GIG CYMRU NHS WALES | Iechyd Cyhoeddus Cymru Public Health Wales

Iechyd Rhyngwladol International Health

International Horizon Scanning and Learning to Inform Wales' COVID-19 Public Health Response and Recovery

Report 38, 10/03/2022

Canolfan Gydweithredol Sefydliad Iechyd y Byd ar Fuddsoddi ar gyfer Iechyd a Llesiant

World Health Organization Collaborating Centre on Investment for Health and Well-being

Overview

The International Horizon Scanning and Learning work stream was initiated as part of the COVID-19 public health response, to support response and recovery measures and planning in Wales.

The learning and intelligence is summarised in regular reports to inform decision-making. These may vary in focus and scope, depending on the evolving COVID-19 situation and public health/policy needs. The reports focus on COVID-19 international evidence, experience, measures, transition and recovery approaches. Evidence is provided to help understand and explore solutions for addressing the on-going and emerging health, well-being, social and economic impacts (potential harms and benefits) of COVID-19.

This work is aligned with and feeds into the Welsh Government Office for Science and into Public Health Wales Gold Command. It is part of a wider Public Health Wales' systematic approach to intelligence gathering to inform comprehensive, coherent, inclusive and evidence-informed policy action, which supports the Well-being of Future Generations (Wales) Act and the Prosperity for All national strategy towards a healthier, more equal, resilient, prosperous and globally responsible Wales.

Disclaimer: The reports provide high-level summary of emerging evidence from country experience and epidemiology; research papers (peer-reviewed/not); and key organisations' guidance/reports, including sources of information to allow further exploration. The reports do not provide detailed or in-depth data/evidence analysis. Due to the novelty of COVID-19 virus and the dynamic epidemiological situation, studies, data and evidence can be conflicting, inconclusive or out-of-date very quickly depending on country/other context.

In focus this week

- **COVID-19 vaccine equity**
- **COVID-19 excess mortality**

Contents

At a glance: summary of international learning on COVID-19

"Nobody wins the race until everyone wins."
(World Health Organization, 2021)[1]

COVID-19 vaccination equity

- **Stark differences in COVID-19 vaccine supply** have been observed between countries
- Access to essential medicines, including vaccines, is a prerequisite for the fundamental **human right to health for all**, and this must be addressed as a key public health issue
- Many more vaccines are being tested and this market should continue to expand offering new opportunities to improve vaccine equity
- COVID-19 vaccine strategies should continue **to prioritise prevention of severe disease**
- Supporting **the transfer of technology, together with training staff and improving access to ingredients and equipment, so that countries can produce their own vaccine supplies,** appears to be a successful solution

More information is summarised on pp. 4-17

COVID-19 excess mortality

- Monitoring excess mortality provides an understanding of the impact of COVID-19 during the pandemic
- Excess deaths are based on an assumption of an 'average' year given the trends in death rates and demographic change, they are predictions, we cannot know what would have happened if the pandemic had not occurred
- The patterns in excess mortality reflect the waves of virus circulating in different countries at different times
- Public health interventions, such as vaccination, have had an impact on excess deaths

More information is summarised on pp. 18-20

[1] COVAX (who.int)

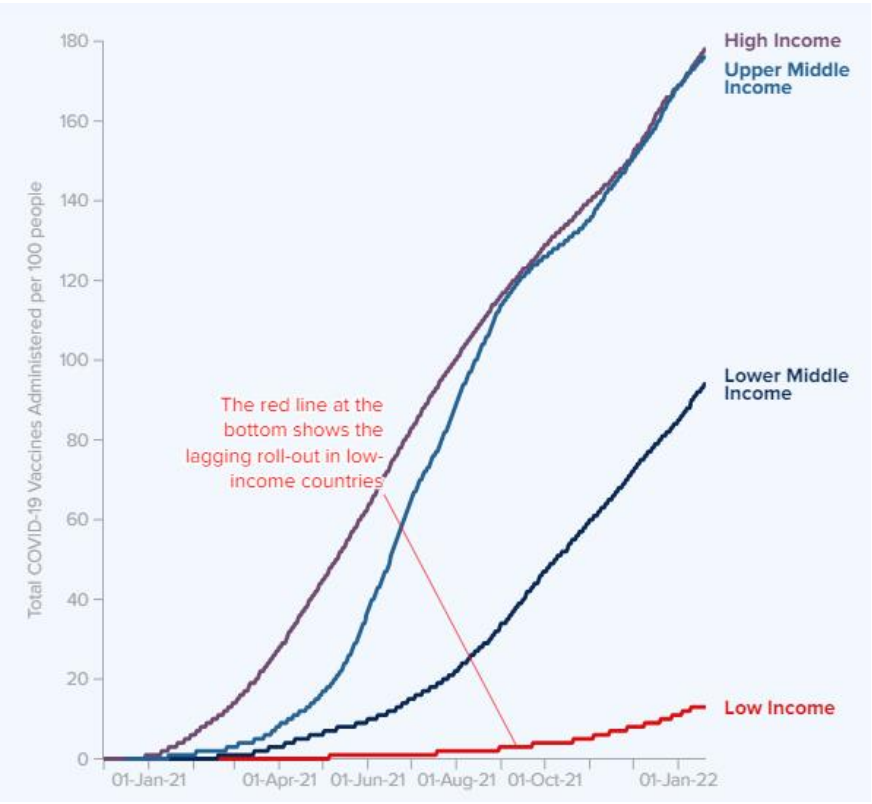
COVID-19 vaccine equity

Vaccine equity

The COVID-19 pandemic has emphasised the **stark inequalities** in access to healthcare that exists, highlighted by the variable access to vaccines globally. While **some countries are still in great need of vaccines for first and second doses,** other countries have already distributed a third dose of vaccine to improve the immune response.[2]

In the countries with the highest percentage of vaccination, more than 200 doses of vaccine have been provided per 100 people (as of 05/01/22). In the rest of the world, the figure is 105, and in Sub-Saharan Africa this is only 15.72 (figure 1). After the introduction of vaccination**, the reported case-fatality rate of COVID-19 has reduced by 35% in the top 20 most vaccinated countries, 8% in the rest of the world and is roughly unchanged in Sub-Saharan Africa.**[3] It is estimated that vaccine sharing would have substantially reduced global mortality by providing earlier protection of the most vulnerable.[4]

Figure 1: Total vaccine doses administered per hundred people, by country category[5]

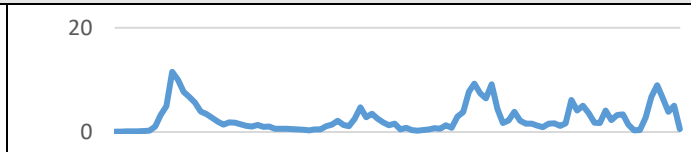
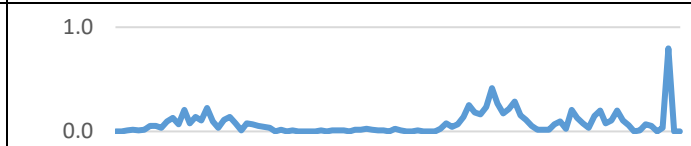
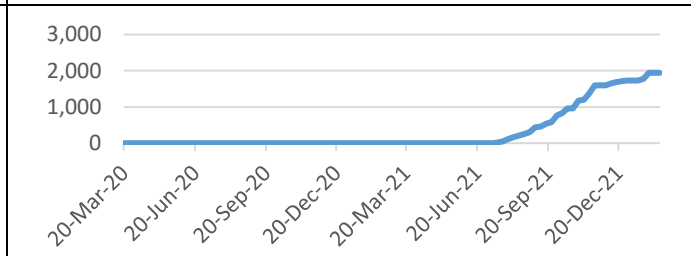
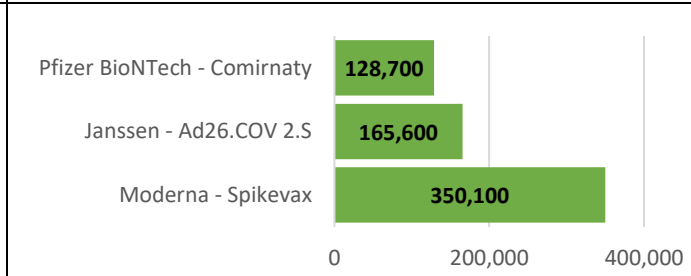


Tables 1-6 display new weekly COVID-19 cases, new weekly COVID-19 deaths and total vaccinations per 100,000 and the number of vaccinations by delivery source for selected countries. The colours in the bars represent the sources of the vaccine as listed below:

Bilateral / multilateral Agreements	Donations	COVAX	AVAT	Unknown

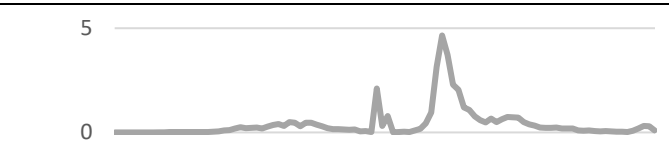
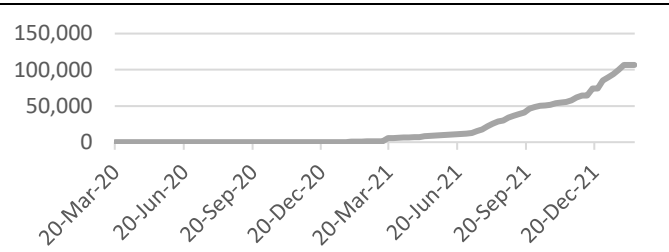
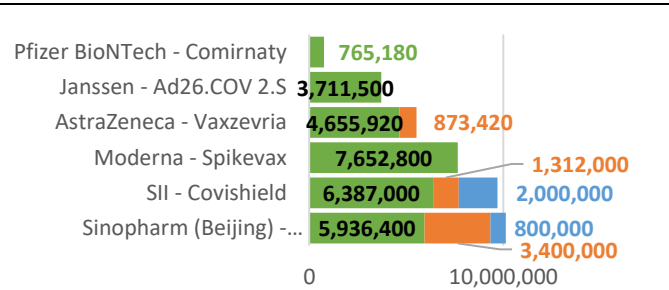
[2] *Vaccine distribution exacerbates the social divide* (published Jan 2022)
[3] *The Global case-fatality rate of COVID-19 has been declining disproportionately between top vaccinated countries and the rest of the world* (published Jan 2022)
[4] *The impacts of increased global vaccine sharing on the COVID-19 pandemic: a retrospective modelling study* (published Jan 2022)
[5] *Global Dashboard for Vaccine Equity*

Table 1: New weekly COVID-19 cases, new weekly COVID-19 deaths and total vaccinations per 100,000 and the number of vaccinations by delivery source for Haiti, March 2020 – February 2022 *[extracted on: 08/02/2022]*[67]

Haiti	
New weekly cases per 100,000	
New weekly deaths per 100,000	
Total vaccinations per 100,000	
Number of vaccines delivered by delivery source and manufacturer	

The cases and deaths in Haiti have fluctuated over time, reaching a high of 12 and 0.8 per 100,000 for cases and deaths respectively. Currently, 2,000 per 100,000 of Haiti's population has received a vaccination this is the lowest from our list of selected countries. **All of the vaccines that Haiti has received has been delivered by COVAX**.

Table 2: New weekly COVID-19 cases, new weekly COVID-19 deaths and total vaccinations per 100,000 and the number of vaccinations by delivery source for Nepal, March 2020 – February 2022 *[extracted on: 08/02/2022]*[89]

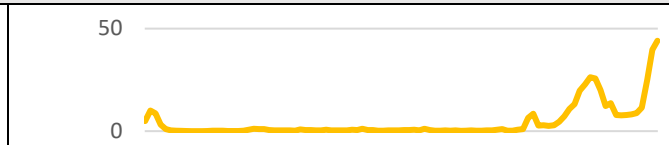
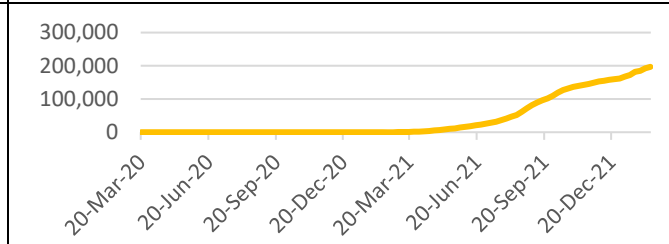
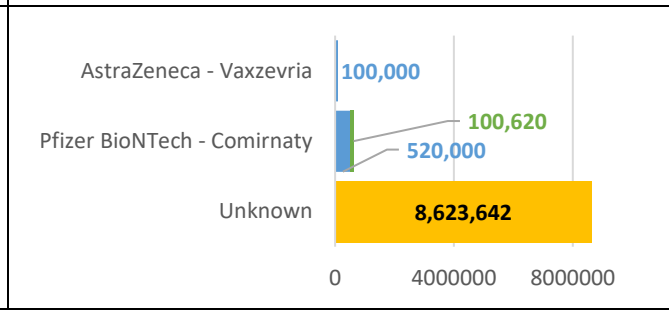
Nepal	
New weekly cases per 100,000	
New weekly deaths per 100,000	
Total vaccinations per 100,000	
Number of vaccines delivered by delivery source and manufacturer	

In Nepal, a few waves can be observed over time reaching a maximum of 211 cases and 5 deaths per 100,000. A **majority of vaccinations in Nepal have been delivered by COVAX or donation**, with 2,800,000 being a bilateral/multilateral agreement. The vaccination rate is currently at 106,630 per 100,000 of the country's population.

[6] https://www.unicef.org/supply/covid-19-vaccine-market-dashboard
[7] https://ourworldindata.org/covid-vaccinations

[8] https://www.unicef.org/supply/covid-19-vaccine-market-dashboard
[9] https://ourworldindata.org/covid-vaccinations

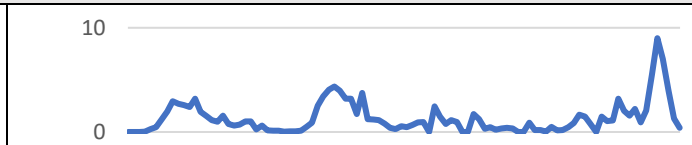
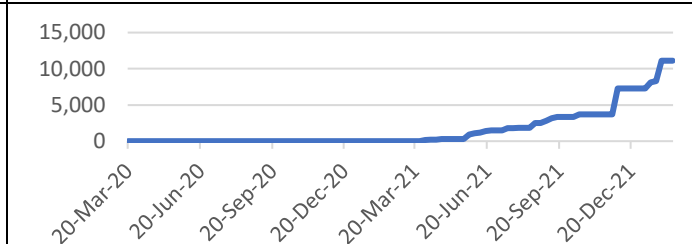
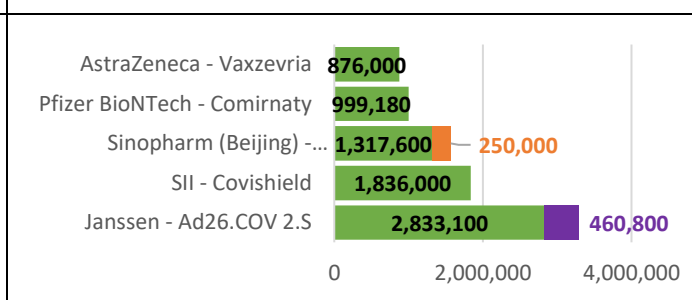
Table 3: New weekly COVID-19 cases, new weekly COVID-19 deaths and total vaccinations per 100,000 and the number of vaccinations by delivery source for New Zealand, March 2020 – February 2022 *[extracted on: 08/02/2022]*[10][11]

New Zealand	
New weekly cases per 100,000	
New weekly deaths per 100,000	
Total vaccinations per 100,000	
Number of vaccines delivered by delivery source and manufacturer	

In New Zealand, cases and deaths have been low initially, but from September 2021 onwards, the number of cases reaches 44 per 100,000 and the number of deaths fluctuates but is typically less than 0.1 per 100,000. With regard to vaccinations, the **majority of vaccines New Zealand used and the delivery source is unknown**. However, the total number of vaccinations has reached 196,841 per 100,000.

[10] https://www.unicef.org/supply/covid-19-vaccine-market-dashboard
[11] https://ourworldindata.org/covid-vaccinations

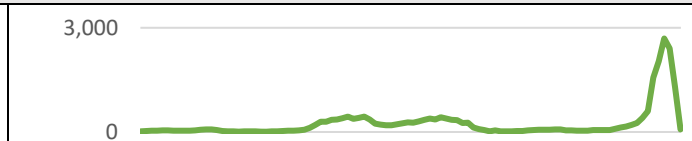
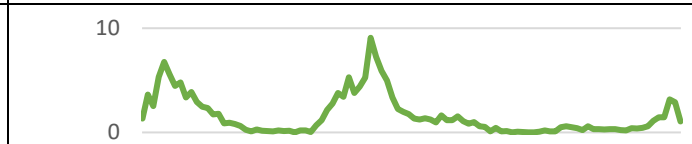
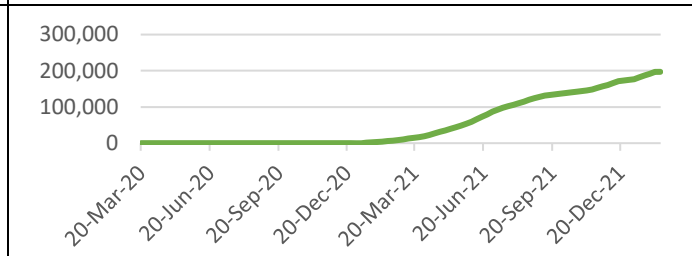
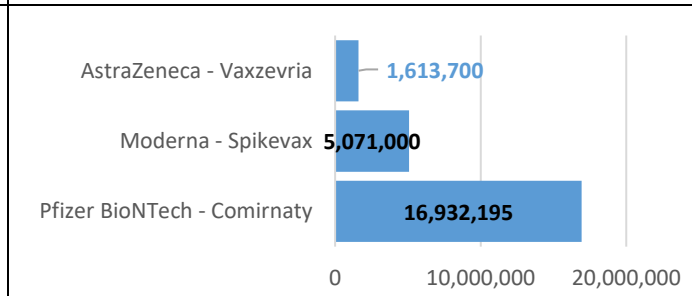
Table 4: New weekly COVID-19 cases, new weekly COVID-19 deaths and total vaccinations per 100,000 and the number of vaccinations by delivery source for Sudan, March 2020 – February 2022 *[extracted on: 08/02/2022]*[12][13]

Sudan	
New weekly cases per 100,000	
New weekly deaths per 100,000	
Total vaccinations per 100,000	
Number of vaccines delivered by delivery source and manufacturer	

The number of cases and deaths in Sudan has fluctuated over time reaching a maximum of 9 and 0.6 per 100,000 for cases and deaths respectively. Vaccinations in Sudan is one of the lowest amongst our selected countries, total vaccinations are 11,114 per 100,000. A **majority of vaccinations were delivered from COVAX**, 250,000 were donated and 460,800 were delivered by African Vaccine Acquisition Trust (AVAT).

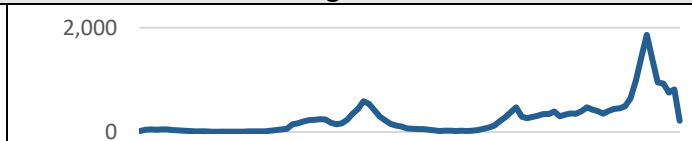
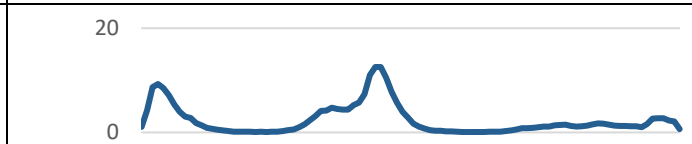
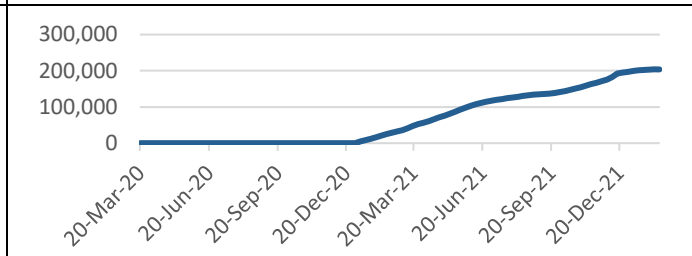
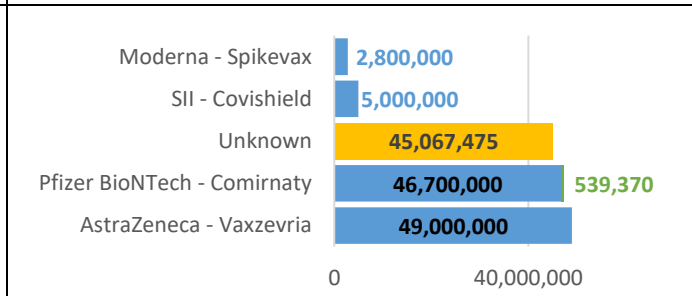
[12] https://www.unicef.org/supply/covid-19-vaccine-market-dashboard
[13] https://ourworldindata.org/covid-vaccinations

Table 5: New weekly COVID-19 cases, new weekly COVID-19 deaths and total vaccinations per 100,000 and the number of vaccinations by delivery source for Sweden, March 2020 – February 2022 *[extracted on: 08/02/2022]*[14][15]

Sweden	
New weekly cases per 100,000	
New weekly deaths per 100,000	
Total vaccinations per 100,000	
Number of vaccines delivered by delivery source and manufacturer	

A few waves of cases and deaths in Sweden can be seen, where the cases and deaths reach 2,693 and 7 per 100,000 respectively. With regard to total vaccinations, there have been 196,487 vaccines administered per 100,000. **All vaccinations in Sweden were Bilateral or Multilateral agreements.**

Table 6: New weekly COVID-19 cases, new weekly COVID-19 deaths and total vaccinations per 100,000 and the number of vaccinations by delivery source for United Kingdom, March 2020 – February 2022 *[extracted on: 08/02/2022]*[16][17]

United Kingdom	
New weekly cases per 100,000	
New weekly deaths per 100,000	
Total vaccinations per 100,000	
Number of vaccines delivered by delivery source and manufacturer	

In total, **45,067,475 of vaccinations delivered to the UK were recorded as unknown in regards to manufacturer and delivery source**. Total vaccinations in the UK is at 203,583 per 100,000 of the population. We can also observe a few waves, new cases and new deaths peaked at 1,865 and 13 per 100,000 of the country's population respectively.

[14] https://www.unicef.org/supply/covid-19-vaccine-market-dashboard
[15] https://ourworldindata.org/covid-vaccinations

[16] https://www.unicef.org/supply/covid-19-vaccine-market-dashboard
[17] https://ourworldindata.org/covid-vaccinations

The global mismatch

The global mismatch in vaccine provision falls clearly along lines of economic standing (figure 2). The World Health Organization set a target for all countries to vaccinate 10% of their populations by the end of September 2021,[18] 56 countries were not able to reach this target, most of these countries are in Africa.[19]

Figure 2: Gross Domestic Product (GDP) per capita vs percentage of population vaccinated by continents[20]

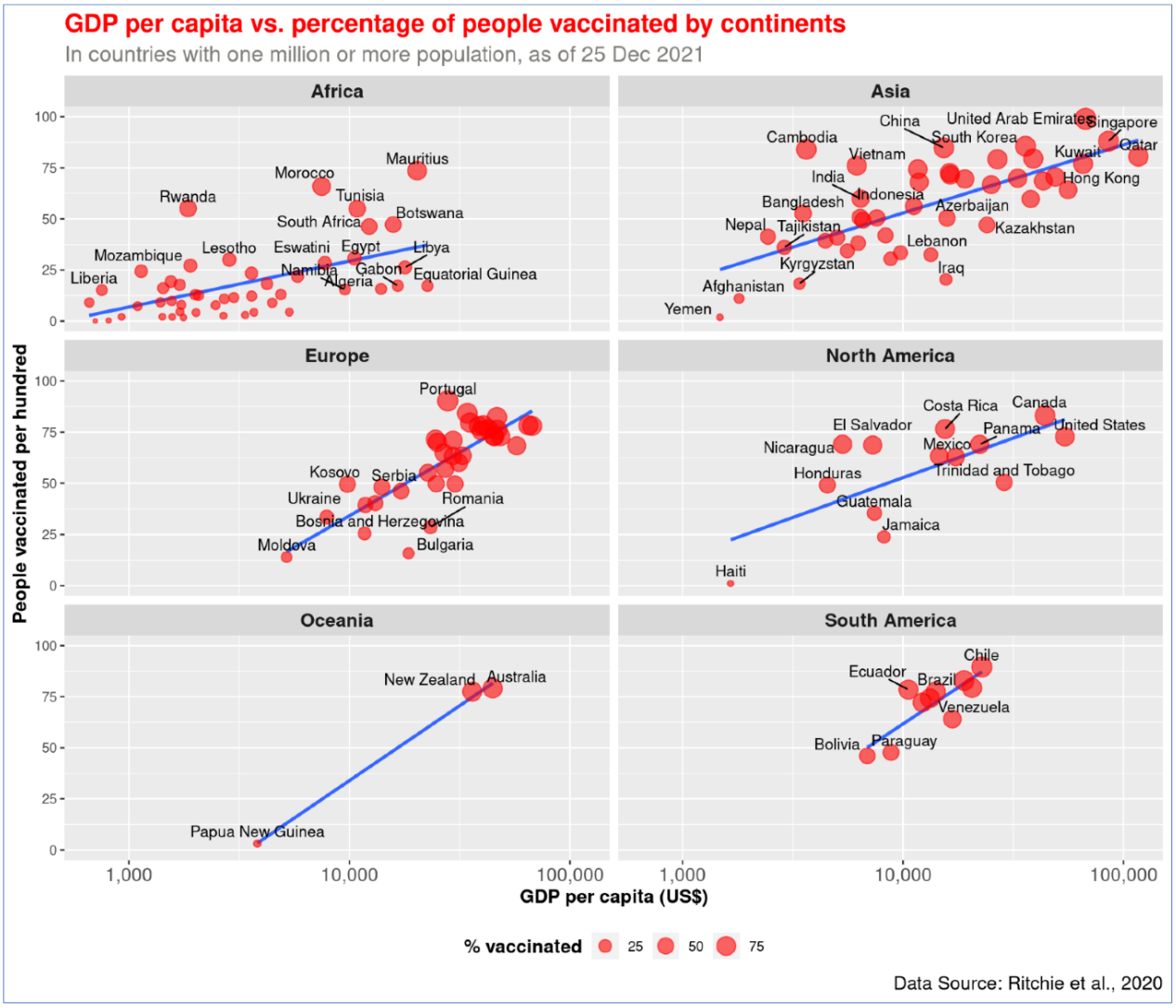


Figure 2 identifies disparities of COVID-19 vaccination between countries and continents:

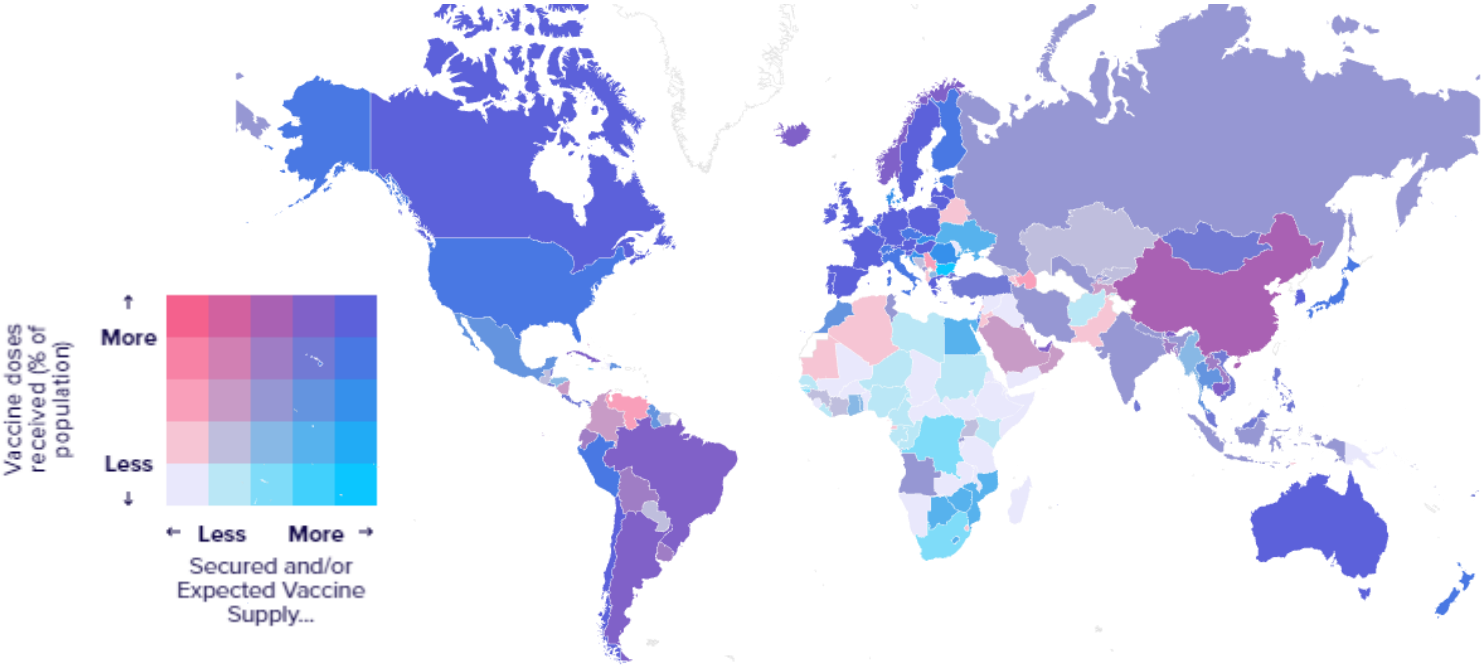
- **Africa** continues to lag behind much of the world in vaccinating its population, although some countries are performing well
- Wide disparities between **Asian countries** are drawn along lines of economic output, although notable performers relative to GDP include Cambodia and Vietnam
- **South America** remains the most equitable continent in terms of vaccine distribution

[18] WHO, UN set out steps to meet world COVID vaccination targets
[19] Vaccine Equity
[20] A Global Study on the Correlates of Gross Domestic Product (GDP) and COVID-19 Vaccine Distribution (published Feb 2022)

Patterns emerging between countries in relation to **vaccine supply and distribution** include:[21]

- **Several countries in Africa have a low percentage of the population vaccinated** and low secured or expected vaccine supply
- While some countries have a **sufficient supply of vaccine**, they have **struggled to distribute doses** to the population (light blue in figure 3), for example, **Egypt and Bulgaria**
- **High levels of vaccination supply and distribution are seen in Western Europe, North America, Australia, New Zealand, Japan and South Korea**

Figure 3: Vaccine supply and distribution by country[22]



Factors influencing vaccine distribution

While there is a **clear relationship between gross domestic product per capita and the percentage of population vaccinated, it is not the only factor**. One analysis of the vaccine roll out across countries found that:[23]

- The four most important covariates associated with vaccine rollout were **median capita per income; human development index; percentage of individuals having used the internet in the last three months and health expenditure per capita**
- Corruption perception index and population density are fifth and sixth respectively, but are significantly less important in comparison
- Impact of pandemic (deaths per million people) was also a significant contributing factor to vaccine roll out

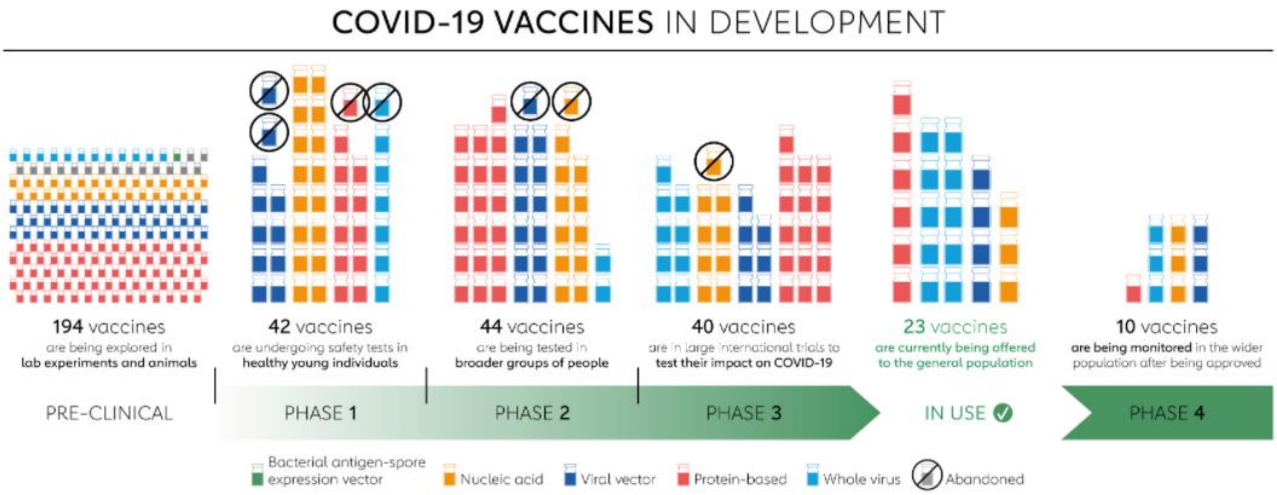
COVID-19 vaccination production

As of 12th January 2022, there are 21 vaccines that have been rolled out for global use, 137 COVID-19 vaccine candidates undergoing clinical trials and 194 candidates in pre-clinical

[21] *A Global Study on the Correlates of Gross Domestic Product (GDP) and COVID-19 Vaccine Distribution* (published Feb 2022)
[22] *Vaccine Access*
[23] *Assessing Inequities in COVID-19 Vaccine Roll-Out Strategy Programs: A Cross-Country Study Using a Machine Learning Approach* (published Jan 2022)

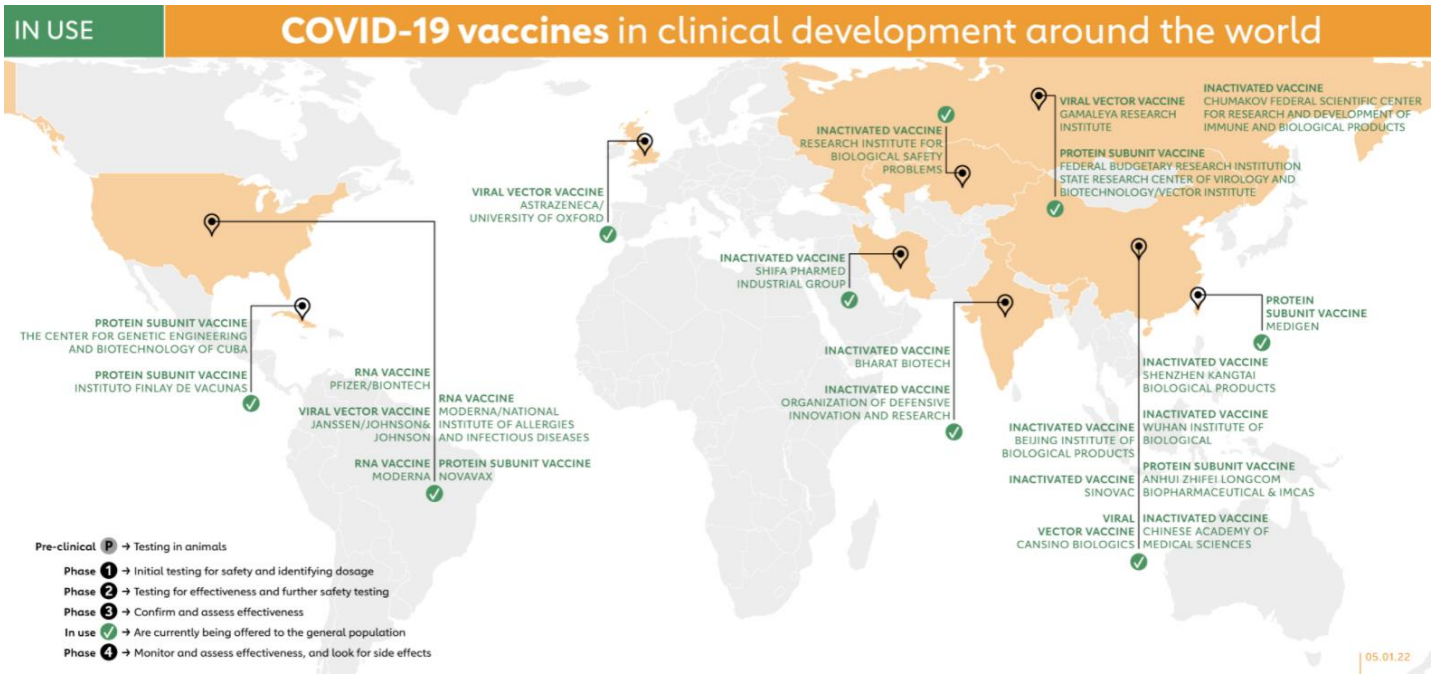
development.[24] Figure 4 demonstrates the four phases of vaccine development and how many vaccines are currently within these stages.

Figure 4: COVID vaccinations in development (data correct as of 12th January 2022)



The manufacturing of these vaccines is mainly concentrated within high-income countries (figure 5). This is in part due to the presence of existing infrastructure, enabling production to be more readily established. In addition to this, the availability of ingredients/equipment also impacts countries' ability to produce vaccines.[25]

Figure 5: Production of COVID-19 vaccines in use around the world [26]



Many countries have adopted a 'local supply first' strategy, where countries provide vaccines for their own populations before distributing vaccines further afield. This means that countries which are able to produce vaccines often have higher rates of vaccination than those

[24] The COVID-19 vaccine race | Gavi, the Vaccine Alliance (published Jan 2022)
[25] Covid-19: global vaccine production is a mess and shortages are down to more than just hoarding | The BMJ (published Oct 2022)
[26] The COVID-19 vaccine race | Gavi, the Vaccine Alliance (published Jan 2022)

reliant upon imported vaccines. In April 2021, the African Union and Africa Centers for Disease Control and Prevention announced goals to produce 60% of their vaccines locally by 2040.[27][28]

Responding to vaccine equity

The **equitable distribution of vaccines for COVID-19 remains a key issue**. High Income Countries have prioritised maintaining high degrees of immunity in order to minimise the impacts of subsequent variants and waves of infection.[29] There is a clear imbalance in the levels of immunity found between countries.[30] It is argued that a **more equitable vaccine distribution is in the global interest,** in order to limit detrimental health outcomes and help return to more stable economic conditions.[31]

Some **proposed vaccine strategies for 2022** include:[32]

- COVID-19 vaccine strategies should continue **to prioritise prevention of severe disease**
- In countries with a high prevalence of previous infection and a low proportion of the population being older than 60 years **prioritising delivery of the first dose** will have the greatest effect on preventing severe COVID-19
- In countries with a low prevalence of previous infection and a high proportion of the population being older than 60 years, **protection against severe disease in adults requires at least two doses**
- In people who are severely immunocompromised or older than 60 years, **evidence supports booster doses** of mRNA or adenoviral vector vaccines to prevent severe disease; booster doses for all adults could compromise timely global availability of first doses

Technology transfer

Nations left waiting for donations of vaccines lack clarity on if or when they will arrive, leaving them unable to reliably plan the complex logistics of vaccination campaigns - including adequate cold chain storage, sufficient equipment and staff, and the ability to time subsequent doses. Long delays also run the risk of creating public mistrust and the politicisation of vaccination campaigns, contributing to waves of vaccine hesitancy.[33] One potential solution is to **enable the transferring of technology so that countries can produce their own vaccine supplies.** Arguments have been made in favour of **waiving intellectual property rights in order for generic versions of vaccine to be produced cheaply, and at location**.[34][35][36] However, even with such waivers, there may be a deficit of required manufacturing capability and capacity in some places.[37]

In order to help enable this technology transfer, the **World Health Organization established the MRNA technology transfer hub** in summer 2021, with the intended purpose of tackling vaccine equity.

- Recently, Egypt, Kenya, Nigeria, Tunisia, Senegal and South Africa were announced as the first countries to host these new vaccine production sites[38]

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[27] Data Dive: Vaccines | ONE (last updated Mar 2022)
[28] Covid-19: global vaccine production is a mess and shortages are down to more than just hoarding | The BMJ (published Oct 2021)
[29] Vaccine distribution exacerbates the social divide | SpringerLink *(published Jan 2022)*
[30] Vaccines | Free Full-Text | A Global Study on the Correlates of Gross Domestic Product (GDP) and COVID-19 Vaccine Distribution (mdpi.com) *(published Feb 2022)*
[31] Full article: COVID-19 vaccine equity: a health systems and policy perspective (tandfonline.com) *(published Now 2021)*
[32] COVID-19 vaccine strategies must focus on severe disease and global equity *(published Jan 2022)*
[33] Centring equity over exceptionalism in the global covid-19 response (published Jan 2022)
[34] Inequitable COVID-19 vaccine distribution and the intellectual property rights prolong the pandemic (published Jun 2022)
[35] Vaccine equity: there is no time to waste (published Jan 2022)
[36] Global Vaccine Equity to End the COVID-19 Pandemic: A Canadian Perspective and Call to Action (published Jan 2022)
[37] From Vaccine Nationalism to Vaccine Equity — Finding a Path Forward (published Apr 2022)
[38] WHO announces first technology recipients of mRNA vaccine hub with strong support from African and European partners (published Feb 2022)

- The World Health Organization announced that South Korea would host the second training hub[39]

Vaccine equity: a policy imperative[40]

- Access to essential medicines and vaccines is a **prerequisite for the fundamental human right** to health for all
- **Pandemics come in waves**, with devastating effects on health systems
- The longer a virus circulates globally, the more **opportunity there is for the emergence of more transmissible or virulent variants**, which may evade existing vaccine formulations and put the global population at risk
- **Uncoordinated COVID-19 vaccination will risk global financial** losses of as much as USD 9.2 trillion, approximately half of which will be in advanced economies

Table 7 displays key priorities and initiatives to achieve global vaccine equity.

Table 7: Key priorities and initiative for achieving global equity for COVID-19 vaccines[41]

Immediate distribution of unallocated or reserve doses of vaccines and donations through COVAX
Ramp up production and distribution capacity for additional doses of vaccines
Technology transfer to enable more vaccine manufacturers to produce vaccines under license
A fully funded, internationally coordinated initiative that facilitates technology transfer, **building of vaccine manufacturing, and scientific and regulatory capacity in different regions**
Governments should preserve a share in the patents of pharmaceutical companies when their support has made a tangible contribution to the development of the product being patented
Some of the funds arising from these shares could support key multilateral agencies and **invest in better pandemic preparedness at global and national levels**
These initiatives require genuine **commitment to working collectively** in the common interest to promote global equity to COVID-19 vaccines and pandemic preparedness

COVID-19 Vaccines Global Access (COVAX)

In April 2020, the Access to COVID-19 Tools (ACT) accelerator initiative was developed in response to the COVID-19 pandemic. The initiative aims to **accelerate development, production, and equitable access to COVID-19 tests, treatments, and vaccines** across the globe. The ACT initiative consists of four central pillars:[42][43]

- Diagnostics
- Treatment
- Vaccines
- Health System Strengthening

The COVID-19 Vaccines Global Access Facility (COVAX) was developed to support the 'Vaccines' pillar. **COVAX is a global collaboration which aims to accelerate the development and manufacture of COVID-19 vaccines, and to guarantee fair and equitable access** for every country in the world. It is led by the Coalition for Epidemic Preparedness Innovations, Gavi the vaccine alliance and the World Health Organization with the key delivery partner UNICEF.[44] COVAX acts as a platform to support research, development and the manufacturing of a wide range of COVID vaccines in order to ensure that ability to pay does not become a barrier to vaccination.[45]

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[39] WHO announces 2nd hub for training countries to make COVID vaccines (published Feb 2022)
[40] COVID-19 vaccine equity: a health systems and policy perspective (published Nov 2022)
[41] Achieving global equity for COVID-19 vaccines: Stronger international partnerships and greater advocacy and solidarity are needed (plos.org) (published Sep 2022)
[42] What is the ACT Accelerator (who.int)
[43] Gavi and global health actors collaborate to accelerate COVID-19 technologies for all | Gavi, the Vaccine Alliance
[44] COVAX (who.int)
[45] COVAX explained | Gavi, the Vaccine Alliance (published Sep 2020)

The scheme offers:[46]

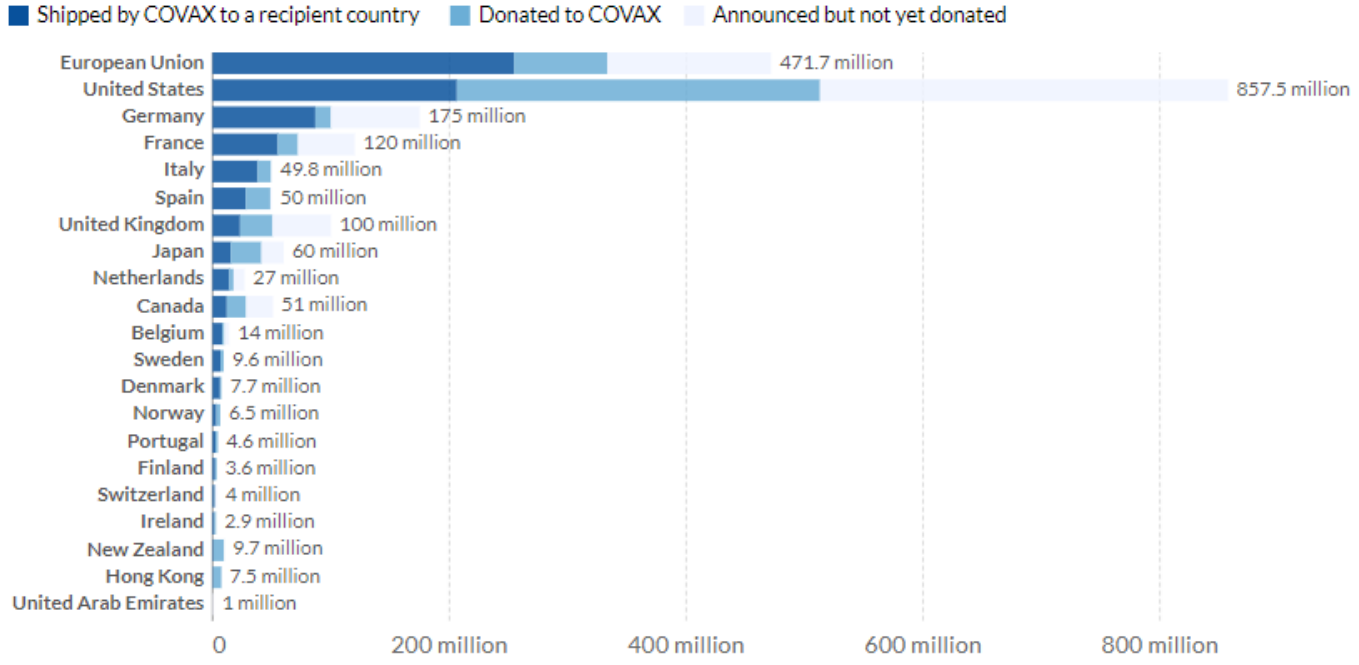
- Doses for at least 20% of countries' populations
- Diverse and actively managed portfolio of vaccines
- Vaccines delivered as soon as they are available

Operation of COVAX

COVAX currently has the world's largest and most diverse portfolio of COVID vaccines.[47] This has been achieved through active research, development and management of vaccine candidates to identify those most suitable and most likely to pass through the phases of development as previously identified in figure 4. The Coalition for Epidemic Preparedness Innovations, one of the organisations leading on COVAX, have a team of expert researchers who actively manage COVAX's portfolio of vaccine candidates. COVAX is involved from vaccine research and development into manufacturing, production and distribution to secure bulk doses to be sent out to participating countries.

- COVAX acts on behalf of all participating countries, therefore the risks associated with new vaccine candidates are shared
- COVAX is funded in part by donation; governments, the private sector and philanthropists. In addition to this, high income self-financing countries who are unable to secure their own bilateral deals with suppliers/manufacturers can buy into the COVAX scheme to secure vaccines for 10-50% of their population[48]
- COVAX is able to pool this funding to invest in vaccine development and manufacturing for a large portfolio of vaccine candidates and negotiate competitive pricing. This then enables doses to be donated to low-income countries unable to afford vaccines[49]
- Figure 6 illustrates vaccine donations received and pledged as of 3rd February 2022 by country.

Figure 6: COVID-19 vaccine doses donated to COVAX as of 24th February 2022[50]

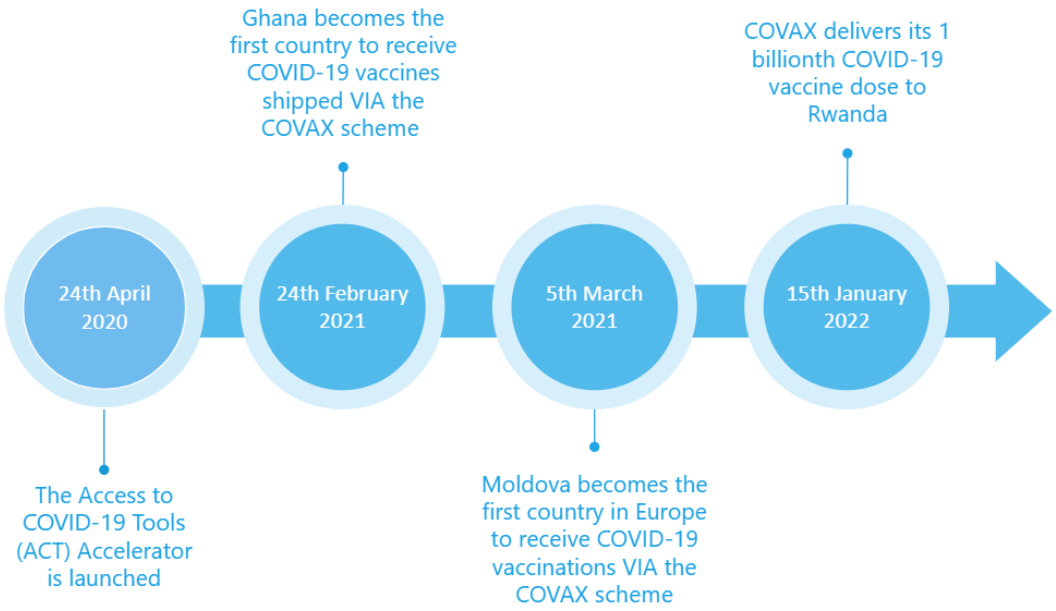


[46] COVAX (who.int)
[47] COVAX explained | Gavi, the Vaccine Alliance (published Sep 2020)
[48] COVAX explained | Gavi, the Vaccine Alliance (published Sep 2020)
[49] COVAX explained | Gavi, the Vaccine Alliance (published Sep 2020)
[50] COVID-19 vaccine doses donated to COVAX (ourworldindata.org)

Timeline of COVAX key events[51][52][53][54]

Upon its inception, COVAX set out to have two billion doses available by the end of 2021.[55] Figure 7 shows a timeline of key events achieved by the COVAX initiative.

Figure 7: Timeline of key events of the COVAX scheme



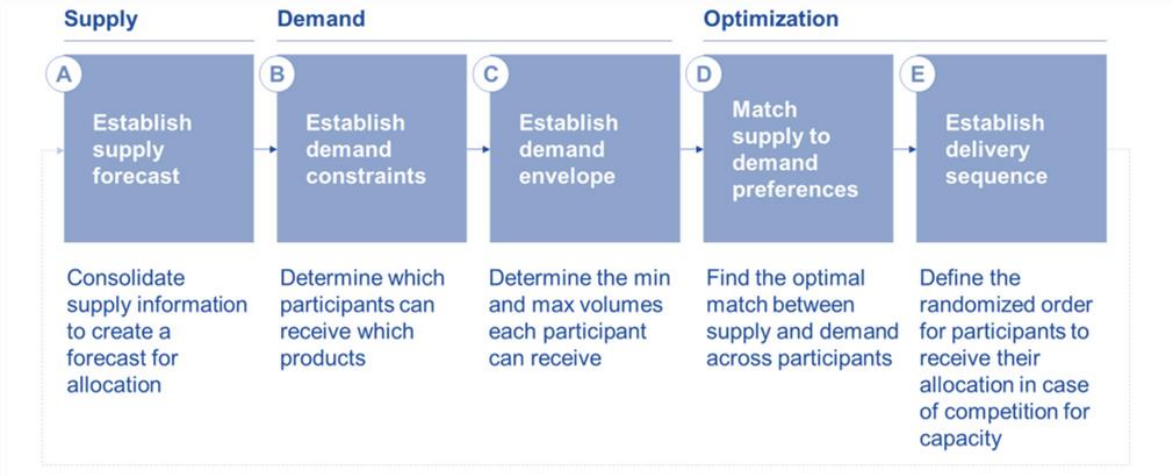
Delivery framework

Initial supplies of vaccinations were limited, therefore it was essential to have a **clear, transparent and broadly accepted framework to enable fair allocation of resources**. The 'Fair Allocation Framework' was developed by the World Health Organization. It was thought that the framework could help to stop the acute phase of the pandemic, rebuild societies and economies and ensure every country was to be able to begin immunising their most vulnerable populations.[56]

- According to the framework, vaccines are allocated in two phases; a proportional allocation up to 20% of the population followed by a weighted allocation beyond 20%. An algorithm is used to optimise the allocation of vaccine according to population, product preference and ensuring consistency[57]
- The algorithm relies upon five key steps as detailed in figure 8

[51] Gavi and global health actors collaborate to accelerate COVID-19 technologies for all | Gavi, the Vaccine Alliance
[52] COVID-19 vaccine doses shipped by the COVAX Facility head to Ghana, marking beginning of global roll-out | Gavi, the Vaccine Alliance (published Feb 2021)
[53] COVID-19 vaccines shipped by COVAX arrive to the Republic of Moldova (unicef.org) (published Mar 2021)
[54] COVAX delivers its 1 billionth COVID-19 vaccine dose (who.int) (published Jan 2020)
[55] COVAX explained | Gavi, the Vaccine Alliance (published Sep 2020)
[56] Fair allocation mechanism for COVID-19 vaccines through the COVAX Facility (who.int) (published Sep 2020)
[57] Allocation logic and algorithm to support allocation of vaccines secured through the COVAX Facility (who.int) (published Feb 2021)

Figure 8: Key steps within the allocation algorithm[58]



Criticisms to this approach have been recorded, with some arguing that the approach taken is not a fair method of allocation of resources[596061] **as it is only during the second phase of distribution that local COVID-19 cases/infections rates and health system capacity is taken into consideration.** Prior to this, during phase 1, all countries receive vaccine doses in equal proportion.

Case study: COVAX in Laos

As of 1st February 2022, Laos has reported 134,438 confirmed cases of COVID-19 and a total of 551 deaths since March 2020.[62] As of **31 January 2022, 64.7% of the total population have been vaccinated with at least one dose of COVID-19 vaccine** while 55.9% have received all recommended doses. These vaccines have successfully reached the most vulnerable members of society including healthcare workers, older people and those with underlying health conditions.

Laos initially received **132,000 AstraZeneca vaccine doses in March 2021, supported by the COVAX facility**. Since this Laos has now received a total of 1,698,840 doses, including the most recent shipment of 899,730 doses of the Pfizer BioNTech vaccine on the 24th January 2022 through the COVAX scheme.[6364] Initially, people were reluctant to take up the available vaccines, despite them being provided free of charge via the COVAX facility. This may be in part due to the perceived risk of the virus due to low case levels. However, take up began to increase in late 2021. This may have been influenced by increasing cases and/or the increased use of public messaging including social media campaigns and televised vaccinations of public officials.

Case study: India

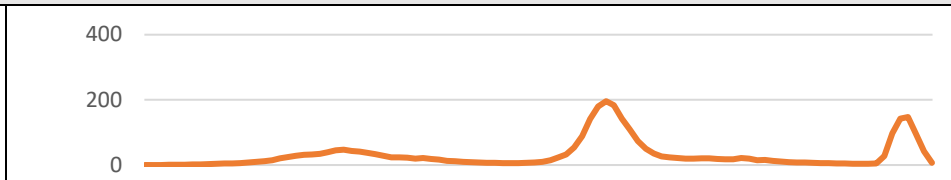
In total, per 100,000 of the population, 123,680 vaccinations have been administered in India. Covishield is the vaccine that has been used the most, some being delivered from the COVAX facility. Table 8 shows the COVID-19 waves in India.

[58] Allocation logic and algorithm to support allocation of vaccines secured through the COVAX Facility (who.int) (published Feb 2021)
[59] medethics-2020-107152.pdf (nih.gov) (published Mar 2021)
[60] An ethical framework for global vaccine allocation (science.org) (published Sep 2020)
[61] Covax must go beyond proportional allocation of covid vaccines to ensure fair and equitable access (bmj.com) (published Jan 2021)
[62] COVID-19 situation report for Lao PDR #49: 1 February 2022 (who.int) (published Feb 2022)
[63] 899,730 Pfizer Doses Donated by the United States Arrive in Lao PDR (unicef.org) (published Jan 2022)
[64] The impact of COVAX in Laos | Gavi, the Vaccine Alliance (published Jan 2022)

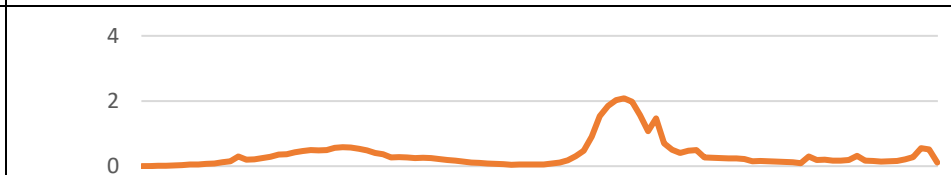
Table 8: New weekly COVID-19 cases, new weekly COVID-19 deaths and total vaccinations per 100,000 and the number of vaccinations by delivery source for India, March 2020 – February 2022 *[extracted on: 08/02/2022]*[6566]

Bilateral / multilateral Agreements	Donations	COVAX	AVAT	Unknown
India				

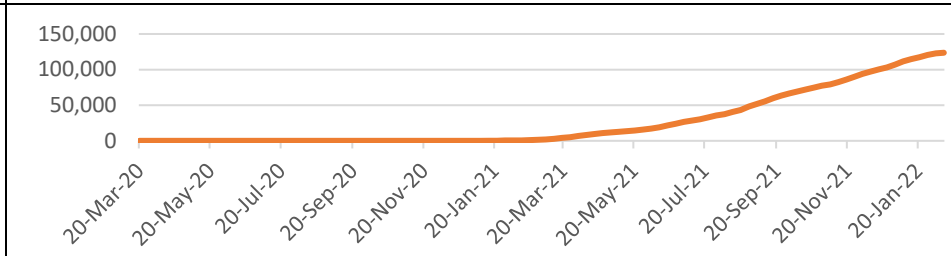
New Weekly Cases per 100,000



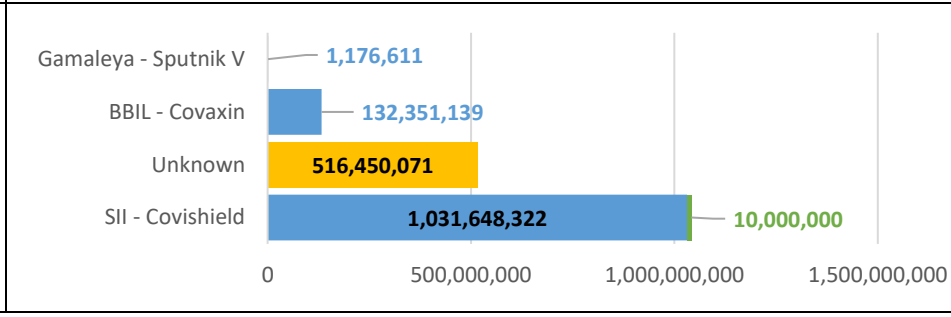
New Weekly Deaths per 100,000



Total Vaccinations per 100,000



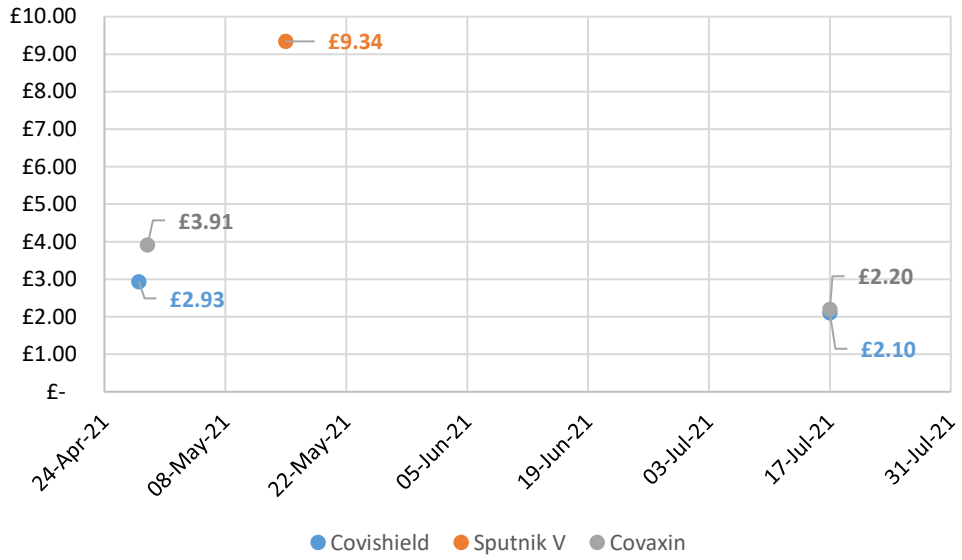
Number of Vaccines Delivered by Delivery Source and Manufacturer



Over one billion Covishield vaccines have been delivered through bilateral/multilateral agreements. Generally, over time the price for each dose has reduced for Covishield and Covaxin.

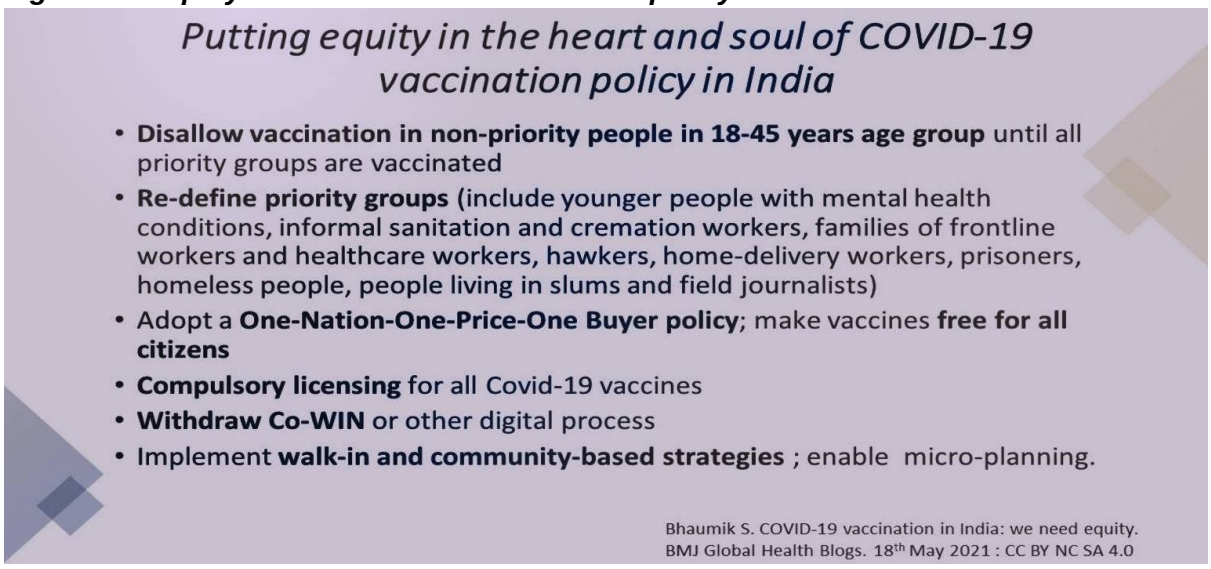
[65] https://www.unicef.org/supply/covid-19-vaccine-market-dashboard
[66] https://ourworldindata.org/covid-vaccinations

Figure 9: Prices of vaccinations per dose by manufacturer, India, April 2021 – July 2021 *[extracted on: 08/02/2022]*[67]



India has faced infrastructural and ethical challenges in regards to the manufacturing and distribution of the COVID-19 vaccination.[68] Various suggestions have been put forward to allow for a more equitable vaccination policy in India (figure 10).

Figure 10: Equity in the COVID-19 vaccination policy in India[69]



Criticism has arisen that the digitalisation of COVID-19 vaccination appointment and procedures in India has led to disparities marginalising those with no access to the internet or smart phones. The following suggestions and alternative methods have been brought forward:[70]

- **Utilise its large network of bureaucrats to organise camps in rural areas** without the need for an appointment
- **Co-opting local leadership** is an effective way to mobilise communities

[67] https://www.unicef.org/supply/covid-19-vaccine-market-dashboard
[68] Will COVID-19 vaccine equity be possible in India? (nih.gov) (published Jul 2021)
[69] COVID-19 vaccination in India: we need equity | The George Institute for Global Health (published May 2021)
[70] Balancing Digital India and Vaccine Equity | Center for Strategic and International Studies (csis.org)

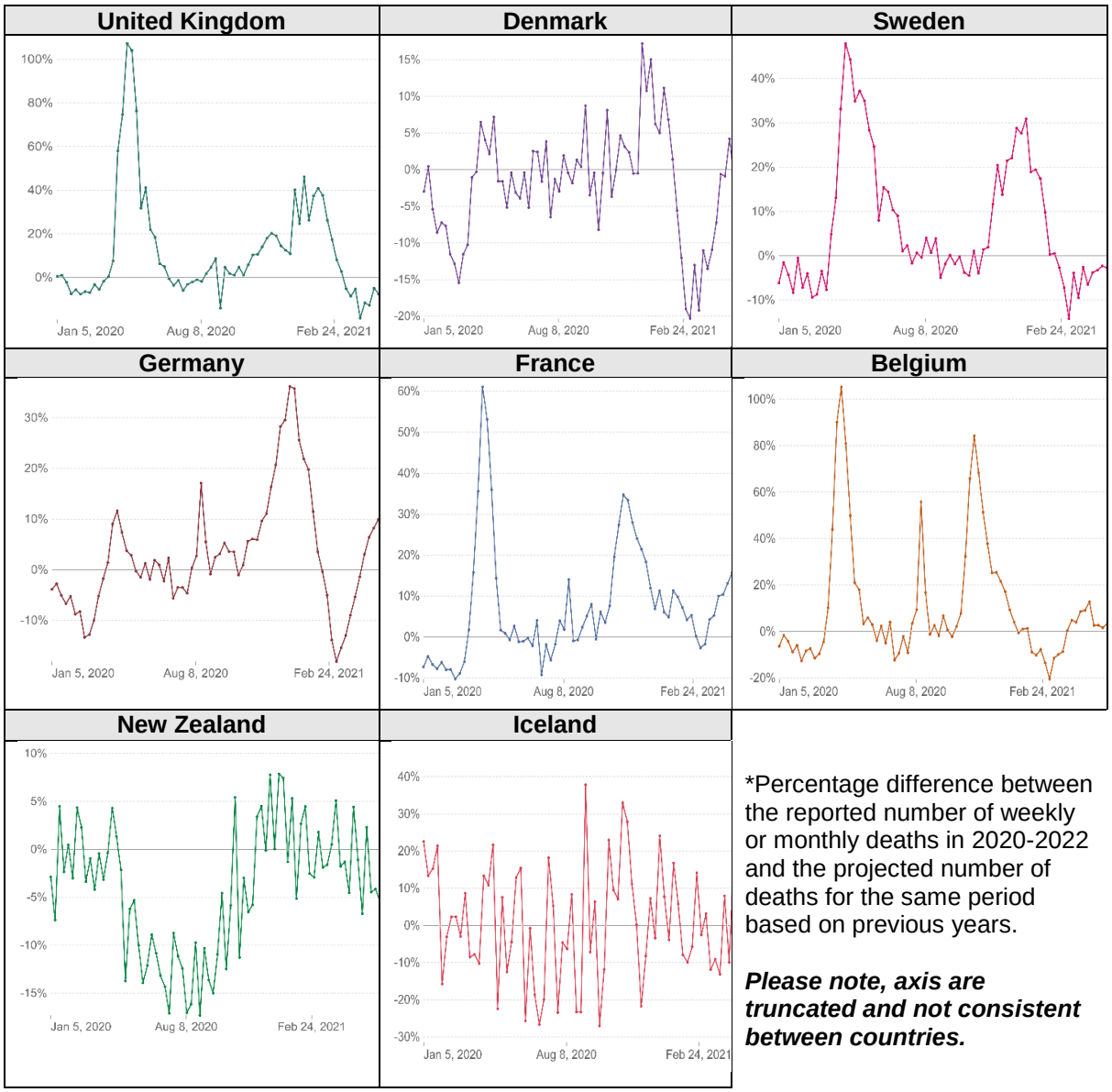
COVID-19 excess mortality

International comparisons of excess mortality

Throughout the course of the pandemic, international data shows a mixed picture (figure 11):

- The **United Kingdom, Sweden, France and Belgium have frequently seen excess deaths** and the trends observed in these countries are similar i.e. several peaks
- The trend in excess mortality in **Germany and Denmark** are similar to each other, with **peaks in excess mortality later on in the pandemic** (late 2020/early 2021) this may be due to differing policy responses
- The volatile nature of excess mortality in **New Zealand and Iceland** is probably a result of their smaller population sizes
- **Excess mortality in New Zealand is considerably lower than the other selected countries**, and for a sustained period (majority of 2020), mortality was considerably lower than expected

***Figure 11: Deaths from all causes compared to projection based on previous years*[71]**



*Percentage difference between the reported number of weekly or monthly deaths in 2020-2022 and the projected number of deaths for the same period based on previous years.

Please note, axis are truncated and not consistent between countries.

[71] https://ourworldindata.org/excess-mortality-covid

Excess mortality in the UK

A similar trend in excess mortality can be seen for England and Scotland throughout the pandemic (figures 12 and 13). The number of deaths observed during April–June 2020 exceeded the 2015-2019 average, this was also the case October 2020–February 2021, and from July–December 2021.

Figure 12: Excess mortality, count, persons, all ages, England, week ending 27 March 2020 to 11 February 2022[72]

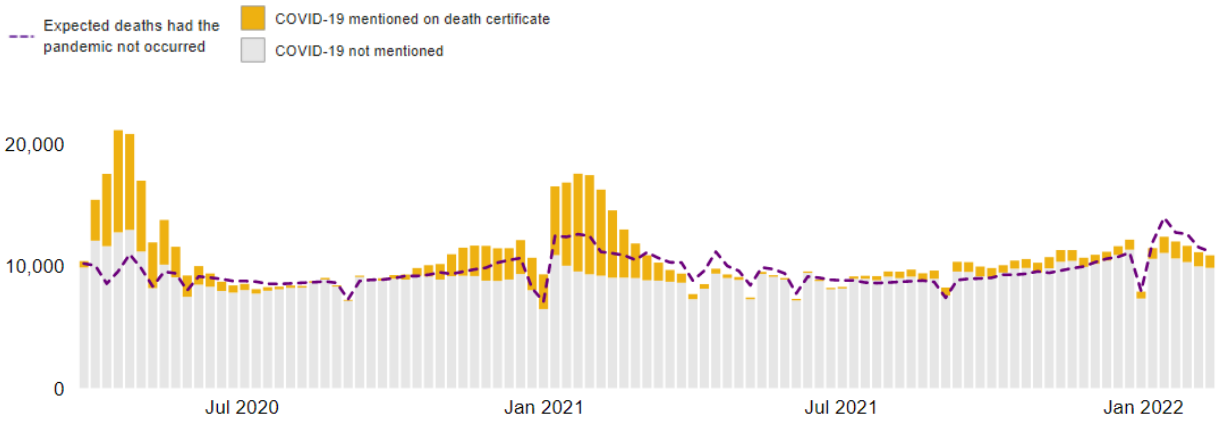
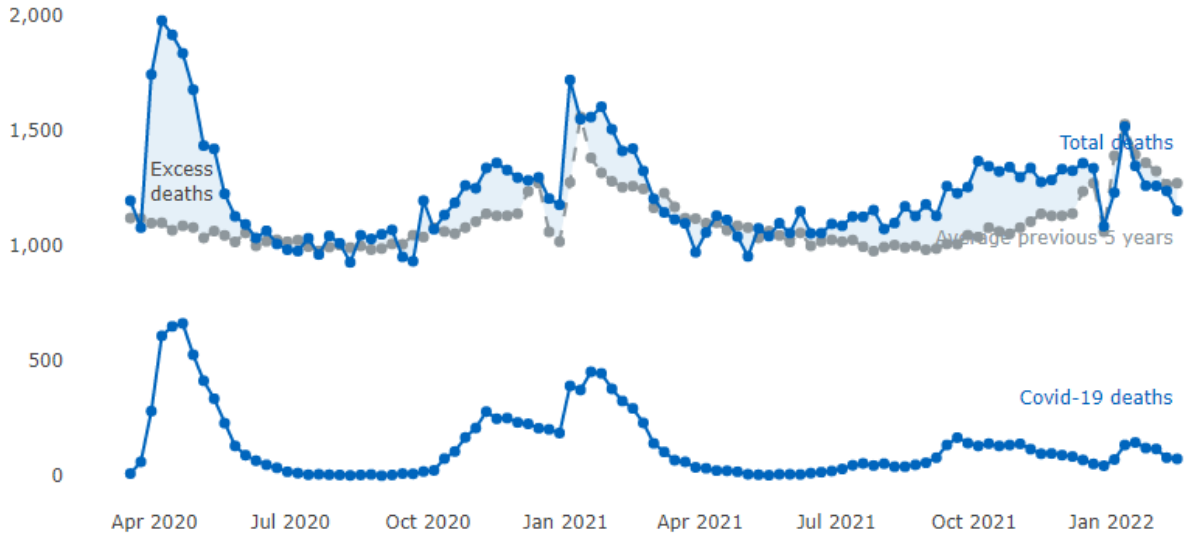


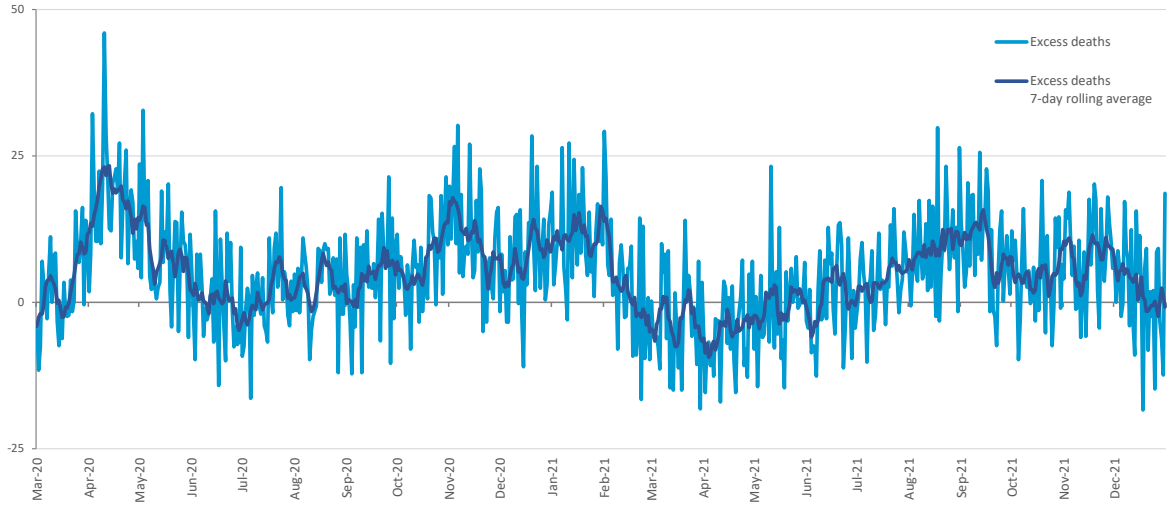
Figure 13: Excess deaths, count, persons, all ages, Scotland, week beginning 16 March 2020 to 14 February 2022, compared to 2015-2019 average[73]



Daily excess deaths in Northern Ireland peaked during April 2020 (figure 14).

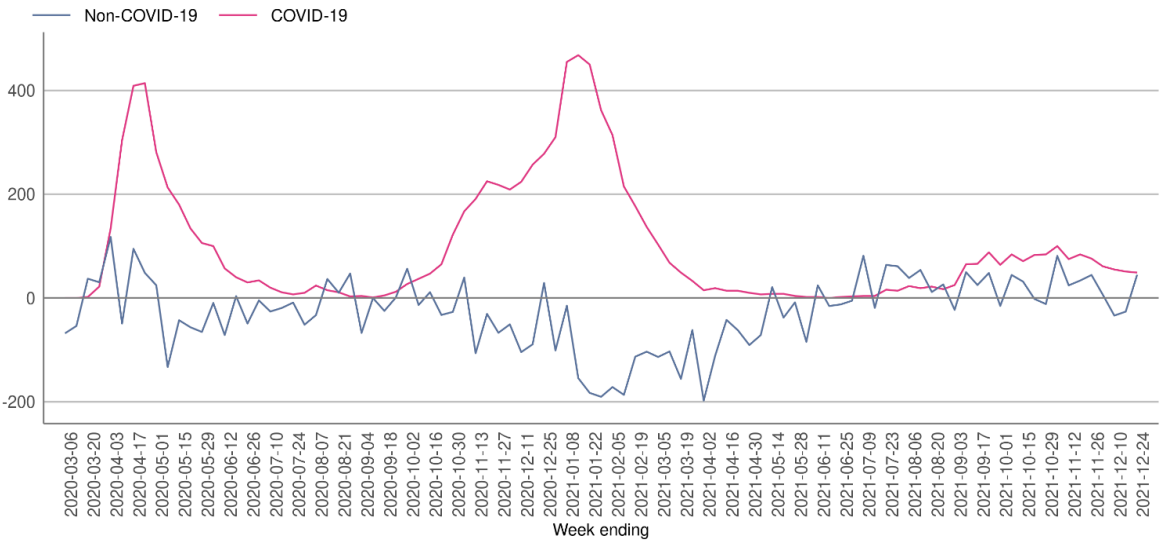
[72] https://www.gov.uk/government/statistics/excess-mortality-in-england-weekly-reports
[73] https://data.gov.scot/coronavirus-covid-19/detail.html#excess_deaths

Figure 14: Daily excess deaths and 7-day rolling average, count, all ages, Northern Ireland, March 2020 to December 2021[74]



For Wales, significant peaks of COVID-19 deaths were observed in March 2020 and January 2021, a third smaller wave can be seen from September-December 2021 (figure 15).

Figure 15: Excess mortality, count, persons, all ages, Wales, week ending 06 March 2020 to 24 December 2021*, compared to 2015-2019 average[75]



*Week 53 in 2015-2019 has been created (by duplicating week 52 data) for the purpose of comparison to 2020 data.

[74] https://www.nisra.gov.uk/publications/excess-mortality-covid-19-related-deaths-december-2021
[75] https://phw.nhs.wales/services-and-teams/observatory/data-and-analysis/covid-19-recovery-profile/

The International Horizon Scanning and Learning reports are developed by the International Health Team / the International Health Coordination Centre (IHCC) at the WHO Collaborating Centre on Investment for Health and Well-being (WHO CC), Public Health Wales.
Executive lead and WHO CC Director: Mark A Bellis
International health lead and WHO CC Deputy Director: Mariana Dyakova
Lead Consultant in Public Health: Claire Beynon
Authors and contributors: Anna Stielke, Andrew Cotter-Roberts, Abigail Instone, James Allen, Benjamin Bainham

Contacts: Claire.Beynon@wales.nhs.uk; Anna.Stielke@wales.nhs.uk

All reports are available at: https://phwwhocc.co.uk/covid-19/international-horizon-scanning/

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