Shaping the Future of Shipping

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25 July 2022 **COVID-19(22)15**

TO: LABOUR AFFAIRS COMMITTEE
ALL MEMBERS & ASSOCIATE MEMBERS
BIWEEKLY MEMBERS MEETING PARTICIPANTS
INTERNATIONAL ASSOCIATION GROUP PARTICIPANTS

COVID-19 UPDATE and MONKEYPOX UPDATE AS OF 25 July 2022

Action Required: Globally, as of 22 July 2022, there have been 565,207,160 confirmed cases of COVID-19, including 6,373,739 deaths, reported to WHO. As of 19 July 2022, a total of 12,219,375,500 vaccine doses have been administered.

SITUATION IN NUMBERS BY WHO REGION

	Cases	Deaths
Global	**565,207,160**	**6,373,739**
Americas	**168,183,683**	**2,779,572**
Europe	**237,944,384**	**2,041,618**
South-East Asia	**59,076,731**	**791,463**
Eastern Mediterranean	**22,398,987**	**344,284**
Africa	**9,181,118**	**173,921**
Western Pacific	**68,421,493**	**242,868**

	TOP 12 COUNTRIES	MOST CASES YESTERDAY	HIGH FATALITIES YESTERDAY
1	USA	Japan	USA
2	India	USA	Brazil
3	Brazil	Italy	Italy
4	France	France	France
5	Germany	Germany	Mexico
6	UK	Korea	Australia
7	Italy	Brazil	China
8	Korea	Australia	Chile
9	Russia	Mexico	Russia

10	Turkey	China	Japan
11	Spain	Peru	Korea
12	Japan	Austria	Peru

The WHO Director-General has determined that the multi-country outbreak of monkeypox constitutes a Public Health Emergency of International Concern, following the International Health Regulations (2005) (IHR) Emergency Committee regarding the multi-country outbreak of monkeypox, held on Thursday, 21 July 2022, from 12:00 to 19:00 CEST. The EC report and temporary recommendations are available at https://www.who.int/news/item/23-07-2022-second-meeting-of-the-international-health-regulations-(2005)-(ihr)-emergency-committee-regarding-the-multi-country-outbreak-of-monkeypox https://www.who.int/news/item/23-07-2022-second-meeting-of-the-international-health-regulations-(2005)-(ihr)-emergency-committee-regarding-the-multi-country-outbreak-of-monkeypox

Please find the statement on the twelfth meeting of the IHR (2005) Emergency Committee regarding the COVID-19 pandemic, held 8 July 2022, available at the following link: **https://www.who.int/news/item/12-07-2022-statement-on-the-twelfth-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-coronavirus-disease-(covid-19)-pandemic**. The WHO Director-General concurs with the advice offered by the EC and determined that COVID-19 continues to constitute a Public Health Emergency of International Concern (PHEIC).

COVID-19(22)15 -Annex 1 - facilitating safe crew changes and supporting seafarer wellbeing during covid-19

COVID-19(22)15 -Annex 2 - Weekly_Epi_Update

COVID-19(22)15 -Annex 3 - ICAO Travel Testing Report 19 Jul_2022

COVID-19(22)15 -Annex 4 - ICAO Vaccination Report_19 July_22

COVID-19(22)15 -Annex 5 - Preliminary-public-health-considerations- COVID-19-vaccination-2022

COVID-19(22)15 -Annex 6 - Joint ECDC-WHO Regional Office for Europe Monkeypox Surveillance Bulletin_2022-07-20

COVID-19(22)15 -Annex 7 - KEEPING AGENTS SAFE ON BOARD - INFECTIOUS DISEASES PROTOCOLS - JULY 2022

COVID-19(22)15 -Annex 8 - JSA updates

Ondrilla Fernandes
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FACILITATING SAFE CREW CHANGES AND SUPPORTING SEAFARER WELLBEING DURING THE COVID-19 PANDEMIC

Version 1

March 2022[*]

[*] The EU HEALTHY GATEWAYS Joint Action has received funding from the European Union, in the framework of the Third Health Programme (2014-2020). The content of this document represents the views of the author only and is his/her sole responsibility; it cannot be considered to reflect the views of the European Commission and/or the European Health and Digital Executive Agency (HaDEA) or any other body of the European Union. The European Commission and the Agency do not accept any responsibility for use that may be made of the information it contains.

Contents

Abbreviations

CDC	Centers for Disease Control and Prevention
COVID-19	Coronavirus disease
DG MOVE	Directorate-General for Mobility and Transport
ECDC	European Centre for Disease Prevention and Control
EMA	European Medicines Agency
EMSA	European Maritime Safety Agency
EU	European Union
EU MS	European Union Member States
ICAO	International Civil Aviation Organization
ICS	International Chamber of Shipping
IHR	International Health Regulations
ILO	International Labour Organization
IMO	International Maritime Organization
ISWAN	International Seafarers Welfare and Assistance Network
IVD	In Vitro Diagnostic
JRC	Joint Research Centre
MDH	Maritime Declaration of Health
MLC	Maritime Labour Convention
NAAT	Nucleic Acid Amplification Test
RT-PCR	Reverse transcription - Polymerase chain reaction
POE	Point of entry
PPE	Personal protective equipment
RADT	Rapid antigen detection test
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
VOC	Variants of concern
WHO	World Health Organization

Definitions

Cycle threshold (Ct) value: Real-time reverse transcription (RT)-PCR tests are the gold standard for the detection of COVID-19 and provide both a qualitative result (detected/not detected) and a quantitative result in the form of a cycle threshold (Ct) value (number of amplification cycles required for the detection signal to cross the background level - i.e. to generate a positive result). As Ct values are determined by the amount of viral RNA in the sample, they are often used as a proxy for the viral load (defined as the quantity of virus particles or viral genome copies in a given volume of the specimen) and can relate to the amount of virus present in the specimen (source: Infection, updated 17 March 2022. https://www.ecdc.europa.eu/en/covid-19/latest-evidence/infection).

Confirmed COVID-19 case: Any person that SARS-CoV-2 nucleic acid or antigen is detected in a clinical specimen. Rapid antigen test should be performed within 5 days from symptom onset or within 7 days from time of exposure. If the exposure time is unknown, the rapid antigen test should be performed as soon as possible (source: Case definition for COVID-19, as of 3 December 2020. https://www.ecdc.europa.eu/en/covid-19/surveillance/case-definition).

Face mask: Overarching term used for any device (i.e. a community face covering, medical face mask or a respirator) that is worn over the mouth and nose to prevent the inhalation of harmful substances such as infectious respiratory droplets or the release of infectious respiratory droplets produced by breathing, speaking, coughing or sneezing in the environment (source: Considerations for the use of face masks in the community in the context of the SARS-CoV-2 Omicron variant of concern. 7 February 2022. https://www.ecdc.europa.eu/en/publications-data/using-face-masks-community-reducing-covid-19-transmission).

Incubation period: Time between exposure to a virus and the development of symptoms (incubation period of COVID-19 is five to six days on average - range: two to 14 days) (source: Infection, https://www.ecdc.europa.eu/en/covid-19/latest-evidence/infection).

Isolation: separation of ill persons from others in such a manner as to prevent the spread of infection or contamination (source: International Health Regulations 2005, 3rd Edition. https://www.who.int/publications/i/item/9789241580496).

Medical face mask (also known as surgical or procedure mask): Disposable medical device used by healthcare workers to prevent large respiratory droplets and splashes reaching the mouth and nose of the wearer, and as a means of source control to stop the spread of large respiratory droplets by the person wearing them. Requirements for medical face masks, including the duration of use, are defined in the European Committee for Standardization's published standards. Medical face masks are not defined as personal protective equipment in Regulation (EU) 2016/425 of 9 March 2016 or Directive 89/656/EEC on personal protective equipment. However, for the purpose of this document and in accordance with guidance on infection prevention and control in the context of COVID-19 by the World Health Organization (WHO) and on transmission-based precautions, medical face masks are considered to provide protection against infections transmitted by droplets (source: Considerations for the use of face masks in the community in the context of the SARS-CoV-2 Omicron variant of concern. 7 February 2022. https://www.ecdc.europa.eu/en/publications-data/using-face-masks-community-reducing-covid-19-transmission).

Nucleic Acid Amplification Test (NAAT): RT-PCR or other NAAT, which should have the CE certification marking and should be in the list of the Joint Research Centre (JRC) In Vitro Diagnostic (IVD) database (https://covid-19-diagnostics.jrc.ec.europa.eu/) or in the list of US Food and Drug Administration with the In Vitro Diagnostics Emergency Use Authorization – Molecular Diagnostic Tests for SARS-CoV-2 and authorised for screening (testing asymptomatic individuals without known exposure) and can be used as specified in the authorization list for certified laboratories or health care settings: https://www.fda.gov/medical-devices/coronavirus-disease-2019-covid-19-emergency-use-authorizations-medical-devices/in-vitro-diagnostics-euas-molecular-diagnostic-tests-sars-cov-2#individual-molecular. Further information on diagnostics can be found on "FIND", the global alliance for diagnostics: https://www.finddx.org/

Possible case of COVID-19: Any person with at least one of the following symptoms: runny nose, sore throat, headache, cough, fever, shortness of breath, sudden onset of anosmia, ageusia or dysgeusia, vomiting or diarrhoea. Additional less specific symptoms may include chills, muscle pain, fatigue (Source: https://www.ecdc.europa.eu/en/covid-19/latest-evidence/clinical).

Public health observation: Monitoring of the health status of a traveller over time for the purpose of determining the risk of disease transmission (source: International Health Regulations 2005, 3rd Edition. https://www.who.int/publications/i/item/9789241580496).

Quarantine: restriction of activities and/or separation from others of suspect persons who are not ill in such a manner as to prevent the possible spread of infection or contamination (source: International Health Regulations 2005, 3rd Edition. https://www.who.int/publications/i/item/9789241580496).

Rapid antigen detection test (RADT): Any type of RADT listed in the document "Common list of COVID-19 rapid antigen tests, including those of which their test results are mutually recognised, and a common standardised set of data to be included in COVID-19 test result certificates" (source: European Commission Directorate-General for Health and Food Safety. Public health, country knowledge, crisis management Health Security. Agreed by Health Security Committee on 17 February 2021. An updated to Annex II agreed by HSC on 19 March 2021. https://ec.europa.eu/health/sites/health/files/preparedness_response/docs/covid-19_rat_common-list_en.pdf).

Respirator (also known as a filtering face piece (FFP) mask or filtering half mask): device designed to protect the wearer from exposure to airborne contaminants (e.g. from inhaling dust or infectious particles). Requirements for FFPs, including the intended duration of use, are specified in the European Committee for Standardization's published standards, and respirators are classified as personal protective equipment. An N95/N99 respirator is the United States' equivalent of FFP2/FFP3 respirators as defined by US standard NIOSH 42 CFR, part 84. The KN95/KP95 standards (China) has similar performance requirements (source: Considerations for the use of face masks in the community in the context of the SARS-CoV-2 Omicron variant of concern. 7 February 2022. https://www.ecdc.europa.eu/en/publications-data/using-face-masks-community-reducing-covid-19-transmission).

Vaccinated individuals: a seafarer who carries a proof of vaccination, and at least 14 days and no more than 270 days have passed since the last dose of the primary vaccination series or if the person has received a booster (i.e. 3rd dose) dose (exceptions apply for persons under the age of 18)[†]. The above definition of vaccinated individual is based on the current European Commission definition. Should the European Commission definition change, the definition of vaccinated individual in this document will change accordingly. Heterologous vaccination is acceptable as indicted in the EMA and WHO recommendations[1,2]‡.

Acceptable vaccines are considered those listed in the European Medicines Agency (EMA) or WHO lists.

Listed vaccine (as of 18 March 2022)*		EMA list	WHO list	Doses in Series	Type
1	Comirnaty (BioNTech and Pfizer)	Yes	Yes	2	mRNA
2	Spikevax (Moderna)	Yes	Yes	2	mRNA
3	Janssen (Johnson & Johnson)	Yes	Yes	1	Vectored
4	Vaxzevria (AstraZeneca, Covishield)	Yes	Yes	2	Vectored
5	Nuvaxovid (Novavax)	Yes	Yes	2	Protein subunit
6	Sinopharm	No	Yes	2	Inactivated
7	Sinovac-CoronaVac	No	Yes	2	Inactivated
8	Covaxin	No	Yes	2	Inactivated
9	Covovax	No	Yes	2	Protein subunit

**Updates can be found in: https://www.ema.europa.eu/en/human-regulatory/overview/public-health-threats/coronavirus-disease-covid-19/treatments-vaccines/covid-19-vaccines and https://www.who.int/emergencies/diseases/novel-coronavirus-2019/covid-19-vaccines*

[†] Certificates held by persons aged 18 and above indicating the completion of the primary vaccination series shall be accepted only if not more than 270 days have passed since the date of the latest dose in that series

[‡] Depending on product availability, countries implementing WHO EUL inactivated vaccines for initial doses may consider using WHO Emergency Use Listing (EUL) vectored or mRNA vaccines for subsequent doses.

• Depending on product availability, countries implementing WHO EUL vectored vaccines for initial doses may consider using WHO EUL mRNA vaccines for subsequent doses.

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1. Introduction

The EU HEALTHY GATEWAYS Joint Action (Grant Agreement No 801493) in collaboration with the European Commission's Directorate General for Mobility and Transport (DG MOVE) have jointly developed this document.

As indicated by the International Maritime Organization (IMO), more than 80% of the trade volume globally is transported by ships. Seafarers' work is essential to maintain supply chains of food, medical products, energy and other goods globally. During the COVID-19 pandemic seafarers were dramatically affected due to travel restrictions and were unable to perform crew changes, with thousands stranded on board ships for several months. Efforts of the shipping industry and governmental authorities are essential to protect seafarers' health and wellbeing, while at the same time allowing for safe movements and crew changes.

This document was produced considering Communications and Recommendations issued by the European Commission on travel and transport during the coronavirus disease (COVID-19) pandemic[3]. Current evidence on COVID-19, recommendations and guidance from the World Health Organization (WHO)[4], technical reports from the European Centre for Disease Prevention and Control (ECDC)[5] and relevant Circular Letters of the IMO[6] as of March 2022 were also taken into account.

Commercial vessels are semi-closed workplaces with common facilities that promote close contact, enabling COVID-19 transmission. It is important that ship owners, crew managers and other ship operators (or their representatives) ensure public health measures are in place to prevent introduction, as well as on board transmission among seafarers, from seafarers to ship visitors (e.g. persons involved in ship/shore interface, maritime/shore-based/port personnel) or conversely from ship visitors to seafarers. Risks for COVID-19 transmission also exist during seafarers' entire journey travelling from their place of residence to the ship and returning. With on-going COVID-19 transmission continuing to be reported worldwide, variants of concern (VOCs) present in many countries, and uneven COVID-19 vaccination coverage of seafarers, this group is at risk during any point of their journey. Measures should also be in place to prevent COVID-19 infectious seafarers from beginning their journey or boarding the vessel, and at the same time while on board facilitating seafarers' opportunities for shore-side visits and supporting their access to healthcare and mental health services.

While this document focuses on providing practical guidance related to COVID-19, the guidance and procedures included within (e.g. preventive measures to be in place at all times on board, responding to an event, supporting seafarers' welfare and safeguarding mental/physical health) are more widely applicable. Measures for commercial vessels included in this document can be applied to other similar respiratory illnesses that are easily transmitted on board such as Influenza, as well as to new emerging pathogens and during future public health emergencies.

Provision of medical care and support without delay on board is essential as commercial vessels undertake extended journeys and may be away from land-based health facilities for long periods. This is essential especially during the pandemic since due to the nature of their work, unavoidable close contact in the shipboard accommodation and with limited access to land-based care, seafarers are at greater risk if they contract COVID-19 and cannot receive prompt and appropriate care.

2. Purpose and scope

The purpose of this document is to provide practical guidance for ship owners, crew managers and ship operators (or their representatives) for measures on commercial vessels that should be implemented to protect the health of seafarers and safe seafarer travel in the European Union (EU) context. This document does not contain legally binding guidance, but is based on existing published recommendations and guidelines from the European Commission and EU agencies. This document has not been developed to provide guidance to governmental authorities or port administrations, since European Commission Recommendations as well as other guideline documents have been published by EU agencies – including ECDC and the European Maritime Safety Agency (EMSA) – addressing recommendations for actions by governmental authorities (**Annex 1**). The document should also be read in conjunction with other documentation provided by WHO and the International Chamber of Shipping (ICS) in relation to ships sailing on international voyages.

For the purpose of this document, a commercial vessel does not include passenger cruise or passenger ferry vessels. EU HEALTHY GATEWAYS has developed specific guidance for passenger cruise and passenger ferry ships in the context of COVID-19[§]. This current guidance describes measures for public health observation and for preventing the introduction of COVID-19 on board vessels, screening and diagnostic testing for COVID-19 and reducing risks for transmission among seafarers covering their entire journey, beginning from their home to the ship and back. Considerations are further provided to facilitate seafarers' shore-based visits when at a port of call and to safeguard seafarers' health and welfare. Any national or local guidelines, policies and regulations relevant to the scope of the current document, enacted by European Union Member States (EU MS) which are stricter than the current document guidelines and addressed to ship owners or their representatives, should be implemented in addition to the current guidelines.

3. Preventive measures in place at all times on board

3.1. Written contingency plan/outbreak management plan

A written contingency plan/outbreak management plan for the commercial vessel should be in place for detecting and responding to a COVID-19 event on board. The plan should be tested through exercises.

The plan should outline the following procedures related to[7]:

- Detection of COVID-19 cases (e.g. protocols for surveillance and monitoring, including testing frequency)
- Reporting and notification of an incident on board
- Management of possible/confirmed COVID-19 cases and their contacts (including protocols for isolation and quarantine)
- Disembarkation of cases and their contacts, including transport to a land-based medical facility if required
- Personal protective measures (e.g. protocols for face mask use, physical distancing, hand hygiene etc.) and environmental measures (e.g. protocols for routine and

[§] EU HEALTHY GATEWAYS guidance in the context of COVID-19 for passenger cruise ships and passenger ferries (https://www.healthygateways.eu/Novel-coronavirus#Interim)

enhanced cleaning and disinfection measures if an event takes place on board, protocols for ventilation of ship areas)

- Plan for communication (internal communication procedures and for communication with competent authorities at the port)

Box 1: Essential information and instructions for raising seafarer awareness to detect COVID-19 cases

Raising seafarer awareness for detecting and managing a COVID-19 event on board

Ship owners, crew managers and ship operators (or their representatives) should provide seafarers with information and instructions in English and if possible in their national language, related to their role in the implementation of the ship's contingency plan/outbreak management plan, the detection and management of possible/confirmed COVID-19 cases and contacts on board, as well as other necessary information.

All seafarers on board should receive instructions about the following:

- *Ship's written contingency plan and their specific role in plan implementation*
- *COVID-19 compatible signs and symptoms*
- *On board procedures in the event that a seafarer displays relevant COVID-19 symptoms*
- *Special considerations for high-risk groups on board*
- *Personal protective and hygiene measures implemented on board the vessel (e.g. protocols for face mask use, physical distancing, hand hygiene etc.)*
- *Environmental measures implemented on board the vessel (e.g. protocols for routine and enhanced cleaning and disinfection measures if an event takes place on board, protocols for ventilation of ship areas)*

In accordance with the Maritime Labour Convention (MLC) 2006, as amended (MLC, 2006)[8] *"ships which do not carry a medical doctor shall be required to have either at least one seafarer on board who is in charge of medical care and administering medicine as part of their regular duties or at least one seafarer on board competent to provide medical first aid; persons in charge of medical care on board who are not medical doctors shall have satisfactorily completed training in medical care that meets the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended ("STCW").…."*

Seafarer on board in charge of medical care/competent to provide medical first aid should receive instructions (in addition to above) about the following:

- *Care of possible/confirmed COVID-19 cases*
- *Procedures if event detected on board (e.g. protocols for isolation and quarantine)*

Guidance related to COVID-19 case management on board are available from WHO[7] and ICS[9].

3.2. Routine screening tests

The following section describes the suggested frequency of screening during routine operations (excluding the period of public health observation conducted on board). It further provides guidance on the recommended supplies and equipment to be carried on board for both routine screening and to respond to a COVID-19 case or outbreak on board.

3.2.1. Frequency of routine screening/diagnostic testing

As COVID-19 cases may be introduced on board during the ship's voyage, a protocol of routine screening is recommended. The frequency can be determined following a risk-based approach. Rapid Antigen Detection Tests (RADTs) should be conducted on all seafarers on board, but giving priority to unvaccinated seafarers in any situation that could pose a risk of infection.

3.2.2. Acceptable diagnostic tests

As described in the definition section of this document, any type of RADT listed in the European Commission document "Common list of COVID-19 rapid antigen tests, including those of which their test results are mutually recognised, and a common standardised set of data to be included in COVID-19 test result certificates"[**] and/or the WHO "Emergency Use Listing for In vitro diagnostics (IVDs) Detecting SARS-CoV-2-RADTs lists"[††] is suggested for use of routine screening on board.

3.2.3. Recommended supplies and equipment for screening and general measures

Ship owners, crew managers and other ship operators (or their representatives) should ensure in accordance with the MLC 2006[8], that if a medical doctor is not on board, at least one seafarer on board will be in charge of medical care and administering medicine as part of their regular duties, or at least one seafarer on board is competent to provide medical first aid and medical care to possible/confirmed COVID-19 cases on board and their contacts. This designated seafarer should be trained to perform clinical specimen collection and testing with RADTs, particularly if on extended voyages where access to land-based facilities will be very limited.

It should also be ensured that adequate medical supplies and equipment are available for symptomatic treatment of COVID-19 (e.g. antipyretics) and other health conditions, as described in the WHO (2007) recommended medicines and equipment by the *International Medical Guide for Ships* 3rd edition[10], or as per country medical guidance published by national authorities. Thermometers accurately measuring body temperature should be available on board. An adequate supply of personal protective equipment (PPE) should be available on board with ship owners, crew managers and other ship operators (or their representatives) considering the number of seafarers on board, the embarkation of ship visitors, the duration of the voyage and the possibility of shore-side visits by seafarers.

Box 2: Essential supplies and equipment to be available at all times

Essential supplies and equipment

An adequate supply of the following should be available **at all times** on board for routine preventive measures and if needed to respond to a COVID-19 case or outbreak:

RAPID ANTIGEN DETECTION TESTS:

- The number needed should be calculated based on the vessel capacity and frequency of routine screening described in **Section 3.2.1.** For example, ship owners, crew managers and ship operators (or their representatives) could plan to carry on board a stockpile as follows:
  - *2 RADTs per seafarer per week (for the duration of the planned voyage)*
  - *1 additional RADT per seafarer per two weeks*

Ship owners should ensure continuous monitoring and replenishment of RADT stockpiles on board.

PERSONAL PROTECTIVE EQUIPMENT:

- Respirators (e.g. FFP2 or equivalent standard) if available and medical face masks
- Eye protection (goggles or face shields)
- Disinfectants and hand hygiene supplies, tissues and no-touch bins for waste disposal
- Disposable gloves
- Long-sleeved impermeable gowns (aprons could also be included)

[**] https://ec.europa.eu/health/sites/default/files/preparedness_response/docs/covid-19_rat_common-list_en.pdf

[††] https://extranet.who.int/pqweb/vitro-diagnostics/coronavirus-disease-covid-19-pandemic-%E2%80%94-emergency-use-listing-procedure-eul-open (list updated periodically)

Seafarers should be instructed routinely by ship owners, crew managers and other ship operators (or their representatives) in their national language about appropriate wearing, use, removal, disposal or cleaning/storage of PPE.

Ship owners should take into consideration PPE supplies that may also be required if a possible case or outbreak of COVID-19 occurs on board, for interaction of seafarers with any ship visitors and in the event that shore-side visits take place[11]. Guidance regarding suggested PPE supplies are available from EU HEALTHY GATEWAYS[12] and ICS[9].

4. Options for measures to prevent introduction of COVID-19 on board

To ensure continuous operation of the maritime sector for the maintenance of supply chains, essential services and economies, crew changes should be allowed in ports of EU MS, minimizing as far as possible the impact from restrictions on seafarers. European Commission Recommendations, Communications and Guidelines related to facilitating crew changes during the COVID-19 pandemic can be found in **Annex 1**.

For the purposes of crew changes, the first part of a seafarers' journey is the period of time to reach the ship, including time spent in their country of origin before leaving home, travelling to the country of destination where they will embark the ship, and any time spent in the destination country before embarking. Since seafarers may be exposed to COVID-19 at any point during this period, when implementing measures in accordance with the countries' and companies' policies, ship owners, crew managers and other ship operators (or their representatives) should ensure seafarers are supported and public health measures are in place to mitigate the risks of transmission during any point in this journey. It is also important that when on board, measures are in place to prevent and limit as much as possible transmission of COVID-19.

Seafarers who appear fit to begin work duties may be incubating the disease in the pre-symptomatic period, or be asymptomatic (not presenting with COVID-19 compatible symptoms) and infectious. It is therefore suggested to implement a risk-based approach when deciding on establishing public health observation measures and/or testing, irrespective of potential exposure to COVID-19, as a pre-embarkation measure for new crew. As indicated by WHO the benefits of public health observation in reducing COVID-19 transmission *"must be balanced against the related risks of infringement of human rights, psychosocial and economic harm, disruption to travel and trade, reductions in the movement of essential goods and workforce mobility"*[7].

It is suggested to consider different factors including COVID-19 incidence rates in the country of seafarers' origin and the country of embarkation, as well as the vaccination and health status of seafarers, and then decide if necessary to define a period of public health observation for new crew before starting regular work duties to prevent potentially COVID-19 infectious seafarers from embarking the vessel, or if already on board to prevent and limit transmission on the vessel.

Depending on the COVID-19 incidence rates in the country of seafarers' origin and the country of embarkation, public health observation measures of seafarers prior to beginning their regular work duties could take place in a designated accommodation facility ashore (e.g. hotel) **or** after embarking the vessel, in addition to enhanced screening and diagnostic testing. **Table 1** presents the timeframe of work restrictions depending on the immunity status of the seafarer.

Table 1: Suggested duration of isolation, quarantine, public health observation and possible work restrictions considering seafarers' health and vaccination status[13-15] (Table 1 does not address the isolation of patients that require hospitalisation ashore)

Vaccination status of seafarers	Timeframe of work restrictions
Work restrictions for seafarers infected with COVID-19	
Not vaccinated or not fully vaccinated, mild or moderate COVID-19 case	Resolution of fever for 24 hours and clinical improvement of symptoms[a] **AND** Five days isolation[b] after the onset of symptoms **AND** Five additional days wearing a high efficiency (FFP2) mask[c] **AND** If possible, test by RADT or RT-PCR (if RT-PCR available on board) on day five after onset of symptoms[e]. If the ship is close to land, then alternatively RT-PCR[d]could be conducted in a shore-side laboratory
Vaccinated[f] mild or moderate COVID-19 case	Resolution of fever for 24 hours and clinical improvement of symptoms[a] **AND** Three days isolation[b] after onset of symptoms **AND** Three additional days wearing a high efficiency (FFP2)[c] mask **AND** If possible, test by RADT or RT-PCR (if RT-PCR available on board) on day three after onset of symptoms. If the ship is close to land, then alternatively RT-PCR[d], could be conducted in a shore-side laboratory
Work restrictions for asymptomatic seafarers with exposure	
Unvaccinated individuals	Five days quarantine[g] **AND** RADT or RT-PCR (if RT-PCR available on board) on day 5[h]. If the ship is close to land, then alternatively RT-PCR could be conducted in a shore-side laboratory **AND** Five additional days wearing a high-efficiency (FFP2) mask[i]
Vaccinated[f] individuals	10 days wearing a high-efficiency (FFP2) mask[i] **AND** RADT or RT-PCR (if RT-PCR available on board) on day 5[g]. If the ship is close to land, then alternatively RT-PCR could be conducted in a shore-side laboratory **AND** Self-monitoring for symptoms, wearing a mask, keeping distance from others and avoiding contact with vulnerable populations, if possible
Work restrictions for <u>new</u> seafarers without infection or exposure	
Vaccinated[d]	No work restrictions with negative RADT on days 2, 5 and 7
Unvaccinated, even if within 90 days of prior infection	Public health observation for 10 days **OR** 7 days with negative test

[a] Asymptomatic COVID-19 cases should follow the same guidance as symptomatic cases. Days should be counted from the date of the sample collection for their diagnostic test.

[b] When recommending a shorter duration of isolation, the residual risk of onward transmission of COVID-19 increases. Therefore, in addition to wearing a mask, COVID-19 cases should be advised to avoid non-essential contact with other people and especially vulnerable individuals. The end of isolation should be differentiated from the potential need for sick leave.

[c] Where a high-efficiency mask is recommended, an FFP2 (or equivalent) without a valve should be used. To be effective, these need to be fitted properly at all times and seal testing should be performed each time the mask is put on. Fit testing is recommended, especially for those working in the healthcare sector, where re-using FFP2 masks should be avoided due to heavy contamination.

[d] Testing by either RADT or RT-PCR should preferably be performed. Self-testing by RADTs is not considered adequate for ending isolation.

[e] Isolation should continue if the RADT (including self-performed) or RT-PCR test is positive on day six. If RT-PCR is performed, then high Ct values (≥30) can be used, with caution, as a proxy of low likelihood of transmissibility. RADT can be repeated daily until negative or until 10 days of isolation are completed.

[f] In this table, the term 'vaccinated' refers to people who:

- *have received a full primary COVID-19 vaccination course within the last six months.*
  - *o The duration of protection is subject to evolving evidence and this may need to be considered.*
  - *o In areas/countries where the Omicron VOC is dominant, this period may be restricted further to three months.*
  - *o This does not apply to one-dose vaccines.*
- *have received a booster dose of COVID-19 vaccine.*

[g] When recommending a shorter duration of quarantine, the residual risk of onward transmission of COVID-19 increases. Therefore, in addition to mask use, individuals identified as close contacts should be advised to avoid non-essential contact with other people and especially vulnerable individuals.

[h] Testing by either RADT or RT-PCR should preferably be performed by a qualified professional. Self-testing by RADTs is not considered adequate for releasing from quarantine.

[i] Where a high-efficiency mask is recommended, an FFP2 (or equivalent) without a valve should be used. To be effective, these need to be worn properly at all times. Fit testing is recommended.

When deciding to place seafarers under public health observation (monitoring their health status over time for the purpose of determining risk of disease transmission) for a specific duration of time, in accordance with the duration of time described in **Table 1**, ship owners, crew managers and ship operators (or their representatives) should make arrangements to ensure that the following are implemented for the duration:

- Self-monitoring for symptoms suggestive of COVID-19 (e.g. self-monitoring for fever by checking temperature twice daily, recording and reporting results)
- Avoiding as much as possible non-essential contact with others and use of common/shared areas on board (mess halls, laundry rooms etc.)
- Limiting interaction with other seafarers during work activities (e.g. ship owners could assign new crew to duties where they work individually for the period of observation, if feasible) or ensure strict measures (physical distancing of 1.5 meters and use of face mask when working with others)
- Wearing a face mask at all times when outside of individual cabins
- Practicing frequent/thorough hand hygiene and respiratory etiquette
- Remaining in individual cabins when not working, as much as possible
- Eating meals in their cabin (if possible)
- Not entering galley or pantry areas of the vessel
- Transiting the vessel through outer walkways when possible

Box 3: Essential information and guidance for seafarers when undergoing public health observation

Information for seafarers

Seafarers should receive written guidance, information, instructions and material in English and if possible in their national language from ship owners, crew managers and other ship operators (or their representatives) to support compliance with public health measures on board.

<u>Prior to or at embarkation:</u>

- *Duration of the public health observation period.*
- *General guidance and advice on personal protective and hygiene measures that should be observed by seafarers (proper use and management of PPE, frequent and thorough hand hygiene, proper respiratory etiquette). If such national/local regulations do not exist, informing seafarers about adherence to a minimum standard of hygiene and protective measures (e.g. in accordance with ECDC guidance[16,17]).*

Resources and advice for the public about protective measures against COVID-19 are also available from the WHO[18].

- *Procedures to follow if COVID-19 compatible symptoms develop (e.g. reporting symptoms to the ship owner and seeking medical assessment).*
- *Protocols that should be followed to ensure compliance with public health observation measures.*
- *Any other screening measures that may be required (e.g. visual observation, temperature measurement, testing etc.).*
- *Provide seafarers with appropriate and sufficient amounts of PPE, hygiene supplies and other equipment required for the public health observation period (e.g. no-touch thermometers for monitoring of symptoms) with specific instructions for use.*

5. Response to a COVID-19 event on board

5.1. Management of possible/confirmed case

Once a possible or confirmed COVID-19 case is detected on board, ship owners, crew managers and ship operators (or their representatives) should ensure that the below procedures are followed:

- Activation of the written ship contingency plan/outbreak management plan as needed.
- Providing the possible/confirmed COVID-19 case with a medical face mask and informing them to practice strict respiratory etiquette and hand hygiene, especially if a medical face mask cannot be tolerated.
- Immediate isolation of the possible/confirmed COVID-19 case in the pre-designated area with adequate ventilation and a specific toilet facility for their use.
- Ensuring that contact with the possible/confirmed COVID-19 case in isolation is restricted to only those necessary (e.g. the seafarer on board in charge of medical care /competent to provide medical first aid) and any person entering the isolation area wears a respirator.
- Inform the next port of call about the event (see Section **5.1.1**).
- Test possible cases via RADT and their contacts and share the test results.
  If seafarers are identified as confirmed COVID-19 cases, it is advised that they are disembarked and isolated ashore as soon as possible following medical advice. Port States are required to support these efforts in line with the requirements for onshore provision of medical care and repatriation of deceased seafarers under the MLC 2006.
- If disembarkation and isolation ashore is not feasible (e.g. due to lack of isolation facilities ashore or visa issues), isolation could be carried out on board in the ship's isolation facilities in accordance with medical advice provided:
  i. Cases are isolated separately and individually in cabins for the required period of time, where possible. If individual isolation of cases is not possible due to space limitations (outbreak involving many cases), accommodating confirmed cases in the same room could be considered.
  ii. Strict control measures are implemented and isolation cabins have access to natural light (window), where possible.
  iii. Seafarers have access to the required services, including any necessary health care and psychological support.

- For the seafarers' protection of health, ships should not depart when COVID-19 cases have been identified among seafarers who stay on board, unless if cases have disembarked in isolation facilities or hospitals ashore and quarantine measures are applied for close contacts, as well as other measures in accordance with the written ship contingency plan/outbreak management plan.

5.1.1. Reporting to the next port of call

Ship owners, crew managers and other ship operators (or their representatives) should ensure that the International Health Regulations (IHR, 2005) are followed and that officers in command of ships or their agents inform the competent authority of the next port of call (through the completion of the Maritime Declaration of Health (MDH) or by other means as applicable) if a possible or confirmed COVID-19 case is detected.

5.1.2. Disembarkation

Disembarkation will be done in accordance with the instructions of the competent authority. The following legal documents describe the obligations of governmental authorities and ship operators about providing medical examination and treatment ashore and on board:

- *International Labour Organization (ILO) 2006 Maritime Labour Convention (MLC 2006):* Member States must ensure seafarers on board ships in their territory are given access to medical facilities ashore, should they require immediate medical care, including dental care.
- *IMO conventions:* the International Convention for the Safety of Life at Sea (SOLAS); the International Convention on Maritime Search and Rescue (SAR); and the Convention on the Facilitation of International Maritime Traffic (FAL): MS must render assistance to seafarers in distress, including medical assistance.
- *IHR*: Each State Party must designate a port or ports with the capacities: (a) to provide access to (i) an appropriate medical service including diagnostic facilities located so as to allow the prompt assessment and care of ill travellers, and (ii) adequate staff, equipment and premises; (b) to provide access to equipment and personnel for the transport of ill travellers to an appropriate medical facility; (c) to provide assessment of and care for affected travellers by establishing arrangements with local medical facilities for their isolation, treatment and other support services that may be required; (d) to provide appropriate space, separate from other travellers, to interview suspect or affected persons; (e) to provide for the assessment and, if required, quarantine of suspect travellers, preferably in facilities away from the point of entry.

5.1.3. Cleaning, disinfection and waste management

Ship owners, crew managers and other ship operators (or their representatives) should ensure that the following measures are strictly followed as soon as a confirmed COVID-19 case has been disembarked from the vessel, with the cabin or quarter facilities where they were isolated/managed to be thoroughly cleaned and disinfected.

Box 4: Essential instructions for cleaning, disinfection and waste management

Information and instructions for cleaning, disinfection and waste management

If a COVID-19 event takes place on board the vessel, protocols for cleaning and disinfection should be carried out by personnel trained to clean surfaces contaminated with infectious agents.

Seafarers should further be routinely informed and instructed in handling laundry, food service utensils and waste from cabins of possible cases and contacts as infectious, in accordance with procedures for handling infectious materials available on board.

Further resources on cleaning and disinfection of ships can be found from ECDC[19] and EU HEALTHY GATEWAYS[20] and WHO[7].

5.1.4. Management of contacts

Ship owners, crew managers and other ship operators (or their representatives) should ensure that following a confirmed COVID-19 case, the below procedures are implemented:

- Testing all contacts of a confirmed case by NAAT (e.g. RT-PCR if available on board) or by RADT.
- If contacts test positive, they should be immediately isolated as described in **Section 5.1**.
- Place contacts in quarantine in accordance with **Table 1**.

The suggested measures for work restrictions, isolation and quarantine must always be considered in accordance with any national/local regulations that apply.

Box 5: Essential information regarding COVID-19 contact management

Information regarding management of COVID-19 contacts

In all situations ship owners, crew managers and other ship operators (or their representatives) should inform:

- *Seafarers that when undergoing work restrictions, they should follow strict measures as described in **Table 2.***
- *Local public health authorities in the event that any form of quarantine is taking place in their local region/district in accordance with national/local regulations.*

A flow chart illustrating the response to a COVID-19 event on board a commercial vessel can be found in **Annex 3**.

5.2 Overview of general measures to mitigate COVID-19 transmission and considerations for the seafarer's journey

Seafarers can observe personal protective measures to mitigate transmission, both on board and during their journey to and from the vessel. Furthermore, ship owners, crew managers and other ship operators (or their representatives) can also facilitate measures during each stage of the seafarers' journey.

Table 2 outlines general measures for avoiding transmission that ship owners should inform and support seafarers to comply with, regardless of where public health observation takes place (ashore prior to embarkation or on board at the start of work duties) and seafarers' vaccination status.

Table 3 presents considerations for ship owners, crew managers and other ship operators (or their representatives) during specific stages of the seafarers' journey to reach the commercial vessel and repatriate (including their time on board).

Table 2: Overview of general personal protective measures to limit COVID-19 transmission

General measures to minimize transmission risk	Examples for ship owners to facilitate measures
Minimizing interaction between seafarers	• Ensure any documentation required by seafarers for the purpose of crew changes is provided to them through electronic means to avoid non-essential contact with other individuals (if possible). • When feasible, arrange for seafarers to travel (joining the ship or returning home) individually or in cohorts (e.g. up to five seafarers per cohort). Ensure when arranging transport or designated accommodation for public health observation, that cohorts do not change throughout the journey and that there is no interaction between cohorts (as far as practicable).
Use of face masks to prevent droplet transmission	• Ensure availability of face masks for the seafarers' journey to/from the commercial vessel and while on board. - Respirators (e.g. FFP2 standard or equivalent) as a first priority when available for use by the public and if sufficient supplies are available after prioritization for use in healthcare settings. - Medical face masks when respirators are not available (where strategies to improve fit[‡‡] could be considered) • Provide guidance and periodic/regular instruction to seafarers related to use of face masks (and other PPE where needed) including: - Settings and situations when face mask use and PPE is required. - Information on procedures and best practices for wearing (donning), removal (doffing), management and safe disposal or storage of face masks and other PPE. - Reminding seafarers that any face mask use is complementary to other personal protective measures such as physical distancing, hand hygiene, respiratory etiquette and avoiding touching one's eyes/nose/mouth. More detailed resources can be found from WHO[21,22], ECDC[23] and EU HEALTHY GATEWAYS[12].
Hand hygiene	• Ensure availability of hand hygiene materials for the seafarers' journey to/from the commercial vessel (where applicable) and while on board: - Soap and water - Alcohol-based hand rub solution (containing at least 60% ethanol or 70% isopropanol) • Provide guidance and periodic/regular instruction to seafarers related proper hand hygiene including: - Hand washing techniques - When hand rubbing with an alcohol-based solution can be used, instead of hand washing and how this can be performed More detailed resources can be found from WHO[18] and ECDC[23].
Respiratory etiquette	• Ensure availability of respiratory etiquette supplies for the seafarers' journey to/from the commercial vessel (where applicable) and while on board: - Disposable tissues, no-touch waste bins • Provide guidance and periodic/regular instruction to seafarers related to proper respiratory etiquette.

[∞] If there is limited availability of respirators, their use should be prioritized considering:
- Setting and job position: prioritized for health care workers, medical personnel or those providing direct care to a possible or confirmed COVID-19 case, especially if aerosol-generating procedures are performed
- Vulnerability of wearer: use of respirators if could be prioritized for seafarers belonging to high-risk groups for severe COVID-19 complications or those that have not been vaccinated

[‡‡] Strategies to improve mask fit include using masks with nose wires, using mask fitters/braces, using a knotting/tucking technique or double masking. Further details about strategies that can be used to improve face mask fit can be found from ECDC (https://www.ecdc.europa.eu/en/publications-data/using-face-masks-community-reducing-covid-19-transmission) and the Centers for Disease Control and Prevention (https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/types-of-masks.html)

Table 3: Measures for consideration during seafarer journey

Phase of seafarer journey	Situation	Options for consideration by ship owners, crew managers and other ship operators (or their representatives)
Travelling to join the commercial vessel or return to place of origin	**When transiting in means of transport[§§]** • Travel to/from designated public health observation facility (e.g. hotel) • Travel to and from airport in country of origin or destination country • Travel to and from the seaport in destination country • Travel on an aircraft	Ensure transit of seafarers conducted in controlled way by: • Arranging private transport for seafarers and informing seafarers to avoid use of public transport as far as practicable • Ensuring the private transport vehicle arrives early to meet the seafarer, to limit the seafarer's interaction with others that may occur if they wait for their transport to arrive • Ensuring proper cleaning and disinfection protocols are carried out between each use of a private transport vehicle in accordance with WHO[24] and ECDC technical guidance for cleaning and disinfection of non-health care settings[19] • Ensuring that alcohol-based hand rub and face masks are available to the seafarer in the private transport vehicle (and means to dispose of face masks, e.g. secured plastic bag). • Informing seafarers to wear face masks for the entire duration of the transit • Informing seafarers that any personal baggage should be carried by seafarers themselves as much as possible at all times while within the transfer vehicle) • Ensuring measures to limit interaction between seafarers and maintain physical distancing as far as practicable within means of transport: - Arranging so seafarers travel individually in private transport vehicle (if feasible) or arranging seafarers' transit in cohorts • Informing seafarers travelling by aircraft to comply with the airline and aircraft protocols related to personal protective and hygiene measures implemented on board. If such protocols are not in place, ship owners could inform seafarers to adhere to a minimum standard of personal protective and hygiene measures when in airports and on aircrafts (e.g. in accordance with guidance from IMO[25], ICAO[26] and ECDC/EASA[27])
At transport hubs	**When at transport hub** • Airports/seaports waiting to embark an aircraft/commercial vessel	Inform seafarers to: • Keep physical distancing at all times while in transport hubs, minimizing close contact with others and avoiding the use of public areas in the hub, such as eating establishments

[§§] As seen in Annex 2 several points of transit occur in means of transport throughout the seafarers' journey (In accordance with the *Industry recommended framework of protocols for ensuring safe ship crew changes and travel during the coronavirus (COVID-19) pandemic* presented in IMO MSC.1/Circ.1636/Rev.1. 22 April 2021 (https://wwwcdn.imo.org/localresources/en/MediaCentre/HotTopics/Documents/MSC%201636%20protocols/MSC.1-Circ.1636%20-%20Industry%20Recommended%20Framework%20Of%20Protocols%20For%20Ensuring%20Safe%20Ship%20Crew%20Changes%20And%20Travel.pdf)

		• Practice thorough and frequent hand hygiene, respiratory etiquette, and use of a face mask (in accordance with national/local regulations)
At seaport	**During screening /embarkation/ disembarkation**	Inform seafarers to: • Keep physical distancing • Use face masks • Practice hand hygiene and respiratory etiquette • Ensure safe disposal of disposable PPE used during travel, handling their own luggage[25]
On board commercial vessel	**When no interaction between seafarers or others** • While in individual cabins	Inform seafarers that: • Face masks are not needed • Frequent and thorough hand hygiene and respiratory etiquette should be practiced
	When exiting/outside of individual cabins and interaction among seafarers occurs • During work activities • Gathering in mess halls, laundry and recreational areas***	Ensure general measures to avoid transmission on board are taken: • Consider increasing frequency of meal service to limit crowding • Consider staggering seafarers' work shifts to limit crowding during work activities
	When external visitors (shore-side personnel, inspectors etc.) board the vessel†††	Inform seafarers that in these situations strict personal protective and hygiene measures should be followed: • Maintaining as far as practicable 1.5 metre physical distance • Use of a face mask at all times • Practice frequent/thorough hand hygiene and respiratory etiquette
	When seafarers undergo public health observation period	Inform seafarers that in these situations strict personal protective and hygiene measures should be followed for the duration of quarantine: • Avoiding as much as possible non-essential contact with others and use of shared areas on board the ship (mess halls, laundry rooms etc.) • Limiting interaction with other seafarers during work activities (assign to positions where work alone) or ensure strict measures (physical distancing of 1.5 metres and use of face mask when working with others) • Wearing a face mask at all times when outside of individual cabin • Practicing frequent/thorough hand hygiene and respiratory etiquette • Remaining in individual cabins when not working as much as possible

*** If during quarantine the conditions on board are not suitable to mitigate the risk of transmission, it could be considered to close common areas such as laundry rooms/mess halls/recreational areas.

††† Only the minimum number of personnel required should be allowed to board in order to limit interactions between seafarers and shore-based personnel.

		• Eating meals in their cabin (if possible) • Not entering galley areas of the vessels • Transiting the vessel through outer walkways when possible

	Areas possibly contaminated on board commercial vessel
	• While providing care in medical facility where possible COVID-19 case isolated on board
		Ensure that:
		• Only those individuals necessary enter the isolation area (ideally the same person)
		• Appropriate PPE is available to those entering isolation area and they are trained in its use (wearing, removing, safe disposal):
		  • Properly fitting respirator (FFP2) or if unavailable medical face masks
		  • Eye protection (goggles or face shield)
		  • Disposable gloves
		  • Long-sleeved impermeable gown
		• Individuals practice frequent and thorough hand hygiene
		• Isolation areas on board are cleaned and disinfected in accordance with WHO[24], ECDC[19] and EU HEALTHY GATEWAYS[20] technical guidance
		• Items such as laundry, food service utensils and waste from the medical facility where possible cases are in isolation should be handled as infectious

6. Public health measures during shore-side visit

Like for every other citizen, seafarers can enjoy their right to shore leave subject to strict respect of any public health measures applicable to the local population and following all precautionary measures to minimise the risk of infection coming on board. Shore leave and shore-side visits at a port of call should only be possible under specific circumstances. A risk assessment could be conducted to ensure shore leave is safe and appropriate. Issues to consider include the need to minimise the risk of infection coming on board, balanced against the benefits to a seafarer's physical and mental wellbeing of being allowed ashore.

When seafarers are able to safely take shore-side visits at a port of call, ship owners, crew managers and ship operators (or their representatives) should support seafarers to comply with strict public health measures while shore-side. It could be considered to advise seafarers to visit an ICMA run seafarers' centre in the port which is observing and applying COVID-19 prevention measures protocols, to avoid the seafarers being exposed with local populations.

Box 6: Essential information for seafarers regarding shore-side visits

Information for seafarers

Seafarers should receive written guidance, instructions and material in English and if possible in their national language from ship owners, crew managers and ship operators (or their representatives) for the purposes of shore-side visits with information about:

- *Any national/local public health requirements or measures in place for the local population at the port of call.*
- *General personal protective and hygiene measures (as outlined in **Table 2**) to protect themselves and the local population against COVID-19.*

Furthermore, they should:

- *Facilitate seafarer's compliance with requirements during shore-side visits by providing any necessary supplies (e.g. face masks, alcohol-based hand rub) for seafarers' shore-side visit.*

7. Journey from the ship to home

Ship owners, crew managers and ship operators (or their representatives) should facilitate the disembarkation process to allow seafarers to follow all personal protective and hygiene measures while disembarking, including maintaining physical distancing from other persons while disembarking, providing the appropriate PPE, ensuring safe disposal of disposable PPE used during travel, and handling their own luggage[25].

Seafarers that will disembark the ships and will be travelling to their country of origin could be subject to undergo a quarantine period and testing and or vaccination requirements as per national/local requirements in their destination country/origin country.

8. Considerations for crew vaccinations

WHO reported that seafarers gaining access to vaccination continues to be challenging for this group[7]. Furthermore, WHO recommends to Member States to allow entry/exit from the country without requiring proof of COVID-19 vaccination. Prevention and control strategies on board ships should not rely exclusively on vaccination. As indicated by WHO, *"fully vaccinated people have some level of protection against COVID-19, and are less likely to infect someone else. However,*

vaccines do not confer 100% immunity, nor they prevent transmitting the virus to others, and breakthrough infections may occur".

It is recommended that all seafarers have access to vaccination against COVID-19. Currently, seafarers may be vaccinated in accordance with their national vaccination programme, and some countries are developing vaccination programmes specifically targeting seafarers. As transportation workers, seafarers are recommended to be considered a priority group by EU/EEA MS for vaccination against COVID-19 in accordance with the European Commission Communication[28].

Vaccination of crew should be legally acquired from official sources. Moreover, all vaccinated crew members should hold valid proof of vaccination if applicable based on national requirements, and inform their employer about their vaccination status (**Annex 4** provides a list of information to be included in the valid proof of vaccination particularly for the purposes of validating the vaccination). The vaccine delivered should be included in the list of approved vaccines by an internationally recognized authority (EMA and/or WHO) as described in the definitions section of this document.

ECDC indicates in its options for response to the EU MS: "*National Immunisation Technical Advisory Groups (NITAGs) in EU/EEA countries should consider a booster dose for those 40 years and over, targeting the most vulnerable and the elderly. Countries could also consider a booster dose for all adults 18 years and older at least six months after completion of the primary series to increase protection against infection due to waning immunity, which could potentially reduce transmission in the population and prevent additional hospitalisations and death*".
The European Commission press release of 21 December indicates: "*Vaccination certificates will be accepted by Member States for a period of nine months since the administration of the last dose of the primary vaccination. For a single-dose vaccine, this means 270 days from the first and only shot. For a two-dose vaccine it means 270 days from the second shot, or, in line with the vaccination strategy of the Member State of vaccination, the first and only shot after having recovered from the virus. Under these new EU rules for intra-EU travel, Member States must accept any vaccination certificate that has been issued less than nine months since the administration of the last dose of the primary vaccination. Member States are not able to provide for a shorter nor for a longer acceptance period*". Exceptions apply for persons under the age of 18[‡‡‡].

Records of crew members who have received vaccination, including names and dates, should be kept in order to support decision making regarding public health measures during a potential outbreak situation. Proof of vaccination/vaccination documentation should be kept by seafarers' themselves so it can be shown when required. Any data kept by the ship owners, crew managers and ship operators (or their representatives) should be handled in accordance with the relevant legislation for personal data protection.

‡‡‡ Certificates held by persons aged 18 and above indicating the completion of the primary vaccination series shall be accepted only if not more than 270 days have passed since the date of the latest dose in that series

Box 7: Essential information for seafarers regarding vaccination

Information for seafarers

Seafarers should receive existing written guidance, instructions and material in English and if possible in their national language from ship owners, crew managers and other ship operators (or their representatives) regarding COVID-19 vaccination to promote its use. This can include information regarding:

- *Benefits of vaccination to protect seafarers' health*
- *Types of vaccines available*
- *Vaccine safety and possible side-effects*
- *Locations where seafarers could be vaccinated, if known and/or facilitated by ship owners, crew managers or ship operators (or their representatives). A list of countries that have implemented seafarer vaccination programs, or have signalled their intent to do so, in designated ports within there is provided at the following link: https://icma.as/vaccines/*

Information about COVID-19 vaccines and vaccine safety can be found from:

- **EMA:** *COVID-19 vaccines*[29]
- **ECDC:** *Questions and answers on COVID-19: Vaccines*[30]
- **WHO:** *Coronavirus disease (COVID-19): Vaccines*[31] *and Vaccines safety*[32]
- **International Chamber of Shipping (ICS)**
  - *Coronavirus (COVID-19): Roadmap for Vaccination of International Seafarers*[33]*, Vaccination for Seafarers and Shipping Companies: A Practical Guide*[34]*, Legal, Liability and Insurance Issues arising from Vaccination of Seafarers*[35]
  - *Additional guidance from ICS can be found at the following link: https://www.ics-shipping.org/supporting-shipping/covid/*

9. Supporting seafarer welfare and safeguarding mental and physical health

9.1. Seafarer access to health care

In the context of the COVID-19 pandemic and measures implemented by Member States to limit the spread of the virus, seafarers have faced difficulties accessing medical care (for both COVID-19 and other conditions) on shore[36].

Ship owners, crew managers and other ship operators (or their representatives) should ensure that the commercial vessel's written contingency plan/outbreak management plan includes:

- Communication plans and routes in place to facilitate rapid communication between the vessel and the maritime telemedicine assistance service (TMAS) and/or alternative shore-based healthcare services which should be pre-defined in the contingency plan/outbreak management plan.
- Criteria to decide if a possible COVID-19 case can be managed on board or immediate medical care is required[7].
- Plan for seafarers responsible to provide medical care on board the vessel, to ensure they are adequately instructed in procedures for deciding if a seafarer requires immediate assistance for COVID-19 or other non-related health condition, or if medical care can be provided when the ship reaches the next port of call (radio medical advice could be considered).

9.2 Seafarer access to psychological assistance and mental health services

Stressors linked to the COVID-19 pandemic can include challenges related to disembarkation and repatriation, restricted access to medical care on shore, lack of information about COVID-19 prevention and control measures on board, among other issues. These factors further contribute to the adverse psychosocial health of seafarers leading to stress, fatigue, feelings of social isolation and other conditions such as anxiety and depression[7,37].

Risk communication messaging should take into consideration language and cultural differences of seafarers. In addition to English and where possible, messaging should be available in national languages.

To support seafarers' mental wellbeing during the COVID-19 pandemic, ship owners, crew managers and other ship operators (or their representatives) should ensure:

- Seafarers have access to confidential mental health/psychosocial services at all times in English and where possible in national languages. If in person services are not feasible, remotely offered services should be available through online/video tools or telephone services (e.g. telemedicine). Several helplines exist to support seafarers and provide mental health assistance; a list of available helplines is available from ICS[§§§].
- Orientation and courses on mental health awareness and healthy ways of coping with stress. Resources and guidance for seafarers to support mental wellbeing and manage stress are available from the International Seafarers' Welfare and Assistance Network[****] (ISWAN) and ICS[††††].
- Seafarer communication with family/friends and access to entertainment on board is facilitated (e.g. via offering internet for seafarers' personal use free of charge).
- Plans and procedures are in place to manage and mitigate seafarer fatigue (particularly during COVID-19) in line with IMO guidelines on fatigue[38].

Box 8: Essential information to seafarers related to mental health services

Information to seafarers

Ship owners, crew managers and ship operators (or their representatives) should inform and provide continuous up-to-date information to seafarers (through guidance, instructions and material in English and if possible in their national language) about:

- *Resources available to them for mental health/psychosocial support (prior to embarkation or at embarkation).*
- *Crew change processes and repatriation, national/local regulations and public health measures implemented at ports of call, the epidemiological situation at the ports of call, information related to COVID-19 prevention and control.*

WHO provides information on resources available to support seafarer mental health[7] and guidance on mental health/psychosocial considerations during COVID-19[39].

[§§§] https://www.ics-shipping.org/wp-content/uploads/2021/06/Access-to-company-or-other-support-helplines-for-seafarers.pdf
[****] https://www.seafarerswelfare.org/seafarer-health-information-programme/good-mental-health
[††††] https://www.ics-shipping.org/publication/handling-a-mental-health-crisis-or-emergency-and-spotting-suicidal-behaviour-in-seafarers/

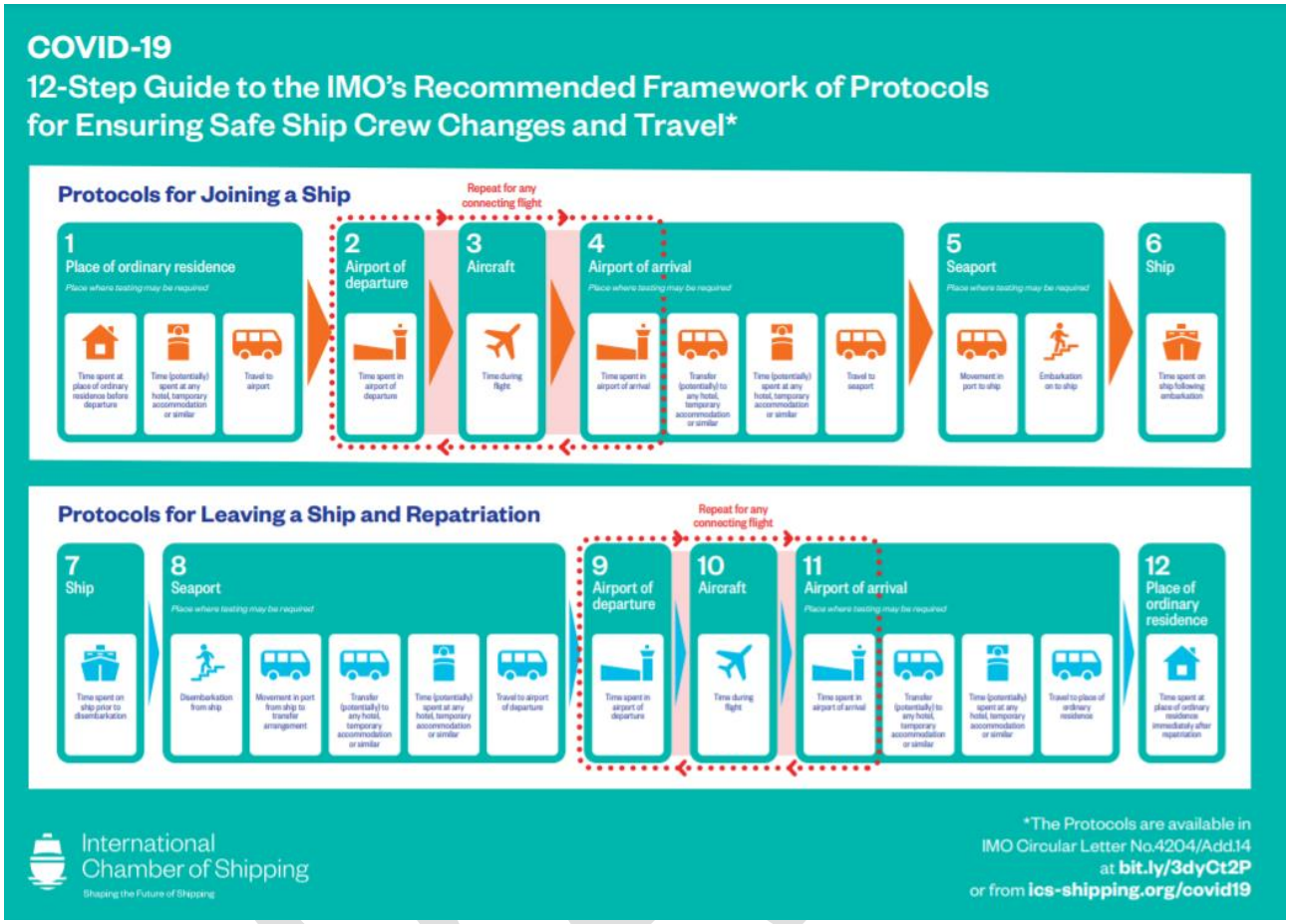
10. Annexes

Annex 1: Relevant European Commission Communications, Recommendations and Guidelines

- *Commission Delegated Regulation (EU) 2022/503 of 29 March 2022 amending Regulation (EU) 2021/953 of the European Parliament and of the Council as regards exempting minors from the acceptance period of vaccination certificates issued in the EU Digital COVID Certificate format (Text with EEA relevance) C/2022/2050. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022R0503*
- *Commission Delegated Regulation (EU) 2021/2288 of 21 December 2021 amending the Annex to Regulation (EU) 2021/953 of the European Parliament and of the Council as regards the acceptance period of vaccination certificates issued in the EU Digital COVID Certificate format indicating the completion of the primary vaccination series (Text with EEA relevance) C/2021/9920.* ***21 December 2021****. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R2288&qid=1643281793602*
- *Commission Implementing Decision (EU) 2021/2301 of 21 December 2021 amending Implementing Decision (EU) 2021/1073 laying down technical specifications and rules for the implementation of the trust framework for the EU Digital COVID Certificate established by Regulation (EU) 2021/953 of the European Parliament and of the Council (Text with EEA relevance).* ***21 December 2021****. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32021D2301*
- *REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL pursuant to Article 16(1) of Regulation (EU) 2021/953 of the European Parliament and of the Council on a framework for the issuance, verification and acceptance of interoperable COVID-19 vaccination, test and recovery certificates (EU Digital COVID Certificate) to facilitate free movement during the COVID-19 pandemic. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021DC0649*
- *COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Addressing together current and new COVID-19 challenges. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021DC0764*
- *Regulation (EU) 2021/953 of the European Parliament and of the Council of 14 June 2021 on a framework for the issuance, verification and acceptance of interoperable COVID-19 vaccination, test and recovery certificates (EU Digital COVID Certificate) to facilitate free movement during the COVID-19 pandemic (Text with EEA relevance).* ***14 June 2021****. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32021R0953*
- *Regulation (EU) 2021/954 of the European Parliament and of the Council of 14 June 2021 on a framework for the issuance, verification and acceptance of interoperable COVID-19 vaccination, test and recovery certificates (EU Digital COVID Certificate) with regard to third-country nationals legally staying or residing in the territories of Member States during the COVID-19 pandemic (Text with EEA relevance).* ***14 June 2021****. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32021R0954*
- *Council Recommendation (EU) 2021/1346 of 30 August 2021 amending Recommendation (EU) 2020/912 on the temporary restriction on non-essential travel into the EU and the possible lifting of such restriction.* ***31.08.2021.*** *Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32021H1346*
- *Council Recommendation (EU) 2021/961 of 14 June 2021 amending Recommendation (EU) 2020/1475 on a coordinated approach to the restriction of free movement in response to the COVID-19 pandemic.* ***16.06.2021.*** *Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021H0961*
- *Proposal for a COUNCIL RECOMMENDATION amending Council Recommendation (EU) 2020/1475 of 13 October 2020 on a coordinated approach to the restriction of free movement in response to the COVID-19 pandemic.* ***31.05.2021.*** *Available at: https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52021DC0294*

- *Communication from the Commission to the European Parliament, the European Council and the Council: A common path to safe and sustained re-opening COM/2021/129 final.* ***17.03.2021****. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0129*
- *Communication from the Commission to the European Parliament, the European Council and the Council: A united front to beat COVID-19 COM/2021/35 final.* ***19.01.2021.*** *Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021DC0035*
- *Commission Recommendation of 22.12.2020 on a coordinated approach to travel and transport in response to the SARS-COV-2 variant observed in the United Kingdom.* ***28.12.2020.*** *Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32020H2243*
- *Communication from the Commission to the European Parliament, the European Council and the Council on additional COVID-19 response measures.* ***28.10.2020.*** *Available at: https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:52020DC0687*
- *Communication from the Commission to the European Parliament and the Council: Preparedness for COVID-19 vaccination strategies and vaccine deployment COM/2020/680 final.* ***15.10.2020.*** *Available at: https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:52020DC0680*
- *Communication from the Commission: Guidelines on the progressive restoration of transport services and connectivity – COVID-19 (2020/C 169/02),* ***15.05.2020.*** *Available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52020XC0515(04)*
- *Communication from the Commission: Towards a phased and coordinated approach for restoring freedom of movement and lifting internal border controls — COVID-19 2020/C 169/03 C/2020/3250 OJ C 169.* ***15.05.2020.*** *Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020XC0515(05)*
- *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Tourism and Transport in 2020 and Beyond COM/2020/550 final.* ***13.05.2020.*** *Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1591191111789&uri=CELEX:52020DC0550*
- *Communication from the Commission Guidelines on protection of health, repatriation and travel arrangements for seafarers, passengers and other persons on board ships 2020/C 119/01.* ***14.04.2020.*** *Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1587132931038&uri=CELEX%3A52020XC0414%2801%29*
- *Communication from the Commission: Guidelines concerning the exercise of the free movement of workers during COVID-19 outbreak (2020/C 102 I/03).* ***30.03.2020*** *Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020XC0330%2803%29*
- *Communication from the Commission COVID-19 Guidance on the implementation of the temporary restriction on non-essential travel to the EU, on the facilitation of transit arrangements for the repatriation of EU citizens, and on the effects on visa policy 2020/C 102 I/02 C/2020/2050 OJ C 102I.* ***30.03.2020.*** *Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1585642173770&uri=CELEX:52020XC0330(02)*
- *Communication from the Commission on the implementation of the Green Lanes under the Guidelines for border management measures to protect health and ensure the availability of goods and essential services (2020/C 96 I/01).* ***24.03.2020.*** *Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020XC0324%2801%29*
- *Communication from the Commission to the European Parliament, the European Council and the Council: COVID-19: Temporary Restriction on Non-Essential Travel to the EU.* ***16.03.2020.*** *Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0115*
- *Covid-19 Guidelines for border management measures to protect health and ensure the availability of goods and essential services 2020/C 86 I/01 OJ C 86I.* ***16.03.2020.*** *Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020XC0316%2803%29*

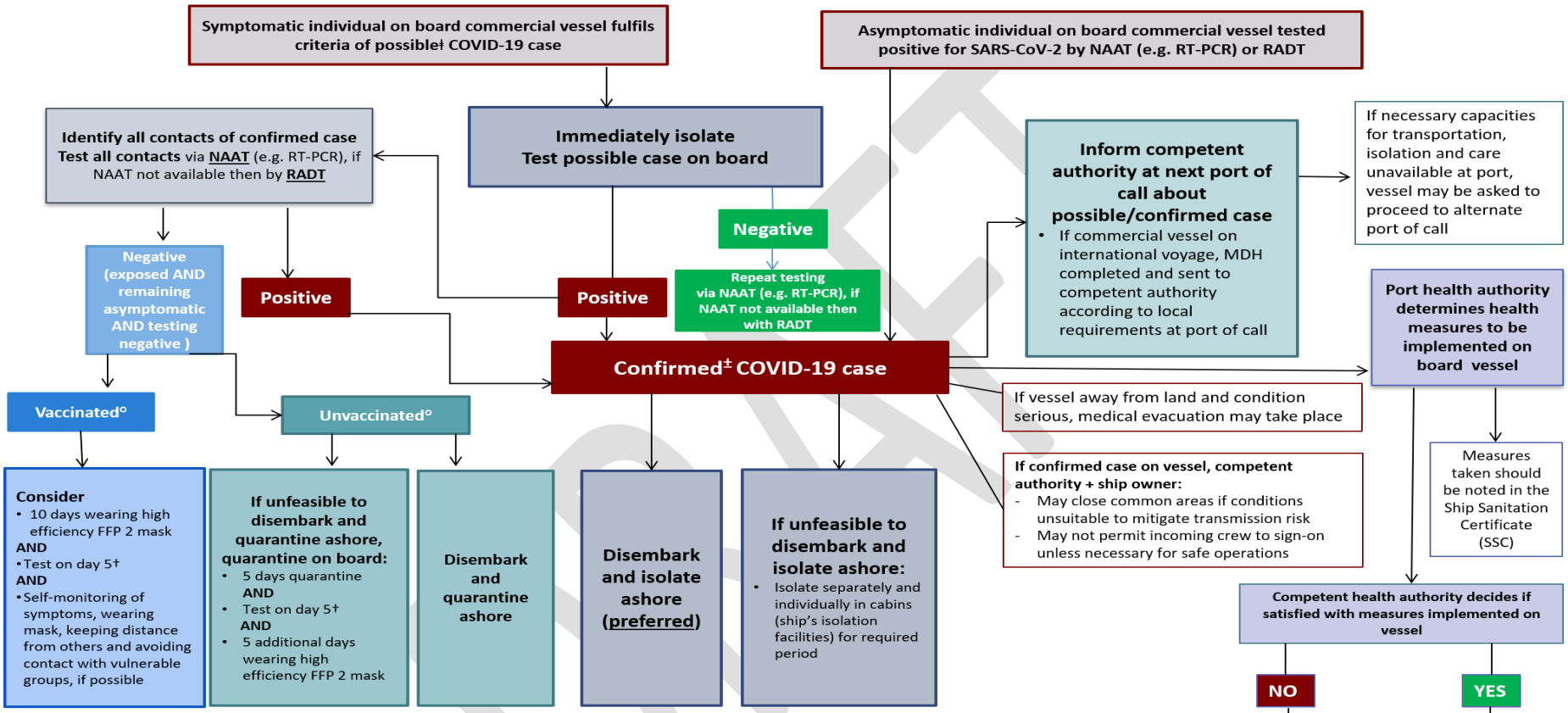
Annex 2: Representation of IMO Recommended Framework of Protocols for ensuring safe ship crew changes and travel



Source: https://www.ics-shipping.org/publication/covid-19-12-step-guide-to-the-imos-recommended-framework-of-protocols-for-ensuring-safe-ship-crew-changes-and-travel/

Annex 3: Response to a COVID-19 event on board

Management of possible‡/confirmed ± COVID-19 cases and their contacts on board commercial vessel



° **Vaccinated individuals**: a seafarer who carries a proof of vaccination, and at least 14 days and no more than 270 days have passed since the last dose of the primary vaccination series or if the person has received a booster (i.e. 3rd dose) dose (exceptions apply for persons under the age of 18). The above definition of vaccinated individual is based on the current European Commission definition. Should the European Commission definition change, the definition of vaccinated individual in this document will change accordingly.

‡**Possible case:** Any person with at least one of the following symptoms: runny nose, sore throat, headache, cough, fever, shortness of breath, sudden onset of anosmia, ageusia or dysgeusia, vomiting or diarrhoea. Additional less specific symptoms may include chills, muscle pain, fatigue

± **Confirmed case:** any person who has been tested positive by RADT or RT-PCR or other NAAT (Case definition for coronavirus disease 2019 (COVID-19), as of 3 December 2020. https://www.ecdc.europa.eu/en/covid-19/surveillance/case-definition).

† Test via RADT or RT-PCR (if RT-PCR available on board). If the ship is close to land, then alternatively RT-PCR could be conducted in a shore-side laboratory.

Annex 4: Information to be included in seafarers' valid proof of vaccination

A valid Digital COVID-19 Certificate (DCC)[‡‡‡‡] or other certificate/document could include the following information:

(a) name: surname(s) and forename(s); (b) date of birth; (c) disease or agent targeted (SARS-CoV-2 or one of its variants); (d) vaccine/prophylaxis; (e) vaccine product name; (f) vaccine marketing authorization holder or manufacturer; (g) number in a series of vaccinations/doses and overall number of doses in the series; (h) date of vaccination, indicating the date of the latest dose received[§§§§]; (i) country of vaccination; (j) certificate issuer; (k) a unique certificate identifier or other means to validate the vaccination such as contact information in order to communicate with the healthcare provider or clinic site that issued the certificate, or the vaccination registry site.

‡‡‡‡ https://ec.europa.eu/info/live-work-travel-eu/coronavirus-response/safe-covid-19-vaccines-europeans/eu-digital-covid-certificate_en

§§§§ certificates held by persons aged 18 and above indicating the completion of the primary vaccination series shall be accepted only if not more than 270 days have passed since the date of the latest dose in that series

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COVID-19 Weekly Epidemiological Update

Edition 101 published 20 July 2022

In this edition:

Global overview

Data as of 17 July 2022

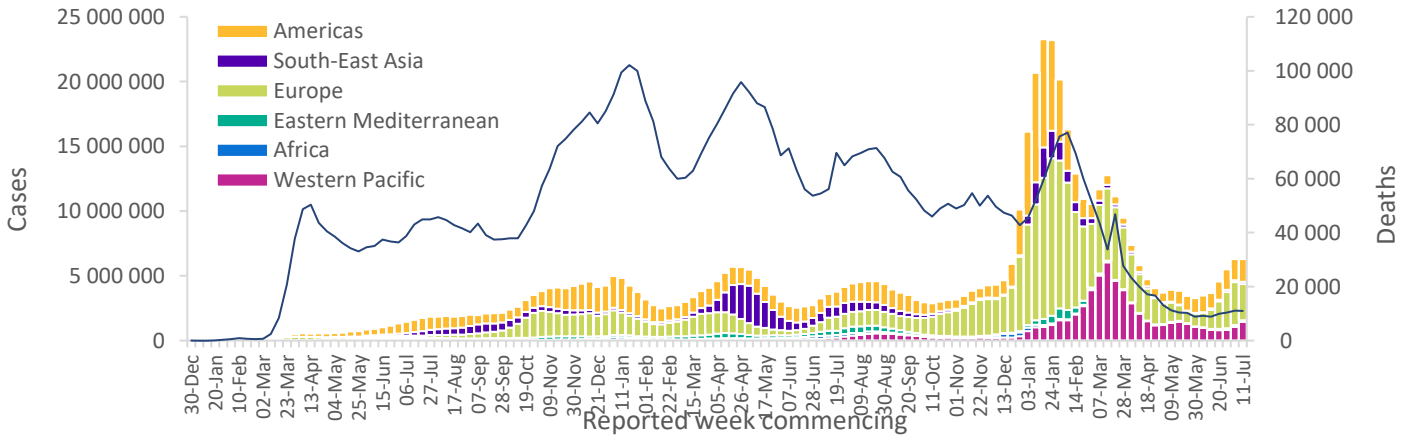
Globally, during the week of 11 to 17 July 2022, the number of weekly cases plateaued, with just under 6.3 million new cases after an increasing trend for the past five weeks (Figure 1). The reported number of new weekly deaths is increasing with 11 000 fatalities reported.

At the regional level, the number of new weekly cases increased in the Western Pacific Region (+37%), the Region of the Americas (+9%) and the South-East Asia Region (+5%), while it decreased in the African Region (-27%) and the European Region (-16%). The number of new weekly cases in the Eastern Mediterranean Region was similar to the figure reported during the previous week. The number of new weekly deaths increased in the South-East Asia Region (+20%), the Eastern Mediterranean Region (+15%) and the Region of the Americas (+7%), while it decreased in the African Region (-39%) and the European Region (-14%). The number of new weekly deaths in the Western Pacific Region was similar to the figure reported during the previous week.

As of 17 July 2022, over 559 million confirmed cases and over 6.3 million deaths have been reported globally.

Current trends in reported COVID-19 cases and deaths should be interpreted with caution as several countries have been progressively changing COVID-19 testing strategies, resulting in lower overall numbers of tests performed and consequently lower numbers of cases detected. Additionally, data is continuously updated to incorporate regular changes made by countries retrospectively.

Figure 1. COVID-19 cases reported weekly by WHO Region, and global deaths, as of 17 July 2022**



**See *Annex 1: Data, table, and figure notes*

At the country level, the highest numbers of new weekly cases were reported from the United States of America (866 479 new cases; +18%), France (757 830 new cases; -15%), Italy (718 925 new cases; +9%), Germany (602 930 new cases; -3%), and Japan (559 111 new cases; +107%). The highest numbers of new weekly deaths were reported from the United States of America (2345 new deaths; +5%), Brazil (1 751 new deaths; +7%), Italy (784 new deaths; +37%), Spain (610 new deaths; -1%), and China (576 new deaths; -17%).

Table 1. Newly reported and cumulative COVID-19 confirmed cases and deaths, by WHO Region, as of 17 July 2022**

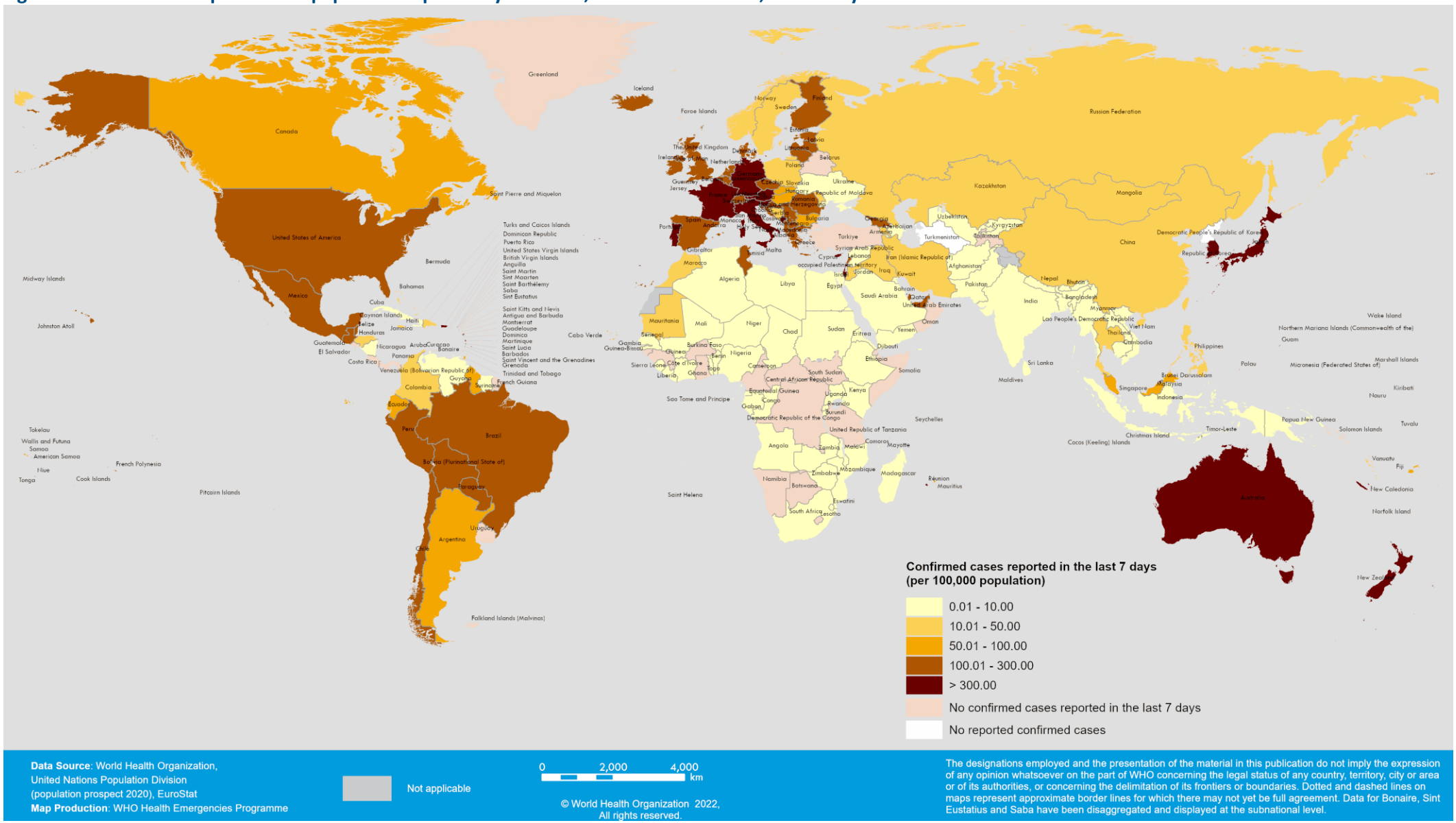
WHO Region	New cases in last 7 days (%)	Change in new cases in last 7 days *	Cumulative cases (%)	New deaths in last 7 days (%)	Change in new deaths in last 7 days *	Cumulative deaths (%)
Europe	2 785 259 (44%)	-16%	235 432 245 (42%)	3 311 (30%)	-14%	2 036 904 (32%)
Americas	1 756 694 (28%)	9%	167 081 979 (30%)	5 470 (50%)	7%	2 775 646 (44%)
Western Pacific	1 444 382 (23%)	37%	66 933 896 (12%)	1 366 (12%)	-3%	241 684 (4%)
South-East Asia	173 854 (3%)	5%	58 967 419 (11%)	538 (5%)	20%	791 164 (12%)
Eastern Mediterranean	120 859 (2%)	-1%	22 288 922 (4%)	228 (2%)	15%	344 024 (5%)
Africa	15 409 (<1%)	-27%	9 175 098 (2%)	87 (1%)	-39%	173 861 (3%)
Global	**6 296 457 (100%)**	**0%**	**559 880 323 (100%)**	**11 000 (100%)**	**-1%**	**6 363 296 (100%)**

**Percent change in the number of newly confirmed cases/deaths in the past seven days, compared to seven days prior*
**See *Annex 1: Data, table, and figure notes*

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

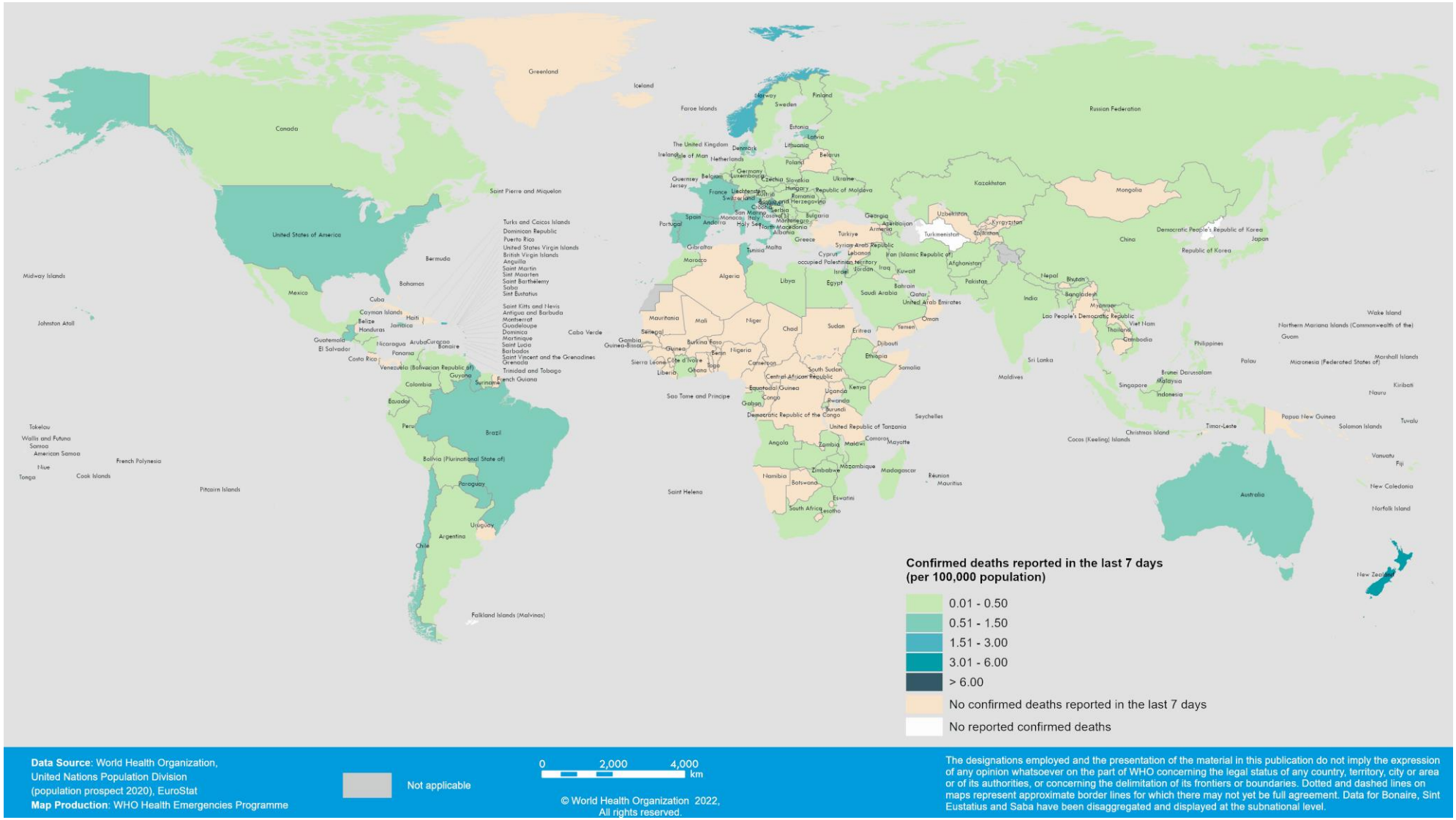
- WHO COVID-19 Dashboard
- WHO COVID-19 Weekly Operational Update and previous editions of the Weekly Epidemiological Update
- WHO COVID-19 detailed surveillance data dashboard

Figure 2. COVID-19 cases per 100 000 population reported by countries, territories and areas, 11 - 17 July 2022*



**See *Annex 1: Data, table, and figure notes*

Figure 3. COVID-19 deaths per 100 000 population reported by countries, territories and areas, 11 - 17 July 2022**



**See *Annex 1: Data, table, and figure notes*

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

Geographic spread and prevalence of VOCs

Globally, from 13 June to 13 July 2022, 200 845 SARS-CoV-2 sequences were collected and submitted to GISAID. Among these sequences, the Omicron VOC remains the dominant variant circulating globally, accounting for 95.4% (191 648) of sequences. The remaining 4.4% (8876) sequences are awaiting PANGO lineage designations and 0.2% (321) are Delta and several recombinants.

Among Omicron sequences, as of epidemiological week 27 (4 to 10 July 2022), BA.2 represents 2.61%, while BA.2.12.1 represents 4.51%, BA.4 represents 10.57%, and BA.5 represents 53.59%. Comparing to the proportion of Omicron sequences collected during epidemiological weeks 26 (27 June to 3 July), BA.2 declined from 3.84% to 2.61%, BA.2.12.1 declined from 10.59% to 4.51%, BA.4 declined from 13.21% to 10.57% while BA.5 increased from 51.84% to 53.59%. Based on the data downloaded from GISAID on 18 July 2022, BA.5 has been reported in 100 countries and continues to drive an increase in cases, hospitalisations and ICU admissions.

Several subvariants of Omicron have emerged and some of these are being monitored by WHO[i]. BA.2.75 is an Omicron subvariant under monitoring, with earliest sequences reported from May 2022. BA.2.75 has nine additional mutations in the spike compared to BA.2. There is no evidence yet of the extent to which these mutations impact on transmissibility and disease severity compared to other circulating lineages. As of 18 July, 250 sequences of BA.2.75 from 15 countries have been reported on GISAID.

Current trends describing the circulation of Omicron subvariants should be interpreted with due consideration of the limitations of SARS-CoV-2 surveillance systems, including differences in sequencing capacity and sampling strategies between countries, as well as changes in sampling strategies and reductions in testing and sequences being conducted and shared from countries around the world.

For more information on the assessment of SARS-CoV-2 variants and the WHO classification refer to Annex 2.

[i] WHO tracking SARS-CoV-2 Variants

Figure 4. Panel A and B: The number and percentage of SARS-CoV-2 sequences, as of 18 July 2022

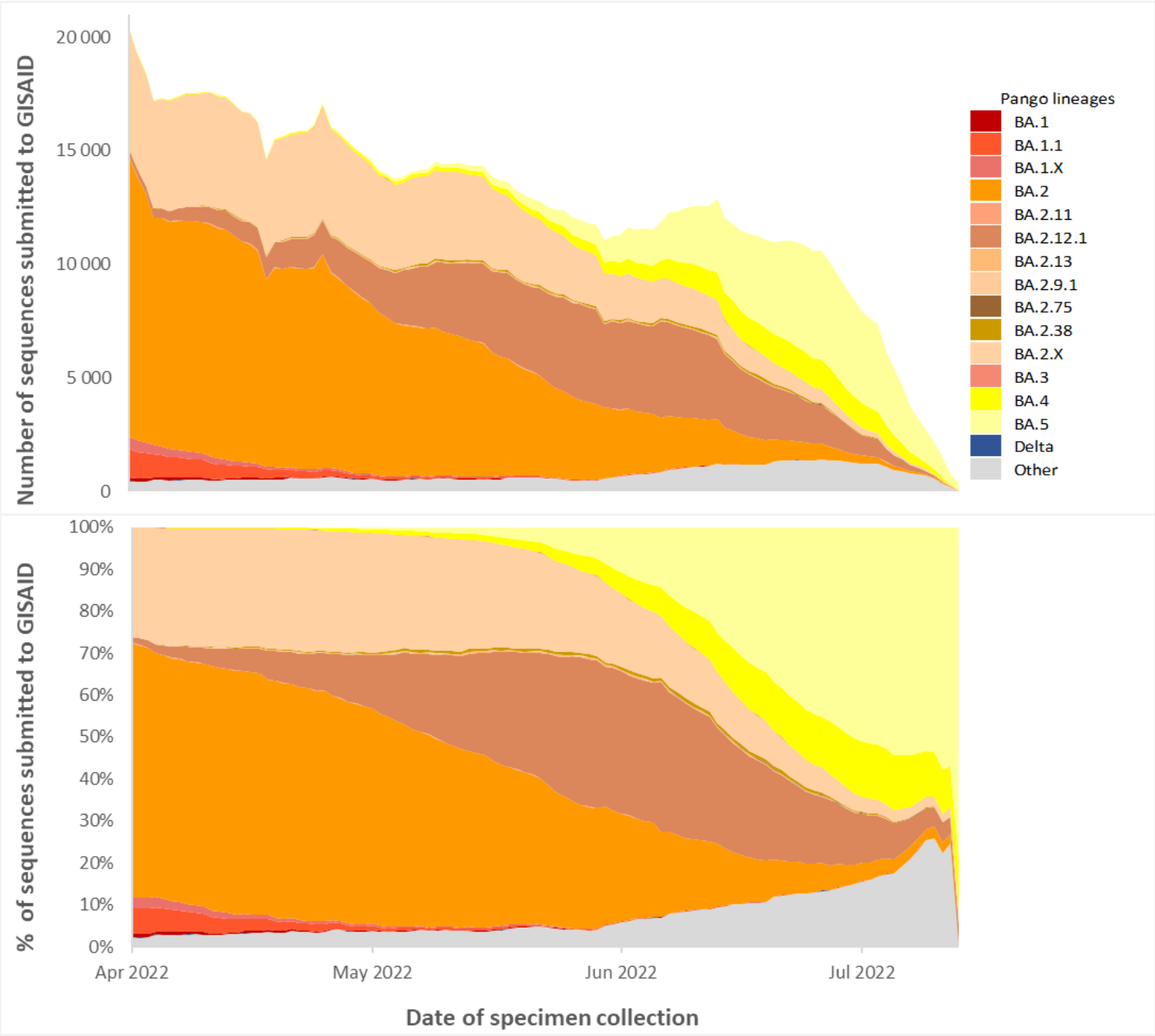


Figure 4 Panel A shows the number and **Panel B** the percentage of all circulating variants since 1 April 2022. Omicron sister-lineages and additional Omicron VOC descendent lineages under further monitoring (VOC-VUM) are shown. BA.1.X and BA.2.X include all BA.1 and BA.2 pooled descendent lineages, except those already shown in the figure above. Source: SARS-CoV-2 sequence data and metadata from GISAID, as of 18 July 202

Table 2. Relative proportions of SARS-CoV-2 sequences over the last four weeks by specimen collection date

A.

			Last 4 weeks by collection date (%)[b]			
Lineage	**Countries**	**Sequences[a]**	**2022-24**	**2022-25**	**2022-26**	**2022-27**
BA.1	177	482 065	0.01	0.01	0.01	0.00
BA.1.1	183	997 165	0.05	0.02	0.02	0.02
BA.1.X*	179	899 907	0.04	0.03	0.02	0.01
BA.2	153	1 141 038	9.83	6.61	3.84	2.61
BA.2.11	23	815	0.02	0.02	0.00	0.01
BA.2.12.1	95	225 356	22.86	15.83	10.59	4.51
BA.2.13	48	3 737	0.32	0.21	0.14	0.12
BA.2.38	56	6 533	0.89	0.51	0.22	0.16
BA.2.75	15	250	0.09	0.14	0.08	0.05
BA.2.9.1	16	767	0.01	0.00	0.01	0.00
BA.2.X*	147	547 294	9.14	6.05	3.19	2.39
BA.3	42	1 146	0.05	0.02	0.01	0.01
BA.4	88	49 813	11.47	12.15	13.21	10.57
BA.5	100	139 680	34.67	45.07	51.84	53.59
Delta[#]	203	4 362 456	0.01	0.04	0.01	0.00
Other[C]	210	2 776 891	10.54	13.30	16.82	25.95

[a] Data source: sequences and metadata from GISAID, data published on 18 July 2022.

[b] Relative proportions in %.

* BA.1.X and BA.2.X include all BA.1 and BA.2 pooled descendent lineages, except those already shown in the table above.

[#] Previously circulating VOC.

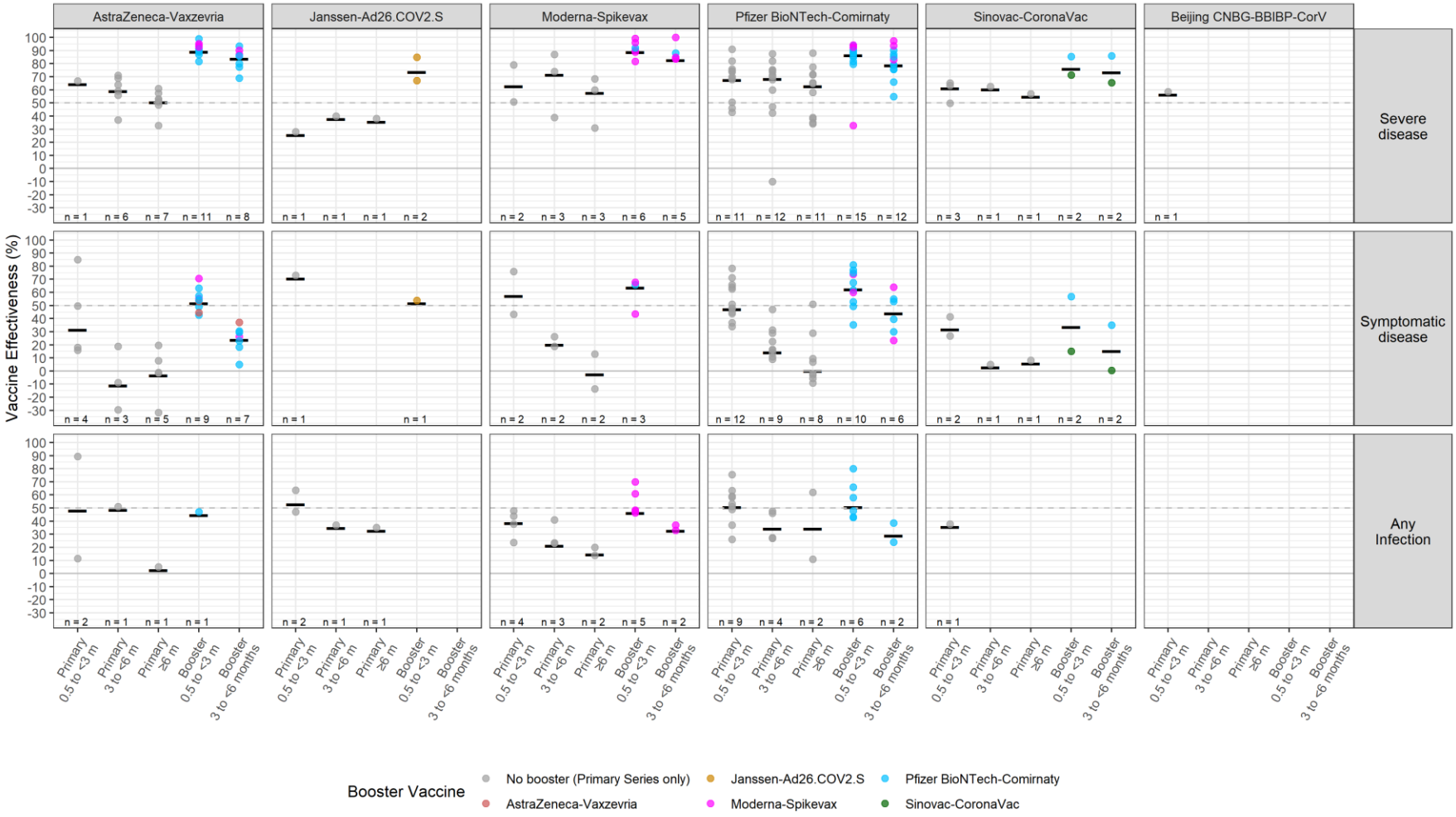
[c] Other includes all omicron lineages which are not listed in the table above as well as sequences which are awaiting PANGO lineage designations (presumed Omicron).

Table 3. Summary of phenotypic characteristics* of the Omicron VOC

Public health domain of impact	Omicron (B.1.1.529)	Omicron sublineages			
		BA.1	BA.2	BA.4	BA.5
Transmissibility	Growth advantage and increased transmissibility compared to Delta [ii]	Lower growth advantage compared to BA.2[1], BA.4 and BA.5 [2]	Lower growth advantage compared to BA.4 and BA.5 [1,2]	Growth advantage compared to BA.2 [2]	Growth advantage compared to BA.4 [2]
Disease severity	Overall evidence suggests lower severity despite contrasting evidence. Earlier studies reported lower severity compared to Delta. [3–7] However, more recent studies in different settings reported similar [8,9] or increased severity[10] compared to Delta.[3–7,11] [12]	No difference in disease severity compared to BA.2, BA.4 and BA.5 [13]	No difference in disease severity compared to BA.4 and BA.5[13]	Currently available evidence does not suggest a difference in disease severity compared to BA.2 and BA.5 [13]	Currently available evidence does not suggest a difference in disease severity compared to BA.2 and BA.4[13]
Risk of reinfection	Reduced risk of Omicron reinfection among individuals previously infected with a different SARS-CoV-2 variant compared to naïve individuals[14,15]	Reduced risk of reinfection with BA.1 after infection with BA.2[15]	Reduced risk of reinfection following infection with BA.1 [15]	Protection against infection following previous BA.2 infection [16]	Protection against infection following previous BA.2 infection [16]
Impact on antibody responses	Reduction in neutralizing activity reported as compared to other VOCs[17–19]	Lower neutralising antibody titers compared to the index virus[19]	Lower neutralising antibody titers compared to the index virus[19]	Lower neutralizing antibody titres (7.6-fold) compared to BA.1 [20,21]	Lower neutralising antibody titres (7.5-fold) compared to BA.1 [20,21]
Impacts on diagnostics	PCR assays that include multiple gene targets maintain their accuracy to detect Omicron[22]; S gene target failure/positivity (SGTF) may be a proxy for screening. Limited to no impact on sensitivity of Ag-RDTs observed[23–26]	S gene target failure	The majority will be S gene target positive	S gene target failure.	S gene target failure.
Impact on treatment	No difference in the effectiveness of antiviral agents (polymerase and protease inhibitors) against the Omicron variant[27]. Conserved neutralizing activity for three broadly neutralizing monoclonal antibodies (sotrovimab, S2X259 and S2H97) and a reduced effectiveness of other monoclonal antibodies[28–31]	Reduced efficacy of cilgavimab[32] and casirivimab-imdevimab[33]	Reduced neutralising activity of sotrovimab, bamlanivimab, casirivimab, etesevimab, imdevimab and tixagevimab [34]	Reduced neutralising activity of sotrovimab, bamlanivimab, casirivimab, etesevimab, imdevimab and tixagevimab. Increased resistance to cilgavimab compared to BA.2[34]	Reduced neutralising activity of sotrovimab, bamlanivimab, casirivimab, etesevimab, imdevimab and tixagevimab. Increased resistance to cilgavimab compared to BA.2[34]
Impact on vaccination	Results of vaccine effectiveness (VE) studies should be interpreted with caution because estimates vary with the type of vaccine administered and the number of doses and scheduling (sequential administration of different vaccines). For further information, see the section Interpretation of the results of the VE for the Omicron variant				

[ii] Similar methodology used as Reference [1]

Figure 5. Vaccine effectiveness (VE) of primary series and first booster vaccination against the Omicron variant of concern



Dots represent point estimates of VE from each study; dark black horizontal lines represent median VE across all studies in stratum. All data is from a systematic review of COVID-19 VE studies; methods and summary tables of VE studies can be found on view-hub.org. Vertical panels represent VE for full primary series (grey dots) and VE for homologous or heterologous booster vaccination (other colored dots) following completion of primary series vaccination with vaccine of primary series noted in panel header. All booster VE estimates are for first booster dose. Severe disease includes hospitalization, and pneumonia; 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 are provided in text.

Figure 5 summarises the impact of the Omicron variant on absolute vaccine effectiveness (VE) over time, grouped by the primary series vaccine; booster doses may have been a different vaccine (i.e., both homologous and heterologous booster vaccination VEs are shown). Additional information on vaccine performance against VOCs can also be found in Annex 3.

Since the last update, one new study (not yet peer reviewed) has been added to the figure. The study assessed the VE of two and three doses of Pfizer BioNTech-Comirnaty against emergency department admissions and hospitalization due to Omicron BA.1 and BA.2 sub-lineages over time among adults 18 years and older in the United States of America.[35]

For more information on the methods for Figure 5 refer to Annex 4.

Interpretation of the results of absolute VE for the Omicron variant

To date, 34 studies from 14 countries (Argentina, Brazil, Canada, Chile, Czech Republic, Denmark, Finland, Norway, Israel, Qatar, South Africa, the United Kingdom, the United States of America, and Zambia) have collectively assessed the protection of six vaccines against the Omicron variant (12 studies contributed VE estimates of primary series vaccination, four contributed to estimates of first booster vaccination only, and 18 contributed to both). Findings from these studies show reduced VE of COVID-19 primary series vaccines against the Omicron variant for all outcomes (*severe disease*, *symptomatic disease*, and *infection*) than has been observed for the other four VOCs. Importantly though, VE estimates against the Omicron variant remain higher for *severe disease* than the other outcomes, in the majority of studies. The first booster vaccination substantially improves VE for all outcomes and for all combinations of schedules with estimates available for both primary series and booster vaccination. VE declines more with time after the first booster vaccination for symptomatic disease and infection than it does for severe disease[36]; however, studies that assess VE of booster vaccination beyond six months to evaluate longer duration of protection are not yet available.

For *severe disease*, VE of the primary series showed little decline over six months. VE was ≥70% during the first three months after primary series vaccination for seven of 13 (54%) VE estimates for the mRNA vaccines (Moderna-Spikevax and Pfizer BioNTech-Comirnaty). Of the two vector vaccines studies available, both had VE <70%: one reported VE <70% for AstraZeneca-Vaxzevria and the other reported VE <50% for Janssen-Ad26.COV2.S. Four estimates were available for inactivated vaccines: none of the three estimates for Sinovac-CoronaVac were ≥ 70% (two [67%] were ≥ 50%); the single estimate for Beijing CNBG-BBIBP-CorV (Sinopharm) was <70% but ≥50%. Beyond three months after vaccination VE was ≥70% for 13 of 33 (39%) VE estimates for the mRNA vaccines (23 [70%] had VE ≥50%); one of 13 (8%) AstraZeneca-Vaxzevria VE estimates was ≥70% (9 [69%] were ≥50%); neither of the two estimates for the other vector-based vaccine, Janssen-Ad26.COV2.S, was ≥50%; the two VE estimates for Sinovac-CoronaVac were ≥50% but <70%.

The first booster dose vaccination improved VE against *severe disease* in all studies, and VE was ≥70% in 36 (95%) of 38 estimates evaluating VE between 14 days and three months of receipt of a booster dose (35 estimates evaluated an mRNA booster, two evaluated a Janssen-Ad26.COV2.S booster, and one evaluated a Sinovac-CoronaVac booster); one Moderna-Spikevax booster dose had VE <50%, and one Janssen-Ad26.COV2.S booster dose had VE <70%. At three to six months post mRNA booster, VE was ≥70% for 25 of 28 (89%) estimates (the primary series was an mRNA vaccine in 19 of the 28 estimates, AstraZeneca-Vaxzevria in eight and Sinovac-CoronaVac in one). One study found the VE to be <70% but ≥50% following three to six months from the third dose of Sinovac-CoronaVac.

VE against *symptomatic disease* and *infection* within the first three months of primary series vaccination was lower than against severe disease, and VE decreased more substantially over time. For *symptomatic disease*, only three of 14 (21%) VE estimates for the mRNA vaccines were ≥70% and only seven (50%) were ≥50%; one (25%) of the four VE estimates for AstraZeneca-Vaxzevria was ≥70% while the remaining three estimates were <50%; the single estimate for Janssen-Ad26.COV2.S was ≥70%, and both estimates for Sinovac (CoronaVac) were <50%. Beyond three months after vaccination, only one of 35 (3%) VE estimates was ≥50% (25 estimates evaluated mRNA vaccines, eight evaluated AstraZeneca-Vaxzevria, and two evaluated Sinovac-CoronaVac). mRNA booster vaccination after completion of a primary series of an mRNA vaccine, AstraZeneca-Vaxzevria, or Sinovac-CoronaVac improved VE against *symptomatic disease*: six of 23 (26%) VE estimates between 14 days and three months post booster were ≥70% (18 [78%] were ≥50%); one (50%) of two VE estimates evaluating three doses of AstraZeneca-Vaxzevria was ≥50% but <70%, as was the single estimate for three doses of Janssen-Ad26.COV2.S, and the single estimate for three doses of Sinovac-CoronaVac was <50%. However, first booster dose protection declined rapidly over time: only four of 15 (27%) estimates available at three to six months following receipt of an mRNA booster dose had VE ≥50% and none were ≥70%. Neither the single estimate for three doses of AstraZeneca-Vaxzevria nor the single estimate for three doses of Sinovac-CoronaVac assessed three to six months post booster vaccination was above 50%. VE against *infection* showed a similar pattern of waning as that against *symptomatic disease.*

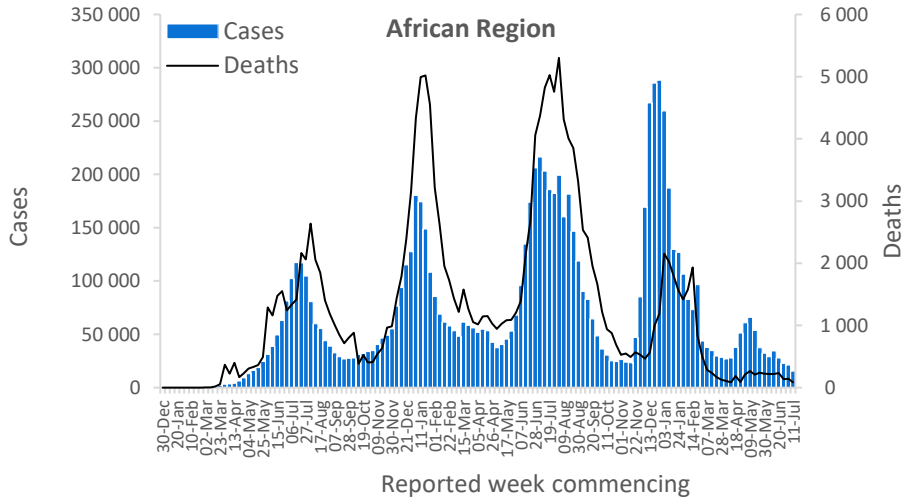
WHO regional overviews:

Epidemiological week 11 - 17 July 2022**

African Region

The African Region reported a decline in the number of new weekly cases, with over 15 000 new cases reported, a 27% decrease as compared to the previous week. Seven (14%) countries reported an increase in the number of new cases of 20% or greater, with the greatest proportional increases seen in Burundi (451 vs 169 new cases; +167%), Senegal (263 vs 133 new cases; +98%), and Eritrea (40 vs 23 new cases; +74%). The highest numbers of new cases were reported from Réunion (3599 new cases; 402 new cases per 100 000 population; +25%), South Africa (2482 new cases; 4.2 new cases per 100 000; +25%), and Zambia (1200 new cases; 6.5 new cases per 100 000; -17%).

The number of new weekly deaths in the Region decreased by 39% as compared to the previous week, with just under 90 new deaths reported. The highest numbers of new deaths were reported from South Africa (42 new deaths; <1 new death per 100 000 population; -34%), Ethiopia (10 new deaths; <1 new death per 100 000; -23%), and Réunion (six new deaths; <1 new death per 100 000; -14%).

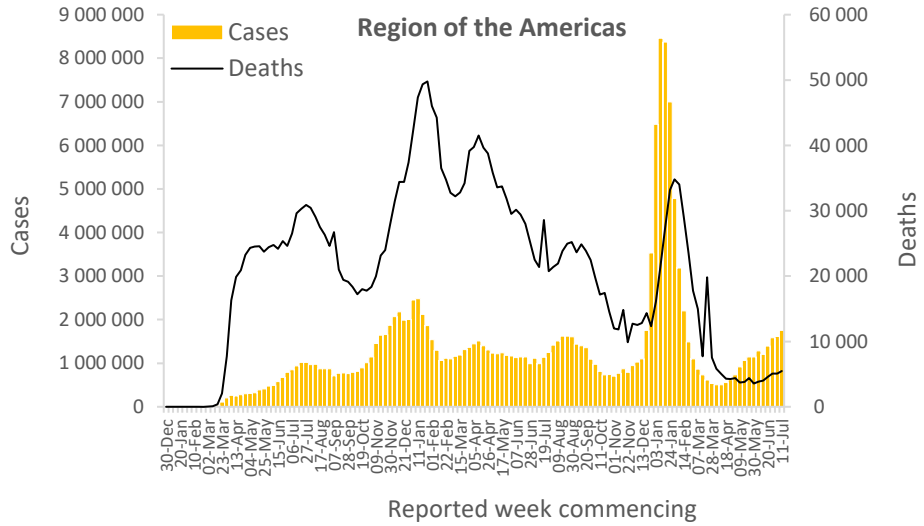


Updates from the African Region

Region of the Americas

The Region of the Americas reported over 1.7 million new cases, a 9% increase as compared to the previous week. Eighteen of 56 (32%) countries for which data are available reported increases in the number of new cases of 20% or greater, with the greatest proportional increases observed in Sint Eustatius (69 vs 18 new cases; +283%), Peru (67194 vs 32889 new cases; +104%), and Saint Vincent and the Grenadines (114 vs 56 new cases; +104%). The highest numbers of new cases were reported from the United States of America (866 479 new cases; 261.8 new cases per 100 000; +18%), Brazil (419 273 new cases; 197.2 new cases per 100 000; +6%), and Mexico (141 241 new cases; 109.5 new cases per 100 000; -20%).

The number of new weekly deaths reported in the Region increased by 7% as compared to the previous week, with over 5000 new deaths reported. The highest numbers of new deaths were reported from the United States of America (2345 new deaths; <1 new death per 100 000; +5%), Brazil (1751 new deaths; <1 new death per 100 000; +7%), and Mexico (315 new deaths; <1 new death per 100 000; +32%).

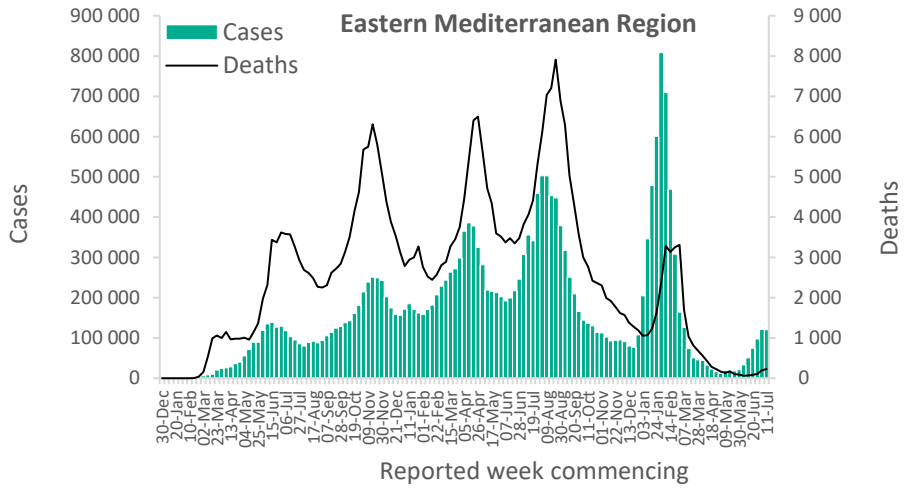


Updates from the Region of the Americas

Eastern Mediterranean Region

After an increasing trend over the past two months, the Eastern Mediterranean Region reported over 120 000 new weekly cases, a figure similar to last week's figure. Six (27%) countries reported increases in the number of new cases of 20% or greater, with some of the highest proportional increases observed in Libya (453 vs 51 new cases; +788%, partly due to batch reporting), the Islamic Republic of Iran (25 126 vs 8761 new cases; +187%), and Jordan (2135 vs 1329 new cases; +61%). The highest numbers of new cases were reported from the Islamic Republic of Iran (25 126 new cases; 29.9 new cases per 100 000; +187%), Tunisia (20 903 new cases; 176.9 new cases per 100 000; +50%), and Iraq (19 217 new cases; 47.8 new cases per 100 000; -34%).

The number of new weekly deaths in the Region increased by 15% as compared to the previous week, with over 200 new deaths reported. The highest numbers of new deaths were reported from Tunisia (75 new deaths; <1 new death per 100 000; +32%), the Islamic Republic of Iran (57 new deaths; <1 new death per 100 000; +46%), and Morocco (27 new deaths; <1 new death per 100 000; -23%).

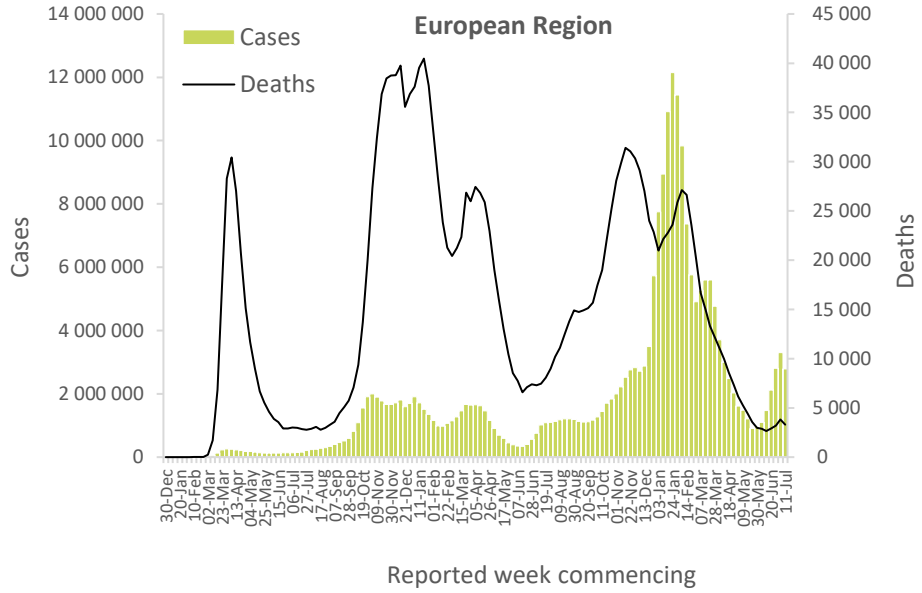


Updates from the Eastern Mediterranean Region

European Region

The European Region reported over 2.7 million new weekly cases, a 16% decrease from the previous week. Twenty (33%) countries in the Region reported increases in new cases of 20% or greater, with the highest proportional increases observed in Kyrgyzstan (485 vs 78 new cases; +522%), Romania (34 582 vs 7726 new cases; +348%), and Kazakhstan (7190 vs 2293 new cases; +214%). The highest numbers of new cases were reported from France (757 830 new cases; 1165.2 new cases per 100 000; -15%), Italy (718 925 new cases; 1205.4 new cases per 100 000; +9%), and Germany (602 930 new cases; 725.0 new cases per 100 000; -3%).

Over 3000 new weekly deaths were reported in the Region, a 14% decrease as compared to the previous week. The highest numbers of new deaths were reported from Italy (784 new deaths; 1.3 new deaths per 100 000; +37%), Spain (610 new deaths; 1.3 new deaths per 100 000; -1%), and France (530 new deaths; <1 new death per 100 000; +30%).

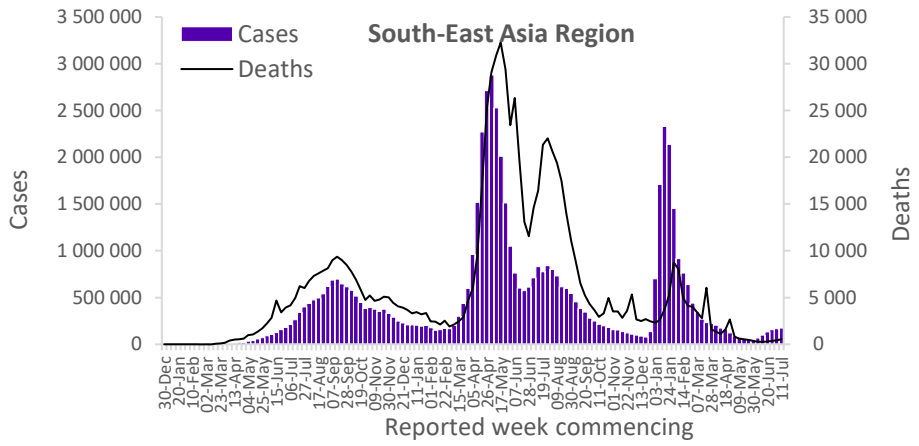


Updates from the European Region

South-East Asia Region

The South-East Asia Region has been reporting an increasing trend in cases since early June, with over 173 000 new cases reported, a 5% increase as compared to the previous week. Three of 10 countries (30%) for which data were available showed increases in the number of new cases of 20% or greater, with the greatest proportional increases observed in Nepal (1091 vs 516 new cases; +111%), Sri Lanka (175 vs 106 new cases; +65%) and Indonesia (23 648 vs 17 388; +36%). The highest numbers of new cases were reported from India (127 948 new cases; 9.3 new cases per 100 000; +6%), Indonesia (23 648 new cases; 8.6 new cases per 100 000; +36%), and Thailand (13 986 new cases; 20 new cases per 100 000; -6%).

The number of new weekly deaths in the Region increased by 20% as compared to the previous week, with over 500 new deaths reported. The highest numbers of new deaths were reported from India (281 new deaths; <1 new death per 100 000; +23%), Thailand (161 new deaths; <1 new death per 100 000; +19%), and Indonesia (58 new deaths; <1 new death per 100 000; +38%).

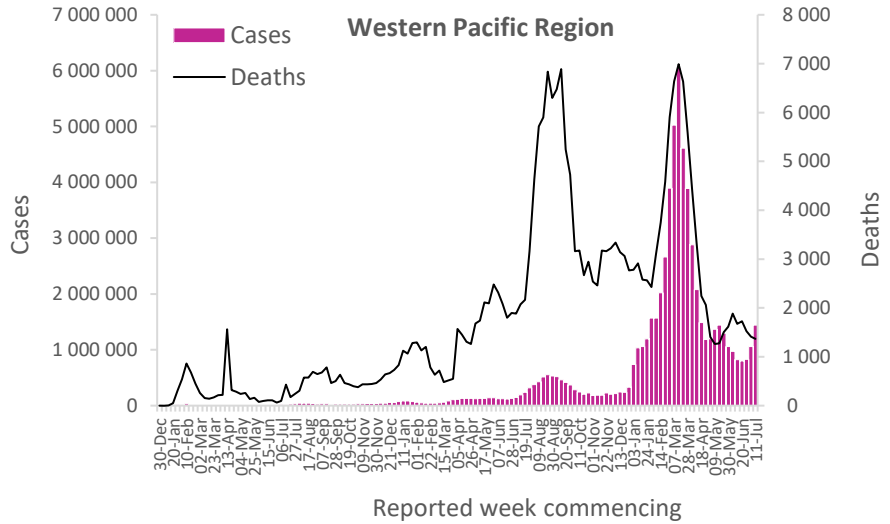


Updates from the South-East Asia Region

Western Pacific Region

The Western Pacific Region reported over 1.4 million new cases, a 37% increase as compared to the previous week. Fourteen (42%) countries reported increases in new cases of 20% or greater, with some of the largest proportional increases observed in the Lao People's Democratic Republic (149 vs 55 new cases; +171%), Japan (559 111 vs 269 760 new cases; +107%), and the Republic of Korea (249 912 vs 122 234 new cases; +104%). The highest numbers of new cases were reported from Japan (559 111 new cases; 442.1 new cases per 100 000; +107%), the Republic of Korea (249 912 new cases; 487.5 new cases per 100 000; +104%), and Australia (229 874 new cases; 901.5 new cases per 100 000; -11%).

The Region reported over 1300 new weekly deaths, similar to the figure reported during the previous week. The highest numbers of new deaths were reported from China (576 new deaths; <1 new death per 100 000; -17%), Australia (293 new deaths; 1.1 new deaths per 100 000; -1%), and Japan (164 new deaths; <1 new death per 100 000; +52%).



Updates from the Western Pacific Region

Annex 1. Data, table, and figure notes

Data presented are based on official laboratory-confirmed COVID-19 cases 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.

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.
[2] Since 21 May 2022, data for COVID-19 cases and deaths in Northern Ireland was no longer included in the United Kingdom updates.
[3] Updates of an outbreak of COVID-19 reported in the Democratic People's Republic of Korea continue through official media since 12 May 2022; however, at present, no confirmed cases or deaths have been reported to WHO.

Annex 2. SARS-CoV-2 variants assessment and classification

WHO, in collaboration with national authorities, institutions and researchers, routinely assesses if variants of SARS-CoV-2 alter transmission or disease characteristics, or impact the 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.

The classifications of variants will be revised as needed to reflect the continuous evolution of circulating variants and their changing epidemiology. Criteria for variant classification, and the lists of currently circulating and previously circulating VOCs, VOIs and VUMs, are available on the WHO Tracking SARS-CoV-2 variants website. National authorities may choose to designate other variants and are strongly encouraged to investigate and report newly emerging variants and their impact.[1]

Annex 3. Summary of Primary Series and First Booster Vaccine Performance against Omicron Variant of Concern (data as of 11 July 2022)

		Omicron Sub-Lineage				
		BA.1	**BA.2**	**BA.2.12.1**	**BA.3**	**BA.4/BA.5**
Primary Series Vaccination						
WHO Emergency Use Listing (EUL) Qualified Vaccines	AstraZeneca-Vaxzevria/SII-Covishield	HNR_{10}	HNR_{1}	----	----	----
	Beijing CNBG-BBIBP-CorV	HNR_{7}	HNR_{2}	HNR_{1}	HNR_{1}	HNR_{1}
	Bharat-Covaxin	$\downarrow\downarrow_{1}$	----	----	----	----
	Cansino-Convidecia	----	----	----	----	----
	Janssen-Ad26-COV2.S	HNR_{6}	----	----	----	----
	Moderna-Spikevax	$\downarrow\downarrow\downarrow_{10}$	HNR_{2}	----	----	----
	Novavax-Nuvaxovid/SII - Covavax	----	----	----	----	----
	Pfizer BioNTech-Comirnaty	HNR_{47}	$\downarrow\downarrow\downarrow_{2}$	----	HNR_{1}	HNR_{1}
	Sinovac-CoronaVac	$\downarrow\downarrow\downarrow_{1}$	----	----	----	----
Vaccines without WHO EUL	Anhui ZL-Recombinant	----	----	----	----	----
	Gamaleya-Sputnik V	HNR_{2}	----	----	----	----
Booster Vaccination (Primary Series Vaccine + Booster Vaccine)						
WHO Emergency Use Listing (EUL) Qualified Booster Vaccines	AstraZeneca-Vaxzevria/SII-Covishield + AstraZeneca-Vaxzevria/SII Covishield	HNR_{2}	HNR_{2}	----	$\downarrow\downarrow_{1}$	$\downarrow\downarrow\downarrow_{1}$
	AstraZeneca-Vaxzevria/SII-Covishield + Moderna-Spikevax	$\downarrow_{1}$	----	----	----	----
	AstraZeneca-Vaxzevria/SII-Covishield + Pfizer BioNTech-Comirnaty	$\downarrow\downarrow_{1}$	$\downarrow\downarrow_{1}$	----	$\downarrow\downarrow_{1}$	----
	Beijing CNBG-BBIBP-CorV + Beijing CNBG-BBIBP-CorV	$\downarrow\downarrow$to$\downarrow\downarrow\downarrow_{4}$	HNR_{2}	HNR_{1}	$\downarrow\downarrow_{1}$	HNR_{1}
	Janssen-Ad26-COV2.S + Janssen-Ad26-COV2.S	HNR_{1}	----	----	----	----
	Janssen-Ad26-COV2.S + Pfizer BioNTech-Comirnaty	$\downarrow_{1}$	----	----	----	----
	Moderna-Spikevax + Moderna-Spikevax	$\downarrow$to$\downarrow\downarrow\downarrow_{9}$	$\downarrow\downarrow_{1}$	$\downarrow\downarrow_{1}$	$\downarrow\downarrow_{1}$	$\downarrow\downarrow\downarrow_{1}$
	Moderna-Spikevax + Pfizer BioNTech-Comirnaty	$\downarrow\downarrow\downarrow_{1}$	----	----	----	----
	Pfizer BioNTech-Comirnaty + Pfizer BioNTech-Comirnaty	$\downarrow$to$\downarrow\downarrow\downarrow_{40}$	$\downarrow$to$\downarrow\downarrow_{13}$	$\downarrow$to$\downarrow\downarrow\downarrow_{3}$	$\downarrow$to$\downarrow\downarrow_{4}$	$\downarrow\downarrow$to$\downarrow\downarrow\downarrow_{5}$
	Pfizer BioNTech-Comirnaty + Janssen-Ad26-COV2.S	$\downarrow_{2}$	----	----	----	----
	Pfizer BioNTech-Comirnaty + Moderna-Spikevax	$\downarrow$to$\downarrow\downarrow_{2}$	----	----	----	----
	Sinovac-CoronaVac + Sinovac-CoronaVac	HNR_{6}	$\downarrow\downarrow_{2}$	$\downarrow\downarrow_{1}$	$\downarrow\downarrow_{1}$	$\downarrow\downarrow_{1}$
	Sinovac-CoronaVac + Pfizer BioNTech-Comirnaty	$\downarrow\downarrow_{2}$	$\downarrow\downarrow_{1}$	----	----	----
Booster Vaccines without WHO EUL	Anhui ZL-Recombinant + Anhui ZL-Recombinant	$\downarrow$to$\downarrow\downarrow_{2}$	$\downarrow\downarrow_{1}$	$\downarrow\downarrow_{1}$	$\downarrow\downarrow\downarrow_{1}$	$\downarrow\downarrow\downarrow_{1}$
	Beijing CNBG-BBIBP-CorV + Anhui ZL - Recombinant	$\downarrow\downarrow$to$\downarrow\downarrow\downarrow_{4}$	HNR_{2}	HNR_{1}	$\downarrow\downarrow\downarrow_{1}$	HNR_{1}
	Gamaleya-Sputnik V + Gamaleya Sputnik Light	$\downarrow\downarrow_{1}$	----	----	----	----
	Sinovac-CoronaVac + Anhui ZL - Recombinant	$\downarrow$to$\downarrow\downarrow_{2}$	$\downarrow$to$\downarrow\downarrow_{2}$	$\downarrow$to$\downarrow\downarrow\downarrow_{2}$	$\downarrow$to$\downarrow\downarrow\downarrow_{2}$	$\downarrow\downarrow_{1}$

Abbreviations: HNR=high non-response. Arrows generalize the magnitude of reduction in VE or neutralization: "↔" indicates <2-fold reduction in neutralization; "↓" indicates 2 to <5-fold reduction; "↓↓" indicates 5 to <10-fold reduction; "↓↓↓" indicates ≥10-fold reduction. When more than one neutralization study is available, the interquartile range (25th and 75th percentiles) of fold-reductions across all studies for specific vaccine/sub-lineage was used. HNR indicates a median percent response across all studies of <75%; in these instances, fold-reductions can be biased and, thus. are not presented. The number of studies is shown as subscripts.

Additional notes on Annex Table 3

- Studies contributing to the table are identified from an ongoing review of the preprint and published literature on neutralization of SARS-CoV-2 variants by COVID-19 vaccines.
- Studies that use samples collected >7 days and < 6 months after complete vaccination and that use an ancestral strain as the reference are included in the table.
- Studies of immunocompromised persons are excluded.
- It is important to note that studies vary in population and other methodological considerations which may in part explain some differences when comparing products between different studies. In addition, the reductions summarised in the table do not incorporate uncertainty intervals around the fold reductions which can vary substantially across studies when reported.

Annex 4. Methods for Figure 5

- 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 designs conducted when Omicron was the predominant circulating variant. Methods for the systematic review and inclusion/exclusion criteria are available on view-hub.org.
- Only studies providing VE estimates of individual vaccines are included in the plot; studies assessing combined VE of more than one vaccine are excluded except for studies of heterologous primary and booster schedules where all participants included in a VE estimate received the same brands of vaccines in the same order.
- Only studies providing VE estimates for discrete time intervals since vaccination or estimates with limited follow-up time (such that the median time point falls clearly in one of the intervals for the plot) are included. Studies that only provide VE estimates over a cumulative period of time covering more than one time interval are excluded because they are difficult to interpret due to the marked waning of VE over time with Omicron.
- Only estimates of absolute vaccine effectiveness (i.e., the comparison group is unvaccinated persons) are included in the plot; estimates of relative vaccine effectiveness (e.g., the comparison group is persons having completed the primary series) are excluded as the interpretation of relative vaccine effectiveness is not comparable with absolute vaccine effectiveness.

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Reopen for International Travel Without COVID-19 Testing Required（142 Member States）

Updated on 19 July, 2022

Albania	Effective May 1, 2022, the Government of Albania repealed COVID-19-related entry requirements.(Last updated: 06/11/2022)	https://al.usembassy.gov/updates_covid19/
Algeria	Effective March 20, 2022, passengers can enter Algeria without restriction if they are fully vaccinated and if their last vaccine is not older than 9 months.Non-vaccinated passengers and those whose vaccinations are older than 9 months must have a negative PCR test within 72 hours of the time of arrival.	https://dz.usembassy.gov/covid-19-information/
Andorra	The Andorran authorities have taken no measures to close the borders and movement into the country. The Government of Andorra is therefore currently applying no restrictions on entering the country, nor on the movement of people and vehicles around its territory.	https://visitandorra.com/en/covid-19-in-andorra/faq-if-you-re-spending-a-few-days-in-andorra/
Antigua and Barbuda	Arriving passengers are not required to present verifiable documentation of full vaccination to be permitted entry into Antigua and Barbuda.Fully vaccinated arriving passengers are not required to present a PCR/Rapid Antigen Test negative result to be permitted entry into Antigua and Barbuda, (unless they show symptoms of possible infection). This includes transiting passengers.((Last updated:04/16/2022)	https://visitantiguabarbuda.com/travel-advisory/
Argentina	Travelers are not required to provide proof of a negative COVID-19 test result before traveling to Argentina.People who have an incomplete vaccination schedule are recommended to have a diagnostic test within 24 hours of their entry into the country.	https://www.argentina.gob.ar/interior/migraciones/ddjj-migraciones
Armenia	According to the amendments of the Government Decree: № 1514-N of September 11, 2020, which entered into force on May 1, 2022: The passengers are NO LONGER REQUIRED to present a COVID-19 PCR test or a Certificate of complete vaccination against COVID-19 to enter the Republic of Armenia.	https://www.gov.am/en/covid-travel-restrictions/
Australia	Changes to the requirements for travel into and out of Australia came into effect on 18 April 2022. The Australian Government no longer requires people travelling to Australia to have a COVID-19 test before travel.You do not need to provide proof of COVID-19 vaccination to travel to and from Australia.	https://www.health.gov.au/health-alerts/covid-19/international-travel/inbound
Austria	Travel to Austria is possible for touristic purposes.Since 16 May, proof of vaccination/recovery or a test are no longer needed.(Last update: 2022/05/17)	https://www.austria.info/en/service-and-facts/coronavirus-information/entry-regulations
Azerbaijan	The Cabinet of Ministers announced that, beginning April 15, 2022, the need for a negative PCR test for entry to Azerbaijan is eliminated.	https://az.usembassy.gov/covid-19-information-for-azerbaijan/
Bahamas	Effective Sunday 19th June 2022 at 12:01 am The Bahamas Travel Health Visa (BTHV) will no longer be required to travel to The Bahamas. All unvaccinated travelers ages 2 and older will be required to obtain a negative COVID-19 test - either a negative RT-PCR or a Rapid Antigen Test to be presented at check-in. Vaccinated travelers will only be required to present proof of vaccination at check-in.	https://travel.gov.bs/
Bahrain	Starting from 20 February 2022, All passengers arriving in the Kingdom of Bahrain do not need to conduct a PCR test upon arrival.Cancellation of the precautionary quarantine for all passengers arriving in the Kingdom of Bahrain.	https://healthalert.gov.bh/en/article/entry-procedures-through-kingdom-of-bahrain

Bangladesh	1) Vaccinated with Covid-19 vaccine:Travelers completed full dose (single/double dose as applicable for a full dose) of WHO approved Covid-19 vaccine can enter Bangladesh with the official proof of certification of vaccination and no RT PCR based COVID-19 negative certificate is required. 2) Not vaccinated with Covid-19 vaccine:Travelers without having full dose (single/double dose as applicable for a full dose) of Covid-19 vaccine can enter Bangladesh if they possess RT PCR based COVID-19 negative certificate done within 72 hours of departure time (Last update: 2022/06/02)	http://caab.gov.bd/circul/AT-Circular-FSR-03-2022%20(02June22).pdf
Barbados	Effective Wednesday, May 25, 2022, fully-vaccinated travellers to Barbados will no longer have to take a COVID-19 test to enter the country.	https://www.visitbarbados.org/covid-19-travel-guidelines-2022
Belarus	There are no restrictions on entry into Belarus for citizens of Belarus, foreign citizens and stateless persons.	https://gpk.gov.by/covid-19/
Belgium	From 23 May 2022, measures will only apply to travellers coming from a very high risk country.	https://www.info-coronavirus.be/en/travels/
Belize	Effective March 1, 2022, fully vaccinated travellers no longer require a negative test but must show proof of vaccination for entry into Belize's airport, land borders or sea ports.If unable to show proof or if unvaccinated, the traveller must present proof of a negative PCR result taken within 72 hours of arrival or a negative Antigen Rapid test taken within 48 hours of arrival. A test can be administered by the Ministry responsible for health at the airport. Every child under the age of 5 years shall not be subjected to testing for SARSCoV2 upon entry into Belize through airport, land or sea port.	https://belizetourismboard.org/news-and-gallery/belize-covid-19-travel-updates/#1644266913182-1e31ba74-2de7
Benin	There is no negative COVID-19 test (PCR and/or serology) required for entry Benin.(Last updated: 06/16/2022)	https://bj.usembassy.gov/info-covid19/
Bolivia	Travelers to Bolivia must comply with the following requirements.(Last Updated 6/13/22) Present a COVID-19 vaccination certificate, or Present a negative COVID-19 RT-PCR test (for persons older than 5 years) taken no more than 72 hours prior to embarkation, or Present a negative COVID-19 nasal antigen test (for persons older than 5 years) no more than 48 hours prior to embarkation.	https://bo.usembassy.gov/covid-19-information/
Bosnia and Herzegovina	As of May 26, 2022, BiH authorities have removed entry restrictions related to COVID-19.	https://granpol.gov.ba/Content/Read/74?title=COVID-19
Bostswana	Fully vaccinated travelers with proof of a booster dose do not need to present negative COVID-19 test results.Others are required to show proof of a negative PCR COVID-19 test within 72 hours of travel and must submit to vaccination on arrival at the Port of Entry.	https://covid19portal.gov.bw/node/1017
Brazil	Fully vaccinated travelers are not required to present proof of negative COVID-19 test results before traveling to Brazil.	https://www.in.gov.br/en/web/dou/-/portaria-interministerial-n-670-de-1-de-abril-de-2022-390351794
Brunei	In view of the opening of borders via air travel on 6th May 2022, the COVID-19 Steering Committee would like to inform the public on the easing of cross-border travel restrictions and the updates of control measures which will also commence on Wednesday, 15th June 2022, as follows: 1)Pre-departure swab test (either (RT-PCR or ART test) for inbound travellers is no longer required, regardless of vaccination status. 2)Fully vaccinated travellers are no longer required to undergo ART testing and self-isolation upon arrival in the country. 3)Travellers who have not completed the COVID-19 vaccination are required to undergo ART testing upon arrival, three (3) days self-isolation and will only be allowed to end their self-isolation if tested negative RT-PCR on day three.(Last updated: 06/09/2022)	https://www.bruneitourism.com/covid19-travellers-advisory/

Bulgaria	As of 1 May 2022, the restrictions on entry into the territory of the Republic of Bulgaria are lifted.	https://coronavirus.bg/bg/az-sum/zavrashtam-se-bulgaria
Burkina Faso	Fully vaccinated travelers are not required to have a negative COVID-19 test result before traveling to Burkina Faso.(Last updated:06/03/2022)	https://www.sante.gov.bf/covid19
Cabo Verde	If you're fully vaccinated, you can enter Cape Verde without needing to test or quarantine but you will need to present proof of your vaccination status when you check-in for your flight to Cape Verde. If you're not fully vaccinated, you'll need to show proof of a negative PCR test (taken no more than 72 hours before you travel) or an antigen test (taken no more than 48 hours before you travel) when you check-in for your flight to Cape Verde. If you're not fully vaccinated but have tested positive for COVID-19 in the last year, you can enter Cape Verde with a COVID-19 recovery certificate showing you recovered from COVID-19 no less than 11 days and no more than 180 days before you travel.	https://www.gov.uk/foreign-travel-advice/cape-verde/entry-requirements
Cambodia	As of March 17 2022, the Royal Government of Cambodia has officially decided as follow: 1)Lift the requirement that travelers from abroad shall present a negative PCR Test Result of COVID-19 within 72 hours prior arriving in Cambodia. 2)Lift the requirement for Antigen Rapid Test upon arrival in Cambodia. 3) Resume the issuance of Visa on arrival for international travelers by air, land and sea.	https://www.embassyofcambodiadc.org/embassy-updates/pr-no-098-easing-of-entry-requirements-march-17-2022
Canada	Starting April 1, 2022, pre-entry tests are no longer required for fully vaccinated travellers entering Canada by land, air or water. Unvaccinated and partially vaccinated children 5 years of age or older must provide a valid pre-entry test result, even if they are accompanying a fully vaccinated adult. Children who are less than 5 years old are not required to test, regardless of their vaccination status.	https://travel.gc.ca/travel-covid/travel-restrictions/flying-canada-checklist/covid-19-testing-travellers-coming-into-canada?utm_campaign=gac-amc-covid-20-21&utm_source=travel-covid_travel-restrictions_flying_&utm_medium=redirect&utm_content=en
Chad	If you're fully vaccinated, you can enter Chad without needing to test or quarantine.You must present proof that you have been fully vaccinated to enter Chad.If you're not fully vaccinated, you'll need to show proof of a negative PCR test (taken no more than 96 hours before entry) in order to enter Chad.	https://www.gov.uk/foreign-travel-advice/chad/entry-requirements
Colombia	International travelers who entered Colombia should not present a negative PCR test to enter the country. They only have to do their Check-Mig registration 24 hours before their flight at the following link: migracioncolombia.gov.co.	https://colombia.travel/en/covid-19-information
Cook Islands	From 1 May, pre-departure testing has been removed for all international arrivals	https://cookislands.travel/entry
Costa Rica	Starting April 1, the temporary migration measures established in the framework of the national health emergency due to COVID-19 are repealed.	https://www.visitcostarica.com/en/costa-rica/planning-your-trip/entry-requirements
Côte d'Ivoire	With effect from 7 March 2022, the Ministry of Health, Public Hygiene and Universal Health Coverage has announced that you no longer need to show a negative PCR test as long as you can prove that you are fully vaccinated. If you are not fully vaccinated, you will still need to show evidence of a negative COVID-19 test result, dated a maximum of 72 hours prior to arrival, before being allowed to board your flight	https://www.gov.uk/foreign-travel-advice/cote-d-ivoire/entry-requirements

Croatia	Croatia removed all border crossing restrictions, notably the requirement for non-EU citizens to present a COVID-19 certificate or proof of vaccination for entry to Croatia. There are no longer any COVID-related restrictions for entry to Croatia.(Last updated: 06/24/2022)	https://hr.usembassy.gov/covid-19-information/
Cuba	In accordance with the international and national epidemiological situation of COVID-19 and the levels of immunization achieved, it has been decided to make the following modifications to the entry requirements to the country as part of the International Health Control. 1) Eliminate as a requirement for entry to the country the presentation of a test for COVID-19 (Antigen Test or PCR-RT) carried out in the country of origin, as well as the certificate of vaccination against COVID-19.2) Maintain the sampling for SARS CoV-2 study (free) randomly to travelers at the points of entry into the country, taking into account the number of flights, the entry of boats and the epidemiological risk represented by the country of origin.	https://www.mintur.gob.cu/protocolos/
Cyprus	Effective 1 June 2022, all travellers arriving in the Republic of Cyprus, irrespective of their country of origin, will not be required to present a valid certificate of vaccination or recovery or a negative result from a PCR or antigen rapid test.	https://www.pio.gov.cy/coronavirus/uploads/27052022_airportsportsactionplanabolished_EN.pdf
Czechia	As of 9th April 2022, the protective measures regarding the conditions of entry into the Czech Republic in relation to the epidemic of covid-19 have been suspended. Entry into the Czech Republic is no longer subject to any special epidemiological conditions to prevent the spread of the disease. The entry-ban for foreigners from third-countries and the obligation to prove infection-free status have been lifted.	https://www.mvcr.cz/mvcren/article/as-of-december-27th-2021-the-rules-for-entry-into-the-czech-republic-will-be-tightened-for-foreign-nationals.aspx
Denmark	There are no covid-19 related restrictions on entry into Denmark. On this page, you will find information on testing and everyday precautions.(Updated: 4 July 2022)	https://en.coronasmitte.dk/travel-rules/covidtravelrules
Dominica	As of April 4th, travellers will no longer be required to fill and submit the pre-travel online form. The requirement for pre-arrival testing, and testing on arrival for vaccinated travellers at all ports of entry, including seafarers and yachters, has been removed.	https://discoverdominica.com/en/travel-advisory-for-dominica
Dominican Republic	As of April 23, 2022, all passengers and crew members do not need to present a COVID-19 Vaccination Card, PCR, or antigen test to enter the Dominican Republic or to enter tourist centers, any establishments or to receive services such as excursions.	https://www.godominicanrepublic.com/newsroom/coronavirus/
Egypt	All passengers traveling to Egypt (including Egyptians) must be in possession of a vaccination certificate or a negative PCR, Antigen Rapid Test, or ID NOW test result for COVID-19 with Quick Response (QR) code, taken at a maximum of 72 hours before their flight departure time.(Last updated: 06/12/ 2022)	https://eg.usembassy.gov/u-s-citizen-services/covid-19-information/
El Salvador	The Government of El Salvador has removed COVID-19 testing/vaccination requirements for entry. Visitors are advised however to bring proof of vaccination with them, as this may be requested for entry into certain events or locations in El Salvador.	https://www.dfa.ie/travel/travel-advice/a-z-list-of-countries/el-salvador/
Estonia	COVID-19 travel restrictions have been lifted in Estonia. Travellers are not required to provide proof of vaccination, recovery from COVID-19 or a negative test result.	https://www.visitestonia.com/en/covid-19-and-travelling-to-estonia
Eswatini	As at March 2022, Eswatini is open to all visitors based on the following requirements: Travellers entering and exiting the Kingdom of Eswatini must produce EITHER of the following, upon arrival at the Points of Entry: A valid COVID-19 vaccination certificate (hard or electronic) and must be fully vaccinated. OR A valid negative COVID-19 PCR test result (hard or electronic) that is not older than 72 hours, for the unvaccinated.	https://www.thekingdomofeswatini.com/travel-advice/

Ethiopia	Passengers age 12 and over who have been fully vaccinated against COVID-19 more than two weeks before the date of entry are required to show evidence of this. Accepted vaccinations are a single dose of Johnson and Johnson, or two doses for Astra-Zeneca, Sinopharm, Sinovac, Moderna and Pfizer.Travellers under the age of 12 do not need to show proof of vaccination. If you're not fully vaccinated, you'll need to show proof of a negative COVID-19 RT PCR test result issued within the 72 hours (3 days) before departure, or a rapid lateral flow test up to 24 hours before arriving in Ethiopia.	https://www.gov.uk/foreign-travel-advice/ethiopia/entry-requirements
Finland	Restrictions on entry at Finland's external borders imposed due to the COVID-19 pandemic will end on 30 June, 2022. This means that EU travellers, Schengen travellers and third-country travellers arriving in Finland will no longer be required to hold vaccination or COVID-19 test certificates, and COVID-19 tests will not be carried out at border crossing points. Border checks will return to pre-pandemic procedures.	https://www.visitfinland.com/en/practical-tips/covid-19/
France	Covid-19 restrictions at the French border were eased on 12 February 2022 for fully vaccinated travellers. The entry conditions to French territory are defined by the classification of departure countries (countries and territories on 'green' and 'orange' lists) indicated below. Children under 12 years of age are exempt from testing.(Updated on June 13th, 2022)	https://www.diplomatie.gouv.fr/en/coming-to-france/coming-to-france-your-covid-19-questions-answered/article/coming-to-france-your-covid-19-questions-answered?var_mode=calcul
Gabon	Travelers are not required to take a negative COVID-19 test (PCR and/or serology) result.(Last updated: 06/13/2022)	https://ga.usembassy.gov/u-s-citizen-services/coronavirus-update/
Gambia	As of December 11, 2021, the Ministry of Health updated entry requirements into The Gambia: Fully vaccinated travelers into The Gambia do not need a PCR test to enter. However, if such individuals have signs or symptoms similar to those of COVID-19, they will be required to undergo Rapid Diagnostic Test for COVID-19 at the airport. Non-Vaccinated or Partially Vaccinated individuals will need a negative PCR test report valid within 72 hours for entry into the country. Individuals who test positive for COVID-19 upon arrival, will be required to undergo mandatory quarantine at the traveler's own expense.(Last updated: 06/14/2022)	https://gm.usembassy.gov/covid-19-information/
Georgia	From March 1, 2022, citizens of all countries, traveling by air, land, or sea from any country may enter Georgia if they present the document confirming the full course of any COVID-19 vaccination **OR** present a negative PCR test taken within 72 hours (96 h)	https://georgia.travel/en_US/article/covid-travel-alert
Germany	Lifting of COVID-19-related restrictions for entry into Germany with effect as of Saturday, 11 June 2022, 12pm/0.00h CET	https://www.bmi.bund.de/SharedDocs/faqs/EN/topics/civil-protection/coronavirus/coronavirus-faqs.html
Ghana	Vaccinated travelers do not need to show a negative COVID-19 test.(Last updated: 06/13/2022)	https://gh.usembassy.gov/ghana-covid-19-information/
Greece	From 15 March 2022 onwards, travellers visiting Greece are no longer required to fill out the Passenger Locator Form (PLF). Additionally, as of Sunday 01.05.2022 and for as long as the epidemiological data allow so, all travellers arriving in Greece, regardless of their country of origin, are no longer required to display a valid certificate of vaccination or recovery from COVID-19, or evidence of a negative test result from SARS-CoV-2 infection (PCR or Rapid Antigen test).	https://travel.gov.gr/#/
Grenada	State of emergency revoked and all travel protocols lifted on 04th April 2022. (Last updated: 6/08/2022)	https://bb.usembassy.gov/covid-information-grenada/

Guatemala	Effective March 11, 2022, the Government of Guatemala has imposed the following COVID-related entry requirements: Passengers who are Guatemalan citizens, foreigners, residents, accredited diplomats, or airline crew whose final destination is Guatemala must present one of the following: For all travelers aged 12 and over: Evidence of receiving a complete two-dose COVID-19 vaccination course (or one dose for Johnson & Johnson), with the final dose being administered at least two weeks before beginning your trip to Guatemala; or For all travelers aged 10 and over: Proof of a negative COVID-19 PCR or antigen test from a certified lab conducted no more than three (3) days prior to check in at the airport or arrival at the land border.	https://gt.usembassy.gov/alert-covid-19-2/
Guinea	The Ministry of Health announced on 11 March 2022 that fully vaccinated travellers entering or leaving Guinea are not required to show proof of a negative certificate from a polymerase chain reaction (PCR) test.	https://www.gov.uk/foreign-travel-advice/guinea/entry-requirements#entry-rules-in-response-to-coronavirus-covid-19
Guinea-Bissau	Travelers who have been fully vaccinated against COVID-19 at least four weeks prior to arrival into Guinea-Bissau are not required a negative COVID-19 test (PCR and/or serology) for entry.(Last updated: 06/27/2022)	https://gw.usmission.gov/covid-19-information/
Haiti	Haiti is putting new COVID requirements in place as of April 25, 2022. Fully vaccinated visitors will no longer need to present a negative COVID-19 antigen or PCR test taken within 72 hours of travel. But the testing requirement will stay in place for unvaccinated visitors.	https://www.mspp.gouv.ht/
Honduras	Effective June 2, 2021, The Government of Honduras has updated its requirements for entry into the country. All travelers must still complete the online pre-check form, but fully vaccinated individuals with their original vaccination certificate are no longer required to provide proof of a negative COVID test upon entry in Honduras. 1)Proof of Full Vaccination: Passengers must provide the original vaccination certificate documenting complete COVID-19 vaccination (two doses of most vaccines; one dose of Johnson & Johnson) with at least 14 days after receipt of the final dose. 2)COVID-19 Test: Passengers who cannot provide proof of full vaccination must hand-carry the negative test results for a PCR, Antigen or ELISA COVID-19 test taken less than 72 hours before entry into Honduras. Passengers must show the test results at check-in. (Last updated: 6/13/2022)	https://hn.usembassy.gov/covid-19-information/
Hungary	On 7 March 2022, Government Decree No. 77 of 2022 (III. 4.) on the termination of certain safety measures against the coronavirus pandemic entered into force, which repealed Government Decree No. 408 of 2020 (VIII. 30.) on travel restrictions during the period of state of epidemiological preparedness. In accordance with this, it is possible to enter the territory of Hungary by public road, railway, water and air traffic – regardless of citizenship and protection against the coronavirus –, but other general conditions of entry (e.g. a valid travel document) must be provided.	https://www.police.hu/en/content/for-the-attention-of-travelers
Iceland	There are no COVID-19 restrictions in Iceland, either domestically or at the border.	https://island.is/en/p/entry
India	All travellers should Upload a negative COVID-19 RT-PCR report* (The test should have been conducted within 72 hrs prior to undertaking the journey) **or** Certificate of completing full primary vaccination schedule of COVID-19 vaccination	GuidelinesforInternationalarrivalsupdatedon10thFebruary2022.pdf (mohfw.gov.in)
Indonesia	Travelers are not required to have a negative pre-departure COVID-19 test result before traveling to Indonesia.(Updated on July 08, 2022)	https://covid19.go.id/artikel/2022/07/08/surat-edaran-kasatgas-nomor-22-tahun-2022
Iraq	Effective April 1, 2022, outbound and inbound travelers above the age of 12 to all federal Iraq and Iraqi Kurdistan Region airports must present a certificate of vaccination showing at least two doses of one of the COVID-19 vaccines or one dose of Johnson & Johnson's Janssen COVID-19 vaccine. If a traveler is unvaccinated, then they are required to provide medical reports on why they cannot get vaccinated and show a negative COVID-19 PCR certificate valid within 72 hours of travel.(Last updated: 05/15/2022)	https://iq.usembassy.gov/covid-19-information/

Ireland	From Sunday 6 March 2022, travellers to Ireland are not required to show proof of vaccination, proof of recovery or a negative PCR test result upon arrival. There are no post-arrival testing or quarantine requirements for travellers to Ireland.	https://www.gov.ie/en/publication/77952-government-advice-on-international-travel/#passengers-arriving-into-ireland-from-outside-eueea-eu-iceland-lichtenstein-and-norway
Isreal	As of Friday, May 20, at midnight (on the night between Friday and Saturday, May 21), the following guidance will take effect: It will not be required to present a negative result on a COVID test before boarding a flight to Israel or a cruise to Israel or before arriving at an Israeli land border crossing.	https://corona.health.gov.il/en/abroad/arriving-foreign-nationals/
Italy	COVID-19 travel restrictions have been lifted in Italy. Providing proof of vaccination, recovery from COVID-19 or negative test results is no longer required.	https://www.esteri.it/en/ministero/normativaonline/focus-cittadini-italiani-in-rientro-dall-estero-e-cittadini-stranieri-in-italia/
Jamaica	The requirement for travellers to present a negative COVID test prior to travel has ended on 15 April. All travellers arriving in Jamaica may still be tested for COVID-19 if assessed as high-risk as a result of exhibiting symptoms, exposure to people who have tested positive, belonging to a high-risk group or other risk factors. Travellers may be screened for symptoms at the airport.	https://www.gov.uk/foreign-travel-advice/jamaica/entry-requirements
Jordan	The government announced on 17 Feb 2022 that travelers to the Kingdom, whether Jordanians or foreigners, are no longer required to undergo a PCR test upon arrival to the Kingdom via any entry point.	http://international.visitjordan.com/MediaCenter/ShowNews/33#news
Kazakhstan	Travelers are not required to have a negative COVID-19 test result before traveling to Kazakhstan.(Last updated: 06/13/2022)	https://kz.usembassy.gov/covid-19-information/
Kenya	FROM 11th March 2022, All travelers arriving into Kenya through any point of entry must have a certificate of COVID 19 vaccination.All travelers coming to Kenya who are fully vaccinated shall be exempt from the requirement of a PCR test.	https://www.kcaa.or.ke/sites/default/files/covid-19/documents/COVID-19_TRAVEL_REQUIREMENTS_13.3.2022.pdf
Kuwait	Negative COVID-19 test (PCR) is no longer required for entry.(Last updated: 06/12/2022)	https://kw.usembassy.gov/covid-19-information/
Kyrgyzstan	Travelers no longer need to provide a negative PCR test result or a certificate of vaccination to be permitted entry into the Kyrgyz Republic(Last updated: 6/14/2022)	https://kg.usembassy.gov/covid-19-information/
Laos	Travelers must have a certificate of vaccination to prove that they are fully vaccinated. Fully vaccinated travelers are not required to have a negative COVID-19 test result before arrival in Laos.(Last updated: 06/13/2022)	https://la.usembassy.gov/covid-19-information/
Latvia	From April 1, when entering Latvia, you will not need a COVID-19 certificate or test.	https://www.spkc.gov.lv/lv/valstu-saslimstibas-raditaji-ar-covid-19-0
Lebanon	Fully vaccinated travelers are not required to have a negative COVID-19 test result before traveling to Lebanon.	https://www.moph.gov.lb/en/MoPHPASS

Lithuania	FROM 1st MAY 2022: Travelers arriving in Lithuania from any country of the world will no longer be subject to any COVID-19 management requirements: 1)you will no longer need to take the COVID-19 test before the trip, even if you are not vaccinated or recovered from COVID-19; 2)you will not need to fill in the questionnaire; 3)foreigners are not prohibited from entering.	https://nvsc.lrv.lt/en/information-on-covid-19/for-arrivals-from-abroad
Luxembourg	From 22 April 2022, the additional health measures for travel by air to the Grand Duchy are repealed. Thus, persons (of all nationalities) aged 12 years and 2 months or over, authorised to enter Luxembourg, are no longer required to present, upon boarding, a vaccination certificate, a certificate of recovery or the negative result of a nucleic acid amplification test (NAAT) for the detection of SARS-CoV-2 viral RNA carried out less than 48 hours before the flight, or of a SARS-CoV-2 rapid antigen test carried out less than 24 hours before the flight.	https://covid19.public.lu/en/travellers/visiting-luxembourg.html
Malawi	As from 1 June 2022, all travellers that are fully vaccinated will no longer be required to produce negative PCR tests. All travellers that are not fully vaccinated or don't have a valid electronically verifiable COVID-19 full vaccination certificate will be required to produce a negative PCR based COVID-19 certificate that is not older than 72 hours at the time of arrival in the country.	https://www.malawitourism.com/travel-advice/
Malaysia	Starting 1 May 2022, fully-vaccinated inbound travellers are no longer required to undergo pre-departure and on-arrival COVID-19 tests, including children aged 12 and below as well as for those who have been infected with COVID-19 within six to 60 days before departure to Malaysia.	https://www.malaysia.travel/travel-alert
Maldives	Effective from March 13th, 2022, PCR is not mandatory to enter the Maldives.	https://immigration.gov.mv/faq-for-visiting-the-maldives/
Mali	To enter Mali you will need proof of a "complete COVID vaccination" (i.e. usually at least two doses). If you do not have proof of a complete vaccination, you need to present a negative COVID test (PCR) certificate less than 72 hours old.	https://www.gov.uk/foreign-travel-advice/mali/entry-requirements
Malta	As from 6th June 2022, persons aged 12 years and over are permitted to travel to Malta without undergoing quarantine as long as they provide either of the 3 documents mentioned below:1)Proof of full vaccination. 2) Proof of recovery from COVID-19. 3) Negative result to a pre-departure test.	https://deputyprimeminister.gov.mt/en/health-promotion/covid-19/Pages/travel.aspx
Mauritius	As from 1 July 2022, you no longer have to test or self-isolate to enjoy a Mauritius holiday.	https://mauritiusnow.com/mauritius-travel-advice/
Mexico	Travelers are not required to provide proof of a negative COVID-19 test result before traveling to Mexico. Travelers who are connecting through a different country on the way to Mexico should check the testing requirements of the country they are transiting through.	https://embamex.sre.gob.mx/eua/index.php/en/2016-04-09-20-40-51/tourism/1760-mexico-s-covid-19-monitoring-system
Monaco	Anyone aged 16 or over, whatever their nationality, who enters the Principality and comes from a foreign country classified in the green zone must present: 1) Either the negative result of a PCR or antigen test of less than 24 hours 2) Or a complete vaccination; 3) Or proof of a covid19 recovery certificate: positive PCR test older than 11 days and less than 6 months.	https://covid19.mc/en/travel/i-come-from-abroad/
Mongolia	COVID-19 related restrictions for entry have been lifted. Negative COVID-19 PCR tests before and after arrival are no longer required.	https://www.gov.uk/foreign-travel-advice/mongolia/entry-requirements#entry-rules-in-response-to-coronavirus-covid-19

Montenegro	As of March 11, 2022 no proof of vaccination, COVID-19 passports/certificates **or** COVID-19 tests are required to enter Montenegro. (Last updated: 06/13/22)	https://me.usembassy.gov/covid-19-information/
Morocco	Travelers wishing to travel to Morocco, by any means, must present a health form, to be downloaded online before boarding, duly completed. It is also distributed on board the airport or ship. They must also present a valid vaccination passport or a negative PCR test result less than 72 hours old. Children under the age of 12 are exempt from all requirements.	https://www.onda.ma/Je-suis-Passager/Guide-du-voyageur/News-a%C3%A9roportuaires-COVID19
Mozambique	PCR test is no longer needed to enter the country if a person presents a valid certificate showing proof of full vaccination against COVID-19. In addition, children 11 and younger do not require a PCR test or proof of vaccination to enter the country.(Last updated: 06/13/2022)	https://mz.usembassy.gov/covid-19-information/
Namibia	Fully vaccinated travelers are no longer required to produce a negative PCR test result upon arrival in Namibia but are instead required to present an authentic, valid vaccination card at the port of entry. Travelers who are not fully vaccinated must produce a negative COVID-19 Polymerase Chain Reaction (PCR) test result no older than 72 hours from their arrival in Namibia calculated from the date/time the sample was taken. The certificate must be issued by a certified laboratory to issue SARS-Co V-2 test results in the country of issuance. (Last updated: 07/05/2022)	https://na.usembassy.gov/covid-19-information/
Nepal	Effective March 10,2022, passengers entering Nepal from abroad by air or land must submit a certificate of full vaccination against COVID-19.Passengers who fail to submit such certificate will have to submit the certificate with nagative report of COVIS-19 test(RTPCR, True NAAT, Gene Xpert) within 72 hours of starting the journey.	https://www.immigration.gov.np/post/notice-5
Nertherlands	There are no coronavirus-related restrictions for entering the Netherlands for travellers who live in the EU/Schengen area or in a country participating in the EU travel rules scheme. The EU entry ban applies to other travellers who live outside the EU/Schengen area, but there are exemptions to the entry ban. For example, if you come from a safe country, or you have a proof of vaccination or proof of recovery that meets the requirements.	https://www.government.nl/topics/coronavirus-covid-19/visiting-the-netherlands-from-abroad/checklist-entry
Niger	Travelers on arrival (disembarkation): For vaccinated travellers whose last dose is at least 4 weeks old, the COVID-19 PCR Test is no longer required; For travellers who have not been vaccinated or who have not provided proof of vaccination whose last dose is at least 4 weeks old, the COVID-19 PCR Test is required.	https://www.gouv.ne/index.php/les-communiques-du-gouvernement/296-au-conseil-des-ministres-le-gouvernement-reitere-son-engagement-a-remplacer-les-salles-de-classe-en-paillote-par-des-salles-de-classe-en-materiaux-definitifs
Nigeria	Effective from 4th April 2022, as detailed below: 1)Fully vaccinated passengers arriving in Nigeria will not be required to carry out a pre-boarding COVID-19 PCR test nor carry out a Post-arrival PCR test or Rapid Antigen Test upon arrival in Nigeria. 2)Fully vaccinated passengers must show a verifiable full vaccination certificate otherwise, they will be treated as unvaccinated/partially vaccinated under this protocol. 3)Unvaccinated and partially vaccinated passengers are required to take a COVID-19 PCR test 48hrs before departure and conduct days	https://covid19.ncdc.gov.ng/advisory/
North Macedonia	Fully vaccinated travelers are not required to provide proof of a negative COVID-19 test result before traveling to Northern Macedonia. All passengers coming from the medium- and high-risk countries must be in self-isolation for 14 days in their homes and to report to the authorities should they feel any symptoms.	https://koronavirus.gov.mk/en/seek-help-or-report-irregularities/application-for-people-returning-from-travels

Norway	There are no longer special requirements for entry into Norway due to the corona situation. The same rules as before the corona pandemic apply now.	https://www.udi.no/en/corona/about-the-corona-situation/
Oman	Non-citizen travelers aged 18 and above traveling to the Sultanate of Oman are required to present a vaccination certificate indicating that they have received at least two doses of the approved COVID-19 vaccine at least 14 days before traveling.	https://www.omanairports.co.om/news/update-on-travel-restrictions-related-to-covid-19/
Pakistan	Vaccinated individuals do not require a pre-boarding negative PCR test. Unvaccinated individuals over age 12 must present a negative PCR test taken within 72 hours.	https://pk.usembassy.gov/covid-19-information/
Panama	Last update on April 6, 2022.Travelers will not have to present a negative COVID-19 test for entry as long as they can provide physical or digital proof of at least 2 (two) doses or complete vaccination scheme endorsed by the WHO, EMA and FDA, equal to or greater than 14 days after the last dose. Non-vaccinated or partially vaccinated travelers will be required to present a negative COVID-19 PCR or antigen test taken no more than 72 hours prior to their arrival time in Panama.	https://www.tourismpanama.com/plan-your-vacation/advisories/
Paraguay	Fully vaccinated travelers are not required to present a negative COVID-19 test result before traveling to Paraguay, in force as of April 19, 2022.	https://www.migraciones.gov.py/index.php/tramites/ingreso-y-salida-del-pais/exigencias-sanitarias-vigentes-por-covid-19-para-el-ingreso-al-paraguay
Peru	Travelers with valid proof of being fully vaccinated are not required to have a negative COVID-19 test result before traveling to Peru.	https://busquedas.elperuano.pe/normaslegales/decreto-supremo-que-modifica-el-decreto-supremo-n-184-2020-decreto-supremo-no-151-2021-pcm-1988484-1/
Philippines	Fully vaccinated travelers over the age of 18 who have received the primary series of COVID-19 vaccine and at least 1 COVID-19 booster shot are not required to have a negative pre-departure COVID-19 test result before traveling to the Philippines. Travelers aged 12 to 17 who have received their primary COVID-19 vaccines are not required to have a negative pre-departure COVID-19 test result before traveling to the Philippines.(Last updated: 06/02/ 2022)	https://www.philippineairlines.com/en/ph/home/covid-19/arrivingintheph
Poland	From 28 March 2022, on the basis of the provisions of the Regulation of the Council of Ministers of 25 March 2022 on the establishment of certain restrictions, orders and prohibitions in connection with the occurrence of the state of epidemic (Journal of Laws item 673), all restrictions on travel to the Republic of Poland are abolished, which means that there is no longer an obligation to: - to present vaccination certificates when crossing the border, - performing tests for SARS-CoV-2, - the so-called arrival quarantine.	https://www.gov.pl/web/koronawirus/informacje-dla-podrozujacych
Portugal	As of July 1, 2022, passengers entering national territory (including Azores and Madeira) are no longer required to present proof of carrying out a test to screen for SARS-CoV-2 infection with a negative result or to present a COVID-EU digital certificate or vaccination or recovery certificate issued by third countries, accepted or recognized in Portugal.	https://www.visitportugal.com/en/node/446781

Romania	Visitors and residents arriving to Romania from any country in the world do not need to present proof of vaccination (complete scheme) or a negative RT-PCT test.(Last update: July 4, 2022)	https://romaniatourism.com/travel-advisory.html
Saint Lucia	Updated entry requirements effective 2 April 2022, There is no requirement for pre-travel test or quarantine for fully vaccinated travellers. Fully vaccinated travellers must provide a valid vaccination record as requested on check in, for boarding and on entry to Saint Lucia.	https://www.stlucia.org/en/covid-19/
Saint Vincent and the Grenadines	Fully vaccinated travelers to St. Vincent and the Grenadines DO NOT NEED TO ARRIVE WITH A SARS-CoV-2 (COVID-19) TEST(Last updated:06/15/2022)	http://health.gov.vc/health/index.php/covid-19-protocols-documents
San Marino	Health Minister Roberto Speranza has signed a new ordinance establishing, with effect from 1 March, the same rules for arrivals to Italy from all non-European countries as those already in force for European countries. For entry to the national territory,	https://www.salute.gov.it/portale/nuovocoronavirus/dettaglioContenutiNuovoCoronavirus.jsp?lingua=english&id=5412&area=nuovoCoronavirus&menu=vuoto
Sao Tome and Principe	The requirements for entry into Sao Tome and Principe (STP) require passengers - of all nationalities - from the age of 12, who are not with the full digital vaccination certificate, to submit a negative antigen test, performed up to 48 hours before the date of travel. Those with a valid digital certificate are exempt from the presentation of the antigen test.(Last updated: 05/06/2022)	https://portaldascomunidades.mne.gov.pt/pt/vai-viajar/conselhos-aos-viajantes/africa/sao-tome-e-principe
Saudi Arabia	All precautionary and preventive measures related to combating corona pandemic are lifted.(Last updated: 06 March 2022)	https://www.moi.gov.sa/wps/portal/Home/Home/dp-home/!ut/p/z1/rVK5csIwEO35Cqeg9GiRbCFKDYVtrgwQLjUe4QMriWUOD07-RiKkSAnwZMgWQ7urfXvnIdGvrNZF0Ng
Senegal	All travelers to Senegal over the age of two years must present either a: 1) COVID-19 vaccination certificate showing that they were fully vaccinated with AstraZeneca (SK Bioscience or Vaxzevria), Covishield, Janssen J&J, Moderna, Pfizer-BioNTech, Sinovac, or Sinopharm at least 14 days before departure; or 2)A negative COVID-19 PCR or RT-PCR test result issued at most 72 hours before departure. The test result must be in English or French.(Last updated: 06/03/2022)	https://sn.usembassy.gov/covid-19-information/
Serbia	There are no restrictions on entering the Republic of Serbia.(Last updated 05/03/2022)	https://www.mfa.gov.rs/en/citizens/travel-serbia/covid-19-entry-requirements
Seychelles	• All fully immunised visitors are exempted from pre-travel PCR test requirement upon presentation of their vaccination certificate. • Unvaccinated or partially vaccinated visitors will be required to present a negative PCR test certificate from an accredited laboratory departure to Seychelles. Samples for this test must have been taken within 72hours before departure for PCR test and 24 hours for rapid antigen test.(Last updated:03/15/ 2022)	http://tourism.gov.sc/wp-content/uploads/2022/03/Seychelles-Visitor-Travel-Advisory-15-March-2022-1.pdf
Sierra Leone	Vaccinated passengers do not require a pre-departure or on arrival PCR test. Unvaccinated or partially vaccinated passengers do not require a pre-departure PCR test. They do however require an on arrival PCR test that should be booked and paid for in advance of departure through the Government of Sierra Leone travel portal.	https://www.gov.uk/foreign-travel-advice/sierra-leone/entry-requirements#entry-rules-in-response-to-coronavirus-covid-19

Singapore	Fully vaccinated travelers are not required to provide proof of a negative COVID-19 test result to enter Singapore. If you are Non-Fully Vaccinated Travellers and born before 2020 (i.e. above 2 years old) , take any of the following COVID-19 tests within 2 days before departure: COVID-19 Polymerase Chain Reaction test (PCR test) ; Antigen Rapid Test (ART)	https://safetravel.ica.gov.sg/arriving/general-travel/fully-vaccinated
Slovakia	From 6 April 2022, the Decree of the Public Health Authority of the Slovak Republic No. 28/2022 regulating the regime at the borders is repealed. Thus, the obligation to register on eHranica as well as the mandatory quarantine for unvaccinated persons immediately after the arrival from abroad are abolished.	https://www.mzv.sk/web/en/covid-19
Slovenia	As of 14 May 2022, the RVT rule is no longer required.Free testing with a rapid antigen test and a rapid antigen test for self-testing is abolished. The government budget will only pay for testing with a rapid antigen test for activities where this is still required.	https://www.gov.si/en/topics/coronavirus-disease-covid-19/border-crossing/
South Africa	From 4 May 2022, All international travellers arriving at South African Ports of Entry must: (a) be vaccinated against COVID-19 and produce a valid vaccination certificate; or (b) produce a valid certificate of a negative PCR COVID-19 test, recognised by the World Health Organization, which was obtained not more than 72 hours before the date of departure; or (c) produce a valid certificate of a negative antigen COVID-19 test performed by a medical practitioner, registered public health authority or accredited/approved laboratory which was obtained not more than 48 hours before the date of departure; or (d) produce a valid certificate of a positive PCR COVID-19 test, recognised by the World Health Organization, for a test date less than 90 days prior to the date of arrival and more than 10 days prior to the date of arrival, together with a signed letter from a health care provider, registered in the country of origin, stating that the person has fully recovered from COVID-19, is not experiencing any new symptoms and is fit to travel.	https://www.gov.za/covid-19/individuals-and-households/travel-coronavirus-covid-19
Spain	Passengers arriving in Spain by AIR (except children under the age of 12 and passengers in international transit) from countries that DO NOT belong to the European Union or are NOT considered Schengen associated countries, must have one of these documents: 1)DIGITAL COVID CERTIFICATE OR EU EQUIVALENT; 2)QR SPTH.	https://www.sanidad.gob.es/en/profesionales/saludPublica/ccayes/alertasActual/nCov/spth.htm
Sri Lanka	Fully Vaccinated travellers are exempted from pre-departure COVID-19 PCR/ Rapid Antigen tests from 1st March 2022. Not-Vaccinated & Not-fully vaccinated Travellers are released from On-arrival PCR test & Quarantine period.	https://srilanka.travel/helloagain/
Sudan	The Sudanese Civil Aviation Authority requires all passengers entering Sudan to possess: 1) A COVID-19 vaccination certificate showing that the passenger is fully vaccinated at least 14 days and not more than 8 months before arrival; or 2) A negative polymerise chain reaction (PCR) test certificate taken not more than 72 hours before arrival; or 3) A negative polymerise chain reaction (PCR) test certificate taken not more than 96 hours before arrival if arriving from Antigua and Barbuda, Argentina, Austria, Bahamas, Barbados, Belgium, Belize, Bolivia, Brazil, Bulgaria, Canada, Chile, China (People's Rep.), Colombia, Costa Rica, Croatia, Cuba, Cyprus, Czechia, Denmark, Dominica, Dominican Rep., Ecuador, El Salvador, Estonia, Finland, France, Germany, Greece, Grenada, Guatemala, Guyana, Haiti, Honduras, Hungary, India, Ireland (Rep.), Italy, Jamaica, Latvia, Lithuania, Luxembourg, Malta, Mexico, Netherlands, Nicaragua, Panama, Paraguay, Peru, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, St. Kitts and Nevis, Suriname, Sweden, Trinidad and. Tobago, USA, Uruguay or Venezuela. 4) Passengers 8 years old and younger are exempt.(Last Updated: 06/12/2022)	https://sd.usembassy.gov/covid-19-information/
Suriname	Persons who are fully vaccinated or can present a COVID-l9 recovery certifrcate not older than six (6) months and have stayed in Guyana or French Guyana at least 14 days and are travelling to Suriname by land do not need to submit a Negative SARS-CoV-2 PCR or a negative SARS-CoV-2 antigen test result.(Updated:04/13/2022)	https://www.flyslm.com/wp-content/uploads/2022/04/SUR-COVID-19-Measures-13-April-2022.pdf

Sweden	COVID-19 travel restrictions have been lifted in Sweden. Providing proof of vaccination, recovery from COVID-19 or negative test results is not required.	https://www.folkhalsomyndigheten.se/the-public-health-agency-of-sweden/communicable-disease-control/covid-19/recommendations-for-those-travelling/
Switzerland	There are currently no entry restrictions due to the COVID-19 pandemic. No proof of vaccination, recovery or testing is required for entry into Switzerland.	https://www.bag.admin.ch/bag/en/home/krankheiten/ausbrueche-epidemien-pandemien/aktuelle-ausbrueche-epidemien/novel-cov/empfehlungen-fuer-reisende/quarantaene-einreisende.html#-924144951
Syria	If you're fully vaccinated, you can enter Syria without needing to test but you may be required to isolate.If you're not fully vaccinated, you'll need to show proof of a negative PCR test (taken no more than 72 hours before entry) when entering Syria.(Last updated:05/28/2022)	https://www.gov.uk/foreign-travel-advice/syria/entry-requirements
Tajikistan	Each traveler aged three years and older must present either 1) a COVID-19 vaccination certificate showing that they are fully vaccinated or 2) results from a negative COVID-19 PCR test issued within 72 hours of arrival. Test results are verified before passengers are allowed to board flights to Dushanbe and again upon arrival in Dushanbe. (Last updated: 06/28/2022)	https://tj.usembassy.gov/covid-19-information/
Thailand	From 1 July, 2022, foreign nationals are only required to show proof of either a certificate of vaccination or a negative RT-PCR or professional ATK test result within 72 hours of travel.	https://www.tatnews.org/
Togo	For fully vaccinated travellers arriving in Togo, PCR test is no longer required and will not be performed upon arrival either. For unvaccinated travellers arriving in Togo, proof of a negative PCR test is still required and these passengers will be subjected to a PCR test at arrival.The validity of the PCR test results is 5 days.(Date last modified: 15/04/2022)	https://voyage.gouv.tg/?language=en#p2
Trinidad and Tobago	Effective 1st July, 2022, COVID-19 PCR or Lab Acquired Antigen Test results will No Longer be required for entry into Trinidad and Tobago.	https://health.gov.tt/preparation-for-entry
Tunisia	The 05-day self-confinement rule is no longer required for foreign visitors over the age of 18 who are not vaccinated or who have not completed their vaccination schedule. However, they are still compelled to present a negative result of a PCR test carried out 48 hours before boarding or of a 24-hour rapid test prior arriving on Tunisian territory..(Updated 27th May 2022)	https://www.discovertunisia.com/en/infos-pratiques/entry-requirements
Turkey	A PCR test is required for individuals over the age of 12 years old who are unable to show proof of vaccination or are unable to submit a document stating that they have had the virus within the last 6 months.(Last Updated: 06/132022)	https://tr.usembassy.gov/covid-19-information-2/
Uganda	If you are fully vaccinated (and for children under the age of 6) you are now able to enter Uganda via air and land border points without showing a negative COVID-19 PCR certificate. You will be required to show evidence that you are fully vaccinated. If you are not fully vaccinated you will need to show a negative COVID-19 PCR certificate issued no more than 72 hours before departure on arrival by land or air.	https://www.gov.uk/foreign-travel-advice/uganda/entry-requirements#entry-rules-in-response-to-coronavirus-covid-19

United Arab Emirates	From 26 February 2022,Those coming to the UAE have to make sure to present an approved QR code- accompanied Covid-19 vaccination certificate containing a QR code; unvaccinated travelers have to present an approved negative PCR test result received within 48 hours, or a QR code-accompanied certificate of recovery from a Covid-19 infection obtained within one month from the date of travel. Travelers from the UAE have to follow the requirements of medical examinations and vaccinations in place in their countries of destination.	https://covid19.ncema.gov.ae/en/News/Details/2316
United Kingdom	From 4am 18 March,2022, no-one entering the UK will need to take tests or complete a passenger locator form.	https://www.gov.uk/government/news/all-covid-19-travel-restrictions-removed-in-the-uk
United Republic of Tanzania	Fully vaccinated travelers are exempt from testing requirements. Travelers will be required to present a valid vaccination certificate with QR code for verification upon arrival.(Last updated on :06/27/2022).	https://tz.usembassy.gov/covid-19-information/
United States	As of 12:01AM ET on June 12, 2022, CDC will no longer require air passengers traveling from a foreign country to the United States to show a negative COVID-19 viral test or documentation of recovery from COVID-19 before they board their flight. (Last updated on :06/13/2022)	https://www.cdc.gov/coronavirus/2019-ncov/travelers/noncitizens-US-air-travel.html
Uruguay	Foreign citizens who are fully vaccinated or have already completed the COVID-19 disease within the last 90 (ninety) days are not required to present a negative COVID-19 RT-PCR or antigen test result before departure to Uruguay.Unvaccinated travelers need to prove a negative result of SARS-CoV-2 virus detection test (by molecular biology technique PCR-RT or antigen test), performed no more than 72 (seventy-two) hours before the start of the trip, in a laboratory enabled in the country of origin or transit.	https://www.gub.uy/ministerio-salud-publica/comunicacion/publicaciones/requisitos-para-ingreso-uruguay-personas-nacionales-extranjeras
Uzbekistan	Effective June 10, 2022, COVID testing or proof of vaccination are no longer required to enter Uzbekistan at any air, rail or land entry point. (Last updated: 06/13/2022)	https://uz.usembassy.gov/covid-19-information/
Venezuela	Effective May 30, 2022, all air passengers entering Venezuela must present a certificate of vaccination against COVID-19 (completed vaccination schedule) in either physical or digital format (with QR code), with the last dose administered at least 14 days prior to the entry date in Venezuela. If more than 270 days has passed since the last dose of a completed vaccination schedule, proof of a booster dose is required. In lieu of proof of vaccination, passengers must present a negative PCR-RT COVID-19 test result, taken within 72 hours of arriving. (Last updated: 06/21/2022)	https://ve.usembassy.gov/covid-19-information/
Viet Nam	Foreign arrivals will no longer have to take any COVID-19 tests to enter Viet Nam from May 15, 2022, the Government announced Friday.	https://en.baochinhphu.vn/viet-nam-to-scrap-covid-19-test-requirements-for-vaccinated-entrants-from-mid-may-11122051320312898.htm
Zambia	Fully vaccinated traveller do not require any form of negative COVID test results, but shall be requires to provide proof of a full vaccination status.(Updated:03/23/2022)	https://www.zambiaimmigration.gov.zm/wp-content/uploads/2022/03/Revised_Travel_Guidelines_Zambia.pdf
Zimbabwe	All ports of entry have been opened. Returning residents & visitors will no longer be required to present a negative COVID19 PCR certificate at the port of entry but should present a valid Vaccination Certificate showing they are fully vaccinated.	https://zimbabwetourism.net/covid19-guidelines-for-travellers/

Reopen for International Travel With Required COVID-19 Testing (29 Member States)

Updated on 19 July, 2022

Angola	Anyone arriving in Angola must present proof of a negative RT-PCR COVID-19 test; passengers may take the test up to 72 hours prior to travel.(Last updated: 06/14/2022)	https://ao.usembassy.gov/covid-19-information/
Burundi	All travellers are required the negative COVID-19 test(PCR and/or serology) for entry. The test must be done within 72 hours of boarding a plane to Bujumbura. All travelers must take a COVID-19 test upon arrival. The cost is $100. (Last updated: 06/13/2022)	https://bi.usembassy.gov/covid-19-information/
Chile	While it is not mandatory, it is always advisable to perform a diagnostic test before traveling.The approval of vaccines to access the Mobility Pass is voluntary. We recommend processing it, since the pass allows you to enter interior rooms of restaurants, cinemas, theaters, bus trips, among others.	https://www.chile.travel/planviajarachile/
Congo	If you are a traveler to Congo, you must before your departure from abroad: Pay for the COVID-19 PCR test to be carried out as soon as you arrive at Congo airports (Brazzaville and Pointe Noire).	https://voyage-congo.com/en/
Democratic Republic of Congo	If you're fully vaccinated, Travellers aged 11 and above need to provide proof of a negative coronavirus test upon entry to DRC and/or proof of vaccination against COVID-19. The test result date must be within the 48 hours prior to your arrival. Children under the age of 11 are exempt. There is no requirement for a PCR COVID-19 test at the airport upon arrival.If you're not fully vaccinated,you will be subject to an additional PCR test on arrival.	https://www.gov.uk/foreign-travel-advice/democratic-republic-of-the-congo/entry-requirements
Djibouti	Even if you are fully vaccinated you will still need to arrive with a PCR test which must have been taken within 72 hours of the start of the journey and 120 hours of arrival in Djibouti. On arrival you will be required to take an additional COVID-19 test at the airport for which you will pay $30.	https://www.gov.uk/foreign-travel-advice/djibouti/entry-requirements#entry-rules-in-response-to-coronavirus-covid-19
Ecuador	Any traveler over 3 years of age must present a mandatory vaccination certificate with QR code or COVID-19 vaccination card valid with at least 14 days of validity after completing the scheme, or the negative result of an RT-PCR test carried out up to 72 hours prior to boarding to Ecuador. Passengers under 3 years of age will not present these requirements.	https://www.aeropuertoquito.aero/es/protocolo-covid-19.html
Eritrea	Travellers, regardless of whether fully vaccinated or not, must have a negative COVID-19 PCR test result. The test must be taken a maximum of 72 hours before arrival in Eritrea.(Last updated: 05/09/2022)	https://er.usembassy.gov/covid-19-information/
Fiji	Fiji is quarantine free for fully-vaccinated travellers from all over the world. Travellers (16yrs+) must produce a digital/paper certification of full-vaccination at least 14 days before travel. All travellers (12 years+) must take a pre-booked Rapid Antigen Test (RAT) anytime within 72 hours of arrival in Fiji, at their hotel or nearby testing facility. This test must also be taken by travellers transiting Fiji for more than 48 hours	https://www.fiji.travel/articles/frequently-asked-questions-travelling-to-fiji
Guyana	From November 1, 2021, the following COVID 19 measures shall apply as travel requirements for entry into Guyana. The measures in the Official Gazette (Extraordinary) of Guyana, 235/2021 is applicable with these variations. The following documents are required before travelling to Guyana 1) Proof of full vaccination 2) Negative SARS-CoV-2 Antigen test not older than 72 hours or a negative SARs-Cov-2 PCR test not older than 72 hours	https://www.health.gov.gy/images/travel_requirement.pdf

Iran	Travelers must have a negative COVID-19 PCR test result. The test must be taken a maximum of 72 hours before departure. The results must be in English or approved by an Iranian consulate.	https://caa.gov.ir/covid-forms?_gl=1*1ik8cy7*_ga_0NMZLXTZ77*MTY0NjM1OTE5NS40LjEuMTY0NjM1OTI3MS4w
Japan	All entrants must present a certificate of inspection within 72 hours before leaving their country. Test method is valid only for one of the following. 1)Nucleic Acid Amplification Test 2)PCR (Polymerase Chain Reaction) 3)LAMP (Loop-mediated Isothermal Amplification) 4)TMA (Transcription Mediated Amplification) 5)TRC (Transcription Reverse-transcription Concerted reaction) 6)Smart Amp (Smart Amplification process) 7)NEAR (Nicking Enzyme Amplification Reaction) 8)Next Generation Sequence	https://www.mhlw.go.jp/stf/covid-19/border_test.html
Liberia	Travelers must have a negative COVID-19 PCR test result from a test taken a maximum of 72 hours before departure and obtained from an accredited laboratory.(Updaed:04/21/2022)	https://www.nphil.gov.lr/index.php/liberia-health-ministry-introduces-new-covid-19-protocols-for-travelers/
Libya	A COVID-19 PCR test administered no more than 48 hours prior to travel to Libya is required.(Last updated: 05/10/2022)	https://ly.usembassy.gov/u-s-citizen-services/covid-19-information/
Madagascar	Entry requirements update, May 12, 2022:Presentation of a negative result of an Rt-PCR test performed 72 hours before boarding.Performing a rapid antigen test upon arrival in Madagascar, at the traveler's expense. In case of a positive result to the rapid antigen test on arrival, a 7-day self-isolation at least will be implemented in a dedicated facility, at the traveler's expense.	https://madagascar-tourisme.com/Fr-fr/border-reopening/
Mauritania	A NEGATIVE PCR TEST IS ONLY REQUIRED FOR ENTRY TO MAURITANIA IF YOU LACK PROOF OF FULL VACCINATION. Fully vaccinated persons are still require to present a negative PCR test result by airlines prior to boarding for Mauritania bound flights. (Last updated: 06/13/22)	https://mr.usembassy.gov/covid-19-information-2/
Myanmar	All foreign nationals are required to present laboratory evidence of a negative COVID-19 RT-PCR test issued at most 48 hours before arrival if you are unable to present a COVID-19 fully vaccinated certificate at least 14 days before arrival to Myanmar with one of the vaccines approved by the Ministry of Health (MOH)l.(Last updated: 06/17/2022)	https://mm.usembassy.gov/covid-19-information/
New Zealand	Lastest updated: 21 June 2022: 1)You do not need a pre-departure test to enter New Zealand. 2) Most travellers need to be vaccinated and take 2 rapid antigen tests (RATs) after arriving in New Zealand.	https://covid19.govt.nz/international-travel/travel-to-new-zealand/pre-departure-tests-to-enter-new-zealand/
Nicaragua	Travelers must have an original negative COVID-19 RT-PCR test result. The test must be taken a maximum of 72 hours before arrival in Nicaragua.	https://www.intur.gob.ni/2020/09/21/nicaragua-reanuda-vuelos-comerciales/

Palau	Travelers must submit proof of complete COVID-19 vaccination with final dose administered at least fourteen (14) days prior to departure to the Republic.All Travelers must also provide proof of either: a). A negative result of a COVID-19 PCR test (any type of PCR test, including NAAT, RTPCR, qPCR, RT-LAMP, TMA, molecular test, isothermal amplification, ddPCR, or CRISPR), and such test must be taken within three (3) days prior to departure from the point of origin to the Republic; or b). A negative result of a COVID-19 antigen test (WHO or US FDA authorized or approved test), and such test must be taken within one (1) day prior to departure from the point of origin to the Republic; or c). Documentation of recovery from COVID-19 which includes proof of a recent positive viral test and a letter from a healthcare provider or a public health official stating that traveler has recovered from COVID-19 and is cleared to travel.	https://www.palaugov.pw/travel/
Papua New Guinea	1) All persons must be fully vaccinated to travel to PNG, unless they are under 18 years of age or are a citizen of Papua New Guinea. A person is considered fully vaccinated if they have had the recommended number of doses for the vaccine as listed in Schedule 2, within the past 6 months; or they have had the recommended number of doses for the vaccine, as listed in Schedule 2 and they have had a booster vaccine; 2) All persons traveling to PNG must have a valid COVID-19 test within 72 hours prior to their original port of departure. Children aged 5 years and under are exempted from being tested; 3)All people arriving into PNG will be tested for COVID-19 upon arrival;	https://www.papuanewguinea.travel/travel-advice-update
Qatar	Travelers who are required to have a PCR lab result before traveling to Qatar must have it at a medical center authorized by the health authorities in the country of departure. A negative test result is required and must be obtained no more than 48 hours before the time of departure from the country of origin. (Please see the pre-travel test rules for detailed guidance.)	https://covid19.moph.gov.qa/EN/travel-and-return-policy/Pages/default.aspx
Republic of Korea	All passengers arriving in the ROK by plane must provide proof of a negative COVID-19 PCR test taken within 48 hours of their departure.Arriving passengers will experience some combination of temperature screening, health questionnaires, quarantines, and/or COVID-tests, depending on points of departure, visa status, and nationality.(Updated:05/11/2022)	https://kr.usembassy.gov/022420-covid-19-information/
Russia Federation	The Russian government requires that all foreign travelers present a negative PCR COVID-19 test result upon arrival, dated no later than two days prior to arrival in Russia. The results can be in English and/or digital. (Last updated:03/30/2022)	https://ru.usembassy.gov/covid-19-information/
Rwanda	As part of Government measures to prevent the spread of COVID-19, the following is mandatory upon entry into Rwanda, effective 14th May 2022: Arriving passengers at Kigali International Airport must present a negative Antigen Rapid Test (RDT) taken 72 hours prior to departure (meaning travelers must be tested and get results within 3 days of their first flight). COVID-19 Test is not mandatory for accompanied children under 5 years. Incoming travelers eligible (aged 12 years and above) for Covid-19 vaccine are encouraged to be fully vaccinated before their travel. An additional Antigen Rapid Test (RDT) will be taken upon arrival at own cost.	https://www.rbc.gov.rw/index.php?id=745
Saint Kitts and Nevis	Effective Friday April 1st 2022, all travelers must submit a Rapid Antigen negative test result from a CLIA/CDC/UKAS approved lab accredited with ISO/IEO 17025 standard, taken 1 day prior of your arrival or submit a COVID-19 RT-PCR or NAAT negative test result from a CLIA/CDC/UKAS approved lab accredited with ISO/IEO 17025 standard, taken within 3 days of your arrival, along with the required embarkation form, and all other supporting documentation. An embarkation form is required regardless of age.	https://www.stkittstourism.kn/travel-requirements
South Sudan	1) Per guidance issued on July 25, 2021, by the Ministry of Health in the Republic of South Sudan, travelers must present a valid SARS-CoV2 PCR negative test certificate with a sample collected not more than 72 hours prior to arrival at the point of entry and with documentation of full COVID-19 vaccinations (completed at least two weeks before traveling) to not require a quarantine period. 2) Per guidance issued on December 22, 2021, by the Ministry of Health in the Republic of South Sudan, both inbound and outbound travelers must present both a negative PCR test and proof of vaccination.(Last updated: 06/13/2022)	https://ss.usembassy.gov/covid-19-information/

Vaccination Report – 19 July 2022

1. Vaccine Implementation

- WHO's Emergency Use Listing(EUL) Vaccines (Last Updated 7 July 2022）

	Manufacturer	Name of Vaccine	NRA of Record	Vaccine type
1	Pfizer-BioNTech (US)	BNT162b2/COMIRNATY Tozinameran (INN)	EMA,USFDA	mRNA
2	AstraZeneca (UK)	AZD1222 Vaxzevria	EMA, MFDS KOREA, Japan MHLW/PMDA, Australia TGA, COFEPRIS(Mexico), ANMAT(Argentina)	Non ReplicatingViral vector
3	Serum Institute of India (India)	Covishield (ChAdOx1_nCoV-19)	DCGI	Non Replicating Viral Vector
4	Johnson &Johnson (US)	Ad26.CoV2.S	EMA, DCGI	Non ReplicatingViral vector
5	Moderna (US)	mRNA-1273	EMA, USFDA, MFDS	mRNA
6	Sinopharm Beijing (China)	SARS-CoV-2 Vaccine(Vero Cells)	NMPA	Inactivated virus (Vero Cells)
7	Sinovac (China)	COVID-19 Vaccine (Vero Cells)	NMPA	Inactivated virus (Vero Cell)
8	Bharat Biotech (India)	SARS-CoV-2 Vaccine, Inactivated (Vero Cell)/ COVAXIN	DCGI	Whole-Virion Inactivated (Vero Cell)
9	Serum Institute of India (India)	NVX-CoV2373/Covovax	DCGI	Protein Subunit
10	NOVAVAX (US)	NVX-CoV2373/Covovax	EMA	Protein Subunit
11	CanSinoBIO (China)	Ad5-nCoV	NMPA	Non ReplicatingViral vector

- **40** Vaccines Approved by at Least One Country

Vaccine Type	mRNA	Non Replicating Viral vector	Inactivated virus	Protein Subunit	DNA	Virus-like Particles (VLP)	Total
In Use	4	7	11	16	1	1	**40**

Source: https://covid19.trackvaccines.org/vaccines/ （Last Updated 18 July 2022）

- Vaccination against COVID-19 has now started in **218** locations

(Source: Our World in Data. Last Updated 18 July 2022)

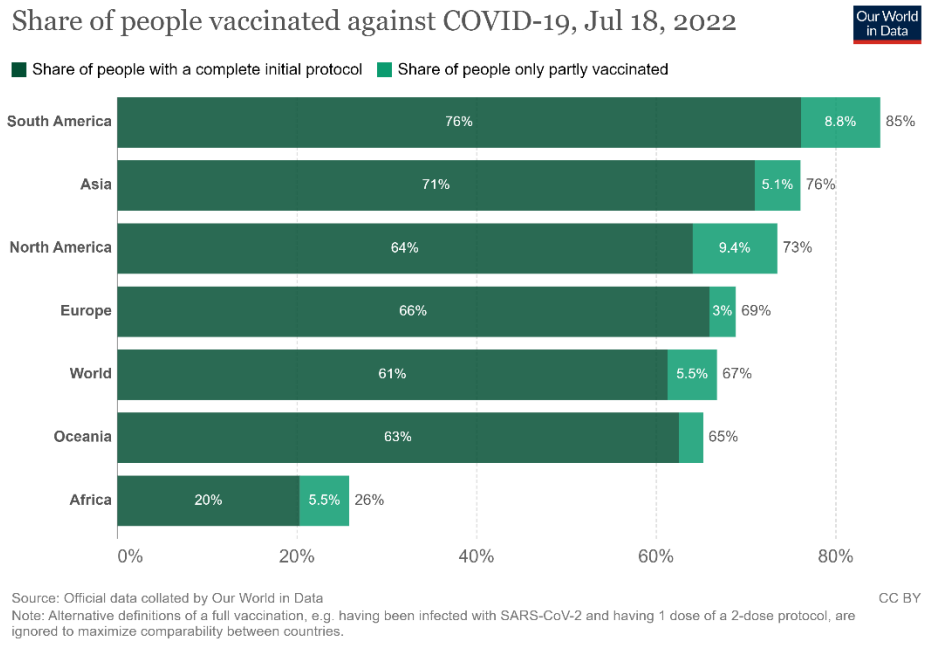
Location	Doses Given	Complete Initial Protocol (% of population)	Partly Vaccinated (% of population)
Worldwide	12.23 billion	4.85 billion (61.28 %)	5.28 billion (66.75 %)

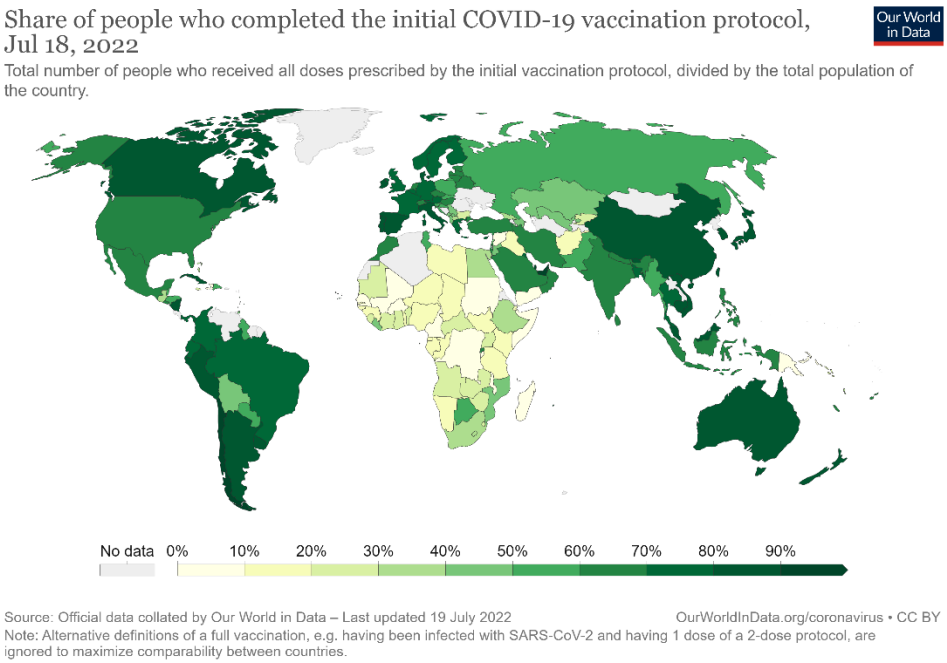
About this data:

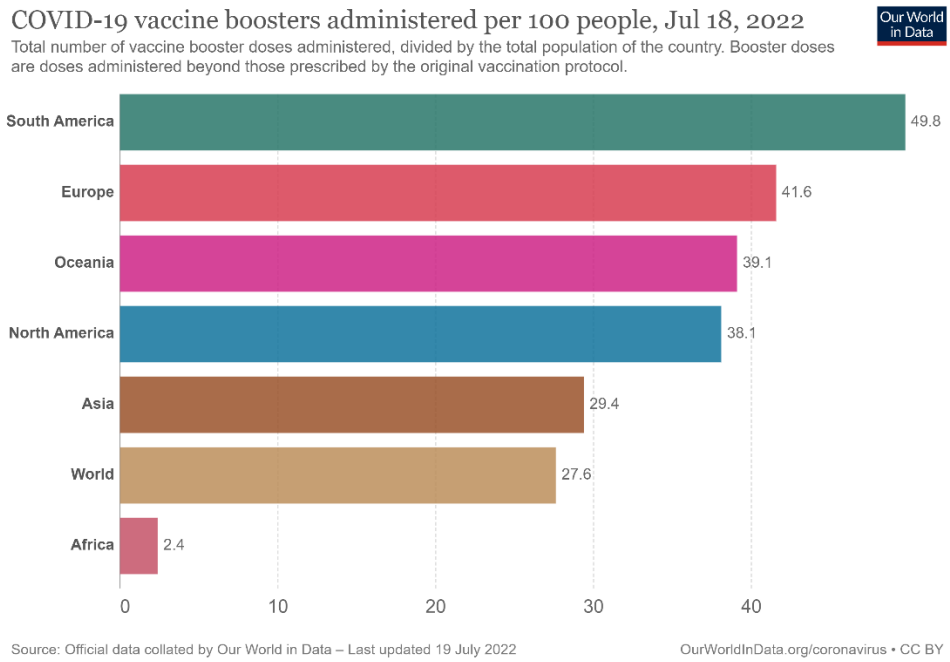
a: This data changes rapidly and might not reflect doses still being reported. It may differ from other sites & sources.

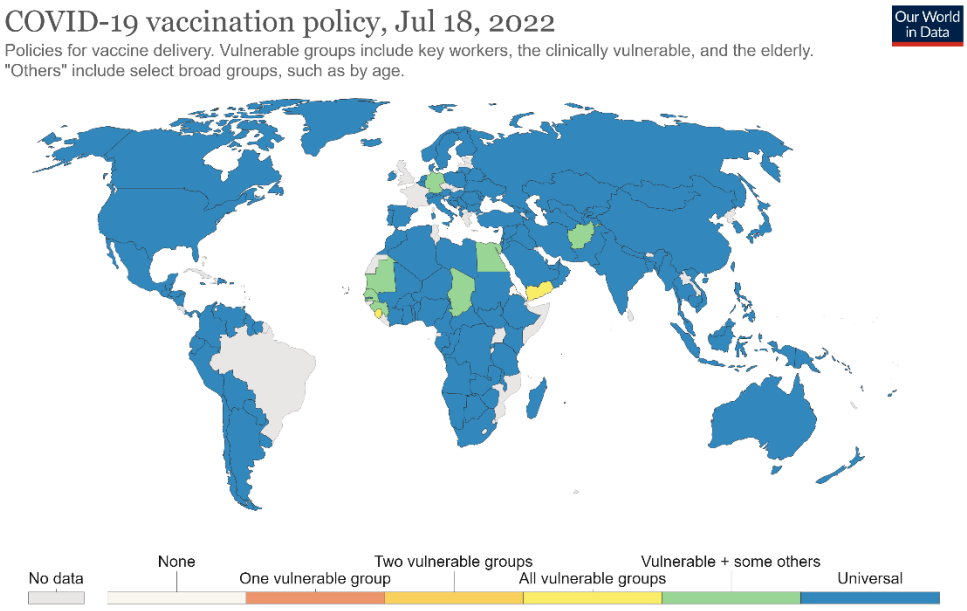
b: Where data for full vaccinations is available, it shows how many people have received at least 1 dose and how many people have been fully vaccinated (which may require more than 1 dose).Where data for full vaccinations isn't available, the data shows the total number of vaccine doses given to people. Since some vaccines require more than 1 dose, the number of fully vaccinated people is likely lower.

c: It only has full vaccination totals in some locations.









2. Effectiveness of Vaccine and/or Previous Infection against symptomatic infection for Alpha, Delta and Omicron variants

Vaccine Status	Vaccine Effectiveness		
	Alpha	Delta	Omicron
1 Dose (BNT162b2 or ChAdOx1 nCoV-19)	**48.7%** (95%CI: 45.5-51.7%)[1] **66%**(BNT162b2)[4] **64%** (ChAdOx1)[4]	**30.7%** (95%CI: 25.2-35.7%)[1] **56%**(BNT162b2)[4] **67%**(ChAdOx1)[4] **82%** (95% CI:73- 91%) [7]	
1 Dose (mRNA-1273)	**83%**[4]	**72%**[4]	
1 Dose(Sinopharm or Sinovac)		**13.8%,**(95%CI: -60.2-54.8%)[3]	
2 Doses (BNT162b2)	**93.7%** (95%CI: 91.6-95.3)[1] **76%** (95%CI: 69-81%)[2] 89% [4]	**88%** (95%CI: 85.3-90.1%)[1] **42%** (95% CI: 13-62%)[2] **87%**[4] **93%**(95% CI: 88-97%/12-18Y)[5] **93%** (95% CI: 88-97%)[7]	**50%** (95% CI: 35%–62%)[8]

2 Doses (ChAdOx1 nCoV-19)	**74.5%** (95%CI: 68.4-79.4%)[1]	**67.0%** (95%CI: 61.3-71.8%)[1]	
2 Doses (mRNA-1273)	**86%,** (95%CI: 81-90.6%)[2]	**76%,** (95% CI: 58-87%)[2]	**30.4%** (95% CI: 5.0%-49.0%)[9]
2 Doses(Sinopharm or Sinovac)		**59.0%,** (95%CI: 16.0-81.6%)[3]	
3 Doses (BNT162b2)		**95.33%** (SD 6.44)[6] **86.1%** (95% CI, 67.3 to 94.1)[11]	**67.2%** (95% CI: 66.5- 67.8%) at 2 to 4 weeks[10] **49.4%** (95% CI, 47.1 to 51.6)[11] **52.2%** (95% CI, 48.1 to 55.9)[12]
3 Doses(mRNA-1273)			**62.5%** (95% CI: 56.2-67.9%)[9] **47.3%** (95% CI, 40.7 to 53.3)[11]
2 Doses (BNT162b2) + 1Dose(mRNA-1273)			**73.9%** (95% CI: 73.1- 74.6%) at 2 to 4 weeks[10]
2 Doses(ChAdOx1 nCoV-19)+1Dose(BNT162b2)			**62.4%** (95% CI, 61.8- 63.0) at 2 to 4 weeks[10]
2 Doses (ChAdOx1 nCoV-19)+ 1Dose (mRNA-1273)			**70.1%** (95% CI, 69.5 to 70.7) at 2 to 4 weeks[10]
2 Doses (BNT162b2) +Previous infection			**55.1%** (95% CI, 50.9 to 58.9)[12]
3 Doses (BNT162b2) +Previous infection			**77.3%** (95% CI, 72.4 to 81.4)[12]
Previous Omicron Infection			**76.1% on BA.4 or BA.5** (95% CI: 54.9 to 87.3%)[13]

References:

1) Effectiveness of Covid-19 Vaccines against the B.1.617.2 (Delta) Variant
2) Comparison of two highly-effective mRNA vaccines for COVID-19 during periods of Alpha and Delta variant prevalence
3) Efficacy of inactivated SARS-CoV-2 vaccines against the Delta variant infection in Guangzhou: A test-negative case-control real-world study
4) Effectiveness of COVID-19 vaccines against variants of concern in Ontario, Canada
5) Effectiveness of BNT162b2 Vaccine against Delta Variant in Adolescents
6) A RCT of a third dose CoronaVac or BNT162b2 vaccine in adults with two doses of CoronaVac
7) Effectiveness of BNT162b2 Vaccine against Delta Variant in Adolescents
8) Effectiveness of BNT162b2 Vaccine against Omicron Variant in South Africa
9) Effectiveness of mRNA-1273 against SARS-CoV-2 omicron and delta variants
10) Covid-19 Vaccine Effectiveness against the Omicron (B.1.1.529) Variant
11) Effect of mRNA Vaccine Boosters against SARS-CoV-2 Omicron Infection in Qatar
12) Effects of Previous Infection and Vaccination on Symptomatic Omicron Infections
13) Protection of SARS-CoV-2 natural infection against reinfection with the BA.4 or BA.5 Omicron subvariants

3. Latest Relevant Articles

- Effectiveness of a fourth dose of mRNA COVID-19 vaccine against all-cause mortality in long-term care facility residents and in the oldest old: A nationwide, retrospective cohort study in Sweden (Published: July 13, 2022)

- Immune boosting by B.1.1.529 (Omicron) depends on previous SARS-CoV-2 exposure (Published 14 Jun 2022)

- Neutralizing antibody activity against 21 SARS-CoV-2 variants in older adults vaccinated with BNT162b2(Published: 14 July 2022)

- Maternal Vaccination and Risk of Hospitalization for Covid-19 among Infants(Published: 14 July 2022)

- SARS-CoV-2 Variant Vaccine Boosters Trial: Preliminary Analyses(Posted on June 15, 2022)

- Novavax NVX-COV2373 triggers potent neutralization of Omicron sub-lineages (Posted on July 17, 2022)

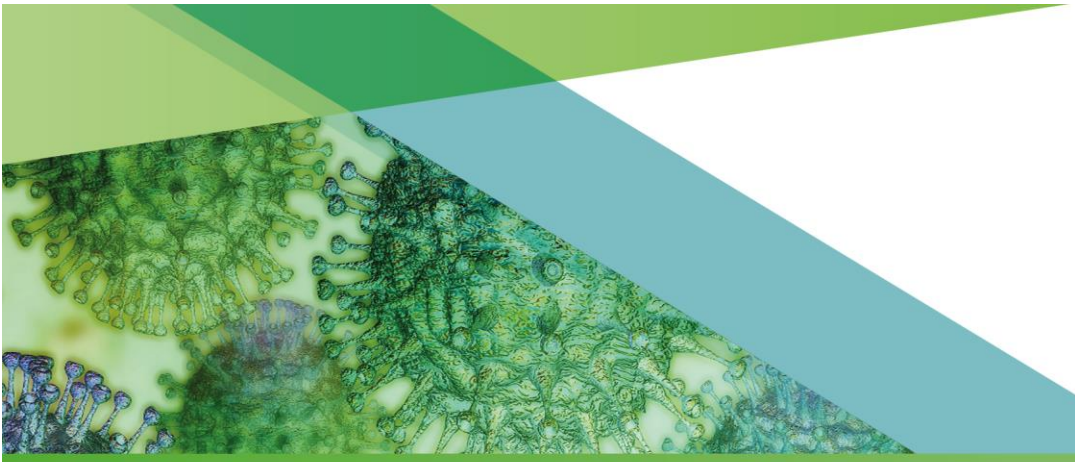
4. Other Information

- FDA Authorizes Emergency Use of Novavax COVID-19 Vaccine (July 13, 2022)

- UK Covid-19 vaccine boosters to be expanded to all over-50s this autumn.(July 15,2022)

- ECDC: Preliminary public health considerations for COVID-19 vaccination strategies in the second half of 2022(July 18, 2022)

- CDC: Rates of COVID-19 Cases and Deaths by Vaccination Status (July,2022)



TECHNICAL REPORT

Preliminary public health considerations for COVID-19 vaccination strategies in the second half of 2022

18 July 2022

Key messages

- In the current post-acute phase of the pandemic, the introduction and emergence of new SARS-CoV-2 variants with increased transmissibility and/or immune escape capacity, together with waning protection against infection and severe disease from natural or vaccine-induced immunity, can result in new waves of virus transmission and surges of COVID-19 cases with a subsequent rise in hospitalisations, ICU admissions and deaths.
- As of 10 July 2022, the overall notification rates of COVID-19 cases in the EU/EEA remain high and have been increasing for the past five weeks. Case rates among people aged 65 years and over increased in 23 of the 27 reporting countries. These increases are still relatively recent, and they signal the start of a widespread wave driven by the BA.4 and BA.5 variants of concern.
- As of 3 July 2022, based on GISAID or the European Surveillance System (TESSy) data, Omicron BA.4 or BA.5 are the dominant circulating SARS-CoV-2 variants (>50%) in 18 EU/EEA countries, and, based on projections, the proportion of all COVID-19 cases due to infection with BA.4 or BA.5 will exceed 95% in most EU/EEA countries by end-July 2022.
- The increasing transmission among older age groups is starting to translate into severe disease, and, as of 10 July 2022, 12 countries reported an increasing trend in either hospital or ICU admissions/occupancy compared with the previous week. At the same time, even though the EU/EEA death rate has remained stable for the last five weeks, the forecast for the period up to 31 July indicates that both case notification rates and death rates will increase.
- As of 10 July 2022, the cumulative uptake of the primary COVID-19 vaccination course in the total population in the EU/EEA reached 72.8%, and 52.9% for the first booster dose. Among individuals aged 60 years and older, vaccine uptake is higher, 90.8% and 83.1% for the primary course and the first booster respectively, but still with significant disparities across EU/EEA countries.
- Currently, 20 countries recommend the administration of a second booster dose, mostly for age groups from 60+ to 80+ years and for long-term care facility (LTCF) residents, with a time interval after the first booster dose varying between three to five months. Approximately 16.5 million second booster doses have been administered so far (data reported to TESSy by 21 countries), the majority among those 60+ (88%), and with a median uptake of 11.6% among 60+ (range: <0.1-59.5%) and 20% among 80+ (range: 0.1-80.1%).

Suggested citation: Preliminary public health considerations for COVID-19 vaccination strategies in the second half of 2022. 18 July 2022. Stockholm: ECDC; 2022

- Published literature indicates that vaccine effectiveness (VE) against severe outcomes caused by Omicron remains high, including among older age groups, with continued strong protection generally around 80–90% around two to three months after receiving the first booster, albeit with the balance of evidence indicating gradual waning after three to six months (VE estimates in the range 53-100%). A second mRNA booster dose restores VE against severe disease, which remains stable for up to 10 weeks, but longer follow-up times are not yet available. Only limited data are available on VE against Omicron sub-lineages BA.4 and BA.5. A preliminary analysis from Portugal suggests that the VE may be reduced against infection with BA.5 as compared to infection with BA.2, while data from South Africa indicate that high VE against severe disease has been maintained during the BA.4/BA.5 dominant period.
- The analysis of severe outcomes of disease among COVID-19 cases having received a first booster dose (TESSy data) shows that hospitalisation and death are rare in this group (0.6% and 0.1% respectively); nevertheless, the adjusted risk of hospitalisation and death is higher in those who received the first booster dose more than three months previously, older age groups (80+ and 60 to 79) and males.
- Mathematical modelling shows that for countries with an uptake of >40% for the first booster in the whole population, a second booster rollout among 60+ can have a substantial impact on restoring vaccine-induced protection against hospitalisation in this population from mid-July to the end of 2022, with an expected median absolute increase of 17% (95% UI 6-34%) on 1 November 2022. For countries with an uptake of <40% for the first booster in the whole population, closing the vaccination coverage gaps of the primary series and the first booster has a larger overall effect than a second booster rollout, with an expected median absolute increase of population-level vaccine-induced protection against hospitalisation of 16% (95% UI 10-41%) and 5% (95% UI 1-24%) on 1 November 2022, respectively. Furthermore, an earlier second booster rollout among 60+ in mid-July 2022 results in a larger vaccine-induced protection against hospitalisation for the rest of 2022 compared to a later second booster rollout. The benefit in terms of vaccine-induced protection against hospitalisation in the population 60+ decreases the more the starting date of the second booster rollout is moved later (we evaluate a starting date in July, August, September, or October).

Public health considerations

Considering the above, the following public health considerations provide some guidance for vaccination strategies and the use of additional booster doses of mRNA vaccines in the second half of 2022:

- At this stage of the pandemic, the objective of COVID-19 vaccination campaigns continues to be to reduce COVID-19 hospitalisation, severe disease and death, and to protect health systems.
- Improving vaccine uptake of the primary course and first booster dose in eligible individuals who are yet to receive them remains a priority, especially for population groups at higher risk of severe outcomes and for countries with lower uptake of primary course and first booster dose.
- An early second booster rollout, not only among 80+, but also for adults between the ages of 60 and 79 years and individuals with underlying comorbidities regardless of age, should now be considered to prevent severe disease and safeguard health system capacity, and countries should consider a rapid deployment. This would be particularly relevant and impactful in countries where the BA.4/BA.5 wave is starting or has not yet peaked. Second boosters could be administered at least four months after the previous one, with a focus on people who received a previous booster more than six months ago.
- At the moment, for immunocompetent individuals below 60 years of age, unless they have underlying comorbidities, there is no clear epidemiological evidence to support the administration of a second booster.
- The early administration of a second booster dose with currently available vaccines to healthcare workers (HCW) and personnel working in LTCFs for infection control purpose, is likely to offer only modest benefits in terms of limiting the risks of transmission to vulnerable people in their care, and be of limited duration. HCW and LTCF personnel may receive a second booster for their own protection if they belong to any prioritised population group based on age or underlying comorbidities. It should be ensured that LTCF residents receive the recommended booster doses; non-pharmaceutical interventions (NPIs) in healthcare settings including LTCFs remain effective measures to protect vulnerable individuals; and access to therapeutics is an additional key measure for the protection of LTCF residents from severe outcomes.
- In addition, in anticipation of further waves of infection that may arrive in the autumn/winter season, countries should consider the need for rollout of further additional booster doses of mRNA vaccines for population groups at risk of severe disease (e.g. 60+,individuals with underlying comorbidities, immunocompromised individuals and pregnant women) later in the year, possibly combining campaigns for vaccination against COVID-19 and influenza, taking into account any new evidence available at that time on the benefit/risk profile of repeated boosters and the impact on the capacity of health systems to deliver vaccinations in the context of other competing public health priorities in the post-pandemic phase.
- The boosting of HCW and LTCF personnel should also be considered for this later rollout. If adapted, vaccines will show increased neutralisation against Omicron variants, indicating a possible higher effect against infection and transmission, they may be used to provide both direct and indirect protection.

- The need for, and optimal timing of further additional booster doses in autumn/winter may vary across countries, especially depending on the timing of rollout of second boosters in spring/summer 2022 and emerging evidence of continued protection against severe disease in those that have received a second booster dose.
- Updated Omicron-adapted vaccines will likely be authorised for use in the EU in September and possibly available sometime during the last trimester of 2022, however the distribution timeline and available supplies are currently being defined with manufacturers. Nevertheless, it is important to continue the efforts to increase vaccination rates with available vaccines for groups at high risk of severe disease in a timely manner, and not to wait for the new Omicron-adapted vaccines.
- Future vaccination strategies may also differ depending on the availability of the updated vaccines and their characteristics. Countries may have to use different types of vaccines for different strategies and population groups depending on the characteristics of the updated vaccines compared to first-generation ones and considering emergence of new variants.
- Communication initiatives to promote uptake of additional vaccine doses, and to promote completion of the primary series by those who have not yet done so face recurring and emerging challenges. These include complacency towards the threat of COVID-19, the need to provide evidence-based reassurances to address lower confidence in vaccine effectiveness and concerns about side effects, as well as potential confusion in the public as to how boosters will be offered in the coming months, timelines for adapted vaccines, who should receive these and when. This context stresses the importance of understanding and addressing individuals' and communities' beliefs, concerns and expectations regarding the vaccine and the disease. Clear information should be provided around the rationale for recommendations, and the benefits of the primary course and boosters for different population groups, including for those who already had the disease.

These public health considerations are based on current scientific evidence and epidemiological trends, and will be periodically reassessed. The scope of these considerations is focused on the second half of 2022, with an emphasis on the case for booster vaccination and closing the primary vaccination gap in the late summer/early autumn, and not for longer term COVID-19 vaccination strategies. National Immunisation Technical Advisory Groups (NITAGs) will ultimately make national decisions on the use of COVID-19 vaccines, taking into account the previous vaccination uptake and the epidemiological situation in their countries.

Background and rationale

Over half of the European Union/European Economic Area (EU/EEA) countries are already recommending and rolling out second booster doses of COVID-19 vaccines, mainly to older population groups. Some countries are also recommending or discussing the introduction of second booster doses in certain other vulnerable population groups, as well as healthcare workers. Furthermore, EU/EEA countries are now discussing their future COVID-19 vaccination strategies and the need for additional booster doses before the autumn/winter season when another wave and health service pressures related to other respiratory viruses may be expected.

Scope of this document

This document offers an overview of the available scientific and epidemiological evidence and provides public health considerations to support decisions on the implementation of additional booster doses of COVID-19 vaccine. It aims to provide some preliminary considerations and inputs to EU/EEA countries for evidence-based decision-making when planning vaccination campaigns, both at present and during the coming months, ahead of the next autumn/winter season. This ECDC technical report builds upon and complements the previous one on public health considerations and evidence to support decisions on the implementation of a second mRNA COVID-19 vaccine booster dose published on 28 April 2022 [1]. The public health considerations presented in this document are based on the assessment of current epidemiological trends and available scientific evidence. As such, they are preliminary and subject to change as more data become available. The scope of these considerations is also focused on the second half of 2022, with an emphasis on the case for booster vaccination and closing the primary vaccination gap in late summer/early autumn, and not for longer term COVID-19 vaccination strategies. National Immunisation Technical Advisory Groups (NITAGs) will ultimately make national decisions on the use of COVID-19 vaccines, taking into account the previous vaccination uptake and the epidemiological situation in their countries.

Target audience

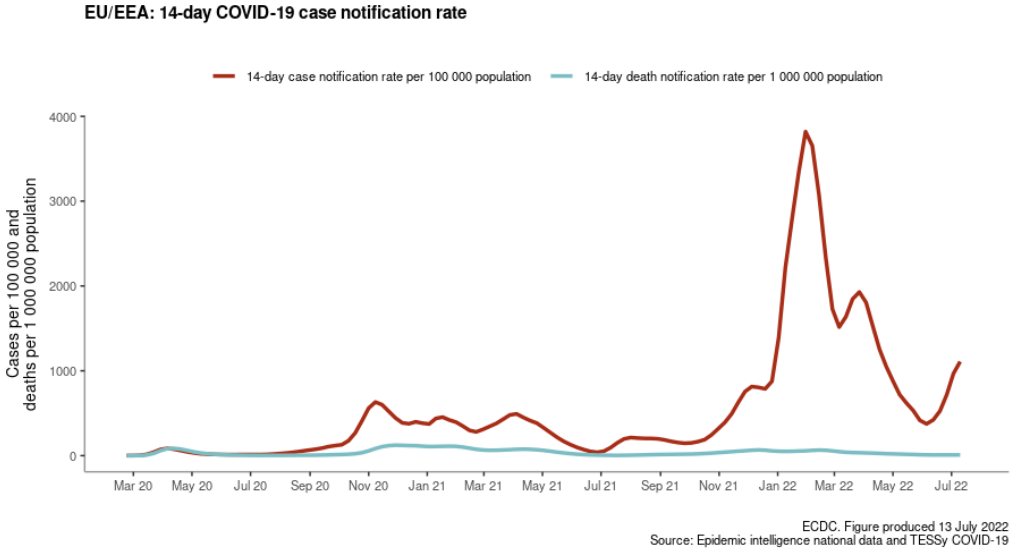
The target audiences for this document are the EU/EEA NITAGs, national public health institutes and ministries of health in the EU/EEA, as well as public health experts and decision-makers at national and subnational level.

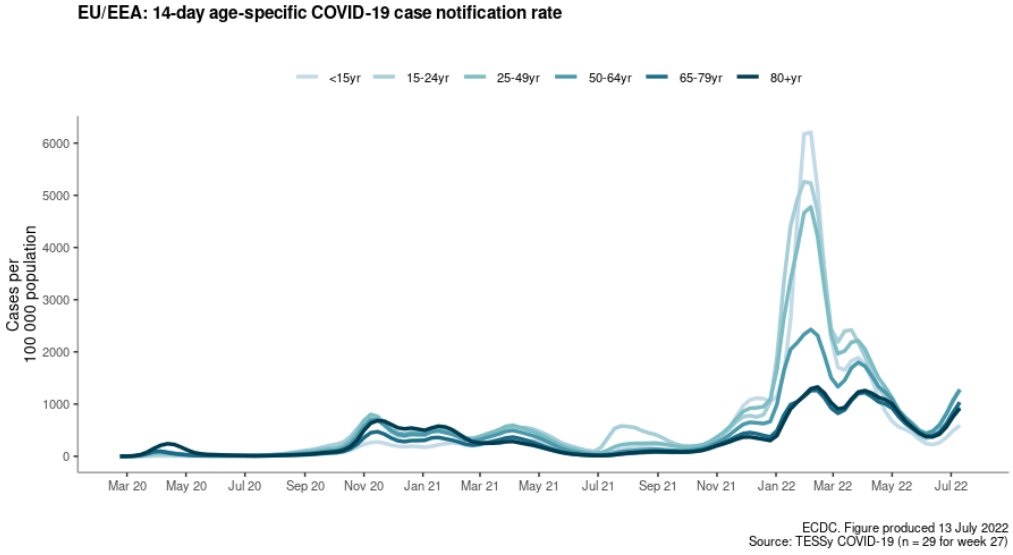
Epidemiological overview based on European surveillance data

COVID-19 case notifications in the EU/EEA

In the post-acute phase of the SARS-CoV-2 pandemic, the introduction and emergence of new SARS-CoV-2 variants with increased transmissibility and/or immune escape capacity, together with waning protection against infection and severe disease from natural or vaccine-induced immunity, can result in new waves of virus transmission and surges of COVID-19 cases [2]. The emergence of Omicron – bearing the most significant profile of SARS-CoV-2 mutations evading existing immunity to-date – in November 2021 resulted in a sharp increase in reported COVID-19 cases in the EU/EEA, reaching a peak in February 2021 (Figure 1, upper panel). The early surge in cases was largely attributable to Omicron sub-lineage BA.1 [3]. The subsequent decline in reported cases observed between February and May 2022 was interrupted by a short period of resurgence between March and April 2022, primarily driven by the replacement of Omicron sub-lineage BA.1 with the more transmissible sub-lineage BA.2, in combination with widespread relaxation of public health response measures [1,4]. Following a sustained period of decline in April and May 2022, the EU/EEA 14-day COVID-19 case notification rate has steadily increased in June 2022, with increases reported across all age groups (Figure 1, lower panel). As of week 27, 2022 (week ending 10 July), the overall case notification rate in the EU/EEA was 1 109 cases per 100 000 population, corresponding to an 11% increase compared to the previous week.

Figure 1. EU/EEA 14-day COVID-19 case notification and death rates (upper panel) and age-specific 14-day case notification rates (lower panel) (up to 10 July 2022)





BA.4 and BA.5 in the EU/EEA

On 13 June 2022, ECDC published an epidemiological update on the implications of the emergence and spread of SARS-CoV-2 variants of concern BA.4 and BA.5 for the EU/EEA [5]. In this update, ECDC reported that whilst most EU/EEA countries had detected low proportions of the SARS-CoV-2 variants BA.4 and BA.5, the estimated growth advantage of BA.4 and BA.5 over other circulating strains would lead to these variants becoming dominant throughout the EU/EEA. BA.4 or BA.5 are the dominant (>50%) circulating SARS-CoV-2 variants in 18 EU/EEA countries (Austria, Belgium, Cyprus, Czechia, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Slovenia, Sweden) according to data submitted to GISAID or TESSy up to 03 July 2022 (Table 1) [6,7].

Table 1. EU/EEA SARS-CoV-2 variant proportions as reported to GISAD or TESSy

Country	Weeks of data	Data source	Number of cases	Sequencing volume			Total known variants detected	BA.4/BA.5		BA.2		BA.2+L452X		BA.1		B.1.617.2		Other	
				n	%	Category		n	%	n	%	n	%	n	%	n	%	n	%
Austria	25-26	TESSy	131844	43652	33.1	L1a	43652	34303	78.6	8769	20.1			152	0.3	2	0	426	1
Belgium	25-26	TESSy	68481	2139	3.1	L1b	2139	1748	81.7	251	11.7			1	0			139	6.5
Bulgaria	26	TESSy	3123	88	2.8	L2	88	7	8	81	92								
Croatia		TESSy	9547		0	No data	0												
Cyprus	25	TESSy	24735	78	0.3	L2	78	70	89.7	8	10.3								
Czechia	25-26	GISAID	10133	12	0.1	L2	12	7	58.3	2	16.7	3	25						
Denmark	25-26	TESSy	19375	8514	43.9	L1a	8514	7258	85.2	1255	14.7							1	0
Estonia	25-26	TESSy	2143	521	24.3	L1c	521	195	37.4	319	61.2			2	0.4			5	1
Finland	25	TESSy	10145	4968	49	L1a	4968	4968	100										
France	25-26	TESSy	1210313	7531	0.6	L1a	7531	5687	75.5	1160	15.4	661	8.8	6	0.1			17	0.2
Germany	25-26	TESSy	1188593	10636	0.9	L1a	10636	9210	86.6	1426	13.4								
Greece	25-26	TESSy	178941	351	0.2	L2	351	239	68.1	111	31.6			1	0.3				
Hungary	25	TESSy	3042	137	4.5	L2	137	7	5.1			124	90.5	6	4.4				
Iceland		TESSy	5605		0	No data	0												
Ireland	25-26	TESSy	27171	336	1.2	L2	336	300	89.3	27	8	9	2.7						
Italy	25-26	GISAID	899833	213	0	L2	213	159	74.6	35	16.4	18	8.5	1	0.5				
Latvia	25-26	TESSy	4932	773	15.7	L1c	773	119	15.4	652	84.3					2	0.3		
Liechtenstein		GISAID	287		0	No data	0												
Lithuania		GISAID	3657		0	No data	0												
Luxembourg	25-26	TESSy	12711	495	3.9	L2	495	414	83.6	69	13.9	12	2.4						
Malta		TESSy	7020		0	No data	0												
Netherlands	25	TESSy	32546	719	2.2	L1b	719	604	84	63	8.8	52	7.2						
Norway	25-26	TESSy	20405	1245	6.1	L1b	1245	858	68.9	270	21.7			3	0.2			114	9.2
Poland	25-26	TESSy	5241	63	1.2	L2	63	36	57.1	22	34.9							5	7.9
Portugal	25-26	TESSy	142728	881	0.6	L1c	881	852	96.7	16	1.8	13	1.5						
Romania	25-26	TESSy	11274	232	2.1	L2	232	58	25	153	65.9	2	0.9	2	0.9			17	7.3
Slovakia		TESSy	6224		0	No data	0												
Slovenia	25	TESSy	4194	84	2	L2	84	84	100										
Spain	25-26	TESSy	283991	347	0.1	L2	347	146	42.1	47	13.5			2	0.6			152	43.8
Sweden	25-26	TESSy	7205	1175	16.3	L1b	1175	985	83.8	190	16.2								

Note: BA.4/BA.5 means BA.4 or BA.5 cannot be distinguished from each other, as reported to TESSy by some countries using non-sequencing methods and/or a recoding of S-gene target failure (SGTF) reported to TESSy since week 20, 2022. Level 1a: Variant proportion estimate with sufficient precision at a variant prevalence of 1% or lower. Level 1b: Variant proportion estimate with sufficient precision at a variant prevalence of >1% to 2.5%. Level 1c: Variant proportion estimate with sufficient precision at a variant prevalence of >2.5% to 5%. Level 2: Not able to estimate a variant proportion with sufficient precision at a variant prevalence of 5%.

COVID-19 severity indicators in the EU/EEA

In the context of recent changes to testing practices amongst younger age groups, ECDC currently considers case rates among people aged 65+ years to be the most reliable indicator of changes in disease transmission, and ICU occupancy and ICU admissions the most reliable indicators of severity in the current context. Importantly, lags and delays in reporting, as well as varying and low levels of reporting by different countries affect the quality of these indicators.

In Portugal, the emergence and subsequent dominance of BA.5 has occurred earlier than in other EU/EEA countries. After emerging in early April (week 13, 2022), BA.5 was the dominant (>50%) variant in circulation by mid-May (week 20, 2022). This increase in BA.5 circulation was associated with a surge in COVID-19 incidence, observed across all age groups, that peaked in early June at approximately 25% of the previous peak incidence recorded earlier in the Omicron wave in late January 2022. Whilst there is currently no indication of any significant change in severity for BA.4 or BA.5

compared to previous Omicron sub-lineages [8], increased BA.5 circulation was associated with an observed increase in hospitalisations and ICU admissions in Portugal, peaking in early June at a lower level than was observed in the previous peak earlier in the Omicron wave. BA.5 associated increases in hospitalisations and ICU admissions have primarily been driven by those aged 60 years and over [9]. The BA.4/BA.5 wave has peaked in Portugal, which has reported a sharply decreasing trend in case rates among people aged 65 years and over for the last five weeks.

The emergence of BA.4 and BA.5 in other EU/EEA countries can be expected to result in increases in COVID-19 cases as observed in Portugal in recent months. The extent of the increase will depend on various factors, including immune protection against infection, the timing and coverage of COVID-19 vaccination and the extent, timing and variant landscape of previous SARS-CoV-2 pandemic waves. In line with trends observed in Portugal, as of week 27, 2022 (week ending 10 July), case rates among people aged 65 years and older have increased in 23 of the 27 countries reporting these data to TESSy, corresponding to a 23% increase at the EU/EEA level compared to the previous week, reaching 78.2% of the highest case rates during the pandemic (Table 2). Increasing transmission among older age groups is starting to translate into severe disease. Of 34 countries with data on hospital or ICU admissions/occupancy, 12 (Austria, Belgium, Cyprus, France, Greece, Ireland, Luxembourg, Malta, the Netherlands, Romania, Slovenia and Spain) reported an increasing trend in at least one of these indicators compared with the previous week. Austria, Belgium, France, Greece, Ireland, and Spain reported increases in both hospital and ICU indicators. Compared to maximum values observed during the pandemic, current levels of ICU indicators are much lower (highest 20% in France) than hospital indicators (highest 57% in Greece) (Figure 2).

Table 2. Current trends in epidemiological indicators for EU/EEA; reporting week 27, 2022 (up to 10 July)

Indicator	Previous week	Reporting week	Change compared to previous week (%)	Number of countries with increasing trend	Percentage of pandemic maximum
Tests per 100 000 people	2 036	2 260	11	9	22.1
14-day case notification rate per 100 000	967	1 109	15	24	29
Test positivity (%)	25.1	24.2	-3.5	12	20.9
14-day case rate per 100 000 (65+ years)	816	1 002	23	23	78.2
Hospital admissions per 100 000	8.8	9.4	6.3	4	39
Hospital occupancy per 100 000	12.6	14.6	16	10	32.8
ICU admissions per 100 000	0.6	0.7	17	2	14.6
ICU occupancy per 100 000	0.8	0.9	12	6	15.5
14-day death rate per million	8.5	8.3	-2.2	7	6.8

Figure 2. Summary of epidemiological indicators; reporting week 27, 2022 (up to 10 July)

Summary of epidemiological indicators: current value as of 10 July 2022 and observed trend (▲ or ▼) compared to the previous week

	Tests per 100k	14-day case rate per 100k	Test positivity (%)	14-day case rate per 100k (65+ years)	Hospital admissions per 100k	Hospital occupancy per 100k	ICU admissions per 100k	ICU occupancy per 100k	14-day death rate per million
EU/EEA	2 260 ▲	1 109 ▲	24.2	1 002 ▲	9.4	14.6 ▲	0.7 ▲	0.9 ▲	8.3
Austria	9 729	1 629 ▲	8.5	1 177 ▲		10.4 ▲		0.6 ▲	5.8 ▼
Belgium	1 321	812 ▲	35.1 ▲	731 ▲	8.5 ▲	14.2 ▲		0.7 ▲	10.1 ▲
Bulgaria	423 ▲	115 ▲	16.5 ▲			6.1		0.5	2.9
Croatia	1 037 ▲	339 ▲	18.4	330 ▲					14.1 ▲
Cyprus	13 102 ▲	4 422 ▼	13.1 ▼	3 476 ▼		10.8 ▲		0.1	10.0 ▼
Czechia	279 ▼	117 ▲	20.6 ▲	156 ▲	2.9	2.6	0.2	0.2	1.8
Denmark	1 210 ▲	393 ▲	17.3	500 ▲		5.6		0.2	11.1 ▲
Estonia	491	188 ▲	17.8	209 ▲	5.3 ▼	6.6	0.2	0.2	12.0 ▲
Finland		289 ▼				8.7		0.2 ▼	1.1
France	4 054 ▲	2 445 ▲	33.3	1 671 ▲	12.9 ▲	25.9 ▲	1.2 ▲	1.5 ▲	10.9 ▲
Germany		1 404 ▼		722				1.2	3.3 ▼
Greece	8 556	2 135 ▲	13.5	1 682 ▲	21.5 ▲		0.5 ▲		27.9 ▲
Hungary	172	131 ▲	48.0 ▲	148 ▲					3.5
Iceland	1 191 ▼	1 733 ▲	72.8 ▲	2 191 ▲		10.7 ▼		0.3	70.5
Ireland	786	571 ▲	36.0	508 ▲	20.2 ▲	18.2 ▲	0.5 ▼	0.3 ▲	3.0
Italy	4 082 ▲	1 696 ▲	19.5 ▼	1 595 ▲	6.2 ▼				13.6
Latvia	910	384 ▲	22.4	267 ▲	7.3		0.2	0.2	8.5 ▼
Liechtenstein	1 160 ▲	927 ▲	46.1 ▼	1 099 ▲	5.1				0.0
Lithuania	241	172 ▲	37.6 ▲	152 ▲		3.4			1.4
Luxembourg	2 252	2 275 ▲	50.3	1 416 ▲		4.5 ▲		0.0	0.0 ▼
Malta	1 797 ▼	1 477 ▲	40.6 ▲	1 565 ▲	15.5 ▼			0.8 ▲	36.8
Netherlands	408	459 ▲	59.2	370 ▲	2.8 ▼	4.6 ▲	0.2	0.2	1.5
Norway	215 ▼	172 ▼	17.5 ▼	305 ▼	5.1 ▼		0.2 ▼		25.0 ▲
Poland	86.3	24.6 ▲	18.2 ▲			1.2			1.0
Portugal	1 325 ▼	1 172 ▼	39.2	1 218 ▼	0.0				24.9 ▼
Romania	461 ▲	113 ▲	16.2 ▲	125 ▲		6.1 ▲		0.3	1.7
Slovakia	370 ▼	152 ▲	22.5 ▲	212 ▲		5.5		0.4	1.3
Slovenia	1 548 ▲	698 ▲	26.6 ▲	670 ▲	4.0	4.5 ▲	0.4	0.5	6.6
Spain	675 ▼	606	40.5 ▲	1 365 ▲	11.3 ▼	25.0 ▲	0.4 ▼	1.1 ▲	14.2 ▼
Sweden	182	80.5 ▲	22.5	117 ▲				0.3	1.5

Level of current value, coloured by class breaks defined per indicator:
- 14-day case notification rate per 100k: <40, 40-<100, 100-<300, 300 or higher
- Test positivity (%): <2%, 2-<4%, 4-<10%, 10% or higher
- 14-day case rate per 100k (65+ years): <20, 20-<50, 50-<150, 150 or higher
- Hospital or ICU admissions per 100k (as % of historical country peak rate): <10%, 10-<25%, 25-<50%, 50% or higher
- Hospital or ICU occupancy per 100k (as % of historical country peak rate): <25%, 25-<50%, 50-<75%, 75% or higher
- 14-day death rate per million: <20, 20-<40, 40-<100, 100 or higher

1 (lowest) 2 3 4 (highest) Not applicable

Age-specific notification rate of hospitalised COVID-19 cases

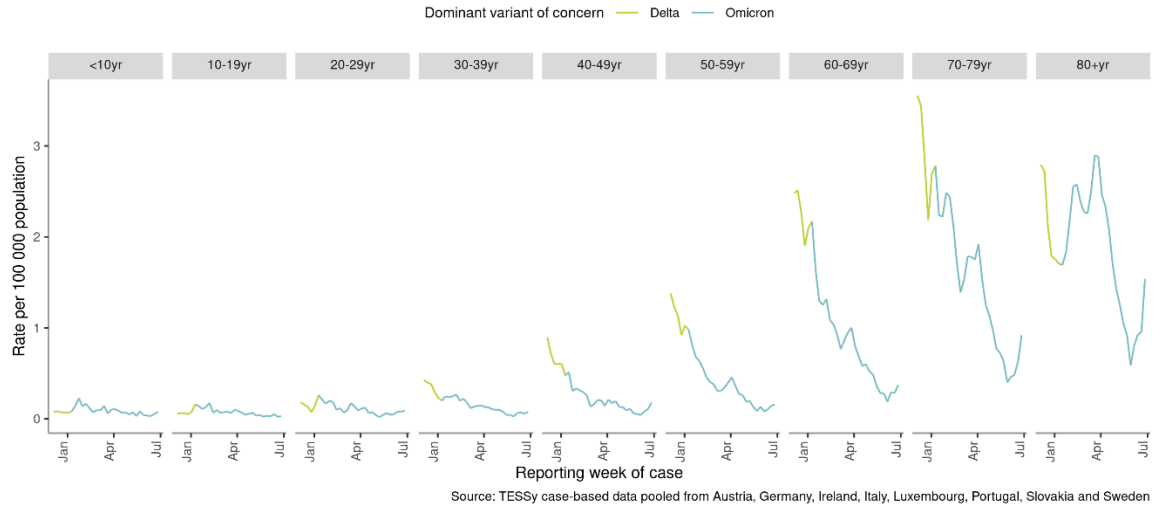
Pooled analysis of case-based data reported to TESSy by eight EU/EEA countries with sufficient data completeness from week 48, 2021, to week 25, 2022, show that after the decrease observed in rates of severely ill cases in hospital (requiring admission to ICU and/or ventilation and/or extracorporeal membrane oxygenation) since Jan-Feb 2022, an increase in trend is seen in recent weeks. This effect is more substantial among those aged 60 years and above (Figure 3a).

The same trend is observed looking at the notified cases requiring hospitalisation, based on pooled data from eight countries (Figure 3b). The interpretation of this is made difficult by the considerable uncertainty concerning the proportion of cases hospitalised due to or with COVID-19. It is not normally possible to make this distinction in routine surveillance data submitted to TESSy.

Since completeness of vaccination status reported to TESSy is limited for this pool of countries, we are unable to attribute the observed increases to individuals with a particular level of vaccination.

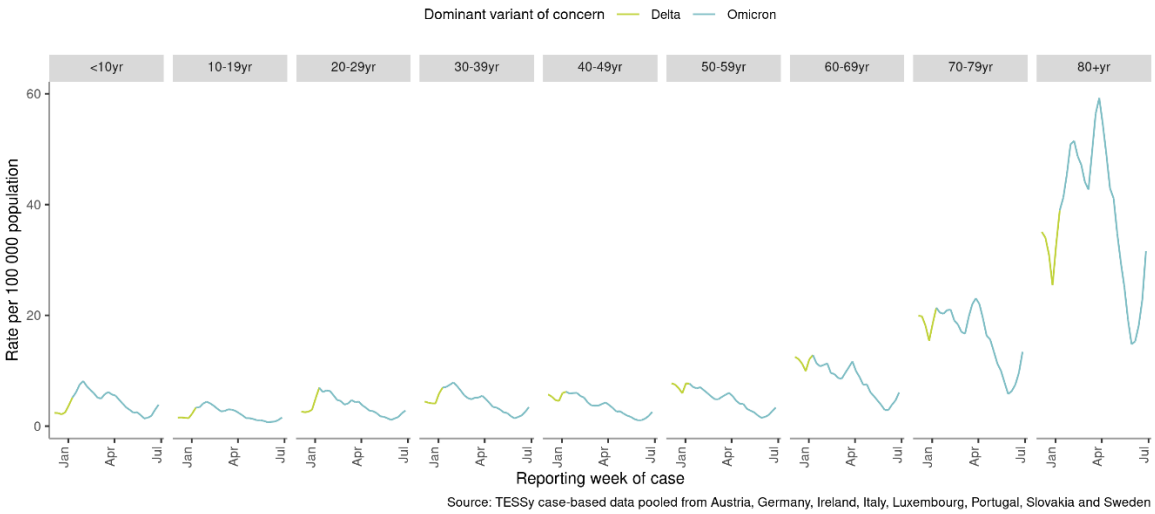
Figures 3a and 3b. Age-specific notification rate of cases admitted to ICU and/or requiring ventilation and/or extracorporeal membrane oxygenation (3a) and age-specific notification rate of hospitalised cases (3b), week 48, 2021 to week 25, 2022

Age-specific notification rate of cases admitted to ICU and/or requiring ventilation and/or extracorporeal membrane oxygenation, week 48, 2021 to week 25, 2022



Source: TESSy case-based data pooled from Austria, Germany, Ireland, Italy, Luxembourg, Portugal, Slovakia and Sweden

Age-specific notification rate of hospitalised cases, week 48, 2021 to week 25, 2022



Source: TESSy case-based data pooled from Austria, Germany, Ireland, Italy, Luxembourg, Portugal, Slovakia and Sweden

Risk of hospitalisation and death post-first COVID-19 booster dose

For this analysis, cases were considered for all adult individuals aged 18 years and older with laboratory-confirmed symptomatic SARS-CoV-2, as reported to TESSy by EU/EEA countries from 1 December 2021 to 29 May 2022 for hospitalisation and from 1 December 2021 to 19 June 2022 for case fatality, with disease onset at least two weeks after receiving their first booster dose. Individuals were then divided into groups who had received their first booster less than or more than three months prior to the COVID-19 onset data. Unknown hospitalisation status and unknown deaths were recoded as 'No'. We believe that a very small proportion of unknown could be categorized as 'Yes', and misclassified observations are very likely to be equally distributed among the groups under comparison. The proportion of hospitalisation and deaths could therefore be slightly underestimated. The risk of hospitalisation and death was compared between groups defined by sex, age (18–59, 60–79, 80+ years) and time from booster dose (less than or 3+ months), adjusted by onset month.

Negative binomial models were run to calculate the Relative Risks (RR) and the 95% Confidence Interval (95% CI) of hospitalisation and death.

Table 3. Main characteristics of COVID-19 cases who had a disease onset at least two weeks after receiving their first COVID-19 vaccine booster dose, by hospitalisation status, 1 December 2021–29 May 2022 (N=398 414)

	Total		Not hospitalised		Hospitalised	
Characteristic	Number of cases	Proportion of cases (%)	Number of cases	Proportion of cases (%)	Number of cases	Proportion of cases (%)
	398 414	100	396 101	99.4	2 313	0.6
Booster vaccination						
Booster dose <3 months	288 648	72.5	287 231	99.5	1 417	0.5
Booster dose >=3 months	109 766	27.5	108 870	99.2	896	0.8
Sex						
Female	223 786	56.2	222 748	99.5	1 038	0.5
Male	174 534	43.8	173 259	99.3	1 275	0.7
Age at diagnosis (years)						
18-59	238 870	60.0	238 471	99.8	399	0.2
60-79	132 900	33.4	131 648	99.1	1 252	0.9
80+	26 644	6.7	25 982	97.5	662	2.5
Onset month						
December 2021	8 257	2.1	8 064	97.7	193	2.3
January 2022	107 960	27.1	107 425	99.5	535	0.5
February 2022	137 739	34.6	137 004	99.5	735	0.5
March 2022	115 771	29.1	115 084	99.4	687	0.6
April 2022	23 714	5.9	23 589	99.5	125	0.5
May 2022	4 973	1.2	4 935	99.2	38	0.8

Cases are from Estonia (735), France (4), Ireland (49), Luxembourg (46 863), Malta (2 996), Norway (877) Poland (346 873), Romania (17).

The main results for hospitalisation data are presented in Table 3. Of 398 414 individuals who acquired COVID-19 between 1 December 2021 and 29 May 2022 at least two weeks after receiving a first COVID-19 booster dose, 0.6% required hospitalisation. This proportion was higher for the individuals who, at the time of onset, had received their booster dose more than three months before their diagnosis of COVID-19 (0.8%), compared to those who had received their booster dose less than three months before (0.5%). The proportion was also higher for males (0.7%) than females (0.5%), and by age group, but remains quite stable in 2022, with the exception of an increase in May.

Table 4. Main characteristics of COVID-19 cases who had disease onset at least two weeks after receiving their first COVID-19 vaccine booster dose, by case fatality, 1 December 2021−19 June 2022 (N= 321 664)

	Total		Survived		Died	
Characteristic	Number of cases	Proportion of cases (%)	Number of cases	Proportion of cases (%)	Number of cases	Proportion of cases (%)
	321 664	100	321 327	99.90	337	0.10
Booster vaccination						
Booster dose <3 months	244 783	76.1	244 649	99.95	134	0.05
Booster dose >=3 months	76 881	23.9	76 678	99.74	203	0.26
Sex						
Female	179 529	55.8	179 368	99.9	161	0.09
Male	142 065	44.2	141 889	99.88	176	0.12
Age at diagnosis (years)						
18-59	190 578	59.3	190 571	100.0	7	0.00
60-79	109 112	33.9	109,023	99.92	89	0.08
80+	21 974	6.8	21,733	98.90	241	1.10
Onset month						
December 2021	4 860	1.5	4 836	99.51	24	0.49
January 2022	40 726	12.7	40 653	99.82	73	0.18
February 2022	97 151	30.2	97 076	99.92	75	0.08
March 2022	134 727	41.9	134 614	99.92	113	0.08
April 2022	30 929	9.6	30 886	99.86	43	0.14
May 2022	8 179	2.5	8 171	99.90	8	0.10
June 2022	5 092	1.6	5 091	99.98	1	0.02

Cases are from Estonia (735), France (4), Ireland (49), Luxembourg (46 863), Malta (2 996), the Netherlands (271 000), Romania (17).

The main results for case fatality data are presented in Table 4. Of 321 664 individuals who acquired COVID-19 between 1 December 2021 and 19 June 2022 at least two weeks after receiving a first COVID-19 booster dose, 0.10% died. This proportion was higher for individuals who, at the time of onset, had received their booster dose more than three months before (0.26%), compared to those who had received their booster dose less than three months before (0.05%). The proportion was also higher for males (0.12%) than females (0.09%) and increased by age group while there was no clear trend over time by month of onset in 2022.

Table 5. Adjusted relative risk of hospitalisation and death by time from booster vaccination, sex, age group ***

	Adjusted relative risk of hospitalisation (95% CI) [&]	Adjusted relative risk of death (95% CI) [$]
Booster vaccination		
Booster dose <3 months	Ref	Ref
Booster dose >=3 months	1.17 (1.04-1.32) *	4.81 (3.64-6.36) *
Sex		
Female	Ref	Ref
Male	1.49 (1.37-1.62) **	1.39 (1.12-1.73) **
Age at diagnosis (years)		
18-59	Ref	Ref
60 to 79	5.32 (4.75-5.97) **	20.80 (9.61-45.01) **
80	13.71 (12.02-15.64) **	204.31 (95.60-436.64) **

** P-value<0.01 ** P-value<0.001 *** Further adjusted by onset month.*
[&] Cases are from Estonia (735), France (4), Ireland (49), Luxembourg (46 863), Malta (2 996), Norway (877) Poland (346 873), Romania (17).
$ Cases are from Estonia (735), France (4), Ireland (49), Luxembourg (46 863), Malta (2 996), the Netherlands (271 000), Romania (17).

The main results for the Relative Risks (RR) and the 95% Confidence Interval (95% CI) of hospitalisation and death are shown in Table 5: the adjusted risk of hospitalisation increases by 17% for those having received a booster dose three months or more before diagnosis of COVID-19, compared to less than three months before. A significant increase in the adjusted risk of hospitalisation is seen also among men compared to women (RR=1.49, 95% CI: 1.37−1.62) and among older age groups. Regarding the adjusted risk of death, those who received the booster dose three months or more before their diagnosis of COVID-19 have a 4.8-fold increase in the risk of dying after COVID-19 onset compared to those who received it less than three months before. A significant increase in the adjusted risk of death is also seen for men (RR=1.39, 95% CI: 1.12−1.73) and older adults.

Update of data on vaccine effectiveness and duration of protection following booster doses against the Omicron variant

The recently published ECDC technical report on the second mRNA COVID-19 vaccine booster dose, published on 28 April 2022, included a review of the available scientific evidence on vaccine effectiveness against the Omicron variants BA.1 and BA.2 [1]. The updated overview of COVID-19 vaccine effectiveness (VE) in this section of the report is largely based on an ongoing systematic review of COVID-19 vaccine effectiveness studies conducted by the International Vaccine Access Center, John Hopkins Bloomberg School of Public Health and the World Health Organization (WHO) [10], with the latest update provided on 23 June 2022, and also through regular monitoring of published and preprint literature up to 4 July 2022.

Since the previous document, additional studies have been published that are included in the summaries below [11-19].

Vaccine effectiveness against infection over time with the Omicron variant

Studies have found that VE against infection with the Delta and Omicron variant wanes over time, starting from around two to three months after completing the primary series [1]. Similarly, the effectiveness against documented infection wanes after administration of a first mRNA vaccine booster dose, from estimates within the range of 45−66% in the first 0 to three months, to around 25−45% between three to six months after the booster dose [20-26]. Estimates for symptomatic infection (as compared to documented infection that also includes asymptomatic infection) are in a slightly higher range, but direct comparisons between studies should be avoided due to different study designs, study population, settings, etc [27-30]. The majority of these studies were conducted during the period where the Delta or Omicron subvariants BA.1 and BA.2 were dominant.

Vaccine effectiveness against transmission with the Omicron variant

Studies conducted in the UK investigating VE against transmission of Omicron and Delta variants in household and non-household settings have found that transmission is less likely from cases receiving a booster dose compared to those receiving only primary vaccination [31,32], but that the protective effect is less pronounced for Omicron compared to Delta [31]. In summary, the studies suggest that booster doses in general have a modest effect and limited duration in preventing Omicron transmission in the population [31-33].

Vaccine effectiveness against severe disease due to the Omicron variant by time since first booster

Several studies conducted during the period when the Omicron subvariants BA.1 and BA.2 were dominant have estimated vaccine effectiveness against severe disease or hospitalisation at sequential time points after the administration of a first booster dose (third dose) [1]. In summary, these studies suggest that vaccine effectiveness against severe outcomes is high following the administration of a booster dose, with estimates of around 77−94% protection for up to two to three months after receiving it [12,16,19,28,29,34-38]. Studies with a follow-up period of three to six months after the first booster dose are heterogenous, but generally show a gradual decrease in effectiveness against severe COVID-19 outcomes (VE estimates in the range of 53-100%) [34,35].

Few studies with a follow-up time longer than six months are available, but a nationwide cohort study from Slovenia estimated the unadjusted vaccine effectiveness against severe acute respiratory infection (SARI) COVID-19 to be 96% (95% CI 90-99%) in 65-year-olds and above at six months or more after administration of a first booster dose [17]. The corresponding effectiveness in younger age groups (18–49 and 50–64-year-olds) was estimated to be 100% at the same follow-up time, but the number of cases were small in these groups and no confidence interval could be calculated. In addition, a preprint study from Israel estimated the relative effectiveness of a first booster dose of Comirnaty to be 68% for hospitalisation and death at six to seven months after the administration of the booster, but this was in comparison to primary vaccination [11].

The available studies indicate that a first booster dose provides strong protection against severe disease in all the investigated age groups, and there are no clear signs of a more rapid waning in elderly groups. In a nationwide study from Finland, the effectiveness against hospitalisation among 70 years old and above was estimated to be 90% (95% CI 87-93%) at 61 or more days after a first booster dose [12], and studies of age groups above 60 or 65 years old have provided estimates in the range 67-96% at three months or more after the first booster [11,15,16,29,37]. Nationwide data from UK reported higher vaccine effectiveness against hospitalisations for 65 years and older (peak estimate of

92.4% and dropping to 76.9% at 15 or more weeks) compared to 18-64 year olds (82.4% and dropping to 53.6%) after administration of a first booster dose, but the observed discrepancy may be explained by younger age groups being more likely to be hospitalised with COVID-19 as an incidental finding [25]. Similarly, a nationwide study from Denmark reported slightly higher estimates in 60 years or older (94%, 95% CI 93-96%, dropping to 77%, 95% CI 71-82%, at 4+ months) compared to 12-59 year olds (90%, 95% CI 88-91, dropping to 33%, 95% CI 1-55%) after administration of a booster dose [15]. The nationwide cohort study from Slovenia also reports similar or higher VE for 65-year-olds and above compared to younger age groups, although the number of cases are relatively few in the younger age groups [17].

These results are in agreement with summarised evidence on VE after primary vaccination suggesting that the waning of protection proceeds more rapidly in older age groups with regards to documented or symptomatic infection, but rates of waning appear to be more consistent, and not as rapid, across age groups for severe disease [39].

Vaccine efficacy and effectiveness of a second booster dose against infection and severe disease

Data on the efficacy and effectiveness of a second mRNA vaccine booster (fourth dose) are still scarce at this point, with little evidence on duration of protection due to short follow-up times of the available studies. In addition, most of the estimates provided so far are mainly calculated as a relative benefit compared to a third dose given three or four months earlier, rather than against those who are unvaccinated. The Canadian study by Grewal et al shows that vaccine effectiveness against infection and severe outcomes ≥7 days after administration of a second booster dose was higher by around 20-40 percentage points when using the unvaccinated as reference group instead of those given a first booster dose [16].

From the evidence available so far, a second booster seems to restore the humoral immune response to levels similar to those shortly after the first booster dose as seen in an open-label non-randomised clinical study from Israel [40].

A second booster improves VE against infection, but this seems to wane rapidly as seen within the short follow-up period available so far after the second booster dose. Studies on vaccine effectiveness against Omicron infection after the second booster dose are heterogenous with regards to study design and follow-up time after the last dose, with estimates ranging from 18 to 81%, comparing those that received a second booster dose with those that only received the first booster dose [16,41-46]. A study from Israel that estimated the effectiveness at sequential time points reports a peak of 64% shortly after receiving the second booster dose, declining to 30% at 10 weeks post second booster dose [43]. VE against severe disease remains high (in the range of 62-77% depending on the specific outcome and study) during the short follow-up period covered in the studies available so far, and seemingly restore the slightly reduced protection seen four months after the first booster dose [16,41,43,44,46,47]. A recent preprint from Israel found that in addition to a maintained high effectiveness of a first booster dose in preventing severe disease (during a seven month follow-up), a second booster dose provides additional protection (assessed during Omicron BA.1 and BA.2 sublineage dominance) [11]. To summarise, the benefit of a second booster dose against infection appears short-lived and limited. The protection of a first booster dose against severe outcomes wanes gradually with time, and a second booster dose seemingly restores the protection against severe disease, hospitalization and deaths.

Effect of vaccination and previous infection on Omicron sub-lineages

It is not fully understood to what extent the different sub-lineages of Omicron influence vaccine effectiveness. A case control study from the southern part of Sweden reported on a rapid decline in vaccine effectiveness against severe COVID-19 that coincided with the transition from Omicron BA.1 to BA.2 dominance in the region [48]. The decline was observed among persons who had received two vaccine doses only, while the effectiveness from the first booster (three doses) remained stable. Other studies from Qatar and the UK have reported similar vaccine effectiveness estimates for the sub-lineages BA.1 and BA.2 in relation to symptomatic infection [28,49], and hospitalisation or death [21].

At present, there are only limited data available on vaccine effectiveness against different clinical outcomes for Omicron sub-lineages BA.4 and BA.5. There is preliminary analysis provided by the UK Health Security Agency that indicate that the vaccination status of cases infected with BA.4 and BA.5 is not significantly different to that of cases infected with BA.2 (adjusted odd ratio- aOR 1.13; 95% CI 0.88-1.44 and aOR 0.83; 95% CI 0.88-1.44, respectively). The authors observe that these early data do not indicate a difference in vaccine effectiveness against BA.4 or BA.5 as compared to BA.2 at this stage, however a test-negative case control vaccine effectiveness study will be carried out when data are available [8]. A study from South Africa that investigated clinical outcomes of Omicron BA.4/BA.5 infections reported that strong protection against severe COVID-19 conferred by prior infection and vaccination was retained in the BA.4/BA.5 wave, with three homologous doses of Janssen or Comirnaty or a heterologous combination of these providing 83% protection (95% CI 60 to 93%) against severe COVID-19 hospitalisation or death [50]. In addition, a preliminary analysis from Portugal comparing reinfections and vaccination breakthrough infections in BA.2 and BA.5 cases have suggested that BA.5 has higher immune evasion from previous infections, and that the vaccine effectiveness against infection with BA.5 is reduced compared to infection with BA.2 (preliminary information from unpublished study).

Some recent studies have investigated previous infection, vaccination and protective effect focusing on the Omicron subvariant BA.4 and BA.5. A recent pre-print from Qatar found that the protection conferred by a previous infection

against BA.4/BA.5 infection was modest when the previous infection involved a pre-Omicron variant, but strong when the previous infection involved the Omicron BA.1 or BA.2 subvariant. Importantly, the protection from previous infection was lower against BA.4/BA.5 than against BA.1/BA.2, consistent with BA.4/BA.5's greater capacity for immune-system evasion. Sensitivity analyses, adjusting for vaccination status in conditional logistic regression, showed similar results [51]. As described above, the recent pre-print study from South Africa found that disease severity was similar amongst confirmed COVID-19 cases in the BA.4/BA.5 and BA.1 periods in the context of growing immunity against SARS-CoV-2, due to prior infection and vaccination, both of which were strongly protective. Prior confirmed infection was strongly protective against severe hospitalisation or death (aHR 0.29; 95% CI 0.24; 0.36) as was vaccination with aHR (95% CI) of 0.17 (0.07; 0.40); 0.37 (0.33; 0.42) and 0.26 (0.21; 0.32) for 'first booster dose', 'two doses' and 'single dose', respectively. Strong protection against severe COVID-19 conferred by prior infection and vaccination was retained in the BA.4/BA.5 wave [50].

Evidence on the protective effect of hybrid immunity

Decision-making around the need for, and timing of additional vaccine doses requires careful consideration of the level of immunity against SARS-CoV-2 in those populations targeted for vaccination. Population immunity can be broadly estimated by measuring both vaccination coverage and the proportion of the population that has experienced prior infection. Due to the recent exposure of large numbers of the population to the Omicron BA.1 and BA.2 variants, hybrid immunity—developed via a combination of full primary course vaccination and at least one prior infection—is likely to play an increasingly important role in protection at population level [52-54]. Hybrid immunity results in the improved induction of site-specific, mucosal IgA (binds to virus/virus expressing host cells) and tissue-resident CD4 and CD8 T cells (lyse infected host cells), which are not induced by injectable vaccines, and which may not be effectively induced by mild natural infections [55]. In the context of Omicron, hybrid immunity has been shown to confer better protection against both SARS-CoV-2 infection and severe outcomes (hospitalisation and death) when compared to vaccine-induced or infection-induced immunity alone [18,19,21,24,53,54]. Evidence to-date also indicates that variant-specific protection against infection and severe disease conferred by hybrid immune responses wane more slowly than protection conferred by vaccine-induced or infection-induced immunity alone [18,54].

As yet, no absolute serum antibody titre threshold has been established as a correlate of protection against SARS-CoV-2 infection, and immune correlates have not been established for protection against severe disease [56,57]. However, serum neutralising antibody titres are well-established predictors of protection against SARS-CoV-2 infection [57]. Nationally representative, age-stratified sero-epidemiological studies provide a basis for estimating the proportion of the population with SARS-CoV-2-specific antibodies in a given country. These, in turn, provide a basis for estimating projected disease burden and evaluating the potential benefit of additional booster doses during periods of increased viral circulation. Such studies are particularly informative when they use quantitative assays to determine the level of both natural and vaccine-induced antibodies in participating individuals to estimate the contribution of natural, vaccine-derived and hybrid immunity in the population [58,59]. Given that serum antibodies wane over time [60], longitudinal or repeated studies with the same sampling strategy and common testing methodology are essential for understanding temporal trends and risks, as is continued vigilance for the immune escape capabilities of newly emerging variants.

Population serosurveys estimating the proportion of the population experiencing prior infection before, during and after the emergence of Omicron, show that despite observed increases in all age groups, older age groups appear less likely to be exposed to or experience Omicron infections. In contrast to younger adults, persons 60 years of age or older face the highest rates of hospitalisation and death, whilst having the lowest rates of combined infection and vaccination [58,61]. These age-specfic trends caution against the assumption that hybrid immunity is developed uniformly across the population.

Evidence from studies looking at the combined effect of naturally-acquired immunity and vaccine-induced immunity clearly point to an extra layer of protection for those with hybrid immunity. However, the scale of natural-acquired immunity in populations is difficult to quantify due to issues such as the under-ascertainment of COVID-19 cases and reinfections, the lack of unbiased, longitudinal seroprevalence data, and the waning profiles of protection. In addition, few vaccine effectiveness studies disaggregate results by prior infection status. For those that do, direct comparison between studies is challenging, owing to heterogeneity (type of study, study population, type of vaccine, follow-up time, sequence of infection/vaccination).

Current recommendations on a second booster dose in the EU/EEA

There are currently 20 EU/EEA countries recommending a second booster dose in immunocompetent individuals (Austria, Croatia, Cyprus, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Sweden). The second booster dose is under discussion in three countries (Latvia, Lithuania, Spain). Twenty countries recommend a second booster for those in the 60+ to 80+ years age group; 11 counties for long-term care facilities residents and four countries for healthcare workers or personnel working in LTCFs. Other population groups are also included in some countries (home care; chronic diseases or underlying conditions; Down syndrome; vaccinated with Jcovden – previously COVID-19 vaccine Janssen). The time interval after the first booster dose differs among countries from an earliest time of three months up to five months (six months for healthcare workers) (see Table A1 in Annex 2 for more details on country recommendations for booster doses).

Uptake of primary vaccination, first and second booster doses in the EU/EEA

As of 10 July 2022, the uptake of the primary vaccination course against COVID-19 in the total EU/EEA population had reached 72.8% (range: 29.8 – 86.4%) and is levelling off with very limited progression over the last month. The uptake of the first booster dose[1] has reached 63.8% (range: 11.2 – 85.9%) among adults aged 18 years and above and is increasing very slowly (average 0.1% weekly increase in the last month). The uptake of the first booster dose is still showing some increase among younger adults aged 18−24 years (average 0.2% of weekly increase in the last month) (Figure 4). Among individuals above 60 years of age, the median uptake of the primary course and first booster dose has reached 90.8% (range: 38.3-100%) and 83.1% (range: 13.5 – 97.5%) respectively (Figure 5). Overall, the progress in vaccine uptake remains uneven across EU/EEA countries (Figure 6). [3].

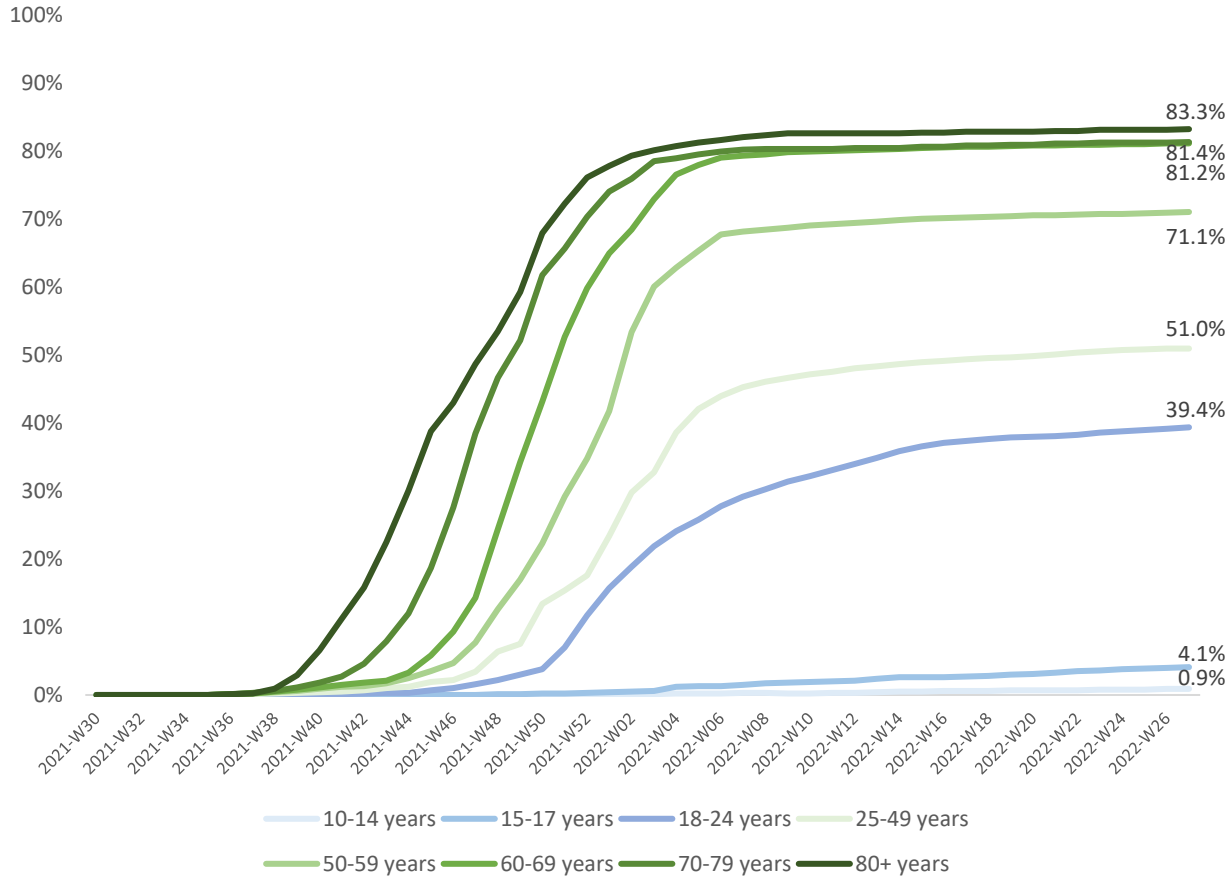
Based on preliminary data reported to TESSy by 19 EU/EEA countries, ~16.5 million second booster doses[2] have been administered to adults 18+ years of age and 88% of them have been administered to those 60+ years of age. The cumulative uptake of the second booster dose among reporting countries is 4.5% in 18+ years olds (range: <0.1-19.8%), 11.6% in those 60+ years old (range: <0.1-59.5%) and 20% in those 80+ years old (range: 0.1-80.1%) [62]. The uptake among 60+ is still low in most countries (only four countries exceeded 25% of 60+ as of week 27: 59.5% in Sweden; 48.8% in the Netherlands; 40.9% in Ireland and 35% in Malta).

Table 6 summarises the uptake of the primary course, first and second booster dose by selected age group as of 10 July 2022. More information on COVID-19 vaccine doses administered and vaccine uptake rates can be found in the ECDC Vaccine Tracker.

[1] For surveillance purposes, this refers to the first additional dose of COVID-19 vaccine administered after the standard primary course. Therefore, the count and uptake estimates may include both first booster doses administered to immunocompetent persons and additional primary course doses administered to immunocompromised individuals.

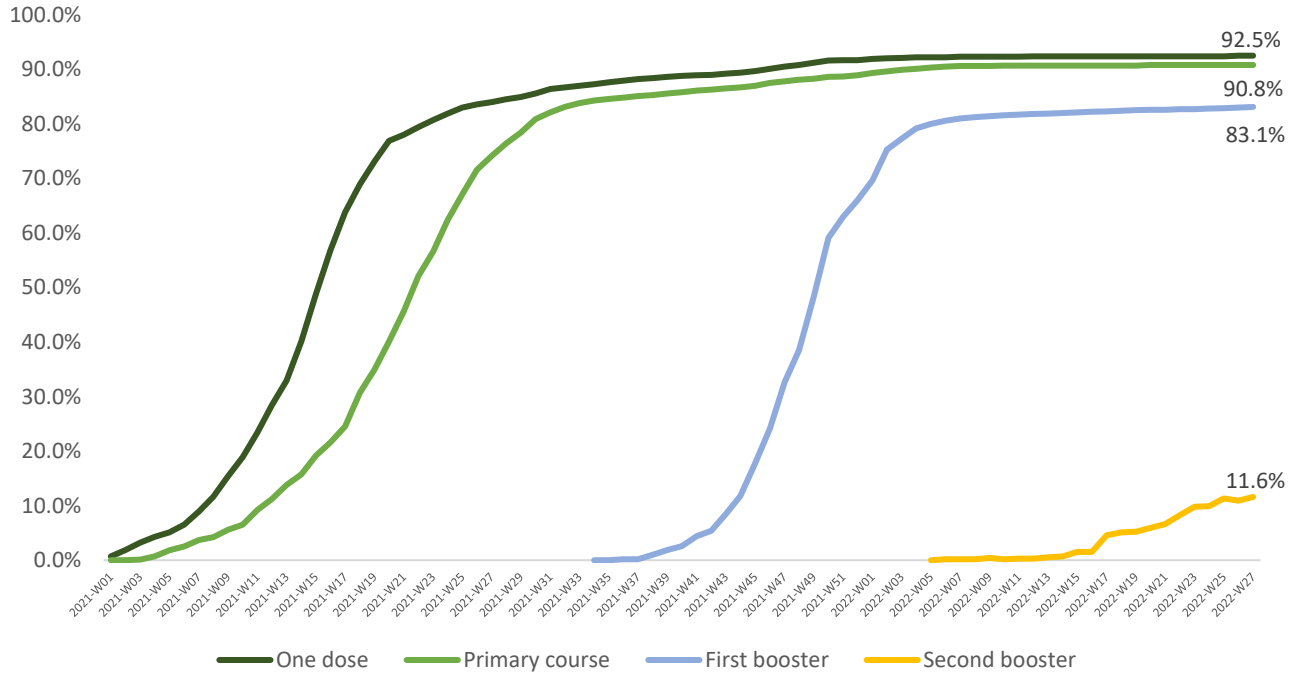
[2] For surveillance purposes, this refers to the second additional dose of COVID-19 vaccine administered after the standard primary course. Therefore, the count and uptake estimates may include both second booster doses administered to immunocompetent persons and second additional doses administered to immunocompromised individuals after a standard primary course.

Figure 4. Median cumulative uptake of first booster dose of COVID-19 vaccine by age group in the EU/EEA (as 10 July 2022)



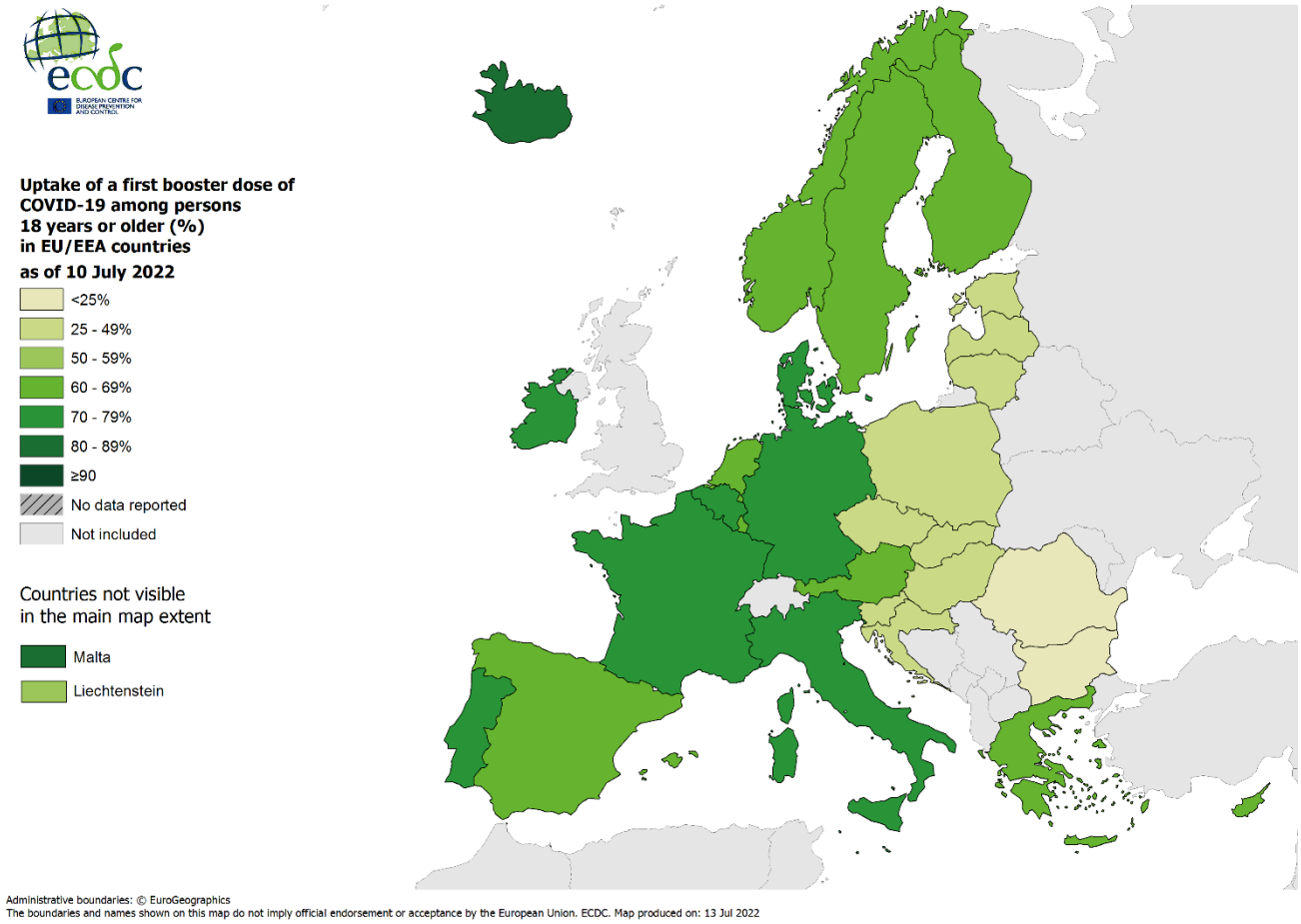
Source: TESSy data reported by 30 countries.

Figure 5. Median cumulative uptake of one dose, primary course first and second booster of COVID-19 vaccine among 60+ in the EU/EEA (as of 10 July 2022)



Source: Cumulative uptake of the primary vaccination course based on the dosing schedule authorised in the EU/EEA. Numbers of countries reporting to TESSy: 30 for uptake primary course and first booster, 21 for second booster.

Figure 6. Uptake of first booster dose of COVID-19 vaccine among adults aged 18 years and above in EU/EEA countries (as of 10 July 2022)



Source: TESSy data reported by 30 countries.

Table 6. Summary table of COVID-19 vaccine uptake (as of 10 July 2022)

Population group	Uptake of primary course (range)	Uptake of the first booster dose (range)	Uptake of the second booster dose (range)
Total population	72.8% (29.8-86.4%)	52.9% (9.1-69.1%)	3.7% (<0.1-15.6%)
Adults (18+)	83.6% (35.6-94.5%)	63.8% (11.2-85.9%)	4.5% (<0.1-19.8%)
Persons aged 60+*	90.8% (38.3-100%)	83.1% (13.5-97.5%)	11.6% (<0.1-59.5%)
Persons aged 80+*	94.1% (26.2-100%)	83.3% (8.0-100%)	20% (0.1-80.1%)

Note: cumulative uptake of the primary vaccination course based on the dosing schedule authorised in the EU/EEA. Numbers of countries reporting: 30 for uptake primary course and first booster in total population and 18+, 21 for second booster; 30 for uptake primary course and first booster in 60+, 21 for second booster; 29 for uptake primary course and first booster in 80+ (missing Germany), 21 for second booster.

**Median uptake among reporting countries.*

Plans for autumn/winter vaccination campaigns in EU/EEA countries

Several EU/EEA countries are currently discussing their future COVID-19 vaccination strategies and the need for additional booster doses before the autumn/winter period when another wave may arrive. The planning of future vaccination strategies and campaigns for the autumn is based on each country's epidemiological situation, the effectiveness of previously administered vaccinations, the potential availability of new, updated and more effective vaccines, and the identification of risk groups. A few EU/EEA countries have already published recommendations for their autumn/winter vaccination campaigns:

- The Belgian Superior Health Council has published recommendations that all risk groups should be vaccinated with an additional booster by the end of September 2022 at the latest and that the campaign should be 'as compact as possible' to maximise the benefits of vaccinating against COVID-19 (the interval should be at least three months, but preferably six months for the administration of an additional booster dose). For the autumn/winter season 2022-2023 a proactive mass vaccination campaign will target adults 65 years of age and older, any patient with immune suppression due to disease or treatment, any patient with at least one comorbidity, all pregnant women, all 'persons active in the care sector' in and outside care institutions, and people living in the same household as people at high risk of severe disease [63].
- The Danish Health Authority has provided preliminary recommendations for an autumn vaccination campaign starting from 15 September for residents in LTCF and other vulnerable elderly people. From the 1 October, all individuals over 50 years of age and those who are severely immunocompromised (regardless of age) will be offered vaccination. Final recommendations are expected in August [64].
- The French Haute Autorité de Santé (HAS) has published recommendations to anticipate the organisation of a vaccination booster campaign for autumn 2022 for the population groups most at risk of severe forms of the disease (immunocompromised, people 65+ years old and/or with comorbidities), with consideration of vaccination of healthcare professionals. The vaccination campaign against COVID-19 will be combined with the one for influenza. In addition, as soon as updated vaccines obtain their marketing authorisation, HAS will assess them, specify their inclusion in the vaccine strategy and indicate, where applicable, the preferred type of vaccine to be used for each population according to their characteristics [36].
- The Portuguese Directorate-General of Health published interin recommendations for the next autumn-winter 2022-2023 COVID-19 vaccination strategy. It is planned that, at the beginning of September, a new dose/booster of COVID-19 vaccine will be given to: nursing home residents; people aged 65 and over; people aged 18 years and over with comorbidities that have a risk for COVID-19; healthcare and nursing home professionals. The inclusion of other priority groups is under discussion. Portugal plans to use the best available vaccine for the variants in circulation (country communication).
- The Swedish Public Health Agency has provided new recommendations for the autumn COVID-19 vaccination campaign starting from 1 September 2022, to adults 65 years of age and older and people in risk groups from the age of 18 years (including among others pregnant women, people with weakened immune systems, people with heart and lung disease). For adults 18-64 years of age, the recommendation remains for one booster dose, however anyone can take a second booster in this age group if they request it [65].

Updated COVID-19 vaccines

The mRNA technology is the only platform that can deliver updated versions of approved vaccines in time for vaccination campaigns for this autumn/winter. Currently under investigation are monovalent Omicron BA.1 vaccines and bivalent Omicron BA.1 and original strain vaccines from both Pfizer/BioNTech and Moderna. Following a recent FDA statement, vaccines incorporating BA4/5 are expected to be developed as well [66].

On 15 June 2022, EMA started a rolling review of an Omicron-adapted Comirnaty COVID-19 vaccine [67]. The review will initially focus on chemistry, manufacturing and controls (CMC), which relate to the manufacturing of the vaccine. As the company makes progress in the development of its adapted vaccine, EMA will receive more data, including data on the immune response to the vaccine as well as data on neutralisation of Omicron subvariants, including BA4/5. On 17 June 2022, EMA started a rolling review for a bivalent Spikevax COVID-19 vaccine adapted to provide better protection against two strains of SARS-CoV-2, the original strain and the BA.1 Omicron variant of concern [68].

On 17 June 2022, the WHO Technical Advisory Group on COVID-19 Vaccination Composition (TAG-CO-VAC) issued an interim statement on the composition of current COVID-19 vaccines and concluded that, given the uncertainties of further evolution, it may be prudent to pursue the additional objective of COVID-19 vaccination of achieving a greater breadth in the immune response against circulating and emerging variants, while retaining protection against severe disease and death. Available data indicate that the inclusion of Omicron in an updated vaccine composition may be beneficial if administered as a booster dose to those who have already received a COVID-19 vaccination primary series [69].

An International Coalition of Medicines Regularity Authorities (ICMRA) workshop took place on 30 June to discuss with international regulators whether vaccines need to be updated and how. ICMRA members and WHO agreed that authorised COVID-19 vaccines continue to offer protection against severe disease, hospitalisation and death and encouraged their use, where available, both as primary series and as booster doses. Global regulators however also acknowledged that the continuous evolution of SARS-CoV-2 reduces the protection offered by the approved vaccines against infection and mild disease. Although the Omicron BA.4 and BA.5 subvariants seem to be taking over in many parts of the world, experience has shown that new variants may emerge rapidly and replace the currently circulating ones after short-lived waves. Preliminary data indicate that adapted mRNA vaccines, which incorporate an Omicron variant strain, can increase and extend protection, when used as a booster. Additionally, according to emerging data, a bivalent mRNA vaccine targeting two strains of SARS-CoV-2, one of which should be an Omicron strain, may provide some advantages in widening the immune response. Bivalent vaccines could be considered initially for use as boosters. Their use for primary vaccination might be supported in the future when further data become available [70].

Additionally, there are new candidate vaccines that contain the Beta variant strain that are currently under assessment by the EMA and they might represent an additional modality for booster doses, if an approval is confirmed before autumn.

Estimating the impact of future COVID-19 vaccination campaigns on the hospitalisation risk in individuals aged older than 60 years by mathematical modelling

Modelling approach and parameters to estimate the vaccine effectiveness against infection and hospitalisation at population level

We estimate vaccine induced protection against infection and against severe disease based on available data of vaccine effectiveness (VE) measured against Omicron subvariant BA.1. We assume that VE against infection wanes following a functional shape based on decaying antibody titers [71]. We use this relationship to back-calculate VE at full vaccine effect (two weeks post administration), which we denote as VE0. For Corminaty we estimate VE0=0.76 [27,34,72], for Spikevax we estimate VE0=0.87 [72], for Vaxzevria we estimate VE0=0.46 [72], and due to lack of data we assume the same VE0 for COVID-19 Vaccine Janssen as for Vaxzevria.

Given the large uncertainty around the waning of immune protection from vaccines, we assume an optimistic and pessimistic waning scenario of the VE against infection. In the optimistic scenario, the relative VE against infection decreases by 60% after 35 weeks, and in the pessimistic scenario the relative VE against infection decreases by 60% after only 13 weeks. Assuming the functional waning shape based on antibody titers [71], immunity keeps declining beyond those time points. For VE against hospitalisation we assume the same protection from all vaccine types, which we estimate as VE0=0.92 [73,74]. Across scenarios we assume that VE against severe outcome wanes four times slower compared to VE against infection. This captures waning of the relative VE against severe outcome by 7% to 24% after six months (for the optimistic and pessimistic scenario, respectively).

We assume that the VE after a first or second booster is independent of the vaccine products used in the primary vaccination series, and we do not differentiate between a Comirnaty or Spikevax booster. We assume the protection of a first booster against infection to be VE0=0.86 [35,73,75], and against hospitalisation to be VE0=0.94 [76]. We assume that the vaccine-induced protection following the booster decays the same way as following the primary vaccination schedule, both for the vaccine-induced protection against infection and against severe outcomes. We assume that a second booster dose restores the vaccine-induced protection against infection and severe disease of the first booster, and has the same waning profile.

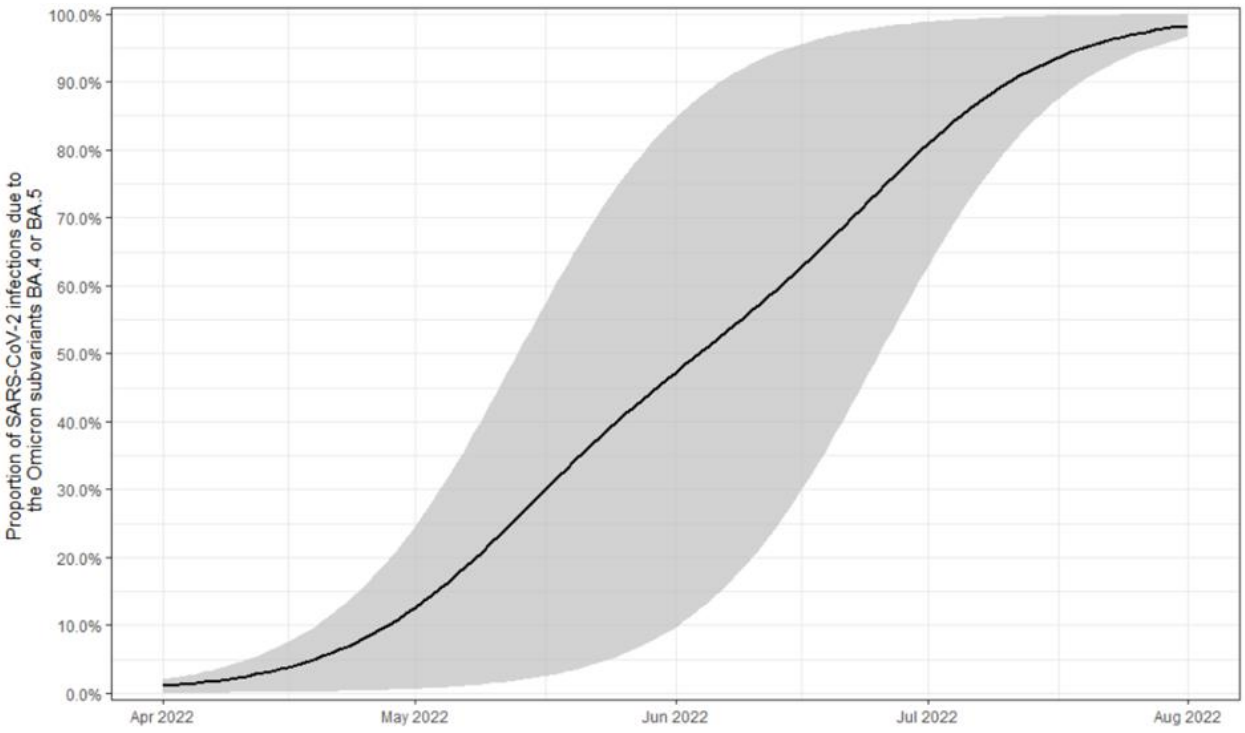
Due to lack of data, we assume no increased transmissibility of BA.4 and BA.5 in comparison to previous Omicron subvariants. Hence, we consider that the growth advantage of BA.4 and BA.5 is due to an increase of immune escape of vaccine-induced and naturally-acquired protection. In Figures 8 and 9 below, we vary the immune escape of vaccine-induced protection against infection due to BA.4 and BA.5 in comparison to previous Omicron subvariants from 0-20%. This range is in agreement with preliminary data that was shared with us confidentially. As there is currently no other indication, we assume the same severity for BA.4 or BA.5 as compared to previous Omicron lineages.

Model predictions of the future BA.4 and BA.5 proportions and the vaccine-induced protection against infection in the EU/EEA

Sequencing data from GISAID of COVID-19 cases until early June 2022 indicate that the Omicron subvariants BA.4 and BA.5 are quickly taking over in countries throughout the EU/EEA [7]. We predict the future combined BA.4 and BA.5 proportion for every country in the EU/EEA for which sufficiently reliable and recent sequencing data is available in GISAID (at least 100 Omicron sequences on 16 May or later, altogether 16 countries). For each of these EU/EEA countries, we fit a logistic curve to the past sequencing data, which matches the observed data well and yields predictions of the future proportion of BA.4 and BA.5. As shown in Figure 7, by end-July 2022 the vast majority of all COVID-19 cases (>95%) in the EU/EEA are predicted to be due to BA.4 or BA.5. We emphasise that the predicted proportion of BA.4/BA.5 infections in Figure 7 is obtained directly from fitting to observations of sequencing data, which does not require the transmissibility or immune-evasion of BA.4 and BA.5.

We note that, as with any extrapolation, there are major uncertainties that may affect the accuracy of our predictions in Figure 7. First, only a subset of EU/EEA countries provided sufficiently reliable and recent sequencing data (16 of 30 countries). Hence, the predictions in Figure 7 are applicable to the whole EU/EEA only under the assumption that a similar trend holds also for countries for which sufficiently reliable or recent sequencing data was not available. Indeed, the estimated proportion of BA.4 and BA.5 for countries with sufficient sequencing data varied less than 1.8% from the mean prediction at the end of July 2022. Second, also for the subset of countries with available sequencing data, the predictions are subject to uncertainties due to country-specific testing and sequencing practices, which have been changing over time, as well as the viral characteristics of the Omicron subvariants BA.4 and BA.5, including changes in the rates of asymptomatic cases and PCR test sensitivities.

Figure 7. Predicted proportion of SARS-CoV-2 infections in the EU/EEA caused by the Omicron subvariants BA.4 or BA.5

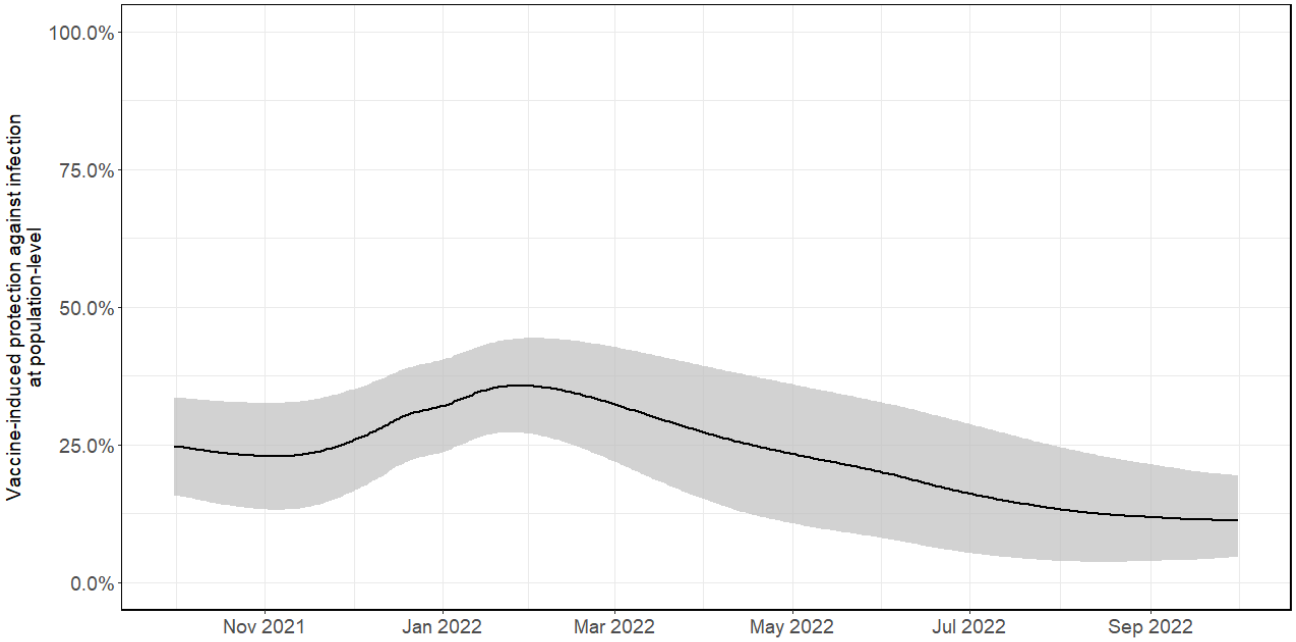


Note: The predictions for each considered EU/EEA country fall within the grey shaded area, and the solid black line is the mean across the predictions of the considered EU/EEA countries.

Preliminary data suggest that BA.4 and BA.5 may result in a substantial reduction of the population-level vaccine protection against infection (the vaccine effectiveness against infection, averaged over the whole population including non-vaccinated individuals) and an increased probability of reinfections. Additionally, the population-level vaccine protection against infection from the primary vaccination course and the first booster dose is likely to have waned substantially by July 2022. We emphasise that, in contrast to the potential reduction of the vaccine effectiveness against infection due to BA.4 or BA.5, there is currently no indication of a decrease in vaccine effectiveness against severe outcome due to BA.4 or BA.5 in comparison to previous Omicron lineages; hence, we assume the same vaccine-induced protection against severe outcomes for BA.4 and BA.5 as for earlier Omicron lineages.

Figure 8 presents estimates of the reduction of vaccine protection against infection at the population-level; we build upon the predictions of the BA.4 and BA.5 proportion shown in Figure 7 and assume that the vaccine effectiveness against infection is reduced by 0%-20% due to BA.4 and BA.5, as compared to previous Omicron sublineages (due to the current lack of evidence, we assume that both BA.4 and BA.5 result in the same reduction of the vaccine effectiveness).

Figure 8. Predicted vaccine effectiveness against infection (averaged across the whole EU/EEA population, and based on assumptions of increasing proportion of BA.4/5 infections from April onwards)



Note: The predictions for each EU/EEA country and for each uncertain spreading parameter fall within the grey shaded area, and the solid black line is the mean across the predictions of the considered EU/EEA countries and parameter uncertainties. Note that the vaccine-induced protection against infection at a population-level does not include protection against infection from prior infections which would increase the population level protection against infection.

Figure 8 shows that, after a peak due to the first booster rollout in early 2022, the vaccine-induced protection against infection at population-level, taking into account the estimated increasing proportion of BA.4 and BA.5 infections during the summer, has been decreasing steadily. By September 2022, the estimated vaccine effectiveness against infection, averaged across the whole population of the respective countries, is reduced to 3%-20% in the EU/EEA. The broad range of the predictions reflect substantial uncertainties regarding crucial parameters, including the waning of the vaccine effectiveness against infection, the current and future proportion of BA.4 and BA.5 and the reduction of the vaccine effectiveness against infection due to BA.4 and BA.5. The estimated substantial waning of the vaccine effectiveness against infection is consistent with the recent rise of COVID-19 notifications rates in the EU/EEA in the past three weeks. Further circulation of SARS-CoV-2 across the EU/EEA is probable in autumn and winter 2022, which results in continued exposure for at-risk groups. We emphasise that Figure 8 considers the vaccine effectiveness against infection, the vaccine effectiveness against severe disease is considered further below.

Scenarios for vaccination campaigns in summer and autumn

To assess the risk of a continued exposure of risk groups to SARS-CoV-2 infection, we conduct scenario analyses until the end of December 2022, for which we explore different vaccination strategies for countries that have not started a rollout of the second booster. In the following, we consider scenarios of rolling out a second booster to elderly individuals and closing the gaps in vaccination by increasing coverage of the primary course and/or first booster dose, as given in detail below:

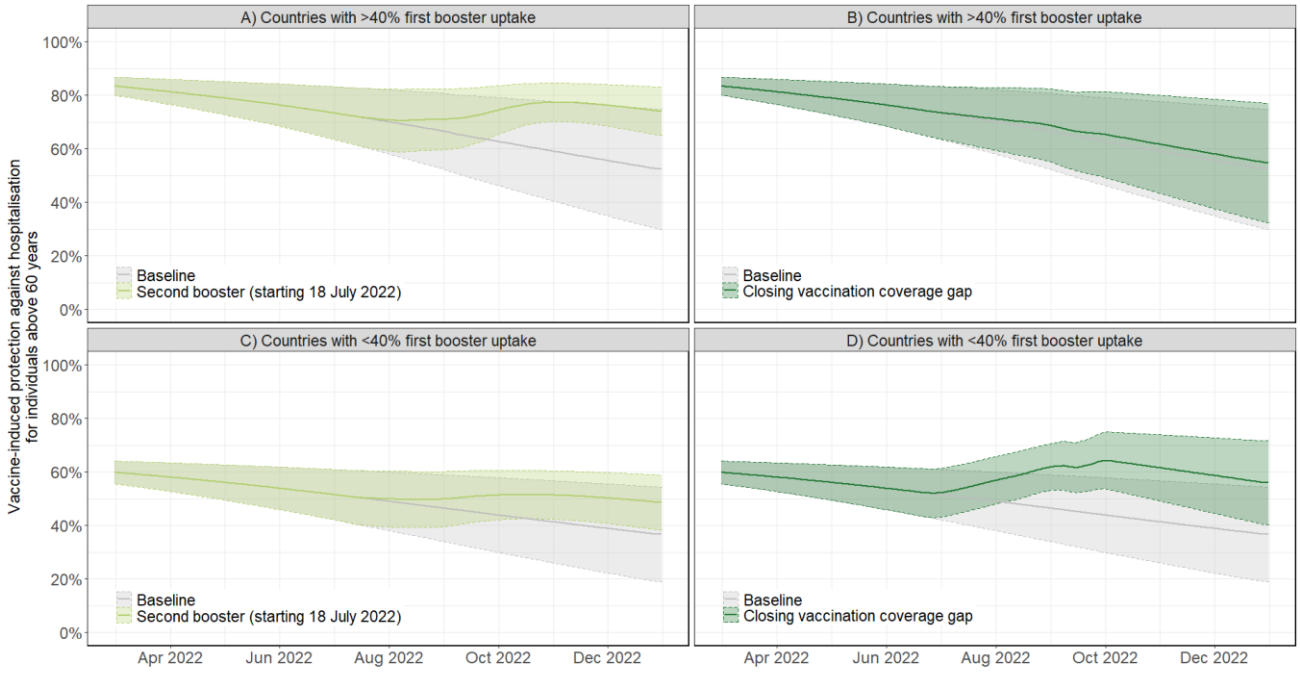
- **Second booster dose rollout.** In this scenario, we consider a rollout of a second booster to individuals older than 60 years who already received a first booster dose. We consider an eventual uptake of 75% of the second booster dose among individuals older than 60 who received a first booster. We consider that the rollout starts on 18 July 2022, and we assume the same speed of the second booster rollout as observed for the past first booster rollout. In Annex 1, we also evaluate the impact of a different start date of the second booster rollout (1 August 2022, 1 September 2022, or 1 October 2022) and the impact of a faster booster rollout, where the eventual uptake of 75% is attained in six weeks. Our modelling focuses explicitly on vaccine effectiveness and second boosters given to individuals of a certain age category (older than 60 years) since vaccine coverage or other data is available by age group.
- **Closing the coverage gaps of the first booster and primary vaccination series.** We consider an optimistic scenario of reducing the vaccination coverage gap for the first booster dose by 50% for individuals between 18 and 59 years and by 75% for individuals older than 60 years by 1 October 2022. Additionally, we consider that the coverage gap for the primary vaccination series for individuals older than 18 years is reduced by 50% by 1 October 2022.
- **Baseline scenario.** In this scenario, we consider that there are no new vaccine campaigns, while current vaccination uptake trends continue.

To capture the uncertainty concerning future viral circulation, we assess each of these intervention scenarios for a range of parameter settings relating to the waning of protection against infection and severe disease, as well as uncertainties relating to the spread of BA.4 and BA.5 and the resulting reduction in vaccine effectiveness against transmission. The results are presented as ranges of estimates across these different settings.

Model predictions of the future hospitalisation risk and conclusions

Figure 9 shows the estimated vaccine effectiveness against hospitalisation over time, averaged over all individuals above 60 years, for the three different vaccination scenarios. The results show that a second booster rollout has a substantial effect on the protection of individuals older than 60 years against hospitalisation, which is particularly large for countries with a high uptake of the first booster dose. More specifically, the expected median absolute increase (in percentage points) of the vaccine-induced protection against hospitalisation on 1 November 2022 due to a second booster rollout starting on 18 July 2022 is 17% (95% UI 6-34%) for countries with a high first booster uptake (see Figure 9A), and 5% (95% UI 1-24%) for countries with a low first booster uptake (see Figure 9C). Furthermore, countries with a low first booster uptake would benefit strongly from a vaccination campaign that aims to reduce the vaccination gap of the primary vaccination series and the first booster (see Figure 9D). The expected median absolute increase (in percentage points) of the vaccine-induced protection against hospitalisation on 1 November 2022 due to closing the vaccination coverage gaps for countries with a low first booster uptake is 16% (95% UI 10-41%) for countries with a low first booster uptake (see Figure 9D).

Figure 9. Predicted vaccine effectiveness against hospitalisation, averaged across all individuals older than 60 years.



Note: the left two subplots compare the baseline scenario with the second booster scenario (starting on 18 July 2022), and the right two subplots compare the baseline scenario with the scenario of closing the vaccination coverage gaps. The top and bottom rows correspond to countries with a high and low first booster uptake (of more or fewer than 40% of the total population, respectively, on 1 July 2022). The predictions for each EU/EEA country and for each uncertain spreading parameter fall within the respective shaded area, and the solid line is the respective mean across the predictions of the considered EU/EEA countries and parameter uncertainties. The expected median absolute increase (in percentage points) of the vaccine-induced protection against hospitalisation on 1 November 2022 due to a second booster rollout starting on 18 July 2022 is 17% (95% UI 6-34%) for countries with a high first booster uptake (see Figure 9A), and 5% (95% UI 1-24%) for countries with a low first booster uptake (see Figure 9C). The expected median absolute increase (in percentage points) of the vaccine-induced protection against hospitalisation on 1 November 2022 due to closing the vaccination coverage gaps is 3% (95% UI 0-10%) for countries with a high first booster uptake (see Figure 9B), and 16% (95% UI 10-41%) for countries with a low first booster uptake (see Figure 9D).

In countries who began second booster vaccination before 18 July 2022, at a similar rollout speed as for the first booster dose, the vaccine-derived protection is expected to be induced earlier than shown in Figure 9, with the curve shifting to the left. In settings with a slow uptake speed before 18 July 2022, the results are not expected to materially change.

Furthermore, we evaluate the impact of different timings of the second booster rollout on the future hospitalisation risk. Figure A1 in Annex 1 shows that there is a considerable advantage of an earlier second booster rollout (18 July) as compared to a later rollout (starting on 1 August 2022, 1 September 2022 and 1 October 2022, respectively). More specifically, Figure A1 shows that the predicted averaged vaccine effectiveness against hospitalisation of the earlier second booster rollout is larger for almost the entire period from 18 July 2022 until 31 December 2022, although the uncertainty intervals are overlapping.

The speed of the second booster rollout in Figure 9 is based on the speed of country-specific first booster rollouts observed historically. The uncertainty bands shown in that figure thus contain both slower and faster rollouts. However, to reflect on the potential advantages of achieving an even faster uptake in second booster vaccines, Figure A2 in Annex 1 shows the effect of an accelerated second booster rollout, which we assumed to reach the eventual uptake plateau of 75% within six weeks. While noting the large uncertainties, a faster second booster rollout starting on 1 September 2022 results in a comparable vaccine effectiveness against hospitalisation by November as the second booster rollout shown in Figure 9 (starting 18 July 2022). However, given the rise in case numbers due to BA.4 and BA.5 at the moment, and if expectations are that a 75% uptake may not be reached within six weeks, then it would be prudent to start the rollout now. Furthermore, a faster second booster rollout starting on 1 October 2022 results in lower vaccine effectiveness against hospitalisation during September/October relative to the second booster rollout shown in Figure 9 (see Figure A2, Annex 1).

We emphasise that Figures 8, 9, A1 and A2 focus on the decrease of vaccine-induced protection against infection and hospitalisation, respectively, due to waning over time and the potential increase of immune-escape of BA.4 and BA.5, while we are not considering additional immunity from previous infections in the population. Naturally-acquired protection does have a considerable impact on the protection against infection and hospitalisation, but the precise extent of naturally-acquired protection in the population is unclear due to substantial uncertainties, which include the under-ascertainment of COVID-19 cases and reinfections, the lack of unbiased and recent seroprevalence data, and the waning profiles of natural, vaccine-induced and hybrid protection. The substantial change in vaccine-induced protection in Figures 8, 9, A1 and A2 suggests a considerable reduction of the protection of individuals above 60 years who have not recently been infected by SARS-CoV-2. Due to fewer human-to-human contacts in general, higher uptakes of the primary vaccination series and first booster doses, and more cautious behaviour, the likelihood of having acquired past infection as a result of exposure in recent months may be particularly low amongst this group.

We summarise the conclusions from ECDC's mathematical modelling as:

- There is a substantial, steady decrease of the vaccine-induced protection against infection at population-level due to waning, and this trend might be exacerbated due to BA.4 and BA.5 Omicron subvariants (based on preliminary evidence). In contrast, there is currently no indication that BA.4 or BA.5 lead to a decrease in vaccine-induced protection against severe outcomes in comparison to previous Omicron lineages.
- For countries with an uptake of >40% of the first booster among the whole population, a second booster rollout can have a substantial impact on restoring protection against hospitalisation in individuals older than 60 years in autumn 2022. The expected median absolute increase (in percentage points) of the vaccine-induced protection against hospitalisation in individuals older than 60 years due to a second booster rollout starting on 18 July 2022 is 17% (95% UI 6-34%) on 1 November 2022.
- For countries with an uptake of <40% of the first booster among the whole population, closing vaccination coverage gaps of the primary vaccination series and the first booster has a larger effect than a second booster rollout, with an expected median absolute increase (in percentage points) of the vaccine-induced protection in individuals older than 60 years of 16% (95% UI 10-41%) and 5% (95% UI 1-24%) on 1 November 2022, respectively.
- An earlier second booster rollout (mid-July 2022) results in a larger protection against hospitalisation in the population above 60 years for the rest of 2022 compared to a later second booster rollout. The benefit in terms of vaccine-induced protection against hospitalisation in the population 60+ decreases the more the starting date of the second booster rollout is moved to a later starting date (we evaluate a starting date in July, August, September or October).

The predictions from mathematical modelling are subject to substantial uncertainties for assessing different vaccination campaigns, including the effectiveness of vaccines against BA.4 and BA.5, the prevalence and severity of BA.4 and BA.5, the associated effectiveness of the vaccine including the speed of waning, the effect of BA.4 and BA.5 on the probability of reinfections, the emergence of new SARS-CoV-2 variants, and the effect of hybrid immunity. Naturally-acquired protection from previous SARS-CoV-2 infections significantly complements the vaccine-induced protection against infection and hospitalisation in Figures 8 and 9, respectively. The level of naturally-acquired protection is uncertain due to lack of epidemiological evidence and data, including under-ascertainment of SARS-CoV-2 infections, lack of recent and unbiased seroprevalence data in the EU/EEA, waning profiles of naturally- and vaccine-induced protection, and the cross-protection and immune escape of different SARS-CoV-2 variants.

Public health considerations for vaccination strategies and campaigns

Considerations on additional booster doses, target groups and timing

Based on current projections, SARS-CoV-2 Omicron variants BA.4 and BA.5 are expected to become dominant across EU/EEA countries and by the end of July 2022 most COVID-19 cases (>95%) in the EU/EEA will be due to BA.4 or BA.5. As of 10 July 2022, the overall notification rates of COVID-19 cases in the EU/EEA remain high and have been increasing for the past five weeks, and case rates among people aged 65 years and over increased in 23 of the 27 reporting countries. These increases are still relatively recent, and they signal the start of a widespread wave driven by the BA.4 and BA.5 variants of concern, although with a growth rate likely slower than observed during the earlier emergence of BA.1 and BA.2. The increasing transmission among older age groups is starting to translate into severe disease, and twelve countries reported an increasing trend in at least one indicator of either hospital or ICU admissions/occupancy compared with the previous week. At the same time, even though the EU/EEA death rate has remained stable for the last five weeks, the forecast for the period up to 31 July indicates that both case notification rates and death rates will increase [77].

Current evidence shows that protection against infection due to Omicron variant (BA.1 and BA.2) starts waning two to three months after completing the primary series, is largely lost after six months and also wanes rapidly after the first booster dose. Protection is stronger and more durable against severe disease, although the balance of the evidence indicates gradual waning three to six months after the first booster dose. A second mRNA booster dose seemingly restores VE against severe disease, which remains stable for up to 10 weeks. Vaccine effectiveness data against BA.4 and BA.5 associated outcomes are still very limited, but thus far there is no evidence of reduced vaccine effectiveness against severe outcomes from BA.4 or BA.5 in comparison to previous Omicron lineages. However, as in previous waves, an overall increase in COVID-19 cases can result in a rise in hospitalisations, ICU admissions and deaths. Some signals in this direction are starting to emerge in a few countries with earlier progression towards dominance of BA.4 and BA.5 and corresponding waves with increased rates of infection.

In April 2022, ECDC assessed that in anticipation of future waves, it was expected that the administration of a second booster dose of mRNA vaccine would avert a significant number of hospitalisations and deaths and be needed for those groups most at risk of severe disease, such as adults 60 years and older and individuals with underlying comorbidities, with clearest public health benefit for those aged 80 years and above [1]. Such additional doses would be of greatest value if administered closer to expected periods of increased viral circulation, but before virus circulation reaches high levels. The age of 60 years as a cut-off for the recommendation was based on the higher observed age-specific notification rates of hospitalisation and ICU admission, increased adjusted risk of hospitalisation and death post first booster dose, and projected reduction in cumulative predicted deaths and SARS-CoV-2 cases by a second booster rollout in this population group.

Based on the new mathematical modelling presented in this document, for countries with an uptake of >40% of the first booster among the whole population, a second booster rollout among 60+ can have a substantial impact on restoring vaccine-induced protection against hospitalisation in this population from mid-July to the end of 2022 and an earlier second booster rollout among 60+ in mid-July 2022 results in a larger vaccine-induced protection against hospitalisation for the rest of 2022 compared to a later second booster rollout. There are currently twenty EU/EEA countries with recommendations on the use of a second booster in age group varying from 60+ to 80+ years, but as of 10 July 2022, the uptake of the second booster is still low in the EU/EEA (20% among 80+; 11.6% among 60+) and uneven across countries.

General considerations

Considering that with currently available vaccines, protection against infections rapidly wanes and effectiveness on transmission is modest, at this stage of the pandemic the objective of COVID-19 vaccination campaigns continues to be to reduce COVID-19 hospitalisation, severe disease and death, and to protect health systems.

Improving COVID-19 vaccine uptake of the primary course and first booster dose in eligible individuals who are yet to receive them remains a priority, especially for population groups at higher risk of severe outcomes and for countries with lower uptake of primary course and first booster dose.

Considerations for vaccination strategies in the summer

In light of the projection of a widespread wave driven by BA.4 and BA.5, waning protection against infection, and the current signal of increased rates of infection and severe disease in several countries, an early second mRNA vaccine booster rollout, not only among 80+ but also for adults between the ages of 60 and 79 years and individuals with underlying comorbidities regardless of age (including moderately to severely immunocompromised individuals), should now be considered to prevent severe disease and safeguard health system capacity, and countries should consider a rapid deployment. This would be particularly relevant and impactful in countries where the BA.4/BA.5 wave is starting or has not yet peaked. Second booster doses could be administered at least four months after the previous one, with a focus on people who received a previous booster more than six months ago. Continued close epidemiological and vaccine effectiveness monitoring continues to be essential to rapidly detect signals of waning protection and tailor the deployment of additional booster doses among population groups most at risk based on local data.

At the moment, for immunocompetent individuals below 60 years of age, unless they have underlying comorbidities, there is no clear epidemiological evidence to support the administration of a second booster dose, even though a certain degree of waning protection against severe outcomes may be expected overtime. The extension of the indication for additional booster doses to younger age groups will need to be reassessed based on epidemiological trends, emerging vaccine effectiveness evidence, performance and availability of future updated vaccines.

Considering the low and rapidly waning protection against infection and modest effect on transmission obtained with COVID-19 vaccines currently available, the early administration of a second booster dose to HCW and personnel working in LTCF for infection control purpose is likely to offer only modest benefits in terms of limiting the risks of transmission to vulnerable people in their care and be of limited duration. HCW and LTCF personnel may receive a second booster dose for their own protection if they belong to any prioritised population group based on age or due to underlying comorbidities. It should be ensured that LTCF residents receive the recommended booster doses, as they are effective in reducing morbidity and mortality in this group. In addition, NPIs in healthcare settings including LTCFs and other health care settings, such as use of face masks, remain effective measures to protect the vulnerable populations in these settings. Finally, access to therapeutics is an additional key measure for the protection of LTCF residents from severe outcomes. LTCFs should ensure the early detection and containment of outbreaks, as larger outbreaks are linked to lower protection by vaccines against infection presumably due to repeated exposure SARS-CoV-2 [78].

Considerations for vaccination strategies in the autumn/winter

Further waves of infection may be expected, including in the autumn/winter season of this year. The key drivers for further waves will be a combination of waning protection from vaccines and natural immunity, further evolution and emergence of variants, and, during autumn/winter months, increased indoor activity, among other factors. In anticipation of this, countries should consider the need for the rollout of further additional booster doses to be administered to population groups at risk of severe disease (e.g. 60+,individuals with underlying comorbidities, immunocompromised individuals and pregnant women), including later in this year. If further boosters are to be offered in the autumn/winter, countries should consider the need for combined campaigns for vaccination against COVID-19 and influenza, since such a combined approach provides efficiencies in administration logistics and costs. The boosting of HCW and LTCF personnel should also be considered for this later rollout. If adapted vaccines will show increased neutralisation against Omicron variants, indicating a possible higher effect against infection and transmission, they may be used to provide both direct and indirect protection. The need for, and the optimal timing of, further additional booster doses in autumn/winter may vary across countries, especially depending on the timing of the rollout of second boosters in spring/summer 2022 and emerging evidence of continued protection against severe disease in those that have received a second booster dose.

In addition, updated Omicron-adapted vaccines will likely be authorised for use in the EU in September and possibly available some time during the last trimester of 2022, however, the exact distribution timeline and available supplies of new vaccines are currently being defined with manufacturers. Efficacy data are currently under evaluation by EMA [67]. Future vaccination strategies may therefore also differ depending on the availability of these updated vaccines and their characteristics, and countries may have to use a mix of current and new vaccines depending on the timing of their availability and distribution. Nevertheless, it is important to continue the efforts to increase vaccination rates with available vaccines for groups at high risk for severe disease in a timely manner, and not to wait for the new Omicron-adapted vaccines. Depending on available supplies, different types of vaccines may therefore be used for different strategies and population groups depending on the characteristics of the updated vaccines compared to first-generation ones and the potential emergence of further new variants.

Furthermore, the frequency of re-vaccination needs to be carefully considered to allow that enough time has elapsed since previous vaccination. Data on the safety of a fourth dose of mRNA COVID-19 vaccine are limited, but so far the adverse events are mostly similar to those following previous doses and are short-lived [40,79]. Data emerging from the use of the second booster will continue to be assessed to determine if repeated boosters show any difference with respect to the overall safety profile.

These public health considerations are based on available scientific evidence and current epidemiological trends, and will be periodically reassessed. Considering that COVID-19 vaccination strategies and uptake, extent and timing of pandemic waves, circulation and timing of dominance of variants, among other factors, may differ across EU/EEA countries, NITAGs will ultimately make national decisions on the use of COVID-19 vaccines, taking into account previous vaccination uptake and epidemiological situation in their countries.

The scope of these considerations is focused on the second half of 2022, with an emphasis on the case for booster vaccination and closing the primary vaccination gap in late summer/early autumn, and not for longer term COVID-19 vaccination strategies. The administration of additional booster doses, both in the second half of 2022 as well as for the longer term COVID-19 vaccination strategy, may have a significant impact on the capacity of health systems to deliver COVID-19 vaccinations in the context of other competing public health priorities in the post-pandemic phase and already overburdened health services. At population level, vaccination fatigue could also undermine efforts to deliver vaccines to groups at higher risk of severe disease. Long-term vaccination strategies, including frequency of boosters, type of vaccines and target population groups, will need to balance scientific evidence and epidemiological trends with health system and economic implications, including investments in capacity to respond to future health service pressure of COVID-19, influenza and other respiratory viruses.

Future COVID-19 vaccination strategies will need to adapt to the evolving epidemiological situation, the possible emergence of new variants and subvariants of concern, potential seasonality, changing seasonal behaviour and future waves. In addition, the speed and degree of waning protection against infection and severe outcomes from both vaccine-induced and natural immunity, vaccine effectiveness against BA.4 and BA.5 or new emerging variants, efficacy, characteristics and available supplies of new adapted vaccines, safety considerations around repeated boosting, all play an important role in determining future long-term vaccination strategies, optimal frequency of revaccination and target groups.

Communication, vaccination acceptance and uptake considerations for the rollout of vaccination campaigns

Communication initiatives to promote uptake of additional vaccine doses and to promote completion of the primary series by those who have not yet done so, face several challenges. Some of these challenges are similar to those previously faced, while others are new:

- **Complacency regarding the threat of COVID-19:** With restrictions lifted throughout the EU/EEA, many people may perceive that the pandemic is over. Further, COVID-19 is regarded as a 'mild' disease for most people, in particular in the context of the Omicron variant, and this can add to perceptions that vaccination is not necessary [80]. The fact that many people not yet vaccinated will have undergone an infection can also contribute to lower vaccination intentions, as this may lead them to underestimate the risk of severe disease if they only faced mild to moderate symptoms. It is also possible that they might assume that they are permanently immune as a result of their earlier infection, and/or that they cannot transmit the disease to others [81].
- **Lower confidence in the effectiveness of the vaccines, and concerns about side effects:** Since early 2022, due to both the circulation of the highly transmissible Omicron variant and waning immunity, the number of COVID-19 cases in vaccinated people has increased, although with lower rate of severe disease compared to those unvaccinated [1]. As reflected in media coverage [82] and surveys [83], this can lead people to question the value of COVID-19 vaccines. Such views may be further amplified by misinformation circulating through social media that interprets these data as confirmation that vaccines do not work [84]. Further, surveys indicate that people who have experienced adverse events of varying degrees after primary vaccination, or who have friends or family members who had such experiences, may be less inclined to receive a booster [85].
- **The potential offer of variant-adapted vaccines, and the accompanying timelines, may be confusing for the public** [86] **and recurrent boosting faces acceptability challenges:** Variant-adapted vaccines are currently expected to become available during the last trimester of 2022 [87], although the timeline of distribution and number of doses that will be available are currently being defined with manufacturers. These uncertainties could lead to some vaccines being perceived as 'better', or people may decide to adopt a 'wait and see' approach to vaccination. Further, the public may be unclear about who should receive additional boosters when and with which vaccine, as well as what are the timelines for newer variant-specific vaccines. There are also media reports on the need for vaccines that offer more durable protection, while also cautioning that a strategy of booster shots given every few months is not sustainable [88]. Members of the US Advisory Committee on Immunization Practices (ACIP) cautioned in April 2022, when discussing US strategies for future doses, that for every COVID-19 vaccine dose recommended, uptake has declined – as shown in vaccine uptake data. ACIP members raised the issue of 'booster fatigue' and how it threatens confidence in the vaccination programme. The impact of each COVID-19 vaccine recommendation on vaccine confidence and uptake needs to be considered. Further, ACIP discussions highlighted the importance of

'communicating with one voice' and using common language to explain scientific complexity and uncertainty, in order to not contribute to the public's confusion [89].

Within this context, it continues to be very important to monitor vaccine uptake and the associated drivers and barriers to vaccination in order to understand where, why, and in which population groups and communities immunity gaps persist. As highlighted in previous ECDC reports [1], successful COVID-19 vaccination programmes can only be built on an understanding of, and a proper response to individuals' and communities' beliefs, concerns and expectations regarding the vaccine and the disease. The '5Cs' model – Confidence, Constraints, Complacency, Calculation, and Collective responsibility – can be used as a framework for understanding these concerns and designing strategies to facilitate COVID-19 vaccination acceptance and uptake [90].

To address the public's doubts about the value of vaccination, clear information should be provided around the rationale for the recommendations [91] as well as around the benefits of the primary course and boosters for different population groups (including for those who already had the disease). Given the evolving nature of the evidence, uncertainty should be acknowledged where it exists [92]. Communication should highlight the protection given by vaccines against the most severe outcomes of COVID-19, such as hospitalisation and death, which has direct benefits for the individual while also limiting the burden on healthcare services. In addition, messaging could also emphasise how vaccination can contribute to limiting the need for any possible re-imposition of restrictions [64]. Further, clear information is needed on which population groups shall receive boosters, as well as details on the optimal timing (for example, in relation to if/when they received a previous booster dose). Targeted communication should be provided to the specific groups being recommended for the boosters, as well as to healthcare workers so they can give reccomendations to their patients. This can also include information on the possibility for combining uptake of COVID-19 vaccine with the seasonal influenza vaccine. Information voids or misunderstandings regarding the types of vaccines that are available along with possible timelines for the availability of adapted vaccines need to be addressed. Barriers to uptake, specifically including those related to physical access, also need to be identified and addressed. Planning of future campaigns should be based on good practices identified during earlier phases of the vaccination programme.

Throughout the vaccination programme, countries have reported adopting a range of strategies to reach individuals and population groups with low vaccination uptake. These have included measures related to addressing, among other issues, access, misinformation, distrust, or a lack of clear and suitably adapted information. For example, access has been facilitated through use of mobile and pop-up vaccination teams/clinics; targeted communication strategies have been adopted; reminders have been sent; outreach initiatives and intersectoral partnerships for community-based interventions have been implemented; and vaccine ambassadors have been used to promote vaccination within their own communities [93].

Knowledge gaps and research priorities

Further or continued research in the following areas should be a matter of public health priority:

- Studies and collection of real-life data on longer-term duration of protection and patterns of waning protection against severe outcomes following first and second booster doses in different population groups, especially in older age groups (in response to currently circulating BA.4/BA.5 and potential future SARS-CoV-2 variants) as well as immunosuppressed individuals, and those with underlying conditions associated with more severe COVID-19 outcomes;
- Nationally representative, age-stratified sero-epidemiological studies provide a basis for estimating the proportion of the population with pathogen-specific antibodies in a given country. Such studies are particularly informative when they apply functional (neutralising titres) or quantitative assays to determine the level of both natural and vaccine-induced antibodies in participating individuals in order to estimate the contribution of natural, vaccine-derived and hybrid immunity in the population. Given that serum antibodies wane over time, longitudinal or repeated studies with the same sampling strategy and common testing methodology are essential for understanding temporal trends. High-quality studies on the current sero-epidemiological situation in different EU/EEA countries will be crucial for high-quality modelling predictions, including an understanding of optimal rollout timing for future vaccine boosters.
- Kinetics of the antibody response to repeated COVID-19 vaccine doses in different populations;
- Effectiveness of eventual future variant-specific vaccines compared to currently available vaccines;
  - Continuous monitoring of safety following additional booster doses;
  - Vaccine effectiveness studies that disaggregate findings by prior infection status;
- Vaccine effectiveness for individuals receiving mRNA vaccine booster doses following administration of a primary vaccine series with another type of vaccine (i.e. viral vector) and for boosters with non-mRNA vaccines.

Consulted experts (in alphabetical order)

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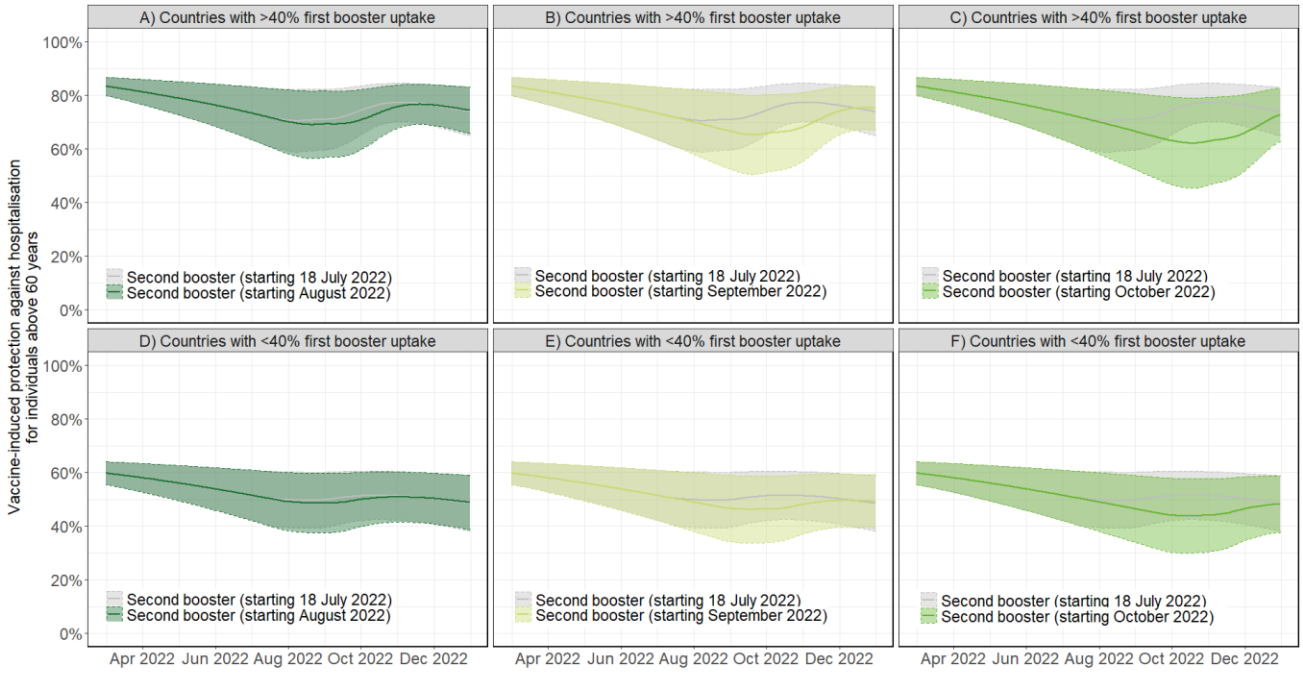
Annex 1. Evaluating the impact of later and/or faster second booster rollout scenarios

Figure A1. Comparison of the second booster rollout scenario starting on 18 July 2022 and later second booster scenarios (starting on 1 August 2022, 1 September 2022 and 1 October 2022, respectively) with respect to the predicted vaccine effectiveness against hospitalisation, averaged across all individuals older than 60 years



The top and bottom rows correspond to countries with a high and low first booster uptake (of more or less than 40% of the total population, respectively, on 1 July 2022). The predictions for each EU/EEA country and for each uncertain spreading parameter fall within the respective shaded area, and the solid line is the respective mean across the predictions of the considered EU/EEA countries and parameter uncertainties.

Figure A2. Comparison of the booster rollout scenario starting on 18 July 2022, where the eventual second booster uptake is attained in the same time as for the first booster uptake of the respective country, and fast booster rollouts that achieve the eventual second booster uptake within six weeks (from 1 September 2022 to 15 October 2022, and from 1 October 2022 to 15 November 2022, respectively) with respect to the predicted vaccine effectiveness against hospitalisation, averaged across all individuals older than 60 years

The top and bottom rows correspond to countries with a high and low first booster uptake (of more or less than 40% of the total population, respectively, on 1 July 2022). The predictions for each EU/EEA country and for each uncertain spreading parameter fall within the respective shaded area, and the solid line is the respective mean across the predictions of the considered EU/EEA countries and parameter uncertainties.

Annex 2 – Policies on additional and booster doses in EU/EEA countries

Table A1. Recommendations for additional and booster doses in EU/EEA countries (n=30)

Country	Recommendation and timing of additional doses and booster doses of COVID-19 vaccination for individuals with weakened immune systems (i.e. immunocompromised and immunosuppressed)	Recommendation for booster doses of COVID-19 vaccination and timing for the general population	References
Austria	**Recommendation**: Additional dose plus one booster dose (four doses) for individuals ≥12 years (extended primary three-dose vaccination series plus a booster dose 3+1 schedule). **Timing**: Additional dose is given at least 28 days after second dose. At least four weeks later, testing of neutralising antibodies is recommended to find out whether any immune response has occurred. If no neutralising antibodies can be detected after the additional third dose, an additional fourth dose is recommended at least four weeks after the third dose (off-label). In the event of a negative neutralising antibody test at least four weeks after the third dose, administration of an additional fourth dose is recommended (off-label).	**Recommendation**: One booster dose for individuals ≥5 years (primary two-dose vaccination series plus a booster dose). Two booster doses for individuals aged ≥80 years; for persons with underlying health conditions or at risk for severe disease (from 12 years) and those 65-79 years according to a medical individual benefit -risk assessment or at the explicit request of the person to be vaccinated (two dose primary vaccination series plus two booster doses). **Timing**: Individuals aged five years and above: booster given as of six months after the second dose; After one dose with COVID-19 Vaccine Janssen a second dose is recommended 28 days after the first dose (preferably with mRNA-vaccine), COVID-19 Vaccine Janssen can also be used again for the second dose, in this case an interval of at least two months between the first two doses is recommended and a third dose at the above-indicated intervals (six months) is also recommended for people vaccinated with COVID-19 Vaccine Janssen. Two booster doses (fourth doses) can be considered four months after the third dose at the earliest, but in any case, six months after the third dose for those ≥80 years. For people aged ≥65 years and persons regardless of age (12 years or older) with pre-existing conditions and circumstances that may place them at increased risk for severe disease of COVID-19, in whom an earlier waning of immunity is to be expected - six months after the first booster (third dose)– off-label	Bundesministerium für Soziales Gesundheit Pflege und Konsumentenschutz. COVID-19-Impfungen: Anwendungsempfehlungen des Nationalen Impfgremiums. 2021. Available at: https://www.sozialministerium.at/Corona-Schutzimpfung/Corona-Schutzimpfung---Fachinformationen.html
Belgium	**Recommendation**: Additional dose for individuals aged 5-11 years (extended primary three-dose vaccination series). One booster dose (fourth dose) for individuals >12 years (extended primary three-dose vaccination series plus a booster dose). **Timing**: Additional dose given at least 28 days after second dose followed by a booster dose (fourth dose) at least three months after the third dose.	**Recommendation**: One booster dose for individuals aged ≥18 years (primary two-dose vaccination series plus a booster dose). **Timing**: Booster given at least four months after primary vaccination with mRNA-based vaccines; four months after primary vaccination with Vaxzevria; two months after single dose of COVID-19 Vaccine Janssen.	Belgium Superior Health Council. Available at: https://www.health.belgium.be/en/superior-health-council
Bulgaria	**Recommendation**: Additional dose for individuals (extended primary three-dose vaccination series). **Timing**: Additional dose given at least 28 days after second dose.	**Recommendation**: One booster dose for individuals age ≥12 years (primary two-dose vaccination series plus a booster dose). **Timing**: Booster dose given at least three months after primary vaccination for those aged ≥18 years. For those aged 12-17 years, at least six months after primary vaccination.	Unified Information Portal Bulgaria. Guidelines for administering an additional or booster dose of COVID-19 vaccine are provided by the Expert Advisory Board on Immunoprophylaxis Surveillance. 2021. Available at: https://coronavirus.bg/bg/news/2513#
Croatia	**Recommendation**: Additional dose plus one booster dose (four doses) for individuals aged ≥5 years (extended primary three-dose vaccination series plus a booster dose).	**Recommendation**:	Croatian Institute for Public Health. Preporuke za primjenu treće doze u imunokompromitiranih osoba i docjepljivanje protiv bolesti COVID-19. 2021. Available at: https://www.hzjz.hr/wp-

Country	Recommendation and timing of additional doses and booster doses of COVID-19 vaccination for individuals with weakened immune systems (i.e. immunocompromised and immunosuppressed)	Recommendation for booster doses of COVID-19 vaccination and timing for the general population	References
	Timing: Additional dose given at least eight weeks after second dose, followed by a booster dose at least three months after the additional dose.	One booster dose for individuals ≥18 years (primary two-dose vaccination series plus a booster dose). Also recommended for children aged 12 years and over with underlying risk factors and at increased risk of severe disease. Two booster doses for individuals ≥80 years and residents and staff in LTCF who are over 65 years and health professionals. Also recommended for those at increased risk of developing severe disease and those vaccinated with Janssen. **Timing**: First booster dose given at least three months after primary vaccination; two months after single dose of COVID-19 Vaccine Janssen. Second booster dose given at least four months after the first booster dose.	content/uploads/2020/03/Preporuke-za-primjenu-tre%C4%87e-doze-u-imunokompromitiranih-osoba-i-docjepljivanje-protiv-bolesti-COVID-19.pdf https://cijepise.zdravlje.hr/
Cyprus	**Recommendation**: Additional dose plus one booster dose (four doses) for individuals irrespective of age (extended primary three-dose vaccination series plus a booster). **Timing:** Additional dose given at least four weeks after second dose followed by a booster dose at least five months after the third dose.	**Recommendation**: One booster dose for individuals aged ≥12 years (two dose primary vaccination series with mRNA-based vaccines plus booster dose with Comirnaty). Two booster doses given to those aged >60 years, residents and staff at LTCF, vulnerable groups (i.e. individuals with diabetes mellitus, and severe obesity), healthcare professionals (two dose primary vaccination series plus two booster doses (second booster dose with mRNA-based vaccines)). **Timing**: First booster dose given at least five months and two weeks after primary vaccination, second booster dose at least five months after the first booster dose.	Republic of Cyprus Ministry of Health. COVID-19 Vaccines and Treatment Protocols. 2022. Available at: https://www.pio.gov.cy/coronavirus/eng/categories/vaccines-en
Czechia	**Recommendation**: Additional dose for individuals (extended primary three-dose vaccination series). **Timing:** Additional dose given at least one month after second dose.	**Recommendation:** One booster dose for individuals aged ≥12 years (two dose primary vaccination series plus booster dose). **Timing**: Booster dose given at least three months after primary vaccination for those aged >60 years, LTCF residents and staff, healthcare workers and people with chronic conditions. For the rest of the population five months after primary vaccination. Two months after single dose of COVID-19 Vaccine Janssen.	The Ministry of Health of the Czech Republic. Booster and additional dose. 2021. Available at: https://covid.gov.cz/en/situations/register-vaccination/booster-and-additional-dose
Denmark	**Recommendation**: Additional dose plus one booster dose for individuals (extended primary three-dose vaccination series plus a booster). **Timing:** Additional dose given at least one month after second dose and a maximum of eight months afterwards or at earliest convenience (different timings depending on the risk group) followed by a booster dose at least three months after the third dose.	**Recommendation** Three doses for individuals aged ≥18 years (2 dose primary vaccination series plus booster dose). 4th dose as a second booster is recommended to specific target groups. **Timing**: Booster given at least 140 days after primary vaccination.	Danish Health Authority. Booster vaccination against COVID-19. 2021. Available at: https://www.sst.dk/en/English/Corona-eng/Vaccination-against-COVID-19/Booster-vaccination
Estonia	**Recommendation**: Additional dose for individuals (extended primary three-dose vaccination series). **Timing:** Additional dose given at least one month after second dose.	**Recommendation:** One booster dose for individuals aged ≥18 years (two dose primary vaccination series plus booster dose). **Timing**: Booster given at least three months after primary vaccination with mRNA-based vaccines; and Vaxzevria; two months after single dose vaccination with COVID-19 Vaccine Janssen. Recovered individuals – five months after recovery. Two booster doses 60+ individuals and individuals 12+ with certain diagnosis; elderly care/nursing houses (residents and care providers who	Terviseamet. https://vaktsineeri.ee/covid-19/lahen-vaktsineerima/

Country	Recommendation and timing of additional doses and booster doses of COVID-19 vaccination for individuals with weakened immune systems (i.e. immunocompromised and immunosuppressed)	Recommendation for booster doses of COVID-19 vaccination and timing for the general population	References
		are in direct contact with patients); health care providers who are in direct contact with patients	
Finland	**Recommendation** Additional dose plus a booster dose for individuals aged >12 years (extended primary three-dose vaccination series plus a booster dose). **Timing**: Additional dose given at least two months after second dose followed by a booster dose at least 3-4 months after the third dose.	**Recommendation**: One booster dose for individuals aged ≥18 years and persons aged 12-17 years in risk groups (two dose primary vaccination series plus booster dose). Two booster doses for individuals aged ≥80 years, residents of LTCFs, older people receiving home care or informal care (two dose primary vaccination series plus two booster doses). **Timing**: One booster dose given to those over 60 years of age and at-risk groups aged over 18 years is recommended 3-4 months after primary course. For persons between 18 and 60 years of age, a booster dose is recommended 4-6 months after primary course. In 12–17-year-olds six months after primary course. For those vaccinated with Janssen vaccine, a booster dose is recommended two months after the primary course. Second booster dose given at least three months after the first booster dose.	Terveyden ja hyvinvoinnin laitos. Kolmas koronarokoteannos. 2022. Available at: https://thl.fi/fi/web/infektiotaudit-ja-rokotukset/rokotteet-a-o/koronavirusrokotteet-eli-covid-19-rokotteet-ohjeita-ammattilaisille/kolmas-koronarokoteannos
France	**Recommendation** Additional dose plus a booster dose for individuals (extended primary three-dose vaccination series plus a booster dose). **Timing:** Additional dose given at least one month after second dose, followed by a booster dose as least three months after the third dose.	**Recommendation:** One booster dose for individuals aged ≥12 years (two dose primary vaccination series, plus booster dose). Two booster doses for individuals aged ≥80 years, residents of LTCFs aged ≥65 years who are at risk of severe disease (two dose primary vaccination series plus two booster doses after 3 months). Two booster doses for individuals aged ≥60 years and < 80 years (with or without comorbidities) 6 months after the first booster or infection. **General population**: Booster dose given at least three months after primary vaccination and a second booster dose given at least six months after the first booster dose.	Haute Autorité de santé. Covid-19 : un second rappel réservé aux personnes les plus à risques. 2022. Available at: https://www.has-sante.fr/jcms/p_3325021/fr/covid-19-un-second-rappel-reserve-aux-personnes-les-plus-a-risques Conseil d'orientation de la stratégie vaccinale. Available at : cosv_-_addendum_du_18_fevrier_2022_a_l_avis_du_19_janvier_2022_-_deuxieme_dose_de_rappel_vaccinal-2.pdf (solidarites-sante.gouv.fr) Ministery of Health. Available at: https://solidarites-sante.gouv.fr/IMG/pdf/dgs-urgent_no_2022_47_2eme_rappel_60_-2.pdf
Germany	**Recommendation** Additional dose plus two booster doses for individuals aged ≥5 years (extended primary three-dose vaccination series plus two booster doses). **Immunocompromised individuals:** Additional dose is given at least one month after the second dose followed by a booster dose given at least three months after the third dose.	**Recommendation**: One booster dose for all individuals aged ≥12 years and for 5- to 11-year-olds at increased risk of severe illness (two dose primary vaccination series plus booster dose). Two booster doses for individuals aged >70 years, residents of LTCFs and people at risk of developing severe illness in support facilities, workers in medical and nursing facilities (especially those in direct contact with patients and residents) (two dose primary vaccination series plus two booster doses). **Timing**: Booster dose given at least three months after primary vaccination for those ≥12 years. For 5–11-year-olds, booster dose given at least six months after primary vaccination. Second booster dose at least three months after first booster dose for those at risk. For personnel in medical and nursing facilities, second booster dose given at least six months after the first booster dose. For those vaccinated with COVID-19 Vaccine Janssen, a second dose with an mRNA vaccine is recommended one month after primary course to optimise immunisation. A booster of mRNA should follow after at least three months.	Epidemiologisches Bulletin 21/2022, STIKO: 20. Aktualisierung der COVID-19-Impfempfehlung. Tab. 5 | Empfehlungen zu Indikationsgruppen, Impfstoffen und Impfabständen zur 2. Auffrischimpfung gegen COVID-19 (Stand: 24.05.2022). Available at: https://www.rki.de/DE/Content/Infekt/EpidBull/Archiv/2022/Ausgaben/21_22.pdf?__blob=publicationFile

Country	Recommendation and timing of additional doses and booster doses of COVID-19 vaccination for individuals with weakened immune systems (i.e. immunocompromised and immunosuppressed)	Recommendation for booster doses of COVID-19 vaccination and timing for the general population	References
Greece	**Recommendation** Additional dose plus one booster dose for individuals aged ≥12 years (extended primary three-dose vaccination series plus a booster dose). **Timing:** Additional dose given at least four weeks after second dose, followed by a booster dose at least three months after the third dose.	**Recommendation:** One booster dose for individuals aged ≥18 years (two dose primary vaccination series plus booster dose). Two booster doses for those aged ≥60 years. **Timing**: One booster dose given at least three months after primary vaccination. Two months after primary vaccination with COVID-19 Vaccine Janssen. Second booster dose at least four months after first booster dose.	Briefing by the President of the National Vaccination Committee Maria Theodoridou and the Secretary General Primary Health Care Mario Themistocleous. 2022. Available at: https://www.moh.gov.gr/articles/ministry/grafeio-typoy/press-releases/10335-enhmerwsh-diapisteymenwn-syntaktwn-gia-to-ethniko-sxedio-emboliastikhs-kalypshs-kata-ths-covid-19-apo-thn-proedro-ths-ethnikhs-epitrophs-emboliasmwn-maria-theodwridoy-kai-ton-g-g-prwtobathmias-frontidas-ygeias-mario-themistokleoys
Hungary	**Recommendation:** Additional dose plus one booster dose for individuals (extended primary three-dose vaccination series plus a booster dose). **Timing:** Additional dose given at least 28−56 days after second dose, followed by a booster dose at least four months after third dose.	**Recommendation**: One booster dose for individuals aged ≥12 years (two dose primary vaccination series plus booster dose). Two booster doses for the elderly, and those with chronic disease and also available to anyone who asks for it (two dose primary vaccination series plus two booster doses). **Timing**: One booster dose given at least four months after primary vaccination followed by a second booster dose at least four months after first booster dose.	Hungary Ministry of Interior. https://koronavirus.gov.hu/sites/default/files/sites/default/files/imce/nnk_eljarasrend_2022.01.14._negyedik_oltas.pdf
Iceland	**Recommendation:** Additional doses for individuals (extended primary three-dose vaccination series). **Timing:** Additional dose given at least three months after second dose.	**Recommendation:** One booster dose for individuals ≥16 years (two dose primary vaccination series plus booster dose). A fourth dose has been recommended for those persons 65 and over with an mRNA vaccine. **Timing:** Booster dose given at least five months after second dose.	Iceland Directorate of Health. Early booster vaccination for COVID-19. 2022. Available at: https://www.landlaeknir.is/um-embaettid/greinar/grein/item48474/early-booster-vaccination-for-covid-19
Ireland	**Recommendation:** Additional doses for individuals aged 5-11 years (extended primary three-dose vaccination series). Additional dose plus one booster dose for individuals aged ≥12 years (extended primary three-dose vaccination series plus one booster dose). **Timing:** Additional dose given at least two months after second dose for those aged ≥12 years and 28 days after second dose for those aged 5-11 years. Booster dose given to those aged ≥12 years at least three months after the third dose.	**Recommendation:** One Booster dose doses for individuals aged ≥12 years (two dose primary vaccination series plus booster dose). Two booster doses for those aged ≥65 years (two dose primary vaccination series plus two booster doses). **Timing:** One booster dose is given to those aged >16 years at least three months after the primary vaccination and for 12–15-year-olds the booster dose is given at least six months after the primary vaccination dose. Second booster dose given at least four months after first booster dose.	Ireland Department of Health. COVID-19 vaccine booster dose. 2022. Available at: https://www2.hse.ie/screening-and-vaccinations/covid-19-vaccine/get-the-vaccine/covid-19-vaccine-booster-dose/
Italy	**Recommendation:** Additional dose plus a booster dose for individuals (extended primary three-dose vaccination series plus a booster dose). **Timing:** Additional dose given at least 28 days after second dose, followed by a booster dose fourth months after third dose. A second booster: 120 days from the first booster dose	**Recommendation:** One booster dose for individuals aged ≥12 years (two dose primary vaccination series plus booster dose). Two booster doses for people aged 80 and over, LTCF residents, people with high fragility motivated by pathologies concomitant / pre-existing aged 60 years and over **Timing:** One booster dose given at least four months after primary vaccination. A second booster: 120 days from the first booster dose	Ministry of Health, Italy. COVID-19 vaccine plan. 2022. Available at: https://www.salute.gov.it/portale/nuovocoronavirus/dettaglioContenutiNuovoCoronavirus.jsp?lingua=italiano&id=5452&area=nuovoCoronavirus&menu=vuoto Ministry of Health, Italy. Directorate-General for Health Prevention. Indications on the administration of the second booster dose (second booster) as part of the anti SARS-CoV-2 / COVID-19 vaccination campaign. 2022. Available at: https://www.trovanorme.salute.gov.it/norme/renderNormsanPdf?anno=2022&codLeg=86755&parte=1%20&serie=null

Country	Recommendation and timing of additional doses and booster doses of COVID-19 vaccination for individuals with weakened immune systems (i.e. immunocompromised and immunosuppressed)	Recommendation for booster doses of COVID-19 vaccination and timing for the general population	References
Latvia	**Recommendation:** Additional dose plus a one booster dose for individuals (extended primary three-dose vaccination series plus a booster dose). **Timing:** Additional dose given at least one month after second dose.	**Recommendation:** One booster dose for individuals aged ≥18 years (two dose primary vaccination series plus booster dose). A second booster is under consideration. **Timing**: Booster dose given at least three months after primary vaccination with mRNA vaccines. Two months after single dose of COVID-19 Vaccine Janssen. Three months after primary vaccination with Vaxzevria.	Latvia National Council for Immunization. 2022. Available at: https://www.vmnvd.gov.lv/lv/media/15326/download
Liechtenstein	**Recommendation:** Additional dose for individuals (extended primary three-dose vaccination series). **Timing:** Additional dose given at least 28 days after second dose.	**Recommendation:** One booster dose for individuals ≥12 years (two dose primary vaccination series plus booster dose). **Timing**: Booster dose given at least four months after primary vaccination.	Swiss Federal Office of Public Health FOPH. Coronavirus: Vaccination. Available at: https://www.bag.admin.ch/bag/en/home/krankheiten/ausbrueche-epidemien-pandemien/aktuelle-ausbrueche-epidemien/novel-cov/impfen.html#-1386562885
Lithuania	**Recommendation:** Additional dose for individuals (extended primary three-dose vaccination series). **Timing:** Additional dose given at least 28 days after second dose.	**Recommendation:** One booster dose for individuals aged ≥18 years (two dose primary vaccination series plus booster dose). **Timing:** Booster dose given at least 90 days months after primary vaccination; 60 days after single dose of COVID-19 Vaccine Janssen.	Minister of Health of the Republic of Lithuania. Regarding the approval of the description of the procedure for the organization of COVID-19 disease (coronavirus infection) vaccine purchased from the state budget at the expense of vaccination of the population. 2022. Available at: https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/f735b430469711ebb394e1efb98d3e67/asr
Luxembourg	**Recommendation:** Additional dose plus a one booster dose for individuals aged ≥18 years (extended primary three-dose vaccination series plus a booster dose). **Timing:** Additional dose given at least 12 weeks after second dose followed by a booster dose at least three months after the third dose.	**Recommendation:** One booster dose for individuals aged ≥12 years (two dose primary vaccination series plus booster dose). Two booster doses for people aged 80 and over **Timing:** Booster dose given at least three months after primary vaccination with mRNA-based vaccines; four months after primary vaccination with Vaxzevria; one month after single dose of COVID-19 Vaccine Janssen followed by an optional third dose at least three months after the second dose. Second booster dose at least four months after the first booster dose.	The Luxembourg Government. Coronavirus vaccination. 2022. Available at: https://covid19.public.lu/en/vaccination.html Conseil supérieur des maladies infectieuses. 3 March 2022. Available at : CONSEIL SUPERIEUR D'HYGIENE (public.lu) Coneil supérieur des maladies infectieuses. 12 April 20222. Available at : recommandation-4e dose (public.lu)
Malta	**Recommendation:** Additional dose plus a one booster dose for individuals (extended primary three-dose vaccination series plus a booster dose). **Timing:** Additional dose given at least 28 days after second dose.	**Recommendation**: One booster dose for individuals ≥18 years (2 dose primary vaccination series plus booster dose). Second booster dose to the elderly over the age 65, residence of nursing homes. **Timing:** Booster dose given at least three months after primary vaccination.	Malta Ministry of health. Vaccines. 2022. Available at: https://deputyprimeminister.gov.mt/en/health-promotion/covid-19/Pages/vaccines.aspx
the Netherlands	**Recommendation:** Additional dose plus a booster dose for individuals (extended primary three-dose vaccination series plus a booster dose). For the immunocompromised population 12+: a third dose is recommended as part of the primary series, as well as a fourth dose as a first booster. For the immunocompromised population 18+: a fourth dose is recommended as a first booster, a fifth dose is recommended as a second booster. **Timing:** An additional/third dose at least four weeks after second dose;followed by a booster dose at least three months after third dose;followed by a second booster dose at least three months after the fourth dose.	**Recommendation**: One booster dose for individuals 18-59 years (two dose primary vaccination series plus booster dose). Two booster doses for individuals aged ≥60 years, residents in LTCFs, adults with Down syndrome (two dose primary vaccination series plus two booster doses). **Timing**: One booster dose at least three months after primary vaccination, followed by a second booster dose at least three months after the first booster dose.	The Netherlands - National Institute for Public Health and the Environment. Who can get a booster vaccination and when? 2022. Available at: https://www.government.nl/topics/coronavirus-covid-19/dutch-vaccination-programme/booster-vaccination Netherlands. National Institute for Public Health and the Environment. Repeat shot against corona (2nd booster). 2022. Available at: https://www.rijksoverheid.nl/onderwerpen/coronavirus-vaccinatie/aanpak-coronavaccinatie/herhaalprik

Country	Recommendation and timing of additional doses and booster doses of COVID-19 vaccination for individuals with weakened immune systems (i.e. immunocompromised and immunosuppressed)	Recommendation for booster doses of COVID-19 vaccination and timing for the general population	References
Norway	**Recommendation:** Additional dose plus a booster dose for individuals (extended primary three-dose vaccination series plus a booster dose). Third booster dose (dose 5): recommended for people with severely weakened immune systems **Timing:** Additional dose given at least four weeks after second dose, followed by a booster dose at least three months after the third dose. Interval of minimum three months	**Recommendation:** One booster dose for individuals aged ≥18 years (two dose primary vaccination series plus booster dose). No general recommendation for second booster doses but people aged 80 and older who have received 3 doses and have not had COVID-19 since then, can receive a new booster dose if they wish. **Timing:** Booster dose given at least 20 weeks after primary vaccination with mRNA-based vaccines; COVID-19 Vaccine Janssen dose is followed by mRNA vaccine after at least 8-12 weeks, followed by a booster with mRNA vaccine at least 20 weeks after second dose. Second booster dose (dose 4): four months after the last booster dose (dose 3)	Norwegian Institute of Public Health. Booster doses. 2022. Available at: https://www.fhi.no/en/id/vaccines/coronavirus-immunisation-programme/coronavirus-vaccine/#booster-doses Norwegian Institute of Public Health. Coronavirus vaccine – inforation for the public. https://www.fhi.no/en/id/vaccines/coronavirus-immunisation-programme/coronavirus-vaccine/#booster-doses
Poland	**Recommendation:** Additional dose plus a booster dose for individuals 12 years or older (extended primary three-dose vaccination series plus a booster dose). **Timing:** Additional dose given at least four weeks after second dose, followed by a booster dose at least three months after third dose.	**Recommendation:** One booster dose for individuals aged ≥12 years (two dose primary vaccination series plus booster dose). Two booster doses for people aged 80 and over (the full primary vaccination schedule and the first booster dose with COVID-19 mRNA) **Timing:** Booster dose given at least five months after primary vaccination; two months after single dose of COVID-19 Vaccine Janssen. Second booter: 150 days after an mRNA booster	Polish Ministry of Health. Booster dose. 2022. Available at: https://www.gov.pl/web/szczepimysie/trzecia-dawka Polish Ministry of Health. Second booster dose for people 80+. 2022. Available at: https://www.gov.pl/web/zdrowie/druga-dawka-przypominajaca-dla-osob-80
Portugal	**Recommendation:** Additional dose for individuals 12 years and over (extended primary three-dose vaccination series). For 18 years and over and additional dose plus a booster (extended primary three-dose vaccination series). **Timing:** Additional dose of mRNA vaccine given at least three months after second dose (minimum 28 days).	**Recommendation:** One booster dose for individuals aged ≥18 years (two dose primary vaccination series plus booster dose). Two booster doses for people aged 80 and over, residents of nursing homes. **Timing:** Booster dose of mRNA vaccine given six months (minimum four months) after the last dose.Three months after primary vaccination with COVID-19 Vaccine Janssen.	Portugal - Servico Nacional De Saude. Campanha de Vacinação Contra a COVID-19. 2022. Available at: https://www.dgs.pt/normas-orientacoes-e-informacoes/normas-e-circulares-normativas/norma-n-0022021-de-30012021-pdf.aspx Portugal. National Health Service. Directorate-General for Health. People over 80 and living in nursing homes will receive a second booster dose. 2022. Available at: https://www.dgs.pt/em-destaque/pessoas-com-mais-de-80-anos-e-residentes-em-lares-vao-receber-segunda-dose-de-reforco.aspx and https://covid19.min-saude.pt/wp-content/uploads/2022/06/Parecer-CTVC-Estrategia-reforco-vacinal-antecipacao-2a-dose-ERPI-11.05.2022_pdf-1281kb.pdf
Romania	**Recommendation:** Additional dose for individuals (extended primary three-dose vaccination series). **Timing:** Additional dose given 28-120 days after second dose.	**Recommendation:** One booster dose for individuals aged ≥12 years (two dose primary vaccination series plus booster dose) especially for people at high risk of exposure, vulnerable people and on request for those who have completed the full vaccination course more than four months ago. Two booster doses for people over 18 years of age upon request, according to the National Comittee on Vaccination against COVID-19. People over 18 years of age who have been vaccinated with 3 doses of mRNA vaccine or heterologous regimen that includes Vaxzevria and mRNA vaccines, may receive, upon request a fourth dose of Comirnaty at least 4 months after the third dose. For those vaccinated with Jannsen and an additional dose of mRNA vaccine, the second booster is currently not recommended. Two booster doses for people over age of 18 who have been vaccinated against COVID-19 with 3 doses of mRNA vaccine	Romanian Government website. Platform programming for the third dose has begun. 2021. Available at: https://vaccinare-covid.gov.ro/a-inceput-programarea-in-platforma-pentru-doza-a-iii-a/ The Government of Romania. National Coordination Committee for COVID-19 vaccination activities. Administration of the 4th dose of Comirnaty vaccine – Pfizer BioNTech. 2022. Available at: https://vaccinare-covid.gov.ro/wp-content/uploads/2022/05/20220511__vaccinare_doza_4.pdf The Government of Romania. Doza de rapel – booster. 2022. Available at: https://vaccinare-covid.gov.ro/doza-de-rapel-booster/

Country	Recommendation and timing of additional doses and booster doses of COVID-19 vaccination for individuals with weakened immune systems (i.e. immunocompromised and immunosuppressed)	Recommendation for booster doses of COVID-19 vaccination and timing for the general population	References
		Recommended for people over 60 years of age **Timing:** Booster dose given at least four months after primary vaccination. 4th dose: at least four months after the 3rd dose	
Slovakia	**Recommendation:** Additional dose doses for individuals (extended primary three-dose vaccination series). **Timing:** Additional dose given at least four weeks after second dose.	**Recommendation:** One booster dose for individuals aged ≥18 years (two dose primary vaccination series plus booster dose). **Timing:** Booster dose given at least three months after primary vaccination.	Ministry of Health Slovak Republic. Usmernenie Ministerstva zdravotníctva Slovenskej republiky k aplikácii dodatočnej tretej dávky mRNA vakcíny pre imunokompromitované osoby a tretej posilňovacej dávky mRNA vakcíny pre ostatné osoby proti ochoreniu COVID-19. 2021. Available at: https://www.health.gov.sk/Zdroje?/Sources/Covid-19/Ockovanie/3-davka/MU-tretia-davka.pdf
Slovenia	**Recommendation:** Additional dose plus one booster dose for individuals (extended primary three-dose vaccination series plus a booster dose) Second booster dose for all particularly vulnerable chronic patients who have already received three doses (two primary doses and a booster dose). **Timing:** Additional dose given at least four weeks after second dose followed by a fourth dose at least three months after the third dose. Second booster dose at least 3 months after the 3rd dose.	**Recommendation**: One booster dose for individuals ≥18 years and 12-17 years with chronic diseases. Healthy individuals 12-17 years can choose to get a booster (2 dose primary vaccination series plus booster dose). Second booster dose (third dose) for people who have been vaccinated with the Janssen vaccine is also possible, but only when signing consent for off label use. **Timing:** Booster dose given at least three months after primary vaccination with mRNA vaccines or mixed schedule; at least two months after primary vaccination with Vaxzevria or COVID-19 Vaccine Janssen.	Slovenia - Nacionalni institut za javno zdravje (National Institute for Public Health). Priporočila za cepljenje proti COVID-19 2022. Available at: https://www.nijz.si/sites/www.nijz.si/files/uploaded/priporocila_za_cepljenje_proti_covid_uskl_psc_apr_2021.pdf
Spain	**Recommendation:** Additional dose plus one booster dose for individuals (extended primary three-dose vaccination series plus a booster dose). **Timing:** Additional dose given at least 28 days after second dose, followed by a booster dose at least five months after the third dose.	**Recommendation:** One booster dose for individuals ≥18 years prioritised from oldest to youngest age groups (two dose primary vaccination series plus booster dose). 2 doses of primary series + 1 additional dose+ 1 booster dose recommended in high-risk population groups **Timing:** Booster dose given at least five months after primary vaccination with mRNA vaccines; at least three months after primary vaccination with Vaxzevria or COVID-19 Vaccine Janssen.	Gobierno De España. Estrategia de vacunación COVID19 en España. 2022. Available at: https://www.sanidad.gob.es/profesionales/saludPublica/prevPromocion/vacunaciones/covid19/vacunasCOVID19_Profesionales.htm Government of Spain. Strategy COVID-19 vaccination. Proposal of administration of a second booster dose. Available at: https://www.sanidad.gob.es/profesionales/saludPublica/prevPromocion/vacunaciones/covid19/docs/COVID-19_Administracion_segunda_dosis_de_recuerdo.pdf
Sweden	**Recommendation:** Additional dose plus two booster doses for individuals ≥18 years (extended primary three-dose vaccination series, plus two booster doses). **Timing:** Additional dose given at least two months after second dose, followed by a first booster dose at least three months after third dose and a second booster dose at least three months after the first booster dose.	**Recommendation** One booster dose for individuals aged ≥18 years (two dose primary vaccination series plus booster dose). Two booster doses for individuals aged ≥65 years, LTCF residents, people who have home care (hemtjänst) or home healthcare (hemsjukvård) , people ≥18 with Down syndrome (two dose primary vaccination series plus two booster doses). **Timing:** First booster dose given at least three months after primary vaccination and the second booster dose given four months after the first booster dose.	Public Health Agency of Sweden/Folkhälsomyndigheten. Påfyllnadsdoser rekommenderas till alla över 18 år. 2022. Available at: https://www.folkhalsomyndigheten.se/smittskydd-beredskap/utbrott/aktuella-utbrott/covid-19/vaccination-mot-covid-19/information-for-dig-om-vaccinationen/pafyllnadsdos/

Joint ECDC-WHO Regional Office for Europe Monkeypox Surveillance Bulletin

20 July 2022

Contents

SURVEILLANCE SUMMARY

A total of 10604 cases of monkeypox have been identified through IHR mechanisms and official public resources up to 19 July 2022, 14:00, from 36 countries and areas throughout the European region. Case-based data were reported for 9281 cases from 31 countries and areas to ECDC and the WHO Regional Office for Europe through The European Surveillance System (TESSy), up to 19 July 2022, 10:00.

Of the 9281 cases reported in TESSy, 9276 were laboratory confirmed. Furthermore, where sequencing was available, 150 were confirmed to be of the West African clade. The earliest date of symptom onset was reported as 19 July 2022. The majority of cases were between 31 and 40 years-old (3841/9237 - 42%) and male (9149/9197 - 99.5%). Among cases with known HIV status, 38% (923/2403) were HIV-positive. The majority of cases presented with a rash (4726/5003 - 94.5%) and systemic symptoms such as fever, fatigue, muscle pain, vomiting, diarrhea, chills, sore throat or headache (3269/5003 - 65%). 256 cases were hospitalised (8.1%), of which 114 cases required clinical care. One case was admitted to ICU. No cases were reported to have died. Some (31) cases were reported to be health workers, however no occupational exposure has been reported.

INTRODUCTION

PURPOSE AND SCOPE

This report provides an overview of the total number of cases of monkeypox identified by ECDC and the WHO Regional Office for Europe through IHR mechanisms and official public resources and case-based data through The European Surveillance System (TESSy) up to 19 July 2022.

The first summary table and maps (first two tabs) describe the number of cases identified through the different platforms. The following figures and tables describe national case-based data for surveillance of monkeypox reported in TESSy from all the countries and areas of the WHO European Region, including the 24 countries of the European Union (EU) and the additional three countries of the European Economic Area (EEA).

Case Report Form Data are submitted through the case-based record type MPX to The European Surveillance System (TESSy) database hosted at ECDC.

CASE DEFINITION (WHO)

As of 24 June 2022

Cases of monkeypox should be reported to TESSy if they meet any of the WHO, ECDC or national case definitions.

Confirmed case

- Laboratory confirmed monkeypox virus by detection of unique sequences of viral DNA by real-time polymerase chain reaction (PCR)[1] and/or sequencing.

Probable case:

- A person meeting the case definition for a suspected case

AND One or more of the following:

- has an epidemiological link [prolonged[2] face-to-face exposure in close proximity, including health workers without appropriate PPE (gloves, gown, eye protection and respirator); direct physical contact with skin or skin lesions, including sexual contact; or contact with contaminated materials such as clothing, bedding or utensils] to a probable or confirmed case of monkeypox in the 21 days before symptom onset;
- has had multiple or anonymous sexual partners in the 21 days before symptom onset;
- has detectable levels of anti-orthopoxvirus (OPXV) IgM antibody[3] (during the period of 4 to 56 days after rash onset); or a four-fold rise in IgG antibody titre based on acute (up to day 5-7) and convalescent (day 21 onwards) samples; in the absence of a recent smallpox/monkeypox vaccination or other known exposure to OPXV;
- has a positive test result for orthopoxviral infection (e.g. OPXV-specific PCR without MPXV-specific PCR or sequencing) [1].

Suspected case

- A person of any age presenting since 01 January 2022 with an unexplained acute rash or one or more acute skin lesions

AND one or more of the following signs or symptoms:

- headache, acute onset of fever (>38.5°C), lymphadenopathy (swollen lymph nodes), myalgia (muscle pain/body aches), back pain, asthenia (profound weakness)

AND for which the following common causes of acute rash or skin lesions do not fully explain the clinical picture:

- varicella zoster, herpes zoster, measles, herpes simplex, bacterial skin infections, disseminated gonococcus infection, primary or secondary syphilis, chancroid, lymphogranuloma venereum, granuloma inguinale, molluscum contagiosum, allergic reaction (e.g., to plants); and any other locally relevant common causes of papular or vesicular rash.

N.B. It is not necessary to obtain negative laboratory results for listed common causes of rash illness in order to classify a case as suspected. Further, if suspicion of monkeypox infection is high due to either history and/or clinical presentation or possible exposure to a case, the identification of an alternate pathogen which causes rash illness should not preclude testing for MPXV, as coinfections have been identified.

Discarded case

- A suspected or probable case for which laboratory testing of lesion fluid, skin specimens or crusts by PCR and/or sequencing is negative for MPXV[1].
- Conversely, a retrospectively detected probable case for which lesion testing can no longer be adequately performed (i.e., after the crusts fall off) and no other specimen is found PCR-positive, would remain classified as a probable case.

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1. PCR on a blood specimen may be unreliable and should also not be used alone as a first line diagnostic test. If blood PCR is negative and was the only test done, this is not sufficient to discard a case that otherwise meets the definition of a suspected for probable case. This applies regardless of whether the blood PCR was for OPXV or MPXV specific.

2. Evidence is currently lacking as to the duration of exposure necessary for infection by the respiratory route, including how it relates to the severity of the index case's disease. Characterization of this parameter is one of the goals of the case investigation form described below

3. Serology can be used for retrospective case classification for a probable case in specific circumstances such as when diagnostic testing through PCR of skin lesion specimens has not been possible, or in the context of research with standardized data collection. The primary diagnostic test for monkeypox diagnosis is PCR of skin lesion material or other specimen such as an oral or nasopharygeal swab as appropriate. Serology should not be used as a first line diagnostic test.

CASE DEFINITION (ECDC)

Cases of monkeypox should be reported to TESSy if they meet any of the WHO, ECDC or national case definitions.

Confirmed case :

- A person with a laboratory-confirmed monkeypox infection (1) monkeypox virus specific PCR assay positive result or (2) orthopoxvirus-specific PCR assay positive result which is then confirmed by nucleotide sequence determination of the detected virus as MPXV) with symptom onset since 1 March 2022.

Probable case :

(1) A person with an unexplained rash[1] on any part of their body AND one or more other symptom(s) of monkeypox infection[2] with symptom onset since 1 March 2022

AND one of the following:

- has a positive laboratory test result on orthopoxviral infection (e.g., orthopoxvirus-specific positive PCR without sequencing, electron microscopy, serology);
- has an epidemiological link to a confirmed or probable case of monkeypox in the 21 days before symptom onset;
- reports travel to MPX endemic countries in the 21 days before symptom onset;
- is a person (of any sexual orientation) who had multiple or anonymous sexual partners in the 21 days before symptom onset;
- is a man who has sex with men.

OR

(2) A person with an unexplained generalized or localized maculopapular or vesiculopustular rash with centrifugal spread, with lesions showing umbilication or scabbing, lymphadenopathy and one or more other MPX-compatible symptoms[2].

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1. Since EU/EEA countries are just starting to identify cases and if testing capacity is sufficient, the above more sensitive case definition can be used. In countries with limited testing capacity for orthopoxviruses, the following description can be added to characterize the rash: 'unexplained localized or generalized maculopapular or vesiculopustular rash potentially with umbilication or scabbing'.
2. Fever (usually higher >38.5°C), headache, back ache, fatigue, lymphadenopathy (localized or generalized).

KEY INDICATORS

IHR SUMMARY

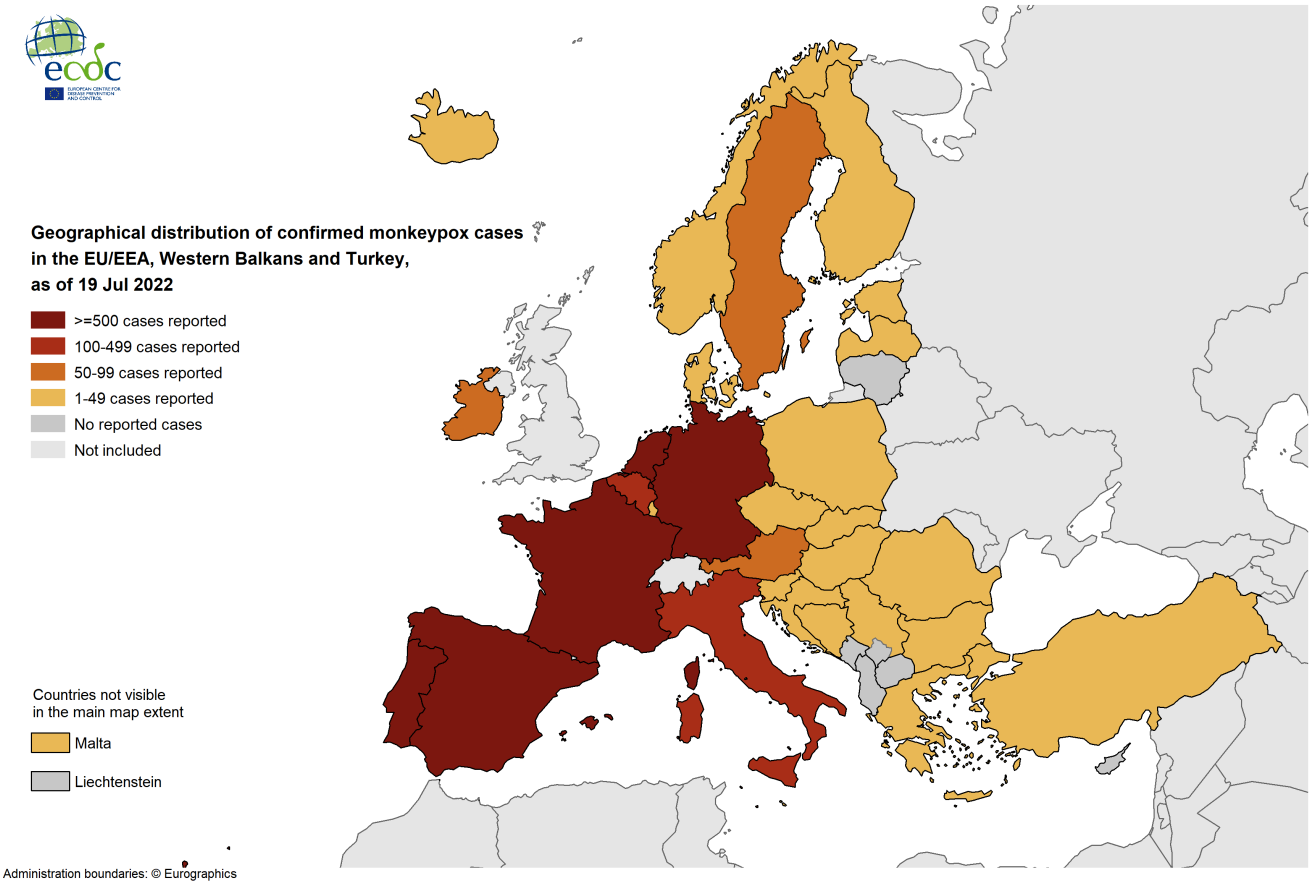
Table 1: Summary of number of cases of monkeypox identified through IHR mechanisms and official public resources and reported to TESSy, European Region, 2022

Country/Area	Number of cases identified through IHR and official public resources	Number of cases reported through TESSy
Spain	2835	2653
United Kingdom	2115	2116
Germany	2033	1859
France	912	350
Netherlands	656	547
Portugal	515	351
Italy	374	374
Belgium	312	312
Switzerland	208	195
Israel	102	0
Austria	88	88
Sweden	71	71
Ireland	69	69
Norway	44	43
Denmark	43	43
Poland	40	40
Hungary	32	32
Slovenia	26	23
Romania	19	19
Greece	18	18
Malta	17	17
Czechia	14	14
Finland	13	13
Luxembourg	10	10
Iceland	7	7
Croatia	6	6
Gibraltar	5	0
Serbia	5	0
Estonia	4	2
Bulgaria	3	3
Latvia	2	2
Slovakia	2	2
Georgia	1	1
Russian Federation	1	0
Türkiye	1	0
Bosnia and Herzegovina	1	1
Total	10604	9281

MAPS

ECDC Map

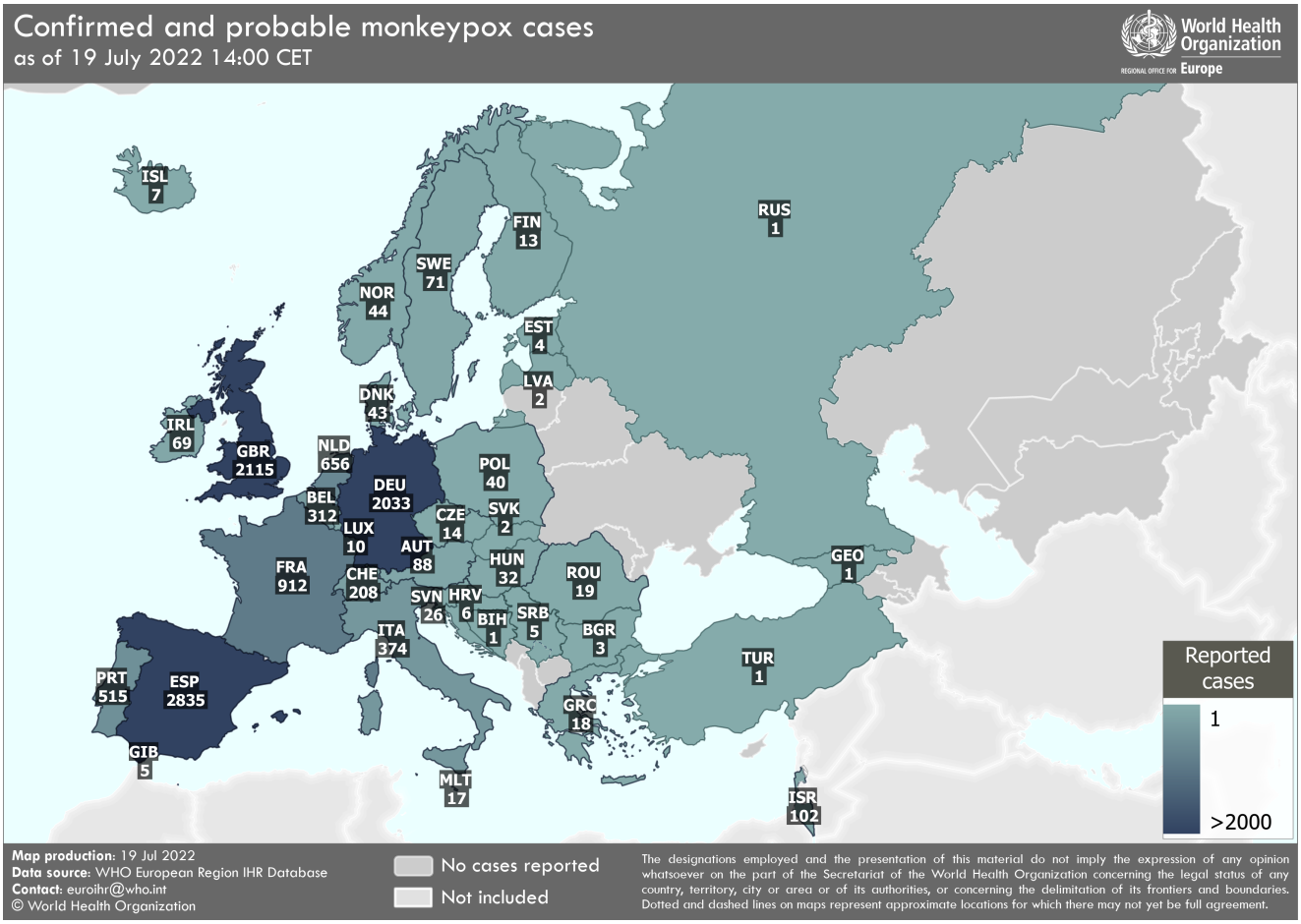
Map Figure 1a: Distribution of cases of monkeypox, European Region, TESSy, 2022, ECDC borders



Administration boundaries: © Eurographics
The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union. ECDC. Map produced on 19 Jul 2022

WHO-EURO Map

Map Figure 1b: Distribution of cases of monkeypox, European Region, TESSy, 2022, wHO EURO borders

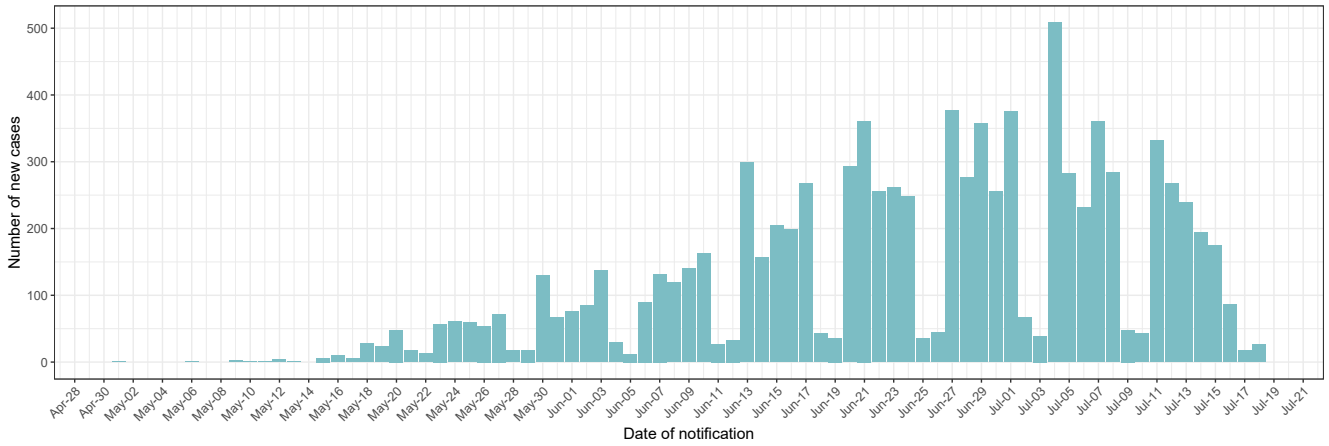


EPICURVES

Date of notification is defined as the date when the case report is notified for the first time to the place of notification, date of diagnosis is defined as the first date of clinical or laboratory diagnosis, and date of onset as the date of onset of any symptoms.

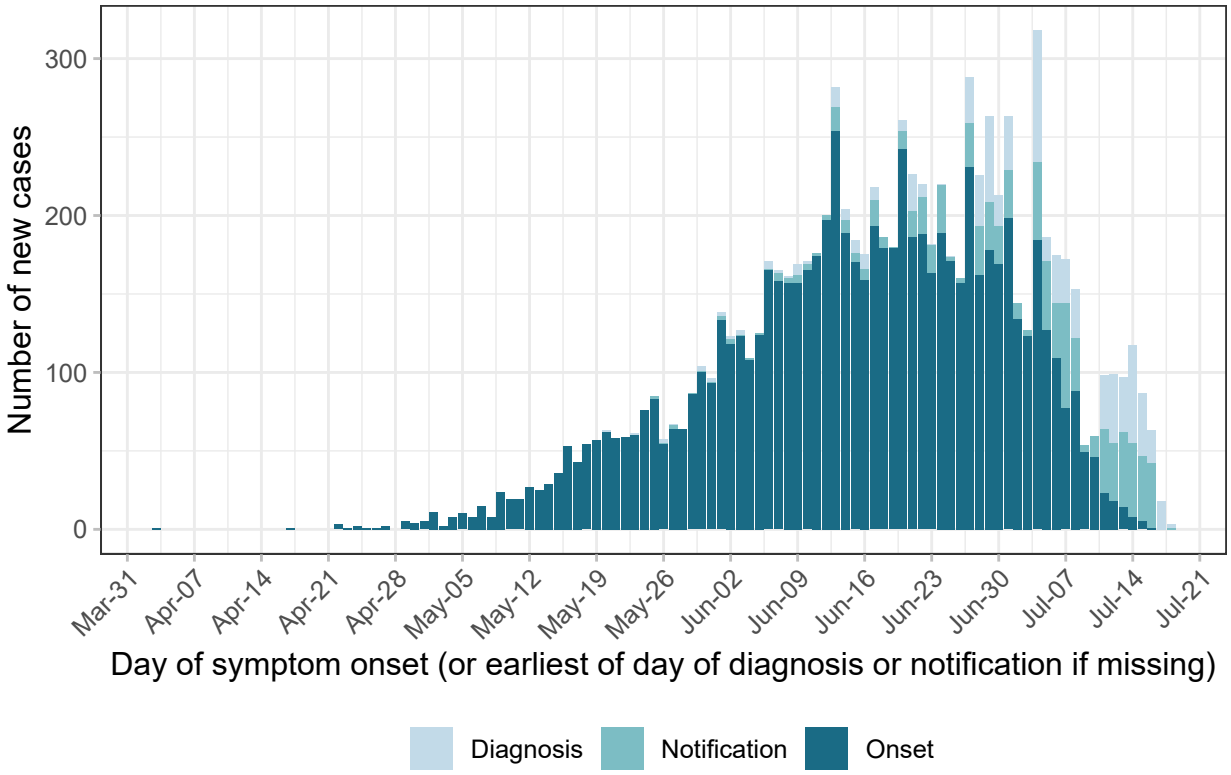
Overall by date of notification

Figure 1: Overall number of cases of monkeypox, per date of notification, European Region, TESSy, 2022



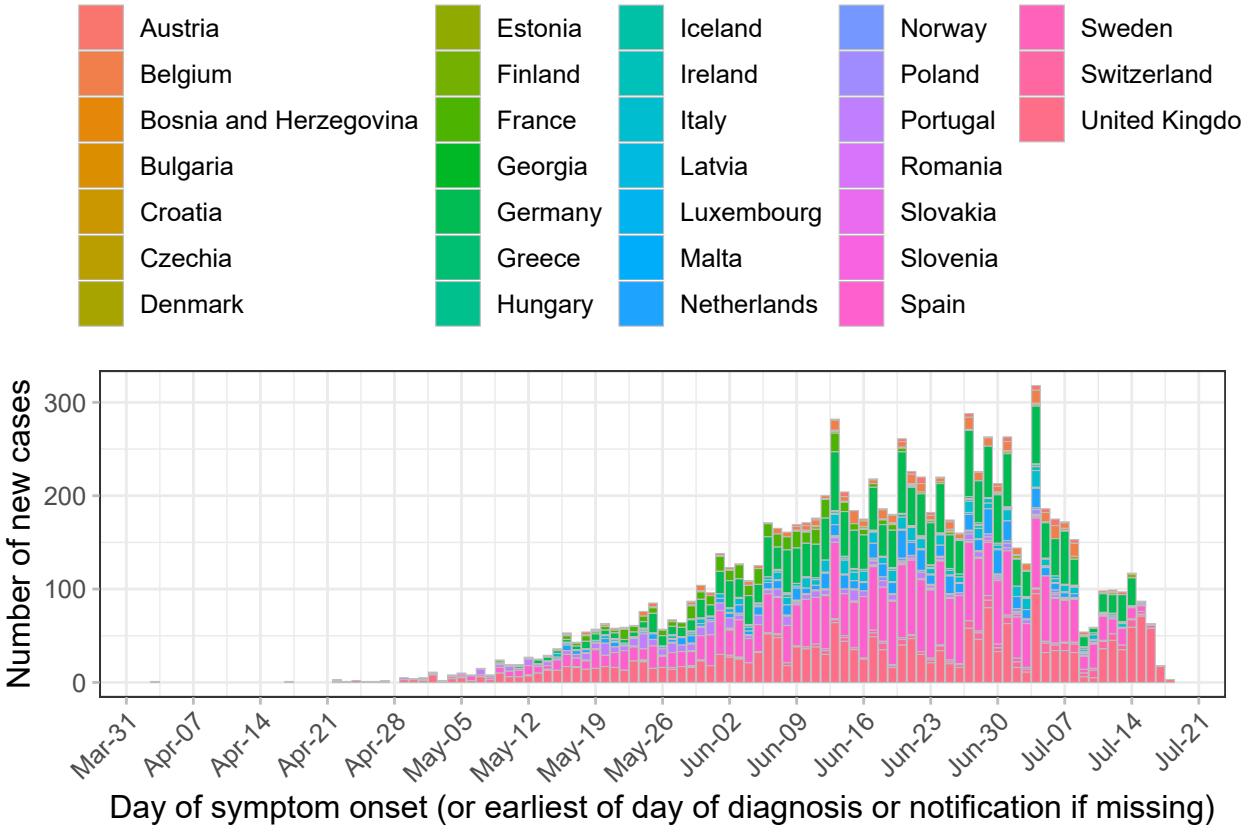
Overall by date of symptom onset

Figure 2: Overall number of cases of monkeypox, per date of symptom onset, European Region, TESSy, 2022



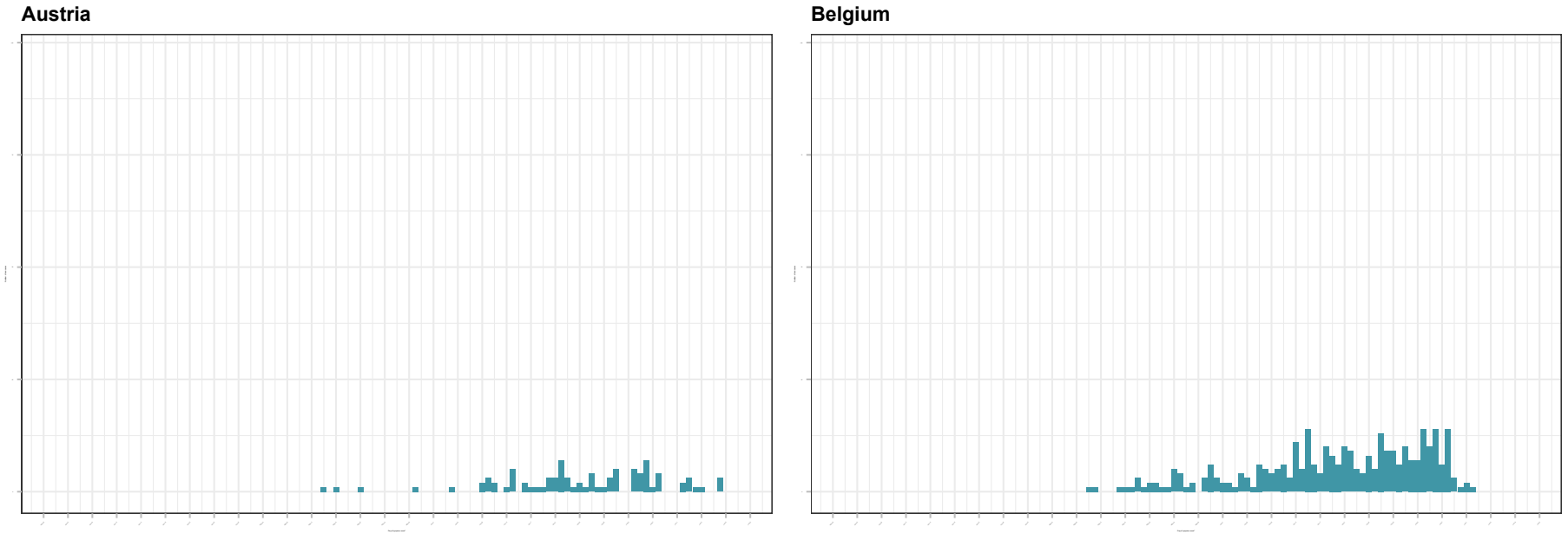
By date of onset and by country or area

Figure 3: Number of cases of monkeypox, per day and per country/area of notification, European Region, TESSy, 2022

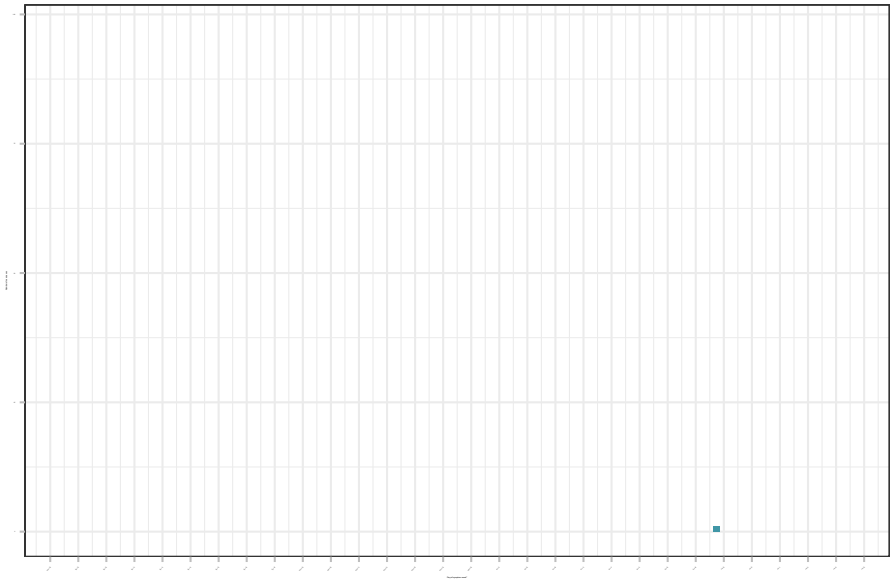


By date of onset and by country or area - country/area level

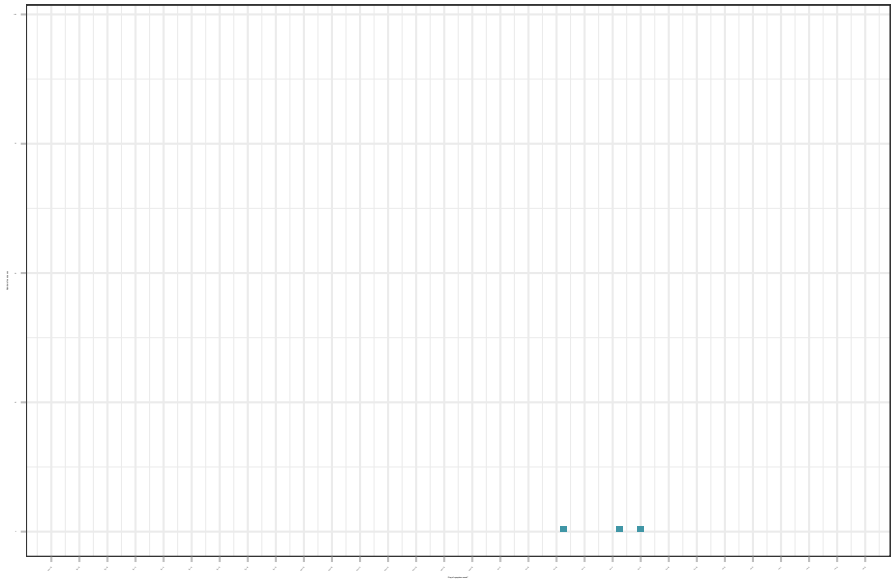
Figure 4: Number of cases of monkeypox, per day and per country/area of notification, European Region, TESSy, 2022



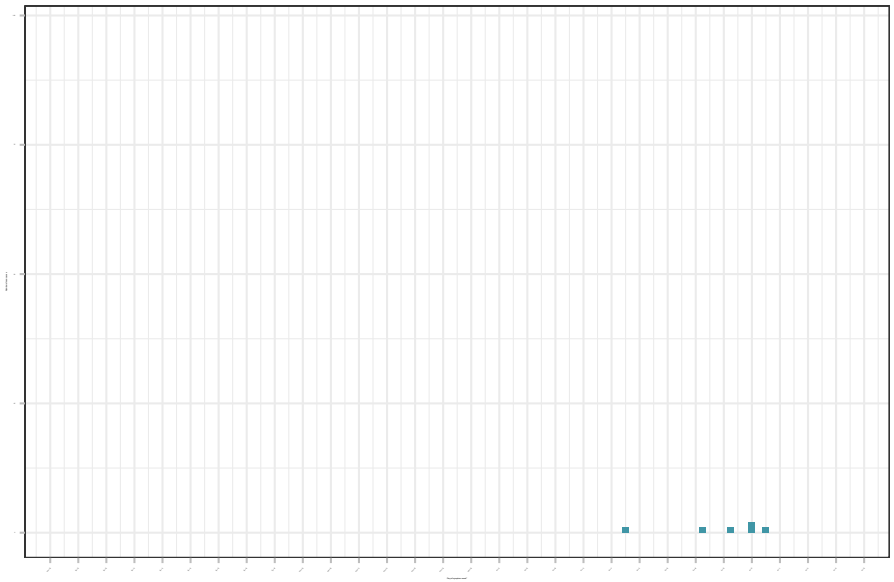
Bosnia and Herzegovina



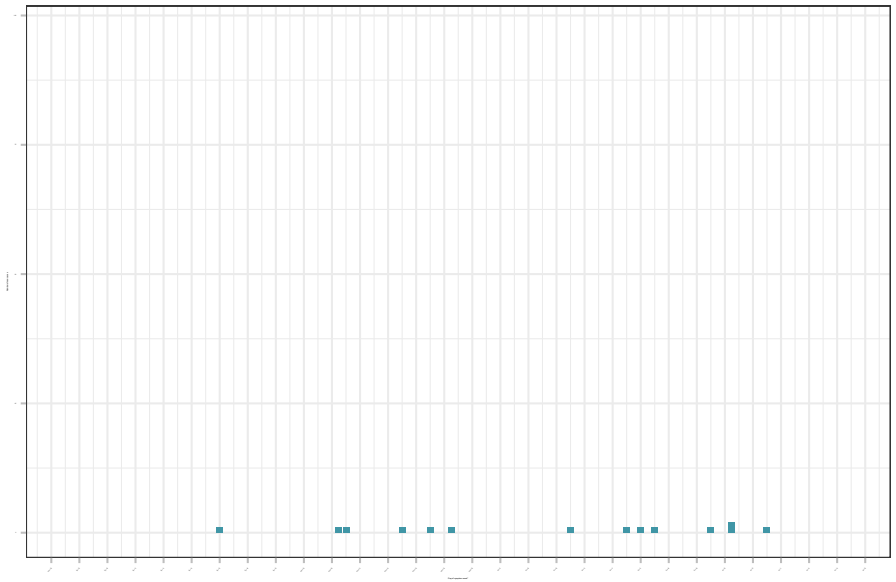
Bulgaria



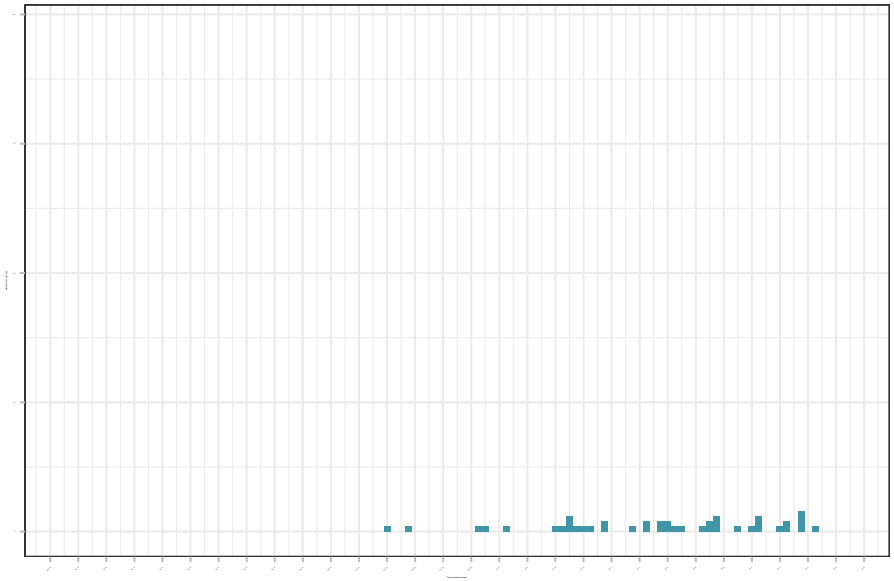
Croatia



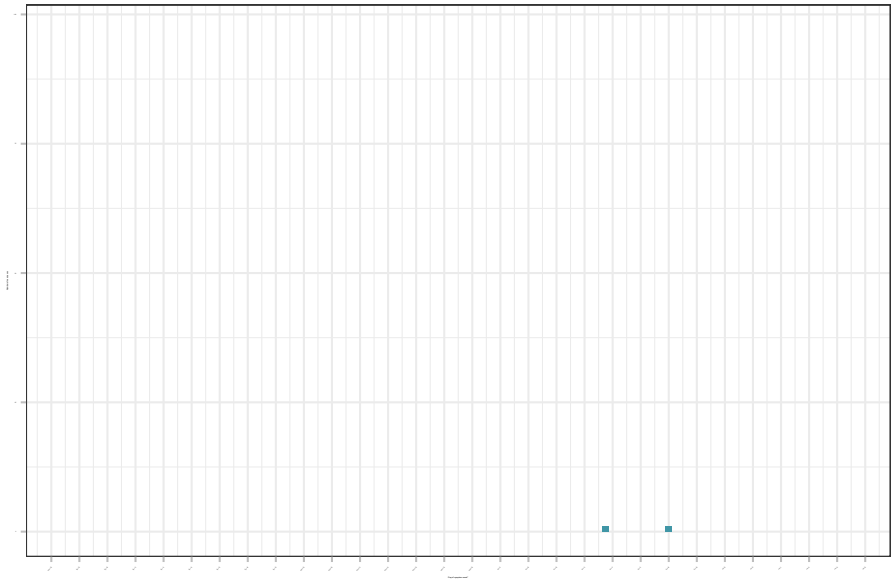
Czechia



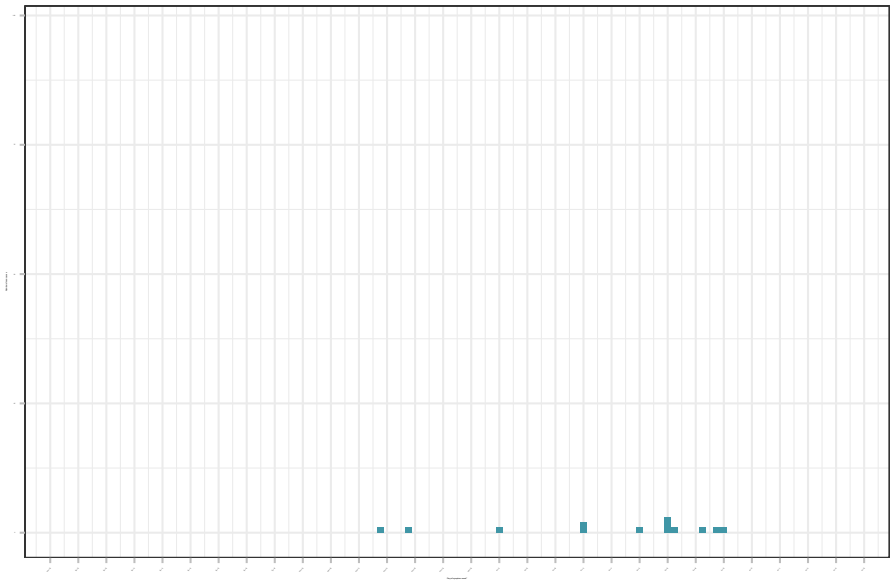
Denmark



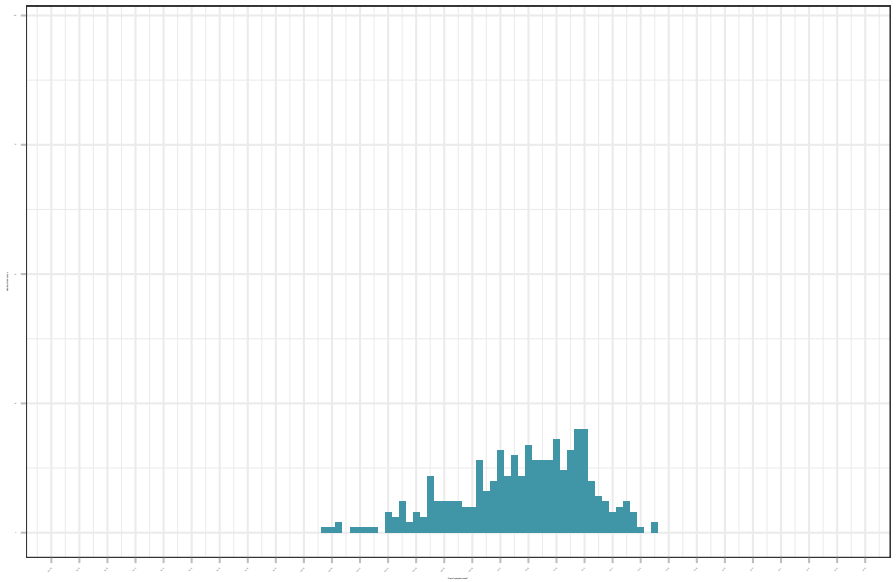
Estonia



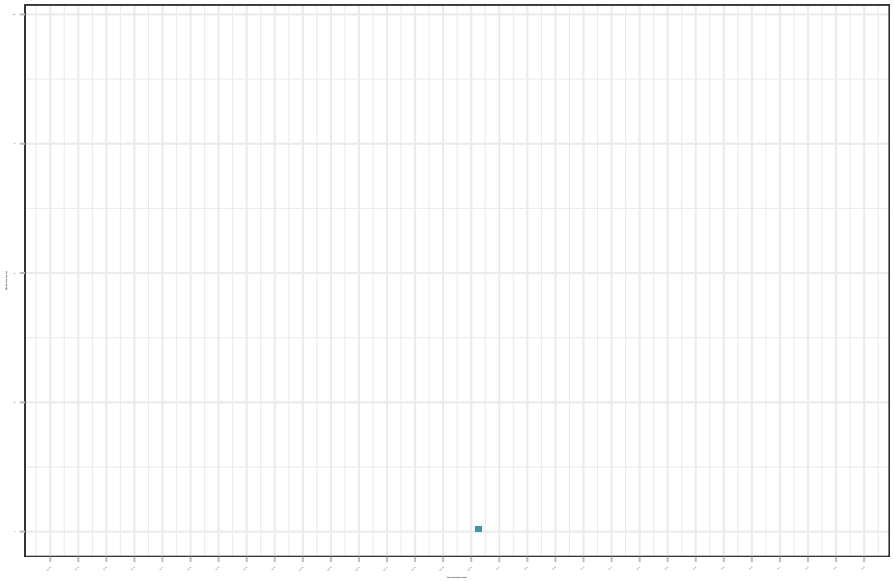
Finland



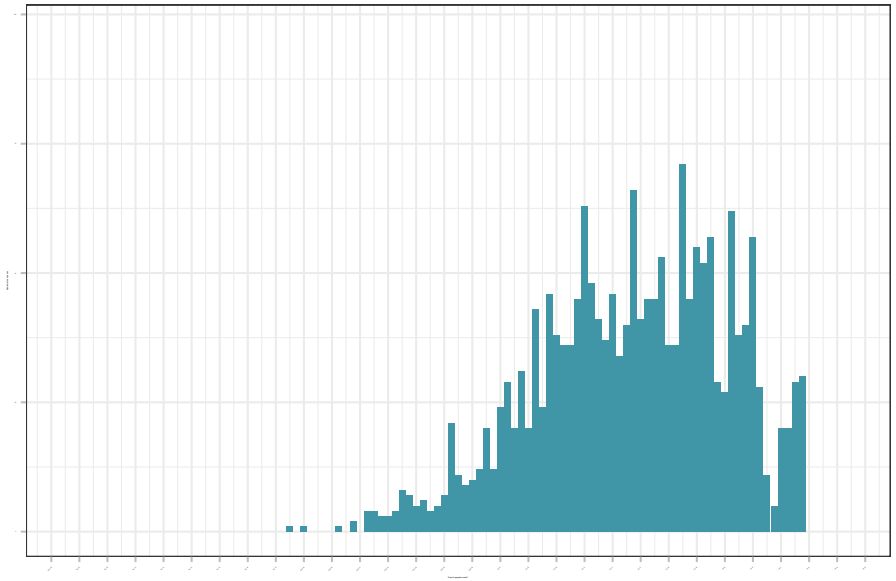
France



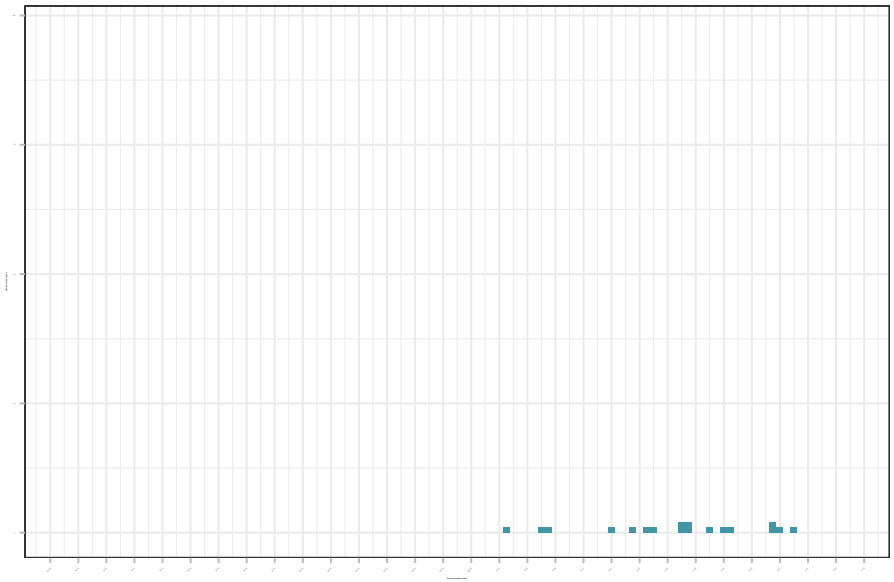
Georgia



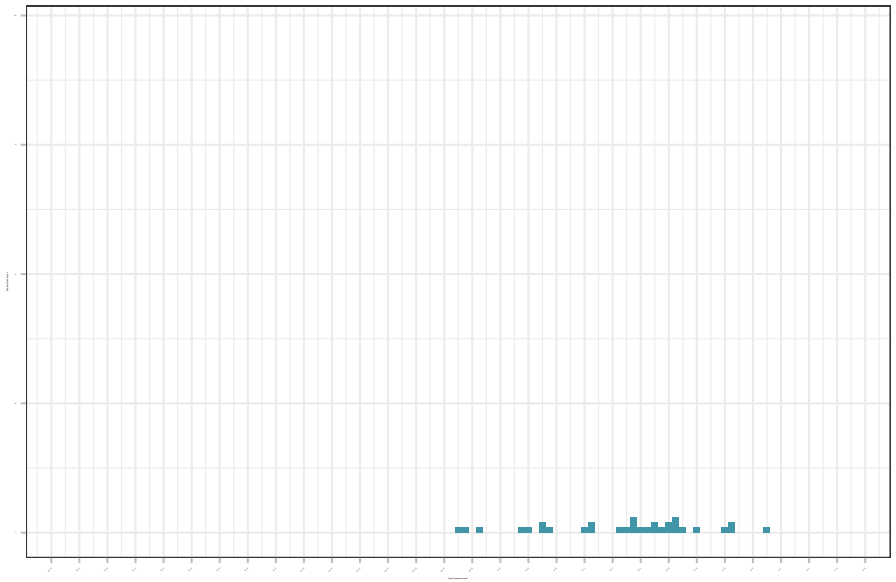
Germany



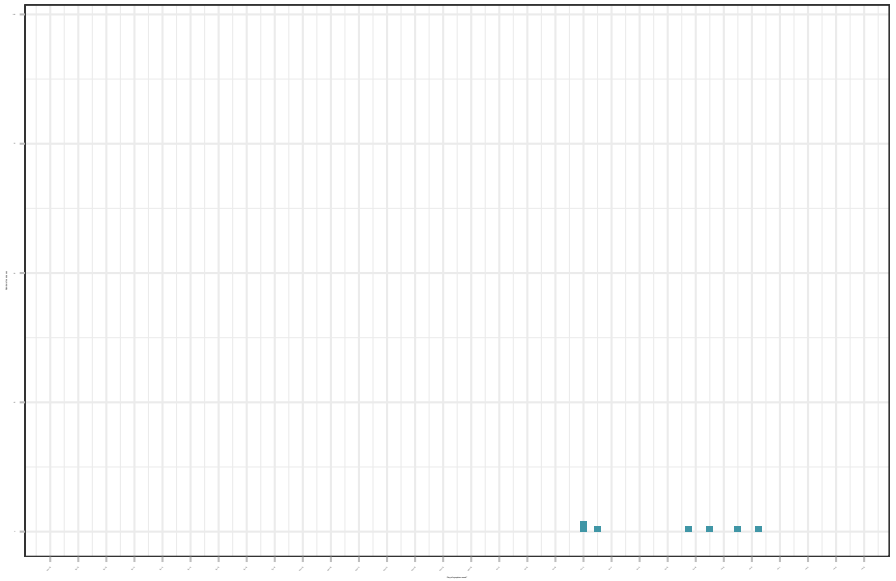
Greece



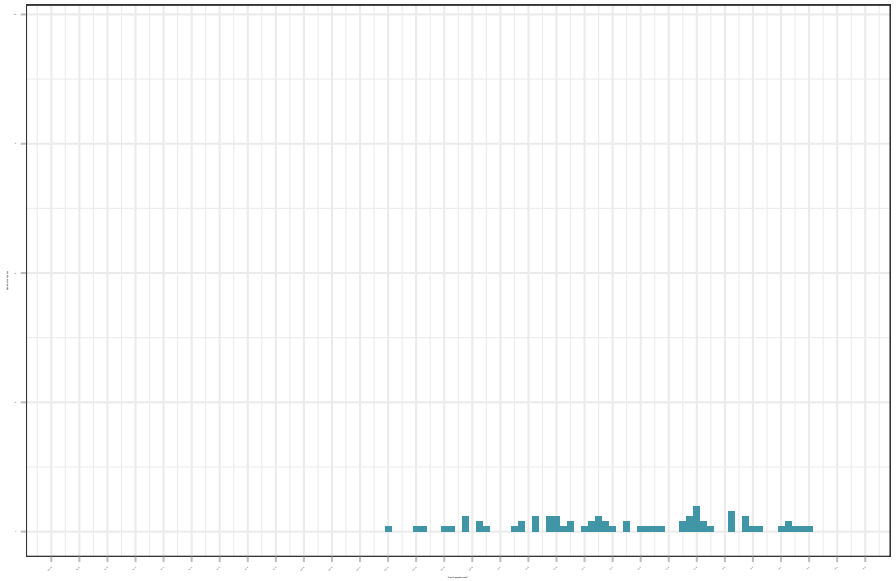
Hungary



Iceland



Ireland



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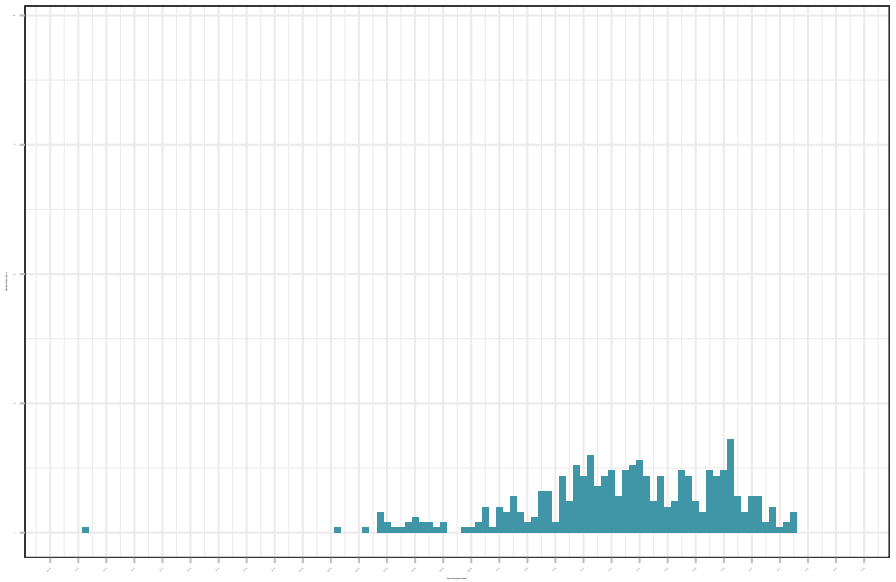
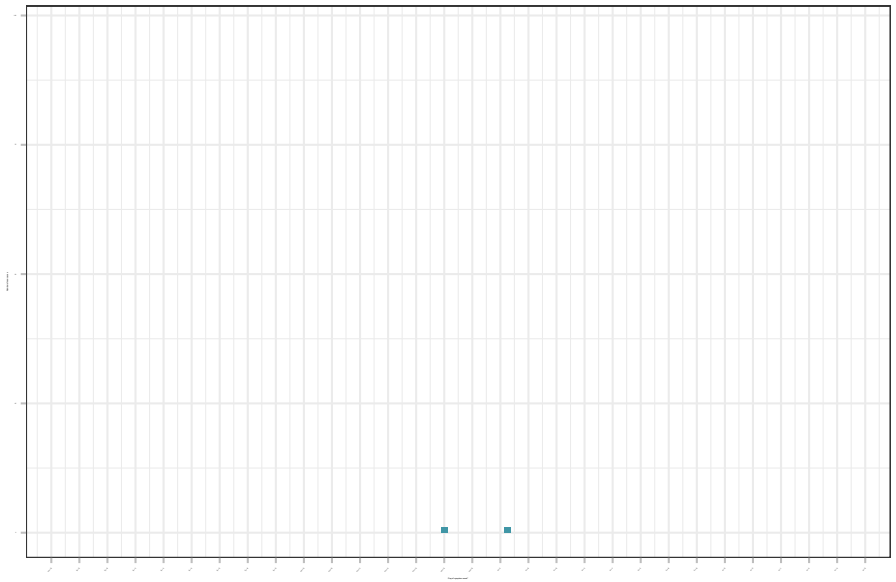
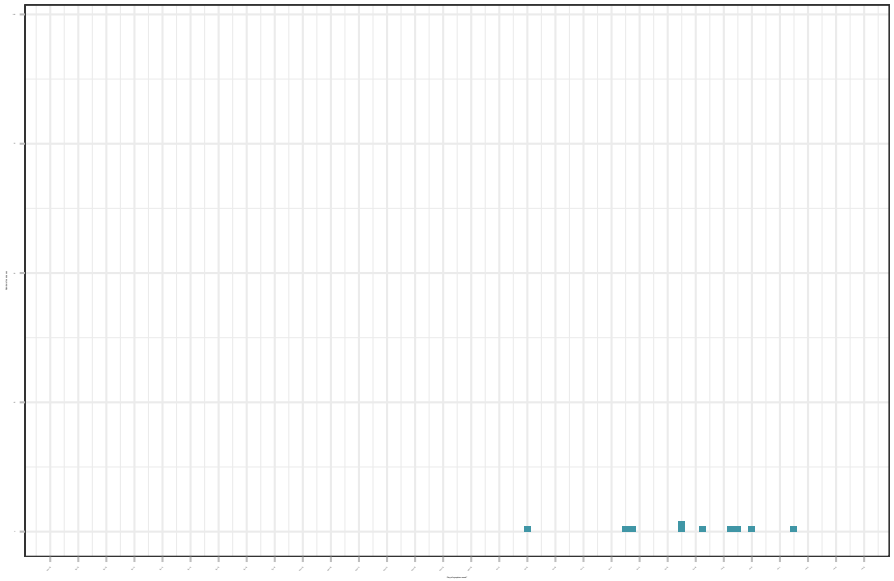


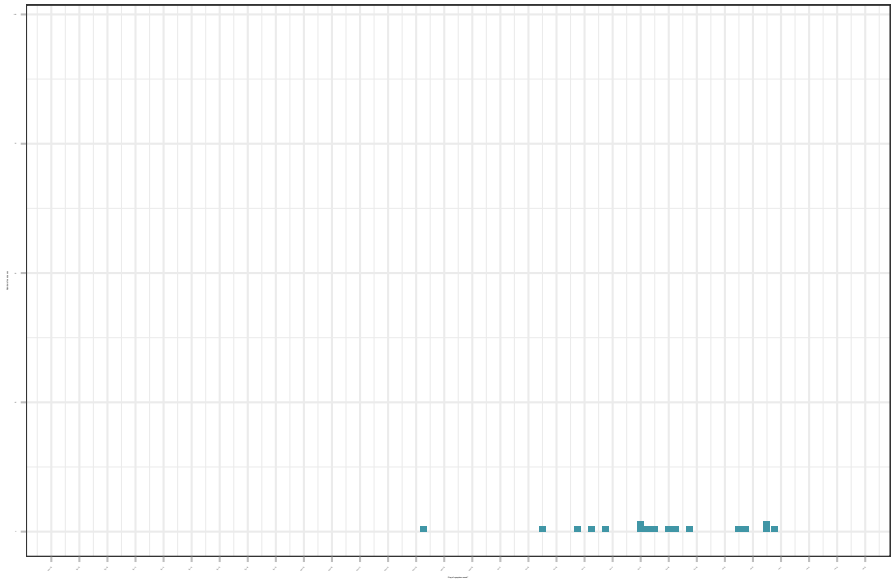
Latvia



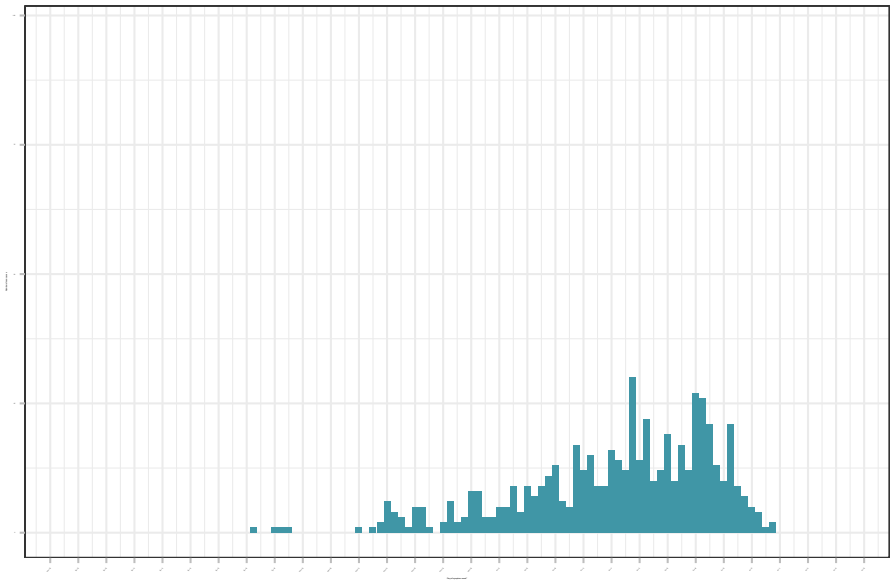
Luxembourg



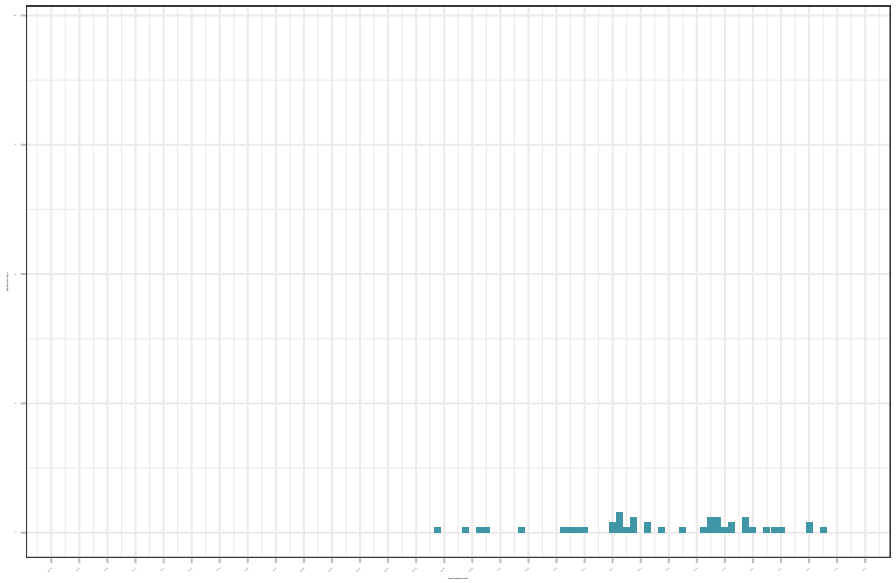
Malta



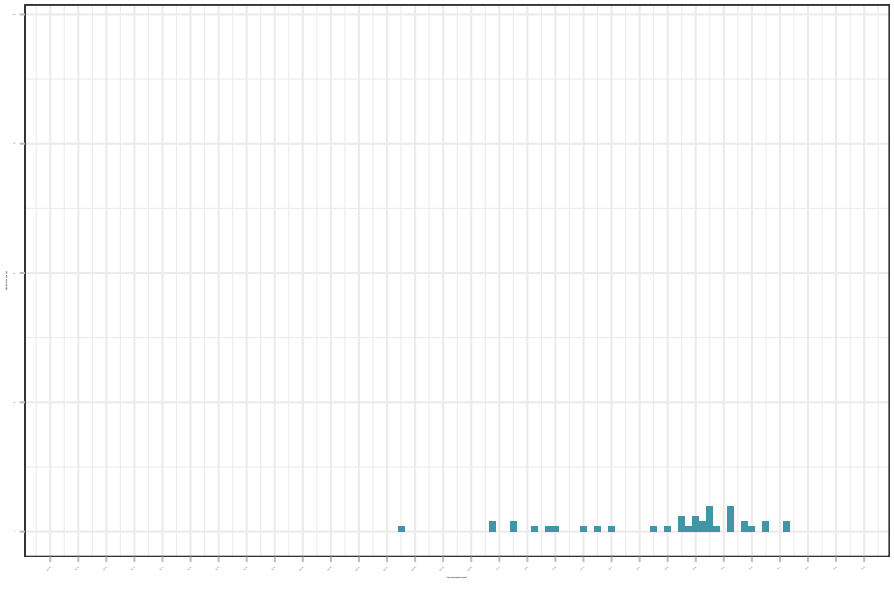
Netherlands



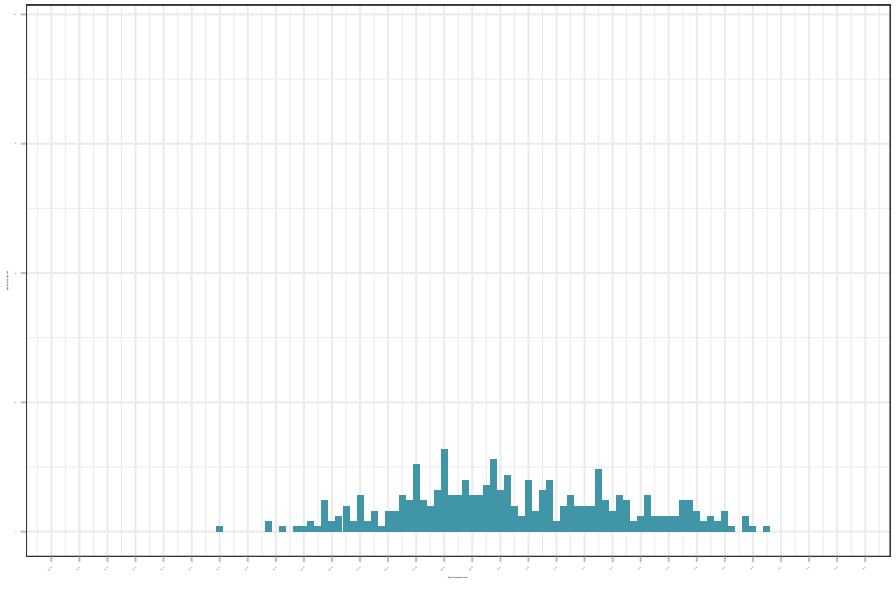
Norway



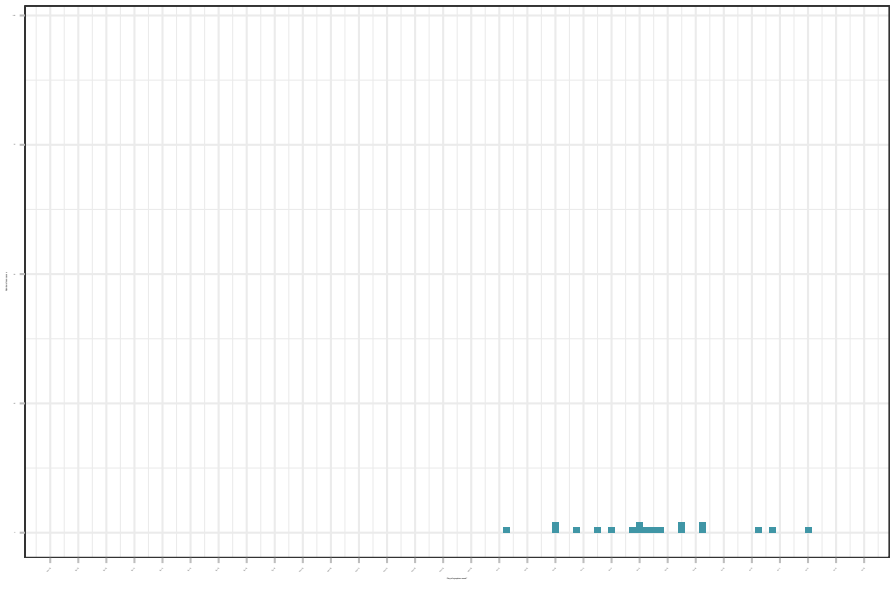
Poland



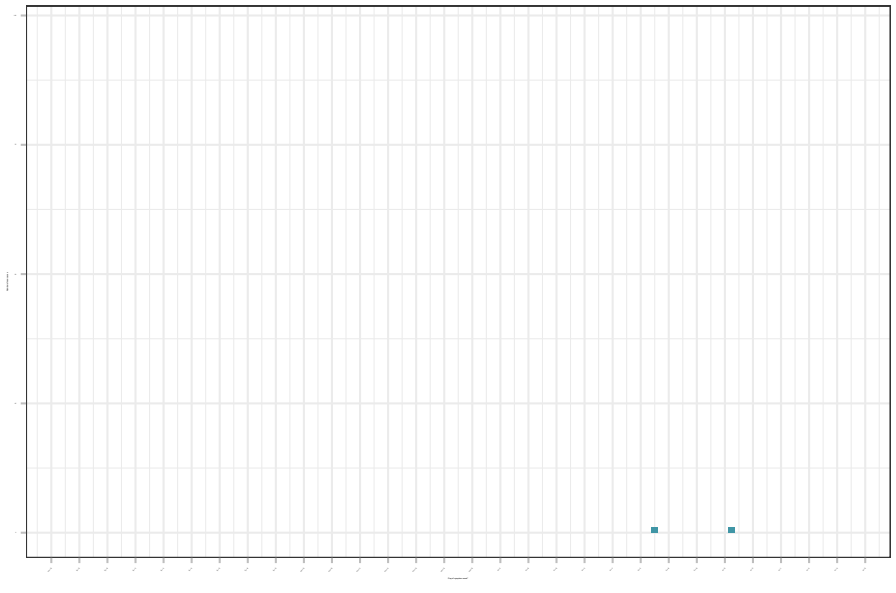
Portugal



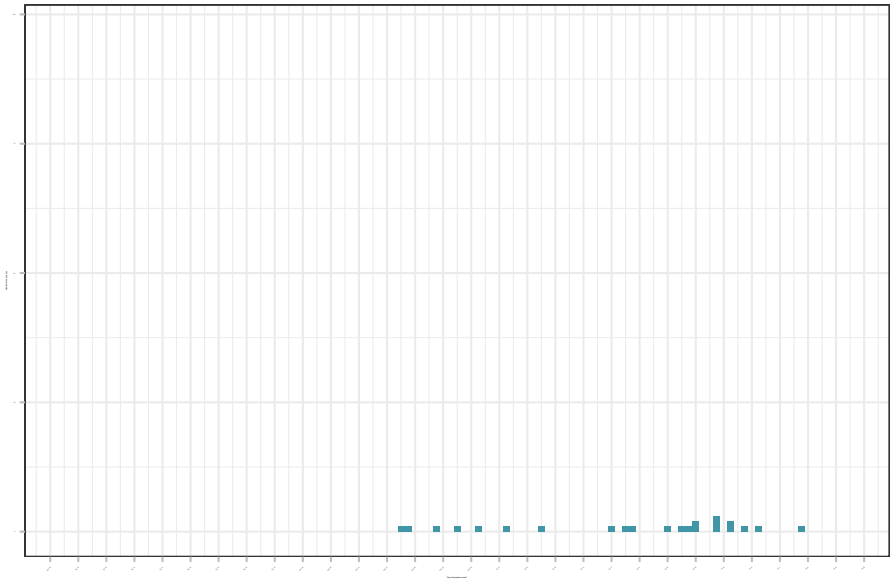
Romania



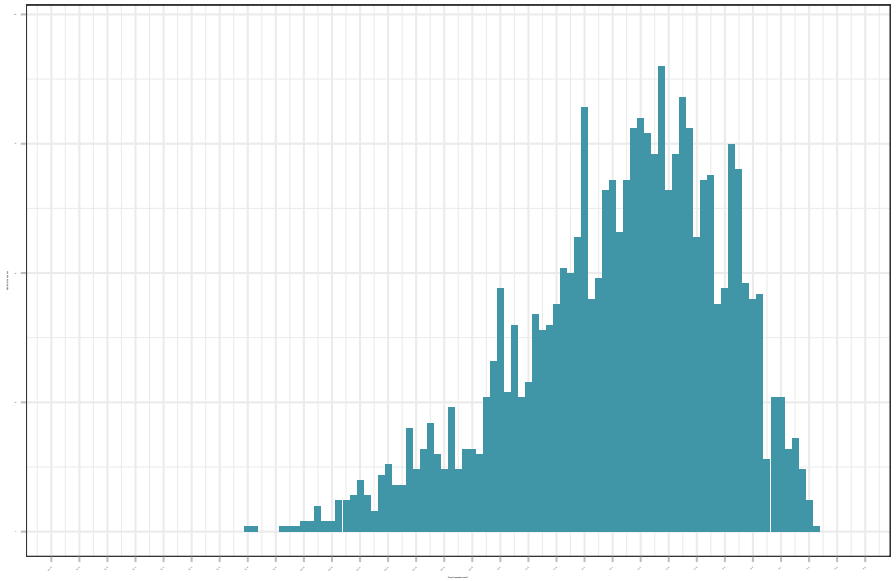
Slovakia



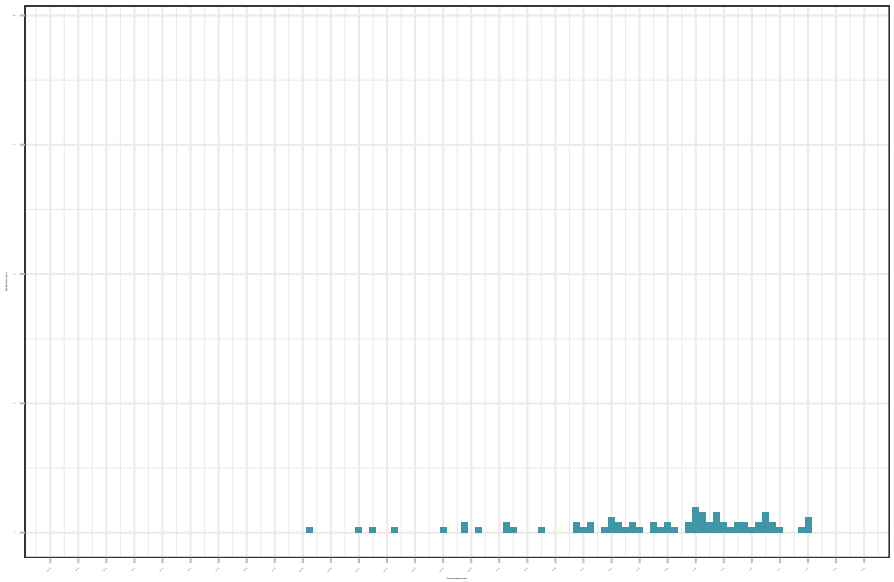
Slovenia



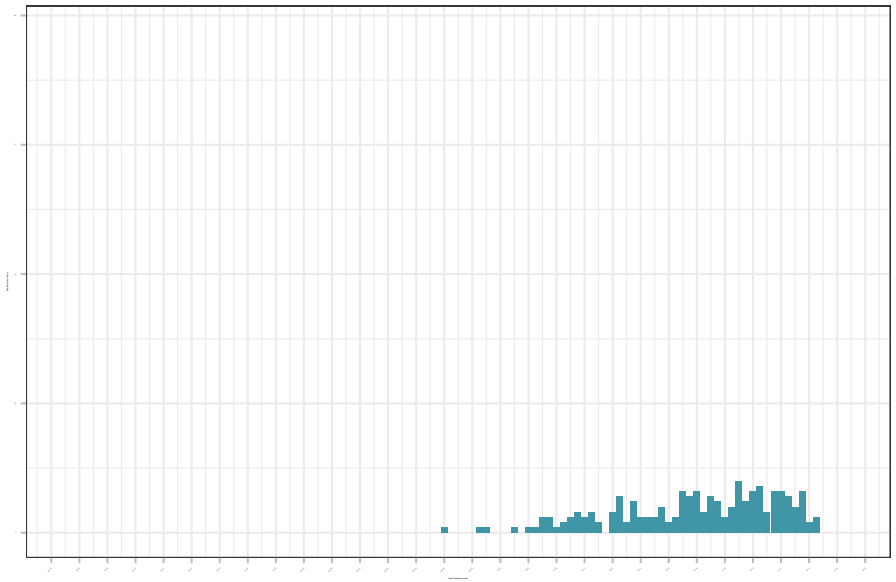
Spain



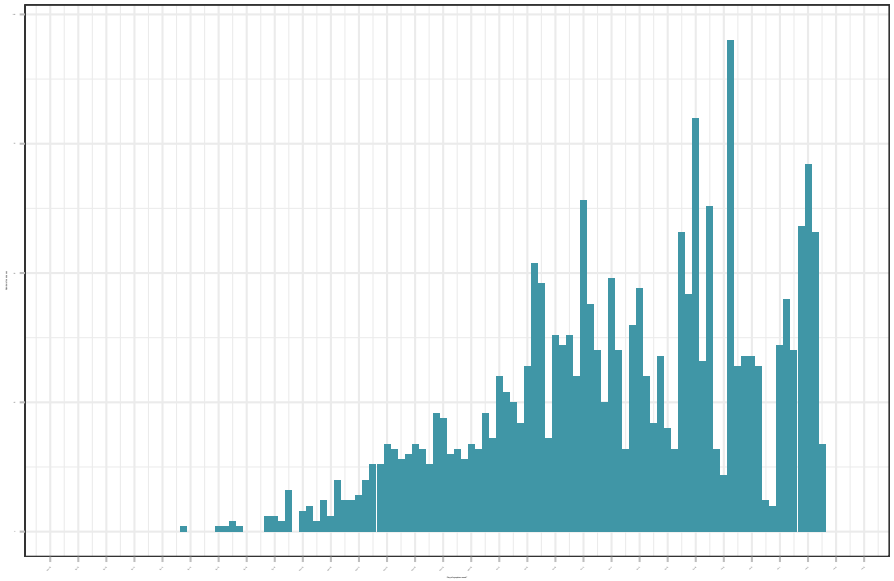
Sweden



Switzerland



United Kingdom



**Day of symptom onset or earliest of day of diagnosis or notification if missing*

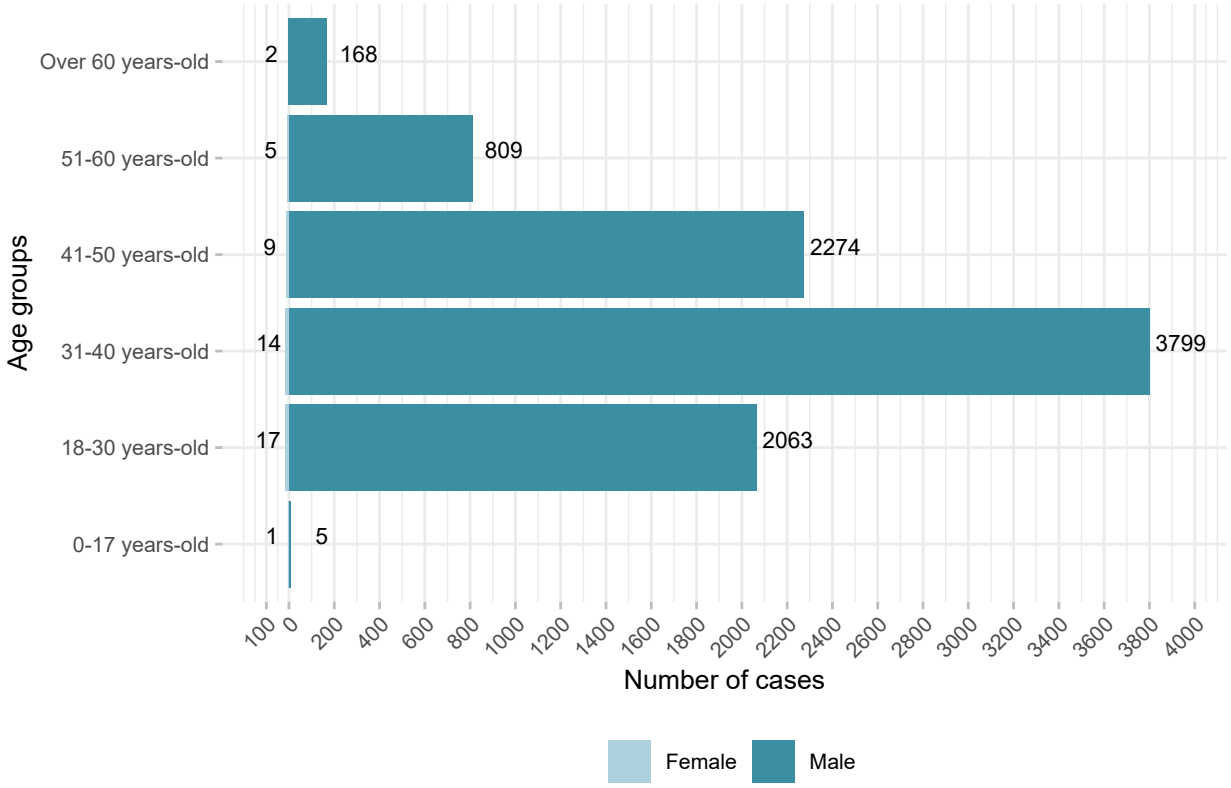
SUMMARY TABLE

Table 2: Summary of number of probable and confirmed cases of monkeypox by country/area, European Region, TESSy, 2022

Country	Confirmed cases	Probable cases	Unclassified cases	Total cases
Austria	88	0	0	88
Belgium	311	1	0	312
Bosnia and Herzegovina	1	0	0	1
Bulgaria	3	0	0	3
Croatia	6	0	0	6
Czechia	14	0	0	14
Denmark	43	0	0	43
Estonia	2	0	0	2
Finland	13	0	0	13
France	350	0	0	350
Georgia	1	0	0	1
Germany	1859	0	0	1859
Greece	18	0	0	18
Hungary	32	0	0	32
Iceland	7	0	0	7
Ireland	69	0	0	69
Italy	374	0	0	374
Latvia	2	0	0	2
Luxembourg	10	0	0	10
Malta	17	0	0	17
Netherlands	547	0	0	547
Norway	43	0	0	43
Poland	36	4	0	40
Portugal	351	0	0	351
Romania	19	0	0	19
Slovakia	2	0	0	2
Slovenia	23	0	0	23
Spain	2653	0	0	2653
Sweden	71	0	0	71
Switzerland	195	0	0	195
United Kingdom	2116	0	0	2116
Total	9276	5	0	9281

DEMOGRAPHICS

Figure 6: Age and gender distribution of cases of monkeypox, European Region, TESSy, 2022

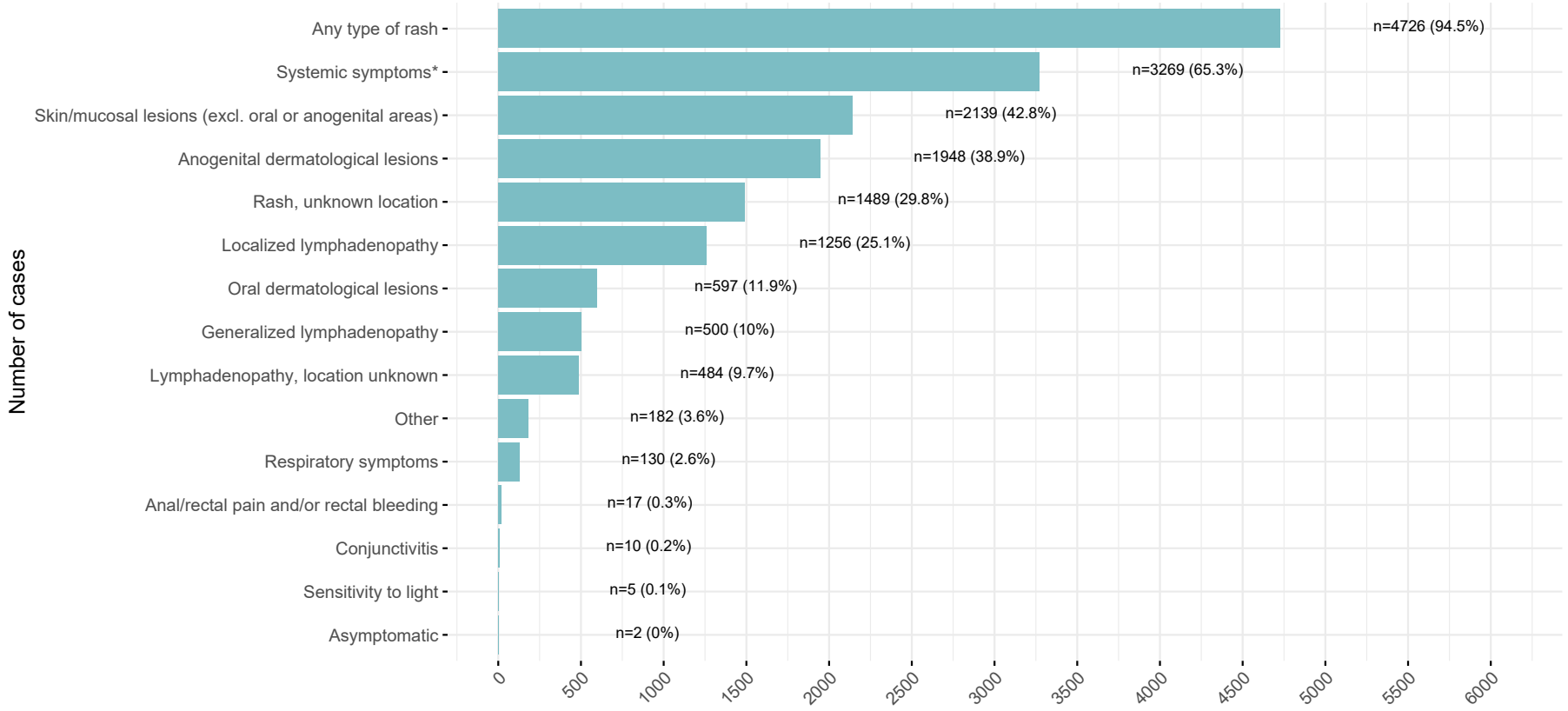


Information on gender is missing for 84 cases and information on age is missing for 44 cases.

CLINICAL DESCRIPTION

The average time between symptom onset and diagnosis was 7 days.

Figure 7: Distribution of symptoms among those reporting at least one type of symptom (N=5003), European Region, TESSy, 2022



Distribution of rash and systemic symptoms among those reporting at least one type of symptom (N=5003), European Region, TESSy, 2022

Table 3: Distribution of rash and systemic symptoms among those reporting at least one type of symptom (N=‘r nrow(ClinicalData)‘), European Region, TESSy, 2022

Any type of rash	Systemic Symptoms*	Count (%)
Present	Present	3036 (60.7%)
Present	Absent	1690 (33.8%)
Absent	Present	233 (4.7%)
Absent	Absent	44 (0.9%)
Total	-	5003 (100%)

**Fever, fatigue, muscle pain, vomiting, diarrhea, chills, sore throat, headache*

Detection of asymptomatic cases is dependent on testing guidelines which currently do not recommend testing asymptomatic persons

OUTCOME, HIV STATUS, HCW

Table 4: Summary of outcome, HIV status of cases, and cases of monkeypox among health workers, European Region, TESSy, 2022

	Yes	No	Total
Admitted to ICU	1 (0.1%)	1359 (99.9%)	1360 (100%)
Hospitalized*	256 (8.1%)	2919 (91.9%)	3175 (100%)
Died	0 (0.0%)	5237 (100%)	5237 (100%)
HIV-Positive	923 (38.4%)	1480 (61.6%)	2403 (100%)
Health worker	31 (2.6%)	1167 (97.4%)	1198 (100%)

**Includes cases hospitalized for isolation or treatment (51 cases were hospitalized for isolation purposes,114 required clinical care and 91 were hospitalized for unknown reasons).*

SEXUAL ORIENTATION

Sexual orientation in TESSy is defined according to the following non-mutually exclusive categories:

- Heterosexual
- MSM = MSM/homo or bisexual male
- Women who have sex with women
- Bisexual
- Other
- Unknown or undetermined

Sexual orientation is not necessarily representative of the gender of the person the case had sex with in the past 21 days nor does it imply sexual contact and sexual transmission.

We summarize here the sexual orientation that male cases identified with. No differences were observed across age groups.

Table 5: Summary of reported sexual orientations among cases of monkeypox, European Region, TESSy, 2022

Sexual Orientation	Count (%)
MSM	3124 (33.7%)
Bisexual	33 (0.4%)
Heterosexual	46 (0.5%)
Unknown or undetermined	1508 (16.2%)
Missing	4570 (49.2%)
Total	9281 (100%)

MICROBIOLOGICAL ANALYSES

SPECIMEN TYPES

Table 6: Summary of specimen types with positive test result used for diagnosis of monkeypox, European Region, TESSy, 2022

Specimen type	Count
Lesion swab	285 (46.5%)
Oropharyngeal swab	128 (20.9%)
Rectal swab	96 (15.7%)
Lesion crust	74 (12.1%)
Genital swab	23 (3.8%)
Urine	7 (1.1%)
Serum	0 (0.0%)
Semen	0 (0.0%)
Total	613 (100%)

PHYLOGENETICS

Phylogenetics of monkeypox virus

Whole genome sequences of MPXV were extracted from GISAID EpiPox and NCBI GenBank on 18 July 2022. NextClade [1] was used to assess the quality and poor-quality sequences were excluded. The phylogenetic analysis was performed using ParSNP [2] with MT903344.1 as reference and visualized using Microreact [3].

There are two genetically distinct major clades described for MPXV, the Central African (Congo Basin) and West African clades (*Figure A*).

The 2022 outbreak sequences from Europe are part of a distinct cluster within the West African clade and cluster together with 2022 MPXV sequences from Australia, Brazil, Canada, Mexico, Peru, South Africa, Taiwan, and the United States (*Figure B*). Two 2022 sequences from the United States do not cluster with the other outbreak sequences. Available information indicate that these are sporadic cases not linked to the current outbreak.

The most recently (since 11 July 2022) deposited sequences collected in 2022 are from Austria, Canada, Czechia, Mexico, Netherlands, Peru and the United States and are all part of the 2022 outbreak within the distinct West African clade (*Figure B*).

Figure A. Phylogenetic tree of monkeypox virus sequences as of 18 July 2022.

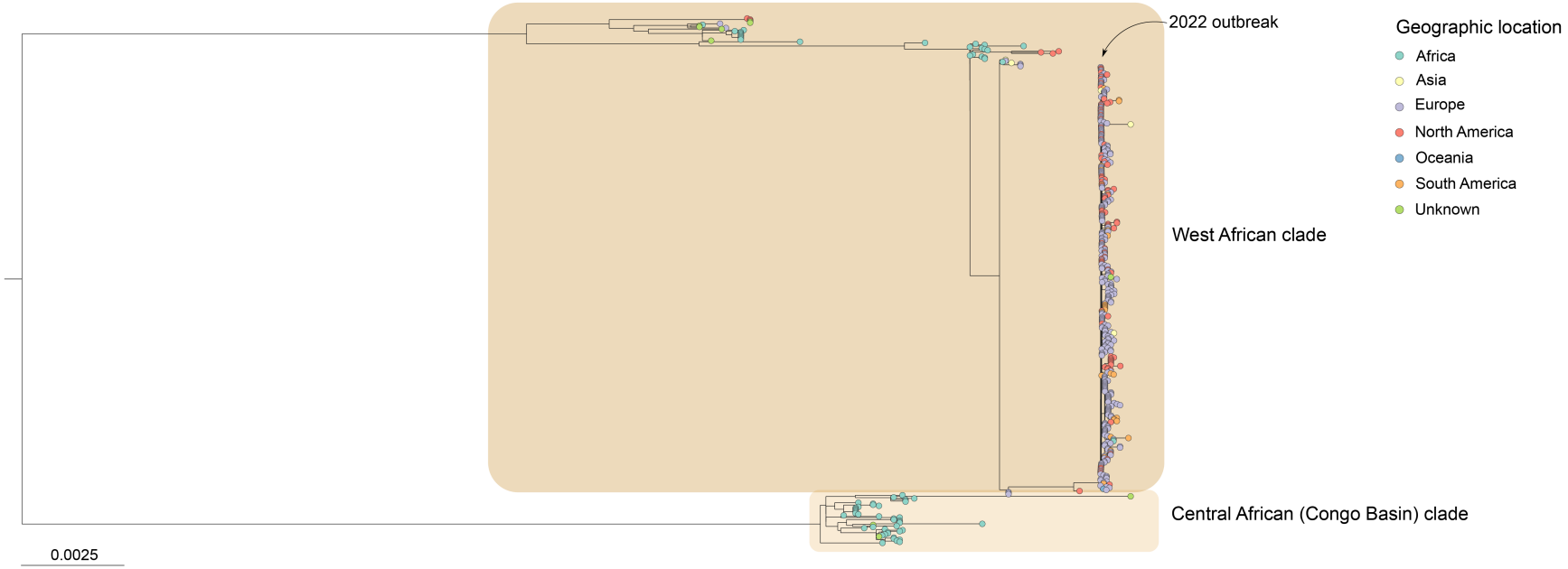


Figure B. Phylogenetic tree of monkeypox virus sequences from West African clade as of 18 July 2022. Sequences from 2022 are indicated with coloured circles and the binary heatmap shows new sequences uploaded to sequence databases after 11 July 2022.

[1] Aksamentov, I., Roemer, C., Hodcroft, E. B., & Neher, R. A., (2021). Nextclade: clade assignment, mutation calling and quality control for viral genomes. Journal of Open Source Software, 6(67), 3773, https://doi.org/10.21105/joss.03773

[2] Treangen TJ, Ondov BD, Koren S, Phillippy AM. The Harvest suite for rapid core-genome alignment and visualization of thousands of intraspecific microbial genomes. Genome Biology. 2014;15(524). Available at: https://genomebiology.biomedcentral.com/articles/10.1186/s13059-014-0524-x

[3] Argimón S, et al. Microreact: visualizing and sharing data for genomic epidemiology and phylogeography. Microbial Genomics. 2016;2(11). Available at: https://www.microbiologyresearch.org/content/journal/mgen/10.1099/mgen.0.000093

DISCLAIMERS AND ACKNOWLEDGMENTS

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KEEPING AGENTS SAFE ON BOARD

INFECTIOUS DISEASES PROTOCOLS FOR SHIP AGENTS

INTRODUCTION

The COVID-19 pandemic has amply demonstrated both the impact a "public health emergency of international concern", (as defined in the WHO's International Health Regulation) can have on the international maritime sector and the resilience, flexibility, and ingenuity of that sector in adapting to the changed circumstances and ensuring that goods continue to move.

The pandemic has also accelerated the use of digital technology and the streamlining of procedures to reduce the levels of personal contact required to ensure the requirements and obligations of the ship-port interface can be carried out, whilst also reducing opportunities for the spread of a communicable disease between the ship and shore. At the same time, concerns about the detrimental impact on the mental health of seafarers resulting from the cancellation of crew changes, reduced human contact and bans on shore leave, have increased significantly.

As the primary contact between the ship and the shore, the ship agent is deeply involved in all these issues and their continued engagement on operational, husbandry and pastoral matters is vital in keeping ships moving and international trade flowing, whilst also addressing the needs of the crew.

To ensure that ship agents can continue to provide the highest and widest possible levels of service to ships and their crews during the ongoing COVID-19 pandemic and any future public health emergency of international concern therefore, FONASBA has drafted these protocols.

COMPLIANCE WITH EXISTING REGULATIONS:

The ship agent operates alongside, and in concert with, all the stakeholders in the ship-to-shore interface and therefore complies with all necessary requirements, regulations and protocols including, but not limited to: the World Health Organisation *International Health Regulations 2005*, the International Maritime Organisation *Convention on Facilitation of International Maritime Traffic (the IMO FAL Convention),* the European Commission *Guidelines for Border Management Measures to Protect Health and Ensure the Availability of Goods and Essential Services (C2020/1753),* the International Chamber of Shipping *Guidance for Ensuring a Safe Shipboard Interface Between Ship and Shore-based Personnel (IMO Circular Letter 4024/Add.16)* and additionally guidance, protocols and requirements issued by national authorities, shipowners, port authorities and terminal operators. These FONASBA protocols are designed to operate alongside, and compliment, existing guidance, protocols, and requirements, but are not intended to override or supersede them, especially where they have legal effect.

METHODOLOGY:

For the sake of consistency, these protocols are based on the "Hierarchy of controls as a guide to establishing effective safety control measures and reducing risk" as detailed in the International Chamber of Shipping's publication *Guidance for Ensuring a Safe Shipboard Interface Between Ship and Shore-based Personnel* mentioned above and endorsed by FONASBA. We are grateful to the International Chamber for permission to use the Hierarchy of Controls as a basis for these protocols.

FONASBA/London, July 2022

HIERARCHY OF CONTROLS[1]:

1. Eliminate	Elimination of the hazard is the most effective measure to reduce risks. Work onboard should not be conducted if there is a safer method to undertake the task, such as not going to a ship. In a number of instances, e.g. conducting audit, surveys inspections and training, remote possibilities exist which may eliminate the need to go onboard or reduce the numbers of personnel needing to attend.
2. Reduce	Can attendance onboard be reduced? Where it is not possible to fully eliminate the hazards, the risk could be reduced by minimising the onboard element of the work.
3. Communicate	If onboard attendance of shore-based personnel cannot be eliminated, communicate, and understand participant requirements. Ensure requirements of each party, the ship and shore-based organisation have been communicated in good time to each other and are assessed and understood. If there are differences in requirements, control measures should be agreed and understood by all parties prior to the shipboard intervention taking place.
4. Control	If the requirements of each party, the ship and the shore-based organisation have been communicated to each other and assessed, and are either not understood or there are differences, measures need to be taken so that all requirements are understood and so that requirements can be mutually agreed and understood by all parties prior to the shipboard intervention taking place.
5. Personal Protective Equipment (PPE)	Understand what PPE is required and expected to be used by crew and shore-based personnel during attendance on board and at what times.

[1] Taken from the International Chamber of Shipping's publication "*Guidance for Ensuring a Safe Shipboard Interface Between Ship and Shore-based Personnel*" and reproduced with permission of the Chamber.

ACTIONS BY THE SHIP AGENT

1. Eliminate	Elimination of the hazard is the most effective measure to reduce risks. Work onboard should not be conducted if there is a safer method to undertake the task, such as not going to a ship. In a number of instances, e.g. conducting audit, surveys inspections and training, remote possibilities exist which may eliminate the need to go onboard or reduce the numbers of personnel needing to attend.	Action should be taken by the agent to minimise unnecessary in-person contact with the vessel as a means of reducing the likelihood of transmission of the disease from the ship to shore or vice versa. At all times however, the agent must be mindful that one of their obligations is to provide appropriate pastoral care to the Master and crew. The right balance must therefore be struck between minimising contact and ensuring the crew receive the pastoral care they deserve. Where possible therefore: • The exchange of documents and other operational information should be undertaken remotely • Physical attendance on the vessel should be limited to the minimum number of personnel required to carry out the tasks concerned • Contact with crew members should involve only those crew members and shore-based staff directly relevant to the matter under discussion • Meetings should be strictly time-limited to further reduce possible exposure • Visits to the vessel should be scheduled to minimise contact between different parties • Visitors to the vessel should use their own transport and avoid having other parties travelling in the same vehicle • Consideration should be given to meetings being held remotely, or outside the accommodation block where unavoidable By eliminating the risk of cross-transmission of infections in other areas, and efficiently addressing the necessary administrative tasks, as detailed above, it is anticipated the agent will be able to devote appropriate time to the husbandry and pastoral needs of the crew.

2. Reduce	Can attendance onboard be reduced? Where it is not possible to fully eliminate the hazards, the risk could be reduced by minimising the onboard element of the work.	The examples of elimination strategies detailed in section 1 above will, if implemented correctly, significantly reduce the levels of contact between the ship and shore and therefore minimise the risks of cross-infection. Any reduction in contact should however be assessed in the context of maintaining a minimum level of physical attendance at the vessel, consistent with the ship agent's ability to provide adequate and appropriate service to the shipowner or operator, and the crew.
3. Communicate	If onboard attendance of shore-based personnel cannot be eliminated, communicate and understand participant requirements. Ensure requirements of each party, the ship and shore-based organisation have been communicated in good time to each other and are assessed and understood. If there are differences in requirements, control measures should be agreed and understood by all parties prior to the shipboard intervention taking place.	Communication between the ship, the operator, the charterer and shore-based service providers is key to the effective and efficient operation and administration of the port call. The need to additionally communicate infectious disease prevention and mitigation information and guidance should be fully integrated into the pre-call communication planning, with emphasis being placed on ensuring the earliest possible advice of appropriate measures in place onboard the vessel and in the port, including: • Full information on all relevant disease mitigation protocols and regulations, including policies on the use of PPE (see control 5 below) • Information on cases of illness on board the vessel and any visits to healthcare professionals that may be required • Details and results of tests taken by the crew, passengers, and shore-based visitors • Information on the procedures, protocols and limitations relating to crew changes, both on and off-signing, and the precautions to be taken by arriving and departing crew members • A schedule of planned visits to the vessel and the number of persons involved • Information on any other visits, inspections, surveys, deliveries organised for the port concerned by the ship owner, operators or charterer, and the relevant contact details to allow same to be integrated into the visit plan • Details of how cargo operations will be managed

		• Procedures for the remote exchange of documentation and for signing (if required) • Any additional information specific to the port, the vessel, the crew, and/or the call

4. Control	If the requirements of each party, the ship and the shore-based organisation have been communicated to each other and assessed, and are either not understood or there are differences, measures need to be taken so that all requirements are understood and so that requirements can be mutually agreed and understood by all parties prior to the shipboard intervention taking place.	Ensuring that all parties are fully informed of all aspects of the port call and the relevant procedures and protocols, and can apply them at the correct time, is vital to avoiding any confusion, conflicts, and other delays. Starting that conversation as early as possible after the destination country and/or port range are known, will allow for the fullest possible time for clarification and explanation to be provided where necessary, and the required procedures implemented. It will also ensure that all parties are fully briefed in advance and therefore able to carry out their obligations efficiently and effectively and with minimal interruption to the port call and cargo operations.
5. Personal Protective Equipment (PPE)	Understand what PPE is required and expected to be used by crew and shore-based personnel during attendance on board and at what times.	Information on company policies (both ship and shore) regarding the use of PPE and its disposal should be included as part of the initial information exchange, ensuring that both the crew and shore-based visitors are fully equipped prior to visits taking place. Again, any questions or concerns about its availability and use can be addressed in sufficient time to avoid any delays. Whilst evidence for surface-based transmission of infections (that is through touching surfaces and materials where viruses may be present) is not conclusive, good practice would indicate that appropriate precautionary actions, such as regular cleaning and

		disinfecting, should be put in place to mitigate any risks from, for example, the handling of paper, touching door handles and guardrails

JSA UPDATES

New requirement for inbounds from June 1, 2022

The government announced that they would change the criteria for inbound people who may enter Japan by air effective from **June 1, 2022**.

Before departure from their home countries

Regardless of the countries' categories by the Japanese quarantine authority, all seafarers coming from all countries and areas shall follow the following criteria.

Persons who are going to visit Japan shall get a negative certificate of COVID-19 test (PCR test or other method authority allows) seventy-two (72) hours before flight departure.

On-arrival Testing at the airport

Red category: Yes
Yellow-category
(Not boosted): Yes
(Boosted): No
Blue-category: No

Note: Persons who may be positive by the airport testing cannot pass an immigration check until released (7 days at least).

Required Isolation after arrival

Red category
(Not boosted): Three days in designated accommodation. The third-day testing is required. They cannot use public transportation after the third-day testing (negative results). After then they can move to their domestic destination using public transportation.

Red category
(Boosted): Basically, three (3) days in accommodation.
Yellow-category
(Not boosted): Basically, three (3) days in accommodation.
They may transfer to the hotel (or to the vessel) using public transportation within 24 hours after testing (specimen collection) at the airport. After the isolation period (3 days), they may move to the destination using public transportation (using non-public transportation is recommended).

Yellow-category

(Boosted): Not required
Blue-category: Not required
They may move to the destination any time after arrival. They may use public transportation.

For details, kindly refer to the following URL:
https://www.mofa.go.jp/ca/cp/page22e_000925.html
Categories as of July 27
Red-category Countries
Albania, and Sierra Leone (in no order)

Yellow-category Countries
[Asia & Oceania]
India, North Korea, Kiribati, Cook Islands, Samoa, Sri Lanka, Solomon Islands, Tuvalu, Tonga, Nauru, Niue, Pakistan, Vanuatu, Fiji, Bhutan, Brunei, Vietnam, Marshall Islands, Macau, Micronesia, and the Maldives.
[North America]
None
[Middle & South America]
Antigua and Barbuda, Uruguay, Guyana, Cuba, Grenada, Suriname, Saint Kitts, and Nevis, Saint Vincent and the Grenadines, Saint Lucia, Dominica, Trinidad and Tobago, Nicaragua, Haiti, Bahamas, Barbados, Venezuela, Belize, and Honduras
[Europe]
Andorra, Ukraine, Uzbekistan, Kazakhstan, North Macedonia, Cyprus, Kosovo, San Marino, Georgia, Tajikistan, Turkmenistan, Vatican City, Belarus, Portugal, Malta, and Liechtenstein.
[Middle East & Africa]
Angola, Yemen, Egypt, Eswatini, Eritrea, Oman, Cape Verde, Gabon, Gambia, Guinea, Guinea-Bissau, Kuwait, Comoros, Republic of the Congo, the Democratic Republic of the Congo, Saudi Arabia, São Tomé and Príncipe, Syria, Zimbabwe, Sudan, Seychelles, Equatorial Guinea, Senegal, Somalia, Chad, Central African Republic, Tunisia, Togo, Turkey, Namibia, Niger, Palestine, Burkina Faso, Burundi, Botswana, Mali, Mauritius, Mauritania, Libya, Liberia, Lesotho, and Lebanon (in no particular order)

Blue-category Countries
Other than the above-listed countries