

Overview of the implementation of COVID-19 vaccination strategies and deployment plans in the EU/EEA

3 March 2023

Key messages

This report provides an updated overview on the progress of national COVID-19 vaccination strategies and deployment in European Union/European Economic Area (EU/EEA) countries, including updates on:

- overall vaccine uptake and uptake by target group; and
- vaccination strategies and policies.

Vaccine COVID-19 roll-out overview

- As of 19 February 2023 (week 7, 2023), over 976 million COVID-19 vaccine doses had been administered in the EU/EEA, with around 331 million people having received a complete primary vaccination course, 248 million having received a first booster dose, 63.9 million having received a second booster dose, and 5.9 million having received a third booster dose.
- Since the start of COVID-19 vaccine deployment in December 2020, and as of 19 February 2023, the cumulative uptake of the primary vaccination course against COVID-19 in the total EU/EEA population has reached 73% (range: 30.0–86.4%), 54.7% (range: 9.2–75.8%) for the first booster dose, 14.1% (range: 0.2–33.6%) for the second booster dose, and 1.7% (range: <0.1–9.5%) for the third booster dose.
- Among adults (aged 18 years and older) the cumulative vaccine uptake reached 82.4% (range: 35.8–96.4%) for the complete primary course, with no sign of further increase for several months, and 65.4% (range: 11.3–87.0%) for the first booster dose, increasing very slowly.
- The progress of vaccination uptake is diverse across EU/EEA countries, with three countries (Bulgaria, Croatia, and Romania) still reporting less than 25% of the cumulative vaccine uptake of the first booster, and nine countries (Czechia, Estonia, Hungary, Latvia, Liechtenstein, Lithuania, Poland, Slovakia, and Slovenia) still reporting less than 50% of vaccine uptake of the first booster in the total population.
- Approximately 63.8 million second booster doses have been administered to adults aged 18 years and older. Of these adults, 77% are people aged 60 years and older. The cumulative uptake of the second booster dose is 17.2% in those aged 18+ years (range: 0.2–41.9%), 35.4% in those aged 60+ years (range: 0.4–86.6%), and 46.5% in those aged 80+ years (range: 0.3–96.7%). The uptake of the second booster dose among those aged 60+ years has significant variations across EU/EEA countries with 12 countries reporting less than 25% (Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Liechtenstein, Lithuania, Poland, Romania, Slovakia, Slovenia).
- Approximately 5.9 million third booster doses have been administered to adults aged 18 years and older. Of these adults, 91% are people aged 60 years and older. The cumulative uptake of the third booster dose is 2.1% in those aged 18+ years (range: <0.1–11.7%), 2.4% in those aged 60+ years (range: <0.1–38.8%) and 4.2% in those aged 80+ years (range: <0.1–58.2%).

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Vaccination strategies and policies during roll-out

- Following the authorisation of primary vaccination in infants and young children aged six months to five years in EU/EEA, 13 countries are recommending primary vaccination to those aged six months to five years with risk factors, seven countries are recommending primary vaccination to all infants and children in this age group, and four countries are not recommending vaccination to this age group.
- Following authorisation of a lower dose of Comirnaty and Spikevax vaccines for children aged five to 11 years in EU/EEA, 25 countries are recommending primary vaccination for all children aged five to 11 years, and four countries recommending primary vaccination to those children in this age group with risk factors. Regarding booster doses, 13 EU/EEA countries are recommending booster doses for those children aged five to 11 years with risk factors and four countries are recommending booster dose for all children in this age group.
- All 30 EU/EEA countries recommend primary vaccination for all 12–17-year-olds. Among all EU/EEA countries, 17 recommend booster vaccination to all adolescents in this age group and nine countries recommend it only for those with risk factors.
- In contrast to the previous ECDC COVID-19 vaccine deployment report published in September 2022, where countries' approach to vaccine doses administered to their population was based on the number of booster doses (i.e. first booster dose, second booster dose), the approach many countries adapted for the autumn/winter 2022 campaign was based on the interval between the doses (i.e. at least three months since last vaccine dose), rather than the number of booster doses received.
- All 30 EU/EEA countries recommended booster vaccination as part of their autumn/winter 2022 campaigns. The age cut-offs for recommendations for booster vaccination (whether it was a second, third, seasonal booster, or repeat vaccination) for the autumn/winter vaccination strategy differs between countries and was between 50 years and above to 80 years and above, with the majority of countries (14) recommending vaccination to those 60 years and above, following by nine countries recommending vaccination to those 65 years and above.
- The majority of countries are recommending booster vaccination for residents in long-term care facilities (LTCFs), healthcare workers or personnel working in LTCFs, and pregnant women. An interval of minimum of three months to maximum of six months since the last vaccination or COVID-19 infection is recommended.
- Planning of the future vaccination strategies and campaigns for 2023 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. One EU/EEA country (Sweden) has published recommendations for their COVID-19 vaccination strategy for 2023, aiming to maximise the benefits of COVID-19 vaccination for those most at risk and older adults who are vulnerable. The majority of countries are still discussing their future COVID-19 vaccination strategies for 2023 and beyond.

The roll-out of national vaccination campaigns is an ongoing process, and this report provides a snapshot of the progress to date.

Scope of this document

ECDC has previously published 10 technical reports on vaccination strategies and vaccine deployment across EU/EEA countries, on 2 December 2020 [1], 1 February 2021 [2], 29 March 2021 [3], 6 May 2021 [4], 14 June 2021 [5], 23 September 2021 [6], 11 November 2021 [7], 31 January 2022 [8], 21 April 2022 [9] and 8 September 2022 [10]. This eleventh technical report provides an updated overview of the progress with national COVID-19 vaccination strategies in EU/EEA countries, including updates on vaccine uptake overall and by target group, as well as detailing the vaccination strategies, communication strategies and policies in place.

Target audience

Target audiences for this document are the European Commission, the Health Security Committee (HSC), the EU/EEA National Immunisation Technical Advisory Groups (NITAGs), national public health institutes and ministries of health in the EU/EEA, and public health experts and decision-makers at national and sub-national level responsible for implementing vaccine deployment plans.

Methods

The information provided in this report was collected from the sources set out below.

Integrated Situational Awareness and Analysis report

The European Commission sends questions on vaccination to EU/EEA countries for the Integrated Situational Awareness and Analysis (ISAA) report. The ISAA report is prepared under the Integrated Political Crisis Response Mechanism (IPCR) of the Council of the European Union [11,12].

- Since 9 December 2020, a weekly (and at a later stage once every two weeks and now once a month) set of questions has been sent via the ISAA report to country representatives, as the validating authorities of the IPCR, to obtain regular information on various topics related to COVID-19. One section of these questions covers vaccination strategies and deployment. The representatives gather the responses to the questions from the various agencies and ministries in their countries.
- This report is based on responses from countries to the vaccine-related questions received between 22 August 2022 and 25 January 2023 and in addition also includes a rapid desk review of official sources and validation from countries. Each table in the report provides the number of countries included in the table.
- A draft version of this report was sent to the Health Security Committee Members for verification and validation, and to complement any missing information.

Data from The European Surveillance System

ECDC has implemented a monitoring system to collect information on vaccine roll-out (the number of doses distributed to EU/EEA countries and administered, by age group and other prioritised population) since mid-January 2021, in conjunction with the World Health Organization's Regional Office for Europe. EU/EEA countries have been reporting data on the COVID-19 vaccine roll-out through The European Surveillance System (TESSy), which can be viewed in the ECDC COVID-19 Vaccine Tracker [13] and in the weekly COVID-19 country overviews on ECDC's website [14]. The information on the COVID-19 vaccine roll-out presented in this report is based on the most recent data reported by EU/EEA countries to TESSy and displayed in the Vaccine Tracker as of 19 February 2023. The Vaccine Tracker may be consulted for additional details and country-specific [disclaimers on data](#).

Results

COVID-19 vaccine roll-out overview

As of 19 February 2023 (week 07, 2023), over 976 million vaccine doses have been administered in the EU/EEA, with around 331 million people in the EU/EEA having received a complete primary vaccination course, 248 million having received a first booster dose, 63.9 million having received a second booster dose and 5.9 million having already received a third booster dose [13].

Since the start of COVID-19 vaccine deployment in December 2020 and as of 19 February 2023, the cumulative uptake of the primary vaccination course against COVID-19 in the total EU/EEA population had reached 73% (range: 30.0–86.4%) and has been stable for several months, 54.7% for the first booster dose¹ (range: 9.2–75.8%), 14.1% for the second booster dose² (range: 0.2–33.6%) (pooled data from 30 reporting countries), and 1.7% (range: <0.1–9.5%) for the third booster dose³ (pooled data from 20 reporting countries).

Among adults (aged 18 years and older) in the EU/EEA, the cumulative vaccine uptake has reached 82.4% (range: 35.8–96.4%) for the complete primary course, with no sign of further increase for several months. Median uptake of completed primary vaccination has reached 74.8% in 18–24-year-olds, 79.2% in 25–49-year-olds, 83.9% in 50–59-year-olds (29 countries reporting), and 91.1% in 60+-year-olds (30 countries reporting). In eligible adolescents and children, the median uptake of primary vaccination is 24.2% in those under 18 years (30 countries reporting), 71.3% in 15–17-year-olds (19 countries reporting), 37.5% in 10–14-year-olds, and 14.2% in 5–9-year-olds (18 countries reporting) (Figure 1).

The uptake of the first booster dose among adults (aged 18 years and older) has reached 65.4% (range: 11.3–87.0%) and is increasing very slowly. Median uptake of the first booster has reached 41.1% in 18–24-year-olds, 52.6% in 25–49-year-olds, 73.2% in 50–59-year-olds, 82.7% in 60-69-year-olds, 83.7% in 70-79-year-olds, and 83.8% in 80+-year-olds (29 countries reporting). In eligible adolescents and children, the median uptake of the

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 individuals 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 individuals and second additional doses administered to immunocompromised individuals after a standard primary course.

³ For surveillance purposes, this refers to the third additional dose of COVID-19 vaccine administered after the standard primary course. Therefore, the count and uptake estimates may include both third booster doses administered to immunocompetent individuals and third additional doses administered to immunocompromised individuals.

first booster dose is 1.8% in those under 18 years (29 countries reporting), 6.4% in 15–17-year-olds (19 countries reporting), 1.0% in 10–14-year-olds (17 countries reporting) (Figure 2).

The progress in vaccine uptake has significant variations across EU/EEA countries (Figure 3) with three countries (Bulgaria, Croatia, Romania) reporting less than 25% cumulative vaccine uptake and nine countries (Czechia, Estonia, Hungary, Latvia, Liechtenstein, Lithuania, Poland, Slovakia, and Slovenia) reporting less than 50% vaccine uptake of the first booster dose in the total population.

Among individuals aged 60 years and older, the median uptake of the primary course, first booster, second booster and third booster dose has reached 91.1% (range: 38.4–100%), 84.9% (range: 13.6–100%), 35.4% (range: 0.4–86.6%) (pooled data from 30 reporting countries), and 2.4% (range: <0.1–38.8%) (pooled data from 20 reporting countries) respectively (Figure 4).

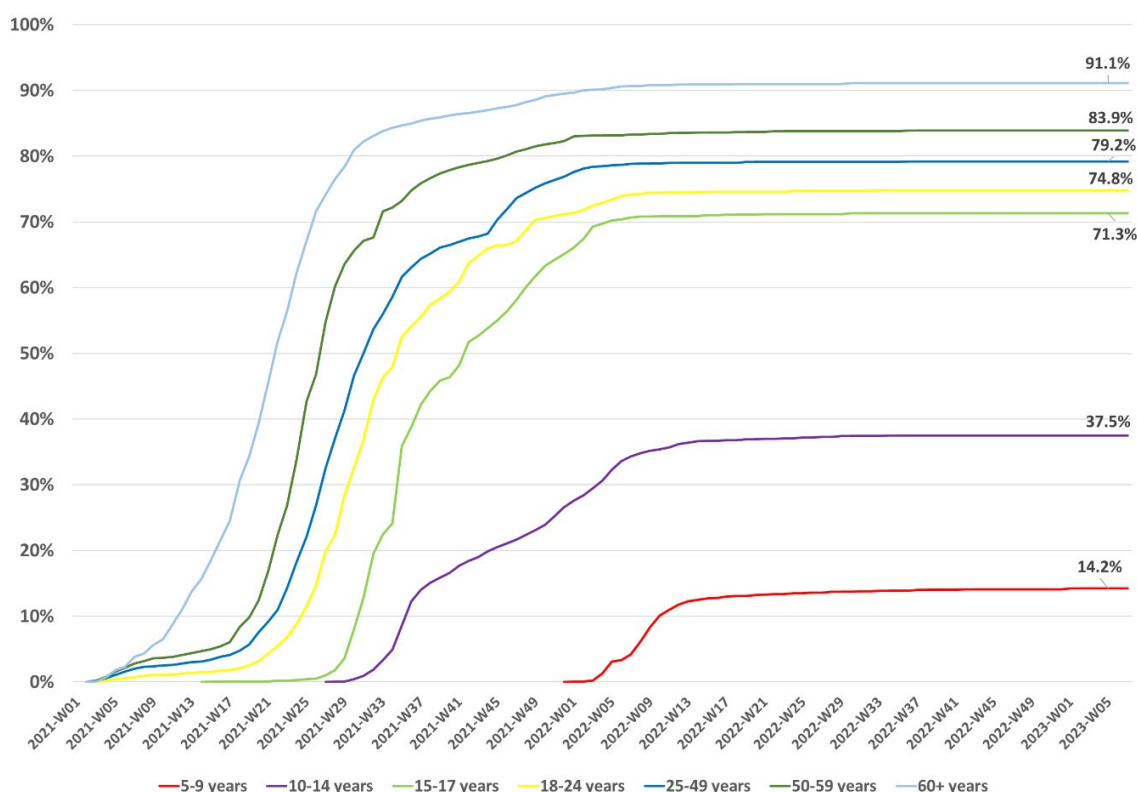
Approximately 63.8 million second booster doses have been administered to adults aged 18 years and older. Of these adults, 77% are people aged 60 years and older. The cumulative uptake of the second booster dose is 17.2% in those aged 18+ years (range: 0.2–41.9%), 35.4% in those aged 60+ years (range: 0.4–86.6%) (30 countries reporting) and 46.5% in those aged 80+ years (range: 0.3–96.7%) (29 countries reporting).

The uptake of the second booster dose among those aged 60 years and older has significant variations across EU/EEA countries with 12 countries (Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Liechtenstein, Lithuania, Poland, Romania, Slovakia, and Slovenia) reporting less than 25% vaccine uptake, eight countries (Austria, Cyprus, France, Germany, Greece, Italy, Luxembourg, Malta) exceeding 25% vaccine uptake and 10 countries (Belgium, Denmark, Finland, Iceland, Ireland, Netherlands, Norway, Portugal, Spain, Sweden) exceeding 50% vaccine uptake (Figure 5).

Approximately 5.9 million third booster doses have been administered to adults aged 18 years and older. Of these adults, 91% are people aged 60 years and older. The cumulative uptake of the third booster dose is 2.1% in those aged 18+ years (range: <0.1–11.7%), 2.4% in those aged 60+ years (range: <0.1–38.8%) (20 countries reporting) and 4.2% in those aged 80+ years (range: <0.1–58.2%) (18 countries reporting).

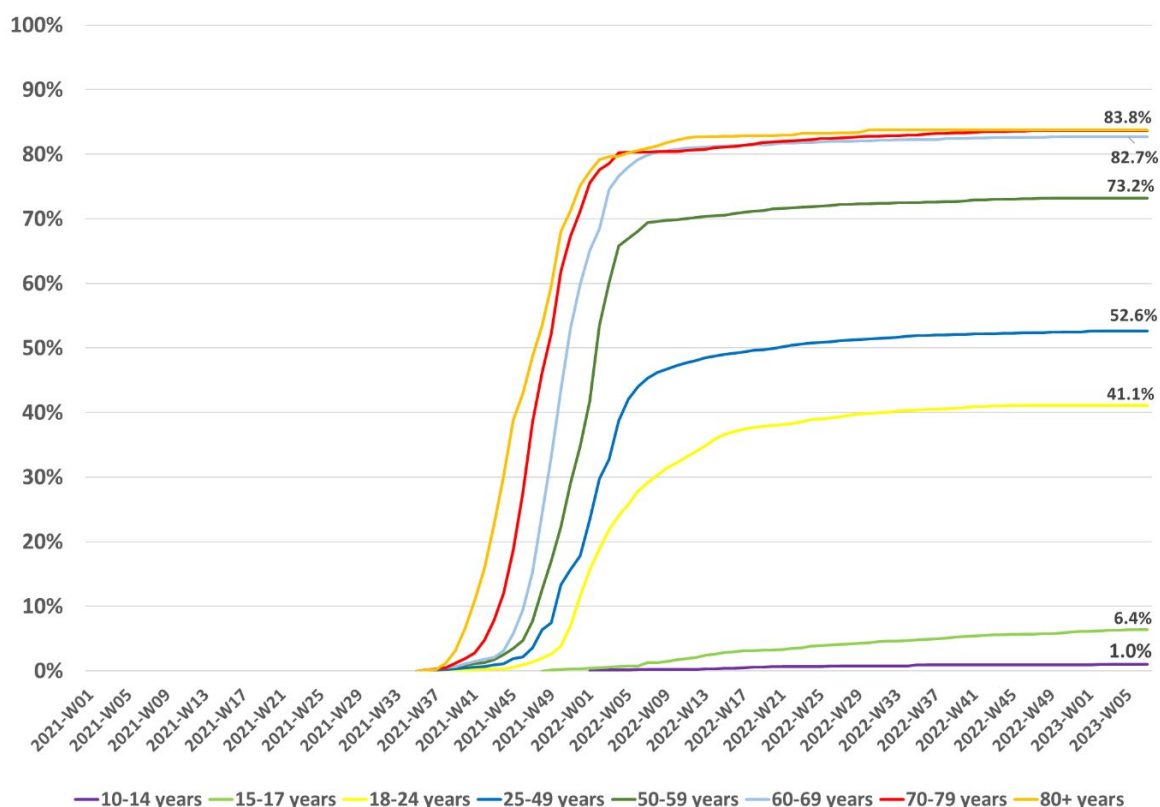
Table 1 summarises the uptake of the primary course, first, second and third booster dose by the total population, adults (18 years and older) and older adults (60 years and older, and 80 years and older) as of 19 February 2023. More information on the COVID-19 vaccine roll-out in EU/EEA countries can be found on ECDC’s Vaccine Tracker [13] and in the weekly COVID-19 country overviews [14].

Figure 1. Median cumulative uptake of the primary course of COVID-19 vaccines by age group in the total population in the EU/EEA (as of 19 February 2023)



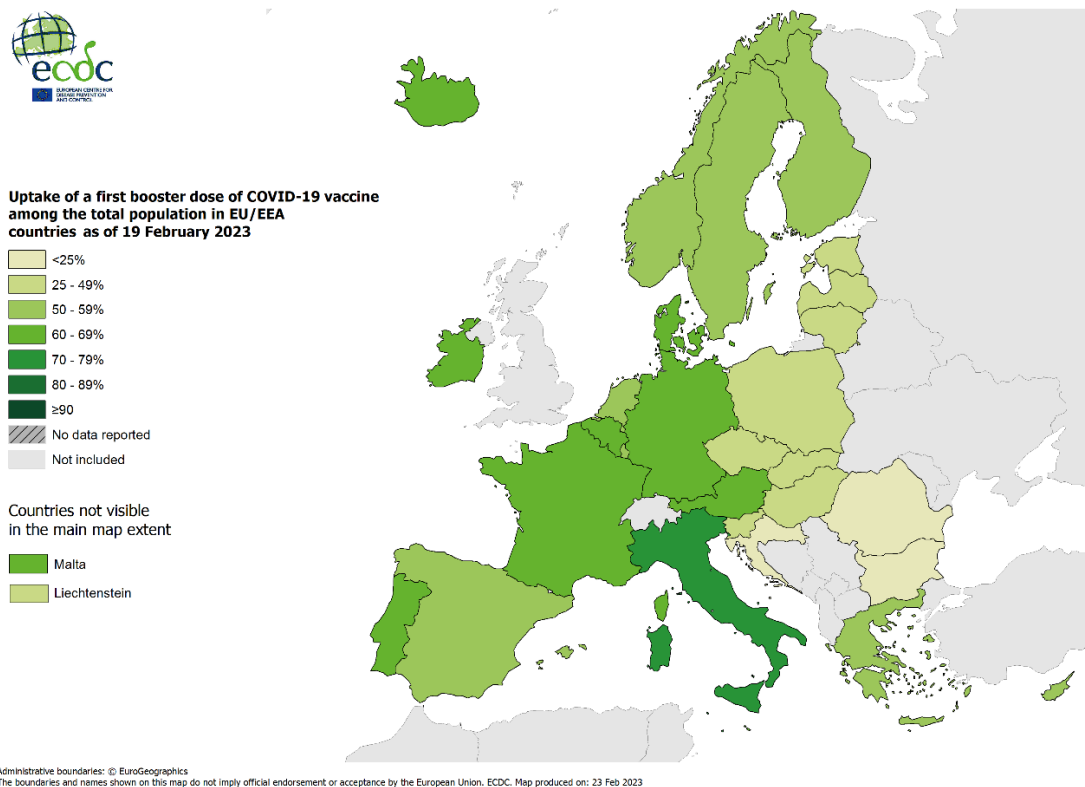
Source: TESSy data reported by 30 countries.

Figure 2. Median cumulative uptake of the first booster of COVID-19 vaccines by age group in the total population in the EU/EEA (as of 19 February 2023)



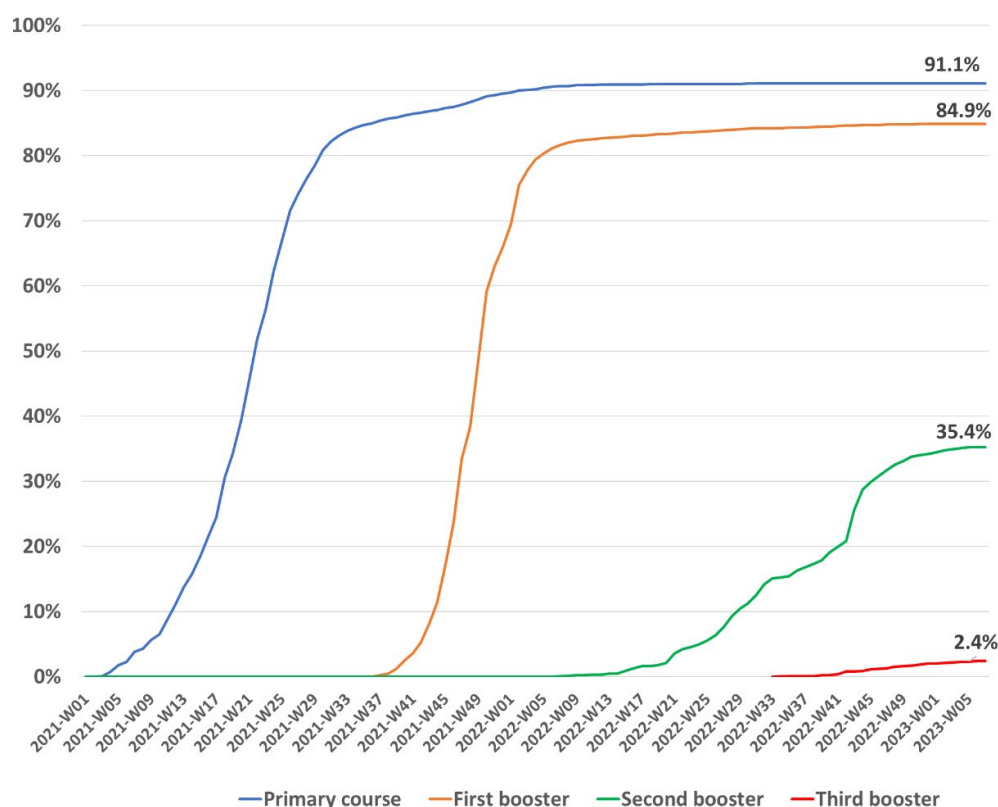
Source: TESSy data reported by 30 countries.

Figure 3. Uptake of the first booster of COVID-19 vaccines in the total population in the EU/EEA (as of 19 February 2023)



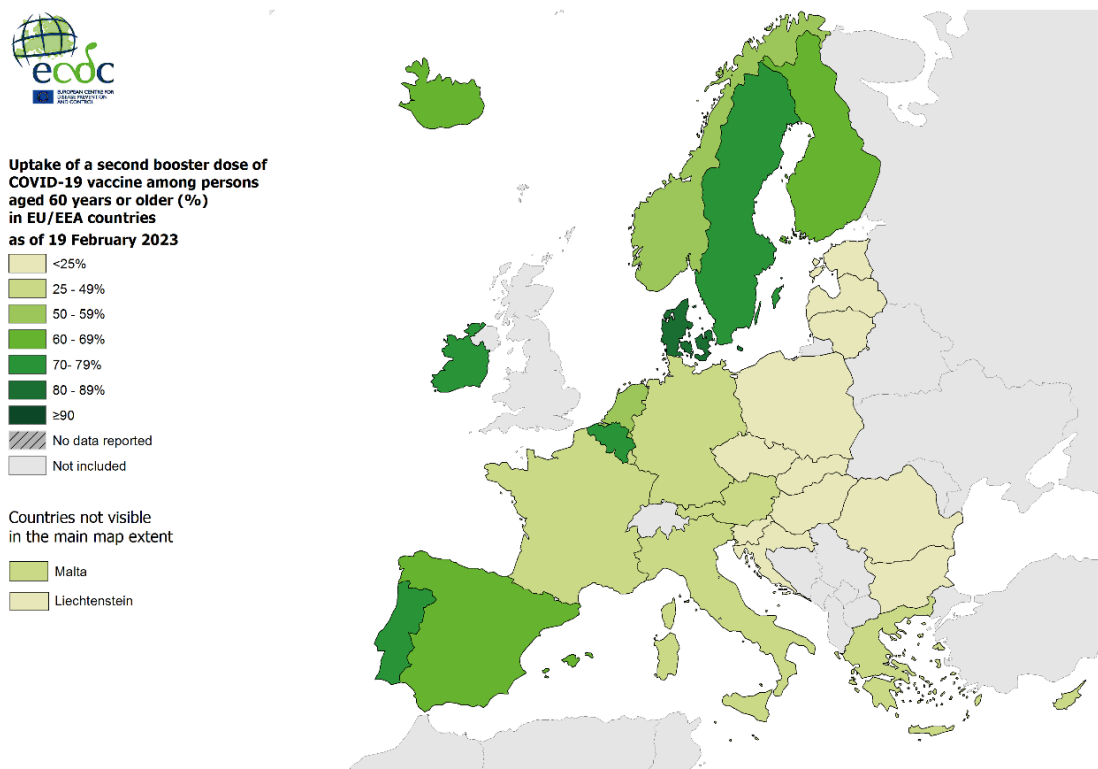
Source: TESSy data reported by 30 countries.

Figure 4. Median cumulative uptake of primary course, first, second and third booster of COVID-19 vaccines among those aged 60 years and older in the EU/EEA (as of 19 February 2023)



Source: Numbers of countries reporting to TESSy: 30 for uptake of the primary course, first booster and second booster, 20 for uptake of the third booster.

Figure 5. Median cumulative uptake of the second booster of COVID-19 vaccines among people aged 60 years and older in the EU/EEA (as of 19 February 2023)



Administrative boundaries: © EuroGeographics
The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union. ECDC. Map produced on: 23 Feb 2023

Source: TESSy data reported by 30 countries.

Table 1. Summary table of COVID-19 vaccine uptake in EU/EEA countries (as of 19 February 2023)

Population group	Uptake of primary course (range)	Uptake of first booster (range)	Uptake of second booster (range)	Countries reporting	Uptake of third booster (range)	Countries reporting
People aged 60+ years*	91.1% (38.4–100%)	84.9% (13.6–100%)	35.4% (0.4– 86.6%)	30	2.4% (<0.1–38.8%)	20
People aged 80+ years*	94.0 (26.3–100%)	83.8% (8.0–100%)	46.5% (0.3–96.7%)	29	4.2% (<0.1–58.2%)	18
Adults (18+ years)**	82.4% (35.8–96.4%)	65.4% (11.3 - 87.0%)	17.2% (0.2–41.9%)	30	2.1% (<0.1–11.7%)	20
Total population**	73.0% (30–86.4%)	54.7% (9.2–75.8%)	14.1% (0.2–33.6%)	30	1.7% (<0.1–9.5%)	20

* Values are the median across the reporting countries.

**Note that not all countries actively promote second/third booster vaccination for these age group.

Vaccination strategies and policies during roll-out

Countries continue to adapt vaccination strategies and policies based primarily on the changing epidemiological situation at country and sub-national level, new information regarding the efficacy of the various COVID-19 vaccines, safety, effectiveness (including the duration of protection from the vaccines against different outcomes), and new evidence about the virus and its impact on human health. The vaccination policies captured in this section include recommendations for the Omicron-adapted bivalent mRNA vaccines, vaccination of infants, children, adolescents and adults, vaccination and communication strategies, as well as policies for the 2022 autumn/winter vaccination campaigns, and longer-term vaccination strategies for 2023 and beyond.

Recommendations for the Omicron-adapted bivalent mRNA vaccines

There are two types of bivalent mRNA vaccines authorised for use in the EU. Both contain an ancestral SARS-CoV-2 strain component, and in addition one has an updated component of the Omicron BA.4/BA.5 and the other has an updated component of the Omicron BA.1 [15]. The vaccines are currently only authorised as boosters, however on 6 December 2022 the European Medicine Agency's Emergency Task Force concluded that the bivalent original/Omicron BA.4-5 mRNA vaccines may also be used for primary vaccination [16]. Several countries have made the decision to use the adapted bivalent vaccines in their national vaccination campaigns.

Table 2. Booster vaccination with adapted bivalent mRNA vaccines (as of 25 January 2023) (n=24)

Who is offered a booster vaccination with adapted bivalent mRNA vaccines	Countries
Offered only to specific target groups, while the monovalent vaccines continue to be used for boosters in other individuals	Slovenia, Sweden
Offered to all groups eligible for their next booster (as defined by the national vaccination campaign)	Austria, Croatia, Czechia, Denmark, Estonia, Finland, Germany, Hungary, Iceland, Ireland, Lithuania, the Netherlands, Norway, Slovenia, Spain, Sweden
Offered to the whole population/all individuals interested in receiving their next booster	Cyprus, France, Latvia, Lithuania, Luxembourg, Malta, Poland, Romania

Sources: ISAA survey responses and validation from countries.

Vaccines available and administered during the 2022 autumn/winter vaccination campaigns

Countries were using a range of available COVID-19 vaccines in the autumn/winter campaigns, with majority countries using monovalent and bivalent mRNA vaccines.

Table 3. COVID-19 vaccines used in the 2022 autumn/winter vaccination campaign (as of 25 January 2023) (n=23)

Vaccines being administered	Countries
Comirnaty Original/Omicron BA.1 adapted vaccine (BioNTech and Pfizer)	Austria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, Germany, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Slovenia, Sweden
Comirnaty Original/Omicron BA.4-5 adapted vaccine (BioNTech and Pfizer)	Austria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Iceland, Ireland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Romania, Slovenia, Spain, Sweden
Comirnaty (BioNTech and Pfizer)	Austria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, Germany, Hungary, Iceland, Ireland, Latvia, Lithuania, Luxembourg, Poland, Romania, Slovenia, Spain
Spikevax (Moderna)	Austria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, Germany, Iceland, Ireland, Latvia, Lithuania, Luxembourg, Norway, Poland, Slovenia, Spain
Spikevax Original/Omicron BA.1 adapted vaccine (Moderna)	Austria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Iceland, Ireland, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Slovenia, Spain, Sweden
Spikevax Original/Omicron BA.4-5 adapted vaccine (Moderna)	Austria, Croatia, Cyprus, Denmark, Estonia, Finland, France, Germany, Iceland, Ireland, Latvia, Luxembourg, Norway, Poland, Slovenia, Spain, Sweden
Jcovden (Johnson@Johnson/Janssen Pharmaceuticals)	Austria, Croatia, Cyprus, Czechia, Estonia, Finland, Germany, Hungary, Iceland, Ireland, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Romania, Slovenia
Nuvaxovid (Novavax)	Austria, Cyprus, Czechia, Estonia, Finland, France, Germany, Iceland, Ireland, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Slovenia, Sweden
COVID-19 vaccine Valneva	Austria, Cyprus, Germany, Latvia
Vaxzevria (AstraZeneca)	Latvia
VidPrevtyn Beta	Austria, Czechia, Hungary, Spain
Other vaccines authorised nationally	Hungary*

Sources: ISAA survey responses and validation from countries.

*Sinopharm is also available.

Communication strategies to inform the public about the 2022 autumn/winter COVID-19 vaccination rollout

Many countries developed a communication strategy for the 2022 autumn/winter vaccination campaign. Some countries also developed targeted communication strategies towards specific population groups, such as older people, population groups that have a lower uptake of the vaccines, healthcare workers and other vulnerable groups such as individuals who are immunocompromised. Some countries provided further information. In Austria objectives are to increase vaccine confidence in general, not only specifically/exclusively for adapted vaccines. Ireland advised that they use multiple campaigns with a mix of press, digital and radio advertising to target eligible groups with specific messages on how, when, and why to get their vaccines. The target audiences in Ireland included older people, pregnant women, parents of children, healthcare workers and those with long-term health conditions that put them at greater risk of serious illness from flu or COVID-19. In the Netherlands they have raised attention about the importance of COVID-19 vaccination in light of reduced media attention about COVID-19 and have also increased messages around the practicalities for getting vaccinated (i.e. how to make an appointment). In Malta specific communication strategies targeting people aged 55 years and older, those with chronic diseases, individuals who are immunocompromised, people living in institutions and staff caring for them, and healthcare workers. In Spain, emphasis was placed on communicating towards target groups. Sweden responded that they also use social media and news as communication channels.

Table 4. Development of communication strategies for the 2022 autumn-winter season to inform the public about the COVID-19 vaccination campaign (as of 19 December 2022) (n=21)

Development of communication strategies for the 2022 autumn/winter COVID-19 vaccination campaign	Countries
Yes, with the objective to increase vaccine confidence, particularly once adapted vaccines will become available	Austria, Cyprus, Czechia, Denmark, Estonia, Germany, Lithuania, Luxembourg, Malta, Netherlands, Poland, Romania, Slovenia, Spain, Sweden
Yes, with the objective to provide clarity on the rollout of the campaign (who will be receiving which vaccine when, how and where)	Cyprus, Czechia, Denmark, Estonia, Germany, Ireland, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Slovenia, Spain, Sweden
Yes, with the specific objective to address mis- and disinformation	Cyprus, Czechia, Germany, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Spain
No, the current communication strategies still apply, and we have not put a new one in place	Croatia, Finland, Hungary, Latvia
Working on developing a campaign	Spain

Sources: ISAA survey responses and validation from countries.

Table 5. The target groups of the specific communication strategy to inform the public about the rollout of the 2022 autumn/winter COVID-19 vaccination campaign (as of 19 December 2022) (n=18)

Target groups for a specific communication strategy to inform the public about the rollout of the next COVID-19 vaccination campaign during the upcoming months	Countries
The whole population	Austria, Cyprus, Czechia, Estonia, Germany, Hungary, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Romania, Slovenia, Spain
Older people	Austria, Cyprus, Czechia, Denmark, Estonia, Germany, Ireland, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Slovenia, Sweden
Population groups that have low COVID-19 vaccination coverage in general	Austria, Cyprus, Czechia, Estonia, Germany, Hungary, Luxembourg, the Netherlands, Poland
Healthcare staff and personnel in long-term care facilities	Cyprus, Czechia, Denmark, Estonia, Germany, Ireland, Luxembourg, Malta, Slovenia
Vulnerable groups such as immunocompromised people	Cyprus, Czechia, Denmark, Estonia, Germany, Ireland, Luxembourg, Malta, the Netherlands, Slovenia, Sweden

Sources: ISAA survey responses and validation from countries.

Vaccination recommendations for infants, children and adolescents aged six months to 17 years for the 2022 autumn/winter campaign

The vaccination policies captured in this section include vaccination of infants, children and adolescents aged six months to 17 years, with detailed information on vaccination for infants and children aged six months up to five years, vaccination of children and adolescents aged five to 11 years, and those aged 12 to 17 years. More detailed information on each countries' strategy can be found in the Annex – Table 1.

Vaccination of children aged six months to five years

As of February 2023, there are two COVID-19 vaccines authorised for primary vaccination in infants and young children aged six months to five years in the EU/EEA, they include Comirnaty (monovalent vaccination for young children aged six months to four years) and Spikevax (monovalent vaccination for young children six months to five years [15]). The administration of booster doses is currently not authorised for infants and children aged six months up to and including five years.

Primary vaccination of infants and children aged six months to four years is provided with Comirnaty (BioNTech/Pfizer) vaccine of 3 µg, three vaccine doses, with interval of three weeks between the first and second dose, and interval of eight weeks between the second and third dose. Primary vaccination of infants and children aged six months to five years is provided with Spikevax (Moderna) 25 µg, two vaccine doses, with an interval of four weeks between doses [17].

The majority of countries (13/29) are recommending primary vaccination to infants and children aged six months to five years with risk factors. In five countries (Austria, Belgium, Czechia, Germany, and Luxembourg) infants and children in this age group who do not belong to risk groups may also receive primary vaccination after an individual risk assessment. Seven countries are recommending primary vaccination for all infants and children in this age group, five countries are not recommending vaccination to this age group, and three countries are currently discussing expansion of primary vaccination to children with risk factors. One country is currently discussing possibility of offering primary vaccination for all children in this age group.

Table 6. Countries recommending primary vaccination of children aged six months to five years (n=29)

Primary vaccination of children aged six months to five years	Countries
Yes, for all children	Bulgaria, Cyprus, Greece, Ireland, Lithuania, Malta, Poland
Yes, but only for children with risk factors	Austria*, Belgium**, Czechia***, Estonia, Finland, France, Germany****, the Netherlands, Norway, Latvia, Luxembourg^, Slovenia, Spain
No, vaccination is not offered to this age group	Denmark, Hungary, Iceland, Romania, Sweden
This is under discussion for all children	Ireland
This is under discussion for children with risk factors	Croatia, Portugal, Slovakia^^

Sources: ISAA survey responses and validation from countries. Rapid desk review of official sources.

* Children in this age group who are not at risk for severe disease can also receive the vaccine in consideration of their personal situation and individual settings.

** Primary vaccination is not recommended in healthy children, but it can be done on an individual basis with parental consent.

***Healthy children can be vaccinated upon request and after individual risk assessment in consultation with the doctor.

****Primary vaccination of healthy children can be carried out after an individual risk assessment in consultation with the doctor.

^Healthy children can be vaccinated upon request.

^^Such as children with cardiovascular, neurological, respiratory, endocrine, metabolic, and other serious diseases.

Vaccination of children aged five to 11 years

Primary vaccination

The majority of countries (25/30) recommend primary vaccination for all children aged five to 11 years, following the authorisation of a lower dose of Comirnaty for children aged five to 11 years [18] and Spikevax for six- to 11-year-olds [19]. A few countries (4/30) recommend primary vaccination to those aged five to 11 years with risk factors. Some countries introduced some changes to their vaccination strategies of children aged five to 11 years since the previous ECDC COVID-19 vaccine deployment report published in September 2022 [10]. In Denmark, it has no longer been possible for children and young people aged under 18 years to get their first dose of the primary vaccination since July 2022, and from September 2022 a second dose of their primary vaccination. Moreover, in Czechia, Finland, and Slovenia, primary vaccination is recommended only to children with risk factors, however healthy children can be vaccinated upon request and based on individual consideration and risk assessment.

Table 7. Countries recommending primary vaccination of children aged five to 11 years (n=30)

Primary vaccination of children aged 5-11 years	Countries
Yes, for all children	Austria, Belgium, Bulgaria, Croatia, Cyprus, Estonia, France, Germany*, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg**, Malta, the Netherlands, Norway***, Poland, Portugal, Romania, Slovakia, Spain
Yes, but only for children with risk factors	Czechia^, Finland^^, Slovenia^^^, Sweden
Not recommended	Denmark^^^

Sources: ISAA survey responses and validation from countries. Rapid desk review of official sources.

*It is recommended that children aged 5–11 years with severe underlying disease should be given a two-dose primary series, children with no underlying disease should be given one dose.

**Children aged 5–11 years have an option of being vaccinated voluntarily.

***Primary vaccination for children aged 5–11 years is recommended with two doses to children with underlying conditions.

Children with no underlying conditions can be vaccinated with both one or two doses if parents wish.

^Primary vaccination for children aged 5–11 years is primarily recommended with two doses for children with underlying conditions. Children with no underlying conditions can be vaccinated upon request based on individual consideration and risk assessment.

^^ Primary vaccination for children aged 5–11 years are recommended only to children in risk groups and can only be given to healthy children based on individual consideration and risk assessment.

^^^Primary vaccination is highly recommend to those children aged 5–11 years with chronic diseases and children who are in contact with people with a higher risk of a severe course of COVID-19 infection and cannot be effectively protect by vaccination (e.g., immunocompromised people, relatives with chronic diseases), however primary vaccination could be also given to other children aged 5–11 years upon request.

^^^ Since July 2022 it has no longer been possible for children and young people aged under 18 years to get their first dose of the primary vaccination, and from September 2022 a second dose of their primary vaccination.

Booster vaccination

The administration of booster doses is currently only authorised for children aged five years and older. The bivalent Omicron-adapted vaccines are currently authorised for children aged five years and above for booster vaccination. Comirnaty Original/Omicron BA.4-5 (5/5 micrograms)/dose is authorised for booster vaccination to children aged five to 11 years, who have previously received a primary vaccination [20]. Spikevax Original/Omicron BA.1 is authorised for booster vaccination for children aged six to 11 years, who have previously received a primary vaccination [21].

The majority of countries (13/17) are recommending booster vaccination for those children aged five to 11 years in risk groups, and a few countries (4/17) are recommending booster vaccination for all children in this age group. In Belgium, Czechia, Iceland, and Norway, healthy children aged five to 11 years may receive a booster dose upon request or after a risk-benefit analysis by a physician. In Germany, children aged five years and above with immunodeficiency and underlying conditions who have an increased risk of severe COVID-19 progression are recommended a first and a second booster dose. In Portugal, a seasonal booster dose is recommended to those aged five years and older with underlying conditions with an interval of four to six months since the last COVID-19 vaccination/infection. The majority of countries recommend interval of at least three to six months for booster vaccination after the last dose of vaccine.

Table 8. Countries recommending booster vaccination of children aged 5–11 years (n=17)

Booster vaccination of children aged 5-11 years	Countries
Yes, for all children	Austria [^] , Bulgaria, Malta, Poland
Yes, but only for children with risk factors	Belgium [*] , Czechia ^{**} , Estonia, France, Germany ^{***} , Greece, Iceland [^] , Ireland, Latvia, Netherlands, Norway ^{^^} , Portugal ^{^^^} , Spain

Sources: Rapid desk review of official sources. Validation from countries.

[^] Primary immunisation for children from age of 5 years, adolescents and adults are recommended and carried out for all COVID-19 vaccines in immunocompetent people in the schedule 2+1. Therefore, in Austria, one speaks of a booster vaccination only from the additional fourth vaccination onward. With regard to these circumstances and to avoid misunderstandings, the answers to booster vaccinations are given according to the wording mentioned in this report, i.e. third vaccination = first booster vaccination, fourth vaccination = second booster vaccination.

^{*}Booster vaccination is possible for healthy children and adolescents on an individual basis, after a risk-benefit analysis by a physician and subject to parental informed consent.

^{**}Booster vaccination is primarily recommended to children with underlying conditions. Booster vaccination is possible for healthy children and adolescents on an individual basis, upon request or after a risk-benefit analysis by a physician.

^{***}Children from the age of 5 years and above with immunodeficiency and underlying conditions, who have an increased risk of severe COVID-19 progression are recommended a first and a second booster dose.

[^]Healthy children aged 5-11 years may receive booster dose upon request.

^{^^}Booster dose can be considered in healthy children.

^{^^^}A seasonal booster dose is recommended to those aged 5 years and older with underlying conditions.

Vaccination of adolescents aged 12 to 17 years

All 30 EU/EEA countries are recommending primary vaccination for all 12–17-year-olds. The majority of countries (17/30) are recommending booster vaccination to all adolescents aged 12 to 17 years, while some countries (9/30) recommend it for those in risk groups. A few countries (4/30) are not recommending booster vaccination to those aged 12 to 17 years. The majority of countries recommend an interval of three to six months since the last vaccination for booster vaccination.

Table 9. Countries recommending booster vaccination of adolescents aged 12-17 years (n=30)

Booster vaccination of adolescents aged 12-17 years	Countries
A booster dose for all adolescents 12 years and older	Austria*, Bulgaria, Cyprus*, France, Germany*, Hungary, Iceland, Ireland**, Italy***, Latvia, Liechtenstein, Lithuania, Luxembourg****, Malta, Netherlands*****, Poland, Slovakia
A booster dose for adolescents 12 years and older with risk factors	Belgium^, Czechia^^, Estonia, Finland, Greece, Norway, Portugal, Slovenia^^^, Spain^^^^
No booster recommendation	Croatia, Denmark^^^^, Romania, Sweden

Sources: Rapid desk review of official sources. Validation from countries.

*First booster dose (additional third dose) is recommended to all children from the age of five years, adolescents, and adults to complete their basic immunisation, and a second booster dose (an additional fourth dose) is recommended for adolescents aged 12–17 years at an increased risk for severe disease or with an increased risk of exposure and infection.

* First booster dose is recommended to all children aged 12–17 years, and a second booster for those with underlying conditions.

**First booster dose is recommended to those aged 12–17 years. A second booster dose is recommended to those 12 years and older with a condition that puts them at high risk of serious illness from COVID-19 (such as diabetes, asthma, or heart disease), and those 12 years and older who are living in LTCFs.

***Adolescents aged 12–17 years are recommended first booster dose. Adolescents aged 12–17 years who have received their first booster dose can receive additional booster dose upon a request from their parents or guardians. However, a second booster dose is recommended for those in risk group.

****Adolescents aged 12–17 years are recommended first booster dose. Second booster dose are recommended to those aged 12 years and above in a risk group. Healthy adolescents aged 12 years and above can receive booster dose on individual assessment.

***** Adolescents aged 12–17 years can receive booster vaccination voluntarily.

^First booster dose is recommended to those with risk factors. First booster vaccination for those aged 12 years and above is possible for healthy adolescents on an individual basis, after a risk-benefit analysis by a physician and subject to parental informed consent.

^^ Booster vaccination is recommended to children and adolescents aged 5–17 years with underlying conditions and those who are immunocompromised. Booster vaccination is also possible for healthy children and adolescents on an individual basis, upon request or after a risk-benefit analysis by a physician. Second booster are primarily recommended for those with immunodeficiency and underlying diseases, who have an increased risk of severe COVID-19 progression, for other groups upon request or after a risk-benefit analysis by a physician.

^^^First booster dose is recommended for those 12 years and older with chronic diseases, but healthy adolescents can also receive it upon request.

^^^^First booster dose is recommended to those with underlying conditions, however, can be also given to healthy adolescents upon request.

^^^^^Primary vaccination to children aged 12–17 years can be given only after an individual medical assessment by a doctor and it will not be recommended and promoted to all children. Only those children and young people who are at increased risk due to illness or a congenital disorder can be vaccinated if the doctor recommends it.

COVID-19 vaccination recommendations for adults aged 18 years and over for the 2022 autumn/winter campaign

In contrast to the previous ECDC COVID-19 vaccine deployment report published in September 2022 [10], where countries' approaches to vaccine doses administered to its population was based on the number of booster doses (i.e. first booster dose, second booster dose), the approach many countries adopted for the autumn/winter 2022 campaign was based on the interval between the doses (i.e. at least three months since last vaccine dose), rather than the number of booster doses received.

- Countries that continued using the term number of booster doses for their vaccination campaign (booster/second/third): Austria, Bulgaria, Croatia, Cyprus, Estonia, Germany, Greece, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Poland, Romania, Slovakia;
- Countries using the terms seasonal booster/seasonal vaccination program or autumn/winter booster: Belgium, Denmark, France, Norway, Portugal, Slovenia for people in risk groups;
- Countries using the term repeat vaccination (regardless of doses previously received, counting time from the last vaccination) – Finland, Iceland, the Netherlands, Spain;
- Country using the term re-vaccination with bivalent vaccines – Czechia;
- Country using the term additional top-up dose before coming autumn/winter – Sweden.

Below are some examples from countries detailing their approach to the vaccine doses administered and how they are counted. More detailed information on each countries' strategy can be found in the Table 12 below.

In Austria, the primary vaccination for children aged five years and older consist of three doses of vaccine with a schedule 2+1. Therefore, in Austria, one speaks of a booster vaccination only from the additional fourth

vaccination onward. (With regard to this circumstance and to avoid misunderstandings, the answers to booster vaccinations are given according to the wording used in this report i.e. third vaccination = first booster vaccination, fourth vaccination = second booster vaccination, and so on.) A bivalent mRNA vaccine, Nuvaxovid or VidPrevtyn Beta, is recommended for the third vaccination from the age of five years according to the European Medicines Agency summary of product characteristics (SmPC) at the respective age. For the second booster vaccination (fourth vaccination), the same or a different vaccine as for the basic immunisation (three vaccinations) can be used. Preferably, bivalent mRNA vaccines or VidPrevtyn Beta are recommended to extend the spectrum of protection.

In Finland, the autumn/winter booster dose is recommended to everyone aged 65 years and over, for people aged 18 years and over who belongs to risk groups, for immunocompromised people aged 12 years and over. While administering booster dose, it's no longer calculated how many booster doses a person has previously received, or how many times a person has possibly contracted the COVID-19 infection, but what is taken into consideration is that the booster dose can be given when at least three months have passed since the previous vaccination/COVID-19 infection (given that the person has a primary vaccination with two doses of vaccine for immunocompetent individuals and three doses of vaccine for immunocompromised individuals).

In France, the administration of booster doses, regardless of the number of doses previously received, can be carried out from three months after the last vaccination for people aged 80 years and over, residents of nursing homes, and immunocompromised individuals, and from six months after the last vaccination for others, especially for those aged 60 years and over, pregnant women, and healthcare workers. In the event of recent infection with COVID-19, a three-month period should be maintained between infection and a booster dose. The intervals between doses are under discussion by health authorities to simplify the recommendations and recommend the same interval between doses for everyone – either three or six months.

In Greece, people, who have already been vaccinated with the second booster dose of the monovalent vaccines (Pfizer/BioNTech or Moderna) and belong to the priority groups can receive their third booster dose with the updated bivalent vaccines (Pfizer/BioNTech or Moderna) with an interval of at least three months since the last vaccination or COVID-19 infection.

In Iceland, people aged 60 years and over are given booster doses every four months, especially if there has been a change in a vaccine composition.

Portugal has adopted the approach of a seasonal booster dose, with an interval of four to six months with a minimum interval of three months since the last COVID-19 vaccination or infection.

In Slovenia, people in risk groups are recommended a seasonal booster dose with an updated bivalent vaccine (Pfizer/BioNTech or Moderna) with an interval of at least three months since the last vaccination or COVID-19 infection.

In Spain, the booster dose is administered regardless of the number of doses received, with an interval of at least five months from the last dose administered (interval of at least three months for these aged 80 years and over and immunocompromised individuals). Recent infection is not a contraindication or precaution for vaccination against COVID-19.

Booster vaccination recommendations for the priority groups for the COVID-19 2022 autumn/winter vaccination strategy

The age cut-offs for prioritising recommendations for booster vaccination for the older population (whether it was a second, third, seasonal booster, or repeat vaccination) for the autumn/winter vaccination strategy differed between countries and was between 50 years and above to 80 years and above, with the largest number of countries (14/30) recommending vaccination to those aged 60 years and above, followed by countries (9/30) recommending vaccination to those aged 65 years and above. Four countries recommend vaccination to those aged 50 years and above, one country to those aged 55 years and above, and two countries to those aged 80 years and above.

Table 10. Priority groups' age cut-offs for recommendation of booster doses for healthy adults during the 2022 autumn/winter vaccination campaign (n=30)

Priority groups for the 2022 autumn/winter vaccination strategy	Countries
People aged 50 years and above	Belgium, Denmark, Portugal, Slovakia
People aged 55 years and above	Malta
People aged 60 years and above	Austria, Croatia*, Cyprus, Czechia, Estonia, France, Germany, Greece, Iceland, Lithuania, Luxembourg, the Netherlands, Poland, Slovenia
People aged 65 years and above	Bulgaria, Finland, Hungary, Ireland, Latvia, Liechtenstein, Norway, Romania, Sweden
People aged 80 years and above	Italy**, Spain**

Sources: Rapid desk review of official sources. Validation from countries.

* In Croatia those individuals belonging to the most vulnerable groups (people older than 80 years and extremely immunocompromised adults) can receive the third booster dose six months after the second booster dose, if they decide to do so in agreement with the doctor, considering health status and risks.

**In Italy and Spain, those aged 60 years and above with pre-existing conditions also belongs to priority groups for the autumn/winter vaccination.

Table 11 below summarises additional population groups, starting from 18 years of age, that are included in the booster recommendations during the 2022 autumn/winter campaign.

Table 11. Additional groups from 18 years of age that are recommended booster doses during the 2022 autumn/winter vaccination campaign (n=17)

Groups among adults aged 18 and above for the 2022 autumn/winter vaccination strategy	Countries
All people aged 18 years and above	Austria, Belgium, Bulgaria, Cyprus, France, Lithuania, Malta, Poland
People aged 18 years and above with risk factors	Czechia, Denmark, Estonia, Hungary, Iceland^, Finland, Greece, Luxembourg^, Netherlands^, Iceland^, Ireland, Norway^, Portugal*, Slovenia^, Sweden^
All people aged 30 years and above	Greece**

Sources: Rapid desk review of official sources. Validation from countries.

^ In Iceland, Luxembourg, Netherlands, Norway, Slovenia, and Sweden those without risk factors would be able to receive booster vaccination upon request.

*In Portugal those individuals without associated risk diseases can receive a seasonal booster after individual assessment by the doctor.

**In Greece, individuals aged 30-59 years who do not belong to risk group can receive booster dose with the consent of the attending physician.

The majority of countries recommended booster doses for healthcare workers, LTCF residents, healthcare workers or personnel working in LTCFs, and pregnant women. The minimum interval of three months to maximum of six months since the last vaccination or COVID-19 infection is recommended. Further detailed information on country vaccination recommendations for adults for the 2022 autumn/winter campaign can be found in Table 12 below.

Table 12. Vaccination recommendations against COVID-19 for adults (n=30)

Country	Recommendations for an autumn/winter COVID-19 vaccination programme
Austria [22]	<p>The Federal Ministry for Social Affairs, Health, Care and Consumer Protection of Austria recommends a first booster vaccination to people from five years of age in order to complete basic immunisation*. The recommended interval between the second and third dose for the age group of 18 years to 60 years is four to six months, people from 60 years of age should receive their third dose four months after the second dose.</p> <p>An additional fourth vaccination can be administered to those aged 12 years and above and is recommended for everyone who wants to protect themselves. The fourth vaccination is particularly recommended for people aged over 60 years, people at risk of a severe course of COVID-19, and people with an increased risk of exposure and thus infection.</p> <p>People at risk from the age of 18 and people from the age of 60 can receive a fifth dose (considered a second booster vaccination) from four months after their first booster (fourth dose).</p> <p>Bivalent vaccines (Comirnaty and Spikevax) as well as VidPrevtyn Beta are available and recommended for use from the third dose onwards. However, due to reports of myocarditis/pericarditis following vaccination, Spikevax is only recommended for people above the age of 30 years.</p> <p>*In Austria, the basic immunisation is carried out in a 2+1 schedule.</p>
Belgium [23]	<p>The Ministry of Health in Belgium provides information that everyone aged 18 years and older has the opportunity to get an 'autumn booster' with an adapted vaccine (Pfizer/BioNTech and Moderna). A booster dose is highly recommended to everyone from 50 years and above, people with weakened immunity, and for those working in the healthcare sector. In principle, one must be at least five years old to be able to receive the autumn booster.</p> <p>People who have already received booster dose in previous months can be vaccinated again this autumn if a period of three months has passed since the previous booster.</p> <p>In September, a booster dose was offered to staff from the entire healthcare sector, including primary care, residential care centres, hospitals. After that, 50- to 64-year-olds were actively invited, in decreasing age. People aged between 18 and 50 years can receive a booster dose on a voluntary basis, according to the modalities of their state.</p> <p>This fall campaign is expected to last two to three months.</p>
Bulgaria [24]	<p>The Ministry of Health of Bulgaria recommends booster vaccination to people aged 65 years and older, LTCF residents, healthcare workers, immunocompromised individuals and those with underlying conditions.</p> <p>People aged 18 years and older are recommended to receive the first booster at least three months since the last vaccination and the second booster at least four months since the first booster vaccination.</p>
Croatia [25]	<p>The Institute of Public Health in Croatia recommends a second booster vaccination for people aged 60 years and older, people under the age of 60 years with an increased risk of developing severe forms of COVID-19 (people with moderate or severe immunosuppression, people with severe diseases of the respiratory system, severe forms of diseases of the heart and circulatory system, metabolic and endocrine diseases) and those who were primarily vaccinated with Jcovden. Bivalent vaccines Comirnaty and Spikevax is available for booster vaccination.</p> <p>Routine use of the third booster dose is not currently recommended, however those individuals belonging to the most vulnerable groups (people older than 80 years and extremely immunocompromised adults) can receive the third booster dose six months after the second booster dose, in agreement with the doctor, considering health status and risks.</p>
Cyprus [26]	<p>The Ministry of Health of Cyprus recommends a first booster dose of COVID-19 vaccine for those aged 12 years and above, provided that the period of five months has passed since receiving the last dose of vaccine.</p> <p>A second booster dose is recommended to people aged 60 years and older, LTCF residents, healthcare workers, and those aged 12 years and older with underlying conditions. A second booster can be given at least five months following the administration of the first booster.</p> <p>Adapted vaccines would be available for booster vaccination.</p>
Czechia [27]	<p>The Ministry of Health of Czechia recommends revaccination with bivalent vaccines especially to people aged 60 years and older, people between of 12 and 59 years, whose general practitioner provides them annual invitation for vaccination against seasonal flu, LTCF residents, healthcare workers, and people with associated diseases (such as chronic heart and lung diseases, high blood pressure, obesity, chronic liver and kidney failure, diabetes, Down syndrome, pregnant women with risk factors, such as age over 35 years, high blood pressure, diabetes, obesity).</p> <p>Vaccination is possible at least three months after the last COVID-19 vaccination/infection. COVID-19 vaccination can be administered at the same time as the flu vaccine (recommended for all older than 50 years).</p>
Denmark [28]	<p>The Health Authority of Denmark as a part of the seasonal vaccination program, recommends people aged 50 years and older, people with increased risk of serious illness, healthcare personnel, those who have close contact with patients or people who are at increased risk of a serious course of COVID-19, and pregnant women to receive their booster dose.</p>

Country	Recommendations for an autumn/winter COVID-19 vaccination programme
	<p>People 18 years and older can get their third injection (first booster to immunocompetent individuals) after three months have passed since the second injection. In addition, it is recommended that close relatives in the same household as people with severely weakened immune systems take up the offered vaccination to protect their relatives at particularly increased risk. At least three months must pass since the last vaccination.</p> <p>It would be also possible to take regular flu vaccine at the same time as a booster dose of COVID-19 vaccine.</p>
Estonia [29]	<p>The National Immunisation Technical Advisory Group of Estonia recommends first booster dose to all individuals aged 18 years and older.</p> <p>The second booster dose is recommended to people aged over 60 years and people aged over 12 years who are at risk. People who are not at risk can also be vaccinated if they wish so. A second booster dose is recommended after at least six months have passed since the last vaccination/COVID-19 infection. The vaccines used for boosters should be a bivalent mRNA vaccine, preferably Original/Omicron BA.4-5 adapted vaccines.</p>
Finland [30]	<p>The Ministry of Health of Finland recommends the autumn/winter 2022/2023 booster dose to everyone aged 65 years and over, for people aged 18 years and over who belong to risk groups, for severely immunocompromised people aged 12 years and over. Regarding the target groups of the autumn/winter booster dose, it is no longer calculated how many booster doses a person has previously received or how many times the person has possibly contracted the COVID-19 infection. However, the person must have received the basic series of vaccinations. The basic series includes two vaccine doses, three for the immunocompromised. The vaccine can be given when at least three months have passed since the previous vaccination/COVID-19 infection. If a person has not received the 2022 COVID-19 booster dose, it is possible to take it in 2023.</p>
France [31]	<p>The Ministry of Health and Prevention in France specifies that the booster campaign is open to everyone, however it is recommended for people aged 60 years and older, immunocompromised people regardless of age, people suffering from one or more comorbidities, pregnant women, from the 1st trimester of pregnancy, LTCF residents and healthcare workers. Bivalent vaccines (Comirnaty and Spikevax) are available for booster vaccination. It is possible to take regular flu vaccine at the same time as a booster dose of COVID-19 vaccine.</p> <p>The administration of a booster dose, regardless of the number of doses previously received, can be carried out: from three months after the last injection for people aged 80 years and over, residents of nursing homes or USLDs and immunocompromised people; from six months after the last injection for other people. In the event of recent infection with COVID-19, a three-month period should be allowed between infection and the booster dose.</p>
Germany [32]	<p>The Standing Committee on Vaccination of Germany recommends a first booster dose to those aged 12 years and older and a second booster dose to people aged 60 years and older, LTCF residents, people at increased risk groups, people from the age of five years with immunodeficiency and underlying diseases, who have an increased risk of severe COVID-19 progression, healthcare personnel.</p> <p>The Standing Committee on Vaccination recommends to people aged 18 years and older with product-specific medical contradictions to the COVID-19 mRNA vaccines, a booster vaccination with monovalent vaccine Nuvaxovid from Novavax, administered at least six months after a previous immunological event (infection or vaccination).</p> <p>The booster vaccination with Nuvaxovid is also possible on an individual request after appropriate advice.</p>
Greece [33]	<p>The Ministry of Health of Greece recommends administering booster dose with the updated bivalent vaccines against COVID-19 to all people aged 60 years and over, to people aged 12-59 years who belong to high-risk groups, LTCF residents, healthcare workers, people living with immunosuppression or other underlying disease.</p> <p>People who have already been vaccinated with the second booster dose of the monovalent vaccines and belong to the above groups can receive their third booster with the updated bivalent vaccines after at least three months have passed since the last vaccination/COVID-19 infection.</p> <p>The possibility of vaccination with bivalent updated vaccines for the second booster or the third booster dose given at least three months after the last vaccination is individually provided to people aged 30 to 59 years who do not belong to the above categories with the consent of the attending physician. The Ministry of Health of Greece emphasises that the timely vaccination of the above groups with updated bivalent vaccines is more important than the type of the vaccine that would be administered.</p>
Hungary [34]	<p>The Ministry of Interior and the National Public Health Centre recommend to everyone aged 18 years and older a second booster vaccination at least four months after receiving the previous dose.</p>
Iceland [35]	<p>The Directorate of Health of Iceland recommends a second booster dose to those aged 18-59 years, immunocompromised (at least four months from the previous dose), healthcare workers (at least six months from the previous dose). Other individuals in this age group may receive a second booster dose upon request/recommendation by a doctor (at least four months from the previous dose). Additional booster dose (third booster) is recommended to those individuals 18-59 years of age only for high-risk groups, and at least four months from the previous dose.</p>

Country	Recommendations for an autumn/winter COVID-19 vaccination programme
	<p>Individuals aged 60 years and older are recommended a first booster dose (at least four months after the primary vaccination). Further booster doses are given generally every four months, especially if there has been a change in vaccine composition.</p> <p>Bivalent vaccines are available for the booster vaccination.</p>
Ireland [36]	<p>The Health Service Executive of Ireland recommends a third booster dose to people aged 65 years and older, those aged 12 years and older with weakened immune system, people between 12 and 64 years with a condition that puts them at a high risk of serious illness from COVID-19 (only if the second booster dose was not a bivalent vaccine). Third booster is given at least four months since the last vaccination and at least four months since a positive COVID-19 infection test/beginning of symptoms.</p> <p>A second booster dose is recommended to those aged 50-64 years, to those 12 years and older with underlying conditions, pregnant women from 16 weeks, healthcare workers, LTCF members. After that a booster dose would be given to those aged 18-49 years. Second booster is given at least four months after the last COVID-19 vaccination/infection.</p> <p>Bivalent COVID-19 vaccines are available for booster vaccination. The adapted COVID-19 vaccines are being rolled out in conjunction with the annual flu vaccination programme.</p>
Italy [37]	<p>The Ministry of Health in Italy recommends an additional booster dose, fifth dose/third booster dose, at least four months after last dose/infection with m-RNA vaccine in the bivalent formulation (Comirnaty and Spikevax) for those who have already received a second booster dose with monovalent mRNA vaccine: people aged 80 years and over, LTCF residents, people aged 60 years and over with pre-existing diseases. People aged 60 years and older can receive a third booster dose upon request.</p> <p>Bivalent vaccines are recommended as a second booster dose for people aged 60 years and older, individuals aged 12 years and older with pre-existing conditions, pregnant women, health professionals, residents, and workers in care units for elderly.</p> <p>Bivalent vaccines are recommended as a first booster dose for all individuals aged 12 years and older.</p>
Latvia [38]	<p>The Ministry of Health of Latvia recommends second booster to the following categories of population: immunosuppressed people, people with chronic diseases, seniors aged 65 years and over, healthcare personnel, LTCF residents, pregnant women, and the rest of society (after consultation with the family doctor). Interval of three months since the last vaccination is recommended for those aged 65 years and older, with six months for all other residents. At least three months since the last COVID-19 infection, recommended four to six months.</p>
Liechtenstein [39]	<p>Federal Office of Public Health in Liechtenstein recommends booster vaccinations to those aged 12 years and older, with a priority given to those 65 years and older, people with chronic diseases, pregnant women. Booster vaccination is given with an interval of at least four months after the last vaccination/COVID-19 infection.</p>
Lithuania [40]	<p>The Ministry of Health of Lithuania specifies that all individuals aged 18 years and older can receive their second booster dose, with the priority given to those 60 years and older, as well as those with chronic diseases. Those aged 12 years and older can receive their first booster dose. Bivalent vaccines (Comirnaty and Spikevax) would be available for the booster vaccination.</p>
Luxembourg [41]	<p>The Government of Luxembourg recommends second booster dose to all people aged 60 years and older, people between 12 and 59 years old with underlying conditions, immunocompromised individuals, pregnant women, healthcare workers, with interval of at least four months after the first booster dose.</p> <p>The second booster dose may also be offered by individual decision to all other people aged 12 to 59 without risk factors and who have not had a recent infection. The fourth dose is not recommended in healthy people who have had COVID-19 infection.</p>
Malta [42]	<p>The Ministry of Health of Malta recommends a first booster dose to those aged 12 years and older. Second booster dose is recommended to those 55 years and older, with priority given to those 60 years and older, 12 years and older in risk groups, healthcare workers.</p>
The Netherlands [43]	<p>Minister of Health of the Netherlands informs that anyone aged 12 and older can receive a repeat vaccination against COVID-19 with the bivalent vaccines (Comirnaty and Spikevax) this autumn/winter, with the priority given to people aged 60 years and older, people aged 12 to 59 years who are eligible for the annual flu jab, LTCF residents, people with Down syndrome, pregnant women and healthcare workers. After priority groups are vaccinated, people aged 12–59 years who are not medically at risk would be able to get a repeat vaccination. Repeat vaccination is given at least 3 months after the last vaccination/ COVID-19 infection.</p>
Norway [44]	<p>The Norwegian Institute of Public Health recommends that the following groups should take a new booster dose of COVID-19 vaccine for the autumn/winter season 2022/23: people in the age group 65 years and older, people in the 18–64 years age group with an underlying risk of serious illness, young people in the age group 12–17 years with a severe underlying illness, pregnant women in the second and third trimester.</p> <p>People in the age group 18–64 years with no risk conditions can be vaccinated if they wish so. Bivalent vaccines Comirnaty and Spikevax is available for a booster vaccination.</p> <p>It is possible to take regular flu vaccine at the same time as a booster dose of COVID-19 vaccine.</p>

Country	Recommendations for an autumn/winter COVID-19 vaccination programme
Poland [45]	<p>The Ministry of Health of the Republic of Poland recommends second booster dose to all those aged 12 years and older, after three months since the last vaccination.</p> <p>Priority is given to people aged 60 years and older, individuals over 12 years of age with underlying conditions, healthcare personnel.</p>
Portugal [46]	<p>The Government of Portugal recommends seasonal booster dose to those aged 50 years and older, people aged five to 49 years with underlying conditions, LTCF residents, healthcare workers.</p> <p>People between 18 and 49 years old without associated risk diseases can also have access to the seasonal booster dose after individual risk-benefit analysis.</p> <p>The recommended interval is four to six months, with a minimum interval of three months since the last COVID-19 vaccination/infection.</p>
Romania [47]	<p>The Government of Romania recommends administration of the booster dose to people aged 65 years and older, to those with underlying conditions regardless of age, healthcare personnel, LTCF residents.</p>
Slovakia [48]	<p>The Ministry of Health of the Slovak Republic recommends first and second booster dose to those aged 12 years and older, with interval of at least three months after the last dose.</p>
Slovenia [49]	<p>The National Institute of Public Health of Slovenia recommends a first booster dose for all people aged 18 years and over and for adolescents aged 12 to 17 years with chronic diseases. However, healthy adolescents can also receive it. The recommended interval between the basic vaccination and the first booster dose is at least three months.</p> <p>The second booster dose (fourth dose or fifth dose for the immunocompromised) is recommended for people with higher at risk of a more severe course of COVID-19 disease: especially vulnerable patients with chronic diseases, people aged 60 years and over. Other people aged 18 years and older can also be vaccinated with a second booster dose and more if they so desire. Vaccination with a second booster dose is carried out at least three months after the first booster dose.</p> <p>A 'seasonal booster dose' with updated vaccines is recommended for at-risk groups (particularly vulnerable chronic patients, LTCF residents and all people aged 60 years and over) if at least three months have passed since the last vaccination. Other people can also receive a seasonal booster dose if at least three months have passed since the last vaccination or since recovery from COVID-19 infection.</p>
Spain [50]	<p>The Interterritorial Council of the National Health Service of Spain has published an update on vaccination recommendations against COVID-19 for autumn/winter. According to this update booster vaccination is recommended to people aged 60 years and older with the risk conditions, LTCF residents, with the priority given to people aged 80 years and older and residents in nursing homes. The booster dose will be administered regardless of the number of doses received earlier, at least five months from the last dose administered. Recent infection is not a contraindication or precaution for vaccination against COVID-19.</p> <p>For people aged 80 years and older, and immunocompromised individuals' recommendations of the administration of the booster dose respecting a period of three months after the COVID-19 infection should be kept. Booster dose is also recommended to healthcare personnel. People aged 60 years and older without risk factors that request vaccination may be vaccinated.</p> <p>The joint administration of the vaccines against COVID-19 and influenza is recommended.</p>
Sweden [51]	<p>The Public Health Agency of Sweden recommends people aged 65 years and over, people in the risk group from the age of 18 years, an additional top-up dose before the coming autumn and winter season. The recommendation applies to everyone who has an increased risk of serious COVID-19 disease: pregnant women, people with a weakened immune system, people with heart and lung disease.</p> <p>Adults 18–64 years of age are recommended vaccination with three doses. Anyone who wants to take another top-up dose, fourth dose, for the coming season can do so.</p>

Sources: Rapid desk review of official sources. Validation from countries.

Longer term vaccination strategies for 2023 and beyond

The planning of future vaccination strategies and campaigns for 2023 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. One EU/EEA country (Sweden) has published recommendations for their COVID-19 vaccination strategy for 2023. The majority of countries are still discussing their future COVID-19 vaccination strategies for 2023 and beyond.

Table 13. Future vaccination strategies (n=1)

Country	Recommendations for an autumn/winter COVID-19 vaccination programme
Sweden [52]	<p>As of March 1, 2023, the Public Health Agency's recommendation on vaccination against COVID-19 will be two top-up doses per year (one in the spring and one before the autumn/winter season) for people aged 80 years and older, and for residents of special housing for the elderly (SÄBO). The interval between doses will be at least six months.</p> <p>For people aged 65 to 79 years and for younger people with risk factors, one dose per year (before the autumn/winter season 2023) is recommended. The regions are also recommended to provide the option of another booster dose for these groups. The dose should be taken at six-month intervals to the recommended dose for the autumn/winter season. Examples of medical risk factors are obesity, diabetes, reduced kidney function, and high blood pressure. The new recommendation will apply from 1 March 2023 and until further notice. The Public Health Agency will decide in early 2023 what the recommendations for people younger than 65 years who are not in the risk group will look like after March 1. .</p>

Sources: Rapid desk review of official sources. Validation from countries.

Conclusions

As of 19 February 2023 (week 07, 2023), over 976 million vaccine doses had been administered in the EU/EEA, with around 331 million people in the EU/EEA having received a complete primary vaccination course, 248 million having received a first booster dose, 63.9 million having received a second booster dose, and 5.9 million having already received a third booster dose.

Among adults (aged 18 years and above) the cumulative vaccine uptake reached 82.4% (range: 35.8–96.4%) for the complete primary course, and 65.4% (range: 11.3–87.0%) for the first booster (30 countries reporting). The progress differs across countries, with three countries still reporting less than 25% of the cumulative vaccine uptake of the first booster (Bulgaria, Croatia, and Romania), and nine countries (Czechia, Estonia, Hungary, Latvia, Liechtenstein, Lithuania, Poland, Slovakia, and Slovenia) less than 50% of the cumulative vaccine uptake of the first booster uptake in the total population.

Approximately 63.8 million second booster doses have been administered to adults aged 18+ years. Of these adults, 77% are people aged 60 years and older. The cumulative uptake of the second booster dose is 17.2% in those aged 18+ years (range: 0.2–41.9%), 35.4% in those aged 60+ years (range: 0.4–86.6%), and 46.5% in those aged 80+ years (range: 0.3–96.7%). The cumulative vaccination uptake of the second booster dose among those aged 60+ years has significant variations across EU/EEA countries, with 12 countries having it less than 25% (Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Liechtenstein, Lithuania, Poland, Romania, Slovakia, and Slovenia). Approximately 5.9 million third booster doses have been administered to adults aged 18+ years. Of these adults, 91% are people aged 60 years and older. The cumulative uptake of the third booster dose is 2.1% in those aged 18+ years (range: <0.1–11.7%), 2.4% in those aged 60+ years (range: <0.1–38.8%), and 4.2% in those aged 80+ years (range: <0.1–58.2%).

Following the authorisation of primary vaccination in infants and young children aged six months to five years in EU/EEA, 13 countries are offering primary vaccination to those aged six months to five years with risk factors and seven countries are offering primary vaccination for all infants and children in this age group. Among all EU/EEA countries, 25 are recommending primary vaccination for all children aged five to 11 years, four countries are recommending primary vaccination to those with risk factors (healthy children could be vaccinated upon request and based on individual consideration and risk assessment), and one country does not recommend primary vaccination to this age group. In addition, 13 countries are recommending booster dose for those children aged five to 11 years in risk groups, and four countries are recommending booster dose for all children in this age group. All 30 EU/EEA countries are recommending primary vaccination for those aged 12 to 17 years. In addition, 17 countries are recommending booster vaccination to all adolescents in this age group, and nine countries are only recommending it for those in risk groups.

In contrast to the previous ECDC COVID-19 vaccine deployment report published in September 2022, where countries' approach to vaccine doses administered to its population was based on the number of booster doses

(i.e. first booster dose, second booster dose), the approach many countries adapted for the autumn/winter 2022 campaign was based on the interval between the doses (i.e. at least three months since last vaccine dose), rather than the number of booster doses received. All 30 EU/EEA countries have recommended booster doses as part of their autumn/winter 2022 campaigns. The age cut-offs for recommendations for booster vaccination (whether it was called a second, third, seasonal booster, or repeat vaccination) for the autumn/winter vaccination strategy differ between countries and is between 50 years and above to 80 years and above, with the majority of countries (14) recommending vaccination to those 60 years and above. The majority of countries recommend booster doses as a part of their 2022 autumn/winter campaign to LTCFs residents and personnel, healthcare workers and pregnant women.

Countries are putting in place several measures and strategies to increase vaccination in the population, especially among population groups with low uptake. Several EU/EEA countries are currently discussing their future COVID-19 vaccination strategies and the need for additional booster doses as a preparation for the next campaigns, with the main priority groups for vaccination including those most at risk of severe disease, such as elderly people and those with underlying risk factors. The planning of future vaccination strategies and campaigns for 2023 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.

Vaccination campaigns with recently approved adapted vaccines should prioritise the boosting of individuals who are at risk of progression to severe disease. Reaching out to eligible unvaccinated people, or people who have not had any booster dose is also recommended. Countries have achieved enormous progress in increasing the uptake of the second booster in older age groups, however, the current epidemiological situation calls for a continuation of this effort. While vaccination uptake tends to increase among the older age groups, considerable differences remain among countries in the uptake of the booster as well as the previous vaccination doses recommended.

It will be especially important to continuously monitor vaccine uptake and associated social determinants to understand where and in which population groups and communities the immunity gaps persist. A successful COVID-19 vaccination programme 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 – is one framework that can be used for understanding these concerns and designing strategies to facilitate COVID-19 vaccination acceptance and uptake [53].

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Limitations of the information collected in this report

The information presented in this report is not exhaustive. Some countries did not respond to the vaccine questions collected via the ISAA report and there were different response rates to the questions from week to week. Countries will continue to adapt strategies and plans as the vaccination roll-out continues, and this report provides an overview of progress at the current time.

Disclaimer

All data published in this report are correct to the best of our knowledge at the time of publication.

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Annex

Table 1. Overview of vaccination recommendations against COVID-19 for infants, children, and adolescents (n=30)

Country	Recommendations for an autumn/winter COVID-19 vaccination programme
Austria [22]	<p>The Federal Ministry for Social Affairs, Health, Care and Consumer Protection of Austria recommends primary vaccination for children aged six months to five years with increased risk of a severe course of COVID-19 disease. Vaccination can also be offered to healthy children aged six months to five years without an increased risk of a severe course of the disease from COVID-19, considering personal situation and individual settings (e.g. community facilities). A three-dose schedule with Comirnaty (BioNTech/Pfizer) vaccine of 3µg is recommended. The second dose should be administered 21 days after the first dose. The third dose should then be administered no earlier than eight weeks after the second dose. In Austria, the basic immunisation for children from the age of five years, adolescents and adults is recommended and carried out for all COVID-19 vaccines in immunocompetent people in the schedule 2+1.</p> <p>For children from five to 11 years, the third vaccination is recommended from six months after the second vaccination to complete the basic immunisation. This third vaccination – and thus the completion of the basic immunisation – is particularly important in the cold season.</p> <p>A fourth vaccination can be given to individuals from 12 years and is recommended for anyone who wants to protect themselves (from six months after the last dose). For those at risk aged 12 to 17 years, a fifth vaccination can be given six months after the fourth vaccination or after an individual examination.</p>
Belgium [54]	<p>The Supreme Health Council of Belgium recommends the basic COVID-19 vaccination for children aged six months to four years with immunosuppression or with serious chronic conditions. The vaccination is done with a paediatric Pfizer vaccine. The basic schedule consists of three doses, with an interval of approximately three weeks between the first and second dose, and eight weeks between the second and third dose. Vaccination against COVID-19 is not recommended in healthy children between aged six months to four years, but it can be done on an individual basis with well-informed parental consent.</p> <p>Booster vaccination is recommended to children and adolescents aged five to 17 years with underlying conditions and immunocompromised, given at least three months from the last vaccination. First booster vaccination is possible for healthy children and adolescents on an individual basis, after a risk-benefit analysis by a physician and subject to parental informed consent.</p>
Bulgaria [24]	<p>The Ministry of Health of Bulgaria recommends that children aged six months to five years undergo primary vaccination. Children aged six months to four years are recommended three doses, three micrograms/dose of mRNA vaccine, with three weeks interval between the first and second dose, and eight weeks between the second and third dose. Vaccination for children aged six months to five years is recommended with three doses, 25 micrograms/dose, at least 28 days apart.</p> <p>Children aged five to 11 years are recommended primary vaccination (two doses, at least 21 days apart) and first booster vaccination with Comirnaty vaccine at least three months after the last administered dose of vaccine. Children aged six to 11 years are recommended primary vaccination (two doses, at least 28 days apart). First booster vaccination with Spikevax vaccine, at least three months after the last administered dose of vaccine.</p> <p>Children aged 12 to 17 years are recommended primary vaccination and a first booster vaccination. First booster vaccination is given at least three months since the last vaccination.</p>
Croatia [25]	<p>The Institute of Public Health in Croatia recommends first booster dose for those children 12 years and older with underlying conditions and who are immunocompromised.</p> <p>Eligible children and adolescents over 12 years have already been offered their first booster, but for those who missed it, it will be possible to receive the first booster dose. As of now, the second booster is not recommended for this specific group.</p>
Cyprus [55]	<p>The Ministry of Health of Cyprus recommends to children aged six months to four years to be vaccinated with Comirnaty (Pfizer) vaccine. A first booster dose of COVID-19 vaccine is recommended for those aged 12 years and above, provided that the period of five months has passed since receiving the last dose of vaccine. Children aged 12 years and older with underlying conditions can receive their second booster dose. A second booster can be given at least five months since the administration of the first booster.</p> <p>Adapted vaccines would be available for booster vaccination.</p>
Czechia [56]	<p>Primary vaccination to children aged of six months to five years will not be actively promoted, but the Ministry of Health and Expert Committee on Immunisation recommends a primary vaccination for children aged of six months to five years with increased risk of a severe course of COVID-19. Vaccination can also be offered to healthy children in this age group, upon request based on individual consideration and individual risk assessment in consultation with the doctor.</p> <p>Booster vaccination is recommended to children and adolescents aged five to 17 years with underlying conditions and immunocompromised. Booster vaccination is also possible for healthy</p>

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	<p>children and adolescents on an individual basis, upon request or after a risk-benefit analysis by a physician.</p> <p>Second booster are primarily recommended for people from the age of five years with immunodeficiency and underlying diseases, who have an increased risk of severe COVID-19 progression, for other groups upon request or after a risk-benefit analysis by a physician.</p>
Denmark [28]	<p>According to the Danish Health Authority, primary vaccination to children aged five to 17 years can be given only after an individual medical assessment by a doctor and it will not be recommended and promoted to all children.</p> <p>In Denmark the primary vaccination for children aged five to 17 years will not be a general offer in the future. Children and young people who are at increased risk due to illness or a congenital disorder can be vaccinated if the doctor recommends it. However, the third injection (first booster for immunocompetent) would be available for those aged 18 years and older after three months have passed since the last injection.</p>
Estonia [29]	<p>The National Immunisation Technical Advisory Group of Estonia recommends primary vaccination to children aged six months to four years old with underlying conditions.</p> <p>The same group recommends primary vaccination to children aged five to 11 years old. A first booster dose is recommended with a bivalent mRNA vaccine to children aged five and older with underlying conditions. A booster dose with bivalent mRNA vaccine is given at least three months after the primary vaccination course for the Pfizer, Moderna and AstraZeneca vaccines and two months for the Jcovden vaccine.</p> <p>The second booster dose is recommended with a bivalent mRNA vaccine to individuals over 12 years of age who are at risk. People who are not at risk can also be vaccinated if they wish so. A second booster dose is recommended after at least six months have passed since the last dose or after COVID-19 infection.</p>
Finland [57]	<p>The Ministry of Health of Finland recommends primary vaccination to children aged six months to four years belonging to risk groups. Basic vaccination for this age group includes three vaccine doses.</p> <p>Primary vaccination for children aged five to 11 years belonging to risk groups is recommended. Children aged 12 to 17 years are recommended primary vaccination. Additionally, those in risk groups aged 12 to 17 years are recommended a first booster vaccination. Those aged 12 to 17 years who are severely immunocompromised are among the target group of the autumn-winter 2022 booster dose.</p> <p>Additional boosters are recommended after three months from previous booster/infection for children and adolescents 12 to 17 years, with severely weakened immune defence. Additional boosters are recommended to be administered at the same visit as influenza vaccination.</p>
France [58]	<p>The Ministry of Health and Prevention specifies that children aged six months to five years with risk factors can receive primary vaccination with three doses. Children aged five to 11 years can receive two doses of vaccine for a primary vaccination, and those aged five to 11 years who are at risk can receive a booster dose. Children aged 12 to 17 years can receive two doses of vaccine as part of their primary vaccination schedule, then are eligible for the booster vaccination.</p>
Germany [32]	<p>The Standing Committee on Vaccination recommends primary vaccination to children aged six months to four years with underlying conditions. Primary vaccination of healthy children can be carried out after an individual risk assessment in consultation with the doctor.</p> <p>Children aged five to 11 years are recommended a primary vaccination, one vaccine dose for healthy children, two vaccine doses for children with underlying conditions, at least three to six weeks apart. A two-dose primary vaccination of healthy children can be carried out after an individual risk assessment in consultation with the doctor.</p> <p>Children from the age of five years and above with immunodeficiency and underlying diseases, who have an increased risk of severe COVID-19 progression are recommended a first and a second booster dose.</p> <p>A first booster vaccination will be given at intervals of at least six months after completion of primary vaccination for children with previous illnesses and of at least three months for children with immunodeficiency. To children aged six months to 11 years, Comirnaty in the age-specific formulation is preferentially recommended. The use of Spikevax is possible.</p> <p>Healthy children aged 12 to 17 years are recommended primary vaccination and a first booster dose. Omicron-adapted bivalent mRNA vaccines are preferentially recommended for booster vaccination, however, the monovalent mRNA vaccine Comirnaty or Spikevax may be used alternatively.</p>
Greece [33]	<p>The National Immunisation Committee of Greece recommends children aged six months to four years receive a primary vaccination with three doses of Pfizer/BioNTech (Comirnaty) vaccine.</p> <p>Children aged five to 11 years are recommended primary vaccination with two doses, Pfizer/BioNTech (Comirnaty) paediatrics vaccine. A first booster dose is recommended only for the risk groups (at least three months after the primary course).</p> <p>Children aged 12 to 17 years are recommended primary course with two doses, Pfizer/BioNTech – original(monovalent)/adapted (bivalent) and Moderna (Spikevax). A first and second booster is recommended only for the risk groups (at least three months after the primary course).</p>

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Hungary [34]	The Ministry of Interior and the National Public Health Centre recommend a primary course vaccination for children aged five to 11 years old. Children aged 12 years and older are recommended a first booster vaccination, at least four months after primary vaccination.
Iceland [35]	The National Immunisation Advisory Committee of Iceland recommends primary vaccination to children aged six months to four years with the Comirnaty paediatric vaccine. Children aged five to 11 years are recommended primary vaccination. Children aged five to 11 years may receive a booster dose upon request at least four months after primary vaccination. Children aged 12 to 17 years are recommended to receive primary vaccination, and those who are immunocompromised are recommended a booster dose. Children aged 12 to 17 years may receive a booster dose upon request at least four months after primary vaccination.
Ireland [36]	The Health Service Executive of Ireland recommends children aged five to 11 years with a weak immune system receive their first booster dose. Children aged 12 years and older with a condition that puts them at high risk of serious illness from COVID-19 (such as diabetes, asthma, or heart disease), and children aged 12 years and older who are living in LTCFs are recommended to receive their second booster dose.
Italy [37]	The Ministry of Health of Italy recommends children aged five to 11 years receive primary vaccination. Primary vaccination and a booster dose with bivalent mRNA vaccine (Comirnaty or Spikevax) is recommended for adolescents aged 12 to 17 years. A second booster dose with a bivalent mRNA vaccine is also recommended for adolescents aged 12 to 17 years in a risk group (for these with high frailty motivated by concomitant/pre-existing pathologies). All children aged 12 to 17 years who have received their first booster dose can receive an additional booster dose upon a request from their parents or guardians.
Latvia [38]	The Ministry of Health of Latvia recommends vaccination for children aged six months to four years with underlying condition, with Pfizer-BioNTech (Comirnaty) vaccine, 3 µg, three-dose schedule, Moderna (Spikevax) vaccine (up to five years), 25 µg, two-dose schedule. For children aged five to 11 years primary vaccination is recommended for all children in this age group. For children aged five to 11 years in risk groups booster vaccination is recommended. Pfizer-BioNTech (Comirnaty), two-dose schedule, original (10 µg) or adapted vaccine (5/5 µg). Moderna (Spikevax) vaccine (from six years), 25 µg, two-dose schedule. For children from the age of 12 years primary vaccination and a booster vaccination is recommended. Pfizer-BioNTech (Comirnaty) 30 µg, two-dose schedule. Moderna (Spikevax) vaccine 0.5 ml, two-dose schedule.
Liechtenstein [39]	The Federal Office of Public Health of Liechtenstein recommends booster vaccinations to those aged 12 years and older. Booster vaccination is given with an interval of at least four months after the last vaccination/COVID-19 infection.
Lithuania [59]	The Ministry of Health of Lithuania recommends children aged five to 11 years receive their primary vaccination. Children aged 12 years and older can be vaccinated with a booster dose of the Comirnaty vaccine.
Luxembourg [41]	The Government of Luxembourg informs that children aged six months to five years have an opportunity to be vaccinated. Children aged five to 11 years can receive primary vaccination against COVID-19 voluntarily with two doses, with four weeks interval between the first and second dose. Children aged 12 years and older with underlying conditions are recommended second booster dose. Healthy children aged 12 years and older may be offered a second booster dose on individual decision.
Malta (country validation)	The Ministry of Health of Malta recommends primary vaccination to children aged six months to four years. Booster vaccination is recommended to children aged five to 11 years. Adapted Omicron booster to those aged 12 years and older.
The Netherlands [60]	The Government of the Netherlands recommends primary vaccination to children aged six months to five years with a medical condition that increases the risk of becoming seriously ill due to COVID-19 infection. Vaccination is not recommended to healthy children aged six months to five years. Primary vaccination consists of three doses with a child dose of the Pfizer vaccine, interval of three to four weeks between the first and second dose, interval of at least eight weeks between the second and third dose. Children aged five to 11 years with certain medical conditions, like severe lung or heart disease, can be vaccinated. Primary vaccination for children aged five to 11 years is done with two doses of the BioNTech/Pfizer vaccine in a formula adapted for children. After this they can get a repeat vaccination. Children aged 12 to 17 years can also get a repeat vaccination if they wish so.
Norway [44]	The Norwegian Institute of Public Health recommends primary vaccination to children aged six months to four years who are in risk groups after individual assessment by a doctor, with three doses of Comirnaty vaccine (3 µg /dose). Healthy children aged five to 11 years can be vaccinated with one or two doses of Comirnaty (10 µg/dose) if parents wish. Those with underlying conditions are recommended primary vaccination (two doses, 8–12 weeks interval). Children with severely weakened immune systems should be vaccinated with three vaccine doses in the primary vaccination schedule. A booster dose can be

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	<p>considered for children with underlying risk factors before the upcoming autumn/winter season 2022, with a minimum interval of four months since the previous dose.</p> <p>Healthy children aged 12 to 15 years can be vaccinated with one or two doses of Comirnaty (30 µg/dose) if parents wish. Those with underlying conditions are recommended primary vaccination (two doses, 8–12 weeks interval) and children with severely weakened immune systems should be vaccinated with three doses in the primary vaccination schedule. A booster dose is recommended to children with underlying risk factors before the upcoming autumn/winter season 2022, with a minimum interval of four months since the previous dose.</p> <p>Healthy children aged 16 to 17 years can be vaccinated with one or two doses of Comirnaty (30 µg/dose) if they wish. Those with underlying conditions are recommend primary vaccination (two doses, 8-12 weeks interval) and children with severely weakened immune systems should be vaccinated with three doses in the primary vaccination schedule. A booster dose is recommended to children with underlying risk factors before the upcoming autumn/winter season 2022, with a minimum interval of four months since the previous dose.</p>
Poland [45]	<p>The Ministry of Health of Poland recommends primary vaccination to children six months to five years with Pfizer paediatric formula of three doses of vaccine.</p> <p>All those aged five years and older can receive their first booster dose three months after a primary vaccination. For children aged five to 11 years old, the interval is six months, and for those aged 12 years and older it is an interval of three months. All those aged 12 years and older can receive their second booster dose three months after the last vaccination.</p>
Portugal [46]	<p>The Government of Portugal recommends a seasonal booster dose to those aged five years and older with underlying conditions. The recommended interval is of four to six months, with a minimum interval of three months since the last COVID-19 vaccination/infection.</p>
Romania (country validation)	<p>The Ministry of Health of Romania recommends primary vaccination for children aged five to 11 years.</p>
Slovakia [48]	<p>The Ministry of Health of Slovakia recommends first and second booster doses to those aged 12 years and older, with an interval of at least three months after the last dose.</p>
Slovenia [49]	<p>The National Institute of Public Health of Slovenia recommends primary vaccination against COVID-19 (with three doses of the Comirnaty vaccine) to children aged six months to four years with chronic diseases, children who are in contact with people with a higher risk of a severe course of COVID-19, and who cannot be effectively protected by vaccination, such as immunocompromised people.</p> <p>Primary vaccination against is especially recommended for children aged five to 11 years with chronic diseases, children who are in contact with people with a higher risk of a severe course of COVID-19 and cannot be effectively protect by vaccination (e.g. immunocompromised people, relatives with chronic diseases). Healthy children aged five to 11 years can also be vaccinated upon request.</p> <p>Primary vaccination against COVID-19 is recommended for all adolescents aged 12 and older, first booster dose is mainly recommended for young people with chronic diseases, but healthy people can also receive it upon request.</p>
Spain [50]	<p>For the autumn-winter campaign, the Interterritorial Council of the National Health Service of Spain recommends primary vaccination for children aged six months to five years with comorbidities and immunocompromised, such as at risk that induce high degree of immunosuppression, as transplanted of hematopoietic parents, solid organ transplant, chronic renal failure, HIV infection, some primary immunodeficiencies and certain immunosuppressive therapies. Children aged five to 11 years are recommended to receive the primary course. Children aged five to 11 years in a risk group are recommended to receive their booster dose. Children aged 12 years and older with underlying conditions are recommended to receive their first booster, but booster vaccination can also be given to healthy children aged 12 years and older.</p>
Sweden [51]	<p>The Public Health Agency of Sweden specifies that children in a risk group are recommended primary vaccination from the age of five years. Children aged 12 to 17 years are recommended to be vaccinated with two doses of primary vaccination.</p>

Sources: Rapid desk review of official sources. Validation from countries.