COVID-19 Weekly Epidemiological Update

Edition 80, published 22 February 2022

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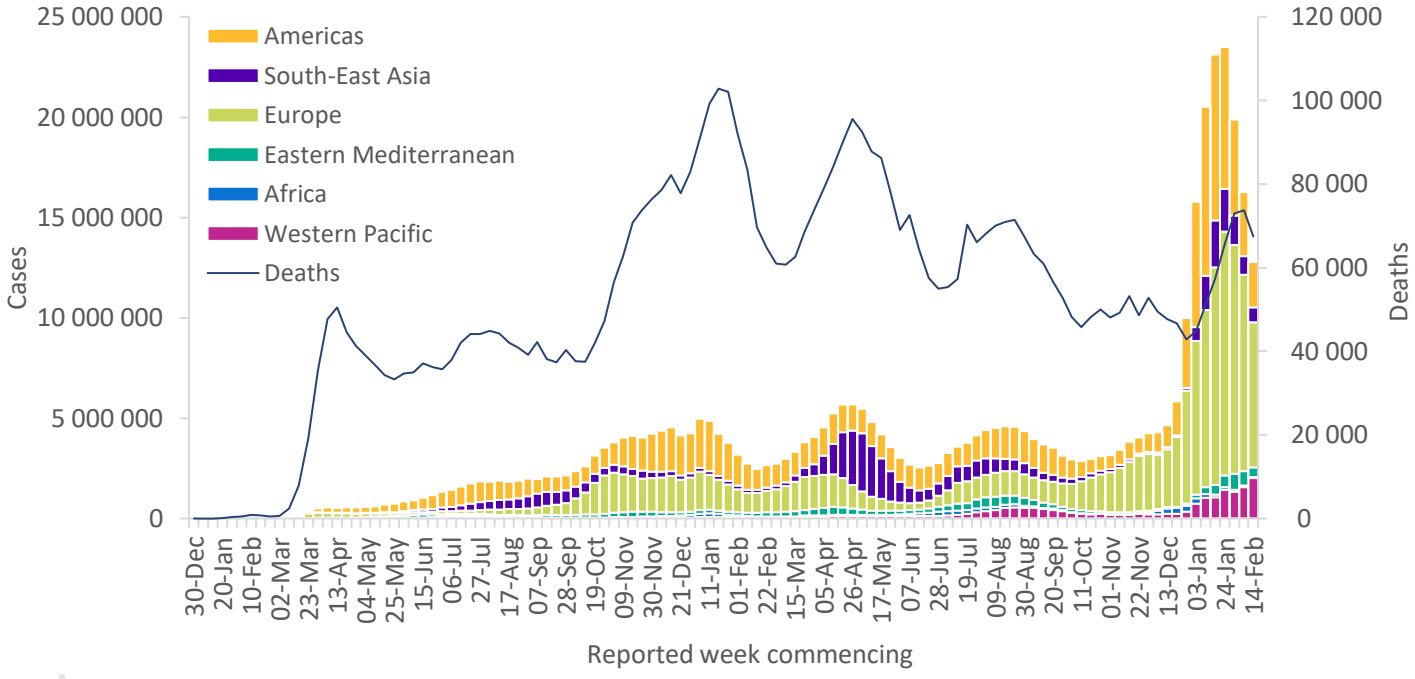
Global overview

Data as of 20 February 2022

Globally, during the week of 14 through 20 February 2022, the number of new COVID-19 cases decreased by 21% as compared to the previous week. In addition, the number of new deaths showed a decreasing trend (-8%) when compared to the previous week (Figure 1). Across the six WHO regions, over 12 million new cases and over 67 000 new deaths were reported (Table 1). As of 20 February 2022, over 422 million confirmed cases and over 5.8 million deaths have been reported globally.

At the regional level, the Western Pacific Region reported a 29% increase in the number of new weekly cases, while all other regions reported decreases: the Eastern Mediterranean Region (-34%), the Region of the Americas (-29%), the European Region (-26%), the African Region (-22%) and the South-East Asia Region (-17%). The number of new weekly deaths increased in the Western Pacific (+21%) and African (+20%) Regions and decreased in the South-East Asia (-37%), the Regions of Americas (-9%), the European Region (-5%) and the Eastern Mediterranean Region (-4%).

Figure 1. COVID-19 cases reported weekly by WHO Region, and global deaths, as of 20 February 2022**



**See *Annex 2: Data, table, and figure notes*

The highest numbers of new cases were reported from the Russian Federation (1 236 910 new cases; -7%), Germany (1 218 465 new cases; -8%), Brazil (773 353 new cases; -23%), the United States of America (746 129 new cases; -39%), and the Republic of Korea (612 195 new cases; +80%).

The highest number of new deaths were reported from the United States of America (14 723 new deaths; -6%), Brazil (5877 new deaths; -11%), the Russian Federation (5252 new deaths; +8%), India (3238 new deaths; -51%), and Mexico (2221 new deaths; +8%).

Table 1. Newly reported and cumulative COVID-19 confirmed cases and deaths, by WHO Region, as of 20 February 2022**

WHO Region	New cases in last 7 days (%)	Change in new cases in last 7 days *	Cumulative cases (%)	New deaths in last 7 days (%)	Change in new deaths in last 7 days *	Cumulative deaths (%)
Europe	7 224 687 (56%)	-26%	171 887 349 (41%)	24 772 (37%)	-5%	1 843 169 (31%)
Americas	2 265 214 (18%)	-29%	145 283 655 (34%)	28 945 (43%)	-9%	2 600 596 (44%)
Western Pacific	2 020 878 (16%)	29%	20 880 285 (5%)	3 749 (6%)	21%	176 613 (3%)
South-East Asia	762 899 (6%)	-17%	55 041 156 (13%)	5 001 (7%)	-37%	757 525 (13%)
Eastern Mediterranean	466 795 (4%)	-34%	20 815 884 (5%)	3 139 (5%)	-4%	329 934 (6%)
Africa	53 489 (0%)	-22%	8 279 661 (2%)	1 913 (3%)	20%	168 916 (3%)
Global	**12 793 962 (100%)**	**-21%**	**422 188 754 (100%)**	**67 519 (100%)**	**-8%**	**5 876 766 (100%)**

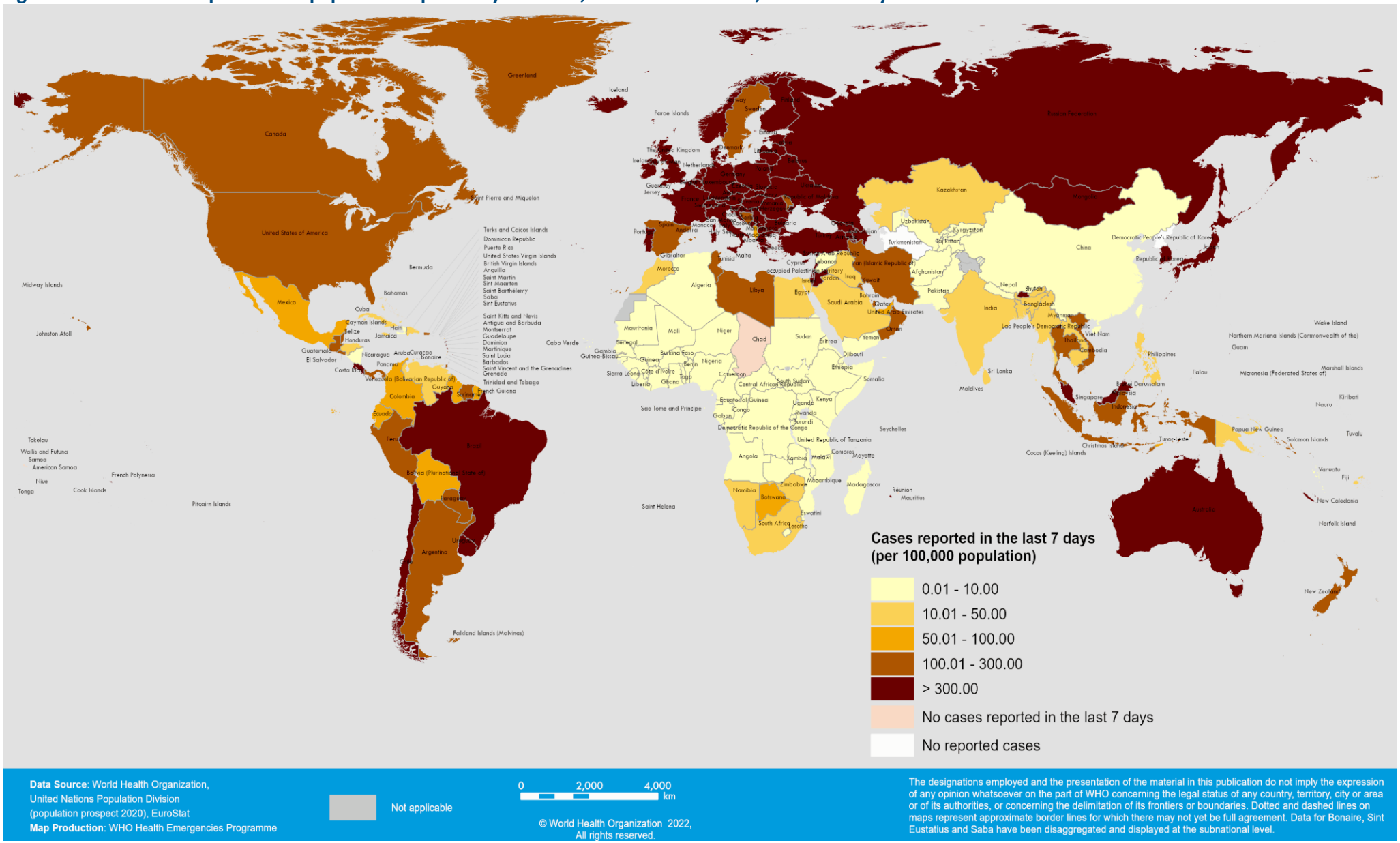
**Percent change in the number of newly confirmed cases/deaths in the past seven days, compared to seven days prior*

**See *Annex 2: Data, table, and figure notes*

For the latest data and other updates on COVID-19, please see:

- WHO COVID-19 Dashboard
- WHO COVID-19 Weekly Operational Update and previous editions of the Weekly Epidemiological Update

Figure 2. COVID-19 cases per 100 000 population reported by countries, territories and areas, 14-20 February 2022**

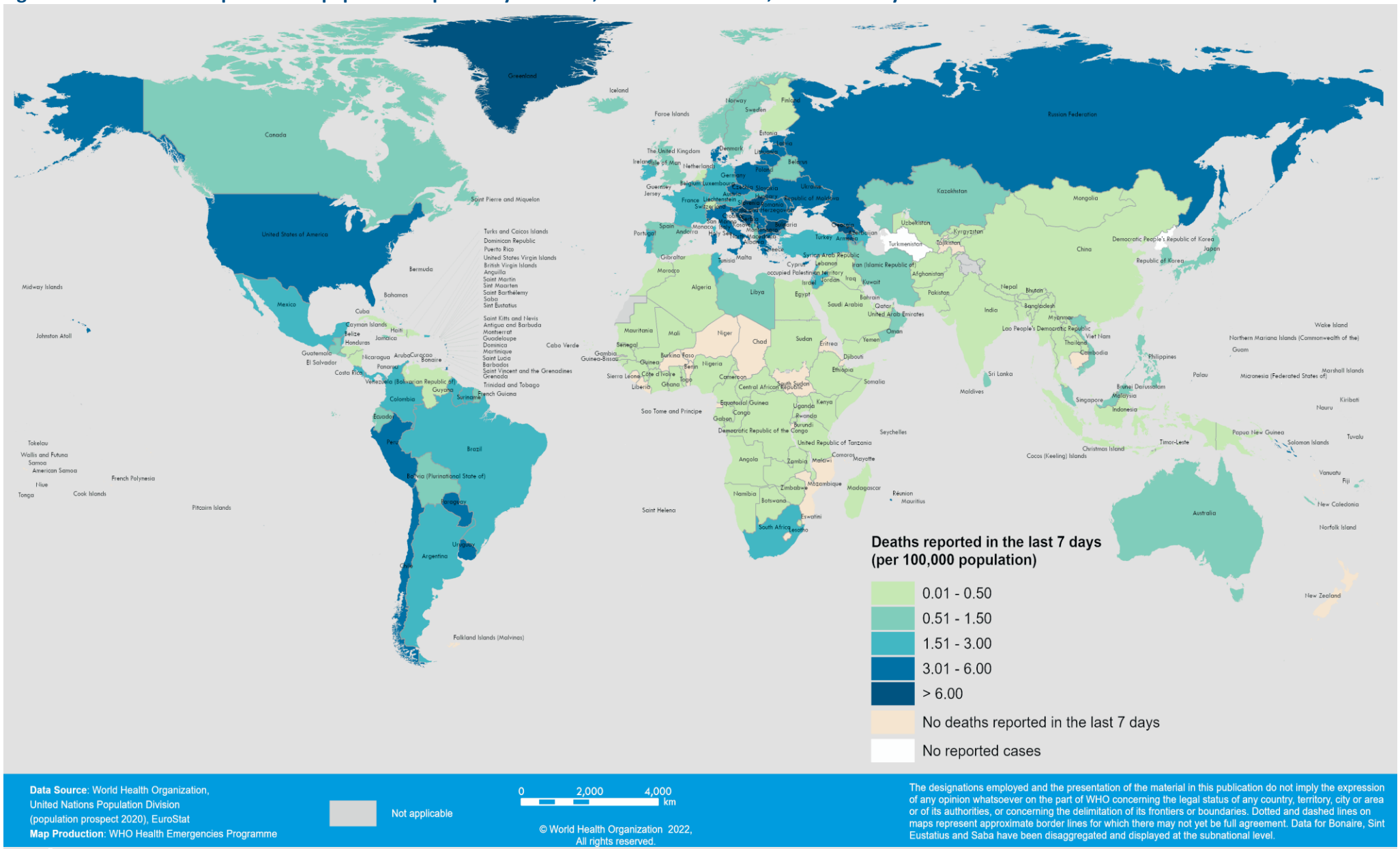


Data Source: World Health Organization, United Nations Population Division (population prospect 2020), EuroStat
Map Production: WHO Health Emergencies Programme

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of WHO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement. Data for Bonaire, Sint Eustatius and Saba have been disaggregated and displayed at the subnational level.

**See *Annex 2: Data, table, and figure notes*

Figure 3. COVID-19 deaths per 100 000 population reported by countries, territories and areas, 14-20 February 2022**



**See *Annex 2: Data, table, and figure notes*

Special Focus: Update on SARS-CoV-2 variants of interest and variants of concern

WHO, in collaboration with national authorities, institutions and researchers, routinely assesses if variants of SARS-CoV-2 alter transmission or disease characteristics, or impact effectiveness of vaccines, therapeutics, diagnostics or public health and social measures (PHSM) applied to control disease spread. Potential variants of concern (VOCs), variants of interest (VOIs) or variants under monitoring (VUMs) are regularly assessed based on the risk posed to global public health. As evidence becomes available, classifications of variants will be revised to reflect the continuous evolution of circulating variants and their changing epidemiology. Criteria for variant classification, and the current lists of VOCs, VOIs and VUMs, are available on the WHO Tracking SARS-CoV-2 variants website. National authorities may choose to designate other variants of local interest/concern and are encouraged to investigate and report on the impacts of these variants.

Geographic spread and prevalence of VOCs

The current global epidemiology of SARS-CoV-2 is characterized by the global dominance of the Omicron variant. Delta remains the only other named variant with significant reported circulation. Among the 495 016 sequences uploaded to GISAID with specimens collected in the last 30 days[i] 490 519 (99.1%) were Omicron, 3 841 (0.8%) were Delta, one (<0.1%) was Alpha and one non VOI/VOC sequence. In the last 30 days, no Beta, Gamma, Lambda or Mu sequences were reported to GISAID. To note, global VOCs distribution should be interpreted with due consideration of surveillance limitations, including differences in sequencing capacities and sampling strategies between countries, as well as delays in reporting.

The Omicron variant

Differences in the characteristics of VOCs

Available evidence on the phenotypic impacts of VOCs is reported in previous editions of the COVID-19 Weekly Epidemiological Update. Since the last update on 8 February 2022, there have been several new publications on the phenotypic characteristics of VOCs**,** including Omicron. Some of these studies have not been peer-reviewed and the findings must therefore be interpreted with due consideration of this limitation.

Update on the Omicron VOC

This section provides a summary of the potential impact of the Omicron variant. Detailed information on this variant and related recommended priority actions for Member States can be found in the updated Technical Brief and Priority Actions for Member States as well as under the Country and Technical Guidance – Coronavirus Disease (COVID-19). Based on the currently available evidence (Table 2), the overall global risk related to the Omicron variant remains very high.

Since the first reporting of the Omicron variant in November 2021, almost 1.5 million sequences have been deposited in GISAID. By the first week of January 2022, Omicron accounted for 90% of submitted sequences; by week five, Omicron had largely replaced all other variants and now accounts for over 99% of submitted sequences. Amongst the major Omicron lineages, BA.1 predominates overall, followed by BA.1.1 and BA.2, with BA.3 being the

[i] Includes sequences submitted to GISAID with sample collected dates from 19 January to 17 February 2022 (last reported sample at the time of data extraction), excluding low coverage sequences. Proportions are estimated for countries submitting more than 100 total sequences. In the past 30 days, 30 countries submitted a total of 100 sequences and above on GISAID.

least frequently detected. Weekly trends (figure 4, panel A) show that the relative proportion of BA.2 has increased over time, becoming the second most frequently detected lineage after BA.1.1 by week 6, and the dominant lineage in 18 countries. This trend is most pronounced in the South-East Asia region, followed by the Eastern Mediterranean, African, Western Pacific and European Regions. In contrast, very little BA.2 has been detected in the Americas, and no growth has been observed for the BA.3 lineage. Increased sequence variation has been observed within the BA.1 and BA.2 lineages over time, in line with increasing transmission. The weekly number of Omicron sequences has been steadily decreasing since the beginning of 2022 (figure 4, panel B). This trend should be interpreted with some caution, as data for the most recent weeks may be incomplete due to the delay between specimen collection and submission of sequences to GISAID (median delay from week 1 of 2022: 13 days). In addition, some countries may have changed their testing and sequencing policies during the presented period.

Figure 4. Global distribution and relative proportion of Omicron lineages for sequences submitted to GISAID presented by week of specimen collection

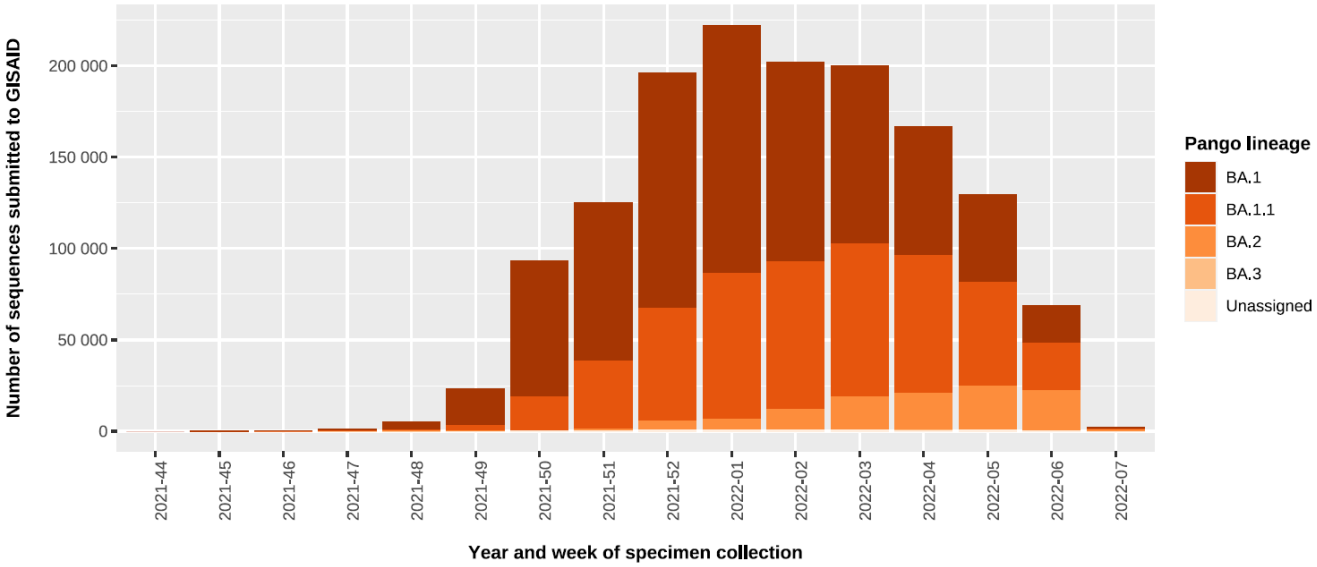
A.

				Overall (%)	Last 4 weeks by collection date (%)			
Lineage	**Countries**	**Sequences[a]**	**SGTF[b]**	**Total**	**2022-04**	**2022-05**	**2022-06**	**2022-07**
BA.1	151	831 022	96.42	55.89	42.18	37.04	30.21	26.67
BA.1.1	139	539 618	95.66	36.29	45.25	43.93	37.41	36.49
BA.2	85	110 905	0.10	7.46	12.23	18.56	31.91	35.80
BA.3	19	422	99.05	0.03	0.04	0.02	0.02	0.05
Unassigned	56	4 834	17.81	0.33	0.31	0.45	0.46	0.99

[a]Data source: sequences and metadata from GISAID

[b]Percentage of sequences with Spike H 69-70 deletion associated with S gene target failure

B.



Global distribution of Omicron lineages from sequences and metadata submitted to GISAID.

Panel A: Relative proportions of Omicron lineages over the last 4 weeks by specimen collection week.

Panel B: Incidence of Omicron lineages by week of specimen collection.

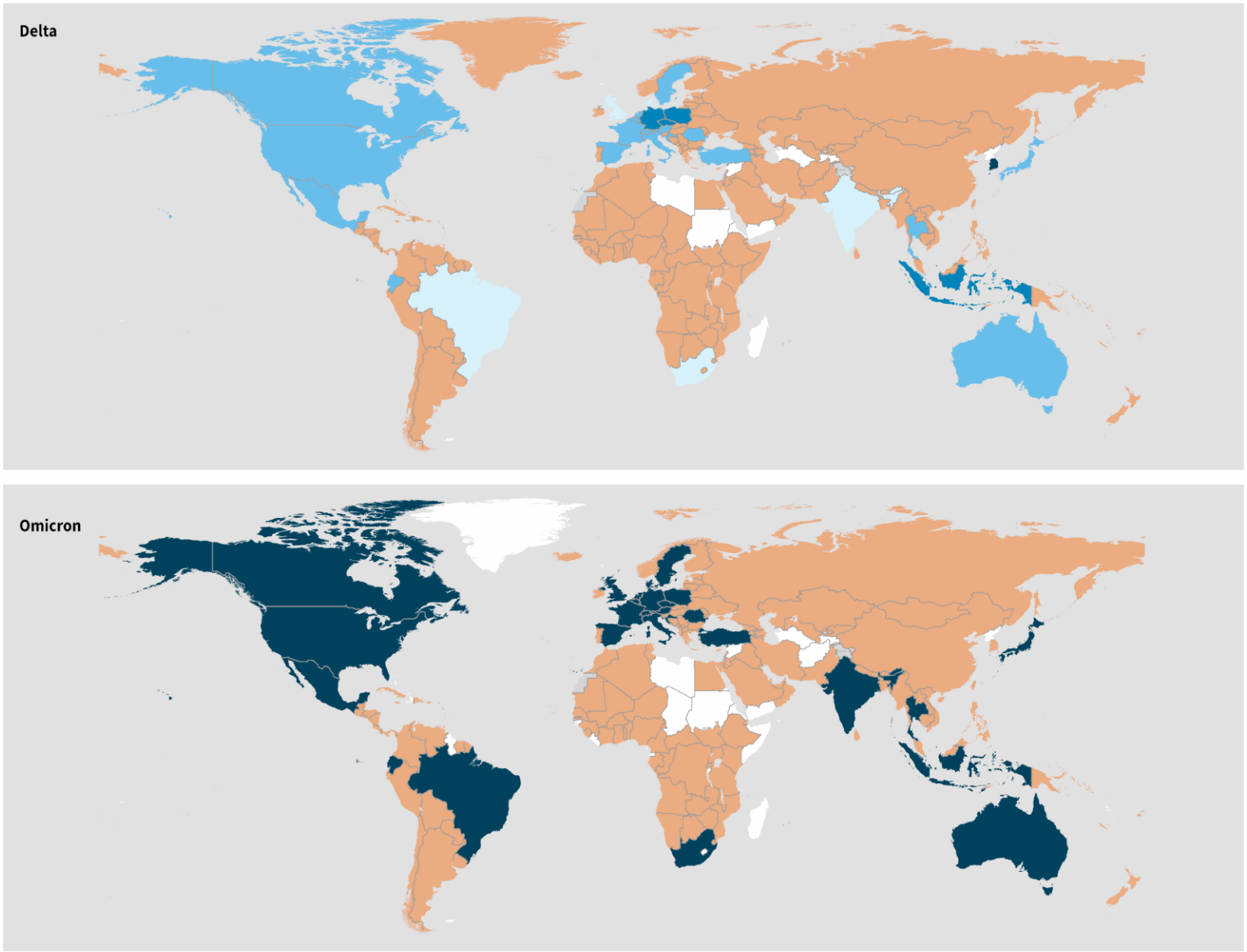
Data was extracted from GISAID on 21 February 2022 at 14:00 CET; figures are correct at the time of printing.

Table 2: Summary of current evidence on the Omicron variant of concern

Domain	Indicator	Main results
Epidemiology	Impact on disease incidence	- Omicron continues to spread globally and has been identified in most countries in all six WHO regions. - Globally, during the week of 14 through 20 February 2022, the number of new COVID-19 cases decreased by 21% as compared to the previous week. The number of new deaths also showed a decreasing trend (8%). At the regional level, the Western Pacific Region reported a 29% increase in the number of new weekly cases while all other regions reported decreases. - It is important to note that these trends may be due, in part, to an overall decrease in testing as some countries may have changed their testing and sequencing policies during the presented period.
	Impact on transmission	- An analysis based on the methods used by Campbell et al [1], and that focused on countries with sufficient sequence data uploaded to GISAID as of 18 February, found a growth rate advantage of Omicron over Delta in all countries. - This translated to a pooled mean transmission advantage (i.e., relative difference in effective reproduction numbers) of 77% (95% CI: 66% – 95%) across epidemiological contexts, under the assumption of an unchanged generation time (i.e. the duration between the moment a person gets infected to the moment they infect another person). The generation time of Omicron has been found to be shorter as compared to Delta, which suggests the transmission advantage may be lower than estimated above; for a 20% shorter generation time, the estimated pooled mean transmission advantage of Omicron over Delta is 66% (95% CI: 60% – 82%). - The same analysis demonstrates a growth rate advantage of the Omicron Pango lineage BA.2 over the Pango lineage BA.1, with a pooled mean transmission advantage of 63% (95% CI: 47% – 77%), under the assumption of an unchanged generation time. - Higher secondary attack rates were reported for Omicron compared to Delta: 13.6% (95% CI: 13.1%-14.1%) vs 10.1% (95% CI: 10.0%-10.2%) in the United Kingdom,[2] and 31% vs. 21% in Denmark.[3] - Researchers in China, Hong Kong SAR[4] found that Omicron had a higher tropism for the bronchi tissue compared to lungs. In the United Kingdom,[5] Omicron was found to infect the upper respiratory tract more rapidly than Delta, yielding about 100-fold higher titres. - Two studies conducted in South Africa [6,7] reported evasion from vaccine-induced and infection-induced immunity by Omicron. This could also be a contributing factor to the higher growth rates of Omicron compared to Delta.
	Impact on disease severity	Following analyses of patterns in recent medical consultations and hospitalizations, Omicron was consistently found to be associated with less severe disease compared to Delta across studies conducted in the United Kingdom,[8] the United States of America,[9,10] Canada[11] and South Africa.[12]
Immune response	Impact on reinfection	Preliminary data on Omicron in individuals previously infected with SARS-CoV-2 since the start of the pandemic showed an increase in the number of reinfections in Denmark[13] and Israel.[14] A higher risk (RR = 3.3; 95%CI: 2.8 – 3.8) of reinfection with Omicron compared to other SARS-CoV-2 variants was reported across the United Kingdom, with an even higher risk (RR = 5.4; 95%CI: 4.9 – 6.0) when reported only from England. [15]
	Impact on vaccination	Results of vaccine effectiveness (VE) studies are difficult to interpret, and estimates vary with the type of vaccine administered and the number of doses and scheduling (sequential administration of different vaccines). Studies conducted in the United Kingdom and the United States of America reported 60% – 75% vaccine effectiveness against symptomatic infection with Omicron.[16] See more details in the section below.
	Impact on antibody responses and cellular immunity	An analysis of neutralization data from 23 laboratories found a 20-fold reduction in neutralization associated with the Omicron variant in unvaccinated, previously infected individuals or individuals who had received two vaccine doses, while sera from vaccinated individuals with previous infection or individuals who had received three vaccine doses showed a seven-fold reduction.[17] This reduced

Domain	Indicator	Main results
		humoral response could be associated with an increased risk of reinfection. Conversely, studies on cellular immunity showed well preserved responses (70% – 80% of CD4+ and CD8+ responses) that could be associated with a decreased risk of severe disease.[18–22]
Diagnostic tools	Impact on PCR assays	Apart from the BA.2 lineage, all Omicron descendent variants have the 69-70 deletion responsible for S-gene target failure. Evaluation of PCR tests for SARS-CoV-2 that include multiple gene targets revealed limited impact of the Omicron variant on the diagnostic test accuracy of these assays.[23,24]
	Impact on Rapid Diagnostic tests	Preliminary data showed contradictory results, with some indicating that Ag-RDTs have similar sensitivity to Omicron as to the wild-type virus or other VOCs, while other studies found a difference. This variability in test performance was also found in more recent studies.[25,26]
Impact on treatment	Impact on antivirals	Preliminary data from several research projects showed no difference in the effectiveness of antiviral agents against Omicron.[27–29]
	Impact on biologicals	Studies on the effectiveness of monoclonal antibodies for treating patients with Omicron reported conserved neutralizing activity for three broadly neutralizing monoclonal antibodies (sotrovimab, S2X259 and S2H97) and a reduction in effectiveness of other monoclonal antibodies (**Planas 2021, VanBlargan 2021, Cameroni 2021, Wilhelm 2021, Roche 2021**).[30–34]
	Other treatment options	It is anticipated that other therapeutics for the clinical management of severe and critical COVID-19 patients (e.g. Interleukin-6 receptor blockers and corticosteroids, will maintain their effectiveness.

Figure 5: Prevalence of variants of concern (VOCs) Delta and Omicron in the last 30 days, data as of 22 February 2022



See also Annex 2 for reported VOC detections by country/territory/area

Figure 6. Vaccine effectiveness (VE) of primary series and booster vaccination against the Delta variant of concern

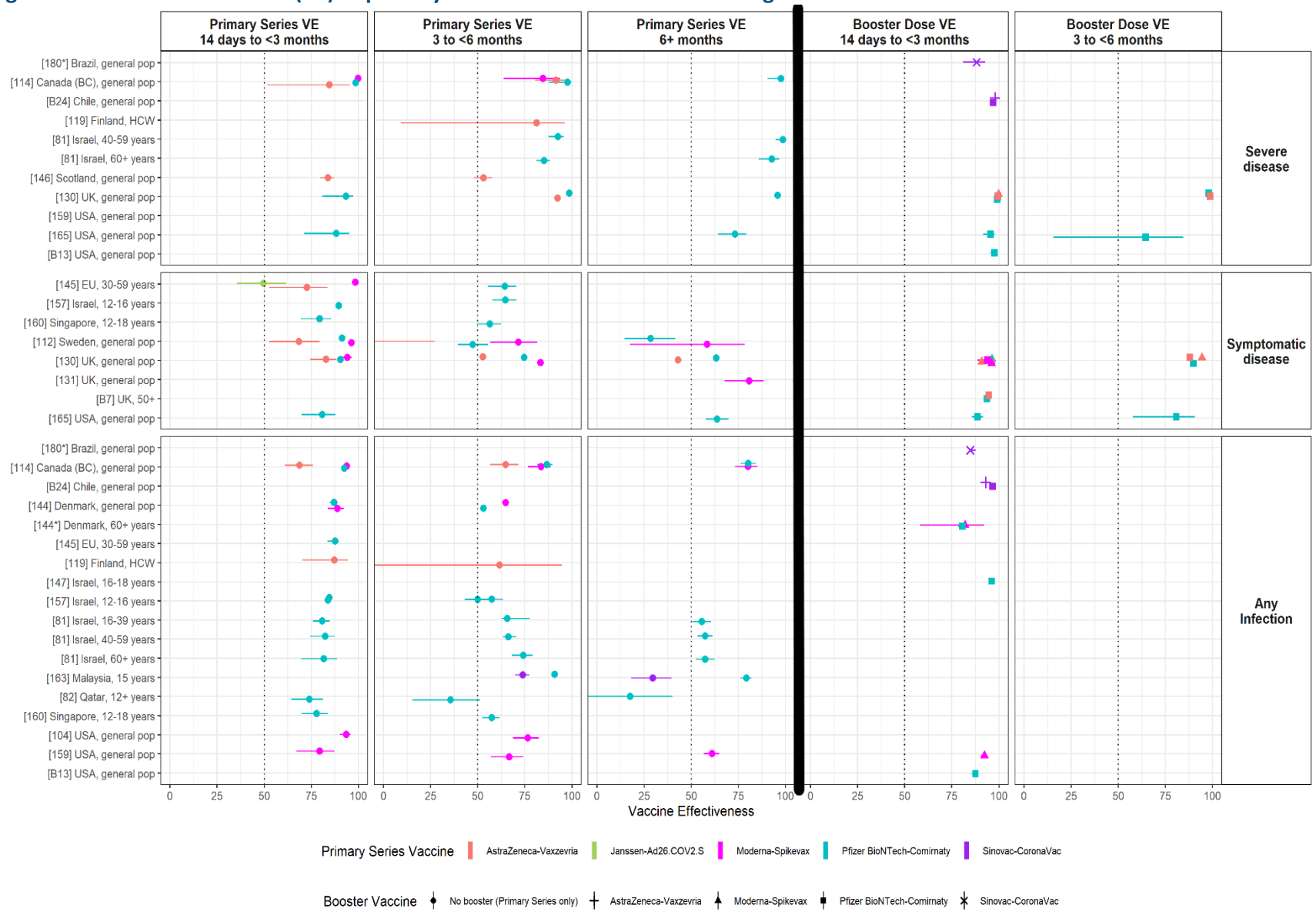
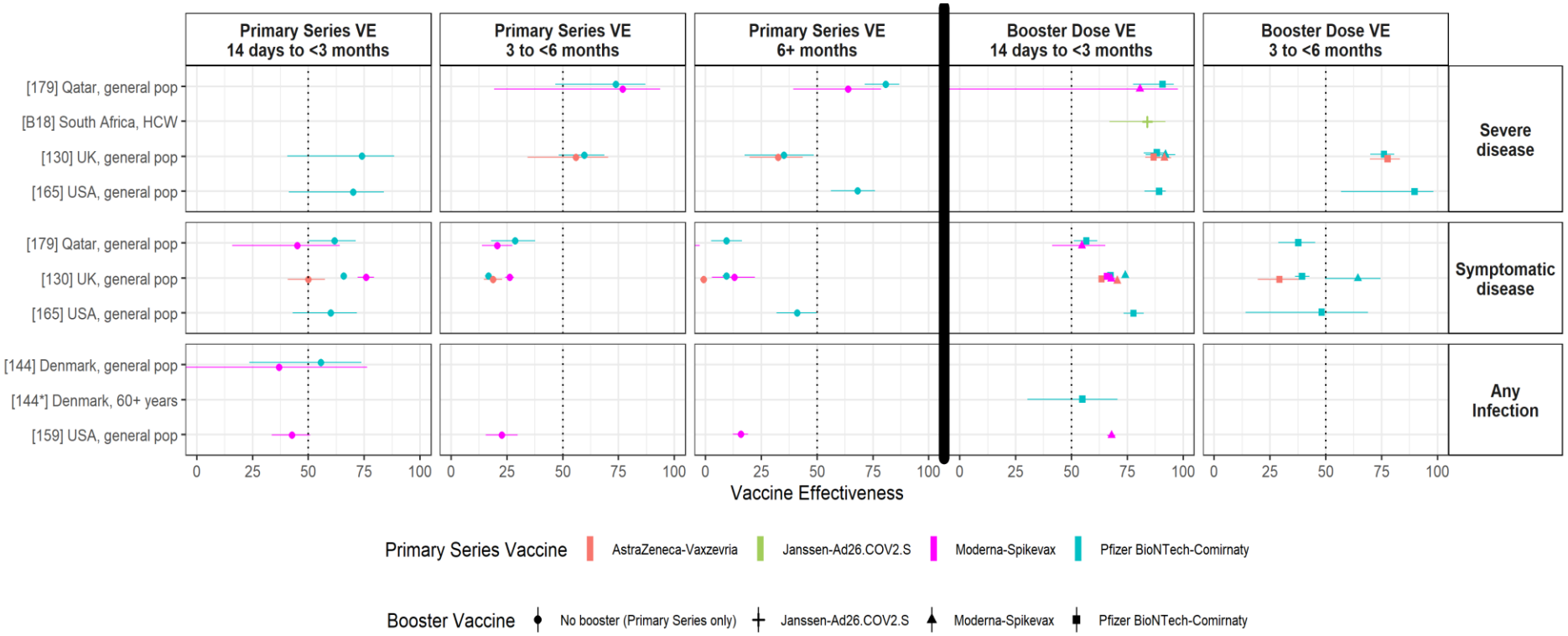


Figure 7. Vaccine effectiveness (VE) of primary series and booster vaccination against the Omicron variant of concern



*Indicates booster dose vaccine effectiveness evaluated using persons completing primary series as reference group, rather than unvaccinated persons.Abbreviations: pop=population; HCW=healthcare workers; EU=European Union. Dots represent point estimates of vaccine effectiveness; horizontal lines represent the 95% confidence intervals. Labels along left side of plot indicate reference numbers [], country, and study population. Reference numbers identify the study and link to the summary table of VE effectiveness studies on view-hub.org (Table 1 in summary table); references starting with a 'B' are studies found in the booster VE table only (Table 2 in summary table). Primary series refers to the completion of two doses of vaccines for Astra-Zeneca-Vaxzevria; Moderna-Spikevax, Pfizer BioNTech-Comirnaty and Sinovac-CoronaVac and one dose of Janssen-Ad26.COV2. Severe disease includes hospitalization; symptomatic disease includes disease of any severity level; any infection can include symptomatic and asymptomatic infection. Additional details on the methods for inclusion of the estimates in the plots provided in Annex 3. Note, three negative point estimates for the primary series are not shown in the Omicron plot: Moderna-Spikevax VE against symptomatic disease at 6+ months (reference 179) as well as Moderna-Spikevax and Pfizer BioNTech-Comirnaty VE against infection at 3-6 months (reference 144); one negative point estimate for primary series is not shown in the Delta plot: AstraZeneca-Vaxzevria VE against Delta symptomatic disease (reference 112) with 95% Cis crossing 0 is not fully visible in the plot.

Figures 6 and 7 summarize the impact of Delta and Omicron variants, respectively, on product-specific vaccine effectiveness (VE) over time for both primary series vaccines and booster vaccines. Since the last update, one new study (pre-print) from Qatar[35] has evaluated primary series and booster dose VE of Pfizer BioNTech-Comirnaty and Moderna-Spikevax vaccines against symptomatic and severe disease due to Omicron; and one new peer-reviewed study from Brazil[36] has assessed VE of three doses of Sinovac-CoronaVac against infection and severe disease in the context of Delta. The methods for including estimates in the plot are described below. Additional information on vaccine performance against VOCs can also be found in Annex 4.

Interpretation of the results of VE for the Delta variant

Most of the evidence to date indicates that effectiveness of the mRNA vaccines (Pfizer BioNTech-Comirnaty and Moderna-Spikevax) remains high against *severe disease* associated with Delta variant infection at six or more months after the primary series, with three of four studies reporting VE estimates of >90% and one study reporting a VE of 74% at six months or more. Three studies report high VE (>80%) of the AstraZeneca-Vaxzevria vaccine three to six months following the primary series, while one study reports a lower VE (54%), compared to the first three months (84%).

VE estimates against *symptomatic disease* and *infection* range from 73 to 96% following the primary series of one of the two mRNA vaccine from 14 days up to three months after vaccination and 68-88% following the primary series of the AstraZeneca-Vaxzevria vaccine during the same time period. There is, however, consistent evidence of decreasing VE against *symptomatic disease* and *infection* over time following the primary series for all of the vaccines for which data are available. Despite this, most of the evidence still shows VE estimates of >50% (59-80%) at six months or more following mRNA vaccine, with four estimates falling below 50%. Three of the four studies evaluating the AstraZeneca-Vaxzevria vaccine also showed a VE >50% (54-65%) at three to six months, though in one of these studies the VE decreased to 43% at six or more months following the primary series. A single study of Sinovac-CoronaVac (an inactivated vaccine) conducted in Malaysia reported a VE against *infection* of 74% three to six months following the primary series, which decreased to 30% beyond six months.

Receipt of a booster dose of mRNA, vector-based and inactivated vaccines for which there are data available resulted in a VE of ≥79% for *all outcomes* within the first three months. At three to six months following the booster dose, the VE of a Pfizer BioNTech-Comirnaty booster following Pfizer BioNTech-Comirnaty or AstraZeneca-Vaxzevria primary series remained >95% against *severe disease* in a single study conducted in the United Kingdom, but decreased from 95% to 65% with Pfizer BioNTech-Comirnaty primary series and booster in a single study conducted in the United States of America. In the same two studies, the VE against *symptomatic disease* at three months or more following a booster dose with an mRNA vaccine was >75% after a primary series of either the AstraZeneca-Vaxzevria or the Pfizer BioNTech-Comirnaty vaccines.

Interpretation of the results of VE for the Omicron variant

Six studies of VE for the Omicron variant show lower protection of the primary series COVID-19 vaccines for all outcomes (*severe disease*, *symptomatic disease*, and *infection*) than has been observed previously for other VOCs. Importantly, VE estimates against the Omicron variant remains highest for *severe disease*, while they are lower for s*ymptomatic disease and infection.* Booster vaccination substantially improves VE for all outcomes for all products for which there are data. More data are needed to characterize the duration of the VE following a booster dose.

VE estimates for the Pfizer BioNTech-Comirnaty vaccine against *severe disease* due to the Omicron variant within the first three months following the primary series (without a booster dose) range from 70 to 74% and decrease over time since vaccination, with VE estimates of 60-74% between three and six months, and 35-80% at six months or more. In three to six months versus six months or longer, VE estimates for the AstraZeneca-Vaxzevria vaccine against *severe disease* reduced from 56% to 33%, with relatively wide confidence intervals (see Figure 7 for details).

Early VE estimates (measured from 14 days up to three months after vaccination) of the primary series against *symptomatic disease* are generally lower than those for *severe disease*, though they remain at or above 50% for AstraZeneca-Vaxzevria, Moderna-Spikevax, and Pfizer BioNTech-Comirnaty vaccines, except for one study that reported VE of 45% (95% CI: 16-64%) for Moderna-Spikevax. VE against *infection* at 14 days up to three months after the primary series was lower, ranging from 37 to 55%. All available estimates against both *symptomatic disease* and *infection* measured three or more months after completion of the primary series indicate VE estimates of less than 50% for the three vaccines.

A booster dose increases VE estimates against *severe disease* to above 75% for all vaccines for which data are available, with this effect maintained up to six months after the booster dose. A booster dose increased VE estimates against *symptomatic disease* in the first three months following vaccination substantially, by at least 37 percentage points across all studied vaccines, with VE ranging from 55% to 78%. However, VE decreased to 29-64% at three to six months. Limited evidence is available for VE against *infection* due to the Omicron variant following a booster dose, with only one study showing a VE of 68% within the first three months of a booster dose of Moderna-Spikevax.

Additional resources

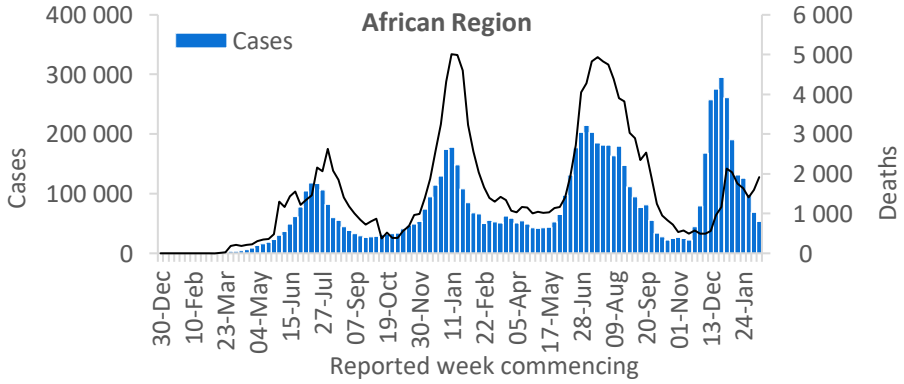
- Tracking SARS-CoV-2 Variants
- COVID-19 new variants: Knowledge gaps and research
- Genomic sequencing of SARS-CoV-2: a guide to implementation for maximum impact on public health
- Considerations for implementing and adjusting public health and social measures in the context of COVID-19
- VIEW-hub: repository for the most relevant and recent vaccine data

WHO regional overviews Epidemiological week 14-20 February 2022**

African Region

The African Region has reported a continued decrease in the number of cases since the beginning of January 2022, with over 53 000 new cases reported, a 22% decrease as compared to the previous week. However, four countries in the Region (8%) reported an increase of over 20% in cases: Ghana (469 vs 210 new cases; +123%), Equatorial Guinea (17 vs 8 new cases; +112%), Zimbabwe (1925 vs 964 new cases; +99%) and Burkina Faso (40 vs 26 new cases; +53%). The highest numbers of new cases were reported from Réunion (21 707 new cases; 2424.5 new cases per 100 000 population; -29%), South Africa (16 929 new cases; 28.5 new cases per 100 000; -6%), and Algeria (2710 new cases; 6.2 new cases per 100 000; -25%).

With just over 1900 new deaths reported this week, the Region shows a 20% increase when compared to the previous week. This increase is driven by a backlog of deaths reported by South Africa following an ongoing audit exercise. The highest numbers of new deaths were reported from South Africa (1632 new deaths; 2.8 new deaths per 100 000 population; +40%), Algeria (72 new deaths; <1 new death per 100 000; similar to previous week), and Réunion (38 new deaths; 4.2 new deaths per 100 000; +12%).

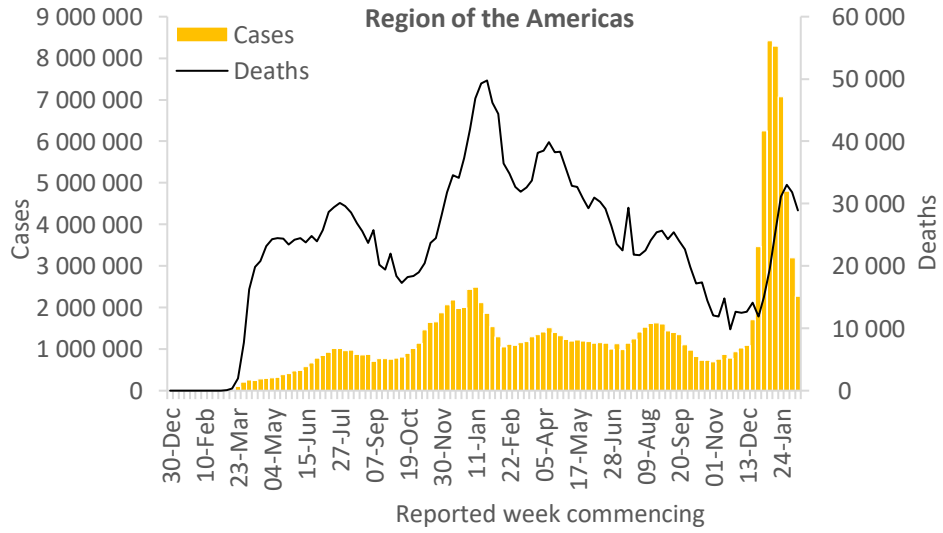


Updates from the African Region

Region of the Americas

The Region of the Americas reported over 2.2 million new cases, a 29% decrease as compared to the previous week, a trend that has continued since mid-January. However, three countries have reported increases in new cases of 20% or greater, with the highest proportional increases reported from Mexico (90 422 vs 53 344 new cases; +70%), Nicaragua (85 vs 65 new cases; +31%) and, Saint Lucia (536 vs 419; +28%). The highest numbers of new cases were reported from Brazil (773 353 new cases; 363.8 new cases per 100 000; -23%), the United States of America (746 129 new cases; 225.4 new cases per 100 000; -39%), and Chile (236 312 new cases; 1236.2 new cases per 100 000; -5%).

The Region reported just under 29 000 new deaths this week, a 9% increase as compared to the previous week. The highest numbers of new deaths were reported from the United States of America (14 723 new deaths; 4.4 new deaths per 100 000; -6%), Brazil (5877 new deaths; 2.8 new deaths per 100 000; -12%), and Mexico (2221 new deaths; 1.7 new deaths per 100 000; +8%).

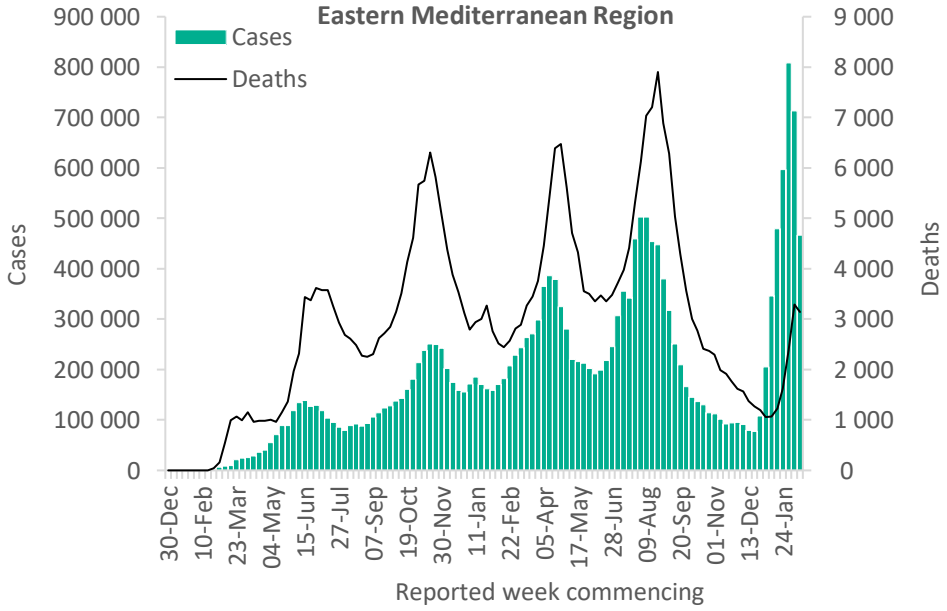


Updates from the Region of the Americas

Eastern Mediterranean Region

In the Eastern Mediterranean Region, new weekly cases continue to decline for the second consecutive week since the peak reached in early February 2022. Over 466 000 new cases were reported this week, representing a 34% decrease as compared to the previous week. The highest numbers of new cases were reported from the Islamic Republic of Iran (145 032 new cases; 172.7 new cases per 100 000; -39%), Jordan (110 012 new cases; 1078.2 new cases per 100 000; -19%), and Lebanon (30 984 new cases; 453.9 new cases per 100 000; -33%).

The number of new weekly deaths remains stable when compared to the previous week's figures, with over 3100 new deaths reported. The highest numbers of new deaths were reported from the Islamic Republic of Iran (1228 new deaths; 1.5 new deaths per 100 000; +49%), Egypt (402 new deaths; <1 new death per 100 000; -3%), and Tunisia (310 new deaths; 2.6 new deaths per 100 000; -32%).

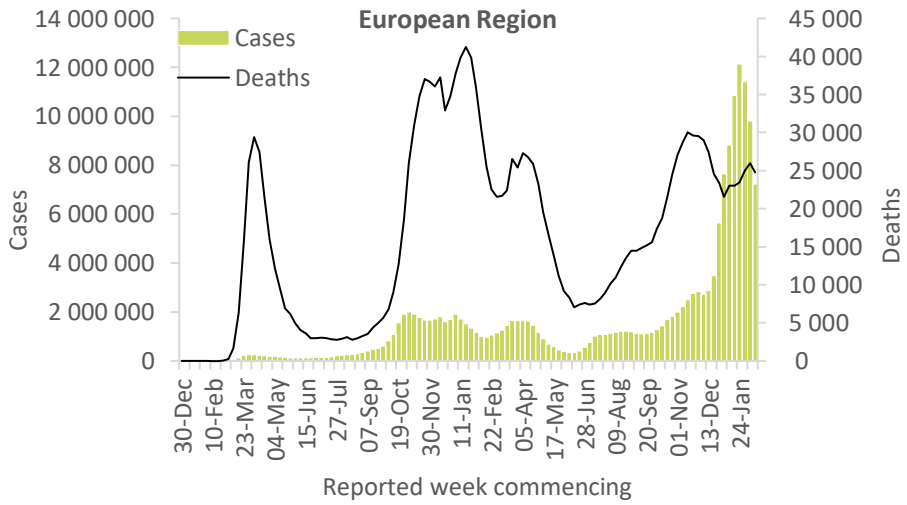


Updates from the Eastern Mediterranean Region

European Region

The European Region reported a further decline this week with over 7.2 million new cases, a 26% decrease as compared to the previous week. This is the third consecutive week of a decline in the number of new cases since the Region observed a peak at the end of January. Only one country – Iceland - reported a greater than 20% increase this week (17 293 vs 13 333 new cases; +30%). The highest numbers of new cases were reported from the Russian Federation (1 236 910 new cases; 847.6 new cases per 100 000; -7%), Germany (1 218 465 new cases; 1465.1 new cases per 100 000; -8%), and Turkey (599 596 new cases; 710.9 new cases per 100 000; -12%).

This week, over 24 000 new deaths were reported in the Region, a 5% decrease as compared to the previous week. The highest numbers of new deaths were reported from the Russian Federation (5252 new deaths; 3.6 new deaths per 100 000; +9%), Italy (2024 new deaths; 3.4 new deaths per 100 000; -11%), and Turkey (1922 new deaths; 2.3 new deaths per 100 000; +11%).

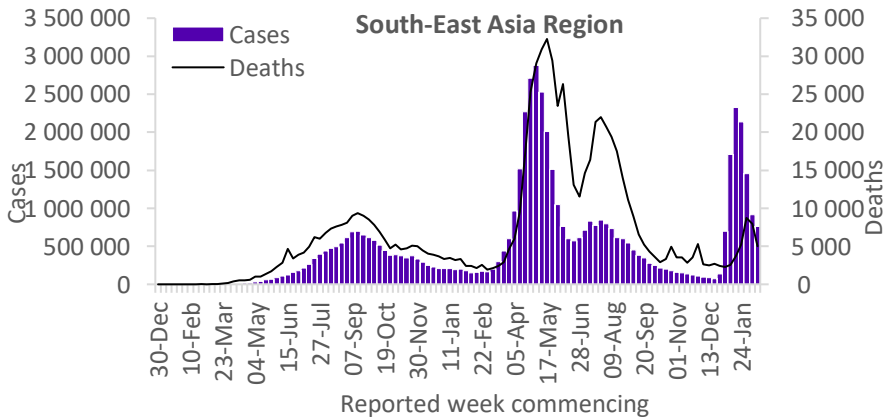


Updates from the European Region

South-East Asia Region

A decline in new cases has been observed in the South-East Asia Region since mid-January. Over 762 000 new cases were reported in the Region this week, a 17% decrease as compared to the previous week. Despite the declining trend at the regional level, four countries reported an increase of over a 20% e: Myanmar (18 896 vs 8870 new cases; +113%), Bhutan (2649 vs 1337 new cases; +98%), Indonesia (389 727 vs 291 298 new cases; +34%) and Thailand (118 988 vs 96 326 new cases; +24%). The highest numbers of new cases were reported from Indonesia (142.5 new cases per 100 000), India (191 052 new cases; 13.8 new cases per 100 000; -57%), and Thailand (170.5 new cases per 100 000).

Regionally, the number of new deaths also declined this week with just over 5000 new deaths reported, a 37% decrease as compared to the previous week. The highest numbers of new deaths were reported from India (3238 new deaths; <1 new death per 100 000; -52%), Indonesia (1189 new deaths; <1 new death per 100 000; +91%), and Thailand (188 new deaths; <1 new death per 100 000; +30%).

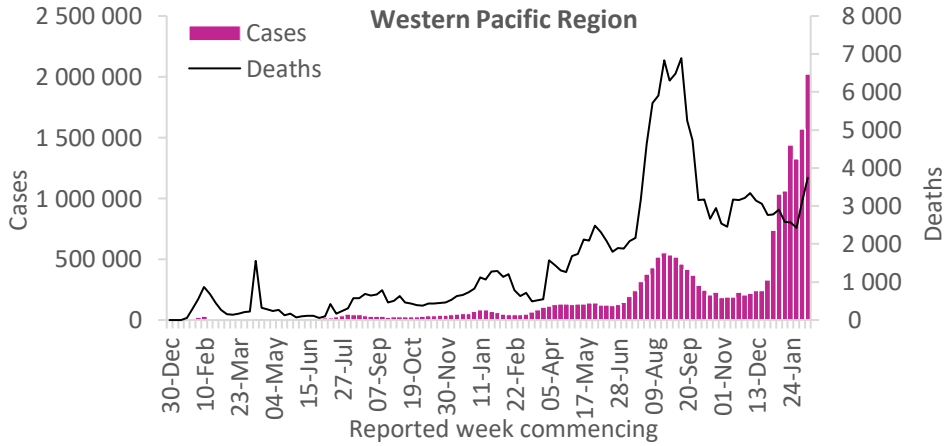


Updates from the South-East Asia Region

Western Pacific Region

The Western Pacific Region reported a sharp increase (29%) in new weekly cases as compared to the previous week, with over two million new cases. More than a third (11/28; 39%) of the countries in the Region reported an increase of 20% or greater in the past week. The most substantial increases were observed in New Zealand (10 361 vs 2792 new cases; +271%), China (26 329 vs 7571 new cases; +248%) and Brunei Darussalam (10 934 vs 4175 new cases; +162%). The highest numbers of new cases were reported from the Republic of Korea (612 195 new cases; 1194.1 new cases per 100 000; +80%), Japan (579 928 new cases; 458.5 new cases per 100 000; -7%), and Viet Nam (255 812 new cases; 262.8 new cases per 100 000; +63%).

Over 3700 new deaths were reported in the Region this week, a 21% increase as compared to the previous week. The highest numbers of new deaths were reported from Japan (1434 new deaths; 1.1 new deaths per 100 000; +52%), the Philippines (677 new deaths; <1 new death per 100 000; -5%), and Viet Nam (561 new deaths; <1 new death per 100 000; -7%).



Updates from the Western Pacific Region

Summary of the COVID-19 Weekly Operational Update

The Weekly Operational Update is a report provided by the COVID-19 Strategic Preparedness and Response Plan (SPRP) Monitoring and Evaluation team, which aims to update on the ongoing global progress against the COVID-19 SPRP 2021 framework, and to highlight country-level actions and WHO support to countries. In this week's edition published on 22 February, highlights include the following:

- Supporting the acceleration of COVID-19 vaccination rollout in Georgia through technical support
- Scaling up genomic sequencing in Nigeria to support policymakers
- WHO and partners working together to support Pacific Island Countries as COVID-19 gains a foothold in the Region
- WHO supports the scaling-up suicide prevention during COVID-19 in Bhutan
- With support of WHO's core contributors, health services and on-site vaccine opportunities were implemented in Iraq
- GOARN expert deployed by WHO to support the Commonwealth of Northern Mariana Islands' COVID-19 response
- Overview of OpenWHO superusers and the most popular COVID-19 online courses
- Progress on a subset of global indicators that demonstrate country and global progress to end the acute phase of the pandemic

Technical guidance and other resources

- WHO technical guidance
- WHO COVID-19 Dashboard
- WHO Weekly Operational Updates on COVID-19
- WHO COVID-19 case definitions
- COVID-19 Supply Chain Inter-Agency Coordination Cell Weekly Situational Update
- Research and Development
- Open WHO courses on COVID-19 in official UN languages and in additional national languages
- WHO Academy COVID-19 mobile learning app
- The Strategic Preparedness and Response Plan (SPRP) outlining the support the international community can provide to all countries to prepare and respond to the virus
- EPI-WIN: tailored information for individuals, organizations, and communities
- Recommendations and advice for the public:
  - Protect yourself
  - Questions and answers
  - Travel advice

Annex 1. List of countries/territories/areas reporting variants of concern as of 22 February 2022

Country/Territory/Area	Alpha	Beta	Delta	Gamma	Omicron
Afghanistan	●	-	●	-	-
Albania	●	-	○	-	●
Algeria	●	-	●	-	●
American Samoa	-	-	○	-	○
Andorra	○	○	○	-	○
Angola	●	●	●	●	●
Anguilla	●	-	●	-	●
Antigua and Barbuda	●	●	●	●	●
Argentina	●	●	●	●	●
Armenia	●	-	●	-	●
Aruba	●	●	●	●	●
Australia	●	●	●	●	●
Austria	●	●	●	●	●
Azerbaijan	●	-	○	-	●
Bahamas	●	-	●	●	-
Bahrain	●	●	●	●	●
Bangladesh	●	●	●	○	●
Barbados	●	-	●	●	●
Belarus	●	-	○	-	●
Belgium	●	●	●	●	●
Belize	●	-	●	●	●
Benin	●	●	●	●	●*
Bermuda	●	●	●	-	●
Bhutan	●	●	●	-	●
Bolivia (Plurinational State of)	●	-	●	●	●
Bonaire	●	-	●	●	●
Bosnia and Herzegovina	●	●	○	●	○
Botswana	○	●	●	-	●
Brazil	●	●	●	●	●
British Virgin Islands	●	-	●	●	●
Brunei Darussalam	●	●	●	-	●
Bulgaria	●	●	●	-	●
Burkina Faso	●	●	●	-	●
Burundi	●	●	●	-	-
Cabo Verde	●	●	●	-	●
Cambodia	●	●	●	-	●
Cameroon	●	●	●	●	●
Canada	●	●	●	●	●
Cayman Islands	●	●	●	●	●
Central African Republic	●	●	●	-	●*
Chad	●	●	●	-	-
Chile	●	●	●	●	●
China	●	●	●	●	●
Colombia	●	-	●	●	●
Comoros	●	●	●	-	●*
Congo	●	●	●	●	●
Costa Rica	●	●	●	●	●
Croatia	●	●	●	●	●
Cuba	●	●	●	-	●
Curaçao	●	●	●	●	●
Cyprus	●	●	●	-	●
Czechia	●	●	●	●	●
Côte d'Ivoire	●	●	●	●	●
Democratic Republic of the Congo	●	●	●	-	●
Denmark	●	●	●	●	●
Djibouti	●	●	●	-	●
Dominica	●	-	●	-	-
Dominican Republic	●	-	●	●	●
Ecuador	●	-	●	●	●
Egypt	●	-	●	-	●
El Salvador	●	-	●	●	●
Equatorial Guinea	●	●	●	●	-
Estonia	●	●	○	○	●
Eswatini	●	●	●	-	●
Ethiopia	●	●	●	-	●
Falkland Islands (Malvinas)	●	●	-	-	-
Faroe Islands	●	-	-	●	-
Fiji	○	-	●	-	●
Finland	●	●	●	●	●
France	●	●	●	●	●
French Guiana	●	●	●	●	●
French Polynesia	●	●	●	●	●
Gabon	●	●	●	●	●
Gambia	●	●	●	●	●
Georgia	●	○	●	-	●
Germany	●	●	●	●	●
Ghana	●	●	●	●	●
Gibraltar	●	-	○	-	●
Greece	●	●	●	●	●
Greenland	-	-	●	-	-
Grenada	●	-	●	●	●
Guadeloupe	●	●	●	●	●
Guam	●	●	●	●	●
Guatemala	●	●	●	●	●
Guernsey	-	-	-	-	●
Guinea	●	●	●	-	●
Guinea-Bissau	●	●	●	-	-
Guyana	●	-	●	●	-
Haiti	●	-	●	●	-
Honduras	●	-	●	●	●
Hungary	●	○	○	●	●
Iceland	●	●	●	●	●
India	●	●	●	●	●
Indonesia	●	●	●	-	●
Iran (Islamic Republic of)	●	●	●	-	●
Iraq	●	●	●	●	●
Ireland	●	●	●	●	●
Israel	●	●	●	●	●

Country/Territory/Area	Alpha	Beta	Delta	Gamma	Omicron
Italy	●	●	●	●	●
Jamaica	●	-	●	-	●
Japan	●	●	●	●	●
Jordan	●	●	●	●	●
Kazakhstan	●	○	●	-	●
Kenya	●	●	●	●	●
Kiribati	-	-	-	-	●
Kosovo[1]	●	○	○	-	●
Kuwait	●	●	●	-	●
Kyrgyzstan	●	●	●	-	●
Lao People's Democratic Republic	●	-	●	-	○
Latvia	●	●	○	●	●
Lebanon	●	-	●	-	●
Lesotho	●	●	●	-	-
Liberia	●	●	●	-	-
Libya	●	●	●*	-	-
Liechtenstein	●	-	○	○	○
Lithuania	●	●	○	●	●
Luxembourg	●	●	●	●	●
Madagascar	●	●	-	○	-
Malawi	●	●	●	-	●
Malaysia	●	●	●	-	●
Maldives	●	-	●	-	●
Mali	●	●	●	-	○
Malta	●	○	○	●	●
Martinique	●	●	●	●	●
Mauritania	●	●	●	-	●
Mauritius	●	●	●	-	●
Mayotte	●	●	●	-	●
Mexico	●	●	●	●	●
Monaco	●	●	●	-	-
Mongolia	●	-	●	-	●
Montenegro	●	-	○	○	○
Montserrat	●	-	●	●	●
Morocco	●	●	●	-	●
Mozambique	●	●	●	-	●
Myanmar	●	-	●	-	●
Namibia	●	●	●	●	●
Nepal	●	-	●	-	●
Netherlands	●	●	●	●	●
New Caledonia	●	-	●	-	●
New Zealand	●	●	●	●	●
Nicaragua	●	●	●	●	●
Niger	○	-	●	-	●
Nigeria	●	●	●	-	●
North Macedonia	●	●	○	-	○
Northern Mariana Islands (Commonwealth of the)	○	-	●	-	○
Norway	●	●	●	●	●
Occupied Palestinian Territory	●	●	●	-	●
Oman	●	●	●	-	●
Pakistan	●	●	●	●	●
Palau	-	-	○	-	-
Panama	●	●	●	●	●
Papua New Guinea	-	-	●	-	●
Paraguay	●	-	●	●	●
Peru	●	-	●	●	●
Philippines	●	●	●	●	●
Poland	●	○	●	●	●
Portugal	●	●	●	●	●
Puerto Rico	●	●	●	●	●
Qatar	●	●	●	-	●
Republic of Korea	●	●	●	●	●
Republic of Moldova	●	-	●	-	●
Romania	●	●	●	●	●
Russian Federation	●	●	●	○	●
Rwanda	●	●	●	-	●
Réunion	●	●	●	●	●
Saba	-	-	●	-	-
Saint Barthélemy	●	-	●	-	●
Saint Kitts and Nevis	-	-	●	-	●
Saint Lucia	●	-	●	-	●
Saint Martin	●	●	●	-	●
Saint Pierre and Miquelon	-	-	●	-	-
Saint Vincent and the Grenadines	-	-	●	●	●
Sao Tome and Principe	●	●	○	-	-
Saudi Arabia	●	●	●	-	●
Senegal	●	●	●	-	●
Serbia	●	-	●	○	○
Seychelles	●	●	●	-	●
Sierra Leone	●	●	●	-	●
Singapore	●	●	●	●	●
Sint Maarten	●	●	●	●	●
Slovakia	●	●	●	-	●
Slovenia	●	●	●	●	●
Solomon Islands	-	-	●	-	●
Somalia	●	●	●	-	-
South Africa	●	●	●	●	●
South Sudan	●	●	●	-	●
Spain	●	●	●	●	●
Sri Lanka	●	●	●	-	●
Sudan	●	●	●*	●	-
Suriname	●	●	●	●	●
Sweden	●	●	●	●	●
Switzerland	●	●	●	●	●
Thailand	●	●	●	●	●
Timor-Leste	●	-	●	-	●
Togo	●	●	●	●	●
Tonga	-	-	-	-	○
Trinidad and Tobago	●	-	●	●	●

Country/Territory/Area	Alpha	Beta	Delta	Gamma	Omicron
Tunisia	●	●	●	-	●
Turkey	●	●	●	●	●
Turks and Caicos Islands	●	-	●	●	-
Uganda	●	●	●	-	●
Ukraine	●	○	○	-	●
United Arab Emirates	●	●	●	●	●
United Kingdom	●	●	●	●	●

Country/Territory/Area	Alpha	Beta	Delta	Gamma	Omicron
United Republic of Tanzania	●	●	●	●	●
United States Virgin Islands	●	●	●	●	●
United States of America	●	●	●	●	●
Uruguay	●	●	●	●	●
Uzbekistan	●	●	○	-	●
Vanuatu	-	-	●	-	-

Country/Territory/Area	Alpha	Beta	Delta	Gamma	Omicron
Venezuela (Bolivarian Republic of)	●	-	●	●	●
Viet Nam	●	●	●	-	●
Wallis and Futuna	●	-	-	-	-
Yemen	●	●	-	-	-
Zambia	●	●	●	-	●
Zimbabwe	●	●	●	-	●

**Newly reported in this update. "●" indicates that information for this variant was received by WHO from official sources. "○" indicates that information for this variant was received by WHO from unofficial sources and will be reviewed as more information becomes available. **Includes countries/territories/areas reporting the detection of VOCs among travelers (e.g., imported cases detected at points of entry), or local cases (detected in the community). Excludes countries, territories, and areas that have never reported the detection of a variant of concern.*

See also Annex 2: Data, table, and figure notes

Annex 2. Data, table, and figure notes

Data presented are based on official laboratory-confirmed COVID-19 case and deaths reported to WHO by country/territories/areas, largely based upon WHO case definitions and surveillance guidance. While steps are taken to ensure accuracy and reliability, all data are subject to continuous verification and change, and caution must be taken when interpreting these data as several factors influence the counts presented, with variable underestimation of true case and death incidences, and variable delays to reflecting these data at the global level. Case detection, inclusion criteria, testing strategies, reporting practices, and data cut-off and lag times differ between countries/territories/areas. A small number of countries/territories/areas report combined probable and laboratory-confirmed cases. Differences are to be expected between information products published by WHO, national public health authorities, and other sources.

Due to public health authorities conducting data reconciliation exercises that remove large numbers of cases or deaths from their total counts, negative numbers may be displayed in the new cases/deaths columns as appropriate. When additional details become available that allow the subtractions to be suitably apportioned to previous days, graphics will be updated accordingly. A record of historic data adjustment made is available upon request by emailing epi-data-support@who.int. Please specify the countries of interest, time period, and purpose of the request/intended usage. Prior situation reports will not be edited; see covid19.who.int for the most up-to-date data. COVID-19 confirmed cases and deaths reported in the last seven days by countries, territories, and areas, and WHO Region (reported in previous issues) are now available at: https://covid19.who.int/table.

'Countries' may refer to countries, territories, areas or other jurisdictions of similar status. The designations employed, and the presentation of these materials do not imply the expression of any opinion whatsoever on the part of WHO concerning the legal status of any country, territory, or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement. Countries, territories, and areas are arranged under the administering WHO region. The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by WHO in preference to others of a similar nature that are not mentioned. Errors and omissions except, the names of proprietary products are distinguished by initial capital letters.

[1] All references to Kosovo should be understood to be in the context of the United Nations Security Council resolution 1244 (1999). In the map, the number of cases of Serbia and Kosovo (UNSCR 1244, 1999) have been aggregated for visualization purposes.

Annex 3. Methods for the update on BA.2 Pango lineage of the Omicron variant of concern

We conducted a search for published and unpublished studies on the BA.2 Pango lineage of the Omicron variant. The search for published studies was conducted in Medline while the search for unpublished literature was conducted in MedRxiv, which is a repository for preprints. We searched for studies and reports with an abstract in English, that were accessible up to 14 February 2022. Search terms used were "BA.2" and "Omicron Pango lineages".

We also searched the GISAID website and websites of the following public health agencies: Health Security Agency (UKHSA) of the United Kingdom, Centers for Disease Control and Prevention of the United States of America (USCDC), Statens Serum Institute (SSI) of Denmark, the National Institute for Communicable Diseases (NICD) of South Africa and the European Centre for Disease Prevention and Control (ECDC).

The summary of the evidence was done based on the risk assessment framework implemented by the UKHSA. Following the assessment, each indicator was assigned one of four colours: red, amber, yellow and green. Red implies a difference

in the indicator between BA.2 and BA.1. Amber implies there is a difference in the indicator between BA.2 and BA.1 in certain population subgroups. Yellow implies there is limited evidence suggesting a difference in the indicator between BA.2 and BA.1. Green implies there is no difference in the indicator between BA.2 and BA.1. Grey implies there is insufficient data on the indicator. The confidence grading was classified as: “Low” when there was little or poor-quality evidence, uncertainty or conflicting views amongst experts or no experience with previous similar incidents; “Moderate” when there was adequate quality evidence – including consistent results published only in grey literature, reliable source(s), assumptions made on analogy and agreement between experts or opinion of at least 2 trusted experts; and “High” when there was good quality evidence, multiple reliable sources, verified, expert opinion concurs, and experience of previous similar incidents.

Annex 4. Methods for Figures 6 and 7

• Figures include six studies from Denmark, Qatar, South Africa, the United Kingdom, and the United States of America evaluating the VE against the Omicron variant, and 20 studies of the VE against the Delta variant from various countries from the European Region and Region of the Americas, as well as Qatar, Malaysia and Singapore.

• VE studies included in the plot were identified from an ongoing systematic review of COVID-19 vaccine effectiveness studies. All studies were cohort or test-negative studies. Methods for the systematic review and inclusion/exclusion criteria are available on view-hub.org. The studies were conducted during a period when either Delta or Omicron was the predominant circulating variant. Estimates were included if they were of laboratory-confirmed cases of the Omicron or Delta variant. In addition, for the primary series VE, only studies providing VE estimates for discrete time intervals since vaccination, which evaluate changes in VE over time, are included.

• For the primary series VE, estimates are only included in the plot for studies that report VE for more than one time period.

Annex 5. Summary of primary series vaccine performance against Variants of Concern (data as of 18 February 2022)

	WHO Emergency Use Listing (EUL) Qualified Vaccines+								Vaccines without WHO EUL+	
	AstraZeneca-Vaxzevria/SII - Covishield	Beijing CNBG-BBIBP-CorV	Bharat-Covaxin	Janssen-Ad26.COV 2.S	Moderna-mRNA-1273	Novavax-Nuvaxovid/SII - Covavax	Pfizer BioNTech-Comirnaty	Sinovac-CoronaVac	Anhui ZL-Recombinant	Gamaleya-Sputnik V
Alpha, Beta, Gamma										
Summary of VE*	*(see update from 11 January 2022 for details of vaccine performance against Alpha, Beta, and Gamma variants of concern*									
Delta[37]										
Summary of VE*	Protection retained against severe disease; possible reduced protection against symptomatic disease and infection									
- Severe disease	↔$_3$	-	-	↓$_1$	↔$_4$	-	↔$_7$	-	-	-
- Symptomatic disease	↔to↓↓$_6$	-	↓$_1$	-	↔$_2$	-	↔to↓$_5$	-	-	-
- Infection	↔to↓$_5$	-	-	↓↓↓$_1$	↔$_6$	-	↔to↓$_6$	-	-	-
Neutralization	↓$_{14}$	↔to↓$_2$	↔to↓$_4$	↔to↓↓$_{10}$	↓$_{14}$	-	↔to↓$_{40}$	↓to↓↓$_9$	↔to↓$_2$	↓to↓↓↓$_3$
Omicron										
Summary of VE*	Reduced protection against infection and symptomatic disease; possible reduced protection against for severe disease but limited evidence									
- Severe disease	-	-	-	-	↓/↓↓$_1$	-	↓↓/↓↓↓$_3$	-	-	-
- Symptomatic disease	↓↓↓$_1$	-	-	-	↓↓/↓↓↓$_2$	-	↓↓↓$_2$	-	-	-
- Infection	↓↓↓$_1$	-	-	-	↓↓↓$_3$	-	↓↓↓$_3$	-	-	-
Neutralization	↓↓↓$_6$	↔to↓↓↓$_3$	↓↓$_1$	↔to↓↓$_4$	↓↓↓$_{16}$	-	↓↓↓$_{34}$	↓to↓↓↓$_4$	-	↓↓$_1$

VE refers to vaccine effectiveness and vaccine efficacy. *Summary of VE: indicates the general conclusions but only for the vaccines evaluated against the specific variant. Arrows generalize the magnitude of reduction in VE or neutralization: "↔" <10 percentage point (pp) reduction in VE, or VE >90% with no comparator, or that there was a <2-fold reduction in neutralization; "↓" 10 to <20 pp reduction in VE, or 2 to <5-fold reduction in neutralization; "↓↓" 20 to <30 pp reduction in VE, or 5 to <10-fold reduction in neutralization; "↓↓↓" ≥30 pp reduction in VE, or ≥10-fold reduction in neutralization. When more than one neutralization study is available, the interquartile range (25th and 75th percentiles) of fold-reductions across all studies for specific vaccine/variant was used. "Moderna-mRNA-1273/Pfizer BioNTech-Comirnaty" indicates that both vaccines were evaluated together in study. The number of studies is shown as subscripts: vaccine effectiveness and neutralization studies informing this table can be found on the VIEW-hub Resources Library . References indicated by superscripts next to VOC name in column 1 are vaccine efficacy results from randomized controlled trials informing this table. + Severe disease is defined differently across studies and may include outcomes such as hospitalization, critical disease, and other forms of 'severe' disease.

Additional notes on VOC impacts on vaccines

- Reductions in VE do not necessarily mean a loss of protection, as indicated by the absolute VE estimate. For example, a 10-percentage point reduction in VE against symptomatic disease for mRNA vaccines would still mean high vaccine effectiveness of ~85%. Likewise, vaccines have shown higher VE against severe disease; thus, small reductions in VE against severe disease due to VOCs may still mean substantial protection.
- Annex 5 summarizes the impact of VOCs on COVID-19 vaccine performance in the absence of waning, and, therefore, does not include studies that only assess VE greater than four months post final dose.
- Studies reporting VOC-specific VE estimates for full vaccination (≥seven days post final dose) are assessed against a comparator VE estimate for that vaccine product to determine level of reduction in VE. For symptomatic disease, VOC VE is compared against phase three randomized controlled trial (RCT) results from non-VOC settings. For severe disease and infection, due to instability or lack of phase three RCT estimates, VOC VE is compared to non-VOC VE estimates from the same study when available (or to Alpha VE from same study when assessing Beta, Gamma, or Delta); with an exception for AstraZeneca-Vaxzevria for infection (when a phase three estimate of VE against infection due to non-VOC is available and used as comparator). In some instances, a study may be included for severe disease or infection outcome even without a comparator if a very high VE estimate is reported against a VOC (i.e., >90%).
- It is also important to note that studies vary in population, outcome definitions, study design and other methodological considerations, which may in part explain differences when comparing VE estimates for a product between different studies. In addition, the reductions summarized in the table represent VE point estimates and do not represent the uncertainty intervals around these estimates which vary substantially across studies. The reductions in VE noted should be interpreted with these limitations in mind.
- Neutralization studies that use samples collected >seven days and < six months after complete vaccination and that use an ancestral strain as the reference are included in Annex 5.

References

1. Campbell F, Archer B, Laurenson-Schafer H, et al. Increased transmissibility and global spread of SARS-CoV-2 variants of concern as at June 2021. *Eurosurveillance*. 2021;26(24). doi:10.2807/1560-7917.ES.2021.26.24.2100509
2. UK Health Security Agency. *Technical Briefing 33: SARS-CoV-2 Variants of Concern and Variants under Investigation in England*.; 2021. Accessed January 21, 2022. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1043807/technical-briefing-33.pdf
3. Lyngse FP, Mortensen LH, Denwood MJ, et al. *SARS-CoV-2 Omicron VOC Transmission in Danish Households*. Infectious Diseases (except HIV/AIDS); 2021. doi:10.1101/2021.12.27.21268278
4. Chan MCW, Hui KP, Ho J, et al. *SARS-CoV-2 Omicron Variant Replication in Human Respiratory Tract Ex Vivo*. In Review; 2021. doi:10.21203/rs.3.rs-1189219/v1
5. Brown J, Zhou J, Peacock T, Barclay W. The SARS-CoV-2 variant, Omicron, shows enhanced replication in human primary nasal epithelial cells. Published 2021. Accessed January 9, 2022. https://www.gov.uk/government/publications/imperial-college-london-omicron-vs-delta-replication-19-december-2021/imperial-college-london-omicron-vs-delta-replication-19-december-2021
6. Viana R, Moyo S, Amoako D. *Rapid Epidemic Expansion of the SARS-CoV-2 Omicron Variant in Southern Africa*.; 2021. Accessed December 23, 2021. https://krisp.org.za/manuscripts/ZHTOWa-MEDRXIV-2021-268028v1-deOliveira.pdf
7. Yang W, Shaman J. SARS-CoV-2 transmission dynamics in South Africa and epidemiological characteristics of the Omicron variant. Published online 2021. Accessed December 23, 2021. http://www.columbia.edu/~jls106/yang_shaman_omicron_sa.pdf
8. Ferguson N, Ghani A, Hinsley W, Volz E. *Report 50: Hospitalisation Risk for Omicron Cases in England*. Imperial College London; 2021. Accessed December 23, 2021. https://www.imperial.ac.uk/media/imperial-college/medicine/mrc-gida/2021-12-22-COVID19-Report-50.pdf
9. Wang L, Berger NA, Kaelber DC, Davis PB, Volkow ND, Xu R. *Comparison of Outcomes from COVID Infection in Pediatric and Adult Patients before and after the Emergence of Omicron*. Infectious Diseases (except HIV/AIDS); 2022. doi:10.1101/2021.12.30.21268495
10. Lewnard JA, Hong VX, Patel MM, Kahn R, Lipsitch M, Tartof SY. *Clinical Outcomes among Patients Infected with Omicron (B.1.1.529) SARS-CoV-2 Variant in Southern California*. Epidemiology; 2022. doi:10.1101/2022.01.11.22269045
11. Ulloa AC, Buchan SA, Daneman N, Brown KA. Estimates of SARS-CoV-2 Omicron Variant Severity in Ontario, Canada. *JAMA*. Published online February 17, 2022. doi:10.1001/jama.2022.2274
12. Wolter N, Jassat W, Walaza S, et al. *Early Assessment of the Clinical Severity of the SARS-CoV-2 Omicron Variant in South Africa*. Infectious Diseases (except HIV/AIDS); 2021. doi:10.1101/2021.12.21.21268116
13. Statens Serum Institut. Re-infections are now part of the Danish State Serum Institute's daily monitoring. Published December 15, 2021. Accessed December 23, 2021. https://www.ssi.dk/aktuelt/nyheder/2021/reinfektioner-indgar-nu-i-statens-serum-instituts-daglige-overvagning
14. Israeli Ministry of Health. Coronavirus in Israel - general picture. Published December 23, 2021. Accessed December 23, 2021. https://datadashboard.health.gov.il/COVID-19/general?tileName=dailyReturnSick
15. Ferguson N, Ghani A, Cori A. *Report 49: Growth, Population Distribution and Immune Escape of Omicron in England*. Imperial College London; 2021. Accessed December 23, 2021. https://www.imperial.ac.uk/media/imperial-college/medicine/mrc-gida/2021-12-16-COVID19-Report-49.pdf
16. International Vaccine Access Center, Johns Hopkins Bloomberg School of Public Health, and, World Health Organization. Forest Plots: Vaccine Effectiveness against Delta and Omicron Variants of Concern: Updated January 13, 2022. Published online 2022. Accessed February 18, 2022. https://view-hub.org/sites/default/files/2022-01/COVID19%20VE%20Studies_Forest%20Plots_Delta_Omicron_0.pdf
17. Netzl A, Tureli S, LeGresley E, Muhlemann B, Wilks SH, Smith DJ. *Analysis of SARS-CoV-2 Omicron Neutralization Data up to 2021-12-22*.; 2022. Accessed January 9, 2022. https://www.biorxiv.org/content/10.1101/2021.12.31.474032v1.full.pdf
18. Ahmed SF, Quadeer AA, McKay MR. *SARS-CoV-2 T Cell Responses Are Expected to Remain Robust against Omicron*. Immunology; 2021. doi:10.1101/2021.12.12.472315
19. De Marco L, D'Orso S, Pirronello M, et al. *Preserved T Cell Reactivity to the SARS-CoV-2 Omicron Variant Indicates Continued Protection in Vaccinated Individuals*. Immunology; 2021. doi:10.1101/2021.12.30.474453
20. Keeton R, Tincho MB, Ngomti A, et al. *SARS-CoV-2 Spike T Cell Responses Induced upon Vaccination or Infection Remain Robust against Omicron*. Infectious Diseases (except HIV/AIDS); 2021. doi:10.1101/2021.12.26.21268380
21. Redd AD, Nardin A, Kared H, et al. *Minimal Cross-over between Mutations Associated with Omicron Variant of SARS-CoV-2 and CD8+ T Cell Epitopes Identified in COVID-19 Convalescent Individuals*. Immunology; 2021. doi:10.1101/2021.12.06.471446
22. May DH, Rubin BER, Dalai SC, et al. *Immunosequencing and Epitope Mapping Reveal Substantial Preservation of the T Cell Immune Response to Omicron Generated by SARS-CoV-2 Vaccines*. Infectious Diseases (except HIV/AIDS); 2021. doi:10.1101/2021.12.20.21267877
23. Administration UF and D. *Vaccines and Related Biological Products Advisory Committee Meeting February 26, 2021, FDA Briefing Document Janssen Ad26.COV2.S Vaccine for the Prevention of COVID-19*.; 2021. https://www.fda.gov/media/146217/download
24. Metzger CM, Lienhard R, Seth-Smith HM. PCR performance in the SARS-CoV-2 Omicron variant of concern? *Swiss Med Wkly*. 2021;151(49-50). doi:10.4414/smw.2021.w30120
25. Bekliz M, Perez-Rodriguez F, Puhach O, et al. *Sensitivity of SARS-CoV-2 Antigen-Detecting Rapid Tests for Omicron Variant*. Infectious Diseases (except HIV/AIDS); 2021. doi:10.1101/2021.12.18.21268018
26. Bekliz M, Adea K, Alvarez C. Analytical sensitivity of seven SARS-CoV-2 antigen-detecting rapid tests for Omicron variant. Published December 22, 2021. Accessed December 23, 2021. https://www.medrxiv.org/content/10.1101/2021.12.18.21268018v1
27. Ullrich S, Ekanayake KB, Otting G, Nitsche C. *Main Protease Mutants of SARS-CoV-2 Variants Remain Susceptible to Nirmatrelvir (PF-07321332)*. Biochemistry; 2021. doi:10.1101/2021.11.28.470226

28. Dabrowska A, Szczepanski A, Botwina P, et al. *Efficacy of Antiviral Drugs against the Omicron Variant of SARS-CoV-2*. Microbiology; 2021. doi:10.1101/2021.12.21.473268
29. Vangeel L, Chiu W, De Jonghe S, et al. *Remdesivir, Molnupiravir and Nirmatrelvir Remain Active against SARS-CoV-2 Omicron and Other Variants of Concern*. Microbiology; 2021. doi:10.1101/2021.12.27.474275
30. Planas D, Saunders N, Maes P, et al. *Considerable Escape of SARS-CoV-2 Variant Omicron to Antibody Neutralization*. Immunology; 2021. doi:10.1101/2021.12.14.472630
31. VanBlargan LA, Errico JM, Halfmann PJ, et al. *An Infectious SARS-CoV-2 B.1.1.529 Omicron Virus Escapes Neutralization by Several Therapeutic Monoclonal Antibodies*. Microbiology; 2021. doi:10.1101/2021.12.15.472828
32. Cameroni E, Saliba C, Bowen JE. Broadly neutralizing antibodies overcome SARS-CoV-2 Omicron antigenic shift. Published December 14, 2021. Accessed December 23, 2021. https://www.biorxiv.org/content/10.1101/2021.12.12.472269v1
33. Wilhelm A, Widera M, Grikscheit K, et al. *Reduced Neutralization of SARS-CoV-2 Omicron Variant by Vaccine Sera and Monoclonal Antibodies*. Infectious Diseases (except HIV/AIDS); 2021. doi:10.1101/2021.12.07.21267432
34. Roche. Ronapreve does not retain neutralising activity against the Omicron variant. Published 2021. Accessed December 17, 2021. https://www.roche.com/dam/jcr:dfe6dcb4-d787-45d6-9b1d-ffc17d667e4c/2021216_Roche%20statement%20on%20Ronapreve%20Omicron.pdf
35. Chemaitelly H, Ayoub HH, AlMukdad S, et al. *Duration of Protection of BNT162b2 and MRNA-1273 COVID-19 Vaccines against Symptomatic SARS-CoV-2 Omicron Infection in Qatar*. Epidemiology; 2022. doi:10.1101/2022.02.07.22270568
36. Cerqueira-Silva T, Katikireddi SV, de Araujo Oliveira V, et al. Vaccine effectiveness of heterologous CoronaVac plus BNT162b2 in Brazil. *Nat Med*. Published online February 9, 2022. doi:10.1038/s41591-022-01701-w
37. Ella R, Reddy S, Blackwelder W, et al. Efficacy, safety, and lot to lot immunogenicity of an inactivated SARS-CoV-2 vaccine (BBV152): a double-blind, randomised, controlled phase 3 trial. *medRxiv*. Published online July 2, 2021:2021.06.30.21259439. doi:10.1101/2021.06.30.21259439