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# Report on Economic Vulnerabilities and Risks to Pandemics and Potential Policy Measures

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This is a Report developed for G20 Joint Finance Health Ministerial Meeting (JFHMM), 19 August 2023. Developed by the World Health Organization (WHO), World Bank (WB), International Monetary Fund (IMF), and European Investment Bank (EIB).

# Contents

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## Executive Summary

A. This Report has been prepared by World Health Organization, World Bank, International Monetary Fund and European Investment Bank pursuant to a request by the G20 Joint Finance and Health Task Force (JFHTF) to better understand **health and economic vulnerabilities, and their resulting risks, caused by pandemics.**

B. The first Report in this series presented a preliminary framework for health, social, and economic vulnerabilities (FEVR) with the aim to answer two key questions:

- What are the **current risks, vulnerabilities** and impacts for future pandemics scenarios, and **where are policy actions to strengthen institutional capacity, coordination, and legislation, and investments required to maximise preparedness and resilience** to minimize the health, social and economic impact?
- In the context of a response to future pandemic scenarios, what are the **types of policy responses and associated costs** required as well as the **differential health, social and economic outcomes** of different mitigation measures?

C. The COVID-19 pandemic caused significant health, social and economic impacts, including significantly altering growth trajectories, financial and economic deprivation rates and other economic outcomes within all countries, on top of the human toll and social impact it caused.

D. This report presents preliminary analysis using the preliminary FEVR presented in Report 1. The intent is to show the possible uses of the FEVR, and to stimulate discussion around the potential for a global report on health, social, and economic vulnerabilities related to pandemics. The data presented should be considered indicative only.

E. The framework for health, social, and economic vulnerabilities and risks consists of 16 indicators across three domains. Analysis of these indicators highlights a strong relationship between vulnerabilities and income level, with lowest income countries facing the highest vulnerabilities.

F. Comparisons across indicators within domains could inform investment needs, when used alongside broader considerations such as costs.

G. Next steps for this report are to:

- Finalise the FEVR as described in Report 1
- Update and expand upon the analysis presented

- Develop a comprehensive report on global health, social, and economic vulnerabilities

H. Discussion points for the JFHTF:

- Are there additional suggestions on the types of analyses drawing from the FEVR to inform decision making?
- Would a global report on health, social, and economic vulnerabilities related to pandemics be a valuable use of the FEVR?

## A | Context: COVID-19 pandemic and the global economy

The COVID-19 pandemic caused significant health, social and economic impact, including significantly altering growth trajectories, financial and economic deprivation rates and other economic outcomes within all countries, on top of the human toll and social impact it caused. The magnitude of such an impact is related to multiple characteristics of the pandemic, including the type and speed of spread, magnitude of associated morbidity and mortality, and rapidity and effectiveness of the response.

The COVID-19 pandemic caused significant health, social and economic impacts, including:

- health losses: morbidity, mortality and disability-adjusted life years (DALYs)
- stress on health systems
- strains on mental health, including loneliness, stress, anxiety
- increases in health, social and gender-based inequalities
- lower educational outcomes due to school/university closures and distant learning
- sharp GDP contractions or growth slowdowns
- collapse in demand in various economic sectors
- reduced job security, income losses for households and increases in global poverty rates
- increased public and private debt

The COVID-19 pandemic will not be the last pandemic but hopefully it will be the last of its kind if we can identify and reduce vulnerabilities and increase resilience and response capacities to health emergencies.

### A1. Health system vulnerabilities and risks

As of May 31st, 2023, there have been more than 700 million confirmed cases of COVID-19 and almost 7 million deaths[1]. In addition to the direct impacts of COVID-19, the indirect impacts caused by disruptions to service delivery and delays in diagnoses are indicative of the vulnerabilities of the health system to cope with major shocks such as a pandemic.

To better understand the extent of health system and essential health service disruptions caused by the COVID-19 pandemic, WHO has conducted four rounds of the Pulse survey on continuity of essential health services during the COVID-19 pandemic. It is only in the most recent survey, for the time period of Q4 2022, that significant recovery from disruptions reported in past survey rounds begins to be evident[2].

[1] WHO Coronavirus (COVID-19) Dashboard | WHO Coronavirus (COVID-19) Dashboard With Vaccination Data
[2] Fourth round of the global pulse survey on continuity of essential health services during the COVID-19 pandemic: November 2022–January 2023 available here.

However, despite signs of recovery, the extent of essential health service disruptions reported globally persisted widely, with 84% of countries continuing to report some disruption to at least one essential health service during Q4 2022.

### A2. Social and economic protection vulnerabilities and risks

Social protection system responses were critical during the COVID-19 pandemic. However, the pandemic has exposed deep-seated inequalities and significant gaps in social protection coverage, comprehensiveness, and adequacy across all countries.

As of 2020, only 46.9% of the global population were effectively covered by at least one social protection benefit, while the remaining 53.1% – as many as 4.1 billion people – were left unprotected. Behind this global average, there are significant inequalities across and within regions.[3]

The social impacts of COVID-19 were widespread and impacted all age groups. Reported outcomes include increased food insecurity[4], changes in family dynamics resulting in higher rates of intimate partner violence[5], social isolation of vulnerable populations[6] and reductions in student/teacher contacts and lost schooling for as many as 1.6 billion children[7].

### A3. Macroeconomic vulnerabilities and risks

Prior to the COVID-19 pandemic, economic growth was expected to remain relatively stable between 2019 and 2023. However, the pandemic created one of the major economic shocks of the last century with the economic vulnerability and risk extending well beyond the domain of healthcare.

Global growth contracted by an estimated 3.5% during 2020 in the first year of the COVID-19 pandemic[8]. Although many economies rebounded rapidly, supported by an unprecedented global economic policy response, entering 2023 recovery is still ongoing and uneven. Public debt as a ratio to GDP soared across the world during COVID-19 and is expected to remain elevated.

Impacts on national economies were multi-faceted, driven by loss of work in both the formal and informal economy, business closures and disruptions of activities such as tourism and agriculture. It is expected that global poverty rates have risen for the first time in a generation owing to the COVID-19 pandemic and our understanding of the long-term scarring effect is still developing.

[3] International Labour Organization. World Social Protection Report 2020-2022. Available here.
[4] United Nations Sustainable Development Group. Policy Brief: The Impact of COVID-19 on Food Security and Nutrition. Available here.
[5] Peitzmeir et al. Increases in Intimate Partner Violence During COVID-19: Prevalence and Correlates. Available here.
[6] Hwang et al. Loneliness and social isolation during the COVID-19 pandemic. Available here.
[7] Unesco, The World Bank and Unicef. Mission: Recovering Education in 2021. Available here.
[8] International Monetary Fund. World Economic Outlook January 2021. Available here.

## B | Developing a framework for health, social, and economic vulnerabilities and risks

### B1. A framework for health, social, and economic vulnerabilities and risks can identify systemic weaknesses and guide investments

What this framework aims to do is to monitor progress in reducing key health, socio-, and macro-economic vulnerabilities and their likely economic impact, and to inform investments and policies at national level.

The key questions the framework for health, social, and economic vulnerabilities and risks (FEVR) aims to answer are:

1. What are the current risks, vulnerabilities and impacts for future pandemic scenarios, and where are policy actions to strengthen institutional capacity, coordination, and legislation, and investments required to maximise preparedness and resilience to minimize the health, social and economic impact?
2. In the context of a response to future pandemic scenarios, what are the types of policy responses and associated costs required as well as the differential health, social and economic outcomes of different mitigation measures?

Answering these questions requires a robust understanding of (1) the health, social, and economic vulnerabilities that are specific to, or are influenced by, pandemics, and (2) the health, social and economic policies and actions that can be taken to reduce risks and improve outcomes.

Investments in preparedness and resilience, as well as an understanding of the costs of policy actions which will address vulnerabilities and mitigate impacts of an outbreak could be informed by the FEVR. When denoting the possible policies and actions taken during a pandemic, we refer to costs related to:

- The national health response including collaborative surveillance, community protection, safe and scalable emergency care whilst maintaining essential health services, access to medical countermeasures, and emergency coordination at global, regional, national and sub-national levels. This includes the costs of public health and social measures and other response measures.
- The social response & economic response to protect livelihoods, jobs, and businesses including, but not limited to, the scaling of social protection schemes and the exceptional support to business to mitigate the impact of non-pharmaceutical interventions.
- Macroeconomic interventions including bolstering fiscal spending on public health and affected sectors, alongside implementing monetary easing, and liquidity provisions to ensure financial stability.

When considering investments, it is important to note that there are broader considerations than what are included in this framework, such as the comparative financial costs of different strategies.

The first Report in this series presented a proposed methodology to develop a framework for health, social, and economic vulnerabilities and risks from pandemics and a preliminary framework. This Report presents preliminary analyses using the framework to identify broad areas of vulnerability and consider future directions for using the FEVR.

Importantly, the framework presented is preliminary and should be considered only insofar as it indicates the direction such a framework could take. There is significant additional analysis required to finalise the framework and ensure it accurately informs decision making around reducing vulnerabilities before and during a pandemic.

## C | Preliminary indication of types of data analysis possible with the FEVR

### C.1 The preliminary framework for health, social, and economic vulnerabilities and risks consists of 16 indicators across three domains

A broad scoping of the literature covering existing measurement frameworks for health, social, and economic indicators related to pandemic preparedness, response and resilience identified 72 potential indicators for the FEVR, of which 35 indicators had data availability to allow possible inclusion in the FEVR. Of these, 16 were correlated with GDP per capita, and change in GDP per capita during the first year of the pandemic (Table 1). These 16 indicators are used in this preliminary analysis of the global health, social, and economic vulnerabilities and risks from pandemics.

***Table 1: Indicators included in the preliminary FEVR Framework***

| Domain | Indicator |
|---|---|
| **Health system resilience and response capacity** | Health Expenditure per capita |
| | Logistics Index |
| | Physicians per 1,000 population |
| | UHC Service coverage |
| | International Health Regulations |
| **Macroeconomic stability** | Population with bank savings |
| | Exports |
| | Credit to private sector |
| | Global Value Chain |
| | Agriculture & tourism |
| | Central government debt |
| **Social and economic protection** | Informal economy |
| | Food insecurity |
| | Social protection benefit coverage |
| | SDG Index |

| | |
|---|---|
| | Internet access |

## C.2 Current status of global health, social and economic vulnerabilities to pandemics based on preliminary FEVR framework

Within each domain, indicators have been ranked by decile, and a simple average has been used to score the domain, with all indicators equally weighted within domain. This method was chosen for its simplicity in presenting these preliminary results, and will be further considered in the next iteration of the FEVR. For comparisons of individual indicators within a domain, these are scored based on the decile ranking, with a high score denoting low vulnerability, and a low score denoting high vulnerability.

Health, social and economic vulnerabilities vary by region and income level. Comparing relative measures across the domains of health, economic and social vulnerabilities, the lowest income countries (Table 2), and those in the WHO African Region (Table 3) are comparatively more vulnerable than those in high income countries, or in the WHO European or Western Pacific regions.

The presentation of results uses a heat map to present the relative vulnerabilities, with red signifying greatest vulnerability and risk, and green the least. It is important to note that these data are presented based on relative data, meaning that the countries with the lowest vulnerability to a pandemic may still suffer from a significant shock if they are badly hit by a pandemic. Perhaps unsurprisingly, vulnerabilities increase as income levels decrease, and the WHO African Region, which consists of the highest number of low-income countries, also faces the greatest vulnerabilities.

***Table 2: Summary of health, macroeconomic, and social and economic protection vulnerabilities by income level. Vulnerabilities are presented as a heatmap, with darkest green showing lowest vulnerability, and red highest vulnerability. Colours in between are on a sliding scale.***

| Income level | Overall score | Health system resilience | Macroeconomic stability | Social and economic protection |
|---|---|---|---|---|
| High income | | | | |
| Upper middle income | | | | |
| Lower middle income | | | | |
| Low income | | | | |

*Table 3: Summary of health, macroeconomic, and social and economic protection vulnerabilities by WHO Region. Vulnerabilities are presented as a heatmap, with darkest green showing lowest vulnerability, and red highest vulnerability. Colours in between are on a sliding scale.*

| Region | Overall score | Health system resilience | Macroeconomic stability | Social and economic protection |
|---|---|---|---|---|
| African Region | | | | |
| Region of the Americas | | | | |
| Eastern Mediterranean Region | | | | |
| European Region | | | | |
| South-east Asia Region | | | | |
| Western Pacific Region | | | | |

To inform investments, it is more useful to look at the variation in individual indicators within a domain, to review at the county level and to focus on the change in vulnerability over time as a measure of increasing resilience to pandemics. For four example countries, one each of high, upper-middle-, lower-middle- and low- income groups, we share example summaries of country level data. Countries were selected to show differing vulnerability profiles.

As can be seen in Figure 1, the high-income and upper-middle-income countries face the lowest relative vulnerabilities, and the low-income country faces much higher vulnerabilities across all domains. Expanding further, however, we can identify specific investment possibilities by country. For example, as seen in Figure 2, although the high-income country faces overall lower vulnerabilities, this country should improve their International Health Regulations (2005) core capacities in order to further reduce vulnerabilities. Conversely, for the lower- and upper- middle income countries, their IHR core capacities are relatively strong, but both should focus on increasing health spending and strengthening logistics. The low-income country shown has comparably the highest vulnerabilities in health and needs to strengthen all indicators.

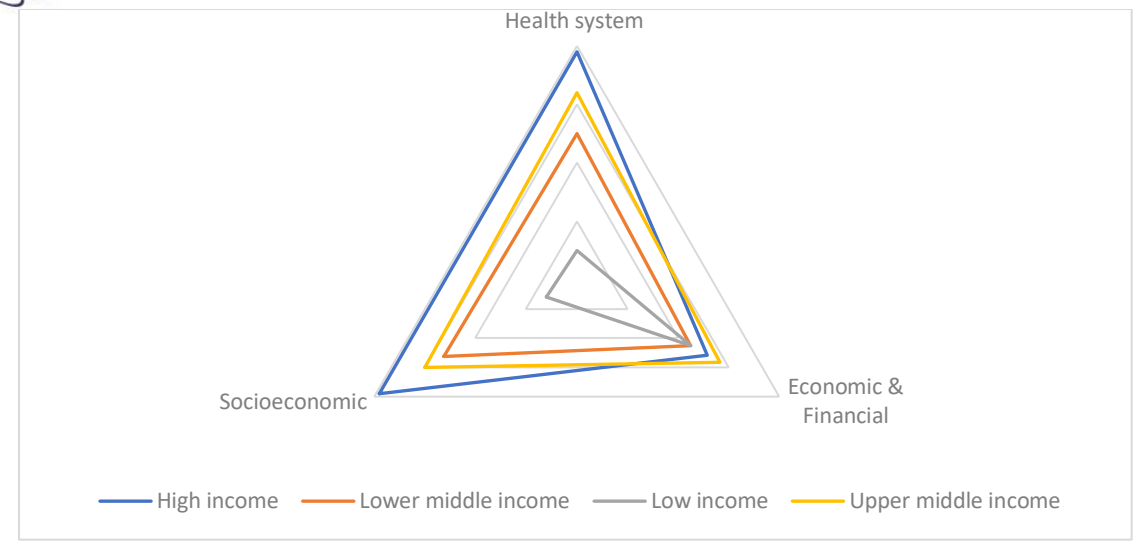


***Figure 1: Summary of health, macroeconomic and social and economic protection vulnerabilities for four example countries***

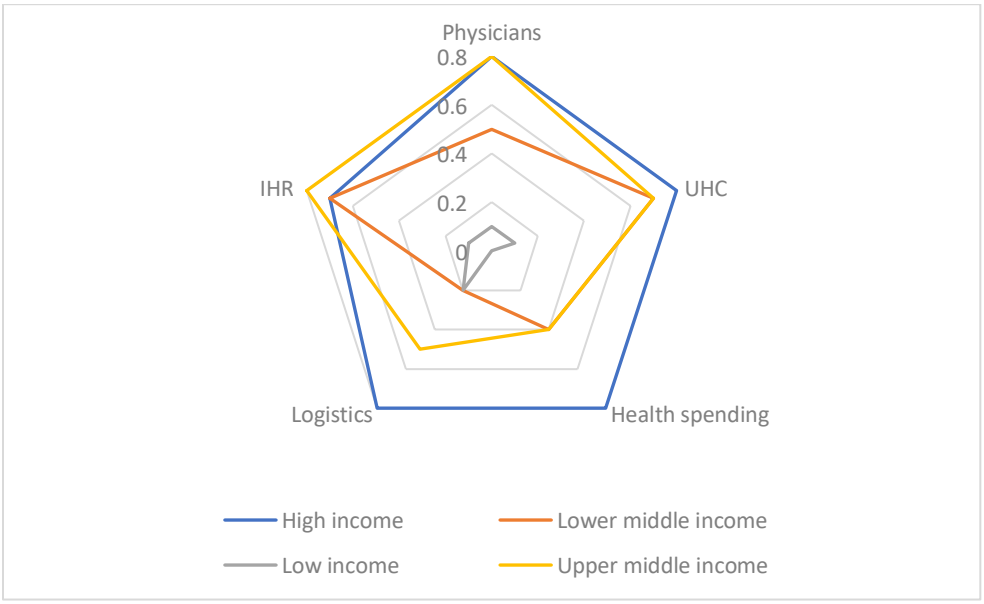


***Figure 2: Differential vulnerabilities for health indicators in the FEVR for four example countries***

From the social and economic protection perspective (Figure 3), both middle income countries need to focus on reducing informal employment and increasing internet access, and the high-income country should focus attention on strengthening social protection and improving internet access.

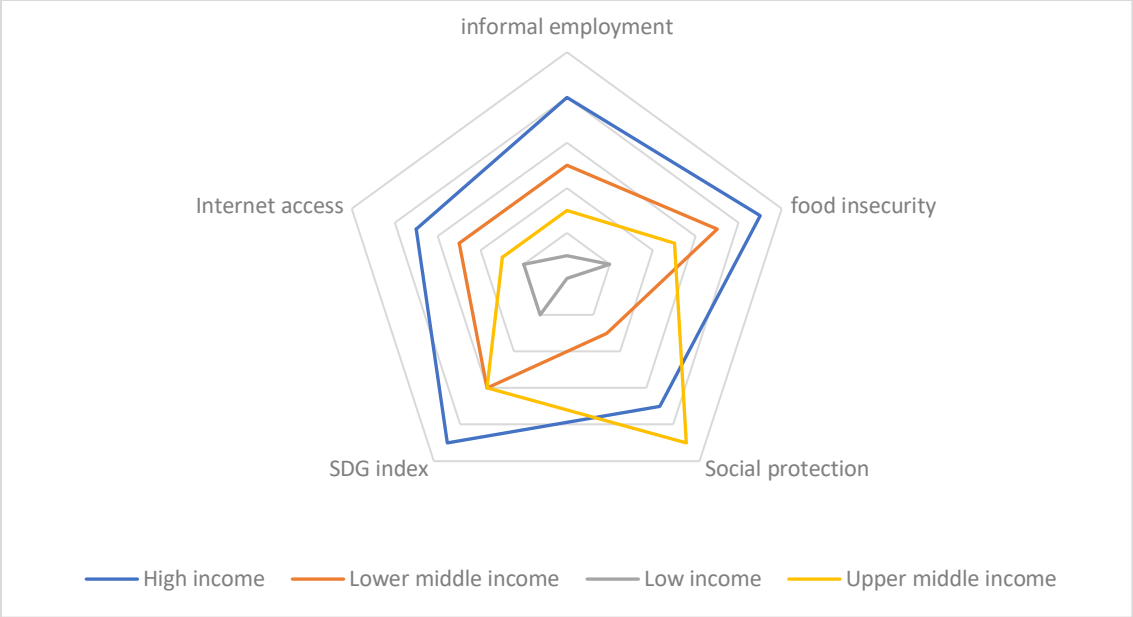


***Figure 3: Differential vulnerabilities for social and economic protection indicators in the FEVR for four example countries***

This analysis is intended as an example as to how the FEVR could be used at both the global and country level to identify specific vulnerabilities which could be mitigated to prevent excessive impacts on the economy of a future pandemic. It should be noted that as the selection of indicators for the framework is still ongoing, this should be considered as indicative only.

## D | Preliminary scenario analysis on the relationship between health and economic outcomes provides an indication of how the FEVR could guide decision making

Exploratory scenario analysis has been undertaken to estimate differential impacts on health, social and economic outcomes due to mitigation measures in a pandemic. This model is not at this stage linked to the indicators identified for FEVR and is intended as proof-of-concept for consideration by the JFHTF. This analysis has been included as indicative of the type of end product the FEVR could produce, once finalised.

One outcome representing each domain has been included: short-term loss in economic production due to the pandemic and mitigation measures measured in changes in GDP (for the economic domain), lost lives measured in Years of Life Lost (YLL) (for the health domain), and long-term GDP loss due to interrupted in-person schooling (for the social impact domain). All domains are measured converted into monetary values to allow for comparison across domains. YLL are measured at 160 GDP per capita[9], and missed schooling converted to life-long income loss[10].

Hypothetical pandemic scenarios caused by one of seven respiratory pathogens, each with a disease profile informed by a past epidemics, were simulated in the integrated epi-econ model, DAEDALUS[11], that was originally developed for COVID-19. The scenarios are projected for three stylized countries varying in income level. The characteristics of the countries are informed by real-world demographic, societal and economic data for 197 countries.

Outcomes are evaluated for four mitigation strategies of increasing stringency that are inspired by policies chosen by countries during the COVID-19 pandemic ("No closures", "Economic closures" defined as mandated closure of all non-essential business, "School closures" defined as closure of all in-person schooling, and "Elimination" defined as the most stringent mitigation measures aiming for elimination of the disease), which allows us to consider the trade-offs in health, social and economic outcomes considering different response policies.

As an example of the outcome of this analysis, Table 4 and 5 highlight the health, social and economic outcomes, by income level, for a pathogen profile based on the 1918 influenza and another scenario based on SARS-CoV2 delta.

[9] Robinson, L. A., Hammitt, J. K. and O'Keeffe, L. [2019], 'Valuing mortality risk reductions in global benefit-cost analysis',Journal of Benefit-Cost Analysis 10, 15–50.
[10] Psacharopoulis, G Collis, V. and Patrinos [2021], 'The COVID-19 Cost of School Closures in Earnings and Income across the World', *Comparative Education Review* **65**(2).
[11] Haw, D., Forchini, G., Doohan, P., Christen, P., Pianella, M., Johnson, R., Bajaj, S., Hogan, A. B., Winskill, P., Miraldo, M., White, P. J., Ghani, A. C., Ferguson, N. M., Smith, P. C. and Hauck, K. [2022], 'Optimizing social and economic activity while containing SARS-CoV-2 transmission using DAEDALUS', Nature Computational Science 2, 223–233.
URL: https://www.imperial.ac.uk/mrc-global-infectious-disease-analysis/covid-19/report-35-schools/

*Table 4: Impact on health, social and economic outcomes of different mitigation strategies for a virus with the same properties as the 1918 Influenza outbreak*

| | Strategy | Total cost | YLLs<br>Health impact | Education<br>Social impact | GDP<br>Economic impact |
|---|---|---|---|---|---|
| Low and lower middle income | No Closures | 150 | 147 | 0 | 3 |
| | School Closures | 114 | 63 | 44 | 7 |
| | Economic Closures | 79 | 34 | 27 | 19 |
| | Elimination | 82 | 22 | 39 | 22 |
| Upper middle income | No Closures | 142 | 140 | 0 | 2 |
| | School Closures | 88 | 60 | 23 | 6 |
| | Economic Closures | 68 | 40 | 11 | 16 |
| | Elimination | 54 | 19 | 17 | 18 |
| High income | No Closures | 135 | 133 | 0 | 2 |
| | School Closures | 69 | 58 | 7 | 5 |
| | Economic Closures | 69 | 55 | 2 | 12 |
| | Elimination | 35 | 20 | 3 | 12 |

*Table 5: Impact on health, social and economic outcomes of different mitigation strategies for a virus with the same properties as the SARS-CoV2 delta*

| | Strategy | Total cost | YLLs Health impact | Education Social impact | GDP Economic impact |
|---|---|---|---|---|---|
| Low and lower middle income | No Closures | 202 | 196 | 0 | 6 |
| | School Closures | 185 | 132 | 44 | 10 |
| | Economic Closures | 142 | 79 | 39 | 24 |
| | Elimination | 145 | 76 | 44 | 25 |
| Upper middle income | No Closures | 244 | 239 | 0 | 5 |
| | School Closures | 183 | 151 | 23 | 9 |
| | Economic Closures | 129 | 89 | 19 | 22 |
| | Elimination | 130 | 83 | 23 | 24 |
| High income | No Closures | 383 | 378 | 0 | 5 |
| | School Closures | 246 | 752 | 7 | 8 |
| | Economic Closures | 156 | 132 | 4 | 20 |
| | Elimination | 148 | 118 | 6 | 24 |

Whilst in both instances, the 'no closures' strategy has the highest total cost, this is driven by health losses. Implementing different mitigation strategies changes the balance between the different outcome indicators. An 'elimination' strategy, whilst having the lowest total cost and lowest health impact, will have the biggest impact on short term GDP production, and large impacts on educational outcomes.

Comparing the results from the scenario analysis using the two pathogen profiles, both the magnitude of outcomes, and the differential impacts across the dimensions changes. The 1918 influenza was much less transmissible than SARS-CoV2 delta (R0 1.6 vs 5.1) and had lower associated mortality rates.

Developing this analysis further in a future iteration of the FEVR would allow linkages between the identified vulnerabilities and scenarios of possible pandemics, to inform investment and policy possibilities.

## E | Future directions of the Framework for Health and Economic Vulnerabilities and Risks from Pandemics

The current iteration of the FEVR identifies 16 indicators with strong relationships with GDP, and GDP change between 2019-2020 driven by the COVID-19 pandemic. Along with this, a proof-of-concept model showing the differential health, social and economic impacts of possible pandemic scenarios has been developed.

At present, the FEVR has been developed using an individual country lens. To strengthen the framework global transmission dynamics and global production interconnectedness will be considered in the next phase, along with a tracking mechanism to monitor reduction of vulnerabilities over time.

Next steps for this report are to:

- Finalise the FEVR as described in Report 1
- Update and expand on the analysis presented
- Develop a comprehensive report on global health, social, and economic vulnerabilities