeh M, Ondoro K, Stark L, Lilley S, Wessells M. 'Worse than the War': An ethnographic study of the impact of the Ebola Crisis on Life, Sex, Teenage Pregnancy, and a Community-driven Intervention in Rural Sierra Leone. London: Save the Children; 2016 (https://resourcecentre.savethechildren.net/pdf/worse-than-the-war-post-ebola-ethnographic-report-on-sierra-leone.pdf, accessed April 2026).

124 Jakubowski M, Gajderowicz T, Patrinos HA. COVID-19, school closures, and student learning outcomes. New global evidence from PISA. npj Science of Learning. 2025; 10(5). doi: 10.1038/s41539-025-00297-3

125 Psacharopoulos G, Collis V, Patrinos HA & Vegas E. The COVID-19 cost of school closures in earnings and income across the world. Comparative Education Review. 2021; 65(2):271–287 (https://www.journals.uchicago.edu/doi/abs/10.1086/713540, accessed April 2026).

126 Marques FJP, Tran L, Kousa YA, Leyser M. Long-term developmental outcomes of children with congenital Zika syndrome. Pediatric Research. 2025; 97(3):989-993. doi: 10.1038/s41390-024-03389-9.

127 World Bank, Global Inequality and Economic Growth (Washington, DC: World Bank, 2025).

128 World Bank, Global Inequality and Economic Growth (Washington, DC: World Bank, 2025), Table A1, global Gini, total mean log deviation, within-country mean log deviation and between-country mean log deviation estimates through 2024; 2023–2024 values are based on Poverty and Inequality Platform nowcasts.

129 World Bank, Poverty, Prosperity, and Planet Report 2024: Pathways Out of the Polycrisis (Washington, DC: World Bank, 2024); World Bank, State of Social Protection Report 2025: The 2-Billion-Person Challenge (Washington, DC: World Bank, 2025); International Monetary Fund, 'Cost of Living Crisis', IMF Annual Report 2023.

130 Ebola Hampering Household Economies across Liberia and Sierra Leone. In: World Bank [website]. Washington (DC): World Bank Group; 12 January 2015 (https://www.worldbank.org/en/news/press-release/2015/01/12/ebola-hampering-household-economies-liberia-sierra-leone, accessed April 2026).

131 International Labour Organization. Recovery of the World of Work in Guinea, Liberia and Sierra Leone: Bringing ILO Support to Decent Work for the Social and Economic post-Ebola Recovery. Geneva: ILO, July 2015. https://www.ilo.org/publications/recovery-world-work-guinea-liberia-and-sierra-leone

132 Oliveira FA, Silva AMD, Hora SSD, Oliveira SA, Silva Junior AGD, Cardoso CAA. Healthcare for children with congenital Zika syndrome: analysis of access to social rights. Ciência & Saúde Coletiva. 2022; 27(9):3679-3688. doi: 10.1590/1413-81232022279.02972022.

133 Fernandes S, Pinto M, Barros L, et al. The economic burden of congenital Zika Syndrome in Brazil: an overview at 5 years and 10 years. BMJ Global Health. 2022; 7(7):e008784. doi: 10.1136/bmjgh-2022-008784.

134 Peiter PC, Pereira RDS, Nunes Moreira MC, et al. Zika epidemic and microcephaly in Brazil: Challenges for access to health care and promotion in three epidemic areas. PLoS One. 2020; 15(7):e0235010. doi: 10.1371/journal.pone.0235010.

135 Pinto M, Fernandes S, Barros L, et al. Estimating the cost of congenital Zika syndrome to families and healthcare providers in Rio de Janeiro and Pernambuco, Brazil: results of a case-control study. Wellcome Open Research. 2021; 6:78. doi: 10.12688/wellcomeopenres.16623.1.

136 Albuquerque MSV, Lyra TM, Melo APL, et al. Access to healthcare for children with Congenital Zika Syndrome in Brazil: perspectives of mothers and health professionals. Health Policy and Planning. 2019; 34(7):499-507. doi: 10.1093/heapol/czz059.

137 World Bank, Ebola Emergency Response Project (P152359): Implementation Completion and Results Report (Washington, DC: World Bank, 2024, accessed May 2026).

138 Putnam, R.D. Making Democracy Work: Civic Traditions in Modern Italy. Princeton, NJ: Princeton University Press; 1993.

139 Social capital index. In: Food Systems Dashboard [website]. Global Alliance for Improved Nutrition (GAIN), The Columbia Climate School, Cornell University, and Food and Agriculture Organization of the United Nations (FAO); 2021 (https://www.foodsystemsdashboard.org/indicators/cross-cutting-issues/resilience/social-capital-index/table, accessed April 2026).

140 Devlin K, Fagan M, Connaughton A. People in Advanced Economies Say Their Society Is More Divided Than Before Pandemic. In: Pew Research Center [website]. Washington (DC): Pew Research Center; 2021 (https://www.pewresearch.org/global/2021/06/23/people-in-advanced-economies-say-their-society-is-more-divided-than-before-pandemic/, accessed April 2026).

141 Belardinelli S, Gili G. Credibility, trust, and suspicion: Social relationships put to the test by Covid-19. Church, Communication and Culture. 2022; 7(1): 91-113, doi: 10.1080/23753234.2022.2039075.

142 Jewett RL, Mah SM, Howell N, Larsen MM. Social Cohesion and Community Resilience During COVID-19 and Pandemics: A Rapid Scoping Review to Inform the United Nations Research Roadmap for COVID-19 Recovery. International Journal of Health Services. 2021; 51(3):325-336. doi: 10.1177/0020731421997092.

143 Trust during troubled times: Evidence from Sierra Leone's Ebola epidemic. Economic Modelling. 2025; 144. doi: 10.1016/j.econmod.2024.107004.

144 Arthur RF, Horng LM, Bolay FK, et al. Community trust of government and non-governmental organizations during the 2014-16 Ebola epidemic in Liberia. PLoS Neglected Tropical Diseases. 2022; 16(1):e0010083. doi: 10.1371/journal.pntd.0010083.

145 Blair RA, Morse BS, Tsai LL. Public health and public trust: Survey evidence from the Ebola Virus Disease epidemic in Liberia. Social Science & Medicine. 2017; 172:89-97. doi: 10.1016/j.socscimed.2016.11.016.

146 Trust in government. In: Organisation for Economic Co-operation and Development (OECD) [website]. Paris: OECD; 2024 (https://www.oecd.org/en/data/indicators/trust-in-government.html, accessed April 2026).

147 OECD Survey on Drivers of Trust in Public Institutions – 2024 Results. Paris: Organisation for Economic Co-operation and Development (OECD); 2024. doi: 10.1787/9a20554b-en.

148 Adaba KA, Boio D. AD891: Across Africa, public trust in key institutions and leaders is weakening. In: Afrobarometer [website]. Accra; Afrobarometer; 2024 (https://www.afrobarometer.org/publication/ad891-across-africa-public-trust-in-key-institutions-and-leaders-is-weakening/, accessed April 2026).

149 Ibid.

150 Country Graph. In: Varieties of Democracy (V-Dem) [website]. Gothenburg: V-Dem; 2025 (https://www.v-dem.net/data_analysis/CountryGraph/, accessed April 2026).

151 Ibid.

152 Ibid.

153 Little fires everywhere: How polarization is shaping the economy (and what to do about it). Westminster; Allianz Research; 2024 (https://www.allianz.com/content/dam/onemarketing/azcom/Allianz_com/economic-research/publications/specials/en/2024/november/2024-11-18-social-resilience.pdf, accessed April 2026).

154 Country Graph. In: Varieties of Democracy (V-Dem) [website]. Gothenburg: V-Dem; 2025 (https://www.v-dem.net/data_analysis/CountryGraph/, accessed April 2026).

155 Country Graph. In: Varieties of Democracy (V-Dem) [website]. Gothenburg: V-Dem; 2025 (https://www.v-dem.net/data_analysis/CountryGraph/, accessed April 2026).

156 Country Graph. In: Varieties of Democracy (V-Dem) [website]. Gothenburg: V-Dem; 2025 (https://www.v-dem.net/data_analysis/CountryGraph/, accessed April 2026).

157 Ibid.

158 Democracy index. In: Our World in Data [website]. Economist Intelligence Unit; 2025 (https://ourworldindata.org/grapher/democracy-index-eiu?tab=table&time=2022..latest, accessed April 2026).

159 Ibid.

160 Ibid.

161 Ibid.

162 Simas C, Penn-Kekana L, Kuper H, et al. Hope and trust in times of Zika: the views of caregivers and healthcare workers at the forefront of the epidemic in Brazil. Health Policy and Planning. 2020; 35(8):953–961. doi: 10.1093/heapol/czaa042.

163 Klofstad CA, Uscinski JE, Connolly JM, West JP. What drives people to believe in Zika conspiracy theories?. Palgrave Communications. 2019; 5(36). doi: 10.1057/s41599-019-0243-8.

164 On the intersection of Zika and reproductive rights debates, see Valente PK. Zika and Reproductive Rights in Brazil: Challenge to the Right to Health. American Journal of Public Health. 2017; 107(9):1376–1380. doi: 10.2105/AJPH.2017.303924; Wenham C, Abagaro C, Arévalo A, Coast E, Corrêa S, Cuéllar K, Leone T, Valongueiro S. Analysing the intersection between health emergencies and abortion during Zika in Brazil, El Salvador and Colombia. Social Science & Medicine. 2021; 270:113671. doi: 10.1016/j.socscimed.2021.113671; Gressick K, Gelpi A, Chanroo T. Zika and abortion in Brazilian newspapers: how a new outbreak revived an old debate on reproductive rights. Sexual and Reproductive Health Matters. 2019 May;27(2):1586818. doi: 10.1080/26410397.2019.1586818; Neglected and Unprotected: The Impact of the Zika Outbreak on Women and Girls in Northeastern Brazil. New York: Human Rights Watch; 2017 (https://www.hrw.org/report/2017/07/13/neglected-and-unprotected/, accessed April 2026).

165 Among other important trends such as misinformation and media ecosystem fragmentation, partisan politics, growing inequalities and others.

166 Stoetzer LF, Munzert S, Lowe W, et al. Affective partisan polarization and moral dilemmas during the COVID-19 pandemic. Political Science Research and Methods. 2023; 11(2):429–436. doi: 10.1017/psrm.2022.13.

167 Silver L, Connaughton A. Partisanship Colors Views of COVID-19 Handling Across Advanced Economies. In: Pew Research Center [website]. Washington (DC): Pew Research Center; 11 August 2022 (https://www.pewresearch.org/global/2022/08/11/partisanship-colors-views-of-covid-19-handling-across-advanced-economies/, accessed April 2026).

168 Sharples R, Kamp A, Dunn K, Denson N, Nicholas L & Ovenden G. Misinformation and Conspiracy Theories During the Covid-19 Pandemic in NSW, Australia and the Risks for Social Cohesion. Journal of Intercultural Studies. 2025; 46(5): 928–953. doi: 10.1080/07256868.2025.2481391.

169 McMann KM, Tisch D. Democratic Regimes and Epidemic Deaths. In: Varieties of Democracy (V-Dem) [website]. Gothenburg: V-Dem; 2021 (https://v-dem.net/media/publications/wp_126_final.pdf, accessed April 2026).

170 Democracy index. In: Economist Intelligence Unit (EIU) [website]. EIU; 2023 (https://www.eiu.com/n/campaigns/democracy-index-2023/, accessed April 2026).

Full methodology

GPMB Monitoring Framework for Preparedness

The GPMB published its Monitoring Framework for Preparedness in May 2023, following two years of development and broad consultation. The Framework provides a multisectoral, whole-of-society assessment of pandemic risks, capacities, and impacts at global, regional, and national levels. It features 90 indicators grouped into three dimensions: Risk; Prevention, Preparedness and Resilience; and Impact.

- **Risk** includes 15 indicators across five pillars — Social, Technological, Economic, Environmental, and Political determinants.
- **Prevention, Preparedness and Resilience** comprises 70 indicators assessing systems, governance, financing, and community capacities, using both quantitative and qualitative data to evaluate readiness.
- **Impact** includes five indicators measuring the consequences of health emergencies, including outbreak frequency, severity, and their health, social, economic, and political effects — with a focus on recovery speed and equity.

The GPMB uses the Framework to inform its reporting: the 2023 report assessed 30 indicators that the GPMB identified as most pertinent to equity, leadership and accountability, and coherence; the 2024 report examined the global state of pandemic risk; and the 2026 report focuses on impact, drawing on this dimension to highlight the shifts needed in preparedness efforts.

The Framework was designed to evolve, incorporating emerging risks and new evidence to ensure it remains relevant, predictive, and action-oriented. This initial version was published to test the feasibility of a broad, multisectoral risk-based framework. With the publication of this year's Impact report, the GPMB has now reviewed all three sections of the Monitoring Framework.

This analysis follows the methodology of the GPMB Monitoring Framework, using the Impact indicators and sub-indicators included in the Framework. The indicators are:

- **C.1.1** Is the frequency and magnitude of health emergencies increasing or decreasing?
- **C.1.2** Is the cost of health emergency response increasing or decreasing, compared with investments in preparedness?
- **C.1.3** Are the health, economic, social and political impacts of health emergencies increasing or decreasing?
- **C.1.4** Has equitable access to vaccines, therapeutics, diagnostics and other countermeasures improved or declined?
- **C.1.5** Are countries and communities recovering more quickly from health emergencies, and is this recovery more equitable?

The analysis assesses these five indicators across the six PHEICs declared over the past decade, beginning with the 2014–2016 West African Ebola epidemic, which led to the creation of the GPMB. The six PHEICs reviewed are: the 2014–2016 West African Ebola epidemic; the 2016 Zika epidemic; the 2018–2020 Ebola outbreak in the Democratic Republic of the Congo; the COVID-19 pandemic; the 2022–2023 multi-country mpox outbreak; and the 2024–2025 mpox upsurge. The PHEIC related to the international spread of poliovirus was excluded because it was declared before the West African Ebola PHEIC and remains ongoing.

The unit of analysis varied by event and indicator. For the West African Ebola epidemic, data were generally aggregated or averaged across Guinea, Liberia and Sierra Leone, except where data were unavailable or incomplete. For Zika, data were generally aggregated or averaged across Brazil, Colombia and Venezuela; however, in some cases, country-level data were reviewed separately because exposure, data availability and concurrent political and economic conditions varied significantly across affected countries.

For COVID-19, global and regional aggregates were used where appropriate, given the pandemic's worldwide scale. For the Ebola outbreak in the Democratic Republic of the Congo, the analysis focused on DRC and, where relevant, neighbouring countries. For mpox, the analysis considered both PHEICs separately, focusing on the country with the highest reported number of cases in each event: the United States for the 2022–2023 multi-country mpox outbreak and the Democratic Republic of the Congo for the 2024–2025 mpox upsurge. These country-level analyses were supplemented by global data where relevant.

The period of analysis generally extended from the year in which the infectious hazard emerged to the year in which the relevant PHEIC ended. For COVID-19, the analysis ends in 2022, reflecting the end of the acute pandemic phase and the fact that the PHEIC ended shortly thereafter. For the 2024–2025 mpox PHEIC, the analysis uses the latest available data at the time of writing.

For each indicator, the analysis drew on triangulated sources, including global databases, national reports and published literature. Priority was given to internationally comparable datasets and authoritative institutional sources, including WHO, the World Bank, IMF, OECD, UNICEF, ILO and other relevant agencies. These were supplemented by peer-reviewed studies, independent evaluations, national data and grey literature where global datasets were unavailable or insufficient.

Using these inputs, a directional trend was derived across the events reviewed. For each indicator, the report assessed whether the available evidence pointed to improvement, deterioration or no clear change. Directional assessments were based on convergence across multiple sources, rather than on a single metric. They drew on both quantitative indicators and qualitative evidence from peer-reviewed literature, institutional reviews and country reports. Final trend determinations were made by the Board, based on the data and evidence available and the analysis provided by the Secretariat.

Limitations

Attribution and causality. It is difficult to determine the precise causal effect of each PHEIC on the observed impacts. The analysis therefore does not seek to isolate the effect of each PHEIC from other social, economic or political shocks. Instead, it assesses the extent to which major health emergencies contributed to, amplified or coincided with observed impacts, drawing on triangulated evidence.

Data availability and comparability. The principal constraint in developing this report was not only a lack of data, but a lack of standardized, longitudinal and directly comparable data across events, countries and time. Cases are not consistently reported; preparedness and response budgets and expenditures are inconsistently tagged; datasets use different scopes, definitions, denominators and time windows; and estimates often carry wide margins of error. Data are frequently discontinuous, difficult to compare across crises and susceptible to double counting or gaps, limiting trend analysis and attribution.

Temporal coverage. Data are not consistently available for the full periods covered by this analysis. Indicators are therefore aligned to the best available windows, which introduces asymmetric baselines and can make before-and-after comparisons difficult across the five indicators.

Short assessment horizon. Ten years is a short timeframe in which to observe structural progress in preparedness and resilience. While progress has been made in some areas, its effect on the risk and impact of pandemics and other health emergencies may not yet be fully visible.

Differences between pathogens and response contexts. The PHEICs reviewed differ substantially in transmission dynamics, severity, geographic spread, affected populations, available countermeasures and response contexts. Direct comparisons across events must therefore be interpreted cautiously.

Multiple overlapping shocks. Outcomes associated with each event can, in some instances, reflect concurrent crises, including conflict, macroeconomic stress, climate events and other health emergencies, especially during the recovery phase. For example, during the Ebola outbreak in DRC, the country was also affected by COVID-19, altering dimensions such as mobility and service delivery more profoundly than Ebola alone. Observed shifts in immunization, mortality, trade, education or trust can therefore reflect overlapping shocks and policy responses, complicating causal inference.

Measurement and reporting bias. Under-counting due to limited testing and reporting, changes in surveillance intensity during different phases of a PHEIC, and political or operational constraints can distort indicators. These biases are particularly important when comparing reported cases, deaths, service disruptions and access to countermeasures across countries and events.

Lagging and long-term impacts. Some impacts of health emergencies emerge only after the acute phase has ended, including effects on education, poverty, debt, trust, health systems, disability and long-term morbidity. The latest available data may therefore underestimate the full consequences of more recent events, particularly COVID-19 and the 2024–2025 mpox PHEIC.

Scope and selection. The analysis focuses on PHEICs declared over the past decade, excluding the ongoing poliovirus PHEIC because it was declared before the West African Ebola PHEIC and predates the creation of the GPMB. Other significant outbreaks and health emergencies that were not declared PHEICs are therefore outside the formal scope of the trend assessment, although they may provide important context for understanding evolving pandemic risk.

GPMB purpose and membership

The GPMB is an independent monitoring and accountability body to ensure preparedness for global health crises, co-convened by the World Health Organization and the World Bank Group. The Board provides an independent and comprehensive appraisal for leaders, key policy-makers and the world on system-wide progress towards increased preparedness and response capacity for disease outbreaks and other emergencies with health consequences. The Board monitors and reports on the state of global preparedness across all sectors and stakeholders, including the UN system, government, non-governmental organizations, and the private sector.

CO-CHAIRS

HE Kolinda Grabar-Kitarović
GPMB Co-Chair and former President of Croatia

Ms Joy Phumaphi
GPMB Co-Chair and former Minister of Health of Botswana

SECRETARIAT

Bruce Aylward
Head of Secretariat

Timothy Corrigan

Amélie Rioux

Aidana Zhumadilova

Shoa Moosavi
Consultant, Technical editor

Vivian Lee
Consultant, Design and layout

BOARD MEMBERS

Dr Palitha Abeykoon
Senior Advisor to the Ministry of Health of Sri Lanka and a former WHO Special Envoy for COVID-19 Preparedness and Response

Dr Ibrahim Abubakar
Pro-Provost (Health) and Dean, Faculty of Population Health Sciences, UCL

Ms Bente Angell-Hansen
Former diplomat of Norway and former President of the EFTA Surveillance Authority

Professor Victor J. Dzau
President of the United States National Academy of Medicine and Vice-Chair of the US National Research Council

Dr Maha El Rabbat
Former Minister of Health and Population of Egypt and former WHO Special Envoy for COVID-19 Preparedness and Response

Dr Chris Elias
President of the Global Development Program at the Gates Foundation and former President and CEO of PATH

Dr Zijian Feng
Professor and PhD Supervisor, School of Public Health and Emergency Management, Southern University of Science and Technology; Vice President of the Chinese Preventive Medicine Association; Senior Research Fellow of the Chinese Center for Disease Control and Prevention

Ms Henrietta Fore
Former Executive Director of UNICEF, former USAID Administrator, and CEO & Chairman, Holsman International

Dr Jayati Ghosh
Professor of Economics at the University of Massachusetts Amherst

Professor Naoko Ishii
Former Deputy Vice Minister of Finance of Japan and Professor and Executive Vice President at the University of Tokyo

Professor Ilona Kickbusch
Founder and Chair of the Global Health Centre at the Graduate Institute of International and Development Studies in Geneva

Dr Matthew Stone
Veterinary epidemiologist and former Deputy Director-General — International Standards and Science at the World Organisation for Animal Health (WOAH)

Abbreviations and acronyms

ACT	Access to COVID-19 Tools Accelerator
ADB	Asian Development Bank
Africa CDC	Africa Centres for Disease Control and Prevention
AI	Artificial intelligence
AMR	Antimicrobial resistance
ANC	Antenatal care
APA(s)	Advance purchase agreement(s)
ASEAN	Association of Southeast Asian Nations
AVMA	African Vaccine Manufacturing Accelerator
CDC	Centers for Disease Control and Prevention
CFE	Contingency Fund for Emergencies
CFR	Case fatality rate
CGD	Center for Global Development
CGWR	Center for Global Workers' Rights
COVAX	COVID-19 Vaccines Global Access
COVID-19	Coronavirus disease 2019
CPJ	Committee to Protect Journalists
CZS	Congenital Zika syndrome
DAH	Development assistance for health
DOD	Department of Defense
DPT3	Third dose of diphtheria, pertussis and tetanus-containing vaccine
DRC	Democratic Republic of the Congo
Dx	Diagnostics
ECDC	European Centre for Disease Prevention and Control
EIU	Economist Intelligence Unit
EMDEs	Emerging markets and developing economies
EMRO	WHO Regional Office for the Eastern Mediterranean
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign direct investment
FGH	Financing Global Health
FTS	Financial Tracking Service
Gavi	Gavi, the Vaccine Alliance
GDP	Gross domestic product
GHO	Global Health Observatory
Gini	Gini coefficient/Gini index
GPE	Global Partnership for Education
GPMB	Global Preparedness Monitoring Board
H1N1	Influenza A(H1N1)
H5N1	Influenza A(H5N1)
HCW	Health care workers
HDI	Human Development Index
HICs	High-income countries
HIV	Human immunodeficiency virus
HIV/AIDS	Human immunodeficiency virus/ acquired immunodeficiency syndrome
HLIP	High-Level Independent Panel
HLM	High-Level Meeting
HSS	Health system strengthening
ICAO	International Civil Aviation Organization
IDEA	International Institute for Democracy and Electoral Assistance
IFAD	International Fund for Agricultural Development
IHME	Institute for Health Metrics and Evaluation
IHR	International Health Regulations
ILO	International Labour Organization
IMF	International Monetary Fund
IMR	Infant mortality rate
IP	Intellectual property
IPC (food security)	Integrated Food Security Phase Classification
IPC (health)	Infection prevention and control
IPPPR	Independent Panel for Pandemic Preparedness and Response
JFHTF	Joint Finance-Health Task Force

KFF	Kaiser Family Foundation
LAC	Latin America and the Caribbean
LGBTQ+	Lesbian, gay, bisexual, transgender, queer/questioning and others
LICs	Low-income countries
LMICs	Low- and middle-income countries
MCMs	Medical countermeasures
MDBs	Multilateral development banks
MERS	Middle East respiratory syndrome
MLD	Mean log deviation
mRNA	Messenger RNA
MSF	Médecins Sans Frontières
MSM	Men who have sex with men
NGO	Non-governmental organization
NHS	National Health Service
OCHA/ UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
ODA	Official development assistance
OECD	Organisation for Economic Co-operation and Development
PABS	Pathogen Access and Benefit-Sharing
PAHO	Pan American Health Organization
PEF	Pandemic Emergency Financing Facility
PHC	Primary health care
PHEIC(s)	Public Health Emergency of International Concern(s)
PHSM	Public health and social measures
PIP	Poverty and Inequality Platform
PPE	Personal protective equipment
PPPR	Pandemic prevention, preparedness and response
PPR	Prevention, preparedness and response
PTSD	Post-traumatic stress disorder
R&D	Research and development
RSF	Reporters Without Borders
SARS	Severe acute respiratory syndrome
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SRHIN	Slum and Rural Health Initiative
STEEP	Social, technological, economic, environmental and political
TB	Tuberculosis
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UMICs	Upper-middle-income countries
UN	United Nations
UN DESA	United Nations Department of Economic and Social Affairs
UNAIDS	Joint United Nations Programme on HIV/ AIDS
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCWA	United Nations Economic and Social Commission for Western Asia
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
V-Dem	Varieties of Democracy
VUCA	Volatility, uncertainty, complexity and ambiguity
Vx	Vaccine
WASH	Water, sanitation and hygiene
WFP	World Food Programme
WHA	World Health Assembly
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WITS	World Integrated Trade Solution
WOAH	World Organisation for Animal Health
WTO	World Trade Organization
ZIKV	Zika virus

GPMB
GLOBAL PREPAREDNESS MONITORING BOARD

gpmb.org

Global Preparedness Monitoring Board Secretariat
c/o World Health Organization
20 Avenue Appia
1211 Geneva 27, Switzerland

gpmbsecretariat@who.int

@TheGPMB
@global-preparedness-monitoring-board