

TECHNICAL REPORT

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

11 November 2021

Key messages

This report provides an updated overview of 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;
- vaccination strategies and policies;
- challenges and good practice with the rollout, including vaccine acceptance and uptake.

Vaccine COVID-19 rollout overview

- As of 7 November 2021, over 599 million vaccine doses have been administered in the EU/EEA, 293 million people have received a complete primary vaccination course (30 countries reporting) and over seven million individuals in the EU/EEA have already received an additional dose following the primary vaccination course (22 countries reporting).
- Since the start of COVID-19 vaccine deployment in the EU/EEA in December 2020, the cumulative uptake of a full vaccination course has reached 64.8% (range: 22.5-81.2%) in the total population and 76% (range: 27-92.4%) in the adult population aged 18 years and above (pooled data from 30 reporting countries). However, the pace of weekly increase in vaccine uptake in the EU/EEA as a whole is slowing down and the progress is unequal across countries, with four reporting less than 50% of full vaccination uptake in the total population (Bulgaria, Croatia, Romania and Slovakia).
- As vaccine campaigns expanded to include younger age groups, the median uptake of full vaccination among the elderly aged 60 years and above in the EU/EEA, as of 7 November 2021, reached a plateau well above 80%, while still increasing among younger adults (65.9% in 18-24; 71.6% in 25-49; 79.6% in 50-59), as well as in adolescents and children, with a median uptake of full vaccination of 14.3% among individuals below 18 years (52.9% in 15-17; 19.5% in 10-14).

Vaccination strategies and policies during rollout

- From the start, vaccinations have been rolled out in phases through various priority groups. Countries initially prioritised elderly people, residents and personnel of LTCFs, healthcare workers, social care personnel, and people with certain comorbidities. All EU/EEA countries then opened vaccination to the general population, with all offering vaccination to those aged 12 years and over.
- Twenty-eight countries (out of the 28 countries who responded to this question) recommend the vaccination of pregnant women, most of them with mRNA vaccines following the first trimester.

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- In June 2021, 16 countries had extended the timing between vaccine doses to provide the first dose to as many people in the priority groups as possible for vaccines with a two-dose schedule. The timing between the first and second dose varies by country and by vaccine product. As of September 2021, seven countries, among those that had previously extended the timing between doses, decreased the interval between doses for some vaccine products to accelerate the uptake of full vaccination, especially in the context of the increased circulation of the Delta variant.
- Twenty-one countries recommend specific COVID-19 vaccine products for specific population groups. The adaptation is mainly based on age-specific recommendations for both the Vaxzevria and COVID-19 Vaccine Janssen.
- All 30 countries recommend an additional dose as an extension of the primary series for those with weakened immune systems and a booster dose to different population groups to improve protection in individuals for whom immunity may wane after completing the primary schedule. Eight countries incorporate the booster dose in the yearly seasonal influenza vaccination campaign and eight countries will not incorporate the two vaccines, whereas for six countries this is still under discussion.
- Twenty-two countries are administering a heterologous primary schedule of vaccine doses under specific circumstances, with seven countries routinely recommending an mRNA vaccine as a second dose following a first dose of Vaxzevria.
- The majority of countries do not have mandatory vaccination in place. Only five countries have mandatory vaccination in place for healthcare workers and/or workers in long-term care facilities.

Vaccine acceptance, hesitancy, and uptake

- With vaccination uptake plateauing, and with some countries lagging behind in increasing uptake, many countries are now trying to reach those population groups that still have low uptake, such as under-served and vulnerable groups and young people.
- Countries are using a range of strategies to encourage vaccine acceptance and address vaccine hesitancy or uptake. These include measures such as: mobile and pop-up vaccination teams/clinics; targeted communication strategies; outreach initiatives and intersectoral partnerships for community-based interventions. Some countries have also introduced incentives to be vaccinated, while others have mandatory vaccination for healthcare workers.
- Increasing vaccination uptake and ensuring all eligible individuals are fully vaccinated, especially those at higher risk of severe disease, continues to be the highest priority at this stage of the vaccination rollout in the EU/EEA.

The rollout of national vaccination campaigns is a continuously moving process, and this report provides a snapshot of the progress to date.

Scope of this document

ECDC has previously published six 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] and 23 September 2021 [6]. This sixth technical report provides an updated overview of the progress of national COVID-19 vaccination strategies in EU/EEA countries, including updates on: vaccine uptake overall and by target group; vaccination strategies and policies in place; vaccine acceptance and hesitancy; and challenges countries face with increasing uptake and good practices to mitigate these challenges.

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) collaboration and national public health institutes and ministries of health in the EU/EEA, as well as public health experts and decision-makers at subnational level in charge of implementing vaccine deployment plans.

Methods

The information provided in this report was collected from the following sources:

The Integrated Situational Awareness and Analysis report

Questions on vaccines are sent by the European Commission 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 [7,8].

- Since 9 December 2020, a weekly set of questions has been sent via the ISAA report to representatives of countries, as validating authorities of the IPCR, to gather regular information on various topics around COVID-19. One section of these questions covers vaccination strategies and deployment. The representatives of countries gather the responses to the questions from different agencies and ministries in their countries.
- This report is based on: Responses from countries to the vaccine-related questions received between 13 September and 26 October. Where relevant, data are included from responses provided before September. The response rate from countries to each question is specified in the sections below.
- On 3 November 2021, 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 rollout (the number of doses distributed to EU/EEA countries and administered, including by age groups and other prioritised populations) 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 rollout through The European Surveillance System (TESSy), which can be viewed on the COVID-19 Vaccine Tracker [9] on ECDC's website, as well as the weekly COVID-19 country overviews [10]. The information on the COVID-19 vaccine rollout 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 10 November 2021. The Vaccine Tracker may be consulted for additional details and country specific [disclaimers on data](#).

Results

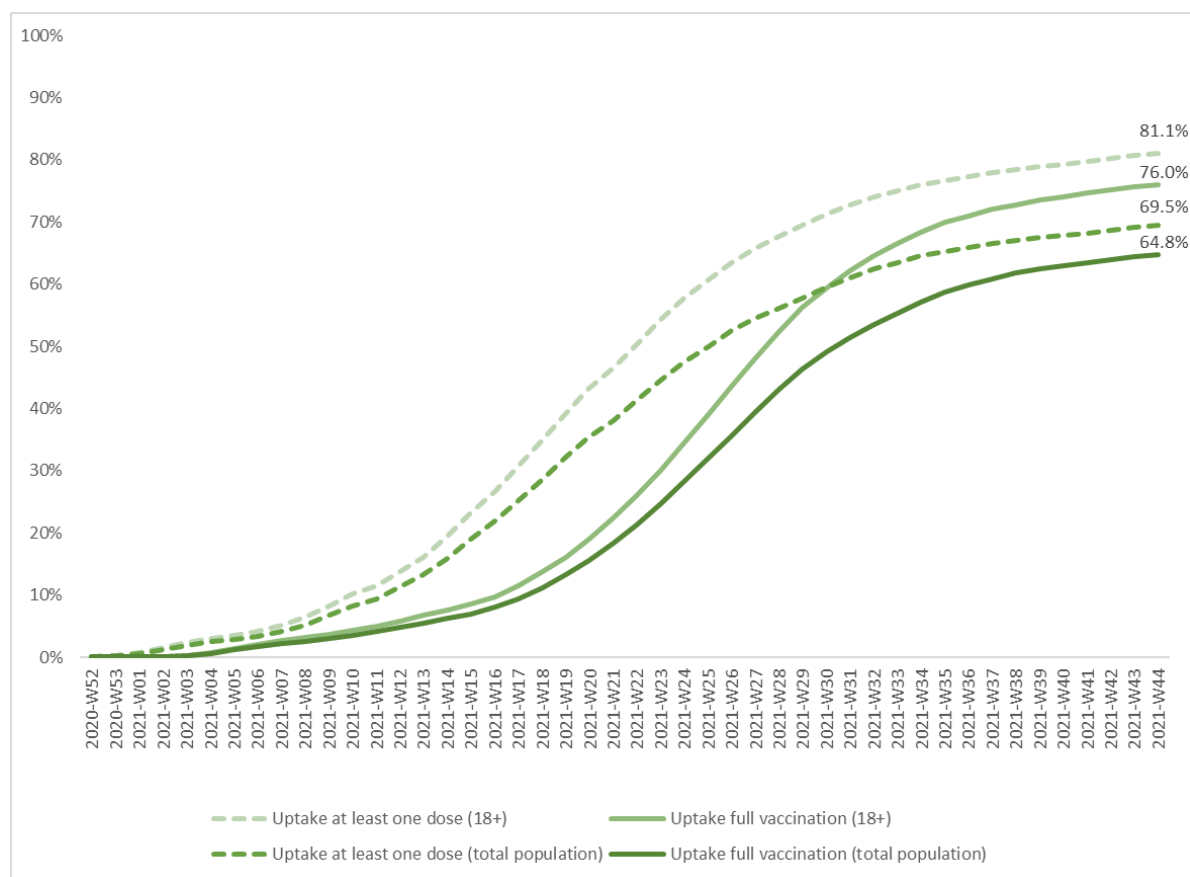
COVID-19 vaccine rollout overview

As of 7 November 2021 (week 44, 2021), over 599 million vaccine doses have been administered in the EU/EEA, 293 million people have received a complete primary vaccination course (30 countries reporting) and over seven million individuals in the EU/EEA have already received an additional dose following the primary vaccination course (22 countries reporting) [9].

Since the start of COVID-19 vaccine deployment in December 2020 and as of 7 November 2021, the cumulative vaccine uptake in the total population in the EU/EEA reached 69.5% (range: 24.9-87.8%) for at least one vaccine dose and 64.8% (range: 22.5-81.2%) for the full vaccination course (pooled data from 30 reporting countries). Among adults (aged 18 years and older) in the EU/EEA as a whole, the cumulative vaccine uptake reached 81.1% for at least one vaccine dose (range 29.7-98.8%) and 76% for the full vaccination course (range: 27-92.4%) (pooled data from 30 reporting countries) [10].

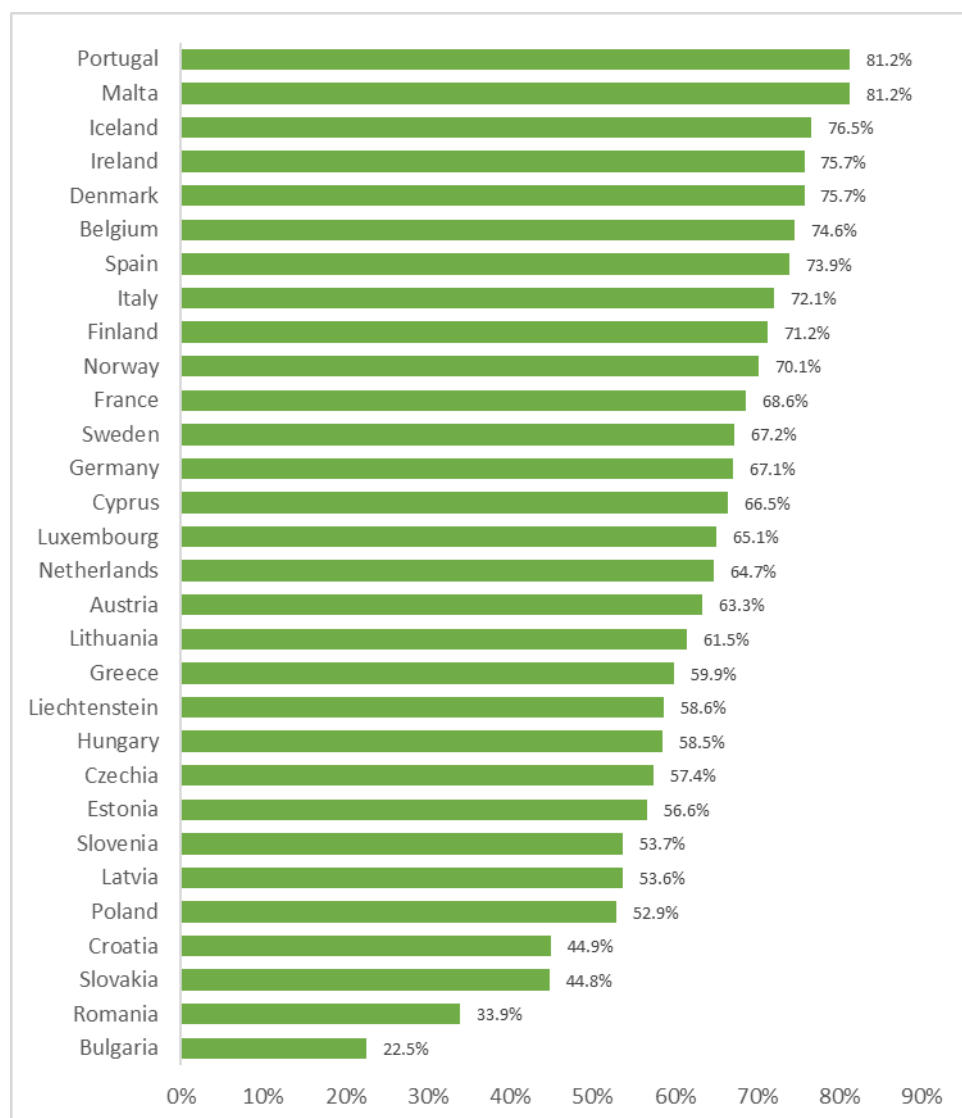
As the cumulative vaccine uptake in the adult population in the EU/EEA reaches above 75%, the increase in vaccine uptake in the total population is mostly driven by the rollout in younger age groups, including among eligible individuals below 18 years. On the other hand, the overall pace of weekly increase in vaccine uptake in the EU/EEA is slowing down (Figure 1) and the progress is unequal across countries (Figure 2). It is notable that a few EU/EEA countries are lagging behind, with four still reporting less than 50% of full vaccination uptake in the total population (Bulgaria, Croatia, Romania and Slovakia).

Figure 1. Cumulative uptake of at least one dose of COVID-19 vaccine and full vaccination among adults (18+) and total population in EU/EEA countries as of week 44, 2021



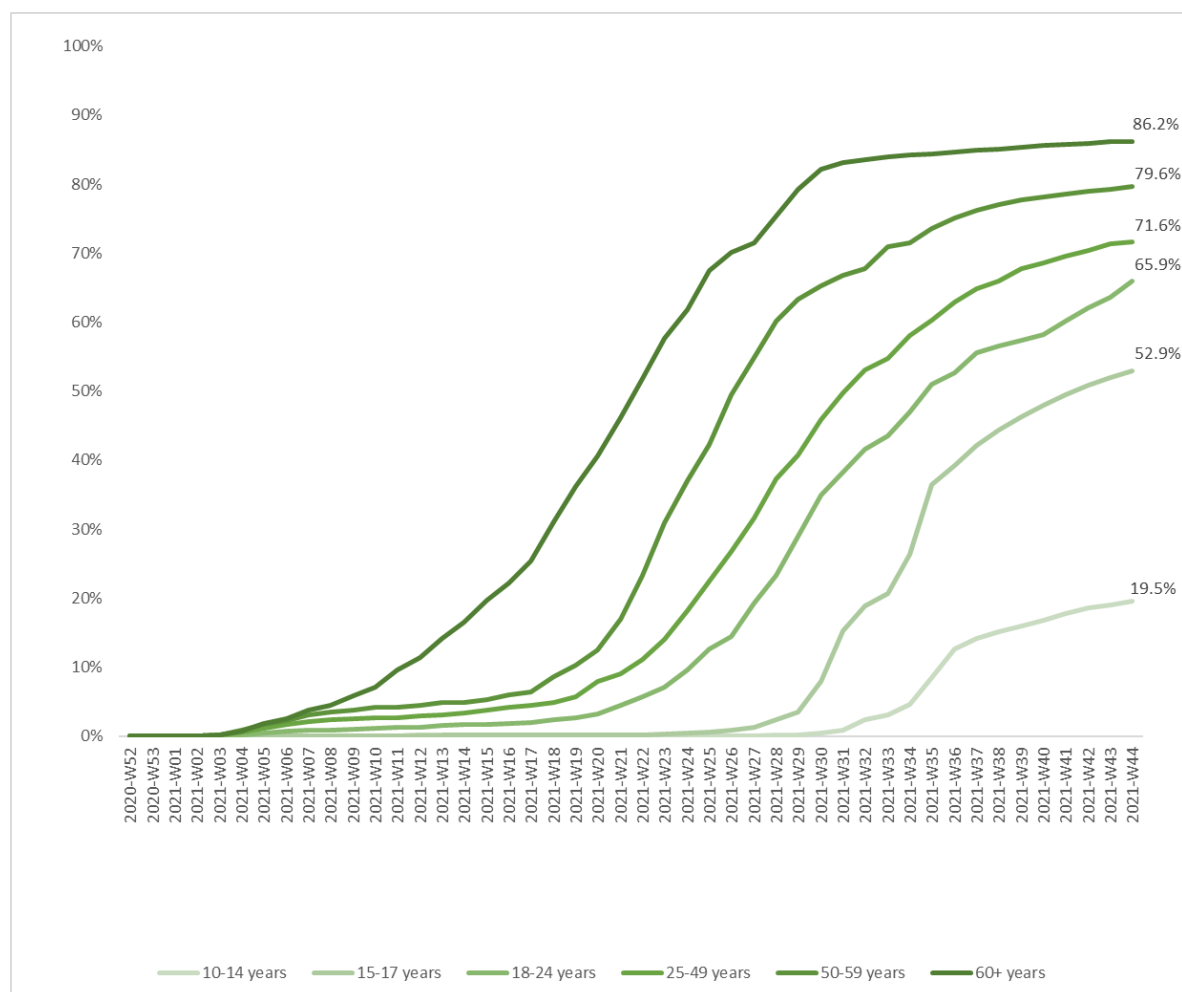
Source: TESSy; data reported by 30 countries as of week 44, 2021. The total population includes children and adolescents for whom the vaccine is not yet indicated (e.g. below 12 years) or who may not be included in national target groups yet.

Figure 2. Cumulative uptake of full COVID-19 vaccination in the total population by EU/EEA country as of week 44, 2021



Source: TESSy; data reported by 30 countries as of week 44, 2021. See the [Notes on data](#) in the ECDC Vaccine Tracker for country specific disclaimers.

As of 7 November 2021, the median uptake of full vaccination among the elderly aged 60 years and above in the EU/EEA reached a plateau well above 80%, while still increasing among younger adults, (65.9% in 18-24; 71.6% in 25-49; 79.6% in 50-59), as well as eligible adolescents and children (Figure 3). With the expansion of the vaccine rollout to include eligible adolescents and children, as of 7 November 2021, the median uptake of full vaccination in those under 18 years reached 14.3% (52.9% in 15-17; 19.5% in 10-14).

Figure 3. Median cumulative uptake of full vaccination by age group, as of week 44, 2021


Source: TESSy; data reported by 27 countries as of week 44, 2021 (missing Germany, Liechtenstein and The Netherlands); for age groups 10-14 and 15-17 data are available for 17 countries (missing Belgium, Bulgaria, Estonia, France, Germany, Hungary, Italy, Liechtenstein, Malta, the Netherlands, Norway, Romania, Slovenia).

Table 1 shows a summary of the cumulative uptake of full vaccination in the total population, adults (18+), individuals under 18 years and priority groups (e.g. elderly 60+, healthcare workers, residents in long term care facilities). More information on the COVID-19 vaccine rollout in EU/EEA countries can be found on the ECDC Vaccine Tracker [9] and in the weekly COVID-19 vaccine rollout overview [10].

Table 1. Summary table of COVID-19 vaccine uptake by target population as of week 42, 2021

Vaccine uptake	Uptake (range)	Reporting countries
Full vaccination in the total population	64.8 (range: 22.5-81.2%)	All 30 EU/EEA countries
Full vaccination among adults (18+)	76% (range: 27-92.4%)	All 30 EU/EEA countries
Full vaccination among those under 18 years (median)	14.3% (range:0.9-28.8%)	27 (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden)
Full vaccination among people aged 60+ years (median)	86.2% (range: 31.5-100%)	27 (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden)
Full vaccination among healthcare workers (median)	87% (range: 25.9-100%)	17 (Bulgaria, Croatia, Czechia, Denmark, Estonia, France, Greece, Hungary, Iceland, Ireland, Latvia, Luxembourg, Malta, Romania, Slovenia, Spain, Sweden)
Full vaccination among residents in long-term care facilities (median)	83% (range: 38.3-100%)	13 (Bulgaria, Czechia, Denmark, Estonia, Greece, Hungary, Iceland, Ireland, Latvia, Luxembourg, Malta)

*Source: TESSy; data reported as of week 44, 2021

Vaccination strategies and policies during rollout

Countries continue to adapt vaccination strategies and policies based primarily on the changing epidemiological situation at country and subnational level, vaccine supply, new information regarding different COVID-19 vaccines efficacy, safety, effectiveness and new evidence about the virus and its impact on human health.

The vaccination policies captured in this section include: vaccination of adolescents aged 12-17 years; recommendation of vaccination for pregnant women; timing between doses; recommendation of vaccination in those previously infected; recommendations of vaccine products for age or target groups; recommendations for an additional vaccine dose or booster dose; administration of a heterologous combination of vaccine doses; mandatory vaccination and use of vaccination certificates.

Priority groups defined for vaccination

Due to the limited availability of COVID-19 vaccines at the start of vaccination campaigns, most countries opted to prioritise vaccination for those individuals most at risk of severe disease (e.g. the elderly and residents in long-term care facilities), as well as healthcare workers. Vaccination phases differed by country, with a range of two to 16 different phases, depending on their specific prioritisation strategies and vaccine availability.

As vaccines have been made widely available, all countries have now opened vaccination to the general population and are no longer in the prioritisation phase of vaccinating only those at risk of severe disease and healthcare workers. All responding countries have now opened vaccination to those aged 12 years and over based on current indications for use of available mRNA-based COVID-19 vaccines, Comirnaty and Spikevax.

Vaccination of 12-17-year-olds

In comparison to the responses from countries in late August, when 28 countries were recommending vaccination for all adolescents and two were recommending vaccination only for adolescents with risk factors, all reporting countries are now recommending vaccination for all 12-17-year-olds.

Table 2. Country recommendations of vaccination of 12-17-year-olds (n=30)

Vaccination of adolescents aged 12-17 years	Countries
Yes, for all adolescents	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Liechtenstein, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden

~One dose of vaccination is recommended for 12-15 years and two doses for 16-17 years.

All responding countries report that the vaccination of adolescents have started, and several countries provided details of where the vaccinations are taking place. All countries are offering adolescent vaccination at vaccination centres, with GP clinic/family doctors as the second most popular option. Several countries also offer vaccinations at schools, hospitals, paediatrician clinics, mobile vaccination sites or pharmacies.

Table 3. Locations/sites for providing adolescent vaccinations (n=28)

Sites for providing adolescent vaccination	Countries
Vaccination centres	Austria, Belgium, Bulgaria, Croatia, Czechia, Cyprus, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Liechtenstein, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain, Sweden
GP clinics/Family doctors	Austria, Bulgaria, Czechia, Estonia, Germany, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg,
Schools	Belgium, Estonia, Finland, France, Germany, Hungary, Luxembourg, Sweden
Paediatrician clinics	Austria, Czechia, Estonia, Germany, Latvia, Lithuania
Hospitals	Austria, Estonia, Germany, Latvia, Slovakia, Spain
Mobile vaccination or pop-up vaccination sites	Austria, Denmark, Germany, Luxembourg, Malta, the Netherlands
Pharmacies	Italy, Ireland
Local Health Centres	Portugal

Planned vaccination of children under the age of 12 years

Of 20 responding countries, three countries (Czechia, Lithuania and Hungary) report that they plan to expand vaccination to children under the age of 12, if the EMA authorises any COVID-19 vaccine for that age group. Nine countries report that this is under discussion, one country (Slovenia) report that this is not planned, and five countries have provided other answers.

Table 4. Planned recommendation of vaccination for children under 12 years (n=21)

Vaccination under the age of 12 years	Countries
Yes, for all children	Czechia, Lithuania, Hungary
No	Slovenia
Under discussion	Belgium, Croatia, Latvia, Luxembourg, Malta, Netherlands, Poland, Portugal, Spain
Other	Austria*, Germany*, Iceland**, Ireland***, Romania*, Norway***, Slovenia*, Sweden*

* Will be discussed after EMA authorisation

** Likely but not decided

*** To be determined

Recommendation of primary vaccination for pregnant women

All 28 responding countries recommend vaccination for pregnant women. Nine countries reported that they recommend vaccination after the first trimester (Austria, Croatia, Czechia, Denmark, France, Germany, Iceland, Norway and Portugal). Nineteen countries report that they recommend vaccination with one of the currently authorised mRNA vaccines (Comirnaty or Spikevax) (Austria, Croatia, Cyprus, Denmark, Estonia, Finland, France, Germany, Iceland, Ireland, Italy, Latvia, Lithuania, Malta (Comirnaty), the Netherlands, Norway, Portugal, Slovakia (Comirnaty), Slovenia and Spain).

Table 5. Recommendation of vaccination for pregnant women (n=28)

Vaccination recommended for pregnant women	Countries
Yes, any of the vaccine products are recommended	Poland, Romania,
Yes, but only certain vaccine products are recommended	Austria, Belgium, Bulgaria, Croatia, Czechia, Cyprus, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Iceland, Ireland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Portugal, Slovakia, Slovenia, Spain, Sweden

Time between the first and second dose of COVID-19 vaccines

In June, there were 16 responding countries who had extended the time between vaccine doses to provide the first dose to as many people in the priority groups as possible. Romania applied extended timing in special circumstances. Seven countries (Iceland, Latvia, Lithuania, Malta, Slovakia, Slovenia, and Spain) had not extended the timing between the first and second dose of authorised vaccines, although Lithuania and Spain had special recommendations. For more details on the timing between doses for countries and vaccine products, please see the June ECDC vaccine deployment report [5].

According to the latest responses from countries, in September, seven countries (Austria, Belgium, Czechia, Finland, Ireland, Portugal, and Spain) that had extended the time between doses earlier in the vaccination campaign had decreased it for some vaccine products. The decrease of time between doses is due to the increase of vaccine supplies and was adopted mainly to enable an acceleration of the COVID-19 vaccination programmes, and in some countries also as a response to the increase in the circulation of variants of concern, particularly Delta.

Recommendation of COVID-19 vaccination in individuals previously infected with SARS-CoV-2

There is some evidence that, for those individuals who have already been previously infected with SARS-CoV-2, a single dose of the currently available vaccines with a two-dose schedule may provide sufficient immunity [11-15].

Based on the most recently reported information, 13 countries currently recommend the full vaccination schedule to people who were previously infected, while 14 countries recommend only one dose (for vaccines with a two-dose schedule). For timing of dose administration and documentation, please see the June ECDC vaccine deployment report [5].

Table 6. Recommendations of COVID-19 vaccination in individuals previously infected (n=27)

Recommended vaccination dose in individuals previously infected with SARS-CoV-2	Countries
Full vaccination course	Belgium, Bulgaria, Cyprus, Czechia, Denmark, Ireland, Lithuania, Luxembourg, Malta, Romania, Poland, Slovakia, Sweden
One dose (for those vaccines that have a two-dose regimen)	Austria**, Croatia, Estonia*, Finland France, Germany, Iceland, Italy, Latvia, the Netherlands, Norway, Slovenia, Portugal*, Spain

* A second dose may be administered if there is a need (e.g. problems entering a country that requires two doses even from those who have recovered from COVID-19).

** A second dose may be administered if there is a need (e.g. problems entering a country that requires two doses even from those who have recovered from COVID-19). Individuals who were previously infected (confirmed by PCR-testing/presence of neutralizing antibodies) and have received one vaccine dose after infection, are advised to receive their second dose after an interval of six months after the first dose. According to the Austrian NITAG these persons can be regarded as being equivalent to individuals having completed two-dose-vaccination-series without infection

Recommendations of specific COVID-19 vaccine products to any target group/age group

Out of the 26 responding countries, seven countries follow the EMA summary of product characteristics for all vaccines (Bulgaria, Hungary, Latvia, Lithuania, Poland, Romania), whereas twenty-one countries recommend specific COVID-19 products to certain target and/or age groups, mainly for the use of Vaxzevria and/or COVID-19 Vaccine Janssen only in older age groups above certain cut-offs. Five countries have suspended or paused the use of certain COVID-19 vaccine products in their vaccination campaigns: Vaxzevria is not being used in Denmark, the Netherlands or Norway. COVID-19 Vaccine Janssen is not being used in Denmark, Finland or Sweden and in Norway it is not being used routinely (only in specific situations). The use of Spikevax has been paused in Sweden and Finland for anyone born 1991 or later [16,17]. In Iceland, Spikevax has been paused and is used only for booster doses for individuals above 60 years [20], in Norway Spikevax is recommended for those over the age of 18 [18] and in France, Germany and Austria Spikevax is recommended for those 30 years and over [19].

Table 7. Details of country recommendations for specific COVID-19 vaccine products for specific age or target groups (n=21)

Country	Comirnaty	Spikevax	Vaxzevria	COVID-19 Vaccine Janssen
Austria	Preferably recommended for pregnant women	≥30 years, Recommended for pregnant women ≥30 years		
Belgium			≥41 years	≥41 years
Croatia			≥50 years	
Cyprus	Recommendation for preference of mRNA vaccines for individuals <50 years	Recommendation for preference of mRNA vaccines for individuals <50 years	Not recommended to individuals with thrombotic/thrombocytopenia syndrome	Not recommended to individuals with previous capillary leak syndrome
Denmark			Vaccine no longer used but can be given to people who want to take the vaccine after consultation with a doctor	Vaccine not used but can be given to people who want to take the vaccine after consultation with a doctor
Estonia			≥50 years	
Finland		≥30 years	>65 years	
France		≥30 years	≥55 years	≥55 years

Country	Comirnaty	Spikevax	Vaxzevria	COVID-19 Vaccine Janssen
Germany	Recommended for pregnant women	≥30 years, Recommended for pregnant women ≥30 years	≥60 years	≥60 years
Greece			≥30 years	
Iceland		Stopped use for others than booster doses or individuals >60	>55 years women >40 years men who do not have risk factors that increase the risk of thrombosis	
Ireland			≥50-69 years; Not recommended for pregnant women	≥50-69 years; <50 years if two-dose vaccine not feasible; not recommended for pregnant women
Italy			≥60 years	≥60 years
Luxembourg	mRNA vaccine for people under <30 years and pregnant women. For people aged 30-54 years at risk of severe COVID-19, preference should be given to mRNA vaccines if available	mRNA vaccine for people under <30 years and pregnant women. For people aged 30-54 years at risk of severe COVID-19, preference should be given to mRNA vaccines if available	Those between 30-54 years can register to be voluntarily vaccinated ≥55 years	≥30 years
Malta			18-70 years	
the Netherlands	Recommended for pregnant women	Recommended for pregnant women	Not used in current vaccination programme	Only on explicit request for people ≥ 18 (pregnant women are excluded and risk groups are advised to get vaccinated with an mRNA vaccine)
Norway		≥18 years	Not used	Only used in specific situations
Portugal			≥ 60 years	Recommended for all people ≥50 years and only for males <50 years
Slovenia			Only recommended in case of contraindication of other vaccines or on explicit request from the individual	Only recommended in case of contraindication of other vaccines or on explicit request from the individual
Spain	Recommended for elderly (≥70), pregnant women and individuals with high-risk conditions, and other age groups are according to availability	Recommended for elderly (≥70), pregnant women and individuals with high-risk conditions, and other age groups according to availability	≥60 years	Recommended primarily for those > 40 years and for socially vulnerable groups
Sweden		Paused for individuals born 1991 or later	≥65 years	Janssen vaccine suspended

Additional dose and booster dose recommendations

Booster doses are for people who have normal immune systems and responded adequately to primary vaccination, whereas additional/extra doses are for those with weakened immune systems who did not respond adequately to primary vaccination. Booster doses are given to vaccinated people (i.e. those who have completed a primary series of COVID-19 vaccination) to restore protection after it would have waned. On the other hand, additional/extra doses as part of a primary vaccination series may be given to people with severely weakened immune systems, as they may not achieve an adequate level of protection from the standard primary vaccination [20].

On 4 October, EMA's Committee for Medicinal Products for Human Use (CHMP) recommended that an extra dose of Comirnaty and Spikevax may be given to people with severely weakened immune systems at least 28 days after their second dose and that booster doses of Comirnaty may be considered at least six months after the second dose for people aged 18 years and older [21]. On 25 October, EMA's CHMP concluded that a booster dose of the Spikevax may be considered in people aged 18 years and above at least six months after the second dose [22].

All 30 countries recommend an additional dose as an extension of the primary series to those with weakened immune systems and are also recommending booster doses for waning immunity to different population groups. The majority of countries recommend a booster dose to those most vulnerable to severe disease and death i.e. residents in LTCF and the elderly.

Table 8. Details of recommendations for an additional dose and/or a booster dose (n=30)

Country	Recommendation of an additional vaccine dose as extension of primary series and booster dose for waning immunity	Population groups are currently indicated	Homologous or heterologous regimen	Timing of additional dose and booster dose
Austria [23]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals, individuals 12-17 years of age only if immunocompromised and after individual risk-benefit-evaluation with physician Booster dose to individuals ≥18 years individuals who received a single dose of Janssen vaccine	mRNA vaccine are recommended, preferably homologous schedule if possible, but currently no recommendation for the use of Spikevax in individuals <30 years individuals who received 1 dose of COVID-19 Vaccine Janssen should preferably receive a mRNA-vaccine as second dose, yet, in this case administration of COVID-19 Vaccine Janssen is also possible	Additional dose to severely immunocompromised individuals: 28 days after second dose. In case of negative neutralizing antibody test four weeks after third dose administration of fourth dose is recommended Booster dose: Six months after second dose COVID-19 Vaccine Janssen: at least 28 days after first dose
Belgium [24]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals, Booster to: LTCF residents, LTCF staff, people aged ≥ 65 years	mRNA vaccine (booster)	Booster dose: Six months for the mRNA based vaccines and four months for other vaccines
Bulgaria [25]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals Booster dose to LTCF residents, healthcare workers	mRNA vaccine	Additional dose to immunocompromised/immunosuppressed individuals: at least 28 days after full vaccination, Booster dose: at least six months after full vaccination
Croatia [26]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/immunosuppressed individuals, Booster dose to people aged ≥65 years, LTCF residents, LTCF staff, individuals who received a single dose of COVID-19 Vaccine Janssen, people aged ≥18 years who share a household with immunocompromised individuals, people aged ≥18 with chronic diseases that increase the risk for severe COVID-19.	mRNA vaccine (Comimaty only for booster dose)	Additional dose to immunocompromised/immunosuppressed individuals: at least two months after full vaccination, Booster dose: at least six months after full vaccination
Cyprus [27]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals, Booster dose to people >65 years, LTCF residents, Healthcare workers	mRNA vaccine	Additional dose to immunocompromised/immunosuppressed individuals: > four weeks. Booster dose: Healthcare workers, >65 years, LTCF residents at least 6 months after full vaccination
Czechia [28]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals Booster dose to LTCF residents and HCW and workers in facilities, 65+ years	mRNA vaccine	Booster dose: Six months after full vaccination

Country	Recommendation of an additional vaccine dose as extension of primary series and booster dose for waning immunity	Population groups are currently indicated	Homologous or heterologous regimen	Timing of additional dose and booster dose
Denmark [29]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals, Booster dose to elderly people living in nursing homes, people >85 years, individuals who received a single dose of COVID-19 Vaccine Janssen	mRNA vaccine	At least one month after full vaccination and maximum eight months or at earliest convenience
Estonia [30]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals, Booster dose to people >65 years, LTCF residents, healthcare workers, employees in social care and education	mRNA vaccine (Cominaty recommended)	Additional dose to immunocompromised/immuno suppressed individuals: at least one month after full vaccination, Booster dose: at least eight months after full vaccination
Finland [31]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals, Booster dose to LTCF residents, healthcare workers	Homologous	Additional dose to immunocompromised/immuno suppressed individuals: at least two months after full vaccination Booster dose: at least six months after full vaccination
France [32]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed people, Booster dose to people >65 years, individuals who received a single dose of COVID-19 Vaccine Janssen, HCW, home care workers for vulnerable people, health transport professionals and firefighters, relatives +18 years of immunocompromised persons.	mRNA vaccine	Additional dose to immunocompromised/immuno suppressed individuals: One month after full vaccination, Booster dose: at least six months
Germany [33]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed people, Booster dose to people >70 years, LTCF residents, healthcare workers, those receiving supportive care and nursing services at home, individuals who received a single dose of COVID-19 Vaccine Janssen	mRNA vaccine	Additional dose to immunocompromised/immuno suppressed individuals: one month after full vaccination Booster dose: At least six months after full vaccination COVID-19 Vaccine Janssen: one month after first dose
Greece [34]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed people, Booster dose to people >50 years, LTCF residents, healthcare workers, individuals with underlying conditions		Additional dose to immunocompromised/immuno suppressed individuals: 4 weeks after full vaccination, Booster dose: at least six months after full vaccination
Hungary [35]	Additional dose as extension of primary series and booster dose for waning immunity	All people over the age of 18 years can make an appointment and it is especially recommended for immunocompromised/ immunosuppressed people, elderly, individuals with chronic illnesses	Heterologous recommended (homologous available)	At least four months after full vaccination
Iceland [36]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed people Booster dose to LTCF residents and other very vulnerable welfare service recipients ≥60 years, healthcare workers, other people ≥60 years, individuals who received a single dose of COVID-19 Vaccine Janssen	mRNA vaccine	Additional dose to immunocompromised - at least 12 weeks after full vaccination Booster dose: LTCF - 13 weeks after full vaccination 60+ and frontline HCW - at least 26 weeks after full vaccination COVID-19 Vaccine Janssen: one month after first dose
Ireland [37,38]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised people aged 12 years or older, Booster dose to LTCF residents ≥65 years, people ≥60 years in the community, healthcare workers	mRNA vaccine	Additional dose to immunocompromised: minimum of two months after full vaccination Booster: at least six months after full vaccination (with a minimum five month interval)

Country	Recommendation of an additional vaccine dose as extension of primary series and booster dose for waning immunity	Population groups are currently indicated	Homologous or heterologous regimen	Timing of additional dose and booster dose
Italy [39]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised people, transplant recipients, Booster dose to people ≥80 years, LTCF staff and guests, healthcare workers ≥60 years or with underlying conditions or with a high level of exposure to infection	mRNA vaccine	At least six months after full vaccination
Latvia [40]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals Booster dose to LTCF residents, healthcare workers, individuals who received a single dose of COVID-19 Vaccine Janssen, people ≥50 years, social care centre clients ≥18 years, people aged ≥18 with chronic disease that increase the risk for severe COVID-19; persons aged ≥18 in other high risk professions and/or persons who are located in high risk environment of Covid-19 infection.	Homologous regimen recommended for immunocompromised/ immunosuppressed individuals	Additional dose for immunocompromised/immunosuppressed individuals: one month after full vaccination; COVID-19 Vaccine Janssen: two months after first dose ; Booster dose: at least six months after full vaccination
Liechtenstein [41]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to severe immunocompromised individuals, Booster dose to people ≥65 years, LTCF retirement home residents and day care facilities for senior citizens	mRNA vaccine	At least six months after full vaccination
Lithuania [42]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals, Booster dose to LTCF residents, healthcare workers, those receiving supportive care and nursing services; employees and staff of medical institutions, social service institutions, social workers; staff of laboratories in public health and pharmacies; drivers of municipalities and medical institutions transporting people suspected of suffering from COVID-19; people >65 years	mRNA vaccine	At least six months after full vaccination
Luxembourg [43]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals, Booster dose to LTCF, individuals who received a single dose of COVID-19 Vaccine Janssen, people >75 years	mRNA vaccine	Six months after a 2 dose vaccination. COVID-19 Vaccine Janssen: two months after first dose
Malta [44]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals, Booster dose to LTCF residents, older frail individuals, healthcare workers, teachers, >12 years	mRNA vaccine	Additional dose for immunocompromised/immunosuppressed individuals: at least 28 days after full vaccination Booster dose: at least six months after full vaccination
the Netherlands [45]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals, Booster dose to people living in care facilities >18 years, people >60 years, healthcare staff with direct patient contact	mRNA vaccine	Additional dose for immunocompromised/immunosuppressed individuals: at least one month after full vaccination Booster dose: at least six months after full vaccination
Norway [46]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals, Booster dose to LTCF residents and people ≥65 years and health care workers in close contact with patients with high risk of severe disease, individuals who received a single dose of COVID-19 Vaccine Janssen	Heterologous and homologous	Additional dose to immunocompromised/ immunosuppressed individuals at least one month after full vaccination. Booster dose at least 6 months after full vaccination. mRNA dose at least 8-12 weeks after single dose Janssen.

Country	Recommendation of an additional vaccine dose as extension of primary series and booster dose for waning immunity	Population groups are currently indicated	Homologous or heterologous regimen	Timing of additional dose and booster dose
Poland [47]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised individuals, Booster dose to healthcare workers and students with regular contact to COVID-19 patients or under laboratory conditions with SARS-CoV-2 infectious material, people aged >50 years	Additional dose: mRNA vaccine Booster dose: Comirnaty	Individuals with weakened immune system: at least one month after full vaccination; People >50 and healthcare workers: at least six months after full vaccination with a two-dose regimen vaccine
Portugal [48]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to certain immunosuppressed individuals, Booster dose to LTCF residents, people aged ≥65 years prioritising people ≥80 years	mRNA vaccine	Additional dose to immunocompromised/ immunosuppressed individuals at least three months after full vaccination Booster dose at least six months after full vaccination
Romania [49]	Additional dose as extension of primary series and booster dose for waning immunity	LTCF residents, healthcare workers, people >65 years, people with chronic diseases regardless of age, individuals who received a complete primary series with Vaxzevria, educational system workers	mRNA vaccine	At least six months after full vaccination
Slovakia [50]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunosuppressed/compromised patients (eg cancer patients, after transplantation, rheumatoid arthritis, etc.) Booster dose to clients and staff in social services facilities, healthcare workers, teachers and staff in schools and school facilities, people ≥60 years Second priority: the general population >18 years	mRNA vaccine	At least six months after full vaccination
Slovenia [51]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals, Booster dose to LTCF residents, healthcare workers, people ≥65 years, viral vector vaccines (Vaxzevria, COVID-19 Vaccine Janssen)	mRNA vaccine	Additional dose: at least one month after full vaccination; Booster dose: at least six months after full vaccination Previously vaccinated with viral vector vaccines: at least two months after full vaccination
Spain [52]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals, Booster dose to LTCF residents, people ≥70 years, individuals who received a single dose of COVID-19 Vaccine Janssen	mRNA vaccine	Additional dose: different timings depending on the risk group; Booster dose: at least 6 months after full vaccination. Previously vaccinated with one dose of Janssen: at least three months
Sweden [53,54]	Additional dose as extension of primary series and booster dose for waning immunity	Additional dose to immunocompromised/ immunosuppressed individuals, Booster dose to LTCF residents, individuals receiving home care, people ≥65 years, staff in LTCF for the elderly, staff working in home health care and home care	mRNA vaccine	Additional dose: at least 8 weeks after full vaccination Booster dose: at least six months after full vaccination

Sources:

ISAA survey responses and validation from countries

ECDC report - Interim public health considerations for the provision of additional COVID-19 vaccine doses [20]

Rapid desk review of official sources

Table 9. Incorporation of the booster dose in the yearly seasonal influenza vaccination campaign (n=22)

Incorporation of the booster dose in the yearly seasonal influenza vaccination campaign	Countries
Incorporation in the yearly seasonal influenza vaccination campaign	Austria, Ireland, Latvia, Luxembourg, Portugal, Romania, Slovenia, Sweden
No incorporation in the yearly seasonal influenza vaccination campaign	Belgium, Bulgaria, Cyprus, Czechia, Estonia, Finland, Norway, Poland
Under discussion	Croatia, Germany, Hungary, Lithuania, the Netherlands, Spain

Countries provided further details:

- In Germany the incorporation of the booster dose in the yearly seasonal influenza vaccination campaign is under discussion. For those eligible now, concomitant use is recommended.
- Ireland have recommended that a booster dose can be given at the same time or at any interval before or after seasonal influenza vaccine.
- In Lithuania it will be possible to get vaccinated against COVID-19, influenza and pneumococcal infection during one visit according to the latest recommendations of the Lithuanian Society of Infectious Diseases (LID).
- In Slovenia, not only the booster dose but the COVID-19 vaccination will be delivered at the same time with the influenza vaccination.
- In Latvia and Luxembourg there will be two weeks interval between influenza vaccination and COVID-19 vaccination.
- Spain reported that the COVID-19 additional dose and the booster dose will be administered together with the influenza vaccine or anticipate it, depending on the epidemiological situation and feasibility.
- In Portugal, COVID-19 vaccination, including booster doses, are being delivered at the same places as influenza vaccines, and coadministration is allowed.

Administration of a heterologous combination of vaccine doses for primary vaccination

Twenty-two countries are administering a heterologous combination of vaccine doses (mixed schedule) for primary vaccination under specific circumstances, with the majority administering Vaxzevria as the first dose followed by Comirnaty or Spikevax for the second dose. Majority of countries reported that a heterologous combination can be used in case of adverse reactions following a first dose of vaccination.

Seven countries are routinely recommending an mRNA vaccine as a second dose following a first dose of Vaxzevria (Cyprus, Finland, Germany, Ireland, Lithuania, Norway, Slovenia). In Portugal and Spain individuals below the age of 60 years are recommended a second dose of mRNA vaccine following a first dose of Vaxzevria. Finland reported that for men under 30 if they received Comirnaty for the first dose they are recommended Spikevax for the second dose. In Sweden individuals below 65 years who received Vaxzevria as first dose and mRNA vaccine is recommended for second dose and individuals under 30 vaccinated with a first dose of Spikevax are recommended Comirnaty as a second dose.

In Luxembourg it is possible for individuals under the age of 55 years without vulnerability criteria to receive a second dose of mRNA vaccine following a first dose of Vaxzevria. In the Netherlands individuals have the option to receive an mRNA vaccine as a second dose following a first dose with Vaxzevria. In Hungary any combination of vaccines is accepted based on physician recommendation. In Norway some people are offered a combination of either of the two mRNA vaccines for dose one and dose two (Comirnaty and Spikevax). In Germany those who received a dose of COVID-19 Vaccine Janssen are recommended a second dose of mRNA vaccine.

Table 10. Administration of a heterologous combination of primary vaccine doses (n=28)

Country administering a heterologous combination of vaccine doses	Countries
Yes	Austria [^] , Bulgaria, Croatia, Cyprus, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden
No	Belgium, Czechia, Latvia, Malta, Romania [~] , Slovakia [~]

[^] A heterologous combination can be used in case of adverse reactions that constitute a medical contraindication for a second vaccine dose with the same vaccine or in case of pregnancy or if vaccinated person explicitly wishes to get a heterologous schedule.

[~]A heterologous combination of vaccine doses is possible for people only in some cases indicated by doctors because of side effect.

Mandatory vaccination

At the start of vaccination campaigns in the EU/EEA, no countries had mandatory vaccination in place for any population groups. There are now five countries with mandatory vaccination in place for healthcare workers and/or workers in long-term care facilities (France, Greece, Hungary, Italy and Latvia). All other EU/EEA countries do not have mandatory vaccination in place.

Table 11. Mandatory vaccination (n=30)

Mandatory vaccination	Countries
Yes, for healthcare workers and/or workers in long-term care facilities	France, Greece, Hungary*, Italy, Latvia [~]
No	Austria, Belgium, Bulgaria, Croatia, Czechia, Cyprus, Denmark, Estonia, Finland, Iceland, Ireland, Germany, Liechtenstein, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Slovakia, Spain, Sweden

*In Hungary, COVID-19 vaccination is mandatory by legislation for healthcare workers.

[~]In Latvia, From 15 November onwards, vaccination will be mandatory for employees and officials of state and local government institutions, educational staff, medical staff, security and rescue staff and prison staff and from 15 December onwards, vaccination will be mandatory for employees who work at particular workplaces of private institutions.

COVID-19 vaccination certificates

All countries are using vaccination certificates for medical use, and the majority are also using them for travel. There are several responding countries who are also using vaccination certificates for access to specific places/events (e.g. restaurants, museums, concerts, etc.): Austria, Belgium, Bulgaria, Croatia, Cyprus, Estonia, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Romania, Slovenia and Spain (officially in only one autonomous region). In Poland it is not obligatory to have a vaccination certificate to have access to specific places/events but for those that do have it, they are exempt from limitations.

Current challenges and good practice with vaccine rollout

Vaccine uptake and acceptance

With full vaccination uptake in the EU/EEA now reaching 64.8% in the total population and 76% among adults over 18 years, although with substantial differences among countries, the vaccination campaign has now slowed down in a number of countries. Some countries still have a low percentage of fully vaccinated people; for example, as of 7 November, in four countries (Bulgaria, Croatia, Romania and Slovakia) less than 60% of the population over 18 years is fully vaccinated and in five (Bulgaria, Croatia, Latvia, Romania and Slovakia) less than 70% of elderly over 60 years have received a full vaccination. Having such a high number of unvaccinated people puts countries at higher risk from the rapidly increasing dominance of the Delta VOC, which is more transmissible than the wild type or other VOCs [55]. Many countries are now putting a lot of emphasis on the vaccination campaign to reach population groups and individuals that may be hesitant or resistant to vaccination and those individuals that are under-served, socially vulnerable, and/or face barriers to accessing vaccines due to geographical limitations or other reasons. Reaching these pockets of unvaccinated individuals is vital to increasing vaccination coverage and protection against severe disease, hospitalisations, and death. There is no one-size-fits all approach to increasing vaccination uptake in diverse populations, it is a complex issue, and the underlying reasons for lower uptake vary considerably among and within countries. Countries are using several different strategies to increase uptake in their populations.

Percentage of population who are not yet vaccinated but are willing, uncertain or not willing to get vaccinated

There were thirteen countries that gave details on the percentage of their population who have not yet been vaccinated but are willing, uncertain or not willing to get vaccinated. Eight countries said that they did not have this information (Bulgaria, Croatia, Cyprus, Finland, Lithuania, Malta, Romania, Poland). Five countries reported that there are less than 10% of the population that have not yet been vaccinated and are not willing to get vaccinated (Germany, the Netherlands, Norway, Spain and Sweden), and four countries report that 10-30% of the population are not yet vaccinated and are not willing to get vaccinated (Belgium, Czechia, Estonia, Latvia) and Slovenia and Poland report that 31-60% of the population are not yet vaccinated and not willing to get vaccinated.

In Austria, current research (Austrian Corona Panel Project, September 2021) saw the situation among respondents of the survey on vaccination as follows: 75% vaccinated, one percent unvaccinated but willing, 8 percent hesitant, and 17 percent opposed to the vaccination. In Ireland, a vaccine tracker survey indicates that in late 2020, 73% of respondents said that they definitely/probably will get the COVID-19 vaccine. This rose to +90% as the months progressed [56].

Table 12. Percentage of the population who have not yet been vaccinated but are willing, uncertain or not willing to get vaccinated (N=14)

Countries	Percentage of the population that have not yet been vaccinated but are willing to get vaccinated	Percentage of the population that have not yet been vaccinated and are uncertain if they will get vaccinated	Percentage of the population that have not yet been vaccinated and are not willing to get vaccinated
Belgium	10-30%	-	10-30%
Czechia	10-30%	10-30%	10-30%
Estonia	10-30%	10-30%	10-30%
Germany [57]	<10%	<10%	<10%
Hungary	-	10-30%	-
Latvia[58]	<10%	<10%	10-30%
Luxembourg	-	10-30%	-
The Netherlands [59]	<10%*	<10%**	<10%**
Poland	-	-	31-60%
Portugal	<10%	<10%	-
Slovenia	-	-	31-60%
Spain	<10%	<10%	<10%
Norway	-	-	<10%
Sweden	<10%	<10%	<10%

*Research of the RIVM shows that ~1,3% is willing or has made an appointment for COVID19-vaccination.

** 90% willingness for uptake for first vaccination (this percentage includes both the people that have taken a vaccination or that are willing to take vaccination). 10% not yet vaccinated and part of this will be due to hesitance. This percentage is possibly underestimated.

Vaccine hesitancy in any specific population or age group and for any specific vaccines in particular

Several countries have observed that there is particular hesitancy towards the Vaxzevria vaccine (Austria, Belgium, Bulgaria, Croatia, Iceland, Lithuania, Malta, the Netherlands, Slovakia, Slovenia and Spain). In Belgium, there has been hesitancy due to misinformation about a link between vaccines and fertility issues in some cultural groups and among young people, and hesitancy with regards to viral-vector vaccines in older age groups in two of Belgium's three regions. In Finland, surveys show that 91–92% of the population would take or have taken the vaccine, however younger age groups are more critical towards vaccines than older age groups and 6–11% of those under 30 years are to some degree hesitant to get vaccinated. In Lithuania, there is a population group that strongly refuses to be vaccinated. Spain reported that in general, vaccine hesitancy is very low and coverage in age group over 40 years is greater than 90% and in age group 12-39 years around 80% (where more hesitancy is observed).

Challenges in increasing vaccine uptake in different population groups

Healthcare workers and LTCF facilities workers

The majority of countries who responded to this question reported that they are not facing challenges to increase uptake in HCW and workers in LTCF. Belgium reported challenges with increasing uptake in HCW and six countries reported challenges to increase uptake in both HCW and workers in LTCF (Austria, Bulgaria, Croatia, Czechia, Finland, Slovenia).

Table 13. Challenges with increasing vaccine uptake in HCW and/or workers in LTCF (n=21)

Facing challenges with increasing vaccine uptake in HCW and/or workers in LTCF	Countries
No challenges to increase uptake in these groups	Cyprus, Estonia, Germany, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Romania, Spain
Challenges to increase uptake in HCW	Belgium
Challenges to increase uptake in both HCW and workers in LTCF	Austria, Bulgaria, Croatia, Czechia, Finland Slovenia, Sweden

Some countries provided additional information: Croatia reported that mandatory COVID certificates for healthcare and LTCF workers have been introduced. In Finland, COVID-19 outbreaks in nursing homes have demonstrated occasionally low vaccination rates among workers and according to current legislation, employers do not have the right to obtain information of the COVID-19 vaccination status of their employees. However, there are no signs that the coverage among HCWs is lower than in the general public. Slovenia would like to further increase vaccination coverage in these settings by emphasising the importance of vaccination against COVID-19. In Austria they report that skepticism among long-term care facility workers is a problematic factor.

Elderly population

There are eight, out of 19 reporting countries, that report challenges to increase vaccine uptake in the elderly.

Table 14. Challenges with increasing vaccine uptake in the elderly population (n=21)

Challenges with increasing vaccine uptake in the elderly population	Countries
No challenges to increase vaccine uptake in the elderly population	Austria, Belgium, Croatia, Cyprus, Finland, Germany, Ireland, Luxembourg, Malta, Portugal, Romania, Spain, Sweden
Yes, facing challenges to increase vaccine uptake in the elderly population	Bulgaria, Czechia, Estonia, Hungary, Latvia, Lithuania, the Netherlands, Slovenia

Some details about measures put in place in countries were reported. In Bulgaria, mobile vaccination places for disabled people and old people have been set up countrywide. In Estonia, vaccination uptake for those over 80 years old is lower than in those aged 50-79 years. In order to mitigate these challenges in Estonia, general practitioners are using a more personal approach with those in the 80+ age group, including personal phone calls and consultations. In addition, a nation-wide vaccination campaign led by general practitioners started on 27 October 2021. In Hungary, there are several measures introduced to increase vaccine uptake in those 65+ including direct consultation possibilities by family doctors and newly-graduated young physicians in their homes, easing registration requirements prior to vaccination and administration of the vaccine at easy-to-reach sites or at home. In Latvia, support is provided for physicians to increase their competence in answering questions about vaccination, especially to address hesitancy among elderly persons who either want 'to wait' or want to get a consultation from their physician. There is also involvement of municipalities in the consultations and in organising the vaccination rollout. In Lithuania, financial incentives for individuals 75+ years have been introduced and there is also enhanced communication and mobile teams in place.

Young people

More than half of the 19 countries who responded to this question are having challenges with increasing vaccine uptake in young adults and adolescents.

Table 15. Challenges with increasing vaccine uptake in young adults and adolescents (approx. 12-35 years) (n=21)

Challenges with increasing vaccine uptake in the elderly population	Countries
No challenges to increase vaccine uptake in young adults and adolescents	Belgium, Bulgaria, Ireland, Malta, Portugal, Romania
Yes, facing challenges to increase vaccine uptake in young adults and adolescents	Austria, Croatia, Cyprus, Czechia, Estonia, Finland, Germany, Hungary, Latvia, Lithuania, Luxembourg, the Netherlands, Slovenia, Spain, Sweden

Austria reported that vaccination rates decrease in younger age groups and there is an ongoing public debate about the pros and cons of vaccinating children between the ages of 12 and 18. Targeted communication measures are being rolled out in order to enable both parents and young adults themselves to make informed choices. In Cyprus, they are having challenges of increasing uptake in the particular age group of 16-29 years. Estonia reported challenges related to vaccine hesitancy and a lack of understanding on why younger population have to be vaccinated. In addition, the younger population is mostly interested in vaccination with COVID-19 Vaccine Janssen as a one-dose vaccine. In Luxembourg, younger age groups seem to be more critical towards vaccination than older age groups. Slovenia report that young people are most concerned about the side effects of vaccination, the long-term impact of the vaccine on health and the safety of vaccines, leading to campaigns to inform the population about vaccines being intensified. In Sweden, a survey in September, before the start of vaccination for 12-15 years old showed high acceptance among guardians to vaccinate children aged 12-15 years.

Some measures countries have put in place to increase vaccination include media campaigns in Finland and increasing the possibility for people to be vaccinated, such as offering vaccination without a reservation. In Hungary the school vaccination campaign started before the new fall semester for children between 12-17 years. In Hungary, they have also started with specific communication adverts which are broadcasted widely in mass media with popular actors, sportspeople, celebrities, as well as known scientists. In Latvia they have started specific vaccination campaigns with the aim to increase vaccination uptake in the younger age groups and in Lithuania they have enhanced communication and have placed restrictions on unvaccinated individuals (such as mandatory testing) to try and increase vaccine uptake.

Socially vulnerable or underserved populations

Countries indicated the different socially vulnerable populations with whom they are facing challenges with increasing uptake or access to vaccines, with the majority facing challenges with increasing uptake in ethnic minorities. Some countries consider that there are challenges with access and uptake in all the below mentioned socially vulnerable groups, but this remains unquantified.

Table 16. Challenges with increasing vaccine uptake in socially vulnerable or underserved populations (n=15)

Main population groups facing challenges with increasing vaccine uptake	Countries
Ethnic minorities	Austria, Czechia, Finland, Hungary, Latvia, Malta, the Netherlands, Sweden
Irregular migrants	Austria, Malta, Sweden
People experiencing homelessness	Austria, Malta
People with alcohol or drug dependence	Austria, Malta
People with mobility issues	Austria, Latvia
Prison populations	Latvia
Low socio-economic strata	Austria, Latvia, Malta, the Netherlands, Sweden

Some countries provided further details: in Austria and Luxembourg in the course of the vaccination campaign rollout, a number of these groups were prioritised because of their vulnerability. Germany also reported that groups such as irregular migrants, people experiencing homelessness, people with (known) drug dependence issues, people with mobility issues, people with disabilities as well as prison populations have mostly been reached with vaccination. They are contacted via governmental or NGO groups or points of service. There is no specific data on LGBTI communities. Finland reported that based on vaccination register data there are observed differences in vaccine uptake based on mother tongue/country of birth and those who speak other than official languages/those not born in Finland have lower vaccine uptake compared to those speaking official languages/born in Finland (data on ethnicity per se is not registered in Finland). In Hungary there have been several actions taken to increase vaccine uptake in vulnerable and ethnic minority groups, such as installing mobile vaccination buses in rural areas (in disadvantaged regions). Poland reported that they do not have data available on this. Other groups that countries pointed out they are seeing challenges with increasing uptake include groups in the Netherlands with often a more general hesitance against government and governmental institutions; in Spain anti-vaccination groups and in Germany there is less than 10% of the population not willing to receive vaccination and who are not open to be persuaded.

Drivers of low vaccination

A few countries described some of the drivers of low vaccination acceptance and uptake in different population groups. Many countries mention issues around mistrust, misinformation and low perception of risk in young people as some of the main drivers of low vaccination in different population groups.

- In Austria, current research (Austrian Corona Panel Project, September 2021) shows that 34 percent are concerned about possible side effects; 21 percent carry the opinion that the certified vaccines are not safe; 44 percent did not feel sufficiently informed about the mode of action of the vaccines; 65 percent see vaccination as self-protection with only 51 percent assuming that this contributes to the protection of others.
- In Cyprus they observe that there is mistrust and a low perception of risk in younger age groups.
- Estonia reported that the main issues are related to vaccine hesitancy, mainly mistrust about vaccine safety. In addition, misinformation about vaccine efficacy and low risk perception are challenging.
- Hungary reported that they are unaware of any study conducted to reveal the drivers of low vaccination acceptance and uptake in the population or in any specific group of the population. However, based on their experience they assume that misinformation and low perception of the risk of infection could be key factors. Major access issues in vaccine availability have not been observed.
- In Latvia, for the elderly, minorities and low socioeconomic population groups in society, there is misinformation and mistrust about the safety of vaccines and a low perception of risk.
- Lithuania reported that according to empirical data, there is a distrust of COVID-19 vaccines and there are many rumours and false information spread on the internet. To try and counter this, vaccination promotion measures are being implemented, and the COVID-19 certificate is widely used in Lithuania.
- The Netherlands reported that some of the drivers of low vaccination acceptance and uptake in some groups is due to low perception of risk, doubt about long-term effects/side effects, trust in government in general, misinformation or not enough information.
- Spain reported a low perception of risk in young people, access issues in some socially vulnerable groups (such as seasonal agricultural workers) and mistrust in anti-vaccination groups.

- In Germany, according to the results from a survey on repeated cross-sectional monitoring of knowledge, risk perception, protective behaviour and trust during the current COVID-19 outbreak [57], people who hesitate to get vaccinated tend to rely on others, tend to look for a lot of information for and against the decision and weigh up the risks heavily. They also consider the vaccination to be a little less safe and have less of the feeling of being able to return to normal by vaccinating as well as being able to have more contacts or of making a contribution to combating the pandemic with the vaccination. People who completely refuse to get vaccinated (compared to vaccinated people) have stronger safety concerns and consider vaccination unnecessary as COVID-19 poses no threat to them. In contrast to other unvaccinated persons, practical barriers do not play a role. They have less of the feeling of being able to return to normal through vaccination and of being able to have more contact with others.
- Romania reported that they need to improve their communication and to make sure that all the information on COVID-19 vaccination is available to all population groups.
- In Slovenia there is distrust around vaccine safety and a low perception of risk of COVID-19 in young people.
- In Sweden low vaccination coverage is associated with age (fewer vaccinated amongst young adults), income and education (fewer vaccinated amongst those with low income and education), country of birth (fewer vaccinated amongst people born outside Sweden) and pregnancy (fewer vaccinated amongst pregnant women).
- Poland reported that there are no data available about this.

Strategies and measures in place for increasing vaccine uptake and acceptance

Countries are putting in place a number of strategies and measures to increase vaccine uptake and acceptance in certain population groups. The majority of countries are using mobile and pop-up vaccination teams and clinics, followed by targeted communication strategies, other outreach initiatives, and intersectoral partnerships for community-based interventions.

Table 17. Strategies and measures do you have in place or plan to put in place for increasing vaccine uptake and acceptance (n=23)

Strategies in place for increasing vaccine uptake and acceptance	Countries
Mobile and pop-up vaccination teams/clinics	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Finland, Germany, Iceland, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Portugal, Romania, Slovenia, Spain, Sweden
Targeted communication strategies	Austria, Belgium, Czechia, Estonia, Finland, Germany, Hungary, Latvia, Lithuania, the Netherlands, Poland, Portugal, Spain, Norway, Slovenia, Sweden
Outreach initiatives	Austria, Belgium, Cyprus, Czechia, Estonia, Finland, Germany, Iceland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Spain, Sweden
Intersectoral partnerships for community-based interventions	Austria, Bulgaria, Czechia, Finland, Germany, Latvia, Lithuania, Malta, the Netherlands, Poland, Portugal, Slovenia, Spain, Sweden
Community participation in service delivery	Austria, Czechia, Finland, Germany, Latvia, Lithuania, Malta, the Netherlands, Portugal, Slovenia, Spain, Sweden
Social media campaigns	Austria, Belgium, Croatia, Czechia, Estonia, Germany, Ireland, Latvia, Lithuania, Poland, Portugal, Romania, Slovenia, Sweden
Working with community or faith leaders	Belgium, Germany, The Netherlands, Portugal, Slovenia, Sweden
Incentive schemes (eg vouchers or lottery)	The Netherlands, Poland, Romania
Mandatory vaccination	Latvia

A few countries provided information on some of the specific strategies or good practices that they have found to be effective in increasing uptake in certain population groups.

- Cyprus reported that press-releases and communication from the Ministry of Health have helped as well as the introduction of the Mandatory Safe Pass (obtained from proof of completed vaccination or of previous infection or of negative PCR/RAT test) for all public places which has been an effective measure.
- In Hungary, mandatory vaccination for health care workers and other workers in the healthcare system has been introduced.
- Ireland reported social media campaigns as an effective strategy.
- Latvia reported that for increasing uptake in the elderly, collaboration with municipalities and social services, mobile and pop-up vaccination teams, motivational programme for physicians have all been effective measures. For increasing uptake in minority groups in Latvia they report that collaboration with media, newspapers and activities on social media have been effective.
- In Lithuania, a good practice has been implementing mobile vaccination teams to reach people.

- The Netherlands reported that vaccine ambassadors (key persons in specific communities), pop-up locations or locations where many people pass by (such as the railway) or where target groups are located (such as hospitals) or locations in regions where vaccine uptake is low, also recommendations from providers to vaccinate; vaccinations without appointments; campaigns focused on target groups (such as youngsters and pregnant women) have all been effective.
- Poland reported that communication campaigns in the media were implemented to increase vaccination acceptance and uptake in certain population groups.
- Romania reported that interest in vaccination increased for a short period of time after the adoption of the decree that all employees and users of services or activities (with a few exceptions) must meet the condition of being vaccinated, recovered from COVID-19 or have a negative test result for COVID-19.
- In Slovenia, they have observed that interest in vaccination has increased after the adoption of the decree that all employees and users of services or activities in Slovenia (with a few exceptions) must meet the condition of being vaccinated, recovered from COVID-19 or have negative test result for COVID-19.
- Spain reported that social institutions (such as NGOs etc.) participation in service delivery and outreach initiatives have been effective strategies to increase uptake.
- In Finland, measures are undertaken to improve vaccine uptake among persons of migrant origin by the Finnish Institute for Health and Welfare (THL) and the local authorities. There is emphasis on collaboration between health authorities and NGOs, as well as key community representatives/influencers. Community participation is carried out through these collaborations, e.g. through encouraging key representatives to raise the issue among the community, such as talks at the mosques, in social media, radio and TV in specific language groups.
- In Austria, target group-oriented communication plays a major role. In addition to the 'Austria vaccinates' campaign, which has a broad impact in informing the public and providing comprehensive information about vaccination options, the Ministry of Health focuses on specific stakeholder communication and knowledge transfer. In the course of a comprehensive stakeholder analysis, relevant groups were addressed individually and clustered according to their communication needs. Among others, senior citizens' associations, associations for the disabled, care and nursing institutions, family associations, associations/associations for work with children & youth, educators, cultural associations and associations for migrant target groups (Turkish, Romanian, BKS, ...), etc. The exchange with these is also important in order to ascertain additional information needs. Materials are prepared in the communication of the house according to the target group. In particular, great attention has been and will be paid to materials in different languages. The maxim is to communicate honestly, transparently, comprehensibly and as promptly as possible. For example, various videos have been produced by experts and the minister, which are spoken or subtitled in several languages. The multilingual vaccination appeal by Federal Minister Mückstein was a particularly great success [60]. To counter the flood of misinformation, the Ministry of Health continuously posts facts about corona vaccination on the website as well as the Ministry's social media channels. Likewise, folders and fact sheets on various topics have been created that can be forwarded or simply printed out and posted. In addition, there have been online Q&A sessions with experts from the Ministry of Health and continuous exchange with multipliers. In addition to active target-group-specific communication, individual inquiries from citizens are answered on an ongoing basis.
- In Sweden, actions are being taken in a variety of languages such as a national telephone line, fact sheets and films, as well as collaboration with the Agency for support to religious communities-SST to disseminate information and capture needs.

Monitoring the scale-up and impact of different strategies to increase vaccination uptake in different population groups

Some countries outlined how they assess the impact of the different strategies used to increase vaccination uptake. Eight countries conduct regular surveys on the willingness to be vaccinated in the population (Belgium, Estonia, Finland, Germany, Latvia, the Netherlands, Norway, and Spain). Austria and the Netherlands said that they monitor the effect that pop-up vaccination locations have on vaccine uptake. The majority of countries responded that they are regularly monitoring vaccination uptake in different population groups (Cyprus, Estonia, Finland, France, Hungary, Latvia, Liechtenstein, Lithuania, the Netherlands Portugal, Slovenia, Sweden, and Spain).

Limitations of the information collected in this report

The information presented in this report is not exhaustive. Some countries have not responded to the vaccine questions collected via the ISAA report, in addition there were different response rates from countries to the questions from week to week. Countries will continue to adapt strategies and plans as the rollout continues, and this report provides an overview of the progress at a particular time.

Conclusions

The COVID-19 vaccine rollout has continued to progress over the last months. As of 7 November 2021, the cumulative uptake of full vaccination reached 64.8% in the total population (range: 22.5-81.2%) and 76% among adults (range: 27-92.4%) (30 reporting countries) and 16 countries have already administered the full vaccination course to more than 80% of the population aged 60 years and above.

All 30 EU/EEA countries have opened vaccination to individuals 12-year-olds and over and all EU/EEA countries are recommending additional vaccine doses for immunocompromised individuals, and 28 countries are also recommended booster doses, in particular for residents of LTCF, older age groups and healthcare workers. These recommendations for booster doses will continue to be adapted as evidence evolves on duration of protection of the vaccines against different outcomes and against the Delta variant.

Although the uptake of full vaccination in the total population in the EU/EEA has substantially increased, there continues to be differences of vaccination uptake among countries and at subnational level, where pockets of geographic areas or population groups with low uptake persist, including in countries that have reached high levels of vaccination coverage overall.

Low vaccination uptake means that reaching all eligible people with a primary vaccination series is critical, especially in the older age groups and with the dominance of the Delta VOC and the associated increase of transmissibility and virulence. In addition, with the emerging evidence that vaccine effectiveness may decrease with time and that current vaccines may be less effective against the Delta VOC, consideration could also be given to provide vulnerable individuals with a booster dose [20]. Closing any COVID-19 vaccination gaps in vulnerable populations and healthcare workers before the winter months is also critical to mitigate the risks to healthcare systems, which may be impacted by influenza and other respiratory viruses, in addition to SARS-CoV-2, as the winter season approaches, posing the risk of further increasing the demand for care [55].

To increase vaccination coverage, it will be key to address inequalities in access to COVID-19 vaccination in different population groups. It is also important to understand the factors that determine low vaccine uptake in some population groups, including issues around vaccine acceptance and access so that targeted, context-specific and effective interventions can be developed. A number of countries reported challenges with reaching and increasing uptake in population groups such as the elderly, under-served/socially vulnerable individuals, young people, and in some cases healthcare workers and LTCF workers. Countries reported adopting a range of strategies to reach individuals and population groups with low vaccination uptake and have tried to adapt the different measures based on the drivers behind low uptake, such as access, misinformation, distrust, or a lack of clear and suitably adapted information. Some of these strategies included: mobile and pop-up vaccination teams/clinics; targeted communication strategies; outreach initiatives and intersectoral partnerships for community-based interventions. Some countries have also introduced incentives to be vaccinated, while others have mandatory vaccination for healthcare workers.

In order to expand the vaccine rollout, 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 gap persists. 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 – can be used as a framework for understanding these concerns and designing strategies to facilitate COVID-19 vaccination acceptance and uptake. The '5Cs' model is outlined in a recently published ECDC report on 'Facilitating COVID-19 vaccination acceptance and uptake in the EU/EEA' [61]. There is also a need to evaluate strategies on their effectiveness and to ensure enough flexibility to change course if it is found that a particular strategy is not working. The extent and characteristics of unvaccinated individuals will play a major role in the future dynamic of the pandemic and it should be monitored to inform vaccination strategies.

The rapid and effective administration of full vaccination is critical to reduce hospitalisations, deaths, and viral circulation in the community, as well as to protect against any emerging variants. Risk communication activities should clearly and consistently stress the important role that existing COVID-19 and influenza vaccines play in protecting people against severe disease. Messaging should also highlight the fact that although many countries have relaxed public health measures in recent months, maintaining hygiene measures and avoidance of unnecessary physical crowding remains prudent.

Contributing ECDC experts (in alphabetical order)

Silvia Funke, Nathalie Nicolay, Kate Olsson, Lucia Pastore Celentano, Giovanni Ravasi, Karin Wilbe-Ramsay.

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Disclaimer

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

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