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SURVEILLANCE & MONITORING

The State of Health of HPV vaccination programmes in the EU/EEA

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Abbreviations

EU/EEA	European Union/European Economic Area
HPV	Human papilloma virus
IQR	Inter-quartile range
WHO	World Health Organization

Executive summary

Launched by the European Commission in 2021, Europe's Beating Cancer Plan set the ambitious goal to eliminate cervical cancer as a public health challenge. It aims for 90% human papilloma virus (HPV) vaccination coverage among girls and significant increases in vaccination among boys, alongside strengthened screening programmes.

At the same time, the WHO European Regional 'Roadmap to Accelerate Cervical Cancer Elimination' aligned the region with the global 90/70/90 targets to be reached by 2030: 90% of girls fully vaccinated by the age of 15, 70% of women screened with a high-performance test, and 90% of women with cervical disease receiving appropriate treatment. Each country in Europe should meet the 90–70–90 targets by 2030 to be on track to eliminate cervical cancer within the next century. Cervical cancer elimination is defined as an incidence rate below 4/100 000.

The **EU Council Recommendation on vaccine preventable cancers**, adopted by the Ministries of Health in the EU in June 2024, and put forward by the European Commission as part of its Europe's Beat Cancer Plan, is a first-time document recognising the fundamental link between immunisation programmes and the prevention of certain types of cancers, urging EU Member States to expand HPV vaccination to all adolescent boys and girls and improving catch-up vaccination for adolescent and young adults who missed the vaccination by 2030.

This report monitors the policy objectives set out by the Council Recommendation on vaccine-preventable cancers. The Council Recommendation specifically calls on ECDC to play a key role in monitoring the performance of HPV vaccination programmes in the EU, and to develop an EU vaccination coverage dashboard to closely track Member State progress towards the political goals of achieving a **90% vaccination coverage target for girls in eligible cohorts** to accelerate progress towards cervical cancer elimination, and **to significantly increase the vaccination of boys**.

Taking stock of the vast experience European countries and other countries around the world have in implementing life-saving HPV vaccinations, the main goals of this report are to:

- Describe the performance of HPV vaccination programmes in the EU/EEA;
- Synthetise available evidence to inform policy actions to further strengthen HPV vaccination programmes in EU/EEA countries.

This report accompanies the first release of the above-mentioned dashboard.

While the report is primarily descriptive in nature, the overview of the 'state of health' of HPV vaccination programmes in the EU/EEA should also be used to inform policy by vaccination programme managers and officers in national Ministries of Health. The report also provides key public health recommendations and actions on how to design or strengthen effective HPV vaccination programmes.

Data presented in this report derive from different sources: cancer data from the Global Cancer Observatory, an ECDC developed survey disseminated to ECDC National Focal Points for vaccine-preventable diseases and complemented by a desk review when relevant, vaccination coverage data available through the Immunisation Data Portal (WHO) as well as rapid reviews of literature for selected topics.

Key findings

HPV infection causes approximately 5% of all cancers worldwide, including cervical cancer, other anogenital cancers, and head and neck cancers. In the EU/EEA, in 2022, cervical cancer was the 14th most common cancer in women of all ages and the fourth most common cancer in women aged 15-44. It was also the second most common cause of cancer death in women aged 15-44 in 2022. In men, the most frequent cancers related to HPV were head and neck cancers, followed by ano-genital cancers. The most recent available data (2022) indicate that no country in the EU/EEA has met the elimination target defined by WHO for cervical cancer (incidence < 4 per 100 000).

Available reviewed evidence indicates that the introduction of HPV vaccination in the EU/EEA has led to significant changes in the prevalence of HPV infections and HPV-related diseases. Observed trends show reductions in HPV types, genital warts, cervical pre-cancers, and early indications of lower cervical cancer rates in vaccinated populations. Additional available evidence indicates that HPV vaccination not only protects individuals who are vaccinated, but also contributes to population immunity by reducing the overall circulation of the virus in the population.

As of 2026 and since 2025, all EU/EEA countries recommend HPV vaccination for both adolescent girls and boys as part of their vaccination programmes for this group. Recommendations on the age of primary vaccination varies between nine and 13 years of age. The 9-valent product is the exclusively recommended product in 23 countries. There are variations in the way the programmes are implemented, such as the age of the cohort targeted (single versus multiple age cohort), delivery mode of the vaccine (school versus other channels), invitation reminders in

place and the need or not for parental consent. A total of three countries in the EU/EEA have implemented a one-dose HPV schedule in primary programmes.

Three EU/EEA countries meet the objective of the Council Recommendation of a 90% vaccination coverage target for girls by the age of 15, and an additional five countries reached high coverage (>90%) for some of the indicators in certain years between 2020-24. The vaccination of boys remains low overall. Coverage trends in girls are steady overall but worryingly declining in a few countries, with some exceptions. Generally, programmes delivered through school were reported as having a higher level of uptake in both girls and boys. Furthermore, although recommendations and catch-up programmes are in place in most EU/EEA countries, little data on performance are routinely collected and available to assess the success of these investments; in addition, some of these cohorts may not have publicly funded catch-up options, reintroducing cost barriers and reducing overall protection.

Available reviewed evidence indicates that suboptimal HPV vaccine uptake and programme and health-system design factors can be equally important or more influential than levels of vaccine acceptance or parental refusal in reaching high levels of HPV vaccination coverage, and more research is needed in this regard.

A variety of factors related to people's attitudes, knowledge and perceptions of the HPV vaccine have an impact in the acceptance and uptake of the vaccination, as reported in numerous studies. These factors can vary across countries and specific population groups. Furthermore, due to the specific target groups of this vaccine, some of these factors can differ from those affecting the uptake of other vaccines. The negative effects of circulating misinformation around the HPV vaccine on vaccination acceptance have also been highlighted in studies.

Recommendations

Considering the findings in this report, ECDC recommends Member States prioritise the following key public actions to strengthen HPV vaccination programmes:

- **Enhance the surveillance of HPV-related cancers** and other clinical outcomes through digital, population-based systems, enabling monitoring of incidence, mortality and integration of data from screening. This action is critical to support progress towards cervical cancer elimination goals, while strengthening prevention and control efforts in the EU/EEA and monitoring the impact of vaccination programmes.
- **Invest in advancing immunisation information systems**, in order to:
  - Effectively monitor HPV vaccination programmes performance, including linking vaccination data to screening and cancer registries.
  - Identify people who are not vaccinated and facilitate opportunities for catch-up vaccination
  - Assess the equity of the programme including geographical and sociodemographic inequities.
- **Ensure the highest possible level of uptake through the primary target programme** for girls and boys; evidence clearly demonstrates that catch-up programmes are much more difficult to implement and monitor, and, though complementary, unlikely to achieve the same level of success as the main programme in the target age group.
- **Consider simplifying vaccine schedules**; a single dose schedule could substantially increase uptake and accelerate progress towards the 90% coverage target and cervical cancer elimination. This requires concerted action across regulators, industry and public health stakeholders to develop adequate pathways while carefully weighing the scientific evidence available, and closely monitoring effectiveness and impact over time.
- Rollout **effective school-based programmes**, based on the experience of several EU Member States, and internationally, regarding its positive outcomes. Such programmes must be well-resourced and carefully designed considering lessons learnt and challenges to ensure that they are well-placed to deliver within local settings.
- Design **health system-based approaches to increase uptake and improve programme delivery**; in particular, promote the integration of HPV vaccination within broader adolescent health programmes, and **include HPV vaccination within health service delivery and quality performance frameworks** as part of value- and outcome-based health systems, especially at primary care level.
- Ensure **data provision and availability** (including, as relevant, public display) of HPV vaccination coverage rates **at the very local level, such as public health units, GP catchment areas, or schools**; The design of effective data feedback and loop systems can effectively guide professionals to drive uptake as well as inform healthcare systems managers and quality improvement leaders on efficiencies that may be needed to achieve the necessary vaccination coverage targets.
- **Strengthen efforts to increase vaccination acceptance**, through diagnosing locally-relevant barriers and facilitators to develop tailored strategies, and by implementing multicomponent strategies, including evidence-based communication, strong community engagement and educational campaigns to address misinformation.

Conclusion

Achieving high HPV vaccination coverage in girls and increasing vaccination coverage in boys by 2030 is challenging. Evidence-based single-dose schedules might offer the potential to boost uptake but requires careful assessment and investment in follow-up monitoring.

Sustained political commitment and funding to strengthen delivery, monitor performance, and target under-immunised populations remains the single most important determinant of reaching and maintaining the high coverage needed for cervical cancer elimination.

Background and context

The Europe's Beating Cancer Plan launched by the European Commission in 2021 set the ambitious goal to eliminate cervical cancer as a public health challenge, aiming **for 90% HPV vaccination coverage among girls and significant increases in vaccination among boys**, alongside strengthened screening programmes [5].

At the same time, the WHO European Regional Roadmap to Accelerate Cervical Cancer Elimination aligned the region with the global 90–70–90 targets to be met by 2030: 90% of girls fully vaccinated by age 15, 70% of women screened with a high-performance test, and 90% of women with cervical disease receiving appropriate treatment [6]. Each country in Europe should meet the 90–70–90 targets by 2030 to be on track to eliminate cervical cancer within the next century. Cervical cancer elimination is defined as an incidence rate below 4/100 000 [6].

European policy frameworks have increasingly prioritised cervical cancer elimination, setting key milestones and targets to encourage countries to maximise the significant potential of effective and comprehensive HPV prevention policies.

In particular, the 2024 EU Council Recommendation on vaccine-preventable cancers, which is a first-time document recognising the fundamental link between critical vaccination programmes and the prevention of certain types of cancers, urged EU Member States to expand HPV vaccination to all adolescent boys and girls, and improve catch-up vaccination for adolescent and young adults who missed the vaccination 2030 [7].

Together, these initiatives reflect a coordinated and strong European commitment to reducing cervical cancer incidence and mortality and other forms of cancers known to be associated with persistent HPV infections. By combining high HPV vaccination coverage with accessible, high-quality screening and timely treatment, cervical cancer can move from a major public health burden to a largely preventable disease.

Aims and objectives of this report

The goals of this report are to:

- Describe the performance of HPV vaccination programmes in the EU/EEA;
- Synthetise available evidence to inform policy actions to further strengthen HPV vaccination programmes in EU/EEA countries.

The specific objectives of this report are:

- To describe the epidemiology of cancers associated with HPV in the EU/EEA;
- To describe the characteristics and performance of HPV vaccination programmes in primary target and catch-up groups;
- To describe the progress of EU/EEA countries towards the objectives set out on in the Council Recommendation;
- To suggest further actions that could be implemented to enhance HPV vaccination programmes across the EU/EEA.

Methods and sources of data

Surveillance data on HPV related cancer

Epidemiological data on HPV-related cancer incidence and mortality (age-standardised rates per 100 000 population) for EU/EEA countries for the most recent year available (2022) was retrieved from the Global Cancer Observatory[8]. Detailed information on definitions, data and methods by country are provided on their website [9,10].

HPV vaccination policies and programme implementation

Information on routine HPV vaccination policies and primary vaccination programmes was collected by ECDC in a survey to ECDC National Focal Points for vaccine-preventable diseases, conducted in April 2025. The objective of the survey was to collect information on catch-up vaccination programmes in adolescents/adults, regardless of specific risk groups, as well as what vaccine delivery mechanisms are in place in the EU/EEA.

All countries except Czechia and Latvia replied to the survey and relevant information for these two countries was extracted from the ECDC vaccine scheduler [11] and updated with the latest information available on the official national immunisation websites [12,13].

HPV vaccination coverage data

HPV vaccination coverage data presented in this report derive from the HPV vaccination coverage estimates available on the WHO Immunisation Data Portal and estimated from the administrative and/or survey data reported by countries to WHO through the WHO/UNICEF electronic Joint Reporting Form each year [14] . The indicator used throughout the report is the 'HPV vaccination coverage by age 15', (first or last dose). In some instances, including for Austria, Croatia, France, Lithuania, the estimate may differ from administrative or official coverage reported by countries, or may be present where administrative or official coverage are absent.

The **'HPV vaccination coverage by age 15'** represents the proportion of the population turning 15 in the reporting year who have been vaccinated against HPV at any time between the ages of nine and 14, at any time up to the calendar year in question. This indicator is highly dependent on the consistency and quality of reporting from the previous five years, since the number of doses administered to a specific birth cohort may accumulate over time. This indicator allows the assessment of the population protection level by age 15 through a standardised cohort-based measure, independent of vaccination strategy/age of primary vaccination, and in theory may allow for a better comparison of vaccine coverage trends over time and across countries [15,16]. **This is the indicator that is used to monitor the progress towards cervical cancer elimination targets and in particular, the target of vaccination coverage**. The estimates referring to this indicator are used for the main analysis presented in this report for the period 2020-24, including for benchmarking against the objectives of the Council Recommendation of vaccination coverage of 90% (HPV vaccination coverage by age 15, last dose).

In this report, the '**drop out**' between the first and last dose value is calculated as the difference between the value of the last dose and the first dose for any of the indicators, and is used as a proxy for individuals who were unable to complete the full course of vaccination.

Burden of HPV infections and HPV-related cancers in the EU/EEA

- HPV infection causes approximately 5% of all cancers worldwide including cervical cancer, other anogenital cancers and head and neck cancers.
- In the EU/EEA, in 2022, cervical cancer was the 14th most common cancer in women of all ages and the fourth most common cancer in women aged 15-44. It was also the second most common cause of cancer death in women aged 15-44 in 2022.
- In men, the most frequent cancers related to HPV were head and neck cancers, followed by ano-genital cancers
- The most recent available data (2022) indicate that no country in the EU/EEA met the elimination target defined by WHO for cervical cancer (incidence < 4 per 100 000).

HPV infection

HPV is one of the most widespread and common sexually transmitted infections worldwide that will affect nearly all sexually active people, usually without symptoms. In most cases the immune system clears HPV from the body. However, persistent infection with carcinogenic HPV types, also known as high-risk HPV types, may lead to precancerous lesions and cancer. The progression from HPV infection to the development of cervical cancer usually takes about 15 to 25 years [17,18].

Out of the more than 200 HPV types identified, only a few are classified as carcinogenic, namely HPV types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58 and 59 [19]. Among high risk HPV types, HPV16 and HPV18 stand out for their highest carcinogenic capacity [20,21]. HPV16, the most carcinogenic type, is consistently the most frequent type detected in HPV-related cancers both in Europe and worldwide [22]. Low-risk HPV types 6 and 11 are associated with anogenital warts (condyloma acuminata) and recurrent respiratory papillomatosis [23,24].

HPV infection causes approximately 5% of all cancers worldwide [25]. Cervical cancer cases account for the majority of the HPV attributable cancer burden, but HPV is a relevant factor of other anogenital cancers (anal cancer, vulvar cancer, vaginal cancer, penile cancer) and of head and neck cancers (oropharyngeal cancer, oral cavity cancer, laryngeal cancer) [26].

Around 90% of the cancer cases attributable to HPV occur in females, the attributable fractions for cancer of the vulva and penis are lower (≤50%) owing to the coexistence of histopathological diagnoses unrelated to HPV [27]. The two primary oncogenic types, HPV 16 and 18, are responsible for 71% of cervical cancers, and HPV 31, 33, 45, 52 and 58 together account for 18% of cervical cancers. Moreover, virtually all genital warts are due to HPV, contributing to the large burden of HPV-related disease in both sexes [19].

Burden of cervical cancer in the EU/EEA

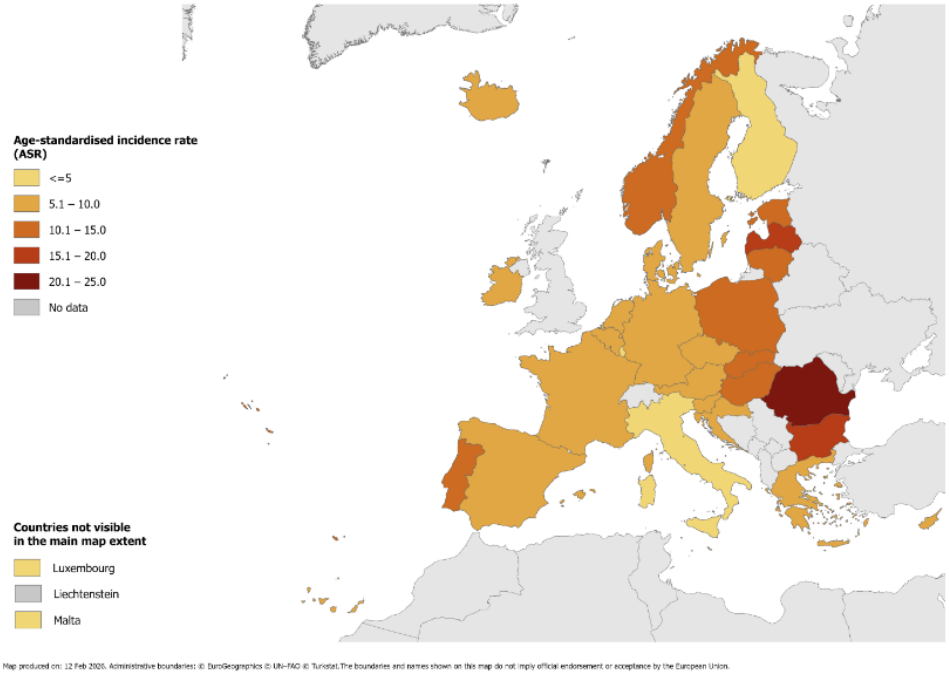
According to latest data available from 2022, cervical cancer was the 14th most common cancer in all women in the EU/EEA, with 28 619 cases reported, and the fourth most common cancer after breast cancer, thyroid cancer and melanoma to affect women aged 15–44 years (7 428 cases). In 2022, 13 754 women died of cervical cancer in the EU/EEA, accounting for the 12th highest cancer mortality. In women aged 15–44 years, it was the second most common cause of cancer death with 1 218 cases in 2022. In comparison, in 2018, the number of cervical cancer cases in all women in the EU (including UK) was 32 675, with a little variation over the most recent five-year period 2018-2022 for which these data are available [28].

Estimates from 2021 indicate that cervical cancer accounted for 9.91 million (9.08–10.8) disability-adjusted life-years (DALYs) globally in females [29]. The age-standardised DALY rate per 100 000 in females was 226.3 (95% uncertainty intervals: 207.1-246.3) globally [29].

In females in the EU in 2022 [30]:

- Cervical cancer incidence (age–standardised rate per 100 000) ranged from 4.2 in Malta (13 cases) to 21.7 in Romania (3 368 cases) (Figure 1, Annex 1). The lowest number of cases was reported in Malta (13 cases) compared to the highest number of cases in Germany (4 544 cases).
- Cervical cancer mortality (age-standardised rate per 100 000) ranged from 1.3 in Finland (65 deaths) to 9.3 in Romania (1 793 deaths). The lowest number of deaths were reported in Malta (six deaths) compared to the highest number of deaths in Poland (2 188 deaths) (Annex 1).

Figure 1. Incidence of cervical cancer, EU/EEA, 2022



Data source: Global Cancer Observatory [30]

Burden of other cancers associated with HPV in the EU/EEA

HPV is a relevant - but not the only - factor of other anogenital cancers (anal cancer, vulvar cancer, vaginal cancer, penile cancer) and of head and neck cancers (oropharyngeal cancer, oral cavity cancer, laryngeal cancer). Higher number of cases and incidences are observed for head and neck cancers, followed by anogenital cancers. In particular, in the EU/EEA, in 2022:

- A total of 85 443 head and neck cancer cases were reported in both sexes (: 39 891; larynx: 25 813; oropharynx: 19 739). Out of these, 74% (n=63 643) were reported in men and 26% (n=21 800) were reported in women, respectively[26]. However, only a fraction of head and neck cancer cases are attributable to HPV. In Europe, around 40% of oropharyngeal cancers are attributable to HPV, while about 4% of both cancer of the oral cavity and of the larynx are attributable to HPV [31].
- A total of 29 638 anogenital cancers other than cervical cancer were reported in both sexes. These included 12 812 vulva cancer cases, 10 008 anal cancer cases (men: n=4 082, women: n=5 926), 2 123 vaginal cancer cases, and 4 695 penile cancer cases.
- 25 928 individuals died of head and neck cancer (lip/oral cancer: 14 027; larynx: 11 429; oropharynx: 8 472) and 2 989 individuals died of anal cancer. 4 504 females died of vulva cancer, 847 females died of vaginal cancer and 1 360 males died of penile cancer.

In the EU/EEA in 2022 [30], the incidence (age-standardised rate per 100 000) was: Lip/oral cancer: 4.1, Larynx cancer: 2.7, Vulva cancer: 1.9, Oropharynx cancer: 2.3, Penile cancer: 0.92, [i]1.1, Vaginal cancer: 0.34. The mortality (age-standardised rate per 100 000) was Lip/oral cancer: 1.3, Larynx cancer: 1.1, Vulva cancer: 0.5, Oropharynx cancer: 0.91, Anal cancer: 0.[ii], Penile cancer: 0.24, Vaginal cancer: 0.

[i] Data for anal cancer only available at EU level (27 countries).

[ii] Ibid.

HPV vaccines and historical developments

In the EU/EEA, three vaccines—bivalent (Cervarix [1]), quadrivalent (Gardasil [2]) and nonavalent (Gardasil 9 [3])—are approved, all covering HPV 16 and 18, the types with the strongest carcinogenic capacity.

Cervarix and Gardasil were initially authorised for girls only, with a three-dosing schedule.

As of today, all vaccines authorised in the EU are authorised for boys and girls from nine years of age, with a dosing schedule of two to three doses depending on age. There is growing evidence showing long-term effectiveness of one-dose regimens. Several national and global policy are moving to one-dose recommendations in the younger age groups [4].

HPV vaccination offers strong, long-lasting protection against the high-risk HPV types responsible for the majority of cervical cancers.

In the EU/EEA, three vaccines—bivalent (Cervarix [1]) , quadrivalent (Gardasil [2]) and nonavalent (Gardasil 9 [3])—are approved, all covering HPV 16 and 18, with the nonavalent vaccine providing broader protection against five additional oncogenic types (Annex 2). Today the vaccines are authorised for boys and girls with a dosing schedule of two to three doses depending on age.

In the initial European Medicines Agency (EMA) summary of product characteristics, the first HPV vaccines were recommended with a three-dose schedule administered over six months for females 9-16 years (Gardasil) and 9-25 years (Cervarix). A few years later, based on relevant evidence, EMA licenced Gardasil for use in males 9-26 years and extended the use for females up to 26 years.

With the increasing evidence of the comparable effectiveness and protection of a reduced two-dose schedule in younger adolescents, Cervarix and Gardasil received new marketing authorisation at the beginning of 2014 for a two-dose schedule use instead of the previous three-dose [1,2], with three doses continuing to be recommended for immunocompromised individuals and older individuals.

In more recent years there has been increasing evidence of comparable protection provided from one dose of HPV vaccine. In April 2022, WHO SAGE concluded that a single dose of HPV vaccine delivers comparable protection to two-dose schedules in immunocompetent people [32]. WHO also updated a position paper on HPV vaccination schedules recommending that a single-dose schedule can be used in those aged between nine to 20 years [4]. Some countries outside the EU/EEA have already started recommending a single-dose schedule to young people, including Australia in 2023 [33] and the UK in 2022 [34].

A growing body of research has evaluated the outcomes of single-dose HPV vaccination compared with two- or three-dose schedules. Key findings providing evidence for one-dose HPV vaccination compared to two-dose or three-dose schedules are provided in Annex 3.

Numerous clinical trials and real-world observational studies have demonstrated the strong effectiveness and impact that HPV vaccination has had on preventing HPV infection, genital warts and high-grade cervical lesions (CIN2+ and CIN3+). Since 2020, newer impact studies including from the EU (Annex 4) have shown HPV vaccination is associated with a substantially reduced risk of invasive cervical cancer, and with greater risk reduction associated with vaccination at a younger age [35-41].

HPV vaccination policies and programmes

HPV vaccination policies have significantly evolved over time. Since 2025, all EU/EEA countries have a gender-neutral nationally funded vaccination programme in place. Recommendations and programmes are available both for the primary HPV vaccination programmes as well as for catch-up programmes, although for the latter, not all countries offer them as fully funded. The mode of delivery of the programmes is school based in approximately half of the countries. A full description of the primary and catch-up vaccination programmes by country is presented in Annex 5 and 6 for 2025; when updates related to 2026 or later after the ECDC survey (April 2025) were reported, these are included as footnotes.

Main features of HPV vaccination programmes in primary target groups, 2025

All EU/EEA countries had a fully funded gender-neutral HPV vaccination programme in place.

- Year of HPV vaccine introduction:
  - Girls: between 2007 (France, Germany, Italy, Luxembourg, Spain) and 2023 (Poland).
  - Boys: between 2014 (Austria) and 2025 (Bulgaria).
- Lower age limit of primary vaccination recommendation ranged between nine to 13 years-old.
  - nine-years-old in Austria, Germany, Greece, Luxembourg, the Netherlands and Poland.
  - 13-years-old in Croatia (with possibility from nine years-old)
- A single HPV vaccine dose for the primary programme was recommended in Estonia, Ireland, Spain.
- The nine-valent product was recommended in Austria, Belgium, Bulgaria, Croatia, Cyprus, Denmark, Estonia, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Liechtenstein, Lithuania, Luxembourg, Malta, Portugal, Romania, Slovakia, Slovenia, Sweden, on top of the bivalent and/or the quadrivalent in Czechia, Germany, Poland, and Spain (n=26)

Characteristics of HPV vaccination programme implementation in primary target group, EU/EEA, 2025:

- Country programmes which targeted a single age cohort: Croatia, Denmark, Hungary, Iceland, Lithuania, Malta, Norway, Portugal, Slovakia and Spain (n=10).
- School-based delivery in Belgium, Croatia, Estonia, Finland, France, Hungary, Iceland, Ireland, Latvia, Norway, Poland, Slovenia, Spain and Sweden (n=14) whereas in Slovenia, teachers take children to health centres for vaccination.
- Croatia, Finland, Hungary, Ireland, Norway and Slovenia and Sweden (n=7) had a single delivery channel through schools only.
- Invitation reminder(s) in place in Belgium, Croatia, Cyprus, Denmark, Estonia, Finland, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, the Netherlands, Norway, Portugal, Spain and Sweden (n=17).
- No written parental consent needed in Croatia, Cyprus, Denmark, Finland, Greece, Iceland, Liechtenstein, Luxembourg, Poland, Portugal, Romania and Spain (n=12).

HPV vaccination recommandations in catch up groups, EU/EEA, 2025

HPV vaccination recommendations in catch-up groups, EU/EEA, 2025:

- All EU/EEA countries had catch-up HPV vaccination programmes, except Hungary; Malta, Romania and Spain had a catch-up programme only for girls.
- Catch-up programmes were fully funded in all countries except in Belgium, France, Lithuania and Romania where it was partially funded; and Bulgaria and Ireland where it was not funded.
- The same vaccine product(s) were recommended as for programmes in primary target groups.
- Various total number of HPV vaccine doses were recommended: from one dose in Estonia (15-18 years-old), Ireland (nine–24 years-old) and Spain (13-18 years-old) to up to three doses in Austria, Belgium, Croatia, Cyprus, Denmark, Finland, France, Germany, Liechtenstein, Lithuania, Malta, Norway, Poland, Portugal, Romania, Slovenia, and some regions in Sweden.

Characteristics of HPV vaccination programme implementation in catch-up groups, EU/EEA, 2025:

- The upper age limit for catch-up vaccination programmes ranged between 17 to 45-year-old. Where implemented, the catch-up programmes targeted the same age groups in boys and girls with the exception of Italy and Lithuania. Italy had a catch-up programme up to 26 years-old in girls and to 18 years in boys, while Lithuania had a catch-up programme up to 17 years-old in girls and in 12-13 years-old in boys.
- The catch-up programmes were school based in Belgium, Croatia, Estonia, Finland and Norway.
- Invitation reminder(s) are in place in Denmark, Estonia, Italy (in female aged 25-26 years-old with the screening invitation), the Netherlands, Norway, Portugal, Spain and Sweden.

HPV vaccination

Main features of systems to monitor HPV vaccination coverage at country level

Systems to monitor HPV vaccination coverage:

- Different systems were in place to monitor HPV vaccination coverage:
  - Immunisation information systems: Austria, Bulgaria, Croatia, Cyprus, Denmark, Estonia, Finland, Iceland, Ireland, Italy, Lithuania, Malta, Netherlands, Norway, Portugal, Romania, Slovenia, Spain, Sweden (n=19).
  - Information immunisation systems coupled with reimbursement databases: Poland (n=1).
  - Reimbursement databases only: France, Germany, Liechtenstein (n=3).
  - Surveys or other methods Belgium, Greece, Hungary, Luxembourg, Slovakia (n=5).

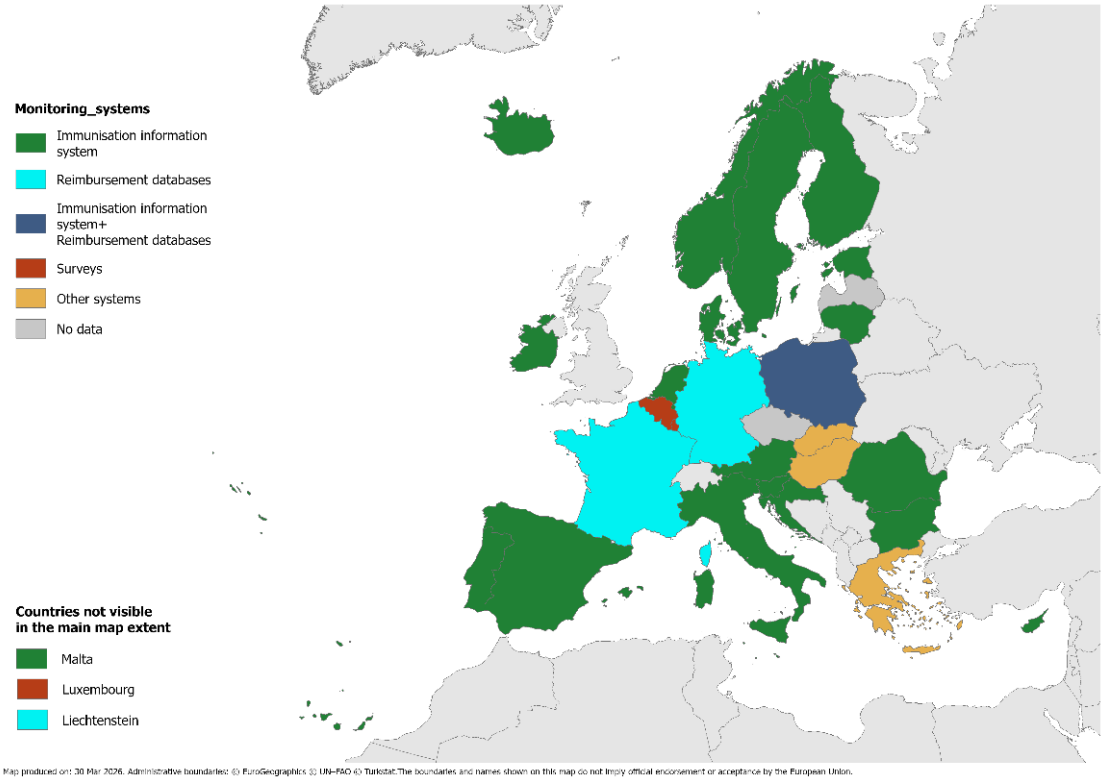
Availability of age cohort estimates in primary target groups:

- Countries having age-cohort vaccination coverage estimates with estimates prospectively updated: Austria, Denmark, Estonia, Finland, Germany, Iceland, Ireland, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Slovakia, and Sweden (n=15).
- Countries with age-cohort vaccination coverage estimates with estimates not prospectively updated (transversal estimates): Cyprus, France, Greece, Hungary, Malta, Romania, Slovenia and Spain (=8).
- Countries not able to provide age cohort specific vaccination coverage estimates Belgium, Bulgaria, Croatia, Liechtenstein, Luxembourg (n=5).

Availability of age-cohort estimates in catch-up groups:

- Countries having age-cohort vaccination coverage estimates with estimates prospectively updated, including for catch up groups: Austria, Denmark, Estonia, Finland, Germany, Iceland, Ireland, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Slovakia, and Sweden (n=15).

Figure 2. Overview of monitoring systems for HPV vaccination coverage in the EU/EEA, 2025



Source: ECDC survey, April 2025

All responding EU/EEA countries reported various systems for the monitoring of HPV vaccination coverage (Figure 2). Austria, Denmark, Estonia, Finland, Iceland, Ireland, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Slovenia and Sweden reporting having immunisation information systems in place that allowed HPV vaccination coverage estimates for the first and last HPV vaccine doses for each single age cohort in both primary and catch-up target groups (up to 18-year-old in Sweden). These estimates may be revised every year for each cohort. Although the system in Germany was the national reimbursement database and another type of database in Slovakia, they featured the same property as the above immunisation information system with estimates available by single age cohort in primary and catch-up groups prospectively updated.

The immunisation information systems in place in Cyprus, Malta, Romania, and Spain can provide estimates for each single age cohort, but these estimates cannot not be prospectively updated, and no estimates can be extracted in the catch-up group from their system. Greece reported using an electronic prescription system that allowed the production of single age cohort estimates in primary and catch-up groups, although the system did not allow to prospectively update the coverage estimates. France reported using their national reimbursement database for the routine production of vaccination coverage estimates at 12, 15 and 16-year-olds although coverage estimates are not prospectively updated. The system monitored vaccination coverage in catch-up programmes although this monitoring was not performed on a routine basis. Hungary was using other types of registries that allowed the production of single age cohort estimates in primary target groups but not in catch-up groups.

Bulgaria and in Croatia reported having an immunisation information system, however aggregated number of doses administered were used in the numerator of the vaccination coverage. Estimates could not be provided by single age cohort nor in catch-up groups.

Surveys in place in Belgium and in Luxembourg, as well as reimbursement database in Liechtenstein, did not allow vaccination coverage to be monitored by single age cohort. No indicator was available in catch-up groups in these three countries.

HPV vaccination coverage rates by age 15 in girls

Progress toward the objectives of the EU Council Recommendation

Countries that reached ≥90% vaccination coverage by the age of 15 in 2024:

- First dose: Denmark, Iceland, Malta, Norway, Portugal, Spain, Sweden (n=7, four EU countries).
- Last dose (target indicator): Iceland, Norway and Portugal (n=3, one EU country).
- During 2020-2024, Portugal was the only country that consistently reached 90% for first dose and last dose of HPV vaccine.

The number of countries that reached 90% coverage target remained stable since 2021, with the same countries reaching the target in 2024.

In 2024, the median level of vaccination coverage in the EU/EEA was:

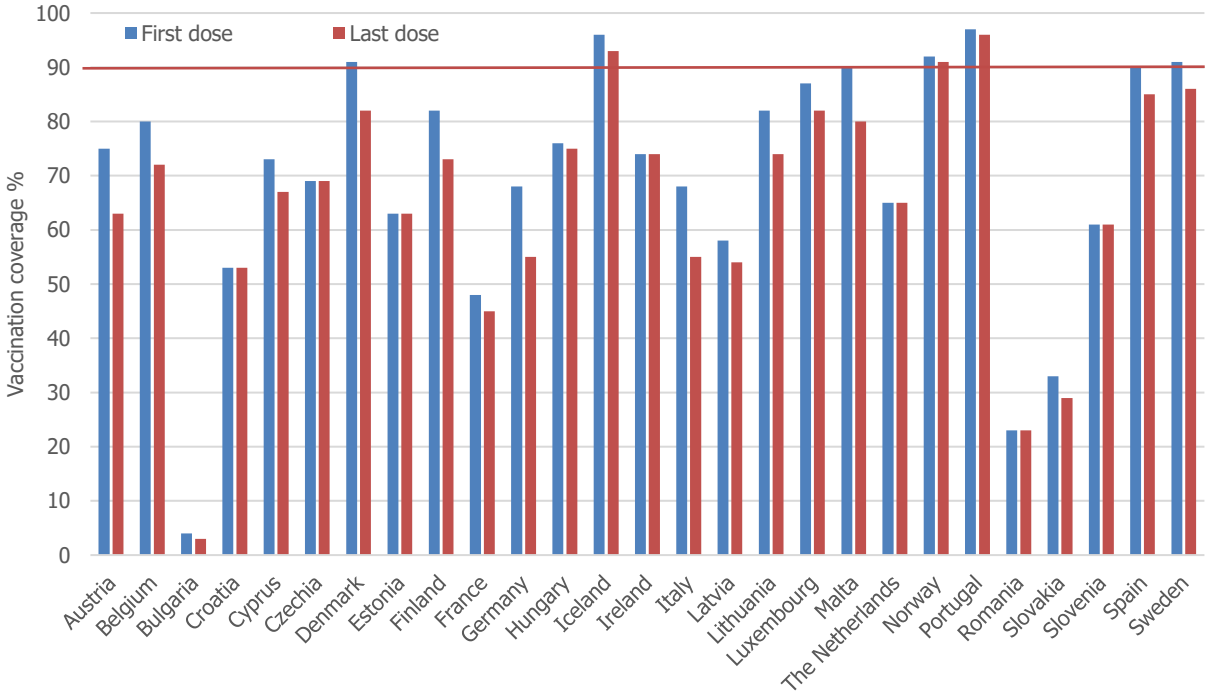
- First dose: 74% (interquartile 25-75% (IQR 25-75%): 61-90%.
- Last dose: 69% (IQR 25-75%: 55-82%).

The median drop out value between the first and last dose during 2020-2024 was 5%

Regarding the indicators of the HPV vaccination coverage for the last dose and the objective set by the Council Recommendation of 90%, three countries met the target (Iceland, Norway and Portugal) in 2024 (Figure 3, Annex 7), and all from 2021 onwards (Figure 4, Annex 5).

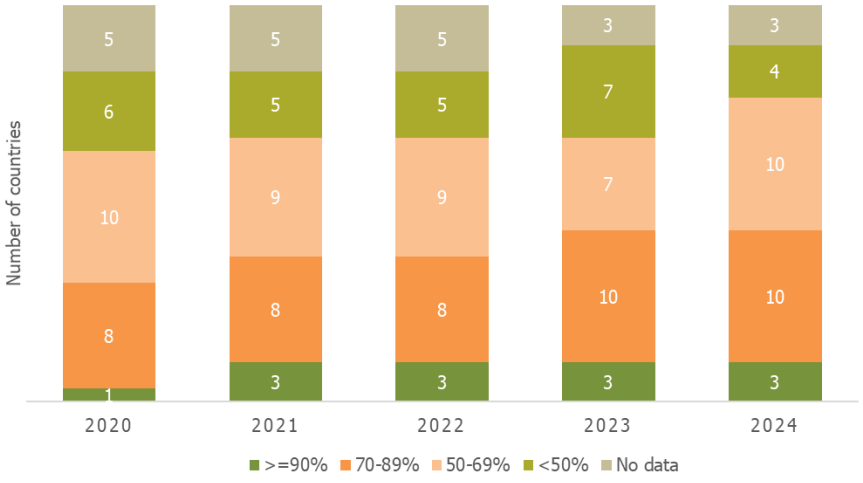
In 2024 (Figure 3, Annex 7), a total of 10 countries had coverage between 70%-89% for the last dose (Belgium, Denmark, Finland, Hungary, Ireland, Lithuania, Luxembourg, Malta, Spain, Sweden), similarly to 2023 and slightly higher than in 2020-2022; 10 countries had coverage between 50%-69% (Austria, Croatia, Cyprus, Czechia, Estonia, Germany, Italy, Latvia, Netherlands, Slovenia) and four below 50% (Bulgaria, France, Romania and Slovakia) compared to four in 2023 (Annex 7).

Figure 3. HPV vaccination coverage (%) by age 15 in girls, first and last dose, EU/EEA, 2024



Source: World Health organization (WHO) immunization data portal [14]. Indicator 'HPV Vaccination coverage by age 15, females'

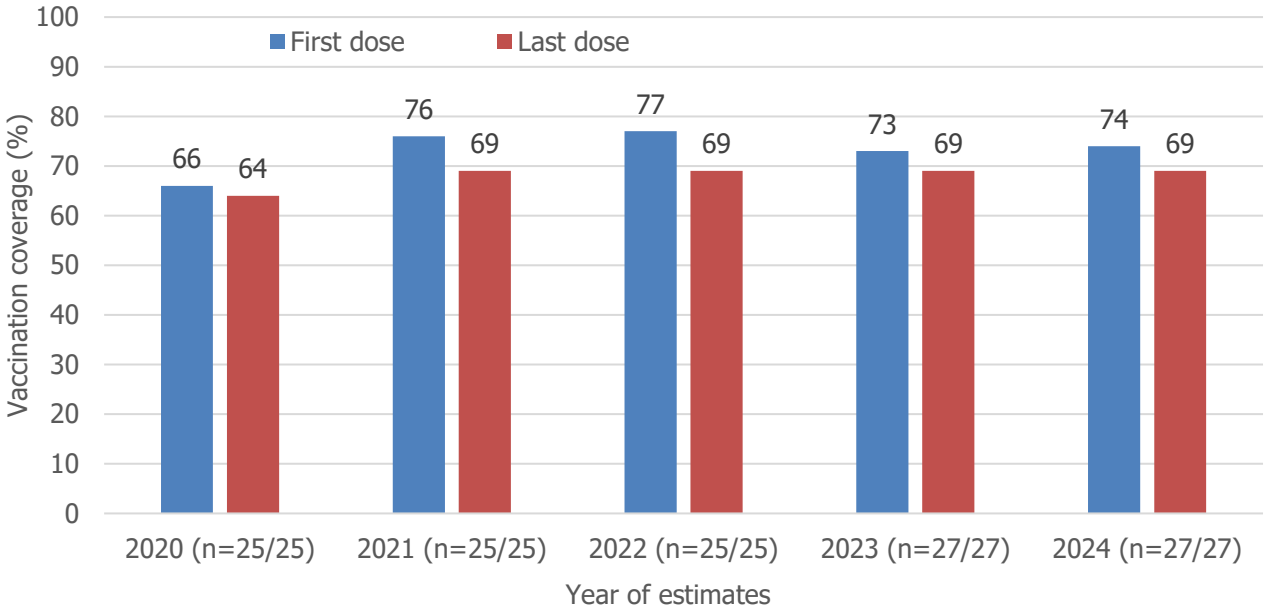
Figure 4. Number of countries based on HPV vaccination coverage by age 15 in girls, last dose, EU/EEA[iii], 2020–2024



[iii] Countries included in 2020-2022: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovenia, Spain, Sweden. On top Romania and Slovakia in 2023-24.

At the EU/EEA level, the median HPV vaccination coverage by age 15 for the first dose in 2024 remained low at 74% (IQR 25-75%=61-90%) although it increased compared to 2020 (66%). The median coverage estimates for the first dose in 2023 (73%) and in 2024 (74%) were lower compared to the level reported in 2021 (76%) and in 2022 (77%) (Figure 4). For the last dose, the median HPV vaccination coverage by age 15 reached 69% (IQR 25-75%=55-82%) in 2021 and remained steady since then, indicating no progression at EU/EEA level (Figure 4).

Figure 5. Median HPV vaccination coverage by age 15 in girls, first dose and last dose, EU/EEA[iv], 2020–2024



Source: World Health organization (WHO) immunization data portal [14] . Indicator "HPV Vaccination coverage by age 15, females"

Trends in vaccination coverage for the first dose by the age of 15 in girls, by country

In 2024, a total of seven countries reached >90% for the HPV vaccination coverage by the age of 15 for the first dose (Denmark, Iceland, Malta, Norway, Portugal, Spain and Sweden), with Norway and Portugal consistently reaching >90% during the period 2020-2024, Iceland since 2021 onwards, Malta in 2024, and Spain and Sweden since 2023.

Between 2020 and 2024, most countries showed an increase in the vaccination coverage of the first dose by age 15, with variation in the magnitude, however for the majority of countries, the increase was less evident or even absent when comparing the vaccination coverage of 2024 to 2022.

Countries with vaccination coverage >90% in 2024 (Denmark, Iceland, Malta, Norway, Portugal, Spain, Sweden) exhibited constant high levels of vaccination coverage or even some increase for the overall period 2020-24 as well as 2022-24.

Between 2022 and 2024 in countries with vaccination coverage between 73% and 87% in 2024 (Belgium, Czechia, Cyprus, Finland, Hungary, Ireland, Lithuania and Luxembourg) the level of vaccination coverage plateaued, showed minimal variation or some decline. In two countries (Hungary and Ireland) a decline of 8-10% respectively was observed. Notably in Lithuania, there was an 31% increase in 2024 from the level since 2020.

In countries with vaccination coverage between 50% and 70% in 2024 (Austria, Croatia, Estonia, Germany, Italy, Latvia, the Netherlands, Slovenia), for the period 2022-24, coverage stagnated or even declined in Estonia, Germany, Italy and the Netherlands, while it increased in Austria, Croatia, Latvia and Slovenia.

[iv]Countries included in 2020-2022: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovenia, Spain, Sweden. On top Romania and Slovakia in 2023-24.

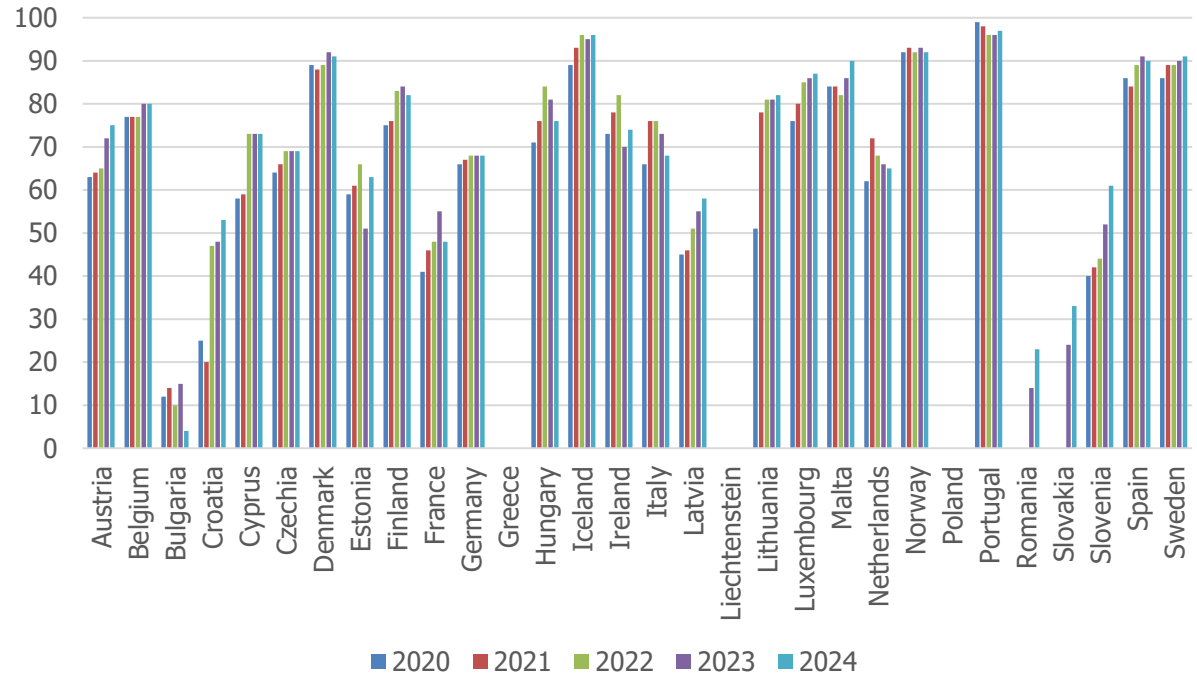
A total of four countries (Bulgaria, France, Romania and Slovakia) did not reach 50% of coverage in 2024. Coverage in France declined in 2024 after some increases between 2020-2023. There was no clear trend in Poland, Romania and Slovakia due to few estimates reported.

The trends for vaccination coverage of the last dose by the age of 15 was similar to the estimates for the first dose.

Drop out between in vaccination coverage by the age of 15 in girls between first and last dose

In 2024[v], there was a 5% (IQR 25-75%=3-9%) difference between the last and first dose (drop out) of HPV vaccination coverage by age 15 in girls, this value fluctuated between 4% in 2020-2022 (IQR 25-75%=2-8%) and 6% (IQR 25-75%=3-9%) in 2023. In 2024 the level of drop out was more than 10% in four countries (Austria, Germany, Italy and Luxemburg), with Austria, France, Germany, Latvia and Lithuania with >10% drop out some years during between 2020-24[vi]. There was no clear declining trend in the level of drop out observed across countries during 2020-2024, except for Lithuania.

Figure 6. HPV vaccination coverage by age 15[vii] in girls, first dose, EU/EEA, 2020-2024



Source: World Health organization (WHO) immunization data portal [14]. Indicator "HPV Vaccination coverage by age 15, first dose, females"

[v] Vaccination coverage estimates of Croatia, Czechia, Romania, Slovenia were identical figures for first and last dose for the 5-year period.

[vi] Countries included (n=23): Austria, Belgium, Bulgaria, Cyprus (except 2020 and 2021 data), Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Portugal, Slovakia, Spain, Sweden. Were excluded countries reporting higher level of coverage for the last dose compared to first dose (Cyprus in 2020 and 2021) Drop off was zero in Croatia, Czechia, Romania, Slovenia. No data available for Greece, Liechtenstein and Poland.

[vii] Countries included in 2020-2022: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovenia, Spain, Sweden. On top Romania and Slovakia in 2023-24. For some countries including Austria, Croatia, France, Lithuania, national estimates may differ from estimates available from WHO Immunisation data portal for the indicators selected in this report.

HPV vaccination coverage rates by age 15 in boys

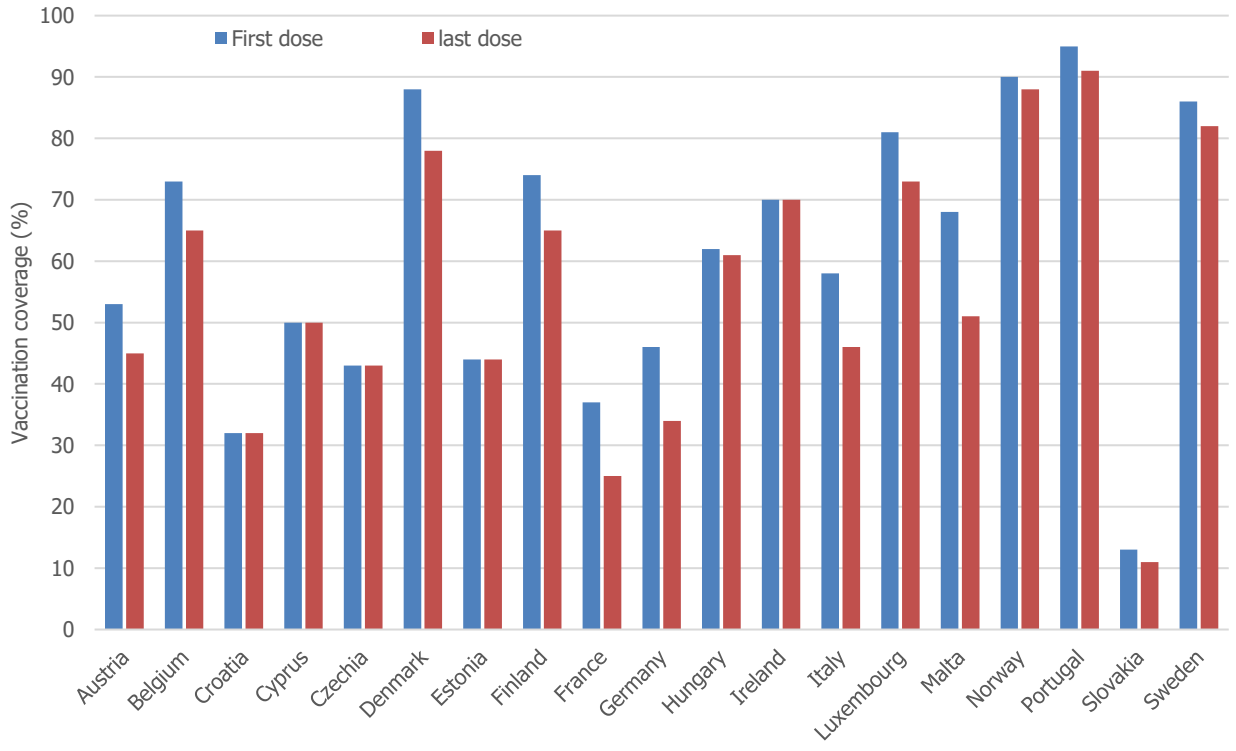
Main features of HPV vaccination coverage rates by age 15 in boys

The median level of vaccination coverage in the EU/EEA in 2024 was:

- First dose: 62% (IQR 25-75%: 44-81%).
- Last dose: 51% (IQR 25-75%: 43-73%).

The highest level of HPV vaccination coverage for the last dose in 2024 was observed in Portugal (91%), Norway (88%), Sweden (82%), Denmark (78%), Luxembourg (73%), Ireland (70%), Finland (65%) and Belgium (65%). In remaining countries with available data, the level of last dose coverage remained low between 11% (Slovakia) and 61% (Hungary) (Figure 7).

Figure 7. HPV vaccination coverage by age 15 in boys, first and last dose, EU/EEA, 2024

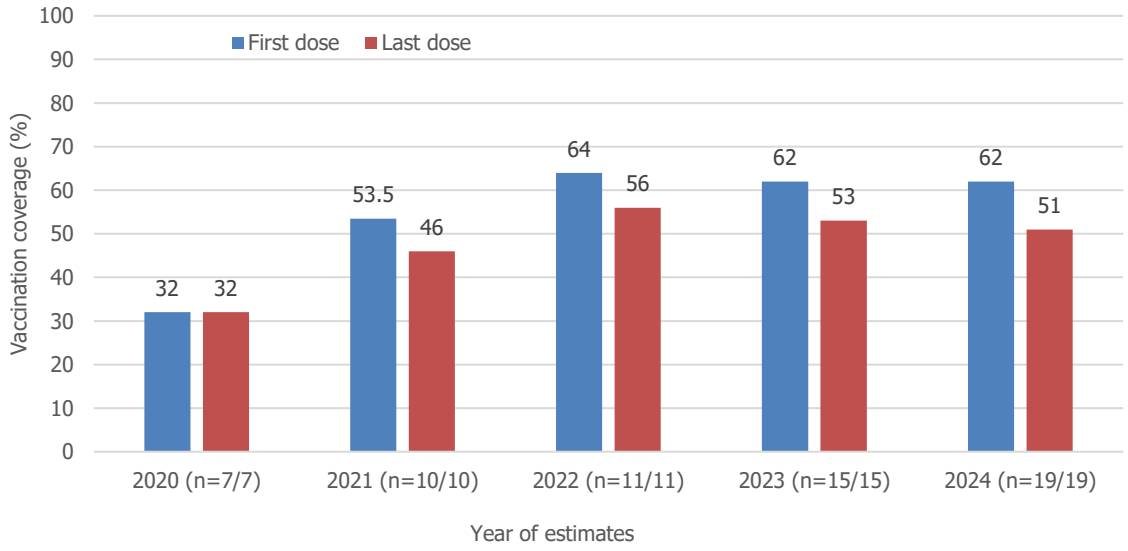


Source: World Health organization (WHO) immunization data portal [14], Indicator "HPV Vaccination coverage by age 15, male"

At EU/EEA level (Figure 8, Annex 8), The median HPV vaccination coverage by age 15 for the first dose showed a progression between 2020 and 2024, reaching 62% (IQR 25-75%=44-81%) in 2024 compared to 32% in 2020 (IQR 25-75%=24-64%). In 2022, median coverage reached 64% (IQR 25-75%= 42-75%) which was the highest level reported over the five years.

The median last dose HPV vaccination coverage by age 15 reached 56% (IQR 25-75%=31-68%) in 2022 compared to 32% (IQR 25-75%=17-61%) in 2020. It has slightly declined since then to 53% in 2023 (IQR 25-75%= 36-67%) and 51% (IQR 25-75%=43-73%) in 2024.

Figure 8. Median HPV vaccination coverage by age 15 in boys, first dose and last dose[viii] EU/EEA, 2020–2024



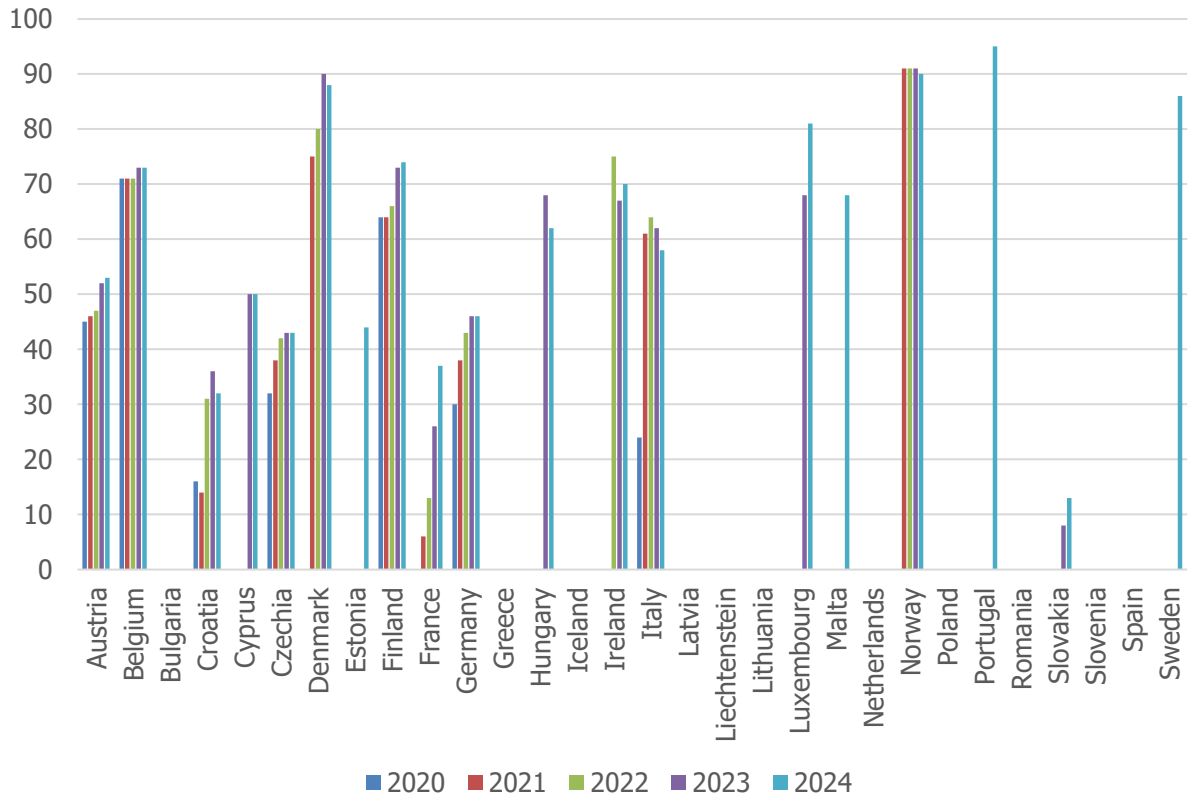
Source: World Health organization (WHO) immunization data portal [14], Indicator "HPV Vaccination coverage by age 15, males"

Trends in vaccination coverage for the first dose by the age of 15 in boys, by country

The analysis was restricted by data not being available for all years for all countries (Figure 9, Annex 8). When these were available, between 2020 and 2024, most countries showed an increase in the vaccination coverage of the first dose by age 15, with variation in the magnitude. However, the increase was less evident or even absent when comparing the vaccination coverage of 2024 to 2022 for the majority of countries, with the exception of Denmark, Finland, Luxemburg which reported an increase of 8% or more.

[viii] Reporting countries in 2020: Austria, Belgium, Croatia, Czechia, Finland, Germany, Italy; In 2021: Denmark, France, Norway on top; in 2022: Ireland on top; in 2023: Cyprus, Hungary, Luxembourg, Slovakia on top, in 2024: Estonia, Malta, Portugal, Sweden on top

Figure 9. HPV vaccination coverage (%) by age 15 in boys, first dose, EU/EEA[10], 2020–2024



Source: World Health organization (WHO) immunization data portal [14] , Indicator 'HPV Vaccination coverage by age 15, first dose, males'

[10]For some countries including Austria, Croatia, France, Lithuania, national estimates may be different from estimates available from WHO Immunisation data portal for the indicators selected in this report.

Drop out between in vaccination coverage by the age of 15 in boys between first and last dose

There was a marked drop out between first and last dose in EU/EEA countries (Figure 8, Figure 9, Annex 8). In 2024, among countries observing some drop out, there was a median level of decline of 8% (IQR 25-75% =4-12%) between the first and last dose. Denmark, France, Germany, Italy and Malta showed >10% drop out in 2024 (Figure 7). During the period 2020-24 and among countries included[ix], the median percentage of drop out fluctuated between 6% (IQR 25-75%=4-9%) (2022) and 8% in 2024.

Performance of school-based programmes

- For girls for the period 2020-2024, the median last dose HPV vaccination coverage by age 15 was higher in countries with school programmes (76.5% (IQR 25-75%=56-89%)) vs. countries with other types of programmes (64% (IQR 25-75%=45-80%)), with exceptions.
- For boys for the period 2020-2024, the median last dose HPV vaccination coverage by age 15 was higher in countries with school programmes 64% (IQR 25-75%=32-72%) versus 50% (IQR 25-75%=31-6%) with other types of programmes

[ix] Croatia, Cyprus, Czechia, reported no drop off. Estonia, Ireland had a single dose vaccination programme. Countries included in the analysis (n=14) Austria, Belgium, Denmark, Finland, France (except 2020), Germany, Hungary (2024), Italy, Luxembourg (2023-2024), Malta (2024), Norway (except 2020), Portugal, Slovakia, Sweden. No data reported for Bulgaria, Greece, Iceland, Latvia, Liechtenstein, Lithuania, the Netherlands, Poland, Romania, Slovakia (2023-2024), Sweden (2024).

Girls

During the period 2020-2024, the median of the first dose HPV vaccination coverage by age 15 in girls was 76.5% (IQR 25-75%=56-89%) in countries with a school-based programme, while the median was 69% (range=45-84%) in countries without a school programme. The median of the last dose of the HPV vaccination coverage was 74.5% (IQR 25-75%=53-85%) versus 64% (IQR 25-75%=45-80%) respectively in countries with a school programme versus other programmes in place. Among countries with a school-based programme, Iceland and Norway had a median of first and last dose coverage >90% during the study period. Among countries with other programmes settings, Portugal reported consistently high levels of coverage.

In countries with a school vaccination programme[x] in place, the median drop out in girls was 4% (IQR 25-75%=3.5-5%) during 2020-2024 versus 6% (IQR 25-75%=5-8%) in countries without a school programme.

Boys

During the period 2020-2024, the median of the first dose HPV vaccination coverage by age 15 in boys was 70.5% (IQR 25-75%=54.5-78.5%) in countries with a school-based programme, while the median was 53% (IQR 25-75%=41-65%) in countries without a school programme. The median of the last dose of the HPV vaccination coverage was 64% (IQR 25-75%=32-72%) versus 50% (IQR 25-75%=31-6%) respectively in countries with a school programme versus other programmes in place during the study period. Among countries with a school-based programme, Norway reported a median first dose coverage 90% during the study period and last dose coverage 89.5%. Among countries with other programmes settings, Portugal reported consistently high level of coverage.

Data were too sparce to make any stratified analysis in boys on the drop out number.

Vaccination coverage of catch-up programmes

Only six countries (Austria, Germany, Italy, Netherlands, Norway and Slovakia) provided vaccination coverage data based on age specific cohorts on the catch-up programme for individuals above age 15. There was high variation in vaccination coverage in boys and girls (Table 1).

In Norway, the overall vaccination coverage for the catch-up group of up to 19 years of age was 89%.

Table 1. Catch-up HPV vaccination coverage first and last doses in girls and boys, EU/EEA, 2023

Country	Upper age limit of catch-up programme	Vaccination coverage in girls (%)		Vaccination coverage in boys (%)	
		First dose	Last dose	First dose	Last dose
Austria	21	65	54	45	37
Germany	18	73.8	60.5	37.3	26.4
Italy	24	68.1	65.3	66	59
Netherlands	Born 1996		55.1		16.1
Slovakia	Born 2009		16.5		28.2

Source: ECDC survey 2025

[x] Belgium, Finland, Hungary, Iceland, Latvia, Norway, Spain Sweden

Discussion and conclusions

HPV-related infections remain a major public health issue in the EU/EEA, driving a substantial burden of cervical cancer as well as other anogenital and head-and-neck cancers. Data presented in this report clearly show that cervical cancer continues to affect women at relatively young ages and show marked differences in incidence and mortality between EU/EEA countries, reflecting unequal access to HPV vaccination and screening programmes [28]. Other HPV-associated cancers, especially head-and-neck cancers, show a marked predominance in men.

Across the EU/EEA, immunisation strategies against HPV infection initially targeted girls with the primary intention of reducing the burden of cervical cancer [42]. From 2025, all EU/EEA countries have adopted gender-neutral HPV primary vaccination programmes. The high burden of HPV-related disease in both sexes highlights the importance of gender-neutral HPV vaccination strategies in conjunction with organised, quality-assured HPV-based screening programmes. Enlarging the programmes to boys also aims to guarantee vaccine equity, increasing population immunity to mitigate persistently suboptimal coverage among girls, and to give direct protection against specific HPV-associated cancers in males. While this is well-established, implementation still lags, with stark differences in uptake trends between the female and male population.

In countries that have succeeded in reaching a sustained high level of vaccination coverage, such as Denmark, Norway, Portugal and Sweden, the effectiveness and impact of the programme is being increasingly documented [38,40,43,44] (Annex 4). Although evidence for noncervical HPV related outcomes remains limited, the observed reductions in HPV infection and precancerous lesions suggest that vaccination is likely to decrease the burden of all HPV-associated diseases over time in both girls and boys [36].

Progress toward the goals set out by the EU Council Recommendation

Only three countries reached 90% HPV vaccination coverage in girls by the age of 15 which is the objective set up by the 2024 EU Council Recommendation. Sustained and consistently high vaccination coverage is a critical milestone towards the elimination of cervical cancer, defined as an incidence of cervical cancer below 4/100 000. Yet, progress remained unequal across the EU/EEA, with most countries not showing progression, and the majority of EU/EEA countries still off track to meet the objective of 90% coverage by 2030 [45,46]. Programme implementation and acceptability issues (Annex 9) must be addressed to ensure that the benefits HPV vaccination can provide are effectively accrued in public health terms.

Expanding HPV vaccination programmes to boys was an important step towards achieving gender equity in cancer prevention, but also to safeguard programme resilience when coverage in the female population suddenly drops or remains consistently low. In all countries, at the time of this report, the primary HPV vaccination programme for boys mirror that for girls in terms of the recommended age of administration, the vaccine product used, and how it is delivered.

However, available data consistently show that HPV vaccination coverage in boys remains lower than in girls despite identical delivery systems; with only some progression observed at the EU level since 2020. As a result, the male programme does not currently function as an effective safeguard against low female coverage, nor do these compensate for gaps in population immunity. Instead, the observed gender gap in uptake suggests that structural equity in programme design does not automatically or immediately translate into equitable outcomes.

These findings highlight that while expanding eligibility to boys is a necessary component of a comprehensive HPV prevention strategy, it is not sufficient on its own. Achieving meaningful protection across genders requires addressing systemic, perceptual, and contextual factors that influence programme performance. Without targeted efforts to improve uptake across the board, the full potential of gender-neutral HPV vaccination programmes will remain unrealised [47]. At the same time, vaccination in boys is in its early stages or infancy in several EU/EEA countries, and time may be needed for programmes to mature and further develop.

Programme- and system-related factors to increase uptake

Suboptimal vaccine uptake is often quickly assumed to be driven by scepticism to vaccination, fear of adverse events following vaccination or a lack of acceptance among eligible teenage girls and boys or their parents and carers. This assumption may be driven by the fact that access to HPV vaccines is in most EU/EEA contexts not considered to be a major barrier – at least in principle; vaccination is available free of charge across all EU/EEA countries for the eligible primary target population and, overall, systems are in place to ensure that vaccines reach recipients.

Nevertheless, while a large body of evidence exists documenting issues on the demand-side of vaccination programmes (such as those linked to citizen acceptance or refusal) there is very limited research available on how supply-side factors linked to programme and/or healthcare system design and delivery structures impact levels of uptake.

This is an important gap, as, in publicly funded vaccination programmes such as HPV, if vaccination does not occur during the recommended time frame for the specific primary target population, there are often no publicly funded catch-up programmes for teenagers and young adults, and the issue of cost or out-of-pocket charges resurfaces. By the same token, data in this report clearly show that when coverage is not sufficiently high for the primary target group at the recommended time of vaccination, it is unlikely that catch-up programmes will succeed in helping to bridge the gap and ensure sufficient levels of protection.

Effective programme delivery by design is critical to increase uptake, and systemic, structural, and healthcare system-related interventions can play a fundamental role in improving performance.

Apart from Portugal, countries with a school-based programme appear to reach higher levels of coverage, as noted earlier in this report. An important body of international evidence from across several countries with different healthcare systems suggests that school-based interventions are highly effective in increasing levels of uptake [48].

At the same time, limited studies have looked at specific organisational factors that can help boost or hinder school-based delivery programmes, although these factors may be equally or potentially more important than demand-side issues related to vaccine acceptance. A rapid review of evidence [49] [50] [51] [52] [48] shows following critical aspects concerning the experience of implementing **school-based programmes**:

- **Classroom outreach varies widely** — nurses' visits in schools ranged from merely handing out consent forms to delivering full HPV education, producing unequal opportunities for informed decision making.
- **Parental consent processes were problematic** — short return windows to provide consent forms, unreadable or untranslated materials, and language/literacy barriers left many parents feeling rushed or unable to make informed choices prior to vaccination.
- **Student–parent consent conflicts occurred** — situations where parents consented but students refused, or parents refused while consenting students requested vaccination, complicated on-site delivery and highlighted unclear consent protocols.
- **Workforce and resource constraints limited delivery** — high nurse workloads, staff turnover, and insufficient training reduced time for education, follow-up, and consistent programme implementation in schools.
- **Operational and logistical frictions reduced completion** — difficulties securing clinic space, weak school collaboration, poor access to vaccination records, and inadequate catch-up clinics impeded series completion.

Learning from long-standing experiences in implementing school-based programmes is paramount to strengthening these interventions and effectively informing policy and programming.

In addition, a number of other studies [53-56] looking at **healthcare system-based or -related interventions** to increase programmatic performance of HPV vaccination, identified the following likewise critical findings:

- **Health system performance-related quality indicators (QI) to increase accountability:** integrating adolescent vaccination as a health intervention into broader quality performance frameworks implemented at healthcare unit delivery level, based on accepted QI metrics and reliable data quality systems, can help increase vaccination providers' buy-in, accountability, and their continuous engagement in action to increase levels of uptake at community level.
- **Effective programmatic interventions at practice level** — empowering nurses via standing orders, using pharmacists where permitted, expanding vaccination sites, bundling HPV with other adolescent campaigns, and deploying EHR alerts and reminder/no-show policies were shown to significantly increase uptake
- **Increased venues and windows of access** — standardising multilingual consent/outreach with well-designed and adapted timeframes for the return of consent forms needed for HPV vaccination as applicable in the local setting; strengthening workforce training and standing orders for nonphysician vaccination providers; expanding access points and catchup options.
- **Improved data availability at delivery level -** investing in the availability of high quality local vaccination coverage data and effective data systems that enable feedback loops to health professionals providing vaccination services right at the delivery level, especially at primary care level. This can significantly enable providers to track their action, measure gaps in their catchment areas and identify targeted interventions needed to increase levels of uptake.

In general, vaccination programmes designed with clear targets that are integrated into broader health system performance and outcome-based quality indicators are more likely to generate higher level of performance and engagement of the stakeholders concerned.

The success of these programmes depends on implementing a mix of comprehensive and targeted actions that address all factors contributing to improved programme performance.

Evidence on one-dose vaccination programmes

In many countries, vaccination coverage estimates observed a drop out between the first and last dose of the vaccination scheme. It is well-established that multi-dose vaccination schedules may be more challenging to implement than vaccination programmes relying on a single vaccine-dose only. A transition toward a one-dose HPV vaccination schedule may represent a major opportunity to expand global access and accelerate progress toward cervical cancer elimination [57]. Such a shift however also presents challenges, requires ongoing well-resourced monitoring, and must be carefully weighed against current gaps in knowledge.

In the EU/EEA, Estonia, Ireland and Spain have already adopted a one-dose HPV vaccination strategy, similar to the one that has been in place in the UK since 2023 [34]-[58] and endorsed by the World Health Organization's Strategic Advisory Group of Experts (SAGE) [4].

Evidence from randomised trials and long-term cohort studies shows that a single dose provides strong and durable protection against persistent HPV infection (Annex 3), particularly for HPV-16 and HPV-18, the types responsible for most cervical cancers. Indeed, the one-dose approach has the potential to offer several advantages that directly address barriers to achieving high coverage.

- First, it simplifies delivery by eliminating the need for follow-up visits, thereby reducing drop out rates and improving rates of completion. This is especially relevant in settings where school attendance is inconsistent, healthcare access may be limited, or second-dose adherence has historically been low.
- Second, the reduced number of doses lowers procurement and delivery costs, enabling countries to stretch limited resources further and potentially expand vaccination to additional cohorts, such as older adolescents or catch-up groups.
- Third, a one-dose schedule enhances resilience during periods of disruption, such as supply shortages, workforce constraints, or public health emergencies, by minimising missed opportunities and simplifying catch-up strategies.

Importantly, the one-dose strategy also has the potential to reduce inequities. In many countries, disparities in HPV vaccination coverage mirror broader social and geographic inequalities. By lowering logistical and financial barriers, a one-dose schedule can help reach underserved populations, including rural communities, marginalised groups, and regions with weaker health infrastructure.

Early adopters of the one-dose schedule have already reported improvements in uptake and programme sustainability, reinforcing the feasibility of this approach.

There are, however, important challenges and scientific caveats associated with a one-dose programme, noting that screening programmes will continue to be sustained, including for vaccinated individuals:

- Evidence to support a one dose schedule is currently strongest with persistent HPV infection and cervical cancer in girls, but there is a lack of real-world evidence of the one dose programme on infection and cancer incidence in boys.
- A programme with two doses does may offer the opportunity to receive/catch up on a first missed dose.
- It is essential to invest or continue investing in strong surveillance and monitoring systems to monitor the impact of vaccination programmes over time.

In general, and regardless of the dose-regimen in place, existing evidence clearly shows that HPV vaccines can provide long-term protection against cervical premalignant lesions and cervical cancer in both controlled and real-world settings, particularly when administered at younger ages.

Improving monitoring systems for vaccination coverage and data on disease burden

Vaccination coverage at 15 years of age is the key indicator used to monitor the progress of countries. Although age-cohort estimates can be readily generated in settings with electronic immunisation registries, as shown in this report, a number of countries still lack such systems, indicating opportunities to increase accuracy and/or completeness of the estimates available. In addition, the paucity of vaccination coverage data in catch-up groups means that a full picture is challenging to describe at the EU level.

The lack of immunisation registries or equivalent systems that can identify eligible unvaccinated individuals prevents the implementation of efficient catch-up campaigns/outreach both in primary target groups but also in older age groups [59]. In addition, systems that can produce granular data, including that at the regional or local level, can support tailored vaccination efforts.

Looking ahead, progress toward cervical cancer elimination will require immunisation registries capable of linking multiple data sources. Integrating vaccination records with screening participation and screening outcomes will be essential to evaluate the full continuum of prevention and treatment including in the one dose era [60] [61] [62].

Recommended public health actions to strengthen HPV vaccination programmes

Considering the findings in this report, ECDC recommends Member States prioritise the following key public actions to strengthen HPV vaccination programmes:

- **Enhance the surveillance of HPV-related cancers** and other clinical outcomes through digital, population-based systems, enabling monitoring of incidence, mortality and integration of data from screening. This action is critical to support progress towards cervical cancer elimination goals, while strengthening prevention and control efforts in the EU/EEA and monitoring the impact of vaccination programmes.
- **Invest in advancing immunisation information systems**, in order to:
  - Effectively monitor HPV vaccination programmes performance, including linking vaccination data to screening and cancer registries.
  - Identify people who are not vaccinated and facilitate opportunities for catch-up vaccination
  - Assess the equity of the programme including geographical and sociodemographic inequities.
- **Ensure the highest possible level of uptake through the primary target programme** for girls and boys; evidence clearly demonstrates that catch-up programmes are much more difficult to implement and monitor, and, though complementary, unlikely to achieve the same level of success as the main programme in the target age group.
- **Consider simplifying vaccine schedules**; a single dose schedule could substantially increase uptake and accelerate progress towards the 90% coverage target and cervical cancer elimination. This requires concerted action across regulators, industry and public health stakeholders to develop adequate pathways while carefully weighing the scientific evidence available, and closely monitoring effectiveness and impact over time.
- Rollout **effective school-based programmes**, based on the experience of several EU Member States, and internationally, regarding its positive outcomes. Such programmes must be well-resourced and carefully designed considering lessons learnt and challenges to ensure that they are well-placed to deliver within local settings.
- Design **health system-based approaches to increase uptake and improve programme delivery**; in particular, promote the integration of HPV vaccination within broader adolescent health programmes, and **include HPV vaccination within health service delivery and quality performance frameworks** as part of value- and outcome-based health systems, especially at primary care level.
- Ensure **data provision and availability** (including, as relevant, public display) of HPV vaccination coverage rates **at the very local level, such as public health units, GP catchment areas, or schools**; The design of effective data feedback and loop systems can effectively guide professionals to drive uptake as well as inform healthcare systems managers and quality improvement leaders on efficiencies that may be needed to achieve the necessary vaccination coverage targets.
- **Strengthen efforts to increase vaccination acceptance**, through diagnosing locally-relevant barriers and facilitators to develop tailored strategies, and by implementing multicomponent strategies, including evidence-based communication, strong community engagement and educational campaigns to address misinformation.

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Annex 1. Cervical cancer, number of cases, number of deaths, incidence and mortality rates in the EU/EEA, 2022

Country	Number of cases	Incidence rate (age-standardised, per 100 000 population)	Number of deaths	Mortality rate (age-standardised, per 100 000 population)
Austria	409	5.9	180	1.9
Belgium	531	6.3	231	1.9
Bulgaria	877	15.4	453	6.2
Croatia	272	8.3	138	2.9
Cyprus	62	7.0	31	2.4
Czechia	658	8.0	369	3.2
Denmark	373	9.7	115	1.8
Estonia	121	11.8	60	3.9
Finland	179	4.6	65	1.3
France	3 185	6.6	1 530	2.3
Germany	4 544	7.1	2 071	2.3
Greece	473	5.5	260	2.2
Hungary	964	12.6	482	4.8
Iceland	19	9.4	8	2.7
Ireland	242	7.5	89	2.3
Italy	2 479	5.0	1 156	1.6
Latvia	238	16.9	113	6.0
Lithuania	296	13.7	191	6.8
Luxembourg	22	4.4	10	1.7
Malta	13	4.2	6	1.4
Netherlands	756	6.7	275	1.7
Norway	376	10.9	104	1.7
Poland	4 008	11.3	2 188	5.2
Portugal	897	11.1	459	3.5
Romania	3 368	21.7	1 793	9.3
Slovakia	557	12.9	276	5.2
Slovenia	119	7.2	61	2.4
Spain	2 020	5.4	802	1.6
Sweden	561	8.6	238	2.0

Source: Global Cancer Observatory [30]

Annex 2. Immunisation products for the protection against conditions caused by HPV in the EU, 2025

Immunisation product	Manufacturer	HPV types in the vaccine	Summary of indication	Date of authorisation
Cervarix [1]	GlaxoSmithKline Biologicals S.A.	HPV 16, 18	Prevention of • premalignant ano-genital lesions (cervical, vulvar, vaginal and anal) and cervical and anal cancers causally related to certain oncogenic HPV types	20 September 2007
Gardasil [2]	Merck Sharp & Dohme B.V.	HPV 6, 11, 16, 18	Prevention of • premalignant genital lesions (cervical, vulvar and vaginal), premalignant anal lesions, cervical cancers and anal cancers causally related to certain oncogenic HPV types; • genital warts (condyloma acuminata) causally related to specific HPV types.	20 September 2006
Gardasil 9 [3]	Merck Sharp & Dohme B.V.	HPV 6, 11, 16, 18, 31, 33, 45, 52, 58	Prevention of • premalignant lesions and cancers affecting the cervix, vulva, vagina and anus caused by vaccine HPV types; • genital warts (Condyloma acuminata) caused by specific HPV types.	10 June 2015

Annex 3. Studies evaluating the efficacy and effectiveness of one dose regimen of HPV vaccine

Study/Country	Date range (enrollment)	Study design	Vaccine	Gender	Age at vaccination	N by number of doses	Outcome(s) reported	Length of follow-up	Funding
KENS HE, Kenya [63,64]	2018 – 2019	RCT	Cervarix® Gardasil 9®	Female	15 – 20	0: 757 1: 760 (Cervarix®); 758 (Gardasil 9®)	Persistent cervical infection	3 years	Bill & Melinda Gates Foundation and the University of Washington
DORIS, Tanzania [65]	2017 – 2018	RCT	Cervarix® Gardasil 9®	Female	9 – 14	1: 155 (Cervarix®); 155 (Gardasil 9®) 2: 155 (Cervarix®); 155 (Gardasil 9®) 3: 155 (Cervarix®); 155 (Gardasil 9®)	Immunogenicity	2 years	UK Department for International Development/UK Medical Research Council/Welcome Trust Joint Global Health Trials Scheme, The Bill & Melinda Gates Foundation, and the US NCI
CVT, Costa Rica[66,67] [66-72]	2004 – 2005	Post-hoc RCT analysis	Cervarix®	Female	18 – 25	1: 275 2: 488 3: 2 964	Incident & prevalent cervical infection; immunogenicity	16 years	NIH, GSK
CVT/PATRICIA (Costa Rica/ International) [73]	2004 – 2005	Post-hoc RCT analysis	Cervarix®	Female	15 – 25	1: 573 2: 977 3: 11 499	Persistent cervical infection	4 years	US National Cancer Institute, NIH Office of Research on Women's Health, and Ministry of Health of Costa Rica (CVT); GSK (PATRICIA)
Batmunkh, et al. Mongolia [74]	2018 – 2019	Retrospective cohort	Gardasil®	Female	11 – 17	0: 357 1: 118	Prevalent cervical infection	6 years	Bill & Melinda Gates Foundation
Hariri, et al. USA [75]	2006 – 2012	Retrospective cohort	Gardasil®	Female	NR	1: 5 864 2: 2 729 3: 21 631	Genital warts	2.7 years	CDC
IARC, India [76-79]	2009 – 2010	Post-hoc RCT analysis	Gardasil®	Female	10 – 18	0: 1 484 1: 4 950 2: 4 979 3: 4 348	Persistent and incident cervical infection; immunogenicity; Cervical abnormalities; CIN2+; Cervical cancer	10 years	Bill & Melinda Gates Foundation
Reyburn, et al. Fiji [80]	2008 - 2009	Retrospective cohort	Gardasil®	Female	9 -12	0: 376 1: 158 2: 99 3: 189	Detection of vaccine HPV genotypes and genital warts	6 -11 years	Bill & Melinda Gates Foundation
Guzun, et al. Canada[81]	NA	Prospective cohort study with an interventional booster component	Cervarix® Gardasil® Gardasil 9®	Female, Male	Girls: 13-24 years Boys: 12-14 years	Girls: 1: 60 2: 60 Boys: 1: 141 2: 141	Immunogenicity	3 -10 years	Quebec Ministry of Health and Social Services, Fonds de recherche du Quebec

Annex 4. Impact studies

The introduction of HPV vaccination in the EU/EEA has led to significant changes in the prevalence of HPV infections and HPV-related diseases. Observed trends show reductions in HPV types, genital warts, cervical pre-cancers, and early indications of lower cervical cancer rates in vaccinated populations. HPV vaccination not only protects individuals who are vaccinated but also contributes to population immunity, reducing the overall circulation of the virus in the population.

A population-based study [82] in Denmark, Norway and Sweden monitored the changes in the prevalence of HPV infections among more women <50 years of age participating in cervical cancer screening before and after the introduction of the quadrivalent HPV vaccine. The study suggested that organised HPV vaccination programmes resulted in a decrease of HPV types circulating in the general population. Among women 18-26 years of age, the prevalence of HPV positivity declined statistically significant level in 2012-2013 compared to 2006-2008 (from 54.4% to 48.1%) with a substantial decline for the quadrivalent HPV vaccine types. Declines were observed for both the low-risk HPV6/11 and the high-risk 16/18 vaccine types. In addition, a Norwegian study [43] comparing HPV prevalence between one vaccine-eligible and two nonvaccine-eligible cohorts of 17-year-old girls described a reduction in HPV vaccine types of 90% in girls who were vaccinated and 54% in girls who were not vaccinated in the first vaccine-eligible cohort five years after vaccination. The study also suggested cross-protection and population immunity of the HPV vaccine.

A German study [37] in a low vaccination rate setting showed a decrease of anogenital warts and precancerous cervical lesions in women between 19-28 years of age who were vaccinated.

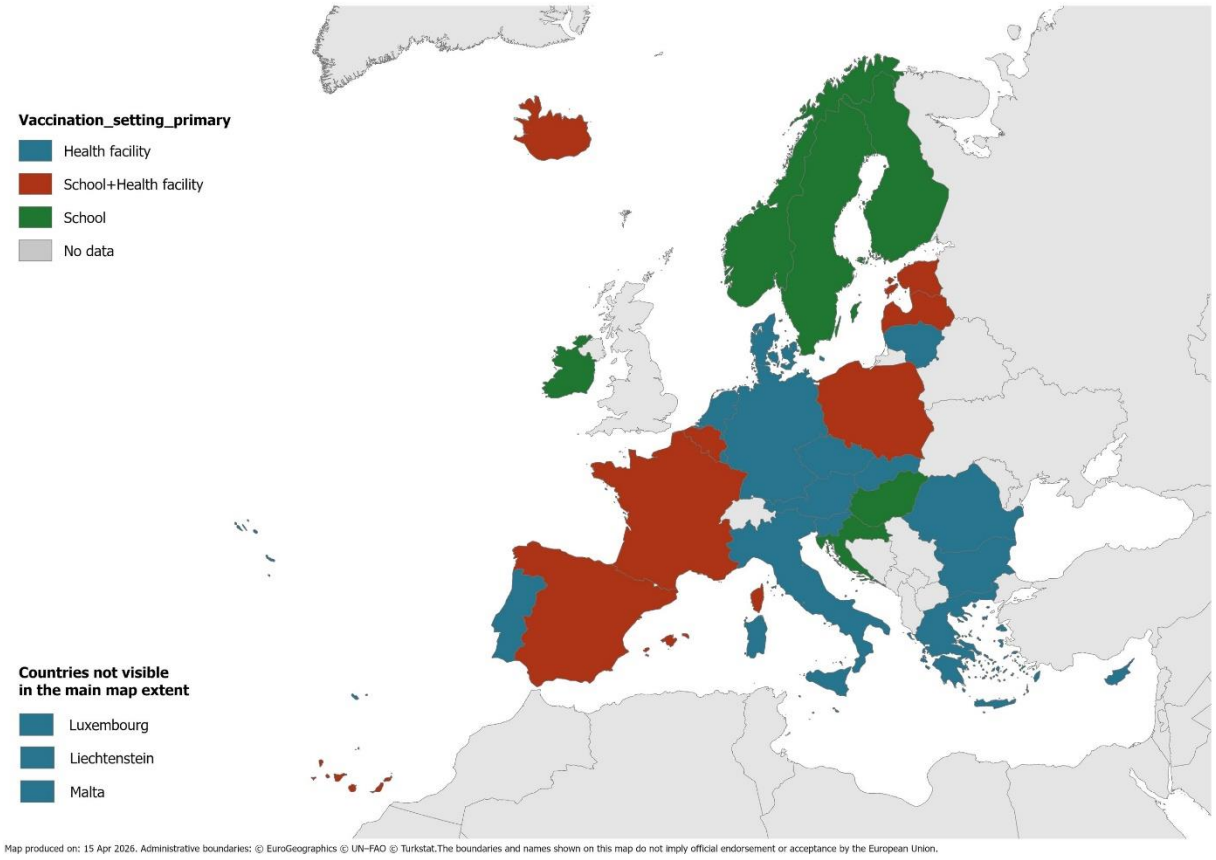
A Danish study [44] showed that the incidence of high-grade cervical lesions (CIN2+) decreased significantly in a younger cohort (<20 years of age) with high HPV quadrivalent vaccine coverage, indicating an early effect of HPV vaccination. A Norwegian study [41] assessing the impact of the HPV vaccination on the incidence of high-grade cervical lesions (CIN2+) among 20–25-year-old women over a 15-year period suggested a significant reduction of incidence of cervical lesions following the HPV vaccine introduction in the national immunisation programme.

Since 2020, European countries have reported a decreased incidence of cervical cancer among women who are vaccinated [83]. Studies from Sweden, Denmark and the United Kingdom showed that early administration of the vaccine increase its full protective potential [39,40,84]. A Swedish study suggested that vaccinating girls before their seventeenth birthday reduced the incidence of cervical cancer by 88% [40]. In an additional six years follow-up, the Swedish study showed a sustained cervical cancer risk reduction and a population level decline in invasive cervical cancer incidence after HPV vaccination [41].

Data on the impact and effectiveness of HPV vaccination on other outcomes, such as oropharyngeal, vulvar, vaginal, penile lesions, and recurrent respiratory papillomatosis are scarce, however, as reductions in HPV infections and lesions are becoming increasingly evident, the vaccination is expected to reduce all HPV-related diseases [36].

Annex 5. Main features of primary HPV vaccination programmes in the EU/EEA, 2025

Figure A1. Delivery setting of HPV vaccination in primary target groups in the EU/EEA, 2025



Notes:
In Austria, vaccination setting varied by federal states and is sometimes part of school-based programmes.
In Slovenia, HPV vaccination is carried out in healthcare centres, but in cooperation with schools which collect parental consent for vaccination and take children (accompanied by a teacher) to the healthcare centre for a systematic check-up and vaccination).

Figure A2. Recommended vaccine product(s) for HPV vaccination in primary target groups in the EU/EEA, 2025

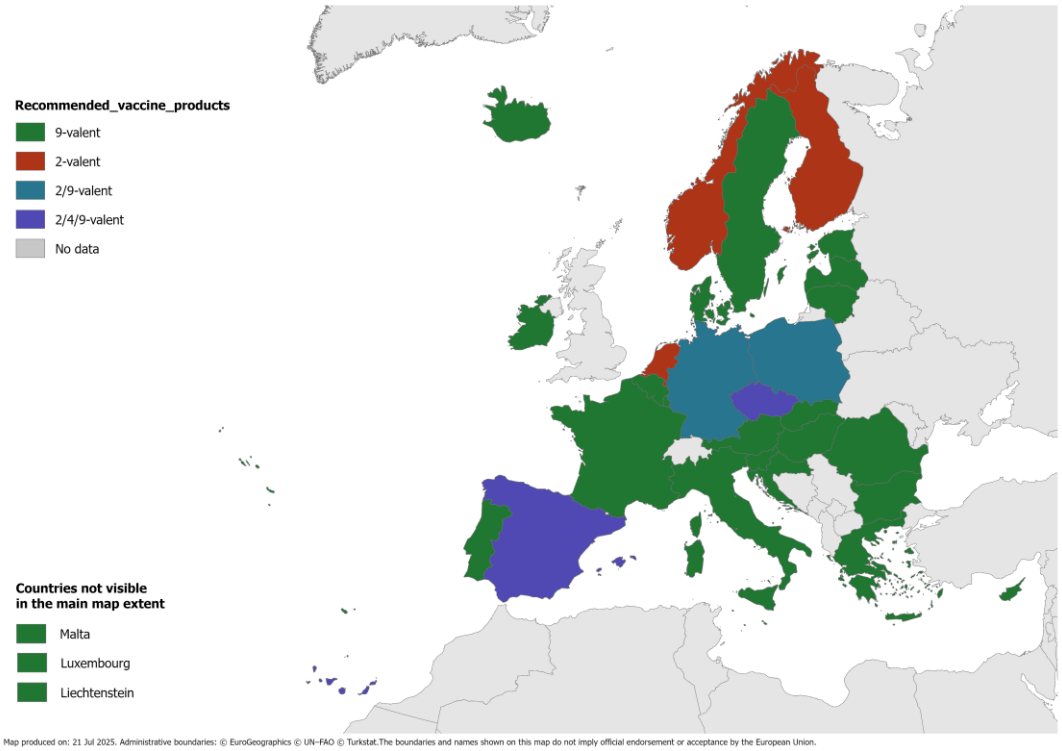
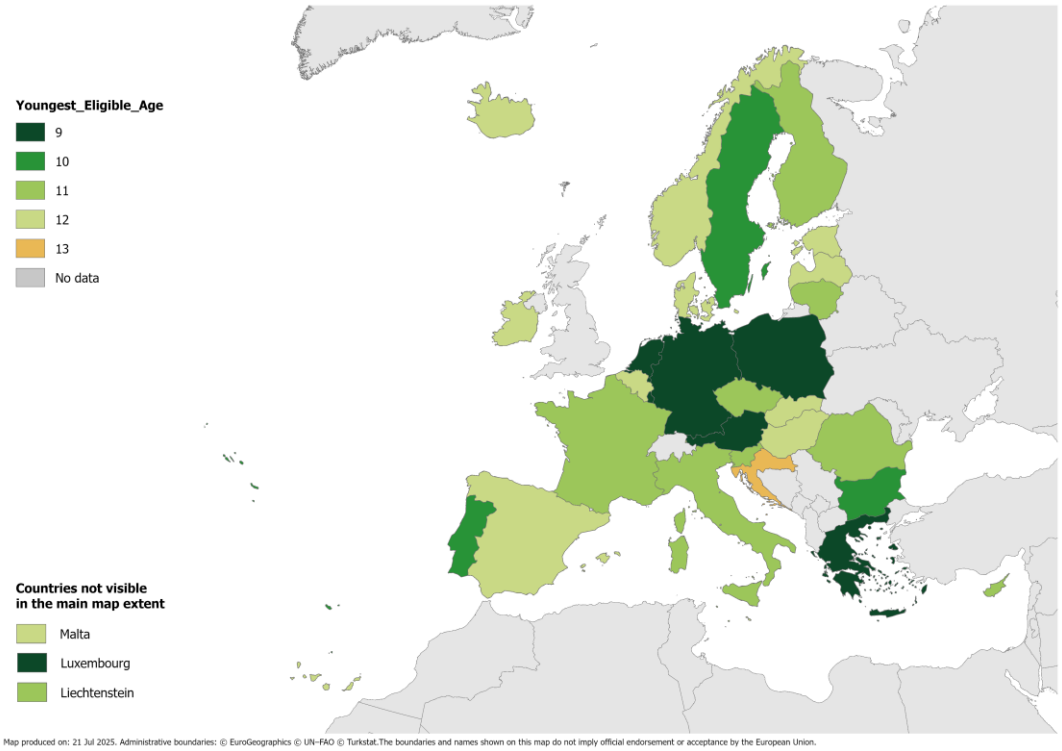


Figure A3. Youngest eligible age for HPV primary vaccination in boys and girls in the EU/EEA, 2025



Notes: In Croatia, it is possible to get the vaccine from nine years of age, for boys and girls.

Table A1. Overview of HPV primary vaccination programmes in the EU/EEA, 2025

Country	Target age groups, females	Target age groups, male	Funding	School based delivery	Other delivery vaccination settings	Reminder System	Written parental consent	Recommended vaccine product(s)
Austria	9-11	9-11	Fully	No*	Geneal practitioners (GP), paediatricians, public vaccination centres	Varied by federal states	Yes	9-valent
Belgium	12-13*	12-13 [b]	Fully	Yes	Geneal practitioners, paediatricians	Yes	Yes	9-valent
Bulgaria	10-14	10-13	Fully	No	Geneal practitioners	No	Yes	9-valent
Croatia [a]	13	13	Fully	Yes		Yes	No	9-valent
Cyprus	11-13	11-13	Fully	No	Geneal practitioners, community clinics, vaccination Clinics	Yes	No	9-valent
Czechia [b]	11-14	11-14	Fully	No	Geneal practitioners, paediatricians	NA	NA	2/4/9-valent
Denmark	12	12	Fully	No	Geneal practitioners, community clinics	Yes	No	9-valent
Estonia	12-14	12-14	Fully	Yes	Geneal practitioners, community clinics	Yes	Yes	9-valent
Finland	11-12	11-12	Fully	Yes		Yes	No	2-valent
France	11-14	11-14	Fully/Partially*	Yes	Medical practitioners (GP, paediatrician, gynaecologists), pharmacies, private midwife practices, vaccination centres	No	Yes	9-valent
Germany	9-14	9-14	Fully	No	Geneal practitioners	No	Yes	2/9 valent
Greece	9-11	9-11	Fully	No	Geneal practitioners, paediatricians, public health clinics	No	No	9-valent
Hungary	12	12	Fully	Yes	None	Yes	Yes	9-valent
Iceland	12	12	Fully	Yes	Primary health centres	Yes	No	9-valent
Ireland	12-13	12-13	Fully	Yes		Yes	Yes	9-valent
Italy	≥ 11	≥ 11	Fully	No	Public health clinics	Yes	Yes	9-valent
Latvia [a]	12-18	12-18	Fully	Yes		NA	NA	9-valent
Liechtenstein	11-15	11-15	Fully	No	Geneal practitioners	No	No	9-valent
Lithuania	11	11	Fully	No	Primary health institutions	Partially (not all primary institutions)	Yes	9-valent
Luxembourg	9-14	9-14	Fully	No	Private physician practices	Yes	No	9-valent
Malta	12	12	Fully	No	Primary health centres	Yes	Yes	9-valent
Netherlands	9-10	9-10	Fully funded	No	Youth health care organisations	Yes	Yes	2-valent
Norway	12	12	Fully funded	Yes		Yes	Yes	2-valent
Poland	9-14	9-14	Fully funded	Yes	Geneal practitioners, community health clinics	No	Yes	2/9 valent
Portugal	10	10	Fully funded	No	Primary health centres, Private and public hospitals	Yes	No	9-valent
Romania	11-18	11-18	Fully funded	No	Primary healthcare specialists or other medical specialists having certification in vaccinology	No	No	9-valent
Slovakia	12	12	Fully funded	No	Self-governing region vaccination centres, Paediatricians	No	Yes	9-valent
Slovenia	11-12	11-12	Fully funded	Yes*		No	Yes	9-valent
Spain	12	12	Fully funded	Yes	primary care centres	Yes	No	2/4/9-valent
Sweden	10-12	10-12	Fully funded	Yes		Yes*	Yes	9-valent

NA not available

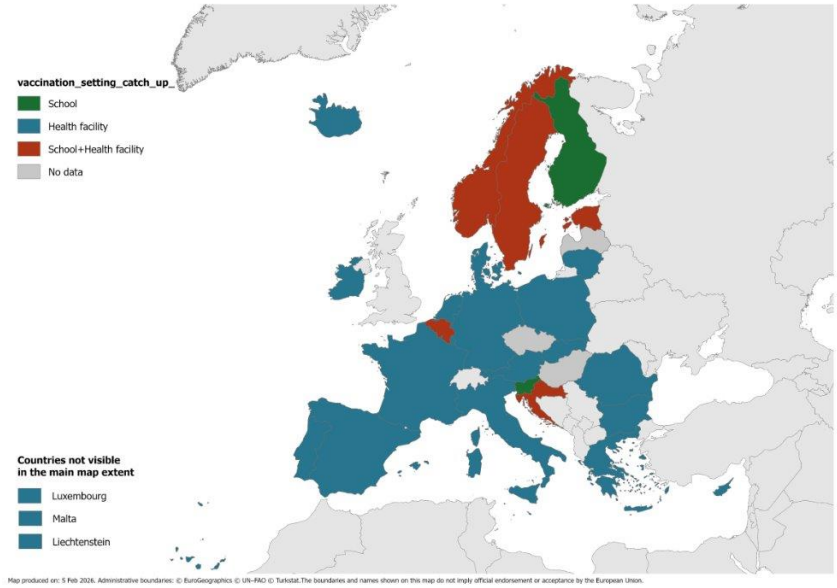
[a] In Croatia it is also possible to get the vaccine from nine years of age, for boys and girls.

[b] Czechia and Latvia did not respond to the ECDC survey and data were retrieved from ECDC vaccine scheduler and updated with the latest information available on the official national immunisation websites [11] [12] [13].

**Austria: vaccination setting varied by federal states and it is part of school-based programmes in some cases. Belgium: targeted age group is 13-14 years in French speaking community. France: fully funded (school or vaccination centres), partially funded (medical practitioners). Sweden: routines within school healthcare to regularly assess children's vaccination status and offer supplementary vaccinations if needed. Slovenia: HPV vaccination is carried out in health care centres, but in cooperation with schools which collect parental consent for vaccination and take children (accompanied by a teacher) to the health care centre for a systematic check-up and vaccination.*

Annex 6. Main features of catch-up HPV vaccination programmes in the EU/EEA,

Figure A4. Delivery setting of HPV vaccination in catch up groups in the EU/EEA, 2025



Notes:
In Slovenia, HPV vaccination is carried out in healthcare centres, but in cooperation with schools which collect parental consent for vaccination and take children (accompanied by a teacher) to the healthcare centre for a systematic check-up and vaccination.

Table A2. Overview of HPV catch-up vaccination programmes in the EU/EEA, 2025

Country	Target age groups, females	Target age groups, male	Funding	Vaccination channel	Reminder	Recommended vaccine products	Recommended doses
Austria*	9-20	9-20	Fully funded	General practitioners (GP), public vaccination centres, paediatricians	Vary by federal states	9-valent	2/3
Belgium	12-18	12-18	Fully funded / partially funded (vary by settings)	General practitioners (GP), paediatricians, schools	No	9-valent	2/3
Bulgaria	15-26	14-26	Not funded	General practitioners (GP)	No	9-valent	2
Croatia	9-25	9-25	Fully funded	School, public health institutes vaccination clinics	No	9-valent	2/3
Cyprus	14-26	14-26	Fully funded (≤17years) and for special groups (≤ 26 years)	Personal doctors and paediatricians	No	9-valent	3
Czechia	NR	NR	NR	NR	NR	NR	NR
Denmark	18	18	Fully funded	General practitioners (GP)	Yes	9-valent	3
Estonia	15-18	15-18	Fully funded	Schools, community clinics, general practitioners (GP)	Yes	9-valent	1
Finland	13-18	13-18	Fully funded	Schools	No	2-valent	2/3

Country	Target age groups, females	Target age groups, male	Funding	Vaccination channel	Reminder	Recommended vaccine products	Recommended doses
France**	26	26	Partially funded	Private midwifery clinics, Sexual health clinics, pharmacies, vaccination centres, general practitioners (GP)	No	9-valent	3
Germany	<18	<18	Fully funded	General practitioners (GP)	No	2/9-valent	3
Greece	15-18	15-18	Fully funded	Public health clinics, general practitioners (GP), paediatricians	No	9-valent	2
Hungary	NA	NA	NA	NA	NA	NA	NA
Iceland	<18	≤ 14 (birth cohort 2011 or later)[a]	Fully funded	Public health centres	No	9-valent	2
Ireland	≤ 24	≤ 24	Not funded	Public health clinics	No	9-valent	1
Italy	≤26	≤ 18	Fully funded	Vaccination clinics, cervical screening centres (in female)	Only for female aged 25-26 years with the screening invitation	NR	NR
Latvia	NR	NR	NR	NR	NR	NR	NR
Liechtenstein	15-26	15-26	Fully funded	General practitioners (GP)	No	9-valent	3
Lithuania	17	12-13	Partially funded	Personal health care institutions through E-Health	Partly	9-valent	2/3
Luxembourg	15- 20	15- 20	Fully funded	Private physician practices	Yes	9-valent	2
Malta	≤25	_	Fully funded	Primary health care clinics	No	9-valent	2/3
Netherlands***	_	_	Fully funded	Youth health care organisations	Yes	2-valent	2
Norway	13-19	13-19	Fully funded	Schools, community health clinics	Yes (up to 15 - 16)	2-valent	2/3
Poland	15-18	15-18	Fully funded	Community health clinics, general practitioners (GP)	No	2-valent	3
Portugal	17	17	Fully funded	Primary Health Care	Yes	9-valent	2/3
Romania	19-45	None	Partially funded	Primary healthcare specialists or other medical specialists having certification in vaccinology	No	9-valent	3
Slovakia	13- 14	13-14	Fully funded	Self-Governing region vaccination centres, Paediatricians	No	9-valent	1/2
Slovenia	13-25	13-25	fully funded	Schools, gynaecologists, general practitioners	No	9-valent	2/3
Spain	13-18		fully funded	Primary health centres	Yes	2/4/9-valent	1
Sweden	18-26	18-26	Decided by each region	Decided by each region	Decided by each region	9-valent	2/3
Sweden	26-30	NA	Fully funded	Cervical screening visits	Yes	9-valent	2

NR not reported, NA not available
**Austria - Under a temporary catch-up programme running from 1 July 2024 to 31 December 2025, people aged between 21 and 30 were able to get vaccinated free of charge against HPV (2-dose-schedule). This age group can still receive their final dose until 30 June 2026, provided that they received their first dose by 31 December 2025 as part of the programme.*
[a] In Iceland, catch-up target age groups in boys changed to 15-17/18 years (birth cohort 2008-2010), in May 2025, as single dose, implementing in both schools and primary care clinics, in May 2025.
*** France: target age groups for boys and girls extended until age 26 years in December 2025. ***Netherlands: no catch-up target age groups in 2025 but it was implemented in the past e.g. under 18 years in 2022-2023, and 18-26 years in 2023-2024.*

Annex 7. HPV vaccination coverage by the age of 15 in girls, first and last dose, EU/EEA, 2020-24

	First dose					Last dose				
Year of estimates	**2020**	**2021**	**2022**	**2023**	**2024**	**2020**	**2021**	**2022**	**2023**	**2024**
Austria	63	64	65	72	75	51	54	57	65	63
Belgium	77	77	77	80	80	69	69	69	72	72
Bulgaria	12	14	10	15	4	9	9	8	7	3
Croatia	25	20	47	48	53	25	20	47	48	53
Cyprus	58	59	73	73	73	64	64	64	67	67
Czechia	64	66	69	69	69	64	66	69	69	69
Denmark	**89**	**88**	**89**	**92**	**91**	**81**	**82**	**82**	**83**	**82**
Estonia	59	61	66	51	63	59	60	59	42	63
Finland	75	76	83	84	82	72	76	78	76	73
France	41	46	48	55	48	37	42	45	45	45
Germany	66	67	68	68	68	51	53	54	55	55
Greece										
Hungary	71	76	84	81	76	71	75	83	80	75
Iceland	**89**	**93**	**96**	**95**	**96**	**87**	**91**	**92**	**93**	**93**
Ireland	73	78	82	70	74	66	78	82	70	74
Italy	66	76	76	73	68	60	68	68	64	55
Latvia	45	46	51	55	58	34	37	43	44	54
Liechtenstein										
Lithuania	51	78	81	81	82	33	65	69	72	74
Luxembourg	76	80	85	86	87	68	74	80	81	82
Malta	**84**	**84**	**82**	**86**	**90**	**83**	**78**	**77**	**80**	**80**
Netherlands	62	72	68	66	65	61	69	68	66	65
Norway	**92**	**93**	**92**	**93**	**92**	**88**	**92**	**91**	**92**	**91**
Poland										
Portugal	**99**	**98**	**96**	**96**	**97**	**98**	**97**	**94**	**91**	**96**
Romania				14	23				14	23
Slovakia				24	33				20	29
Slovenia	40	42	44	52	61	40	42	44	52	61
Spain	**86**	**84**	**89**	**91**	**90**	**76**	**79**	**86**	**86**	**85**
Sweden	**86**	**89**	**89**	**90**	**91**	**80**	**84**	**85**	**85**	**86**

Source: World Health organization (WHO) immunization data portal [14]

Annex 8. HPV vaccination coverage by the age of 15 in boys, first and last dose, EU/EEA, 2020-24

#	First dose					Last dose				
Year of estimates	**2020**	**2021**	**2022**	**2023**	**2024**	**2020**	**2021**	**2022**	**2023**	**2024**
Austria	45	46	47	52	53	37	39	41	47	45
Belgium	71	71	71	73	73	64	64	64	65	65
Bulgaria										
Croatia	16	14	31	36	32	16	14	31	36	32
Cyprus				50	50				50	50
Czechia	32	38	42	43	43	32	38	42	43	43
Denmark		75	80	90	88		66	70	80	78
Estonia					44					44
Finland	64	64	66	73	74	61	61	61	65	65
France		6	13	26	37		8	16	25	25
Germany	30	38	43	46	46	17	26	31	34	34
Greece										
Hungary				68	62				68	61
Iceland										
Ireland			75	67	70			68	67	70
Italy	24	61	64	62	58	20	53	56	53	46
Latvia										
Lithuania										
Luxembourg				68	81				60	73
Malta					68					51
Netherlands										
Norway		91	91	91	90		90	89	90	88
Poland										
Portugal					95					91
Romania										
Slovakia				8	13				6	11
Slovenia										
Spain										
Sweden					86					82

Source: World Health organization (WHO) immunization data portal [14]

Annex 9. Vaccination acceptance and strategies to increase uptake

The estimates of immunisation coverage presented earlier in this report show that more work is needed to promote HPV vaccination acceptance and uptake. Vaccination coverage varies significantly across EU/EEA countries and the estimates of coverage in several countries are still far from the goals established for 2030 in the global Cervical Cancer Elimination Initiative and the Council Recommendation on Vaccine-Preventable Cancers. Data also show that not all individuals who got a first dose completed the recommended vaccination course.

An extensive body of research is available that documents which factors impact the uptake on the demand-side of vaccination programmes, such as those linked to citizen's acceptance or refusal of the HPV vaccine. Factors related to people's attitudes, knowledge and perceptions can vary across countries and specific population groups. Further, due to the specific target groups of this vaccine, some of the factors that impact uptake can differ from those affecting uptake of other vaccines. In the following section, key findings from research in these areas, as well as evidence of effective strategies related to communication and behavioural interventions to increase HPV vaccination acceptance and uptake, are summarised.

Factors related to attitudes, knowledge, perceptions, and socio-cultural norms

Ten thematic categories related to hesitancy towards HPV vaccine in Europe were identified in a systematic literature review from 2019, commissioned by ECDC [85]. The most reported issues were: perceived insufficient and/or inadequate information and knowledge about the vaccine, followed by concerns about potential side effects. Also mistrust of health authorities, healthcare workers, and new vaccines were often mentioned, as well as doubts about vaccine effectiveness. Given that determinants differed by country and population groups, the importance of context-specific interventions and community engagement strategies was highlighted in this review.

A study on vaccine confidence in the EU in 2022, which also looked at confidence in HPV vaccination and compared results with a similar study done in 2020, revealed a drop in confidence in the HPV vaccine in most EU Member States in 2022 [86]. Agreement with the statement that the HPV vaccine is important had decreased in 17 countries. In healthcare professionals, confidence in the vaccine remained high, but with high variability between countries in terms of the likelihood to recommend the HPV vaccine.

Socio-cultural norms can also impact acceptance of the HPV vaccine [87,88]. In population groups where a single lifetime partner is a widespread norm, the HPV vaccine may be perceived as unnecessary. Some parents may fear that the vaccine could encourage sexual promiscuity, and the vaccines' aim to prevent sexual transmission of HPV can evoke moral judgements around sexual behaviour.

As HPV vaccination programmes have evolved to become gender-neutral, differences in knowledge and attitudes between boys and girls can also play a role in levels of uptake. Studies on vaccine acceptance in adolescents have shown that girls had greater knowledge of HPV infection than boys, and more favourable attitudes towards HPV vaccination [89].

Impact of circulating misinformation on HPV vaccines

The Council Recommendation on vaccine-preventable cancers [7] highlights the need to fight the circulating mis- and disinformation around HPV vaccination. The negative effects of circulating narratives on HPV vaccination programmes have been continuously mentioned in studies on acceptance and uptake of the vaccine. Hence, the need for robust data on the effectiveness and safety of the vaccine has also been highlighted in studies, as such data can in turn support communication initiatives and address concerns of parents/caregivers, children and adolescents, as well as healthcare providers.

Two recent and parallel Cochrane reviews addressed the need for robust data and discussed the usefulness of tackling misinformation. One study evaluated the safety and efficacy of HPV vaccines (via a network meta-analysis of RCTs) and the other assessed the population-level effects on HPV-related disease and harms from vaccination [90] [91] . Both studies recognise that with the global reach of social media, dissemination of information regarding adverse effects of vaccination can be extremely pervasive, and mention that the vaccine is a 'major target for misinformation'. It is important to perform such studies to provide robust and unbiased evidence on the benefits and safety of the vaccines and enable fully informed decision making. The population-based study included a search on social media platforms of the most common narratives around serious adverse events. Results of the study show that there is evidence that HPV vaccination does not increase the risk of the most common adverse events that have been reported on social media.

Impact of safety scares on vaccination programmes

As shown by the experiences in some EU countries as well as in other regions, vaccine scares related to adverse events can be highly damaging for vaccination programmes. The HPV vaccination programmes in Denmark and Ireland were heavily impacted some years ago by negative information and rumours around alleged vaccine adverse events, which circulated widely via news media and social media. The drop in confidence in the vaccines could only be reverted after comprehensive and dedicated efforts [92].

Evidence on effective strategies to promote HPV vaccination acceptance and uptake

Given the variety of factors that can influence vaccination acceptance and uptake of HPV vaccination as described above, a key step for implementing effective strategies is diagnosing the locally relevant barriers and facilitators, in developing tailored interventions. A tool that can support such efforts was published in an ECDC report [93]. It is a survey tool, available in all EU/EEA languages, that can be adapted for the specific needs of each country to collect social and behavioural data on vaccination acceptance and uptake. The tool is based on the 5Cs model, and provides a structured way of understanding the core areas that may influence an individual's willingness and readiness to get vaccinated (confidence, complacency, constraints, calculation and collective responsibility).

Further, the ECDC report also provides a library of interventions in EU/EEA countries aimed at increasing vaccination acceptance and uptake, including on the HPV vaccination. The interventions listed there show the variety of possible approaches, going beyond more traditional approaches of raising awareness and providing information. Examples include an initiative from Denmark, where dialogue-based interventions focused on events organised with people from ethnic minority backgrounds, to understand their concerns and barriers in relation to the vaccines, and to foster trust in health services and public health authorities. Another example comes from Germany, with an intervention focused on supporting healthcare providers in their conversations with service users, looking at their training needs, e.g. on difficult topics to address in relation to HPV vaccination, and providing training on motivational interviewing techniques linked to HPV vaccination topics.

Effective strategies to increase HPV vaccination acceptance and uptake have been assessed and widely described in a number of studies. An overview of key findings is presented below:

Importance of multicomponent strategies: An umbrella review from the European Cancer Organisation on the evidence for effective interventions to improve HPV vaccination intention and uptake, highlights that there is 'no single magic bullet solution to increase vaccination uptake or intention' [94]. Furthermore, different approaches may be more suited to some populations than others. Face-to-face presentations and printed information, supplemented with additional components (that can include a variety of actions), appeared to be effective to increase vaccination intention. This review also confirms the importance of reminders and multi-component strategies, especially those that include interventions aimed at the provider level.

Training of healthcare providers: A study from the EU-funded project Protect Europe [95] highlights that healthcare providers may not be prepared to address the variety of concerns around HPV vaccination in the populations they serve. Albeit some themes tend to recur in most populations (e.g. lack of knowledge about the infection, misinformation about the vaccine), there are variations given the diversity of population groups. This highlights the need to adapt the conversations to the characteristics, concerns and interests of specific audiences. Trainings in multicultural communication and provision of tools to facilitate recommendations (support materials, translations), as well as involving other actors, such as schools, cultural mediators and influencers, can support this aim.

Strategies to address drops in uptake: Given the experiences described further above on the impact of safety scares on HPV vaccination programmes, there is a need for countries to have in place robust communication strategies, including crisis communication plans, to address any such potential crisis. The strategies implemented by Denmark and Ireland [92] included cross-sectoral alliances for communication efforts, multi-channel communications, exploring perceptions and concerns to adapt communication materials accordingly, combining factual information with the personal stories of women with cervical cancer, use of social media to engage with audiences and working with trusted sources in the communities.

Addressing information needs: Given that lack of information and health literacy related to HPV infection and the vaccine are consistently reported in the literature as a barrier to uptake, awareness raising initiatives and addressing unmet information needs are a key element of effective interventions. An example of how to address this comes from England's EDUCATE project. Educational resources were developed for use in lessons within the school-based HPV vaccination programme, in order to support decision-making of young people on HPV vaccination [96]. A key feature of this project was that the materials were co-produced with adolescents.

Further to the messaging around HPV vaccination, a systematic review looked at how different messages related to HPV-associated outcomes (prevention of sexually transmitted infection, anogenital warts and/or cancer) influence intentions or initiation of the vaccination series [97]. The review concludes that while many studies found support for cancer prevention messages, some studies also found equal or greater support for messages focusing on prevention of sexually transmitted infection/anogenital warts. The variability was observed within and between studied populations (parents/adults, adolescents, young adults, healthcare providers, and adult males) and gender (male and female adolescents).

Context-specific, tailored interventions to address communities underserved by healthcare providers: A realist review of interventions to increase uptake of HPV vaccination (and MMR vaccination) in communities underserved by healthcare providers in Europe [98] concludes that improving uptake in these populations requires contextually tailored interventions. This review was done in the context of the EU-funded RIVER project, and highlights the importance of multicomponent strategies. Researchers flag that given the heterogeneity of particular minority populations, a one size-fits-all approach is inadequate for addressing the unique barriers faced by these communities. Universal enablers (trust, clear communication) need to be combined with group-specific cultural and social targeted strategies.

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