3 COVID-19 outcomes across OECD countries

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The impact of COVID-19 has been substantially different across OECD countries. This chapter offers an exploratory assessment of the impact of health system capacity and government strategies on COVID-19 outcomes until December 2021. The aim is to provide insights into why certain OECD countries had better outcomes over the first two years of the COVID-19 pandemic (2020-21) and how policy makers can shift their health systems to be better prepared for future challenges. After controlling for core demographic and economic factors, indicators of increased health system capacity and access to high-quality care were associated with better COVID-19 outcomes. Higher COVID-19 vaccination rates were also associated with lower excess mortality, as were certain measures of trust. Health risk factors and social risk factors also influenced outcomes. Beyond national aggregates, the chapter highlights how older people, socially disadvantaged populations, and ethnic minority groups suffered more from the pandemic than others. The main indirect effects of the pandemic are also analysed.

Key findings

COVID-19 has had a substantial negative impact on health. Over 3 million COVID-19 deaths were reported across OECD countries to the end of 2021; all-cause mortality for 2020-21 was higher than the 2015-19 average in all OECD countries with available data (with an average increase in total deaths of 14%); and life expectancy in 2020 fell in 75% of OECD countries. Beyond lives lost, mental well-being deteriorated. Many economies slid into recession. Analysis of key indicators of increased health system capacity and access to high-quality care found the following:

- After controlling for core demographic and economic factors, indicators of increased health system capacity – particularly in terms of health workforce – are associated with better COVID-19 health outcomes. Countries where a high share of the population were employed in the health and social sector had lower COVID-19 and excess mortality rates.
- Access to high-quality care is essential. Countries where the entire population had health coverage for a key set of health services, and where pre-pandemic treatable mortality was low, displayed better health outcomes.
- Vaccination strategy matters. A higher COVID-19 vaccination rate was associated with lower excess mortality.
- Trust also appears to be a factor, with certain indicators of trust in institutions and interpersonal trust associated with lower COVID-19 and excess mortality rates.
- Health risk factors and population health are important. Nationwide obesity levels, alcohol consumption and higher mortality rates from circulatory disease, diabetes and cancer were associated with COVID-19 deaths and/or excess deaths.
- Social risk factors also influence outcomes. Countries in which more of the population face difficulties in making ends meet, or that have higher long-term unemployment rates, had higher COVID-19 and excess mortality rates.
- Beyond national aggregates, older people, socially disadvantaged populations, and ethnic minority groups, suffered more from the pandemic than others. The pandemic also caused massive disruption to health services, a rise in mental health care needs and a significant number of people suffering from post-COVID-19 syndrome or “long COVID”.

Based on these findings, some clear policy implications emerge. First, investing in the health workforce is critical. Second, countries also need to ensure that the entire population has access to high-quality services. Finally, improving people’s underlying health will make them more resilient to future health shocks. Public health policies to reduce major risk factors should therefore be given greater priority.

3.1. Health and other public policies have an impact on COVID-19 outcomes

The pandemic has claimed, and continues to claim, millions of lives. Across OECD countries, more than 3.1 million people have died representing nearly half of the 6.6 million reported global fatalities (as of December 2022). Reported COVID-19 deaths underestimate the true death toll, however, owing to a lack of testing and accurate reporting.

Many more people have died or experienced ill health as a direct or indirect result of the virus, with people living in vulnerable conditions disproportionately hit. The pandemic has placed immense pressure on health services, disrupting health care for people not infected with the virus. COVID-19 has also left many in society mentally scarred by their experiences. In addition to worsening health and well-being, most OECD countries experienced sharp economic recessions – often deeper than during the global financial crisis (2007-08) – because of the pandemic and the policies adopted to slow the spread of the virus.

Behind these aggregate figures, the impact of COVID-19 has been substantially different across OECD countries. These differences reflect both factors beyond the control of policy makers, such as geographical factors or the structural characteristics of economies, and factors more amenable to policy both within and beyond the health system. This chapter offers an exploratory assessment of such differences – particularly the extent to which health system capacity and government strategies during the first two years of the pandemic (2020-21) translated into better COVID-19 outcomes. The purpose of this analysis is to provide insights into why certain OECD countries had better outcomes and how policy makers can shift their health systems to be better prepared for future challenges. The next global health crisis might not be caused by a respiratory virus, so it is essential to understand which insights from the analysis are generalisable and which are more likely specific to the COVID-19 pandemic.

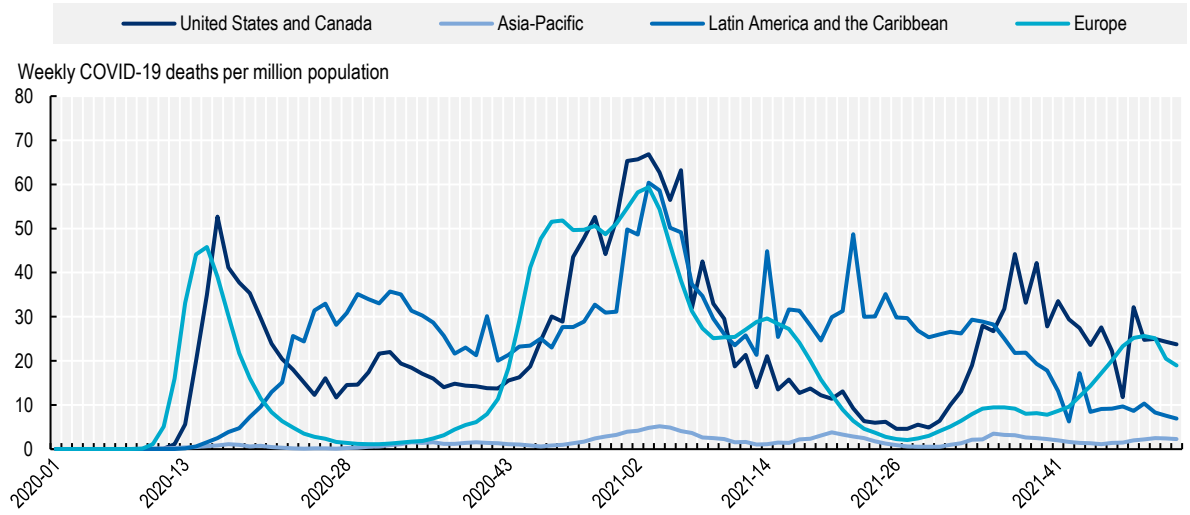
The rest of this chapter is structured as follows. Section 3.2 compares countries' COVID-19 outcomes across a range of health indicators and examines the consequences of disruption to health service provision. Section 3.3 then uses simple quantitative techniques to explore why some countries had better COVID-19 outcomes. The chapter concludes with the main implications of these findings for policy makers.

3.2. The impact of COVID-19 varied across OECD countries

3.2.1. COVID-19 has had a substantial impact on health, well-being and economic activity in OECD countries

Since the outset of the pandemic, there have been several peaks in SARS-CoV-2 infections and associated COVID-19 deaths, with differing impacts across OECD countries over time (Figure 3.1). Reported death rates peaked in late 2020 or early 2021 in most European OECD countries and this trend was similar in Canada and the United States. The situation among the OECD countries in Latin America was more diverse, with reported deaths highest in mid-2020 for Chile, in early 2021 for Mexico, and in mid-late 2021 for Colombia and Costa Rica. In the Asia-Pacific OECD countries, death rates were much lower throughout 2020 and 2021.

Figure 3.1. Weekly reported COVID-19 deaths, OECD countries grouped by region, January 2020 to December 2021



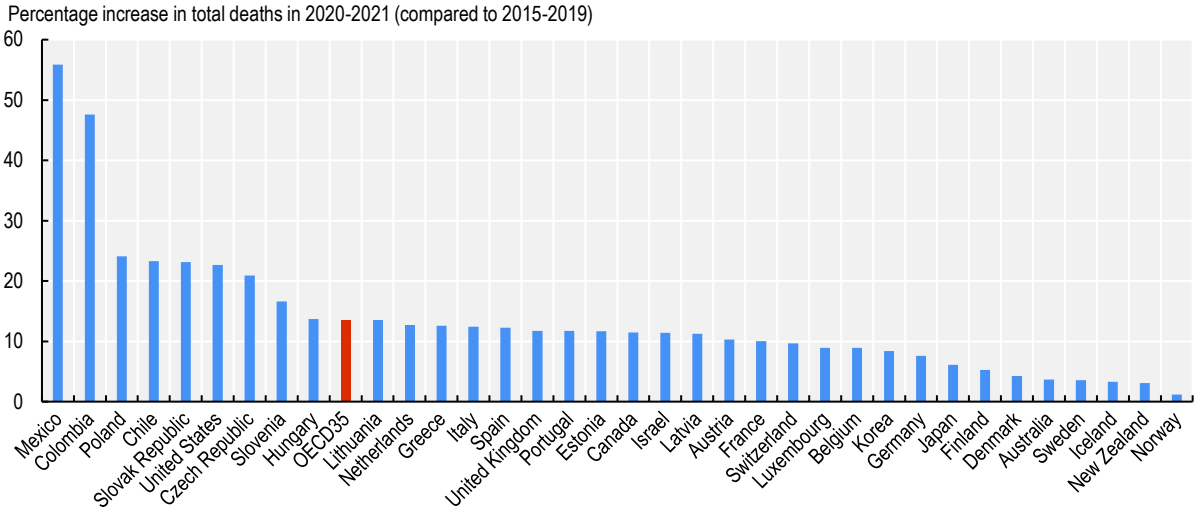
Note: Regional averages are calculated by dividing the total number of cases by total populations. Partly missing data for weeks 51 and 52 of 2021 have been estimated. European Centre for Disease Prevention and Control (ECDC) data use national data sources for non-European countries.
Source: ECDC (2022[1]), COVID-19 datasets, https://opendata.ecdc.europa.eu/covid19/nationalcasedeath/.

The impact of infection waves and associated peaks in fatality has been devastating. By mid-October 2022 (Figure 3.1), nearly 400 million COVID-19 cases and more than 3.1 million COVID-19 deaths had been reported across the 38 OECD countries. By then, cumulative reported COVID-19 death rates totalled around 2 260 per million inhabitants across OECD countries, but with marked cross-country variation. Rates ranged from less than 1 000 deaths per million in Australia, Iceland, Japan, Korea, New Zealand and Norway to over 3 500 deaths per million in the Czech Republic, Hungary and the Slovak Republic.

While the number of reported COVID-19 deaths offers the most direct measure of the number of lives lost to the pandemic, differences in testing capacities, recording, registration and coding practices across countries hamper the international comparability of these figures. Additional indicators to assess the full impact of COVID-19 on population health are therefore useful. The indicator “excess deaths” offers a broader measure, reflecting both the direct and indirect impact of the SARS-CoV-2 virus on mortality, with standardised reporting across OECD countries. It is not affected by capacity limitations to detect COVID-19 fatalities in countries or other differences in the registration of COVID-19 deaths. However, it is not a direct measure of the impact of COVID-19, since it captures all excess deaths in a particular period, irrespective of their cause. This can include other health events, such as exceptional influenza seasons or extreme weather, which have differing mortality impacts across countries.

All-cause mortality for 2020-21 was higher than the average for 2015-19 in all OECD countries with available data (Figure 3.2). The average increase in total deaths was 14% across OECD countries (equivalent to 2 923 excess deaths per million people). Mortality was particularly high in Mexico, which experienced a 56% increase in total deaths (6 094 excess deaths per million) and Colombia, which experienced a 48% increase in total deaths (3 590 excess deaths per million).

Figure 3.2. Excess mortality in 2020-21



Note: Excess mortality is calculated by comparing the average annual deaths in 2020-21 with the annual average for 2015-19. Data for Colombia until week 35-2021 are included. No mortality data are available for Costa Rica, Ireland and Türkiye for 2020-21. OECD average is unweighted. Comparator years to calculate the percentage increase in total deaths are 2015-19.
Source: OECD (2022[2]), *OECD Health Statistics*, https://doi.org/10.1787/health-data-en, based on Eurostat data and national data.

Changes in life expectancy also provide a broader but less direct measure of the mortality impact of the pandemic than reported COVID-19 deaths. In 2020, life expectancy fell in 75% of OECD countries, resulting in a drop in average life expectancy across OECD countries of half a year (from an average of 81.0 years in 2019 to 80.5 years in 2020). The annual reduction was particularly large in the United States (-1.8 years), Spain (-1.6) and Poland (-1.5). While in 2021 life expectancy recovered to some extent in half of OECD countries with available data (14 of 28), it fell by 2.0 years or more in the Slovak Republic, Estonia and Latvia. As a result of these developments, pre-pandemic levels in life expectancy had not been reached in three-quarters of OECD countries by 2021.

Measures of mental well-being and the state of the economy shed further light on the impact of COVID-19 beyond the number of lives lost. Around one in five adults experienced sadness in 2020 and this proportion was typically higher in countries with worse COVID-19 mortality outcomes (Gallup, 2021[3]). Further, except for Ireland and Türkiye, all OECD countries experienced an economic downturn in 2020, mainly due to wide-ranging measures to contain the spread of the SARS-CoV-2 virus. Contractions in GDP were particularly pronounced in Spain (-10.8%), the United Kingdom (-9.3%) and Greece (-9.0%). In 2021, all OECD economies returned to positive GDP growth; consequently, the economic output in 2021 was above pre-pandemic levels (in 2019) in around two-thirds of OECD countries. However, the global economy has since slowed and the economic outlook has worsened (OECD, 2022[4]).

Taken together, these indicators provide a comprehensive overview of COVID-19 outcomes – reflecting not only direct mortality impacts but also indirect mortality impacts, as well as societal and economic effects of the pandemic. Table 3.1 compares OECD countries across selected indicators of mortality, well-being and economic development over 2020-21, using the country dashboard approach used in the OECD Health at a Glance series (OECD, 2021[5]).

Table 3.1. Country dashboard of COVID-19 outcomes, 2020 and 2021

Country	Mortality								Well-being		Economy	
	COVID-19 deaths 2020-21 (per million)		Excess deaths 2020-21 (% change)		Life expectancy (change in years)				Experiencing sadness, 2020 (%)		GDP in 2021 in constant prices (2019 = 100)	
					2020-19		2021-19					
OECD	**1 634**		**13.6%**		**-0.5**		**-0.8**		**22.2%**		**101.6**	
Australia	87	▲	3.7%	▲	0.3	▲			22.0%	—	102.5	—
Austria	1 885	—	10.3%	—	-0.7	—	-0.7	—	24.2%	—	97.5	▼
Belgium	2 440	—	8.9%	—	-1.3	▼	-0.2	—	N/A		100.2	—
Canada	795	—	11.4%	—	-0.6	—	N/A		26.2%	—	99.1	—
Chile	2 007	—	23.3%	▼	0.2	▲	0.4	▲	N/A		104.9	—
Colombia	2 522	—	47.6%	▼	0.1	▲	0.2	▲	34.8%	▼	102.9	—
Costa Rica	1 427	—	N/A		0.1	▲	0.3	▲	31.5%	▼	103.4	—
Czech Republic	3 437	▼	20.9%	▼	-1.0	—	-1.9	▼	21.7%	—	97.3	▼
Denmark	558	▲	4.3%	▲	0.1	▲	-0.1	—	17.4%	—	102.5	—
Estonia	1 454	—	11.7%	—	-0.1	—	-2.1	▼	16.2%	▲	105.4	▲
Finland	310	▲	5.3%	▲	-0.1	—	-0.1	—	13.4%	▲	101.1	—
France	1 836	—	10.0%	—	-0.7	—	-0.5	—	23.9%	—	98.3	—
Germany	1 342	—	7.6%	—	-0.2	—	-0.4	—	23.1%	—	97.8	▼
Greece	1 990	—	12.6%	—	-0.3	—	-1.4	—	27.1%	—	98.6	—
Hungary	4 036	▼	13.7%	—	-0.8	—	-2.0	▼	16.8%	—	102.1	—
Iceland	100	▲	3.3%	▲	-0.1	—	0.0	—	13.2%	▲	97.0	▼
Ireland	1 186	—	N/A		-0.2	—	N/A		22.6%	—	120.0	▲
Israel	887	—	11.4%	—	-0.2	—	-0.3	—	N/A		105.7	▲
Italy	2 319	—	12.4%	—	-1.3	▼	-0.7	—	29.4%	▼	96.9	▼
Japan	148	▲	6.1%	▲	0.3	▲	N/A		11.2%	▲	97.0	▼
Korea	109	▲	8.4%	—	0.2	▲	N/A		14.8%	▲	103.1	—
Latvia	2 439	—	11.3%	—	-0.2	—	-2.3	▼	15.9%	▲	100.7	—
Lithuania	2 654	▼	13.5%	—	-1.4	▼	-2.0	▼	19.2%	—	104.9	—
Luxembourg	1 431	—	8.9%	—	-0.5	—	0.1	—	N/A		105.0	—
Mexico	2 363	—	55.9%	▼	0.1	▲	N/A		30.5%	▼	96.2	▼
Netherlands	1 200	—	12.7%	—	-0.8	—	-0.7	—	17.0%	—	101.0	—
New Zealand	9	▲	3.1%	▲	0.2	▲	N/A		18.5%	—	104.1	—
Norway	242	▲	1.2%	▲	0.3	▲	0.2	▲	16.5%	—	103.1	—
Poland	2 534	—	24.1%	▼	-1.5	▼	-2.4	▼	22.8%	—	103.7	—
Portugal	1 842	—	11.7%		-0.8	—	-0.7	—	25.6%	—	96.0	▼
Slovak Republic	3 054	▼	23.2%	▼	-0.8	—	-3.0	▼	21.5%	—	98.5	—
Slovenia	2 637	—	16.6%	—	-1.0	—	-0.7	—	17.7%	—	103.5	—
Spain	1 883	—	12.2%	—	-1.6	▼	-0.7	—	27.1%	—	93.8	▼
Sweden	1 463	—	3.6%	▲	-0.8	—	0.0	—	18.3%	—	102.5	—
Switzerland	1 406	—	9.7%	—	-0.9	—	0.0	—	16.1%	▲	101.1	—
Türkiye	972	—	N/A		N/A		N/A		49.5%	▼	113.0	▲
United Kingdom	2 636	—	11.7%	—	-1.0	—	N/A		25.4%	—	97.5	▼
United States	2 450	—	22.7%	▼	-1.8	▼	N/A		24.8%	—	102.1	—

Note: ▲ Better than the OECD average; — Close to OECD average; ▼ Worse than the OECD average. The classification of countries being close to, better or worse than the OECD average is based on an indicator's standard deviation (a common statistical measure of dispersion). Countries are classified as close to the OECD average (blue) whenever the value for an indicator is within one standard deviation from the OECD average. Particularly large outliers (more than three standard deviations) are excluded from calculations of the standard deviation to avoid statistical distortions – notably Türkiye for experiencing sadness, Colombia and Mexico for excess mortality and Ireland for GDP growth.
Source: Authors' analysis of Our World in Data, OECD Health Statistics 2022, Gallup, OECD Economic Outlook June 2022.

Correlations across most of these COVID-19 outcome indicators are statistically significant and in the expected direction (*P*-value<0.05). While correlation is not causation, they suggest that COVID-19 outcomes may not be independent. For example, Korea, New Zealand and Norway had comparatively good outcomes across mortality, well-being and economic indicators. Conversely, countries with higher reported COVID-19 death rates also typically had larger increases in excess deaths, more pronounced reductions in life expectancy, a greater share of the population experiencing sadness and larger contractions in GDP. Nevertheless, correlations between these COVID-19 outcomes were not always strong. For example, Mexico had reported COVID-19 death rates only slightly above the OECD average but the highest increase in excess deaths. Moreover, while a statistically significant negative correlation between COVID-19 deaths or excess mortality and economic activity can be observed for 2020, this was not true for 2021. Such results reflect the many different factors that influence economic growth in a country, including the structure of the economy, its reliance on exports, exchange rates and the impact of supply chain problems.

3.2.2. Older people and socially disadvantaged groups were hit harder by the pandemic

Beyond these national-level comparisons, certain population groups within countries face a much higher risk of severe illness or death from COVID-19 (Dessie and Zewotir, 2021[6]). In particular, the vast majority of deaths from COVID-19 have occurred in older populations. Residents of long-term care facilities have been especially vulnerable to contracting and dying from COVID-19 – particularly during the early stages of the pandemic. The chapter on long-term care analyses some of these at-risk groups and shows that:

- More than 90% of reported deaths were among individuals aged 60 years and over, with around half of all deaths occurring among people aged 80 years and over, across 22 OECD countries with comparable data. These proportions have remained relatively stable over the course of the pandemic.
- COVID-19 mortality among older people was particularly high in Slovenia, the United Kingdom, the United States and Belgium, where more than 2.5% of those aged 80-85 years and over have died (data up to May 2021) (Rocard, Sillitti and Llena-Nozal, 2021[7]).
- Long-term care residents accounted for around one-third of total COVID-19 deaths on average in 25 OECD countries with available information (data up to April 2022). Compared to 2020 and 2021, this share decreased in nearly all OECD countries, reflecting strengthened efforts to contain the virus and to protect residents in long-term care facilities, and prioritisation of long-term care residents and staff in countries' COVID-19 vaccination schedules.

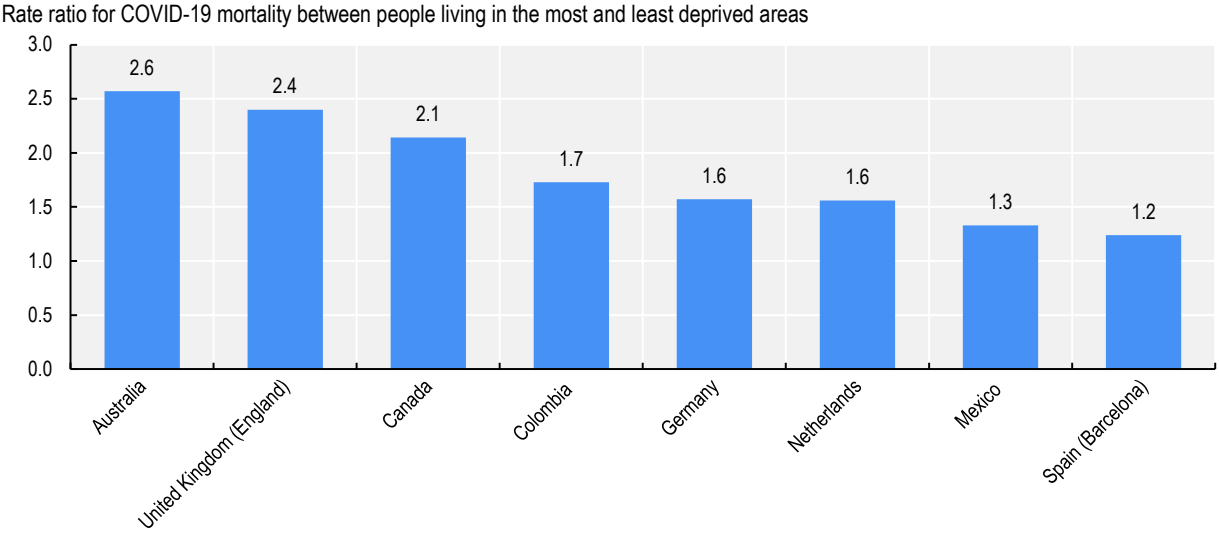
While age remains the largest risk factor, people of all ages with certain underlying health conditions face an elevated risk, including those with obesity, diabetes, hypertension, cancer and chronic obstructive pulmonary disorder. Smoking and harmful alcohol use also increase the likelihood of dying from COVID-19 (Dessie and Zewotir, 2021[6]; Katz, 2021[8]; Reddy et al., 2021[9]; Sanchez-Ramirez and Mackey, 2020[10]) (see the chapter on care continuity).

Both these risk factors and the risk of COVID-19 infection are not equally distributed: individuals that live in socially disadvantaged conditions have been at higher risk of infection, severe illness and death throughout much of the pandemic. For example, among OECD countries with available data, individuals living in socially deprived areas faced a 20% to 160% increased risk of dying from COVID-19 during the first year of the pandemic (Figure 3.3). A higher likelihood of infection and worse health outcomes were also found among people on lower incomes and with lower educational attainment. For example, in Canada, Sweden and the Netherlands, people in the lowest income group are between 1.4 times and 1.8 times more likely to die from COVID-19 (Berchet, forthcoming[11]). The pandemic also revealed demographic and ethnic inequalities: in six OECD countries with available data, foreign-born populations had a mortality risk that was 1.1-2.2 times higher than the risk of those born within the country. In eight

OECD countries, studies have shown substantial differences in mortality rates across ethnicity, with ethnic minority populations experiencing significantly worse outcomes.

Many interrelated causes may explain the unequal health toll of the pandemic. Populations living in disadvantaged social and economic contexts were at a higher risk of exposure to the virus through their working and living conditions. These individuals also accumulate risk factors that put them at higher risk of developing severe COVID-19 symptoms or dying from COVID-19, such as chronic health conditions, obesity and smoking. Crisis standards of care implemented during the pandemic (a move from delivering appropriate care to each individual to ensuring that the most lives are saved) risk embedding such health inequities (see the chapter on critical care surge for further discussion). Further, many of these individuals are already more likely to face barriers to accessing health care.

Figure 3.3. Relative mortality ratio for people living in deprived areas



Note: Data are not directly comparable across OECD countries and regions – while the rate ratio is age-adjusted or multivariate methodology used in all countries, the timeframe of observation differs. For example, in Australia the data cover the first year of the pandemic to May 2021, while in Canada data cover the period January-August 2020.
Source: OECD Health Secretariat based on data in Berchet (forthcoming[11]), "Socio-economic and ethnic health inequalities in COVID-19 outcomes across OECD countries".

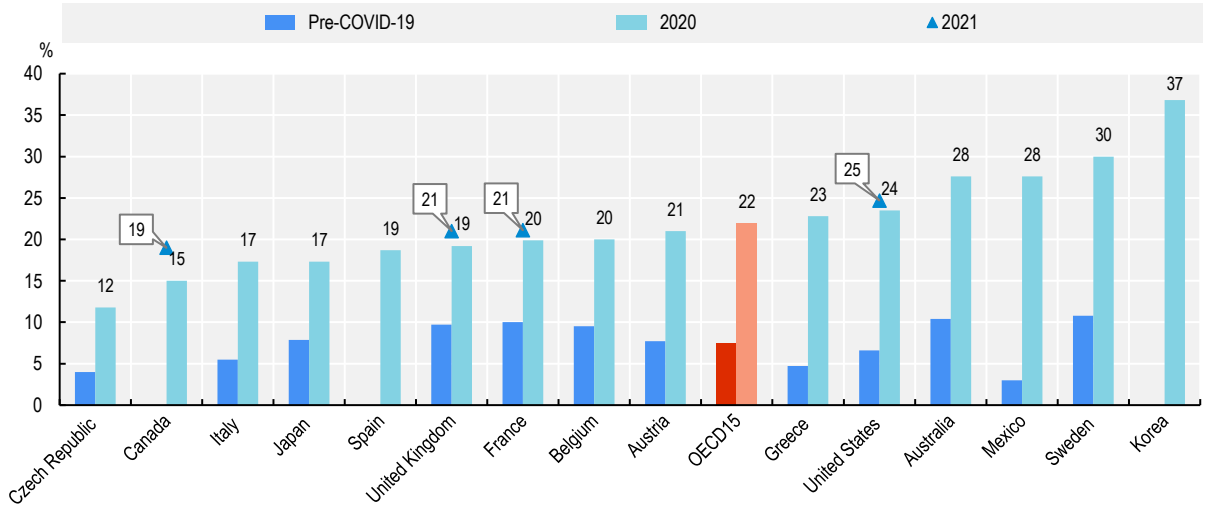
3.2.3. COVID-19 caused substantial disruption to health services, and long-term impacts are still emerging

The pandemic has led many people to experience prolonged ill health and caused massive disruptions to health systems. Levels of anxiety and depression, as well as other symptoms of poor mental health, have consistently been higher during the pandemic than before COVID-19. This reflects a range of factors, including a fear of infection, the rise in economic uncertainty during lockdowns and greater social isolation due to measures to contain the spread of the virus (Figure 3.4). The prevalence of mental health conditions has fluctuated during the pandemic, associated with the stringency of containment measures and the severity of the pandemic (OECD, 2021[12]). In response, most OECD countries reported permanent increases to mental health care support or capacity. However, these increases were not always commensurate with the rise in needs (see the chapter on mental health for analysis of the impact and associated policies).

The mental health of some population groups has been particularly affected by the pandemic. Young people, those living alone, people with lower socio-economic status and those who are unemployed have

all had higher rates of mental health issues. In Canada, for example, a survey in May 2020 found that 27% of those aged 15-24 years were experiencing moderate to severe symptoms of anxiety – significantly above the 19% share among those aged 25-64 years (Statistics Canada, 2020[13]). In Japan, 31% of those aged 20-29 years were experiencing symptoms of depression, compared to 18% of older adults, based on survey responses from July 2020 (Fukase et al., 2021[14]). The higher share of young people experiencing anxiety and depression contrasts with pre-pandemic data, indicating that the mental health of young people has been disproportionately affected during the pandemic.

Figure 3.4. Share of the population suffering from depression or showing symptoms of depression



Note: To the extent possible, 2020 prevalence estimates were taken from March-April 2020, and 2021 estimates were taken from March-April 2021. The survey instruments used to measure depression and population samples differ between countries and in some cases across years, which limits direct comparability. Most national surveys cover the adult population aged over 18 years.
Source: National data sources reported in OECD (2021[12]), "Tackling the mental health impact of the COVID-19 crisis: An integrated, whole-of-society response", https://doi.org/10.1787/0ccafa0b-en.

A substantial share of people who survive a COVID-19 infection experience various health symptoms for an extended time. Post-COVID-19 syndrome or "long COVID" has led to many people experiencing fatigue, breathlessness and other symptoms that impede a return to normal life, with potentially long-lasting social and economic repercussions. The causes of "long COVID" are still not fully understood and there are differences in the notion of how it should be defined. In this context, the World Health Organization (WHO) now refers to "post-COVID conditions" to describe symptoms that exist three months after the onset of COVID-19, that last for at least two months, and that cannot be explained by any other diagnosis (WHO, 2021[15]). While evidence of the prevalence of these conditions varies widely (depending on the study design, study group, timing of the study, length of symptoms and other factors), results from some larger-scale research gives a sense of the magnitude of "long COVID":

- Large-scale population surveys regularly carried out in the United Kingdom and the United States found that 2% and 7.5% of the population were suffering from "long COVID" symptoms that lasted for at least 12 weeks in mid-2022 after a confirmed or suspected COVID-19 infection (Office of National Statistics, 2022[16]; Centers for Disease Control and Prevention, 2022[17]). For the United States, this equates with 19% of those who have had COVID-19 in the past.
- Electronic health records from over 270 000 COVID-19 survivors, mainly from the United States, found that 37% of patients suffer from at least one "long COVID" symptom 4-6 months after diagnosis (Taquet et al., 2021[18]). Summarising study results across Europe, the United States and

the People's Republic of China, Rajan et al. (2021[19]) suggest a lower prevalence of about one in ten experiencing symptoms after 12 weeks.

- Certain population groups appear to be at higher risk of "long COVID": symptoms are associated with age, being female, obesity, prior hospitalisation for COVID-19 and the number of symptoms in the acute phase (Rajan et al., 2021[19]).

The pandemic has also had major knock-on effects on people with other health care needs. The pressure on health systems to cope with COVID-19 has led to disrupted access to care at all levels of the health system – particularly early in the pandemic. Some of these disruptions are highlighted below and analysed further in other chapters in the report.

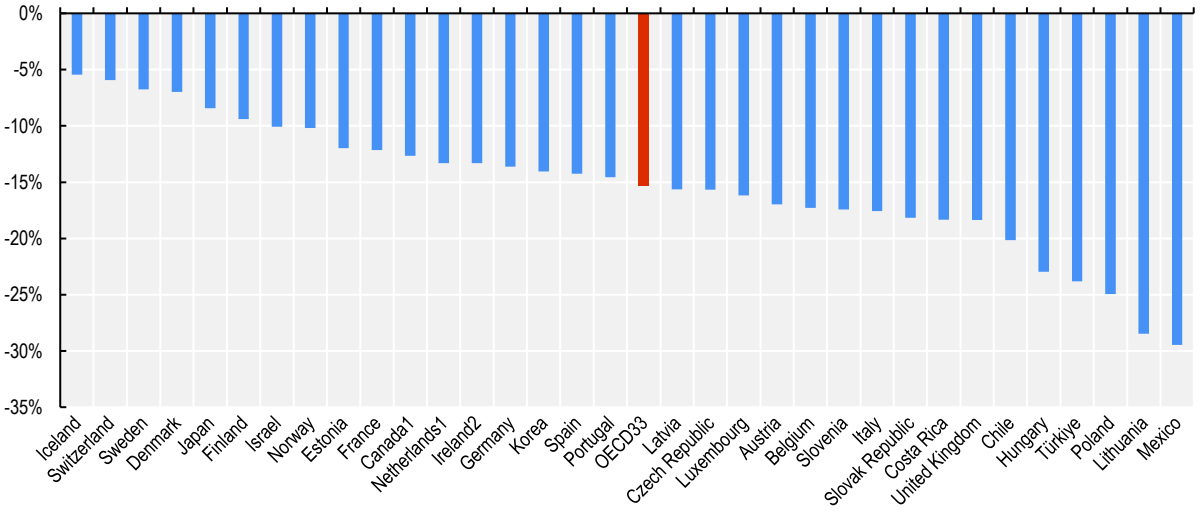
Reduced outpatient consultations, although this was offset to some extent by increased teleconsultations

The number of in-person consultations with doctors (in all settings) fell in 27 of 28 OECD countries in 2020, with an average reduction of 17%. In all five countries with available data for 2021, the number of face-to-face consultations remained below pre-pandemic levels. The drop in visits is also true for primary care, where monthly activity data for a smaller set of countries – including Australia, Belgium and Portugal – suggest a substantial fall in consultations, in particular between March and May 2020. However, reductions in in-person consultations were offset in part by a rise in use of teleconsultations. Data from a Eurofound Survey suggest that, since the start of the pandemic, across the European Union nearly 30% of people had a medical consultation online or via telephone by mid-2020, with this share reaching nearly 40% by early 2021 (see the chapter on care continuity).

An unprecedented fall in hospital inpatient activity due to policies to reserve hospital and intensive care capacity for COVID-19 patients

In all 33 OECD countries for which data are available, the total number of discharged patients per capita in 2020 was below the level of 2019 (Figure 3.5). On average, inpatient activity dropped by 15%. The reduction in activity was particularly marked for elective interventions. Across 30 OECD countries, nearly 4 million fewer elective surgical procedures (e.g. cataract surgery, hip and knee replacements and other non-urgent surgery) were performed in 2020 compared with 2019. This equates to average reductions of 16% in hip replacements and 27% in knee replacements across countries, although with wide cross-country variations (see the chapter on waiting times).

Figure 3.5. Total number of hospital discharges per capita in OECD countries, 2020 compared to 2019



1. Includes discharges for curative (acute) care only.2. Excludes activity in private hospitals.
Source: OECD (2022[2]), *OECD Health Statistics*, https://doi.org/10.1787/health-data-en.

Suspended elective care and diagnostics generated backlogs, leading to longer waiting times and waiting lists

Even before the pandemic, waiting times for elective surgery had started to rise in several countries (including Canada, Ireland, the Netherlands, New Zealand, Portugal and the United Kingdom), indicating that supply was not keeping up with demand. The disruption of services during the pandemic further increased this imbalance between supply and demand for elective surgery. Among the 17 OECD countries that record the data, the waiting time for surgery increased on average by 56 days for hip replacements and 69 days for knee replacements between 2020 and 2019. This rise was particularly pronounced in Poland, Portugal and Lithuania. Given existing capacity constraints, clearing the backlogs in a timely manner will be challenging in many countries. For example, in England (United Kingdom), research has projected that it will take until March 2025 to return to pre-pandemic waiting times (see the chapter on waiting times).

Disruptions occurred to cancer screening, diagnosis and treatment

For breast cancer, screening rates fell in 22 of 24 countries in 2020, and the average screening rate among women aged 50-69 years dropped from 60% to 55%. In five out of six countries with preliminary data for 2021, pre-pandemic levels had not been reached. Fewer screenings led to reduced levels of diagnostic activity, and a consequent decline in new cancer diagnoses in all 12 OECD countries with available data (Fujisawa, 2022[20]). Moreover, the number of cancer-related procedures also fell in 2020 for all six OECD countries with available data (see the chapter on care continuity).

As a result of service disruptions across health systems, levels of unmet need were high

On average across 22 OECD countries with comparable data, more than one in five people reported having forgone a needed medical examination or treatment during the first 12 months of the pandemic. This may be explained in part by patients postponing treatment voluntarily out of fear of exposure to the virus in health facilities, or in order not to overload the health system (see the chapter on care continuity).

People living with chronic health conditions were particularly affected

For example, among people aged 50 years and over in Europe, those with chronic conditions were on average over 40% more likely to report forgoing or postponing medical care due to COVID-19. Across 11 OECD countries, a study by the Commonwealth Fund found that around one-fifth of multi-morbid patients over the age of 65 years had an appointment with a health care professional cancelled or postponed because of the SARS-CoV-2 virus (see the chapter on care continuity).

Provision of mental health care was also disrupted

A WHO survey in the second quarter of 2020 found that up to 70% of countries worldwide reported disruptions in different types of mental health services, with community-based day care services most affected (WHO, 2020[21]). In OECD countries, this is likely to reflect both increased demand for mental health support and an increase in unmet need for mental health care. In a Commonwealth Fund survey conducted between March and May 2020, among those reporting a need for mental health care, 68% of adults in the United Kingdom and 69% in the United States reported not being able to obtain such care (Commonwealth Fund, 2020[22]) (see the chapter on mental health).

Service provision for long-term care recipients was also adversely affected

About 20% of older people who regularly received personal care from professionals or relatives (living outside their household) reported forgone or postponed care in 2021 in 23 OECD countries with available data (see the chapter on long-term care).

While some of these disruptions may have been short-lived, in many cases they extended the suffering of patients and may have contributed, or continue to contribute, to worse health outcomes. Hence, it will take years to assess the full impact of service disruptions due to COVID-19.

3.3. Why did some countries have better COVID-19 outcomes?

3.3.1. Differences in COVID-19 outcomes depend on factors within and beyond the control of policy makers

In assessing cross-country differences in COVID-19 outcomes,[1] it is important to emphasise that countries had different starting points and baselines – notably in terms of overall population health, health system capacity and pandemic preparedness, as well as relevant demographic, economic, institutional and geographical factors. These baseline characteristics determine how vulnerable a specific country is to a health emergency and they can affect how countries absorb and recover from challenges. Ultimately, they also impact the resilience of a country and how well it can endure a major health shock like COVID-19.

Table 3.2 illustrates some of the main factors that can explain why some countries had better COVID-19 outcomes, drawing from the emerging literature. For example, Bollyky et al. (2022[23]), Hradsky and Komarek (2021[24]) and Kapitsinis (2021[25]) all use multivariate analysis to explore potential explanatory factors. A distinction is made between COVID-19-specific responses, wider health system policies and other public policies. Explanatory factors are also categorised by the degree to which they are or are not amenable to policy interventions, including the likely timeframe in which policies can have an effect. For example, a country cannot become an island, and while it can reduce income inequalities, this cannot be achieved in the short term. In contrast, expanding health system capacity can, with the right measures in place, potentially be achieved in the short to medium term.

Table 3.2. Baseline country characteristics and factors more amenable to public policy

Factors influenced by COVID-19-specific policies (health and broader public policies)	
Short-term	**Government COVID-19 responses/strategies** Vaccination, non-pharmaceutical containment and mitigation measures, surge capacity
Factors influenced by health system policies	
Short to medium-term	**Health system characteristics** Workforce, hospital, laboratory and surveillance capacities, access and quality of care
Medium-term	**Population health status** Disease prevalence and risk factors (e.g. prevalence of chronic health conditions)
Factors influenced by broader public policies	
Long-term	**Socio-economic characteristics** Social risk factors (e.g. social deprivation, poverty rates, income inequality)
Long-term	**Economy** Level of economic development, structure of economy (e.g. importance of tourism industry)
Long-term	**Trust in institutions and interpersonal trust** Trust in government, science and the rule of law; interpersonal trust (social cohesion, nature of social interactions)
Factors largely beyond the control of policy makers	
	Population Demography, population density, population size
	Geography Island state/connectedness, climate, altitude, latitude

Note: Based on authors' analysis of the literature.

The quantitative analysis in this section focuses on the extent to which certain health and health system characteristics and government responses to the pandemic – that is, the first three rows in Table 3.2— are associated with COVID-19 outcomes. Such analysis compares countries in relative terms, examining how countries perform relative to baseline characteristics, and is therefore crucial for shaping policy recommendations. It provides additional insights to the more absolute cross-country comparisons in the previous section, where comparisons of COVID-19 outcomes were made without such adjustments. This chapter does not define "good performance" in the sense of a level above or below which a country is found to be performing well or not. Rather, the focus is on relative performance. Further details on the methods and data used are provided in Box 3.1 and in Annex 3.A.

Box 3.1. Overview of methods used to measure and explain differences in outcomes across OECD countries

The quantitative analysis compares national level COVID-19 outcomes across OECD countries, and the extent to which health system capacity and policies affect these outcomes. Data predominantly come from OECD databases. Indicators relate to health and health systems, and to governments, societies and economies. These have the benefit of harmonised collection and reporting processes.

However, there are only 38 OECD member countries, and so only a maximum of 38 observations at any given point in time – not enough to allow the testing of all potentially relevant variables. Therefore, variable selection focuses on those with data available for all or most OECD countries.

- COVID-19 **outcome** variables are mortality (cumulative COVID-19 and excess death rates, change in life expectancy), well-being (population experiencing sadness) and economy (GDP growth). Regression analyses focus on cumulative COVID-19 and excess death rates.

Possible explanatory variables for these COVID-19 outcomes are categorised into seven main groups. These reflect the main causal factors hypothesised in the literature, as in Table 3.2, while also considering sufficient data availability. The groups are:

- **government responses and strategies to COVID-19**: vaccination rates
- **health system characteristics**: workforce, hospital, laboratory/surveillance capacities, access and quality of care
- **population health status**: disease prevalence, health risk factors
- **socio-economic characteristics**: social risk factors
- **economy**: level of economic development
- **trust**: degree of trust in institutions and interpersonal trust
- **population**: demography.

Other than for specific government responses and strategies to COVID-19, data reflect a pre-pandemic baseline (2018 or 2019) to enable analysis of the underlying capacities and characteristics of countries. See Annex 3.A for further details on variables used.

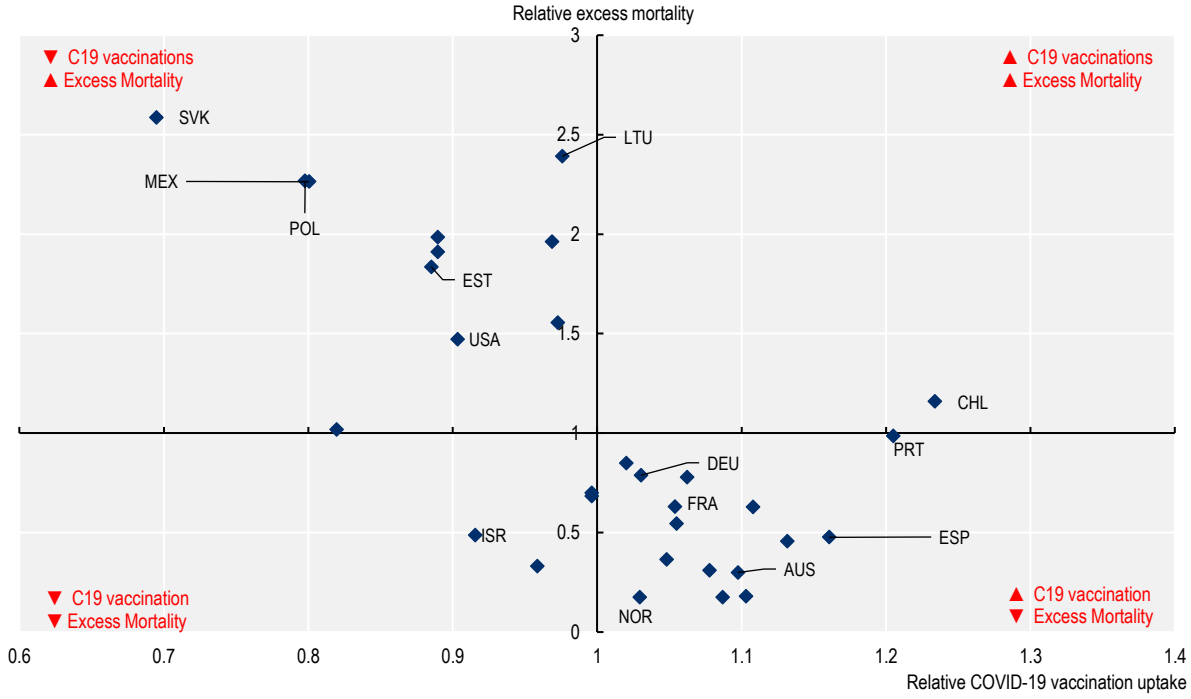
Associations between COVID-19 outcome variables and explanatory variables are first explored through simple pairwise correlations. Further controls are then made for GDP per capita and the share of the population aged 65 years and over. The approach is to run a battery of "partial" multivariate regressions, each analysing one variable of interest and including these two controls. This approach, adopted due to the small sample size, is methodologically more limited than a "full" multivariate regression model, where all relevant variables are included in a single multivariate regression. Such regressions are run for COVID-19 outcomes at the end of both 2020 (which can be considered a pre-vaccine period) and 2021. Note that explanatory variables are log-transformed (zero values are adjusted by adding 5% of the median value across countries for that variable). COVID-19 death rates are also log-transformed in the same way, but excess mortality is left unadjusted, since values can be negative. It is important to reiterate that associations do not imply causality.

Correlations and this partial multivariate regression analysis are supplemented by statistical clustering approaches, to help shed light on what countries that had better (or worse) COVID-19 outcomes have in common. K-means clustering is used to group countries, with countries clustered on cumulative COVID-19 death rates (at the end of 2021), cumulative excess mortality rates (at the end of 2021), the combination of COVID-19 death rates and excess mortality, and on indicators of baseline health system capacity identified in multivariate regressions as statistically significant (P-value<0.05). Selection of the number of clusters was based on the kink in the curve generated from the within-sum of squares of the clusters (Makles, 2012[26]). For the unidimensional clusters the chosen allocation was based on minimising the sum of the within-cluster sums of squared deviations. The results of the K-mean clustering on cumulative COVID-19 mortality between January 2020 and December 2021 are presented.

3.3.2. How have vaccines and other government strategies translated into better COVID-19 outcomes?

Vaccinations have been central to government efforts to combat the pandemic, reducing the risk of severe illness and death from COVID-19. Yet progress in vaccination coverage has varied markedly across OECD countries. Simple correlation analysis shows that countries with higher vaccination rates had, on average, lower excess mortality. Figure 3.6 plots completed initial vaccination schedules at the end of 2021 against excess mortality in 2021.

Figure 3.6. Higher vaccination rates are associated with lower excess mortality



Note: The quadrant chart shows the association between COVID-19 vaccination rates and excess mortality. The x-axis shows how much a country is above or below the OECD average for completed initial vaccination schedules per 100 at the end of 2021; the y-axis shows a country's distance from the OECD average excess mortality rate in 2021 (OECD average normalised to 1). Note that this analysis does not adjust for other factors; nor does it necessarily infer causality. Vaccination reported as of 31 December 2021 or nearest preceding date.
Source: OECD Statistics 2022 and OECD analysis of Our World in Data.

Among the 32 OECD countries with available data, 16 had higher vaccination rates and lower excess mortality than the OECD average (bottom right quadrant). A further 11 countries had lower vaccination rates and higher excess mortality (top left quadrant). A few countries deviate from this association, reflecting the complex determinants of excess mortality and differences in the speed and nature of vaccination coverage. For example, Chile had vaccination rates above the OECD average but higher excess mortality; Israel had slightly lower vaccination rates but lower excess mortality.

It is important, therefore, to go beyond simple pairwise correlations. After controlling for core demographic and economic factors, the positive association between vaccination and excess deaths is confirmed – countries with higher shares of their populations fully vaccinated and with more total vaccinations per capita had lower cumulative excess death rates at the end of 2021. For cumulative COVID-19 death rates, however, the association with vaccination variables was in the same direction, but the associations were not statistically significant at the 95% level. Supplementary regressions analyse the extent to which vaccination coverage is associated with health system characteristics and trust variables (Box 3.2).

Box 3.2. Exploring differences in COVID-19 vaccination rates across OECD countries

While the focus of this chapter is on analysing the impact of health and other public policies on COVID-19 outcomes, auxiliary regressions were run to explore what factors are associated with COVID-19 vaccination rates. Bivariate analysis found that greater health workforce capacity, higher influenza vaccination rates for older populations, trust in science, and better access to and quality of care, were all significantly associated (*P*-value<0.05) with higher vaccination rates across OECD countries. Only the influenza vaccination rate was significantly associated with higher COVID-19 vaccination rates when the control variables of GDP and age were added.

Alongside COVID-19 vaccination coverage, multiple studies have explored whether other government responses and strategies were associated with COVID-19 outcomes (Chiesa et al., 2021[27]; Yuan and Blakemore, 2022[28]; Dergiades et al., 2022[29]; Haug et al., 2020[30]; Oliu-Barton et al., 2021[31]). These studies focus mainly on the first wave of COVID-19 cases. A recent effort by Dergiades et al. (2022[29]), using daily data on the stringency of policies in 32 countries (including 22 OECD countries), found that the more stringent government interventions were – at an early stage in the pandemic – the more effective they were in slowing down or reversing the growth rate of COVID-19 deaths. In a descriptive analysis with similar findings, Oliu-Barton et al. (2021[31]) suggest that countries that aimed for elimination (or suppression, or zero COVID-19) early on fared better than countries that opted for mitigation, in terms of health outcomes and the economy. Both these studies analysed the early waves of the pandemic. The situation was different by the second half of 2022, as most OECD countries had moved away from more stringent elimination or containment strategies.

3.3.3. Do health system characteristics have an impact on COVID-19 outcomes?

Health systems with greater capacity should be better placed to monitor the virus and treat people who are severely ill from COVID-19, and consequently to have better COVID-19 outcomes, all else being equal. In particular, the pandemic caused many people to be hospitalised. Many of those requiring inpatient care needed treatment in intensive care units, which have high staffing and equipment requirements. Primary health care also played a crucial role in keeping patients with milder symptoms out of hospitals. Therefore, countries with more health workers and more hospitals/hospital beds should be better able to cope with sudden surges in COVID-19 patients, while also being better able to maintain health care services for non-COVID-19 patients. As well as workforce and hospital capacity, advanced laboratory infrastructure and surveillance capacity improves monitoring of the virus. At the same time, ease of access to these services, and the quality of care received, can also be expected to affect COVID-19 outcomes.

Several recent studies have found that countries with more medical professionals, more hospital beds, and better access to care, are associated with better COVID-19 outcomes – see, for example, Bayraktar et al. (2021[32]), Giancotti et al. (2021[33]), Liu and Eggleston (2022[34]), Kapitsinis (2021[25]) and Diaz Remirez et al. (2021[35]). Quantitative analysis of data for OECD countries are largely consistent with these findings from the literature, although with important nuances on which specific aspects of health system capacity appear most strongly associated with COVID-19 outcomes.

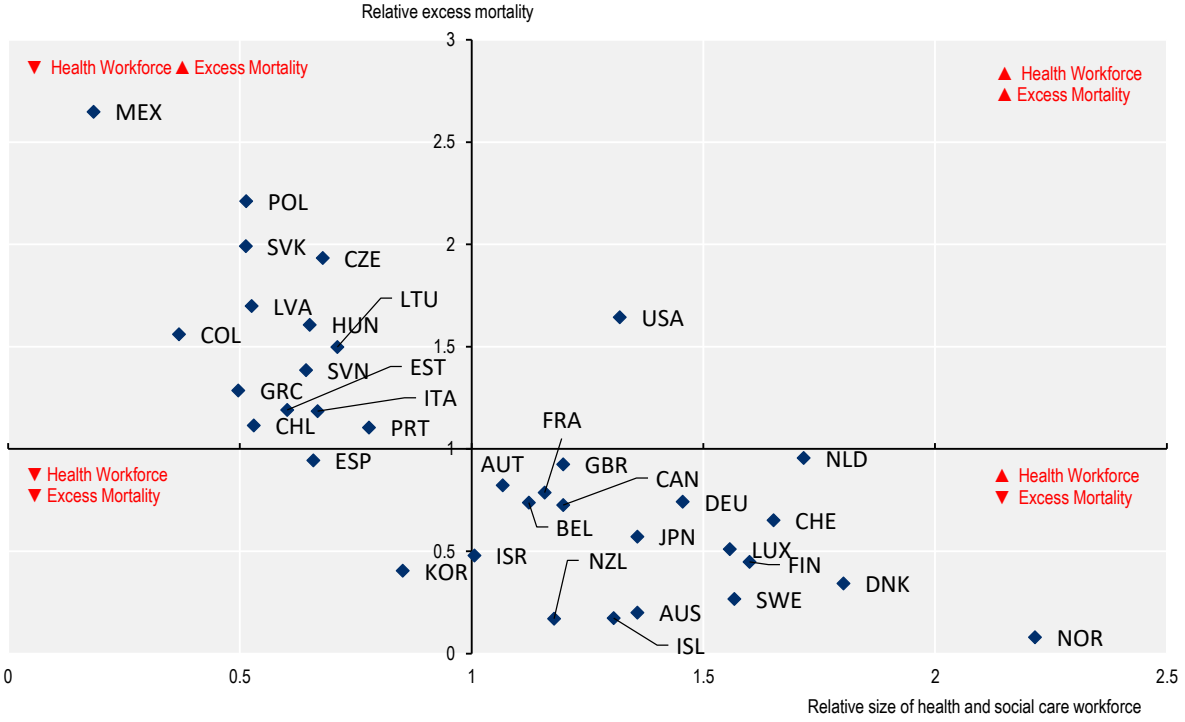
Indicators of health workforce capacity are associated with COVID-19 outcomes

Across OECD countries, higher numbers of health and social care workers serving the population were significantly associated with better outcomes (lower mortality) during 2020-21 (Figure 3.7). Among 35 OECD countries with available data, 18 countries had more health and social care workers and lower

excess mortality than the OECD average (bottom right quadrant). A further 14 countries had fewer staff and higher excess mortality (top left quadrant).

Other simple correlations are also indicative of the importance of health workforce capacity. For instance, countries with higher remuneration of hospital nurses and specialists, more practising physicians and more nursing graduates also typically had better COVID-19 outcomes, all else being equal.

Figure 3.7. Increased numbers of health and social care employment associated with lower excess mortality



Note: The quadrant chart shows the association between the health workforce and excess mortality. The x-axis shows how much a country is above or below the OECD average for total health and social employment in 2019 (per 1 000 population); the y-axis shows a country's distance from the OECD average excess mortality rate for 2020-21 (OECD average normalised to 1). Note that this analysis does not adjust for other factors; nor does it necessarily infer causality. Health workforce figures for 2018 were used in the analyses.
Source: OECD Health Statistics 2022.

Analysis that controls for core demographic and economic factors confirms the relevance of health workforce capacity and other health system characteristics

Controlling for GDP per capita and the population share aged 65 years and above, analysis largely confirms the association of several health workforce indicators with COVID-19 outcomes, although it is important to reiterate that associations do not automatically imply causality (Table 3.3). Analyses also point to the importance of hospital capacity, laboratory and surveillance capacity, and certain indicators of access and quality of care. The results are, however, nuanced. While countries with more hospitals per capita typically had better COVID-19 outcomes, the number of hospital beds did not have a statistically significant association with COVID-19 or excess deaths for 2020 or 2021. Such results could imply that countries with fewer hospital beds were able to increase surge capacity or find alternative ways to cope with surges in demand for health care, or that they had strong primary health care systems.

Other indicators of health system capacity and health policy levers were not statistically significant. This was the case, for example, with total health expenditure – indicating, perhaps, that while health workforce and hospital, laboratory and surveillance capacity are important, other health spending components are less relevant for COVID-19 outcomes once GDP was controlled for, or that substantial inefficiencies exist. The empirical literature produces ambiguous results on the impact of health expenditure on COVID-19 outcomes – see, for example, Kapitsinis (2021[25]) and Canatay, Emegwa and Talukder (2021[36]).

Table 3.3. Impact of health system characteristics on COVID-19 outcomes after controlling for core economic and demographic factors

Share of the population aged 65 years and over and GDP per capita in 2018 included as control variables. Only variables with statistically significant (*P*-value<0.05) associations in at least one regression are shown.

Health system characteristics (capacity and access/quality indicators)		COVID-19 deaths	Excess deaths
Health system capacity			
Health workforce capacity	Total health and social employment (over 1 000 population)	↓↓ (both years)	↓↓ (both years)
	Total health and social employment (% of total employment)	↓ (2021)	↓↓ (both years)
Hospital capacity	Hospitals (per million population)	↓↓ (both years)	(not significant)
Health system access and quality indicators			
Access to care	Population coverage for a core set of services (%)	↓ (2021)	↓ (2021)
Access and quality of care	Treatable causes of mortality (per 100 000 population)	↑↑ (both years)	↑ (2021)

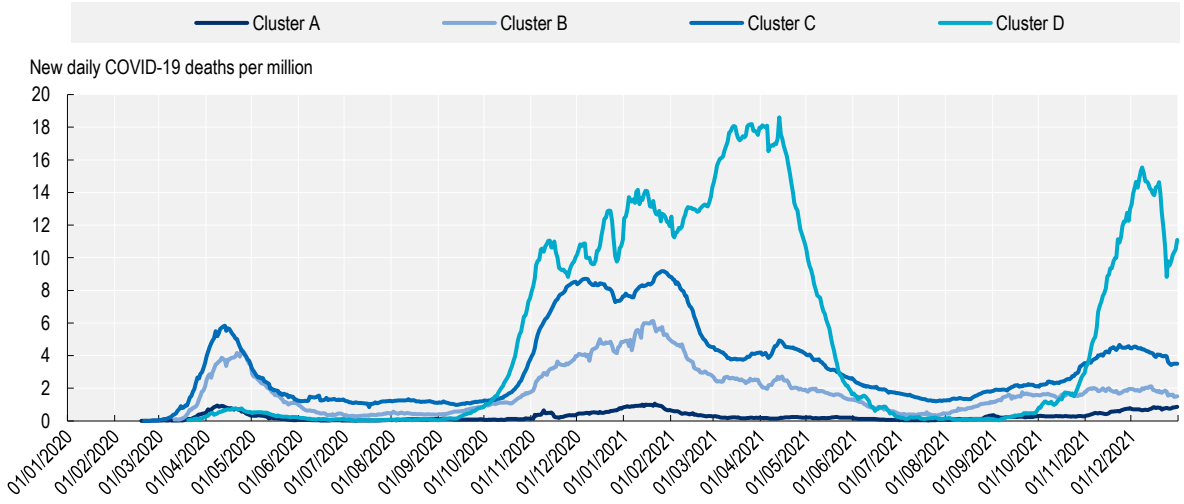
Note: Rates are cumulative to the end of 2021. An up arrow indicates positive coefficient, with ↑↑ for both 2021 and 2020, and ↑ only for the year indicated; a down arrow indicates negative coefficient, with ↓↓ for both 2021 and 2020, and ↓ only for the year indicated: statistically significant with *P*-value<0.05. See Annex 3.A for more detailed information on these and other variables included in multivariate regression analyses.
Source: OECD analysis of OECD Health Statistics, Our World in Data and OECD Short-Term Economic Indicators.

Countries with better COVID-19 outcomes tend to have greater health system capacity

To help understand what countries that performed better (or worse) during COVID-19 have in common, it is informative to group countries based on both COVID-19 outcomes and health system characteristics. To do so, this chapter employs statistical clustering techniques (as described in Box 3.1) and four clusters were identified. Countries in group A performed best, with the lowest mortality from COVID-19, while countries in group D had the highest COVID-19 mortality rates.

Australia, Denmark, Finland, Iceland, Japan, Korea, New Zealand and Norway are included in Cluster A. Canada, Costa Rica, Estonia, Germany, Ireland, Israel, Luxembourg, the Netherlands, Sweden, Switzerland and Türkiye are included in Cluster B. Austria, Belgium, Chile, Colombia, France, Greece, Italy, Latvia, Lithuania, Mexico, Poland, Portugal, Slovenia, Spain, the United Kingdom and the United States are in Cluster C. The Czech Republic, Hungary and the Slovak Republic are in Cluster D. Figure 3.8 shows the evolution of new deaths per million from COVID-19 over time, for the four country clusters.

Figure 3.8. Evolution of new COVID-19 death rates over time, averaged across different OECD country clusters



Note: Clusters of countries defined using clustering based on cumulative COVID-19 mortality rates. Results are the unweighted averages of the countries in each cluster.
Source: OECD analysis of Our World in Data.

Comparisons of the indicators of health system capacity and policy were significantly associated with COVID-19 outcomes in correlations and other analyses. They show that countries in Cluster A have greater health system capacity compared to countries in the three other groups. For example, countries in Cluster A have higher average numbers of hospitals, and higher shares of employment in health and social sectors, compared to countries in the three other groups, with the differences between the best and worst performing groups especially pronounced (Table 3.4). However, both the best and the worst performing groups had high numbers of hospital beds.

Although four clusters were identified using COVID-19 mortality, three clusters were identified using excess mortality. When clustering on excess mortality, Cluster C was removed, with Austria, Chile, France, Greece, Italy, Portugal, and Spain joining Cluster B. Belgium, Colombia, Latvia, Lithuania, Mexico, Poland, Slovenia, the United Kingdom and the United States joined Cluster D.

If there were a perfect correlation between cumulative COVID-19 mortality rates and health system capacity and policy levers, then clustering OECD countries on health system characteristics and health policy levers should lead to the same country groupings as clusters based on cumulative mortality from COVID-19. This is not the case. However, there is a relationship between these variables – countries that had better COVID-19 outcomes (such as Australia, Japan, Korea, New Zealand and Norway) tend to have one or more indicator of health system capacity and health policy levers higher than the OECD average. The opposite is true for some countries with worse COVID-19 outcomes, such as Hungary, Mexico and the Slovak Republic. The opposite was not true, however, for all countries, for example, the United States has a relatively high health workforce capacity.

Taken together, results from cluster analyses are consistent with correlations and analysis reported in this chapter. These results show the positive impact that health systems capacity and policy levers have had improving COVID-19 outcomes, albeit that other factors are involved. This is revealing for improving the readiness and resilience of health systems to withstand future shocks.

Table 3.4. Differences in population health and health system capacity in 2018 across OECD countries was associated with differences in COVID-19 outcomes

	Cluster A	Cluster B	Cluster C	Cluster D
Cumulative COVID-19 mortality until 31 Dec 2021 per million	195	1233	2277	3508
Total number of hospitals per million (2018)	49	21	38	21
Total hospital beds per 1 000 population (2018)	5.8	3.6	4.1	6.4
Total health and social employment (over 1 000 population) (2018)	72	57	37	30
Total health and social employment (% of total employment)	14%	11%	8%	6%
Diseases of circulatory system (deaths per 100 000 population)	175	241	350	483
Population coverage for a core set of services (%)	73%	69%	66%	60%
Treatable causes of mortality (per 100 000 population)	49	63	89	113

Note: Clusters of countries defined using clustering based on cumulative COVID-19 mortality rates. Only countries with reported figures in 2018 are included in the average, which is unweighted.
Source: OECD analysis of OECD Health Statistics and Our World in Data.

Did pandemic preparedness matter for COVID-19 mortality and case outcomes?

As well as health system capacity, pandemic preparedness – both within and beyond the health system – should, in principle, have had a beneficial effect on COVID-19 outcomes. Studies have found, however, that measures of pandemic preparedness are inconsistently associated with the number of cases of COVID-19 and mortality rates from COVID-19 (Bollyky et al., 2022[23]; Lee et al., 2021[37]; Abbey et al., 2020[38]).

The overall score of countries on the Global Health Security (GHS) Index has received much attention. The GHS Index includes six categories: prevention, detection and reporting; rapid response; health systems; commitments to improving national capacity financing and global norms, and risk environment. Studies have found that the overall GHS score was not associated with COVID-19 cases, deaths or case-fatality ratios, either globally or within OECD countries. Similar results are found when running regressions of the cumulative number of COVID-19 deaths per million in OECD countries: no statistically significant associations were found between deaths and how countries scored for pandemic preparedness, overall or by category. The GHS Project Team posits that preparedness capacity is important, but alone it is insufficient without strong health systems in place to serve all populations (GHS Index Project Team, n.d.[39]).

3.3.4. Are health and social risk factors associated with COVID-19 outcomes?

A wide body of research has identified several individual-level mortality-related risk factors for COVID-19, including age, certain underlying health conditions and health risk factors (Dessie and Zewotir, 2021[6]; Sorci, Faivre and Morand, 2020[40]; Oshakbayev et al., 2022[41]). These studies provide insights into what population level factors could be associated with worse outcomes. For example, given that age, chronic obstructive pulmonary disease, cardiovascular disease, cancer, diabetes and obesity are all predictors of COVID-19 mortality at the individual level, it makes sense that countries with older populations and higher

prevalence of these health conditions and risk factors should have higher mortality from COVID-19, all else being equal.

After controlling for core economic and demographic factors, some of these factors are associated with COVID-19 outcomes (Table 3.5). For example, countries with higher pre-pandemic (2018-19) mortality rates from circulatory disease, diabetes and cancer, higher alcohol consumption, and higher obesity rates had higher cumulative COVID-19 and/or excess death rates at the end of 2021.

The literature has also highlighted the relevance of socio-economic characteristics for COVID-19 outcomes. As described in section 3.2.2, individuals living in socially disadvantaged situations are more likely to have living and working conditions that put them at higher risk of exposure to the virus, as well as higher prevalence of key health risk factors. Analysis here shows, for example, that countries where a higher proportion of people have difficulty making ends meet, and with higher long-term unemployment rates pre-pandemic, had higher cumulative mortality rates from COVID-19 at the end of 2021. Such results are consistent with other research (Banik et al., 2020[42]; Bosancianu et al., 2020[43]; Kapitsinis, 2021[25]). It is important to note again, though, that association does not imply causality.

Table 3.5. Impact of health and socio-economic characteristics on COVID-19 outcomes after controlling for core economic and demographic factors

Share of the population aged 65 years and over and GDP per capita in 2018 included as control variables. Only variables with statistically significant (*P*-value<0.05) associations in at least one regression are shown.

Population health and socio-economic characteristics		COVID-19 deaths	Excess deaths
Population health characteristics			
Risk factors for health	Population obese (% population aged 15+)	↑↑ (both years)	↑ (2021)
	Alcohol consumption (litres per capita among population aged 15+)		↑ (2021)
Disease prevalence	Diseases of circulatory system (deaths per 100 000 population)	↑↑ (both years)	↑ (2021)
	Diabetes (deaths per 100 000 population)	↑ (2021)	(not significant)
	Malignant neoplasms (deaths per 100 000 population)	↑↑ (both years)	↑ (2021)
	Consumption of antihypertensive drugs (defined daily doses)	↑ (2021)	(not significant)
Socio-economic characteristics			
Social risk factors	Population facing difficulty in making ends meet (% population aged 15+)	↑↑ (both years)	(not significant)
	Long-term unemployment rate (% population aged 18+)	↑↑ (both years)	(not significant)
	Poorer households without access to basic sanitary facilities (%)		↑ (2020)

Note: Rates are cumulative to the end of 2021 and end of 2022. An up arrow indicates positive coefficient, with ↑↑ for both 2021 and 2020, and ↑ only for the year indicated; a down arrow indicates negative coefficient, with ↓↓ for both 2021 and 2020, and ↓ only for the year indicated: statistically significant with *P*-value<0.05. See Annex 3.A for more detailed information on these and other variables included in multivariate regression analyses.
Source: OECD analysis of OECD Health Statistics, Our World in Data and OECD Short-Term Economic Indicators.

3.3.5. Does trust in institutions and people affect COVID-19 outcomes?

Recent empirical work has demonstrated the importance of trust, hypothesising that populations more trusting of government, science, the rule of law and each other are more likely to comply with major disruptive policies implemented by governments, such as mobility restrictions and vaccination programmes. For example, three recent studies found that higher levels of trust or confidence in government are associated with lower standardised infection rates, lower numbers of deaths and lower excess mortality (Bosancianu et al., 2020[43]; Zaki et al., 2022[44]; Bollyky et al., 2022[23]).In these analyses, multivariate regressions using measures of institutional and interpersonal trust point to trust being a relevant factor. Based on the Legutum Prosperity Index (2021[45]), countries where more people had trust in institutions and interpersonal trust had on average lower reported COVID-19 and excess death rates at the end of 2020 and/or 2021 (Table 3.6).

Table 3.6. The impact of trust on COVID-19 outcomes after controlling for core economic and demographic factors

Share of the population aged 65 years and over and GDP per capita in 2018 included as control variables. Only variables with statistically significant (*P*-value<0.05) associations in at least one regression are shown.

Institutions and culture		COVID-19 deaths	Excess deaths
Measures of trust			
Trust in institutions	Legatum Prosperity Index on confidence in institutions	↓↓ (both years)	↓↓ (both years)
Interpersonal trust	Legatum Prosperity Index on interpersonal trust	↓ (2021)	↓↓ (both years)

Note: Rates are cumulative to the end of 2021. An up arrow indicates positive coefficient, with ↑↑ for both 2021 and 2020, and ↑ only for the year indicated; a down arrow indicates negative coefficient, with ↓↓ for both 2021 and 2020, and ↓ only for the year indicated: statistically significant with *P*-value<0.05. See Annex 3.A for more detailed information on these and other variables included in multivariate regression analyses.
Source: OECD Health Statistics, Our World in Data, Gallop, Legatum Prosperity Index and OECD Short-Term Economic Indicators.

However, these results were not robust to the measure of trust used. Measures sourced from the Gallup World Poll (2018[46]) and the Wellcome Global Monitor Survey (2018[47]) did not find a statistically significant association between trust measures and COVID-19 outcomes (although the coefficients were of the expected sign). See Annex 3.A for details on the survey questions used. This result may reflect methodological limitations in the analyses: the validity of measurements of trust (OECD, 2017[48]); a lower degree of variation in perceptions of trust across OECD countries; and a small sample size (38), compared with analysis of a wider country set (217), restricting statistical power and increasing the importance of outliers.

3.4. Conclusions: Policy options exist to improve resilience

This chapter has shown substantial differences in COVID-19 outcomes across OECD countries and examined how factors amenable to public policy can explain some of these differences. After controlling for core demographic and economic factors, the following factors are associated cross-country differences in COVID-19 and excess death rates:

- **Increased health workforce capacity is associated with better COVID-19 health outcomes**. Countries where more people are employed in the health and social sector have lower COVID-19 and excess mortality.
- **Access to high-quality care is essential**. Countries where the entire population had health coverage for a key set of health services, and where treatable mortality was low in 2018, displayed better health outcomes.

- **Vaccination strategy matters**. A higher COVID-19 vaccination rate was associated with lower excess mortality.
- **Health risk factors and population health matter**. Nationwide obesity levels, alcohol consumption and higher mortality rates from circulatory disease, diabetes and cancer were associated with COVID-19 deaths and/or excess deaths.
- **Social risk factors also influence outcomes**. Countries in which more of the population face difficulties in making ends meet or which have higher long-term unemployment rates had higher COVID-19 mortality.
- **Trust appears to be a factor**. Certain measures of trust indicate that countries in which the population had more trust in their institutions and interpersonal trust had lower COVID-19 and excess mortality.

While these findings are generally in line with the literature, caution needs to be exercised in their interpretation. Such associations do not automatically imply causality. Further, while analysis controls for countries' wealth and demographic factors, they do not analyse the interaction between different potential explanatory variables. Analysis is also limited by the small sample sizes, with at most only 38 data points at any given point in time.

Nevertheless, these results help to identify important health system characteristics, policy levers and other public policies that have the potential to alter COVID-19 and excess death rates substantially. There is also general consistency in cross-country differences across COVID-19 outcome measures: countries with lower COVID-19 death rates also typically recorded fewer excess deaths, scored higher on well-being indicators, and had better economic performance, than those with higher COVID-19 death rates.

Beyond national aggregates, the chapter highlights how older people, socially disadvantaged populations, and ethnic minority groups suffered more from the pandemic than others.

Analysis also summarised the massive disruption to many health services, along with a rise in mental health care needs and people suffering from "long COVID" – factors whose impact on health outcomes will continue to be felt in the coming years.

Based on these findings, some policy implications emerge on how countries can strengthen the resilience of their health systems:

- **Investing in health workers is critical**. Having enough qualified personnel is crucial for dealing with increased demand for health care during a global health crisis. This requires strategies to train, recruit and retain health and long-term care workers, ensuring that these professions are attractive.
- **Improving people's underlying health will make them more resilient to future health shocks**. Public health policies to reduce major risk factors should therefore be given greater priority.

The chapter on investing in resilience explores how much priority health system investments are likely to cost across OECD countries. As well as exploring options for raising additional funds, such investments will require countries to seek efficiency gains to help free up resources. Indeed, analysis in this chapter shows that the overall level of health spending was not significant in explaining cross-country differences in COVID-19 outcomes, implying that many countries could improve outcomes by increasing the efficiency of health spending.

Beyond health policies, governments can create conditions to soften the negative health impact of pandemics and other types of shocks. Policies that reduce social inequities will make people less susceptible to a health shock, and strengthening trust in institutions can improve compliance with public health policies during a crisis.

The quantitative analyses in this chapter do not, and cannot, pinpoint the exact reasons why some OECD countries performed better than others during the COVID-19 pandemic. Nevertheless they confirm

the importance of investing in sufficient health system capacity, and particularly in the health workforce (see chapters on workforce and long-term care). This key finding is not surprising. Capacity is crucial during an emergency. Having higher numbers of health care workers, and a higher percentage of the population covered by health insurance, all contribute to having more agility during periods of peak need. The main outcome indicators used in this paper capture a period of almost two years. Over that time, there were multiple waves of COVID-19; with each wave, health care resources were stretched. Having more health care resources to begin with provides a bigger buffer to deal with surges, especially when the negative effects of these surges will build over time.

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Annex 3.A. Variables used

Annex Table 3.A.1. Variables used in quantitative analyses (pre-pandemic data from 2018/19, unless stated)

Variable type	Indicator used
COVID-19 outcomes [dependent variables]	
COVID-19 deaths	• Cumulative reported COVID-19 death rates (end of 2021 and end of 2020)
Excess deaths	• Cumulative excess death rates (end of 2021 and end of 2020). 2021 data for Colombia only up to week 35.
Population and the economy [control variables used in all multivariate regressions]	
Population	• Share of population aged 65+
Economic development	• GDP per capita
Trust	
Trust in institutions	• Gallup (2018): percentage answering "Yes" to the question "Do you have confidence in the national government?" (2017 data used for Iceland) • Legutum Prosperity Index (2018): weighted average of Gallup and World Economic questions on confidence in institutions • Wellcome Global Monitor (2018): percentage answering "A lot" to the question "How much do your trust the national government in this country?"
Trust in science	• Wellcome Global Monitor (2018): percentage answering "A lot" to the question "In general, would you say that you trust science?"
Interpersonal trust	• Legutum Prosperity Index (2018): percentage of people responding "Most people can be trusted" to the question "Generally speaking, would you say most people can be trusted, or you can't be too careful?" • Wellcome Global Monitor (2018): percentage answering "A lot" to the question "How much do you trust the people in your neighbourhood?"
Socio-economic characteristics	
Social risk factors	• Difficulty making ends meet (% of people who report having difficulty or great difficulty in making ends meet) • Long-term unemployment rate (% of population unemployed for one year or more as a share of labour force) • Relative income poverty (% of people whose household disposable income is below 50% of the national median) • Overcrowding rate (% of households living in overcrowded conditions, adopting the EU-agreed definition) • Poor households without access to basic sanitary facilities (% of households with equivalised disposable household income below 50% of the national median without an indoor flushing toilet for the sole use of the household)
Population health characteristics	
Health risk factors	• Population obese (% of population aged 15+, self-reported) • Alcohol consumption (litres per capita among population aged 15+) • Tobacco consumption daily smokers (% of population aged 15+)
Disease prevalence	• Disease-specific mortality rates: of circulatory system, respiratory system; from COPD, diabetes, malignant neoplasms (age-standardised deaths per 100 000 population) • Consumption of drugs used in chronic conditions: diabetes drugs (A10), antihypertensive drugs (C02), respiratory system drugs (R03) (defined daily doses per 1 000 inhabitants per day)
Overall population health	• Population in good/very good health (% of population aged 15+ and aged 65+)

Variable type	Indicator used
Health system characteristics	
Overall health system capacity	• Health expenditure as a share of GDP
Health workforce capacity	• Total health and social employment (% of total civilian employment and per 1 000 population) • Physicians: practising physicians per 1 000 population; remuneration of specialists and of general practitioners (salaried income relative to average salary) • Nurses: practising nurses per 1 000 population; remuneration of hospital nurses (salaried income relative to average salary) • Pharmacists: practising pharmacists per 1 000 population
Hospital capacity	• Hospitals (per million population) • Hospital beds: total beds; curative (acute) beds (per 1 000 population)
Laboratory/surveillance capacity	• Global Health Security Detection and Reporting index
Access to care	• Population coverage for a core set of services (%)
Quality of care	• Treatable mortality (age-standardised rate per 100 000 population) • Preventable mortality (age-standardised rate per 100 000 population)
Government responses and strategies for COVID-19	
COVID-19 vaccinations	• Share of population fully vaccinated, end of 2021 • Total vaccines per capita, end of 2021

Sources: OECD Health Statistics, OECD Economic Indicators, Our World in Data, Gallup and Legutum Prosperity Index.

Notes

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