COVID-19 Weekly Epidemiological Update

Edition 49, published 20 July 2021

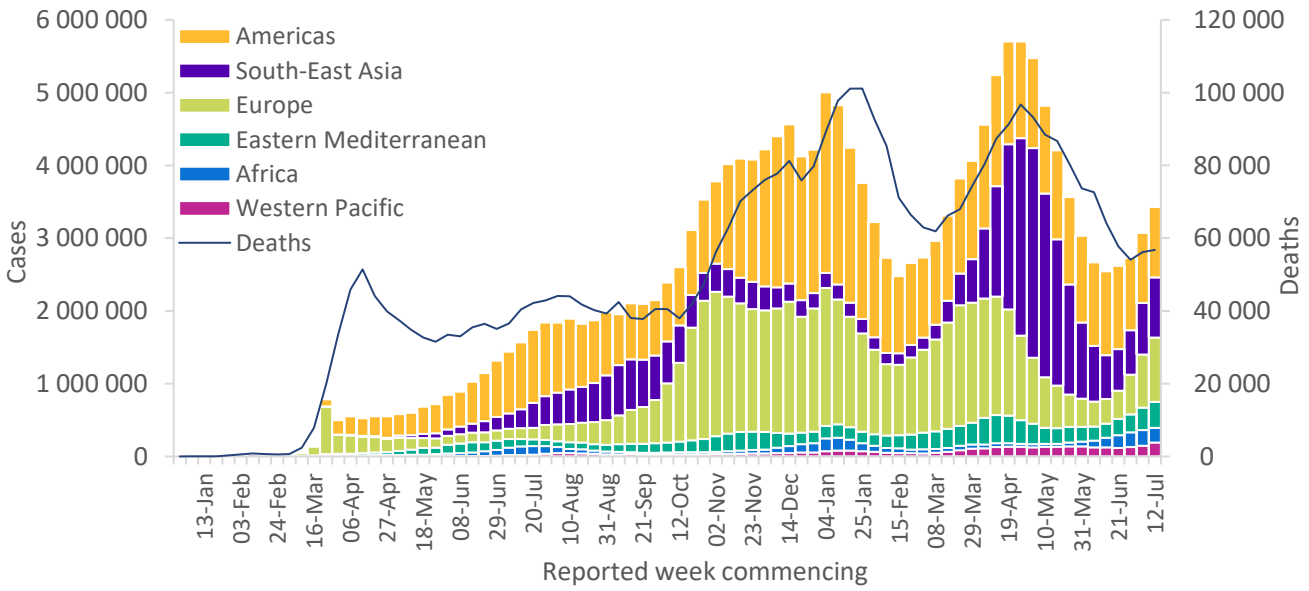
In this edition:

Global overview

Data as of 18 July 2021

The global number of new cases reported last week (12-18 July 2021) was over 3.4 million, a 12% increase as compared to the previous week (Figure 1). Globally, COVID-19 weekly case incidence increased with an average of around 490 000 cases reported each day over the past week as compared to 400 000 cases reported daily in the previous week. Following a steady decline for over two months, the number of weekly deaths reported was similar to the previous week, with almost 57 000 deaths reported. The cumulative number of cases reported globally is now over 190 million and the number of deaths exceeds 4 million. At this rate, it is expected that the cumulative number of cases reported globally could exceed 200 million in the next three weeks. Last week, four Regions (all except the Regions of the Americas and Africa) reported an increase in case incidence. The Western Pacific Region recorded the largest increase in case incidence as compared to the previous week, followed by the European Region (30% and 21%, respectively) (Table 1). The South-East Asia and Eastern Mediterranean Regions also recorded increases in case incidence, 16% and 15%, respectively, as compared to the previous week. The number of deaths increased in the South-East Asia and the Western Pacific Regions by 12% and 10%, respectively, as compared to the previous week. The African, Eastern Mediterranean and European Regions reported similar numbers of deaths as compared to the previous week, whereas the Region of Americas reported a 6% decrease.

Figure 1. COVID-19 cases reported weekly by WHO Region, and global deaths, as of 18 July 2021**



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

The Region of the Americas and the European Region reported the highest weekly case incidence per capita, both reporting 95 new cases per 100 000 population, as well as the highest number of deaths per population over the past week, with 2.2 and 0.8 new deaths per 100 000 population, respectively. The Eastern Mediterranean and South-East Asia Regions reported 48 and 41 new cases per 100 000 population, respectively.

Despite efforts to extend vaccination coverage, many countries across all six WHO Regions continue to experience surges in COVID-19 cases. Over the past week, the highest numbers of new cases were reported from Indonesia (350 273 new cases; 44% increase), the United Kingdom (296 447 new cases; 41% increase), Brazil (287 610 new cases; 14% decrease), India (268 843 new cases; 8% decrease), and the United States of America (216 433 new cases; 68% increase).

Globally, cases of the Alpha variant have been reported in 180 countries, territories or areas (hereafter countries; six new countries in the past week), while 130 countries (seven new countries) have reported cases of the Beta variant; 78 countries (three new countries) have reported cases of the Gamma variant; and 124 countries (13 new countries) have reported cases of the Delta variant.

The increases in transmission appear to be driven by four factors: the circulation of more transmissible Variants of Concern (VOCs), relaxation of public health social measures originally intended to control transmission, increases in social mixing, and the large number of people who remain susceptible to SARS-CoV-2 infection as a result of inequitable vaccine distribution around the world.

Table 1. Newly reported and cumulative COVID-19 cases and deaths, by WHO Region, as of 18 July 2021**

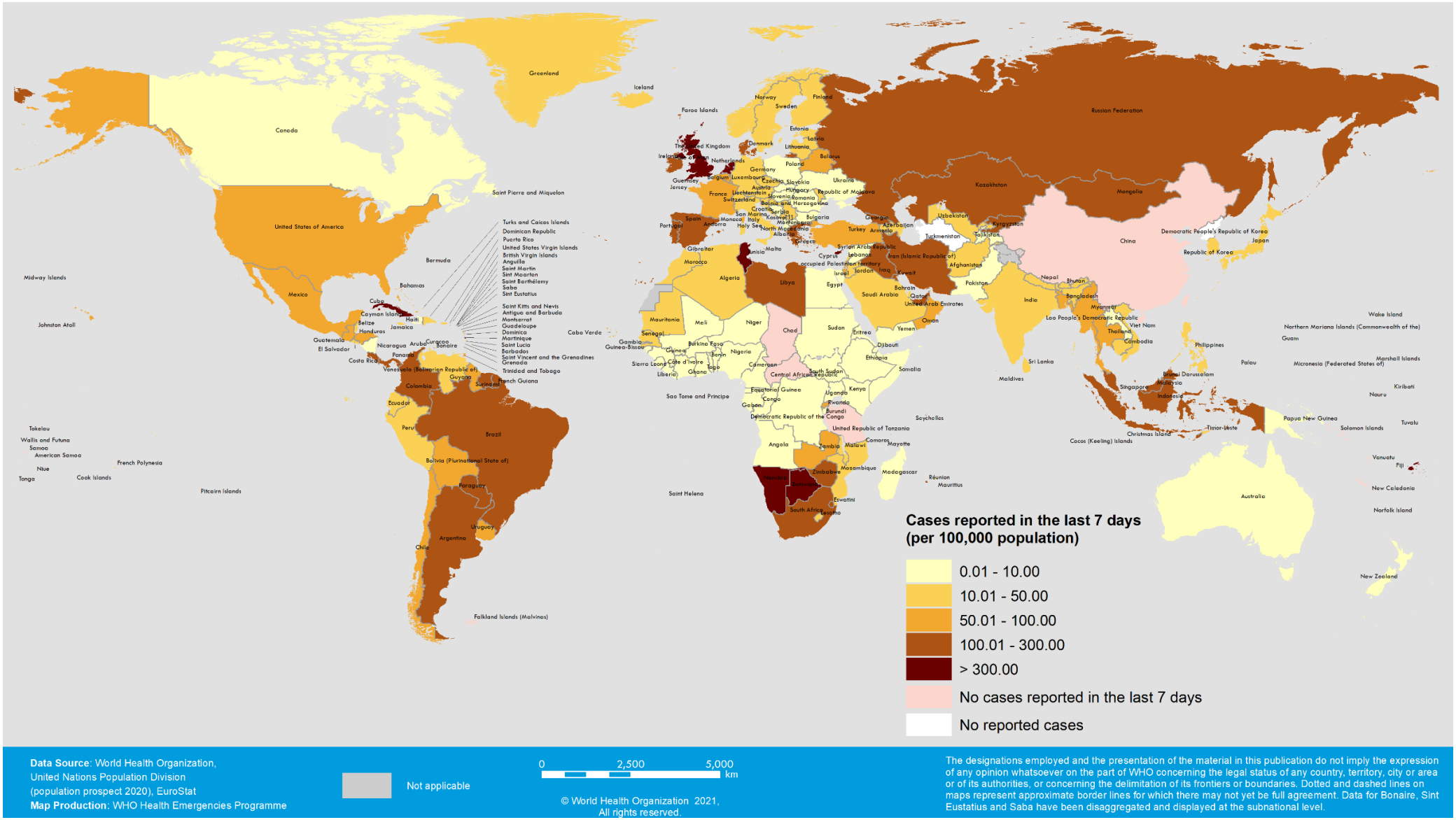
WHO Region	New cases in last 7 days (%)	Change in new cases in last 7 days *	Cumulative cases (%)	New deaths in last 7 days (%)	Change in new deaths in last 7 days *	Cumulative deaths (%)
Americas	967 205 (28%)	0%	74 734 644 (39%)	22 411 (39%)	-6%	1 960 619 (48%)
Europe	885 048 (26%)	21%	58 319 701 (31%)	7 173 (13%)	0%	1 204 780 (29%)
South-East Asia	829 552 (24%)	16%	36 760 906 (19%)	16 403 (29%)	12%	526 942 (13%)
Eastern Mediterranean	354 030 (10%)	15%	11 794 433 (6%)	3 875 (7%)	4%	226 399 (6%)
Africa	202 801 (6%)	-5%	4 589 220 (2%)	4 817 (8%)	-4%	107 498 (3%)
Western Pacific	191 009 (6%)	30%	3 970 165 (2%)	2 088 (4%)	10%	59 749 (1%)
Global	**3 429 645 (100%)**	**12%**	**190 169 833 (100%)**	**56 767 (100%)**	**1%**	**4 086 000 (100%)**

**Percent change in the number of newly confirmed cases/deaths in 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:

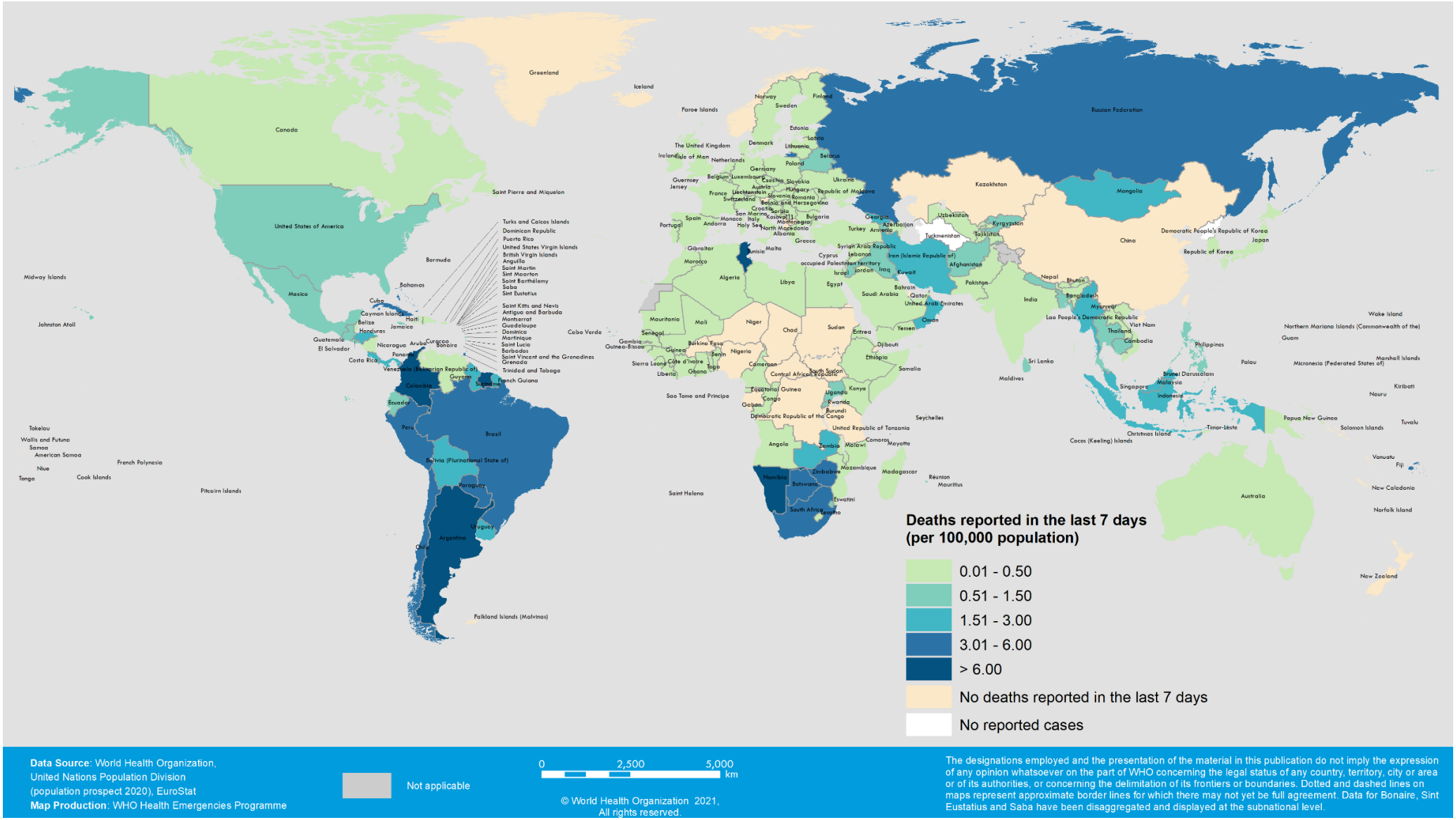
- WHO COVID-19 Dashboard
- WHO COVID-19 Weekly Operational Update and previous editions of the Weekly Epidemiological Update

Figure 2. COVID-19 cases per 100 000 population reported by countries, territories and areas, 12 – 18 July 2021**



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

Figure 3. COVID-19 deaths per 100 000 population reported by countries, territories and areas, 12 – 18 July 2021**



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

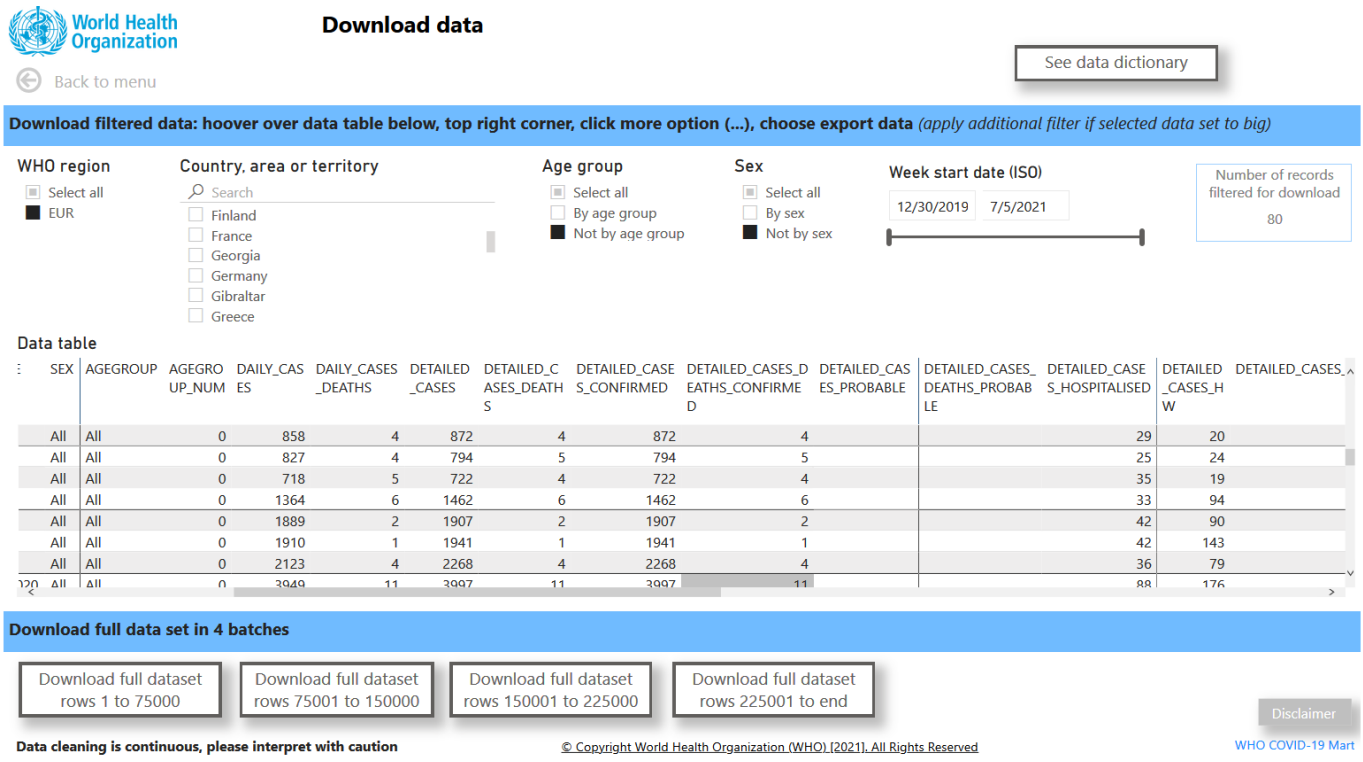
Special Focus: Release of a WHO COVID-19 detailed surveillance data dashboard, including a downloadable database feature

Over eighteen months into the COVID-19 pandemic, the need for global epidemiological surveillance for COVID-19 continues to be of high importance. The evolution of transmission patterns as the pandemic continues will likely be influenced by the impact of the COVID-19 vaccination campaigns and by the emergence of more transmissible variants, or variants with properties of immune escape. Timely and complete surveillance data are therefore key to monitoring these changes.

WHO has been conducting global surveillance of COVID-19 as part of the WHO's preparedness, readiness and response activities for COVID-19. Besides the daily count of confirmed COVID-19 cases and deaths, WHO has requested all Member States to report a minimum set of information using one of the two following mechanisms: a case report form; or via the weekly aggregated surveillance system, as specified in the Public Health Surveillance for COVID-19 interim guidance.

The data reported by Member States are now publicly available through the WHO COVID-19 detailed surveillance data dashboard, without editing or filtering by WHO. This dashboard complements the existing WHO COVID-19 dashboard and provides data by WHO Region and by country, stratified by age and sex, trends over time, case fatality ratios by age, testing, hospitalization, and data on health care workers. The WHO COVID-19 detailed surveillance data dashboard, and the downloadable dataset, provides the ability for users to conduct further analyses by country and over selected time periods.

Figure 4. WHO COVID-19 detailed surveillance dashboard which features a downloadable database



As of 16 July 2021, a total of 186 countries, territories, and areas had reported the minimum required information via case report forms and/or weekly aggregate surveillance to WHO. Of the 188 million cases reported globally at this time, WHO received information for 123 million cases (65%). Of these, sex was reported for over 95 million cases (77%), age reported for 76.5 million cases (62%), and age and sex combined was reported for 73.6 million cases (60%). To date, over 2.1 million cases and just under 7000 deaths among health workers have been recorded in the dashboard.

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 vaccine, therapeutics, diagnostics or effectiveness of public health and social measures (PHSM) applied by national authorities to control disease spread. "Signals" of potential Variants of Concern (VOCs) or Variants of Interest (VOIs) are detected and assessed based on the risk posed to global public health. National authorities may choose to designate other variants of local interest/concern and are encouraged to investigate and report on impacts of these variants.

For updates on VOCs and VOIs, and a list of Alerts for Further Monitoring, are available on the WHO Tracking SARS-CoV-2 Variants website.

Geographic distribution

As surveillance activities to detect SARS-CoV-2 variants are strengthened at national and subnational levels, including through the expansion of genomic sequencing capacities, the number of countries/areas/territories (hereafter countries) reporting VOCs continues to increase (Figure 5, Annex 1). This distribution should nonetheless be interpreted with due consideration of surveillance limitations, including differences in sequencing capacities and sampling strategies between countries.

Phenotypic characteristics

Available evidence on phenotypic impacts of VOCs is summarized in Table 2, as well as in previous editions of these COVID-19 Weekly Epidemiological Updates. Since the last detailed update on 6 July, new evidence has been published on the phenotypic characteristics of the Delta variant.

As of 20 July 2021, a total of 2 418 133 SARS-CoV-2 sequences have been submitted to GISAID, a global science initiative and primary source that provides open access to genomic data. Over 220 000 (9%) of SARS-CoV-2 sequences submitted to GISAID are confirmed as the Delta Variant. As mentioned in our last update, based on the estimated transmission advantage of the Delta variant, it is expected that it will rapidly outcompete other variants and become the dominant circulating lineage over the coming months.[1] According to GISAID data, as of 20 July, the prevalence of Delta among the specimens sequenced over the past 4 weeks exceeded 75% in many countries worldwide including Australia, Bangladesh, Botswana, China, Denmark, India, Indonesia, Israel, Portugal, Russian Federation, Singapore, South Africa and the United Kingdom.

Growing evidence supports the increased transmissibility of the Delta variant as compared to non-VOCs. However, the exact mechanism for the increase in transmissibility remains unclear. A recent study from China during an outbreak of the Delta variant examined the time interval from the exposure of a quarantined population to the first positive PCR result and found that the interval may be shorter for the Delta variant when compared to non-VOCs [4 (IQR 3.00-5.00) days compared to 6 (IQR 5.00 to 8.00) days, respectively]. Moreover, the viral load of the first positive test of Delta infection was over 1200 times higher than non-VOCs, suggesting that this VOC may be able to replicate faster and be more infectious during the early stages of infection.[2]

A study from Canada analysing data from over 200 000 COVID-19 cases showed an increase in virulence of the Delta variant when compared to non-VOCs. Among the COVID-19 cases, the risk of hospitalization, ICU admission and death associated with the Delta variant compared to non-VOCs increased by 120% (93-153%), 287% (198-399%) and 137% (50-230%), respectively. Increased disease severity was also identified for Alpha, Beta and Gamma variants combined when compared to non-VOCs: 59% (49-69%) for hospitalization, 105% (82-134%) for ICU admission and 61% (40-87%) for death.[3]

Preliminary findings from a study in the United Kingdom, which measured antibodies in a cohort of 112 SARS-CoV-2-infected individuals, indicated significantly reduced neutralization titres (2.5 to 5-fold reduction) in sera from individuals infected with Delta, Beta or Alpha variants with a S:484K mutation (but not Alpha without any additional mutations) when compared to the non-VOCs.[4]

A recent modelling study simulated the effects of non-pharmaceutical interventions (NPIs) in the context of expanding vaccination coverage and the predominance of the Delta variant in Germany, while accounting for age-associated factors and commuting activities. The authors indicated that timely implementation of NPIs in combination with masks and testing would considerably reduce the chance of a further surge in infections.[5]

Table 2: Summary of phenotypic impacts* of Variants of Concern

WHO label	Alpha	Beta	Gamma	Delta
Transmissibility	Increased transmissibility and secondary attack rate[6]	Increased transmissibility[7]	Increased transmissibility[8]	Increased transmissibility and secondary attack rate[1,9,10]
Disease severity	Increased risk of hospitalization[11], possible increased risk of severity and mortality[12]	Not confirmed, possible increased risk of in-hospital mortality[13,14]	Not confirmed, possible increased risk of hospitalization[15]	Increased risk of hospitalization[3,16]
Risk of reinfection	Neutralizing activity retained,[17] risk of reinfection remains similar[18,19]	Reduction in neutralizing activity reported; T cell response elicited by D614G virus remains effective[20–23]	Moderate reduction in neutralizing activity reported[24,25]	Reduction in neutralizing activity reported[26]
Impacts on diagnostics	Limited impact – S gene target failure (SGTF); no impact on overall result from multiple target RT-PCR, No impact on Ag RDTs observed[27]	No impact on RT-PCR or Ag RDTs observed[16]	None reported to date	None reported to date

**Generalized findings as compared to previously/co-circulating variants. Based on emerging evidence, including non-peer-reviewed preprint articles and reports, all subject to ongoing investigation and revision.*

VOC impacts on vaccines

Table 3 presents the impact of variants on vaccine efficacy/effectiveness (VE) and quantifies the reduction in VE due to variants compared to VE in non-VOC settings. Of note, reductions in VE do not necessarily mean 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%. In addition, vaccines have shown higher VE against severe disease; thus, small reductions in VE against severe disease due to VOCs may still mean good protection, as is the case for AstraZeneca-Vaxzevria.

Since the 6 July update, two notable studies have provided further evidence of the performance of mRNA vaccines against Alpha and Beta variants. The first, a test-negative case-control study in the United States of America, found that vaccination with two doses of Moderna-mRNA-1273 or Pfizer BioNTech-Comirnaty vaccines was 92.8% (95% CI: 83.0-96.9%) effective at preventing hospitalization due to the Alpha variant 14 or more days after receipt of the second dose; VE against all variants was 86.9% (95% CI: 80.4-91.2%). It should be noted that approximately 21% of the 1210 adults participating in the study were immunosuppressed.[28]

A second study, from Qatar, evaluated VE of Moderna-mRNA-1273 against SARS-CoV-2 infection and severe disease due to Alpha and Beta variants among a large cohort of adults using a matched test negative case-control design. Adjusted VE against infection due to the Alpha and Beta variants 14 or more days after receipt of the second dose was 100% and 96% (95% CI: 90.9-98.2%), respectively. Single dose VE against infection due to Alpha and Beta was reduced: 88.2% (95% CI: 83.8-91.4%) and 68.2% (95% CI: 64.3-71.7%), respectively. The study also evaluated VE of Moderna-mRNA-1273 against asymptomatic, symptomatic, and severe, critical, or fatal disease due to all variants (predominantly Alpha and Beta). VE of two doses of the vaccine ranged from 90-99% for these outcomes. VE of a single dose remained high for severe, critical or fatal disease (84%) but was markedly lower for asymptomatic and symptomatic disease at 47.3% (95% CI: 37.6-55.5%) and 66.0% (60.6-70.7%), respectively, thus, highlighting the importance of two doses.[29]

Table 3. Summary of vaccine performance against Variants of Concern

Alpha	Beta	Gamma	Delta
Efficacy/effectiveness against disease or infection (full vaccination), see key below table			
Protection retained against all outcomes	Protection retained against severe disease; possible reduced protection against symptomatic disease and infection	Unclear impact; very limited evidence	Protection retained against severe disease; possible reduced protection against symptomatic disease and infection
Severe disease			
• ↔: Moderna-mRNA-1273 (1), Moderna-mRNA-1273/Pfizer BioNTech-Comirnaty (1), Pfizer BioNTech-Comirnaty (2)[28,30–32] • ↓: AstraZeneca- Vaxzevria (1) [31]	• ↔: Janssen Ad26.COV 2.5 (1), PfizerBioNTech-Comirnaty (1)[30,33]	• No evidence	• ↔: AstraZeneca- Vaxzevria (1), Pfizer BioNTech-Comirnaty (1)[31]
Symptomatic disease			
• ↔: Moderna-mRNA-1273 (1), Moderna-mRNA-1273/Pfizer BioNTech-Comirnaty (1), Pfizer BioNTech-Comirnaty (3)[34–37] • ↔ to ↓: AstraZeneca-Vaxzevria (3)[35,36,38] • ↓: Novavax-Covavax (1)[39]	• ↔: Janssen-Ad26. COV 2.5 (1)[33] • ↓↓↓: AstraZeneca-Vaxzevria (1), Novavax-Covavax (1)[40,41]	• ↔ to ↓: Sinovac-CoronaVac (1)[42,43]	• ↔ to ↓: PfizerBioNTech-Comirnaty (3)[35–37] • ↓:Bharat-Covaxin (1)[44] • ↓↓: AstraZeneca- Vaxzevria (2)[35,36]
Infection			
• ↔: PfizerBioNTech-Comirnaty (1)[36] • ↔ to ↓: AstraZeneca-Vaxzevria (2)[36,38]	• ↔: Moderna-mRNA-1273 (1)[29] • ↓: PfizerBioNTech-Comirnaty (1)[30]	• No evidence	• ↓: AstraZeneca-Vaxzevria (1), Pfizer BioNTech-Comirnaty (1)[36]
Neutralization (full vaccination), see key below table			
• ↔: Anhui ZL-Recombinant (1), Beijing CNBG-BBIBP-CorV (1), Bharat-Covaxin (1), Gamaleya-Sputnik V (1), Novavax-Covavax (1) [45–49] • ↔ to ↓: Janssen-Ad26.COV 2.5 (3), Moderna-mRNA-1273 (9), Pfizer BioNTech-Comirnaty (27) Sinovac-CoronaVac (5)[23,45,48–84] • ↓ to ↓↓: AstraZeneca-Vaxzevria (2)[38,55]	• ↔ to ↓: Anhui ZL-Recombinant (2), Beijing CNBG-BBIBP-CorV (2)[45,85,86] • ↓: Bharat-Covaxin (1)[87] • ↓ to ↓↓: Moderna-mRNA-1273 (11), Pfizer BioNTech-Comirnaty (27), Sinovac-CoronaVac (4)[23,45,50–52,55,57–61,63,64,66–69,71,73–78,81,84,85,88–96] • ↓ to ↓↓↓: Janssen-Ad26.COV 2.5 (3)[79,80,97] • ↓↓: AstraZeneca-Vaxzevria (4), Gamaleya-Sputnik V (1)[40,47,55,68,93] • ↓↓↓: Novavax-Covavax (1)[59]	• ↔ to ↓: Pfizer BioNTech-Comirnaty, (12), Sinovac-CoronaVac (3)[51,55,57,59,61,64,74,82–84,88,99–101] • ↓: AstraZeneca-Vaxzevria (1), Janssen-Ad26.COV 2.5 (2), Moderna-mRNA-1273 (4)[55,57,73,78–80,100]	• ↔: Janssen-Ad.COV 2.5 (1)[79] • ↓: Anhui ZL-Recombinant (1), AstraZeneca-Vaxzevria (2), Bharat-Covaxin (1), Moderna-mRNA-1273 (2), SII – Covishield (1)[49,78,87,93,102–104] • ↓ to ↓↓: Pfizer BioNTech-Comirnaty (6)[71,84,93,99,102,103] • ↓ to ↓↓↓: Sinovac-CoronaVac (2)[49,81]

Arrows generalize the magnitude of reduction in VE or neutralization: "↔" <10% reduction in VE, or VE >90% with no comparator, or that there was a <2-fold reduction in neutralization; "↓" 10 to <20% reduction in VE, or 2 to <5-fold reduction in neutralization; "↓↓" 20 to <30% reduction in VE, or 5 to <10-fold reduction in neutralization; "↓↓↓" ≥30% 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.
The number of studies is shown in parentheses.
"Moderna-mRNA-1273/Pfizer BioNTech-Comirnaty" indicates that both vaccines were evaluated together in study.

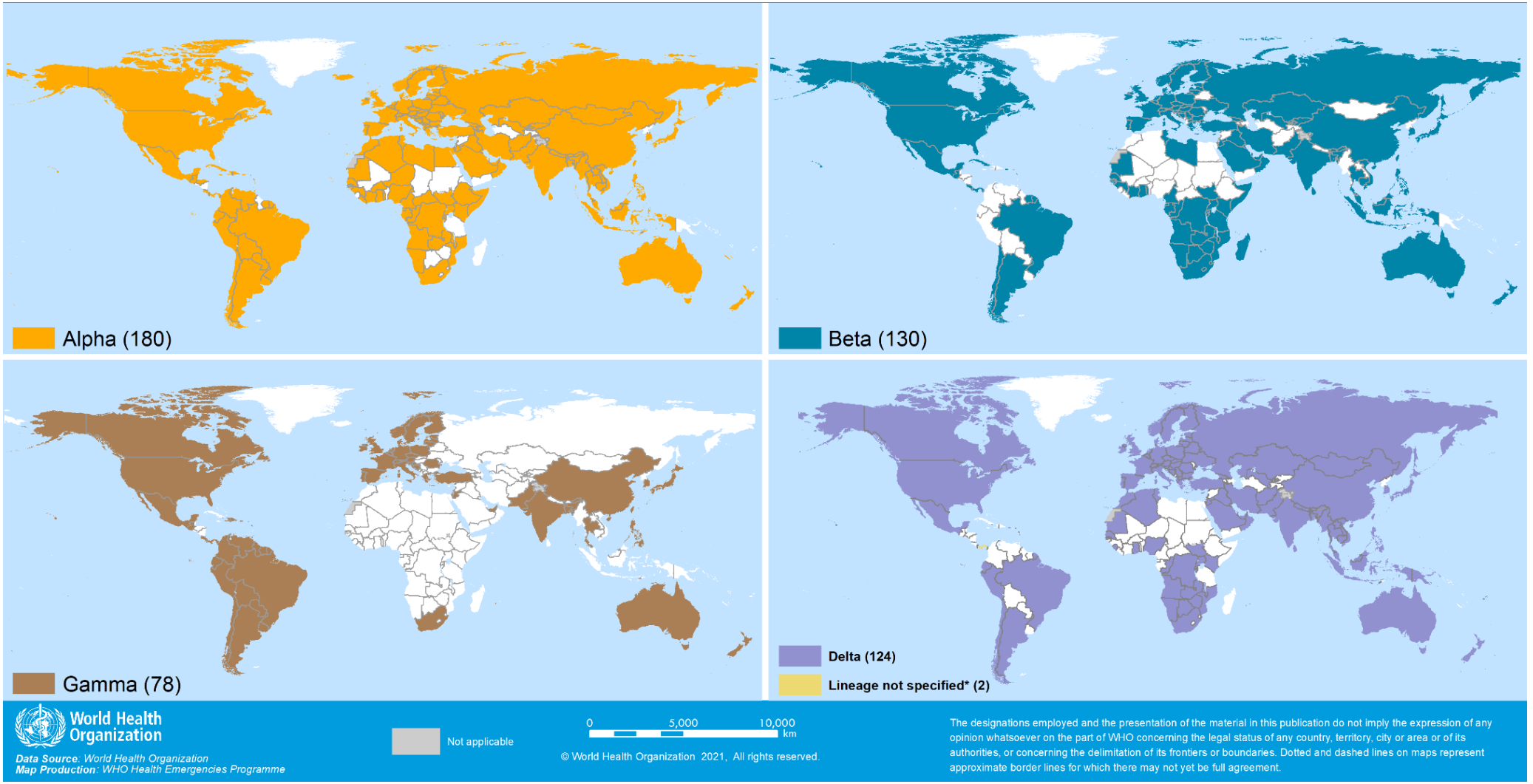
Additional notes on VOC impacts on vaccines

- Studies presenting VOC specific VE estimates for full vaccination (≥ 7 days post final dose) are assessed against a comparator VE estimate to determine level of reduction in VE. For symptomatic disease, VOC VE is compared against phase 3 randomised RCT results from non-VOC settings. For severe disease and infection, 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 severe disease (phase 3 RCT efficacy estimates against severe disease are used as comparator since within study comparator is unavailable) and for infection (when phase 3 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 even without a comparator if very high VE estimate against a VOC is reported (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 between different studies. In addition, the reductions presented consider VE point estimates only and do not take into account the uncertainty around these estimates. The reductions in VE noted should be interpreted with these limitations in mind.

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

Figure 5. Countries, territories and areas reporting variants Alpha, Beta, Gamma and Delta, as of 20 July 2021**



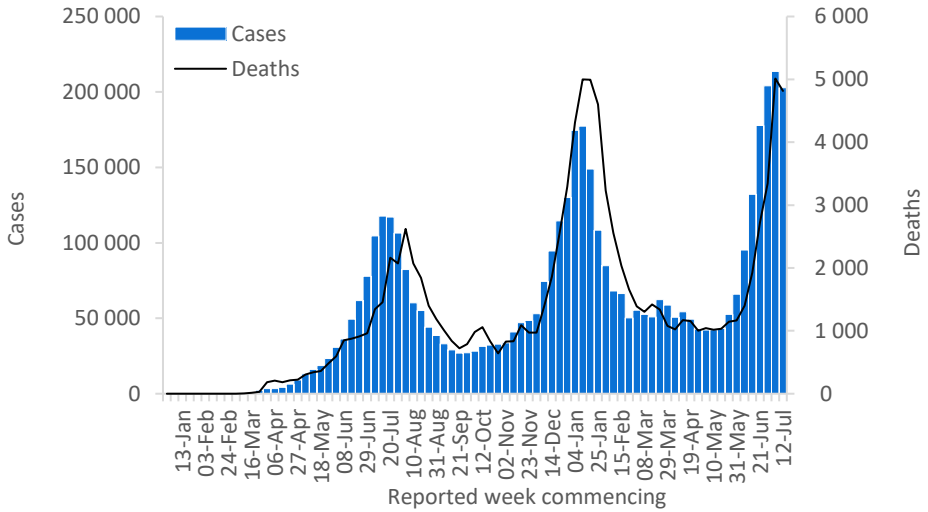
**Includes countries/territories/areas reporting the detection of B.1.617 without further specification of lineage at this time. These will be reallocated as further details become available.*
***Countries/territories/areas highlighted include both official and unofficial reports of VOC detections, and do not presently differentiate between detections among travellers (e.g., at Points of Entry) or local community cases. Please see Annex 2 for further details.*

WHO regional overviews - Epidemiological week 12 – 18 July 2021

African Region

Following an increasing trend in the weekly number of new COVID-19 cases and deaths since early May 2021, the Region reported a slight decrease in case incidence (with over 202 000 new cases) and mortality (over 4800 new deaths) in the past week, as compared to the previous week. These trends were largely driven by decreases reported in South Africa, which reported the highest numbers of new cases (104 583 cases) and more than 50% of the cases reported in the region in the past week. Other countries reporting high numbers of new cases include: Zimbabwe (15 760 cases; 106.0 cases/100 000; +20%), and Botswana (10 745 cases; 456.9 cases/100 000; +172%), while the highest numbers of new cases per population were reported in Seychelles (545 cases/100 000; -28%), Botswana (see above) and Namibia (317 cases/100 000; -19%).

The highest numbers of new deaths were reported from South Africa (2538 deaths; 4.3 deaths/100 000; -4%), Namibia (595 deaths; 23.4/100 000; -109%), and Zimbabwe (462 deaths; 3.1 deaths/100 000; +73%).

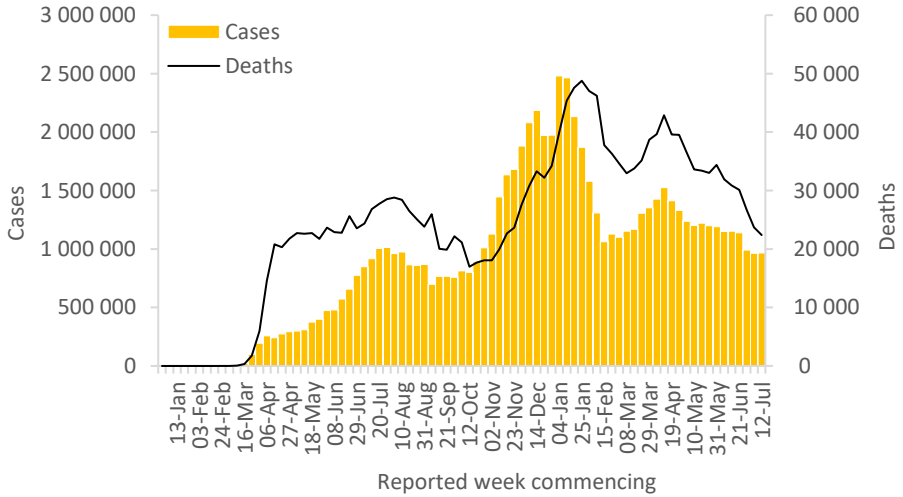


Updates from the African Region

Region of the Americas

The Region reported over 967 000 new cases, a similar number as compared to the previous week, and over 22 000 new deaths, a 6% decrease as compared to the previous week. A decline in weekly case incidence has been reported since the last peak in mid-April 2021, however, very high transmission levels and high mortality rates are still observed across many countries in the Region. The highest numbers of new cases were reported from Brazil (287 610 cases; 135.3 cases/ 100 000; -14%), the United States of America (216 433 cases; 65.4 cases/100 000; +68%), and Colombia (129 713 cases; 254.9 cases/100 000; -26%), while the highest numbers of new cases per population were reported in the British Virgin Islands (2900 cases/100 000; +16%), Martinique (574.8 cases/100 000; +425%) and Cuba (388.8 cases/100 000; +43%).

The highest numbers of new deaths were reported from Brazil (8710 deaths; 4.1 deaths/100 000; -11%), Colombia (3602 deaths; 7.1/100 000; -10%), and Argentina (2927 deaths; 6.5 deaths/100 000; similar to the previous week).

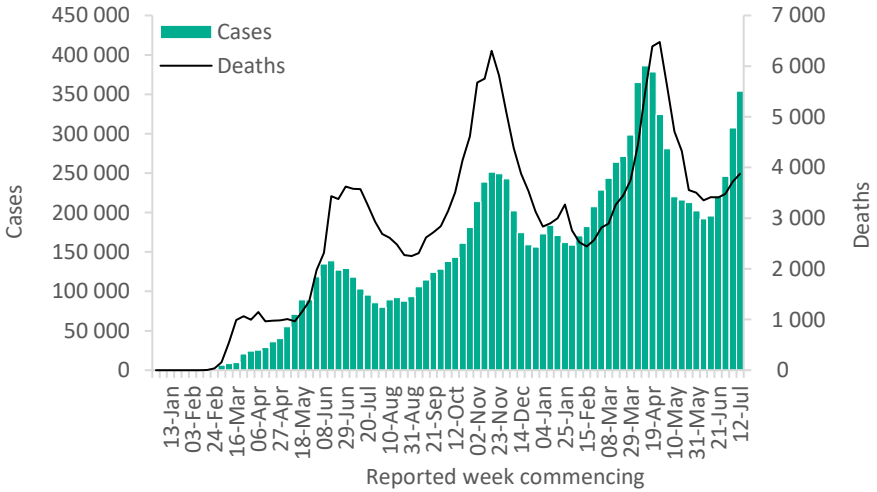


Updates from the Region of the Americas

Eastern Mediterranean Region

The Region has reported a marked increase in weekly case incidence for more than one month with over 354 000 new cases reported, a 15% increase as compared to the previous week. This increase has been driven mainly by surges in several countries in the Region including Iran, Iraq, Libya, Pakistan and Morocco. The Region reported over 3800 new deaths, a similar number as compared to the previous week.

The highest numbers of new cases were reported from the Islamic Republic of Iran (145 293 cases; 173.0 cases/100 000; +27%), Iraq (61 268 cases; 152.3 cases/ 100 000; + 8%), and Tunisia (49 777 cases; 421.2 cases/100 000; similar to the previous week), while the highest weekly case incidence per population was registered in Tunisia (see above), Kuwait (245.1 cases/100 000) and Libya (235.7 cases/100 000). The highest numbers of new deaths were reported from the Islamic Republic of Iran (1272 deaths; 1.5 deaths/100 000; +9%), Tunisia (1110 deaths; 9.4 deaths/100 000; +13%), and Afghanistan (423 deaths; 1.1 deaths/100 000; -19%).

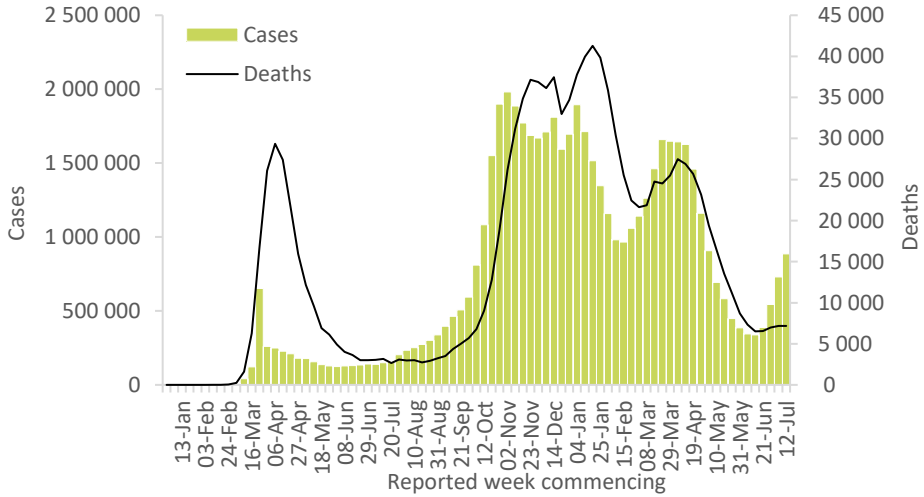


Updates from the Eastern Mediterranean Region

European Region

In the European Region, weekly case incidence has increased significantly across the past month, with over 885 000 new cases reported in the past week, a 21% increase as compared to the previous week. Over 7100 new deaths were reported in the past week, similar to the number reported during the previous week. The increase in reported COVID-19 cases in the Region since mid-June 2021 has been observed across all age groups, but has been most pronounced in those aged 15-24 years. The highest numbers of new cases were reported from the United Kingdom (296 447 cases; 436.7 cases/100 000; +41%), the Russian Federation (174 800 cases; 119.8 cases/100 000; similar to the previous week), and Spain (85 802 cases; 181.3 cases/100 000; -29%), while the highest weekly case incidence per population was registered in Jersey (1274 cases/100 000), Cyprus (779 cases/100 000) and Gibraltar (451 cases/100 000).

The highest numbers of new deaths were reported from the Russian Federation (5417 deaths; 3.7 deaths/100 000; +7%), Turkey (296 deaths; 0.4 deaths/100 000; -7%), and the United Kingdom (284 deaths; 0.4 deaths/100 000; +48%).

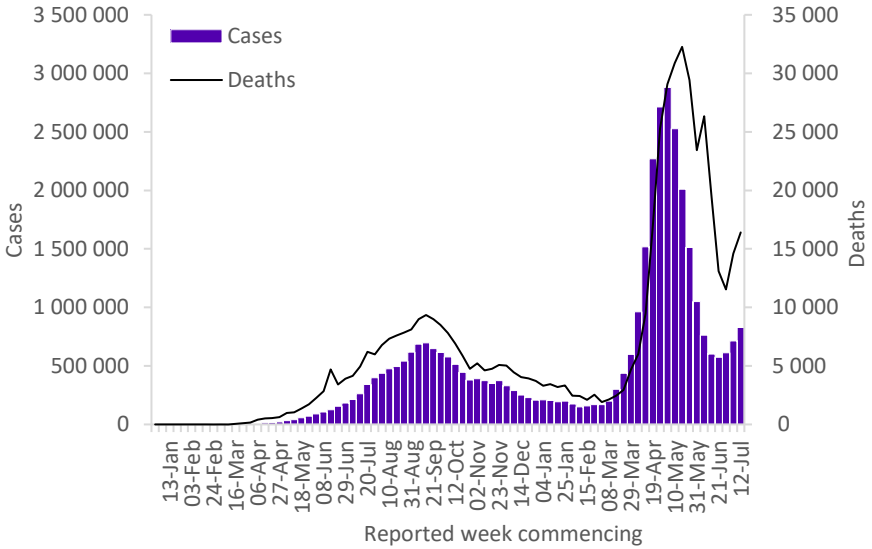


Updates from the European Region

South-East Asia Region

The Region reported over 829 000 new cases and over 16 000 new deaths, increases of 16% and 12%, respectively as compared to the previous week. Weekly case incidence and mortality in India and Sri Lanka continue to decline, with the regional trends being driven mainly by marked increases in Indonesia, Thailand and Myanmar. The highest numbers of new cases were reported from Indonesia (350 273 cases; 128.1 cases/100 000; +44%), India (268 843 cases; 19.5 cases/100 000; -8%) and Bangladesh (82 800 cases; 50.3 cases/100 000; +9%), while the highest weekly case incidence per population was registered in Maldives (150 cases/100 000), Indonesia (see above) and Thailand (96 cases/100 000).

The highest numbers of new deaths were reported from Indonesia (7118 deaths; 2.6 deaths/ 100 000; +21%), India (5569 deaths; 0.4 deaths/100 000; -8%), and Bangladesh (1475 deaths; 0.9 deaths/100 000; +9%).

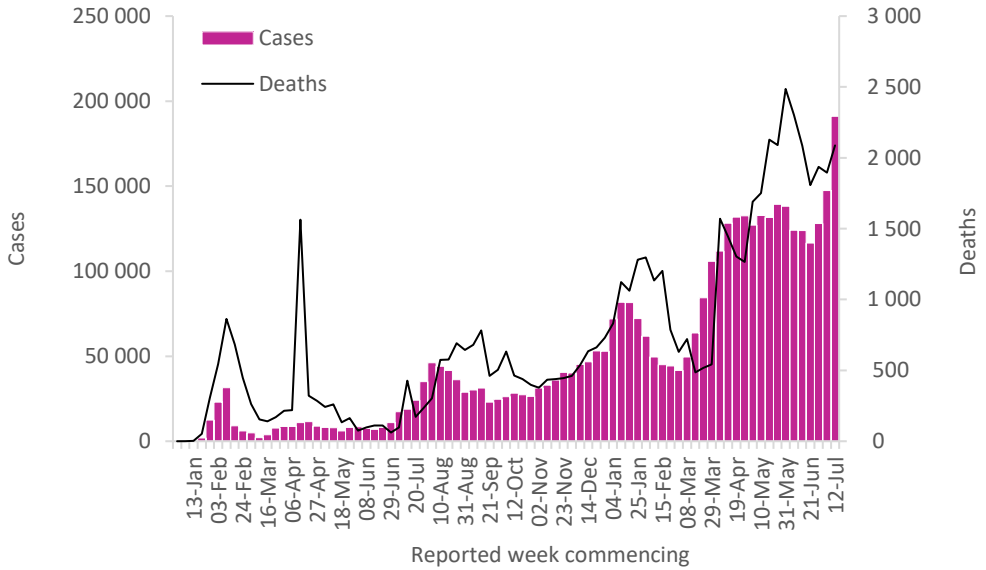


Updates from the South-East Asia Region

Western Pacific Region

Over the past week, weekly case incidence increased sharply in the Region with over 191 000 new cases reported, representing a 30% increase as compared to the previous week. This trend was driven mainly by increases in Fiji, Japan, Malaysia and Viet Nam. The Region reported over 2000 new deaths this week, a 10% increase as compared to the previous week. The highest numbers of new cases were reported from Malaysia (78 660 cases; 243.0 cases/100 000; +44%), the Philippines (35 235 cases; 32.2 cases/100 000; similar to the previous week), and Viet Nam (22 532 cases; 23.1 cases per 100 000; +146%), while the highest weekly case incidence per population was registered in Fiji (719 cases/100 000), Mongolia (297 cases/100 000) and Malaysia (see above).

The highest numbers of new deaths were reported from Malaysia (799 deaths; 2.5 deaths/100 000; +26%), the Philippines (782 deaths; 0.7 deaths/100 000; similar to the previous week), and Cambodia (195 deaths; 1.2 deaths/100 000; +5%).



Updates from the Western Pacific Region

Key weekly updates

WHO Director-General's key messages

- In his opening remarks at the Member State Information Session on Origins – 16 July 2021, the Director-General highlighted the proposed next steps that the WHO Secretariat will take to advance the studies to identify the origins of SARS-CoV-2. He emphasized that finding where the virus came from is essential, not only for understanding how the pandemic started and preventing future outbreaks, but also as an obligation to the families of the 4 million people who have lost someone they love, and the millions who have suffered.

- In his opening remarks at the 8th meeting of the IHR Emergency Committee on COVID-19 – 14 July 2021, the Director-General called for a massive push to vaccinate at least 10% of the population of every country by September 2021, at least 40% by the end of this year, and at least 70% by the middle of 2022. To reach these targets, he highlighted the need for 11 billion vaccine doses. He expressed his gratitude for the announcements made by the G7 countries that together will donate 870 million doses, primarily through COVAX, but emphasized that much more is needed, much faster.

Updates and publications

- Germany reinforces its commitment to support WHO's work, 16 July 2021
- Clinical features and prognostic factors of COVID-19 in people living with HIV hospitalized with suspected or confirmed SARS-CoV-2 infection, 15 July 2021
- COVID-19 pandemic leads to major backsliding on childhood vaccinations, new WHO, UNICEF data shows, 15 July 2021
- Latest updates on emergency use listing (EUL) status of COVID-19 vaccines, 15 July 2021
- Vaccine efficacy, effectiveness and protection, 14 July 2021
- WHO technical consultation on oxygen access scale-up for COVID-19, 14 July 2021
- Safe Eid al Adha practices in the context of COVID-19, 13 July 2021

Annex

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

As of 20 July, WHO will stop collecting reports of national-level transmission classifications and displaying transmission classifications on the global COVID-19 dashboard. WHO however encourages Member States to continue the self-monitoring of transmission at the sub-national level to inform adjustments to PHSM.

Annex 1. List of countries/territories/areas reporting Variants of Concern as of 20 July 2021**

Country/Territory/Area	Alpha	Beta	Gamma	Delta	Unspecified B.1.617
Afghanistan	●	-	-	●	-
Albania	●	-	-	○*	-
Algeria	●	-	-	●	-
Angola	●	●	-	●*	-
Anguilla	●*	-	-	●*	-
Antigua and Barbuda	●	●	-	-	-
Argentina	●	●	●	●	-
Armenia	○	-	-	-	-
Aruba	●	●	●	●	-
Australia	●	●	●	●	-
Austria	●	●	●	●	-
Azerbaijan	●	-	-	-	-
Bahrain	●	●	-	●	-
Bangladesh	●	●	○*	●	-
Barbados	●	-	●	●	-
Belarus	●	-	-	○	-
Belgium	●	●	●	●	-
Belize	●	-	-	-	-
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	●	-	-	-	-
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	●	-	-	-	-
Equatorial Guinea	●	●	-	-	-
Estonia	●	●	○	○*	-
Eswatini	-	●	-	-	-
Ethiopia	○	-	-	-	-
Faroe Islands	●	-	●	-	-
Fiji	-	-	-	●	-
Finland	●	●	●	●	-
France	●	●	●	●	-
French Guiana	●	●	●	●	-
French Polynesia	●	●	●	●	-

Country/Territory/Area	Alpha	Beta	Gamma	Delta	Unspecified B.1.617
Gabon	●	○	-	-	-
Gambia	●	-	-	●	-
Georgia	●	○	-	●	-
Germany	●	●	●	●	-
Ghana	●	●	-	●	-
Gibraltar	●	-	-	-	-
Greece	●	●	●	●	-
Grenada	●	-	-	-	-
Guadeloupe	●	●	●	●	-
Guam	●	●	●	●	-
Guatemala	●	●	●	-	-
Guinea	●	●	-	-	-
Guinea-Bissau	●	●	-	-	-
Guyana	-	-	●	-	-
Haiti	●	-	●	-	-
Honduras	●	-	-	-	-
Hungary	●	○	-	○	-
Iceland	●	-	-	-	-
India	●	●	●	●	-
Indonesia	●	●	-	●	-
Iran (Islamic Republic of)	●	●	-	●	-
Iraq	●	●	-	●*	-
Ireland	●	●	●	●	-
Israel	●	●	●	●	-
Italy	●	●	●	●	-
Jamaica	●	-	-	-	-
Japan	●	●	●	●	-
Jordan	●	●	●	●	-
Kazakhstan	○	○	-	●	-
Kenya	●	●	-	●	-
Kosovo[1]	●	○	-	○	-

Country/Territory/Area	Alpha	Beta	Gamma	Delta	Unspecified B.1.617
Kuwait	●	●*	-	●	-
Kyrgyzstan	●	●	-	-	-
Lao People's Democratic Republic	●	-	-	●	-
Latvia	●	●	●	○	-
Lebanon	●	-	-	●	-
Lesotho	-	●	-	-	-
Liberia	●	-	-	-	-
Libya	●	●	-	-	-
Liechtenstein	●	-	-	-	-
Lithuania	●	●	●	○	-
Luxembourg	●	●	●	●	-
Madagascar	-	●	-	-	-
Malawi	●	●	-	●	-
Malaysia	●	●	-	●	-
Maldives	●	-	-	●	-
Malta	●	○	●	○	-
Martinique	●	●	●	●	-
Mauritania	●	●	-	●	-
Mauritius	○	●	-	●	-
Mayotte	●	●	-	-	-
Mexico	●	●	●	●	-
Monaco	●	○	-	○	-
Mongolia	●*	-	-	●*	-
Montenegro	●	-	-	-	-
Montserrat	●	-	-	-	-
Morocco	●	-	-	●	-
Mozambique	○*	●	-	●	-
Myanmar	●	-	-	●*	-
Namibia	●	●	-	●	-
Nepal	●	-	-	●	-

Country/Territory/Area	Alpha	Beta	Gamma	Delta	Unspecified B.1.617
Netherlands	●	●	●	●	-
New Caledonia	●	-	-	-	-
New Zealand	●	●	○	○	-
Niger	●	-	-	-	-
Nigeria	●	-	-	●	-
North Macedonia	●	●	-	○	-
Norway	●	●	●	●	-
Occupied Palestinian Territory	●	●	-	●	-
Oman	●	●	-	●	-
Pakistan	●	●	●	●	-
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 Lucia	●	-	-	-	-
Saint Martin	●	●	-	-	-
Sao Tome and Principe	●	-	-	-	-
Saudi Arabia	●	●	-	●	-

Country/Territory/Area	Alpha	Beta	Gamma	Delta	Unspecified B.1.617
Senegal	●	●	-	●*	-
Serbia	●	-	-	-	-
Seychelles	-	●	-	-	-
Sierra Leone	-	-	-	○	-
Singapore	●	●	●	●	-
Sint Maarten	●	●	-	●	-
Slovakia	●	●	-	●	-
Slovenia	●	●	●	●	-
Somalia	●	○*	-	-	-
South Africa	●	●	○*	●	-
South Sudan	●*	○*	-	●*	-
Spain	●	●	●	●	-
Sri Lanka	●	●	-	●	-
Suriname	●	●	●	-	-
Sweden	●	●	●	●	-
Switzerland	●	●	○	●	-
Thailand	●	●	●	●	-
Timor-Leste	●	-	-	-	-
Togo	●	●	-	-	-
Trinidad and Tobago	●	-	●	-	-
Tunisia	●	●	-	●	-
Turkey	●	●	●	●	-
Turks and Caicos Islands	●	-	●	-	-
Uganda	●	●	-	●	-
Ukraine	●	○	-	○	-
United Arab Emirates	●	●	●	●	-
United Kingdom	●	●	●	●	-
United Republic of Tanzania	-	●	-	-	-
United States of America	●	●	●	●	-
Uruguay	●	-	●	-	-
Uzbekistan	●	●	-	○	-
Venezuela (Bolivarian Republic of)	●	-	●	-	-
Viet Nam	●	●	-	●	-
Wallis and Futuna	●	-	-	-	-
Zambia	●*	●	-	●	-
Zimbabwe	-	●	-	●	-

**Newly reported in this update.*
"Unspecified B.1.617" reflects countries/territories/areas reporting detection of B.1.617 without further specification of lineage at this time. These will be reallocated as further details become available.
"●" 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 become available.
*** Alpha was excluded for Benin, Botswana, Eswatini and Madagascar, and unspecified B.1.617 was excluded for Estonia this week based on further information.*
****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 incidence, and variable delays to reflecting these data at 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 which 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 country(ies) of interest, time period(s), 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.

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, number of cases of Serbia and Kosovo (UNSCR 1244, 1999) have been aggregated for visualization purposes.

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
- OpenWHO 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
- Recommendations and advice for the public:
    - Protect yourself
    - Questions and answers
    - Travel advice
- EPI-WIN: tailored information for individuals, organizations and communities

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):2100509. https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2021.26.24.2100509
2. Li B, Deng A, Li K, et al. Viral infection and transmission in a large well-traced outbreak caused by the Delta SARS-CoV-2 variant. *medRxiv*. Published online July 12, 2021:2021.07.07.21260122. doi:10.1101/2021.07.07.21260122
3. Fisman DN, Tuite AR. Progressive Increase in Virulence of Novel SARS-CoV-2 Variants in Ontario, Canada. *medRxiv*. Published online July 12, 2021:2021.07.05.21260050. doi:10.1101/2021.07.05.21260050
4. Muecksch F, Wise H, Templeton K, et al. *Longitudinal Variation in SARS-CoV-2 Antibody Levels and Emergence of Viral Variants: Implications for the Ability of Serological Assays to Predict Immunity*. Infectious Diseases (except HIV/AIDS); 2021. doi:10.1101/2021.07.02.21259939
5. Koslow W, Kühn MJ, Binder S, et al. Appropriate relaxation of non-pharmaceutical interventions minimizes the risk of a resurgence in SARS-CoV-2 infections in spite of the Delta variant. *medRxiv*. Published online July 14, 2021:2021.07.09.21260257. doi:10.1101/2021.07.09.21260257
6. Buchan SA, Tibebu S, Daneman N, et al. Increased household secondary attacks rates with Variant of Concern SARS-CoV-2 index cases. *Clinical Infectious Diseases*. 2021;(ciab496). doi:10.1093/cid/ciab496
7. Tegally H, Wilkinson E, Giovanetti M, et al. Emergence of a SARS-CoV-2 variant of concern with mutations in spike glycoprotein. *Nature*. Published online 2021. https://doi.org/10.1038/s41586-021-03402-9
8. Curran J, Dol J, Boulos L, et al. Transmission characteristics of SARS-CoV-2 variants of concern Rapid Scoping Review. *medRxiv*. Published online January 1, 2021:2021.04.23.21255515. doi:10.1101/2021.04.23.21255515
9. Cherian S, Potdar V, Jadhav S, et al. Convergent evolution of SARS-CoV-2 spike mutations, L452R, E484Q and P681R, in the second wave of COVID-19 in Maharashtra, India. *bioRxiv*. Published online January 1, 2021:2021.04.22.440932. doi:10.1101/2021.04.22.440932
10. Public Health England. *SARS-CoV-2 Variants of Concern and Variants under Investigation in England Technical Briefing 16*.; 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/994839/Variants_of_Concern_VOC_Technical_Briefing_16.pdf
11. Bager P, Wohlfahrt J, Fonager J, Albertsen. Increased Risk of Hospitalisation Associated with Infection with SARS-CoV-2 Lineage B.1.1.7 in Denmark. doi:Bager, Peter and Wohlfahrt, Jan and Fonager, Jannik and Albertsen, Mads and Yssing Michaelsen, Thomas and Holten Møller, Camilla and Ethelberg, Steen and Legarth, Rebecca and Fischer Button, Mia Sara and Gubbels, Sophie Madeleine and Voldstedlund, Marianne and Mølbak, Kåre and Skov, Robert Leo and Fomsgaard, Anders and Grove Krause, Tyra, Increased Risk of Hospitalisation Associated with Infection with SARS-CoV-2 Lineage B.1.1.7 in Denmark. Available at SSRN: https://ssrn.com/abstract=3792894 or http://dx.doi.org/10.2139/ssrn.3792894
12. NERVTAG paper on COVID-19 variant of concern B.1.1.7. *GOVUK*. Published online 2021. https://www.gov.uk/government/publications/nervtag-paper-on-covid-19-variant-of-concern-b117, http://files/64/nervtag-paper-on-covid-19-variant-of-concern-b117.html %[2021/02/08/18:37:19
13. Pearson CA, Eggo. Estimates of severity and transmissibility of novel South Africa SARS-CoV-2 variant 501Y.V2. https://cmmid.github.io/topics/covid19/reports/sa-novel-variant/2021_01_11_Transmissibility_and_severity_of_501Y_V2_in_SA.pdf
14. Jassat W MC. *Increased Mortality among Individuals Hospitalised with COVID-19 during the Second Wave in South Africa*.; 2021. https://www.medrxiv.org/content/10.1101/2021.03.09.21253184v1
15. Funk T, Pharris A, Spiteri G, et al. Characteristics of SARS-CoV-2 variants of concern B.1.1.7, B.1.351 or P.1: data from seven EU/EEA countries, weeks 38/2020 to 10/2021. *Eurosurveillance*. 2021;26(16). doi:https://doi.org/10.2807/1560-7917.ES.2021.26.16.2100348
16. Public Health England (PHE). *SARS-CoV-2 Variants of Concern and Variants under Investigation Technical Briefing 18*.; 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1001358/Variants_of_Concern_VOC_Technical_Briefing_18.pdf
17. Muik A, Wallisch A-K, Sänger B, et al. Neutralization of SARS-CoV-2 lineage B.1.1.7 pseudovirus by BNT162b2 vaccine–elicited human sera. *Science*. Published online 2021:eabg6105. https://science.sciencemag.org/content/sci/early/2021/01/28/science.abg6105.full.pdf
18. Gallais F, Gantner P, Bruel T, et al. Anti-SARS-CoV-2 Antibodies Persist for up to 13 Months and Reduce Risk of Reinfection. *medRxiv*. Published online January 1, 2021:2021.05.07.21256823. doi:10.1101/2021.05.07.21256823
19. Graham MS, Sudre CH, May A, et al. Changes in symptomatology, reinfection, and transmissibility associated with the SARS-CoV-2 variant B.1.1.7: an ecological study. *Lancet Public Health*. 2021;6(5):e335-e345. doi:10.1016/S2468-2667(21)00055-4
20. Wibmer CK, Ayres F, Hermanus T, et al. SARS-CoV-2 501Y.V2 escapes neutralization by South African COVID-19 donor plasma. *Nat Med*. Published online March 2021. https://www.ncbi.nlm.nih.gov/pubmed/33654292
21. Li R, Ma X, Deng J, et al. Differential efficiencies to neutralize the novel mutants B.1.1.7 and 501Y.V2 by collected sera from convalescent COVID-19 patients and RBD nanoparticle-vaccinated rhesus macaques. *Cell Mol Immunol*. Published online February 2021. https://www.ncbi.nlm.nih.gov/pubmed/33580167
22. Cele S, Gazy I, Jackson L, et al. Escape of SARS-CoV-2 501Y.V2 variants from neutralization by convalescent plasma. :19. https://www.medrxiv.org/content/10.1101/2021.01.26.21250224v1
23. Caniels TG, Bontjer I, Straten K van der, et al. Emerging SARS-CoV-2 variants of concern evade humoral immune responses from infection and vaccination. *medRxiv*. Published online June 1, 2021:2021.05.26.21257441. doi:10.1101/2021.05.26.21257441
24. Sabino EC, Buss LF, Carvalho MPS, et al. Resurgence of COVID-19 in Manaus, Brazil, despite high seroprevalence. *The Lancet*. 2021;397(10273):452-455. https://linkinghub.elsevier.com/retrieve/pii/S0140673621001835
25. Naveca F, Nasciment V, Souza V, et al. Phylogenetic relationship of SARS-CoV-2 sequences from Amazonas with emerging Brazilian variants harboring mutations E484K and N501Y in the Spike protein. *Virological*. Published online 2021. https://virological.org/t/phylogenetic-relationship-of-sars-cov-2-sequences-from-amazonas-with-emerging-brazilian-variants-harboring-mutations-e484k-and-n501y-in-the-spike-protein/585
26. Planas D, Veyer D, Baidaliuk A, et al. *Reduced Sensitivity of Infectious SARS-CoV-2 Variant B.1.617.2 to Monoclonal Antibodies and Sera from Convalescent and Vaccinated Individuals*. Microbiology; 2021. doi:10.1101/2021.05.26.445838
27. SARS-CoV-2 lateral flow antigen tests: evaluation of VUI-202012/01. *GOVUK*. https://www.gov.uk/government/publications/sars-cov-2-lateral-flow-antigen-tests-evaluation-of-vui-20201201/sars-cov-2-lateral-flow-antigen-tests-evaluation-of-vui-20201201, http://files/62/sars-cov-2-lateral-flow-antigen-tests-evaluation-of-vui-20201201.html %[2021/02/08/16:54:26
28. Tenforde MW, Patel MM, Ginde AA, et al. Effectiveness of SARS-CoV-2 mRNA Vaccines for Preventing Covid-19 Hospitalizations in the United States. *medRxiv*. Published online July 8, 2021:2021.07.08.21259776. doi:10.1101/2021.07.08.21259776
29. Chemaitelly H, Yassine HM, Benslimane FM, et al. mRNA-1273 COVID-19 vaccine effectiveness against the B.1.1.7 and B.1.351 variants and severe COVID-19 disease in Qatar. *Nat Med*. Published online July 9, 2021:1-8. doi:10.1038/s41591-021-01446-y
30. Abu-Raddad LJ, Chemaitelly H, Butt AA, National Study Group for COVID-19 Vaccination. Effectiveness of the BNT162b2 Covid-19 Vaccine against the B.1.1.7 and B.1.351 Variants. *The New England journal of medicine*. Published online May 2021. doi:10.1056/NEJMc2104974
31. Stowe J, Andrews JR, Gower C, et al. Effectiveness of COVID-19 vaccines against hospital admission with the Delta variant - Public library - PHE national - Knowledge Hub. Accessed June 18, 2021. https://khub.net/web/phe-national/public-library/-/document_library/v2WsRK3ZlEig/view/479607266
32. Nasreen S, He S, Chung H, et al. Effectiveness of COVID-19 vaccines against variants of concern, Canada. *medRxiv*. Published online July 3, 2021:2021.06.28.21259420. doi:10.1101/2021.06.28.21259420

33. Sadoff J, Gray G, Vandebosch A, et al. Safety and Efficacy of Single-Dose Ad26.COV2.S Vaccine against Covid-19. *New England Journal of Medicine*. Published online April 2021:NEJMoa2101544-NEJMoa2101544. doi:10.1056/NEJMoa2101544
34. Chung H, He S, Nasreen S, et al. Effectiveness of BNT162b2 and mRNA-1273 COVID-19 vaccines against symptomatic SARS-CoV-2 infection and severe COVID-19 outcomes in Ontario, Canada. Published online 2021:30.
35. Lopez Bernal J, Andrews N, Gower C, et al. Effectiveness of COVID-19 vaccines against the B.1.617.2 variant. doi:https://doi.org/10.1101/2021.05.22.21257658
36. Sheikh A, McMenamin J, Taylor B, Robertson C. SARS-CoV-2 Delta VOC in Scotland: demographics, risk of hospital admission, and vaccine effectiveness. *The Lancet*. 2021;0(0). doi:10.1016/S0140-6736(21)01358-1
37. Nasreen S. Effectiveness of COVID-19 vaccines against variants of concern, Canada. :27.
38. Emary KRW, Golubchik T, Aley PK, et al. Efficacy of ChAdOx1 nCoV-19 (AZD1222) vaccine against SARS-CoV-2 variant of concern 202012/01 (B.1.1.7): an exploratory analysis of a randomised controlled trial. *The Lancet*. 2021;397(10282):1351-1362. doi:10.1016/S0140-6736(21)00628-0
39. Heath PT, Eva Galiza FP, David Neil Baxter M, et al. Efficacy of the NVX-CoV2373 Covid-19 Vaccine Against the B.1.1.7 Variant. *medRxiv*. Published online May 2021:2021.05.13.21256639-2021.05.13.21256639. doi:10.1101/2021.05.13.21256639
40. Madhi SA, Baillie V, Cutland CL, et al. Efficacy of the ChAdOx1 nCoV-19 Covid-19 Vaccine against the B.1.351 Variant. *New England Journal of Medicine*. Published online March 2021:NEJMoa2102214-NEJMoa2102214. doi:10.1056/NEJMoa2102214
41. Shinde V, Bhikha S, Hoosain Z, et al. Efficacy of NVX-CoV2373 Covid-19 Vaccine against the B.1.351 Variant. *New England Journal of Medicine*. Published online May 2021:NEJMoa2103055-NEJMoa2103055. doi:10.1056/NEJMoa2103055
42. Ranzani OT, Hitchings M, Neto MD, et al. Effectiveness of the CoronaVac vaccine in the elderly population during a P.1 variant-associated epidemic of COVID-19 in Brazil: A test-negative case-control study. *medRxiv*. Published online May 21, 2021:2021.05.19.21257472. doi:10.1101/2021.05.19.21257472
43. Hitchings MDT, Ranzani OT, Torres MSS, et al. Effectiveness of CoronaVac among healthcare workers in the setting of high SARS-CoV-2 Gamma variant transmission in Manaus, Brazil: A test-negative case-control study. *medRxiv*. Published online June 24, 2021:2021.04.07.21255081. doi:10.1101/2021.04.07.21255081
44. Ella R. Efficacy, safety, and lot to lot immunogenicity of an inactivated SARS-CoV-2 vaccine (BBV152): a double-blind, randomised, controlled phase 3 trial. :29.
45. Wang G-L, Wang Z-Y, Duan L-J, et al. Susceptibility of Circulating SARS-CoV-2 Variants to Neutralization. *New England Journal of Medicine*. Published online April 2021:NEJMc2103022-NEJMc2103022. doi:10.1056/nejmc2103022
46. Yadav P, Sapkal GN, Abraham P, et al. Neutralization of variant under investigation B.1.617 with sera of BBV152 vaccinees. *bioRxiv*. Published online April 2021:2021.04.23.441101-2021.04.23.441101. doi:10.1101/2021.04.23.441101
47. Ikegame S, A Siddiquey MN, Hung C-T, et al. Qualitatively distinct modes of Sputnik V vaccine-neutralization escape by SARS-CoV-2 Spike variants. *medRxiv*. Published online April 2021:2021.03.31.21254660-2021.03.31.21254660. doi:10.1101/2021.03.31.21254660
48. Shen X, Tang H, McDanal C, et al. SARS-CoV-2 variant B.1.1.7 is susceptible to neutralizing antibodies elicited by ancestral spike vaccines. *Cell Host & Microbe*. 2021;29(4):529-539.e3. doi:10.1016/j.chom.2021.03.002
49. Hu J, Wei X, Xiang J, et al. Reduced neutralization of SARS-CoV-2 B.1.617 variant by inactivated and RBD-subunit vaccine. *bioRxiv*. Published online July 9, 2021:2021.07.09.451732. doi:10.1101/2021.07.09.451732
50. Chen Y, Shen H, Huang R, Tong X, Wu C. Serum neutralising activity against SARS-CoV-2 variants elicited by CoronaVac. *The Lancet Infectious Diseases*. 2021;0(0). doi:10.1016/S1473-3099(21)00287-5
51. Anichini G, Terrosi C, Gori Savellini G, Gandolfo C, Franchi F, Cusi MG. Neutralizing Antibody Response of Vaccinees to SARS-CoV-2 Variants. *Vaccines*. 2021;9(5):517. doi:10.3390/vaccines9050517
52. Bates TA, Leier HC, Lyski ZL, et al. Neutralization of SARS-CoV-2 variants by convalescent and vaccinated serum. *medRxiv*. Published online April 2021:2021.04.04.21254881-2021.04.04.21254881. doi:10.1101/2021.04.04.21254881
53. Becker M, Dulovic A, Junker D, et al. Immune response to SARS-CoV-2 variants of concern in vaccinated individuals. *Nat Commun*. 2021;12(1):3109. doi:10.1038/s41467-021-23473-6
54. Collier AY, McMahan K, Yu J, et al. Immunogenicity of COVID-19 mRNA Vaccines in Pregnant and Lactating Women. Published online 2021. doi:10.1001/jama.2021.7563
55. Dejnirattisai W, Zhou D, Supasa P, et al. Antibody evasion by the P.1 strain of SARS-CoV-2. *Cell*. 2021;0(0). doi:10.1016/j.cell.2021.03.055
56. Edara VV, Floyd K, Lai L, et al. Infection and mRNA-1273 vaccine antibodies neutralize SARS-CoV-2 UK variant. *medRxiv : the preprint server for health sciences*. Published online February 2021:2021.02.02.21250799-2021.02.02.21250799. doi:10.1101/2021.02.02.21250799
57. Garcia-Beltran WF, Lam EC, St. Denis K, et al. Multiple SARS-CoV-2 variants escape neutralization by vaccine-induced humoral immunity. *Cell*. 2021;0(0). doi:10.1016/j.cell.2021.03.013
58. Gonzalez C, Saade C, Bal A, et al. Live virus neutralisation testing in convalescent patients and subjects vaccinated 1 against 19A, 20B, 20I/501Y.V1 and 20H/501Y.V2 isolates of SARS-CoV-2 2 3. *medRxiv*. Published online May 2021:2021.05.11.21256578-2021.05.11.21256578. doi:10.1101/2021.05.11.21256578
59. Hoffmann M, Arora P, Groß R, et al. SARS-CoV-2 variants B.1.351 and P.1 escape from neutralizing antibodies. *Cell*. 2021;184(9):2384-2393.e12. doi:10.1016/j.cell.2021.03.036
60. Kuzmina A, Khalaila Y, Voloshin O, et al. SARS-CoV-2 spike variants exhibit differential infectivity and neutralization resistance to convalescent or post-vaccination sera. *Cell Host and Microbe*. 2021;29(4):522-528.e2. doi:10.1016/j.chom.2021.03.008
61. Liu Y, Liu J, Xia H, et al. Neutralizing Activity of BNT162b2-Elicited Serum. *New England Journal of Medicine*. 2021;384(15):1466-1468. doi:10.1056/nejmc2102017
62. Liu Y, Liu J, Xia H, et al. BNT162b2-Elicited Neutralization against New SARS-CoV-2 Spike Variants. *New England Journal of Medicine*. Published online May 2021:NEJMc2106083-NEJMc2106083. doi:10.1056/NEJMc2106083
63. Liu J, Bodnar BH, Wang X, et al. Correlation of vaccine-elicited antibody levels and neutralizing activities against SARS-CoV-2 and its variants. *bioRxiv*. Published online May 31, 2021:2021.05.31.445871. doi:10.1101/2021.05.31.445871
64. McCallum M, Bassi J, Marco AD, et al. SARS-CoV-2 immune evasion by the B.1.427/B.1.429 variant of concern. *Science*. Published online July 1, 2021. doi:10.1126/science.abi7994
65. Muik A, Wallisch A-K, Sänger B, et al. Neutralization of SARS-CoV-2 lineage B.1.1.7 pseudovirus by BNT162b2 vaccine–elicited human sera. *Science*. 2021;371(6534):1152-1153. doi:10.1126/science.abg6105
66. Pegu A, O'Connell S, Schmidt SD, et al. Durability of mRNA-1273-induced antibodies against SARS-CoV-2 variants. *bioRxiv*. Published online May 2021:2021.05.13.444010-2021.05.13.444010. doi:10.1101/2021.05.13.444010
67. Planas D, Bruel T, Grzelak L, et al. Sensitivity of infectious SARS-CoV-2 B.1.1.7 and B.1.351 variants to neutralizing antibodies. *Nature Medicine*. Published online March 2021:1-8. doi:10.1038/s41591-021-01318-5
68. Zhou D, Dejnirattisai W, Supasa P, et al. Evidence of escape of SARS-CoV-2 variant B.1.351 from natural and vaccine-induced sera. *Cell*. 2021;189(0):1-14. doi:10.1016/j.cell.2021.02.037
69. Tada T, Dcosta BM, Samanovic-Golden M, et al. Neutralization of viruses with European, South African, and United States SARS-CoV-2 variant spike proteins by convalescent sera and BNT162b2 mRNA vaccine-elicited antibodies. *bioRxiv : the preprint server for biology*. Published online February 2021:2021.02.05.430003-2021.02.05.430003. doi:10.1101/2021.02.05.430003

70. Trinité B, Pradenas E, Marfil S, et al. Previous SARS-CoV-2 infection increases B.1.1.7 cross-neutralization by vaccinated individuals. Equal contribution. *bioRxiv*. Published online March 2021:2021.03.05.433800-2021.03.05.433800. doi:10.1101/2021.03.05.433800
71. Wall EC, Wu M, Harvey R, et al. Neutralising antibody activity against SARS-CoV-2 VOCs B.1.617.2 and B.1.351 by BNT162b2 vaccination. *The Lancet*. 2021;0(0). doi:10.1016/S0140-6736(21)01290-3
72. Wang Z, Schmidt F, Weisblum Y, et al. mRNA vaccine-elicited antibodies to SARS-CoV-2 and circulating variants. *Nature*. 2021;592(7855):616-616. doi:10.1038/s41586-021-03324-6
73. Wu K, Werner AP, Koch M, et al. Serum Neutralizing Activity Elicited by mRNA-1273 Vaccine. *New England Journal of Medicine*. 2021;384(15):1468-1470. doi:10.1056/NEJMc2102179
74. Zani A, Caccuri F, Messali S, Bonfanti C, Caruso A. Serosurvey in BNT162b2 vaccine-elicited neutralizing antibodies against authentic B.1, B.1.1.7, B.1.351, B.1.525 and P.1 SARS-CoV-2 variants. *Emerging Microbes & Infections*. 2021;0(ja):1-6. doi:10.1080/22221751.2021.1940305
75. Geers D, Shamier MC, Bogers S, et al. SARS-CoV-2 variants of concern partially escape humoral but not T-cell responses in COVID-19 convalescent donors and vaccinees. *Science Immunology*. 2021;6(59). doi:10.1126/sciimmunol.abj1750
76. Marot S, Malet I, Leducq V, et al. Neutralization heterogeneity of United Kingdom and South-African SARS-CoV-2 variants in BNT162b2-vaccinated or convalescent COVID-19 healthcare workers. *Clinical Infectious Diseases*. 2021;(ciab492). doi:10.1093/cid/ciab492
77. Xie X, Liu Y, Liu J, et al. Neutralization of SARS-CoV-2 spike 69/70 deletion, E484K and N501Y variants by BNT162b2 vaccine-elicited sera. *Nat Med*. 2021;27(4):620-621. doi:10.1038/s41591-021-01270-4
78. Choi A, Koch M, Wu K, et al. Serum Neutralizing Activity of mRNA-1273 against SARS-CoV-2 Variants. *bioRxiv*. Published online June 28, 2021:2021.06.28.449914. doi:10.1101/2021.06.28.449914
79. Jongeneelen M, Kaszas K, Veldman D, et al. Ad26.COV2.S elicited neutralizing activity against Delta and other SARS-CoV-2 variants of concern. *bioRxiv*. Published online July 1, 2021:2021.07.01.450707. doi:10.1101/2021.07.01.450707
80. Alter G, Yu J, Liu J, et al. Immunogenicity of Ad26.COV2.S vaccine against SARS-CoV-2 variants in humans. *Nature*. Published online June 9, 2021:1-9. doi:10.1038/s41586-021-03681-2
81. Vacharathit V, Aiewsakun P, Manopwisedjaroen S, et al. SARS-CoV-2 variants of concern exhibit reduced sensitivity to live-virus neutralization in sera from CoronaVac vaccinees and naturally infected COVID-19 patients. *medRxiv*. Published online July 15, 2021:2021.07.10.21260232. doi:10.1101/2021.07.10.21260232
82. Souza WM, Amorim MR, Sesti-Costa R, et al. Neutralisation of SARS-CoV-2 lineage P.1 by antibodies elicited through natural SARS-CoV-2 infection or vaccination with an inactivated SARS-CoV-2 vaccine: an immunological study. *The Lancet Microbe*. 2021;0(0). doi:10.1016/S2666-5247(21)00129-4
83. Acevedo ML, Alonso-Palomares L, Bustamante A, et al. Infectivity and immune escape of the new SARS-CoV-2 variant of interest Lambda. *medRxiv*. Published online July 1, 2021:2021.06.28.21259673. doi:10.1101/2021.06.28.21259673
84. Lustig Y, Zuckerman N, Nemet I, et al. Neutralising capacity against Delta (B.1.617.2) and other variants of concern following Comirnaty (BNT162b2, BioNTech/Pfizer) vaccination in health care workers, Israel. *Eurosurveillance*. 2021;26(26):2100557. doi:10.2807/1560-7917.ES.2021.26.26.2100557
85. Cao Y, Yisimayi A, Bai Y, et al. Humoral immune response to circulating SARS-CoV-2 variants elicited by inactivated and RBD-subunit vaccines. *Cell Research*. Published online May 21, 2021:1-10. doi:10.1038/s41422-021-00514-9
86. Huang B, Dai L, Wang H, et al. Neutralization of SARS-CoV-2 VOC 501Y.V2 by human antisera elicited by both 1 inactivated BBIBP-CorV and recombinant dimeric RBD ZF2001 vaccines 2 3 Authors. *bioRxiv*. Published online February 2021:2021.02.01.429069-2021.02.01.429069. doi:10.1101/2021.02.01.429069
87. Yadav PD, Sapkal GN, Ella R, et al. Neutralization against B.1.351 and B.1.617.2 with sera of COVID-19 recovered cases and vaccinees of BBV152. *bioRxiv*. Published online June 7, 2021:2021.06.05.447177. doi:10.1101/2021.06.05.447177
88. Chang X, Sousa Augusto G, Liu X, et al. BNT162b2 mRNA COVID-19 vaccine induces antibodies of broader cross-reactivity than natural infection but recognition of mutant viruses is up to 10-fold reduced. *bioRxiv*. Published online March 2021:2021.03.13.435222-2021.03.13.435222. doi:10.1101/2021.03.13.435222
89. Hoffmann M, Hofmann-Winkler H, Krüger N, et al. SARS-CoV-2 variant B.1.617 is resistant to Bamlanivimab and evades antibodies induced by infection and vaccination. *bioRxiv*. Published online May 5, 2021:2021.05.04.442663. doi:10.1101/2021.05.04.442663
90. Sahin U, Muik A, Vogler I, et al. BNT162b2 vaccine induces neutralizing antibodies and poly-specific T cells in humans. *Nature*. Published online May 27, 2021. doi:10.1038/s41586-021-03653-6
91. Stamatatos L, Czartoski J, Wan Y-H, et al. mRNA vaccination boosts cross-variant neutralizing antibodies elicited by SARS-CoV-2 infection. *Science*. Published online March 2021:eabg9175-eabg9175. doi:10.1126/science.abg9175
92. Wang P, Nair MS, Liu L, et al. Antibody resistance of SARS-CoV-2 variants B.1.351 and B.1.1.7. *Nature*. 2021;593(7857):130-135. doi:10.1038/s41586-021-03398-2
93. Davis C, Logan N, Tyson G, et al. Reduced neutralisation of the Delta (B.1.617.2) SARS-CoV-2 variant of concern following vaccination. *medRxiv*. Published online June 28, 2021:2021.06.23.21259327. doi:10.1101/2021.06.23.21259327
94. Edara VV, Norwood C, Floyd K, et al. Infection- and vaccine-induced antibody binding and neutralization of the B.1.351 SARS-CoV-2 variant. *Cell Host and Microbe*. 2021;29(4):516-521.e3. doi:10.1016/j.chom.2021.03.009
95. Shen X, Tang H, Pajon R, et al. Neutralization of SARS-CoV-2 Variants B.1.429 and B.1.351. *New England Journal of Medicine*. 2021;384(24):2352-2354. doi:10.1056/NEJMc2103740
96. Tada T, Zhou H, Dcosta BM, Samanovic MI, Mulligan MJ, Landau NR. SARS-CoV-2 Lambda Variant Remains Susceptible to Neutralization by mRNA Vaccine-elicited Antibodies and Convalescent Serum. *bioRxiv*. Published online July 3, 2021:2021.07.02.450959. doi:10.1101/2021.07.02.450959
97. COVID-19 vaccinesWHO Meeting on correlates of protection. Accessed June 4, 2021. https://www.who.int/news-room/events/detail/2021/06/01/default-calendar/covid-19-vaccineswho-meeting-on-correlates-of-protection
98. Shen X, Tang H, Pajon R, et al. Neutralization of SARS-CoV-2 Variants B.1.429 and B.1.351. *New England Journal of Medicine*. Published online April 2021:NEJMc2103740-NEJMc2103740. doi:10.1056/nejmc2103740
99. Liu J, Liu Y, Xia H, et al. BNT162b2-elicited neutralization of B.1.617 and other SARS-CoV-2 variants. *Nature*. Published online June 10, 2021:1-5. doi:10.1038/s41586-021-03693-y
100. Wang P, Casner RG, Nair MS, et al. Increased Resistance of SARS-CoV-2 Variant P.1 to Antibody Neutralization. *bioRxiv*. Published online April 9, 2021:2021.03.01.433466. doi:10.1101/2021.03.01.433466
101. Palacios R, Batista AP, Albuquerque CSN, et al. Efficacy and Safety of a COVID-19 Inactivated Vaccine in Healthcare Professionals in Brazil: The PROFISCOV Study. *SSRN Electronic Journal*. Published online April 2021. doi:10.2139/ssrn.3822780
102. Liu C, Ginn HM, Dejnirattisai W, et al. Reduced neutralization of SARS-CoV-2 B.1.617 by vaccine and convalescent serum. *Cell*. Published online June 17, 2021. doi:10.1016/j.cell.2021.06.020
103. Edara V-V, Pinsky BA, Suthar MS, et al. Infection and Vaccine-Induced Neutralizing-Antibody Responses to the SARS-CoV-2 B.1.617 Variants. *New England Journal of Medicine*. Published online July 7, 2021. doi:10.1056/NEJMc2107799
104. Sapkal G, Yadav PD, Sahay RR, et al. Neutralization of Delta variant with sera of Covishield vaccinees and COVID-19 recovered vaccinated individuals. *bioRxiv*. Published online July 2, 2021:2021.07.01.450676. doi:10.1101/2021.07.01.450676