4PCAN

# D2.6 – HPV and HBV vaccination policies and best practices in 4P-CAN countries

February 2025

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# List of Abbreviations

| | |
|---|---|
| **CC** | Cancer Control |
| **CPMS** | Psych-medical-social Centres |
| **CPP** | Cancer Primary Prevention |
| **CRC** | Colorectal Cancer |
| **DGMAS** | General Directorate of Medical and Social Assistance |
| **ECDC** | European Centre for Disease Prevention and Control |
| **EEA** | European Economic Area |
| **EU** | European Union |
| **HBsAG** | Hepatitis B surface antigen |
| **HBV** | Hepatitis B Virus |
| **HPV** | Human Papillomavirus |
| **ICCP** | International Cancer Control Partnership |
| **MSM** | Men who have Sex with Men |
| **NCD** | Non-Communicable Diseases |
| **OECD** | Organisation for Economic Cooperation and Development |
| **PEN** | Policy Evaluation Network |
| **PWID** | People who Inject Drugs |
| **UICC** | Union for International Cancer Control |
| **WCRF** | World Cancer Research Fund International |
| **WHO** | World Health Organization |

# Executive Summary

Cancer remains a significant public health issue across Europe, with disparities in prevention efforts, particularly in vaccination rates for Human Papillomavirus (HPV) and Hepatitis B virus (HBV), contributing to high mortality rates. The 4P-CAN project aims to address these challenges by mapping vaccination policies and cancer prevention efforts among participating countries, identifying best practices, and offering insights to close the gap between Eastern and Western Europe in terms of HPV and HBV vaccination coverage. This report provides a comprehensive analysis of vaccination policies, epidemiological trends, and prevention programs across the 4P-CAN countries, highlighting an urgent need for tailored interventions to improve public health outcomes, particularly in Easter European countries.

Today, HPV is responsible for 5% of all cancers globally, with cervical cancer being the most common malignancy linked to the infection. Despite the availability of effective vaccines, HPV prevalence and related cancer incidence remain significantly higher in Eastern Europe due to low vaccination and screening rates. Similar trends are seen with HBV, which can lead to mortal diseases such as liver cirrhosis and cancer. Disparities in HBV vaccination programs mirror those of HPV, with countries in Eastern Europe lagging behind their Western counterparts in achieving the World Health Organization's (WHO) immunisation targets. These differences underscore the importance of implementing more effective public health initiatives to increase vaccination uptake.

Despite the introduction of national HPV vaccination programs in most Eastern European countries after 2018, vaccination rates remain low, with Romania and Bulgaria reporting coverage as low as 6%. Conversely, Western European countries like Portugal and Belgium have nearly reached WHO targets, with Portugal achieving 90% coverage for girls and 88% for boys. The low uptake in Eastern Europe can be attributed to factors such as vaccine hesitancy, misinformation, limited access to healthcare facilities, and a lack of targeted campaigns for vulnerable groups.

Similarly, HBV vaccination coverage varies widely across Europe. While countries like Belgium and Portugal have achieved coverage rates close to 99%, some Eastern European countries, such as Montenegro, report alarmingly low rates of 42%. The mandatory nature of the HBV vaccine in some countries has not consistently resulted in higher uptake, pointing to deeper issues such as low vaccine confidence and public distrust in government and healthcare systems. Addressing these concerns through targeted educational campaigns and improved access to reliable healthcare information is essential to increasing vaccination rates in these regions.

Moving forward, the 4P-CAN project aims to implement nationwide surveys to assess

public knowledge of cancer prevention and vaccination. Pilot campaigns targeting vulnerable groups in Romania and Bulgaria will be launched, with the aim of increasing, amongst other, vaccine awareness and improving coverage rates. These pilot programs could potentially serve as models for other countries, including France and Italy, where HPV vaccination rates remain below expectations. By promoting best practices, rebuilding public trust, and ensuring regionally tailored interventions, significant improvements in vaccination uptake and cancer prevention can be achieved across Europe as a whole.

The findings of this report could inform policy recommendations as part of Europe's Beating Cancer Plan, contributing thus to a coordinated effort to reduce the socioeconomic burden of preventable HPV and HBV-related cancers.

# 1. Introduction

## a. Deliverable objective and scope

Cancer remains a major public health challenge across Europe, with high mortality rates driven largely by preventable causes. The disparity in prevention efforts between Western and Eastern Europe is stark, particularly concerning risk factors like smoking, obesity, and low vaccination rates for Human Papillomavirus (HPV) and Hepatitis B virus (HBV) (1).

HPV is responsible for approximately 5% of all cancers globally, with cervical cancer being the most common malignancy linked to the virus (2). Despite the availability of effective vaccines, HPV prevalence remains significantly higher in Eastern Europe compared to other regions, contributing to higher rates of cervical cancer. Similarly, cervical cancer screening rates vary widely, with countries like Romania having much lower screening rates compared to Western European countries (3). These discrepancies highlight the need for targeted interventions to reduce the burden of HPV-related cancers across Eastern European countries.

On the other hand, Hepatitis B virus (HBV), another vaccine-preventable disease, also poses a significant health threat in Europe, particularly in countries with lower vaccination rates. HBV primarily affects the liver and can lead to serious complications such as cirrhosis and liver cancer. In 2020, approximately 14,428 cases of hepatitis B were reported across 29 EU/EEA (European Economic Area) member states, with significant disparities in incidence rates between countries (4). The burden of HBV remains a concern, particularly in regions where vaccination programs are less effective, underscoring the need for stronger public health initiatives to control the spread of the virus.

As vaccine-preventable diseases like HPV and HBV continue to drive high cancer incidence and mortality rates, particularly in Eastern Europe, there is a pressing need for effective strategies to address the gaps in vaccination and implemented programs. The 4P-CAN project aims to tackle this challenge by analysing how cancer cases and prevention efforts vary across the project's partners. By examining the differences in related policies and identifying best practices, the project seeks to develop actionable strategies that can inspire and guide Eastern European countries in improving their vaccination rates.

## b. Relation to other WPs and deliverables

The present deliverable is part of Task T2.3, which focuses on identifying barriers and opportunities in HPV and HBV vaccination. This deliverable is closely linked to Work Packages WP4 - Targeted public health communication campaigns and WP6 – Multi-stakeholders' co-creation of Cancer Prevention and Control (CPP) policy recommendations. The conclusions drawn from this document will play a pivotal role in supporting these objectives. Additionally, this report could potentially serve as a tool to inform HPV vaccination campaigns as part of the Implementation Roadmap for Europe's

Beating Cancer Plan (WP7).

### c. Content of the deliverable

The presented report provides a comprehensive overview that includes a detailed description of the methodology used in the analysis, profiles of both EU and non-EU countries in relation to HPV and HBV cancer-related epidemiology, as well as an examination of current policies and programs in these regions. Additionally, the report highlights key relevant actions that have the potential to serve as best practices for improving vaccination efforts. Finally, it offers conclusive remarks that can support the development of policy recommendations and potentially inform ongoing HPV vaccination campaigns as part of Europe's Beating Cancer Plan.

# 2. Methodology

## d. Search Strategy and Study Selection

To conduct this study, a comprehensive search was performed, including eligible studies such as scoping reviews, systematic reviews, quantitative and qualitative research, and grey literature. The focus was on publications providing information on HPV and HBV policies and best practices from 2010 to 2024 (studies before 2010 were only accepted if relevant). Studies published in English, or the native languages of the 4P-CAN countries were considered. In addition, due to the exploratory nature of the report, a snowballing approach was employed to identify additional relevant sources, expanding the scope of the initial search.

The databases used for this study included PubMed, Cochrane Library, and Google Scholar. For the literature review, the search was conducted using the following keywords and Boolean operators –the search was applied to each one of the 4P-CAN countries independently–:

| | | |
|---|---|---|
| ▪ HPV<br>▪ HBV | AND | ▪ Vaccination policies<br>▪ National vaccination programme<br>▪ National vaccination plan<br>▪ NCDs prevention/plan/programme/policies<br>▪ Vaccination best practices/campaigns/initiatives |

Grey literature will be sourced from the repositories of the following international organisations: World Health Organization (WHO), Knowledge Action Portal on NCDs (Non communicable diseases), Organisation for Economic Cooperation and Development (OECD), European Commission (EU), European Centre for Disease Prevention and Control (ECDC), International Cancer Control Partnership (ICCP), Union for International Cancer Control (UICC), World Cancer Research Fund International (WCRF), and the Policy Evaluation Network (PEN), as well as the ICCP website. For national, non-English databases, the search will focus on government bodies responsible for the implementation, monitoring, and evaluation of policies, strategies, and actions—specifically, Ministries of Health and Directorates-General for Health in each 4P-CAN country, as well as other relevant entities identified by national stakeholders.

## e. Data Collection Process, Study Selection and Extraction

To collect the data, a standardised form was developed to include the following fields: geographical coverage, document link, name of the document, issuing organisation, format (e.g., report, program, public act, scientific article, presentation, website), year of publication, topic (e.g., epidemiology, prevalence, data), proposing organisation, and

additional comments.
A three-stage approach was employed to include or exclude studies in the final review process. Screening was conducted sequentially based on (1) the title, (2) the abstract, and (3) the full text. The final selection of sources was reviewed by a second external reviewer to ensure comprehensive coverage. A total of 127 sources were included in the study, with additional sources identified through the snowballing approach.

Information was extracted from various sources, with notable references including GLOBOCAN, WHO HPV and HBV coverage rates and immunisation schedules, the ECDC immunisation schedule, the HPV Policy Atlas, HPV Centre national reports, and the ECDC HBV report. These sources played a critical role in informing the final report.

# 3. Results

## EU Country Reports

### Belgium

#### HPV Country Profiling

**National epidemiology for women only HPV-related cancers: cervical, vulvar and vaginal cancers**

| | Cervical Cancer | Vulvar Cancer | Vaginal Cancer |
|---|---|---|---|
| Annual number of new cancer cases | 531 | 265 | 53 |
| Crude incidence rate | 9.0 | 4.5 | 0.9 |
| Annual number of new cancer deaths | 231 | 69 | 20 |
| Crude mortality rate | 3.9 | 1.2 | 0.3 |
| 5-year prevalence (per 100,000) | 1.0 | 0.3 | 0.1 |

**Table 1.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Cervical, Vulvar, and Vaginal Cancers per 100,000 Population in Belgium (2022)[1].

In 2022, Belgium recorded 531 new cases of cervical cancer, with a crude incidence rate of 9.0 per 100,000—an increase from 2020 (data for 2020 sourced from the Human Papillomavirus and Related Disease Report Belgium (6)). Cervical cancer remained a significant public health concern, ranking as the 13th most common cancer among females and the 4th most prevalent among women aged 15 to 44. The highest incidence occurred in women aged 45–49, followed by a decline in older age groups. That year, 231 deaths were reported, resulting in a crude mortality rate of 3.9 per 100,000. The 5-year prevalence rate rose slightly to 1.0, underscoring the persistent impact of the disease.

When compared to its 4P-CAN partners, Belgium had the second-lowest incidence rate, with only Italy reporting a lower rate (8.0). Its mortality rate was among the lowest, alongside Ireland (3.5) and Italy (3.7).

For vulvar cancer, Belgium reported 265 new cases in 2022, with a crude incidence rate of 4.5 per 100,000—a decline from 2020. Most deaths occurred in the 85+ age group, with 69 fatalities recorded, resulting in a crude mortality rate of 1.2. Despite the decrease in incidence, Belgium's rate remained comparable to Romania's (4.8), while its mortality

[1] All data on new cases, deaths, crude incidence, mortality rates, and 5-year prevalence for cervical, vulvar, and vaginal cancers in the 4P-CAN countries, unless otherwise specified, were retrieved from the Global Cancer Observatory (https://gco.iarc.who.int/en) (5).

rate matched that of Bulgaria. The 5-year prevalence rate remained stable at 0.3 per 100,000.

Vaginal cancer remained less prevalent but continued to pose a health concern, with 53 new cases and a crude incidence rate of 0.9 per 100,000 in 2022. That year, 20 deaths were reported, leading to a crude mortality rate of 0.3. The 5-year prevalence rate was 0.1 per 100,000, slightly lower than in 2020. Notably, Belgium's incidence and mortality rates for vaginal cancer exceeded those of several Eastern European countries, including Romania, Montenegro, North Macedonia, Moldova, and Ukraine.

**Men only HPV-related cancer: penile cancer**

In 2022, Belgium reported 95 new cases of penile cancer, a decline from 120 cases in 2020 (7). That year, the crude incidence rate stood at 2.09 per 100,000, closely aligning with the Western European average of 2.18 but nearly double the global average of 0.92. The crude mortality rate in 2020 was 0.15, significantly lower than the Western European rate of 0.53 but in line with the global average of 0.34.

Age-specific incidence rates peaked among individuals aged 65 to 74, while the highest number of deaths occurred in the 65–79 age group, followed by those aged 85+ and 55–59. Incidence rates in Belgium were comparable to those of France (1.5), while mortality rates mirrored those of the Republic of Moldova.

Although penile cancer is less common than other HPV-related malignancies, such as cervical, vulvar, or oropharyngeal cancers, it remains a notable public health concern in Belgium. In 2022, the estimated 5-year prevalence rate reached 0.13, exceeding that of vaginal cancer. This underscores the need for continued awareness and proactive measures to address the disease.

**Gender Neutral HPV-related cancers: anal and oropharyngeal cancers**

| | Anal Cancer | | Oropharyngeal Cancer | |
|---|---|---|---|---|
| | Female | Men | Female | Men |
| Annual number of new cancer cases | 143 | 97 | 141 | 385 |
| Crude incidence rate | 2.4 | 1.7 | 2.4 | 6.7 |
| Annual number of new cancer deaths | 29 | 31 | 58 | 134 |
| Crude mortality rate | 0.5 | 0.5 | 1 | 2.3 |

**Table 2.** New cases, deaths, crude incidence, mortality rates, and 5-year prevalence of anal and oropharyngeal cancer per 100,000 population in Belgium (2022)[2].

In 2022, Belgium recorded 143 new cases of anal cancer among women and 97 among

[2] All data on new cases, deaths, crude incidence, mortality rates, and 5-year prevalence for anal and oropharyngeal cancers in the 4P-CAN countries, unless otherwise specified, were retrieved from the Global Cancer Observatory (https://gco.iarc.who.int/en)

men, reflecting a slight increase from 2020. The crude incidence rates stood at 2.4 per 100,000 for women and 1.7 for men—both below the Western European averages but above global figures.

Mortality rates were similar between genders, with 29 deaths among women and 31 among men, both corresponding to a crude mortality rate of 0.5 per 100,000. These figures remained consistent with 2020 data, with the highest mortality rates observed in the 85+ age group for both sexes.

Belgium follows a pattern seen in other 4P-CAN partner countries, where anal cancer incidence and mortality rates tend to be higher in women than in men. Notably, Belgium had the second-highest female incidence rate, surpassed only by Italy (2.8), and the third-highest male incidence rate. In terms of male mortality, Belgium ranked third, following Romania (0.9) and Portugal (0.6).

For oropharyngeal cancer, 526 new cases were reported in 2022, including 385 in men and 141 in women. This marks an increase compared to 2020 figures. The crude incidence rates stood at 6.7 per 100,000 for men and 2.4 for women—both higher than the global average but still below Western European norms. Notably, Belgium had the second-highest female incidence rate among partner countries, surpassed only by France (2.9).

The most affected age groups were men aged 60–64 and women aged 55–64. Mortality rates remained significant, with 134 deaths in men and 58 in women in 2022, closely mirroring the 2020 data. Among men, the highest mortality was recorded in the 60–64 age group, while for women, it was in those aged 85 and older. This disparity may suggest a more aggressive disease progression in men, potentially influenced by lower vaccination coverage.

Belgium also recorded the highest female mortality rate for oropharyngeal cancer among all 4P-CAN partner countries, underscoring the ongoing burden of the disease and the need for targeted prevention strategies.

## HPV Vaccination Policies

**HPV national vaccination guidelines and coverage rates**

| | Girls | Boys |
|---|---|---|
| National Policy on HPV vaccination | Yes, in form of recommendation | Yes, in form of recommendation |
| Year of Introduction | 2007 | 2019 |
| HPV in national immunisation calendar | Yes | Yes |
| Availability of National HPV registry | Yes | Yes |
| Financing of Vaccine | Free of charge | Free of charge |

**Table 3.** HPV vaccination policies and program details for boys and girls: national guidelines, introduction year, and vaccine financing in Belgium. Data retrieved from the Human Papillomavirus and Related Disease Report Belgium and HPV Prevention Policy Atlas.

In 2007, the Superior Health Council of Belgium announced national recommendations for HPV vaccination, targeting girls aged 10 to 13 and supporting catch-up vaccination for females aged 14 to 26 (8). In response to rising incidences of other HPV-related cancers, such as oropharyngeal cancer in men, the Council updated its recommendations in 2017 to include both boys and girls, with catch-up vaccination for both genders aged 15 to 26 (Table 3).

| | Girls | Boys |
|---|---|---|
| HPV Vaccination Schedule | Advised vaccination between 9 and 14 years old | Advised vaccination between 9 and 14 years old |
| HPV first-dosage coverage (%) | 80% | 73% |
| HPV last-dosage coverage (%) | 72% | 65% |

**Table 4.** HPV vaccination schedule and coverage rates for girls and boys in Belgium in 2023. Source: WHO Human Papillomavirus (HPV) Belgium vaccination coverage.

HPV immunisation programs in Belgium are managed by community governments, leading to variations in vaccine administration, catch-up, and coverage rates across regions. The vaccination uptake in Flanders is 90%, compared to 36% in Wallonia-Brussels (9). As shown in Table 4, Belgium's national vaccination coverage rate is still below the WHO target of 90%. The vaccine coverage rate for females, however, has slightly increased over the years. Similarly, the coverage percentage for males remained steady from 2020 until 2021 (10).

Currently, Belgium has a routine vaccination program offering the HPV vaccine free of charge to boys and girls, primarily administered by doctors and nurses (11). Vaccinations can also be obtained through reimbursement by the National Institute for Health and Disability Insurance or purchased at full price from pharmacies. National reimbursements are mainly available for catch-up HPV vaccination for girls aged 12 to 18 years (12).

The vaccines are further aimed to be administered before the target population becomes sexually active. According to recent data, the percentage of 15-year-old females who have had sexual intercourse is 18%, similar to that of boys (20%) (13).

### Other national preventive measures

| | |
|---|---|
| National screening program for cervical cancer | Yes, mature organised population-based intervention |
| Screening Ages | Varies across regions (e.g., Flemish region: 25-64 years) |
| Type of test provided | PAP[3] and HPV |
| Financing of Screening | Mostly reimbursed |

[3] Pap smear test: procedure to test for cervical cancer in women. A Pap smear involves collecting cells from your cervix — the lower, narrow end of your uterus that's at the top of your vagina.

**Table 5.** HPV national cervical cancer screening program: overview, ages, test types, and financing. Data Source: Human Papillomavirus and Related Disease Report Belgium.

Implementing efficient cervical cancer screening interventions can help detect cervical disease early, and treatment can prevent cervical cancer. Regular screening can reduce the incidence and mortality associated with this type of cancer by 90%. The global strategy recommends at least two lifetime screens with a high-performance HPV test, once by age 35 and again by age 45. Since precancers rarely cause symptoms, regular cervical cancer screening remains crucial, even for those vaccinated against HPV (14).

Belgium has official national recommendations for cervical screening, initiated in 2013. Women receive active invitations to screening, and 85% of women aged 25 to 65 have been screened for cervical cancer at some point in their lives. Comprehensive information on HPV, cervical cancer, screening, and vaccine access is readily available on the government website, ensuring excellent discoverability.

### Case studies of additional strategies and best practices for enhancing HPV vaccination

**HPV vaccination awareness campaign in the Wallonia-Brussels Federation**

In 2023, the non-profit organisation O'YES, in collaboration with the French Speaking Student Committee, launched a comprehensive awareness campaign aimed at increasing HPV vaccination coverage within the Wallonia-Brussels Federation. This initiative was driven by concerning statistics from O'YES, which revealed that less than 50% of young people in the region are vaccinated against HPV. The campaign set an ambitious goal to reach over 500 schools, distributing posters and informative letters to parents to raise awareness about the importance of vaccination.

To ensure the message reached a broader audience, psycho-medical-social centres (CPMS) were also involved. A circular from the office of the Minister of Education, was distributed to emphasise the critical role of HPV vaccination. This initiative underscores the recommended ages for full vaccination and the availability of catch-up vaccines for both boys and girls up to and including 18 years of age. The campaign further promoted the website les-hpv.be, which serves as a hub for regularly updated information from key stakeholders, ensuring that both parents and students have access to accurate and current details about the vaccination process (14).

**Legal challenge for HPV vaccination reimbursement**

In 2022, a legal complaint by a young boy highlighted a significant issue in the HPV vaccination scheme in Belgium. The complaint centred on the lack of reimbursement for the HPV vaccine for boys who were not part of the school vaccination program, requiring them to pay €400 out-of-pocket. The Brussels Labour Court ruled that this reimbursement scheme violated the Gender Act and the Anti-Discrimination Act, as it unfairly disadvantaged boys compared to girls who received the vaccine through the school program.

In response to this ruling, O'YES and its partners took decisive action to address the

inequity. They authored a carte blanche directed at the Health Ministry, advocating for policy changes to ensure equal access to HPV vaccination for all eligible individuals. Additionally, they submitted a formal request to the Medicines Reimbursement Committee, calling for catch-up reimbursement for boys up to and including 18 years of age. This advocacy effort aims to rectify the reimbursement gap and ensure that all young people have equitable access to HPV vaccination (15).

## HBV Country Profiling

### National epidemiology for HBV and HBV-related cancers: liver and intrahepatic bile ducts

In 2022, Belgium reported a total of 1,670 cases of hepatitis B. Prior to this, the prevalence of hepatitis B surface antigen (HBsAg) in the general population was estimated to be around the interval of 0.5-0.99% up to 2021. However, prevalence rates vary significantly across specific minority groups. Data indicates that first-time blood donors exhibited a relatively low prevalence of 0.07%. In contrast, men who have sex with men (MSM) had a notably higher prevalence of 2.30%, people who inject drugs (PWID) had a prevalence of 1.88%, and prisoners showed a prevalence of 1.10%. The highest prevalence was observed among migrants, with a rate of 4.62%. In 2019, the crude mortality rate for hepatitis B was estimated at 1.65 per 100,000 population, reflecting a significant decrease over the past 20 years. In comparison, the rate was modelled at 2.25 per 100,000 population two decades earlier (16) .

| | Liver and intrahepatic bile ducts | |
|---|---|---|
| | Female | Male |
| Annual number of new cancer cases | 429 | 901 |
| Crude incidence rate | 7.3 | 15.6 |
| Annual number of new cancer deaths | 364 | 778 |
| Crude mortality rate | 6.2 | 13.4 |
| 5-year prevalence (per 100,000) | 7.1 | 18.4 |

**Table 6.** New cases, deaths, crude incidence, mortality rates, and 5-year prevalence of liver and intrahepatic bile ducts per 100,000 Population in Belgium (2022)[4].

In the same year, 901 cases of liver cancer were reported among males, resulting in a crude incidence rate of 15.6. Among females, the crude incidence rate was 7.3, corresponding to 429 new cases. The female incidence rate closely mirrored that of Bulgaria (7.9), while the male incidence rate was similar to Ireland (13.1).

Mortality rates were also elevated for both sexes. However, the female mortality rate was

[4] All data on new cases, deaths, crude incidence, mortality rates, and 5-year prevalence for liver and intrahepatic bile ducts cancers in the 4P-CAN countries, unless otherwise specified, were retrieved from the Global Cancer Observatory (https://gco.iarc.who.int/en)

the second lowest among the 4P-CAN partner countries, surpassed only by Ukraine, which had a rate of 3.4. In contrast, male mortality rates were comparable to those observed in Bulgaria (12.7), France (14.1), and Ireland (12.3).

Finally, the observed five-year prevalence followed a pattern consistent with the mortality rates mentioned, further underscoring these trends.

## HBV Vaccination Policies

**HBV national vaccination guidelines and coverage rates**

| | Universal vaccination |
|---|---|
| National Policy on HBV vaccination | Yes, in form of recommendation |
| Year of Introduction | 1999 |
| HBV in national immunisation calendar | Yes |
| Availability of National HBV registry | Yes |
| Financing of Vaccine | Free of charge |

**Table 7.** HBV vaccination policies and program details: national guidelines, introduction year, and vaccine financing in Belgium.

In Belgium, the HBV vaccine has been recommended since 1996, with a partially refunded cost for children under 13 years of age. In 1999, a free-of-charge HBV vaccination program was introduced for both infants and catch-up vaccinations for adolescents. Infants received the vaccine starting at three months old, while adolescents were offered a catch-up dose between the ages of 10 and 13. However, similar to other vaccination programs like HPV, HBV vaccination rates have not always been consistent across different regions, including Flanders, Wallonia, and the Brussels-Capital region (17).

In addition, Belgium has implemented an antenatal HBV screening program, recommended during the first trimester of pregnancy and reimbursed through health insurance. The country also conducts specific HBV vaccination programs targeting at-risk populations, including healthcare workers (vaccination policy implemented in 1983), people who inject drugs, and sex workers (18).

| | Universal vaccination |
|---|---|
| HBV Vaccination Schedule | Advised vaccination at 2, 3, 4 months |
| HBV three dosage coverage | 97% |

**Table 8.** HBV vaccination schedule and coverage rates in Belgium in 2023. Data Source: ECDC Hepatitis B: recommended vaccinations and WHO Hepatitis B Belgium vaccination coverage.

Hepatitis B vaccination is recommended nationally at 2, 3, and 4 months of age. However, if a baby is born to a mother infected with hepatitis B, they will receive an additional dose at birth, administered alongside hepatitis B immunoglobulin to provide immediate protection.

In 2023, official estimates indicated that Belgium achieved 97% coverage for the three-dose hepatitis B vaccination series, surpassing the WHO target of 95%. This high level of coverage has been maintained steadily in recent years, with only a slight decline from 2015, when coverage was reported at 98%.

## Case studies of additional strategies and best practices for enhancing HBV vaccination

**Long-term evaluation of the 1999 HBV vaccination program in Belgium**

To evaluate the long-term impact of the 1999 HBV vaccination program, data on seroprotection and residual sera were collected during two key periods: 2002-2003 and 2006-2007. This approach allowed for a thorough assessment of the program's effectiveness over time, examining changes in immunity levels and identifying any gaps in protection that required attention.

The initial cohort study conducted between 2002 and 2003 revealed that 46.9% of children aged 1-19 had positive anti-HBs antibodies, indicating successful vaccination. Additionally, 2.2% of the cohort had evidence of previous HBV infection, while 0.9% were positive for HBsAg, suggesting active infection. By the follow-up survey in 2006-2007, an increase in vaccination rates was observed, particularly in cohorts targeted after 2002. Notably, the 1989-1994 cohort showed a significant rise in vaccination status, reflecting the positive impact of the vaccination efforts implemented between the two surveys.

Despite the overall improvement, regional variations persisted. Wallonia exhibited a less pronounced increase in vaccinated status between targeted cohorts compared to other regions. Studies like these are instrumental in assessing the effectiveness of vaccination programs and identifying which cohorts are responding well and which may require additional support (19).

## Bulgaria

HPV Country Profiling

**National epidemiology for women only HPV-related cancers: cervical, vulvar and vaginal cancers**

| | Cervical Cancer | Vulvar Cancer | Vaginal Cancer |
|---|---|---|---|
| Annual number of new cancer cases | 877 | 111 | 35 |
| Crude incidence rate | 24.9 | 3.2 | 1 |
| Annual number of new cancer deaths | 453 | 42 | 12 |
| Crude mortality rate | 12.9 | 1.2 | 0.3 |
| 5-year prevalence (per 100,000) | 3.2 | 0.4 | 0.1 |

**Table 9.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Cervical, Vulvar, and Vaginal Cancers per 100,000 Population in Bulgaria (2022).

In 2022, Bulgaria continued to face a high burden of cervical cancer, with 877 new cases reported—though this marked a decline from 1,009 cases in 2020 (data for 2020 sourced from the Human Papillomavirus and Related Disease Report – Bulgaria). Cervical cancer remained the most prevalent HPV-related cancer in the country, far exceeding cases of vulvar and vaginal cancers. The crude incidence rate stood at 24.9, surpassing both Eastern European and global averages, highlighting an ongoing public health challenge despite the downward trend.

Mortality rates also remained high, with 453 cervical cancer-related deaths in 2022, though this represented a reduction from 2020. The age-specific incidence rates peaked among women aged 50-54, while mortality rates increased with age. Among all 4P-CAN partner countries, Bulgaria and Romania reported the highest cervical cancer incidence and mortality rates, with Romania recording even higher figures—34.4 and 18.3, respectively.

Although vulvar and vaginal cancers were less common, they still posed a health concern in Bulgaria. In 2022, 111 new cases of vulvar cancer were reported, a slight decrease from 116 cases in 2020, with a crude incidence rate of 3.2—above the global average. The highest incidence was observed in the 70-79 age group. Vaginal cancer cases, on the other hand, increased from 31 in 2020 to 35 in 2022, with a crude incidence rate of 1.0. Notably, Bulgaria recorded the highest vaginal cancer incidence rates among all partner countries.

Beyond incidence, the burden of these cancers was reflected in Bulgaria's elevated rates of years lived with disability (YLD) and disability-adjusted life years (DALYs), both significantly exceeding European and global averages. These figures underscore the substantial health impact of HPV-related cancers in the country.

**Men only HPV-related cancer: penile cancer**

In 2022, Bulgaria reported 65 new cases of penile cancer, marking an increase from 53 cases in 2020. The crude incidence rate for 2022 stood at 1.57, slightly above the Eastern European average of 1.48 and notably higher than the global average of 0.92. Despite the rise in new cases, the crude mortality rate remained relatively low at 0.22—below the Eastern European average of 0.55 but exceeding the global average of 0.34.

The five-year prevalence rate for penile cancer in Bulgaria was estimated at 0.23 in 2022, surpassing the prevalence of vaginal cancer and significantly exceeding that of Germany. Age-specific incidence rates peaked in the 65-74 age group, with the highest number of deaths occurring among individuals aged 70-74. Although Bulgaria's incidence rate was relatively average compared to other countries, it recorded one of the highest mortality rates for this cancer type.

Notably, penile cancer has now surpassed other HPV-related cancers in Bulgaria, such as vulvar and anal cancer, signalling a growing public health concern. This trend highlights the urgent need for targeted interventions, enhanced awareness campaigns, and improved prevention and treatment strategies tailored to address this emerging issue.

**Gender Neutral HPV-related cancers: anal and oropharyngeal cancers**

| | Anal Cancer | | Oropharyngeal Cancer | |
|---|---|---|---|---|
| | Female | Men | Female | Men |
| Annual number of new cancer cases | 38 | 30 | 23 | 115 |
| Crude incidence rate | 1.1 | 0-9 | 0.7 | 2.8 |
| Annual number of new cancer deaths | 12 | 13 | 11 | 67 |
| Crude mortality rate | 0.3 | 0.4 | 0.3 | 2.0 |

**Table 10.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Anal and Oropharyngeal Cancer per 100,000 Population in Bulgaria (2022).

In 2022, the annual incidence of anal cancer in Bulgaria increased slightly compared to 2020, with 38 new cases reported in women and 30 in men. The crude incidence rates were 1.1 for women and 0.9 for men, exceeding both the Eastern European and global averages. The highest incidence was observed in men aged 75-79 and women aged 56-74, while the lowest rates were recorded in individuals aged 15-39. Female incidence rates in Bulgaria were comparable to those in Montenegro (1.3) and Romania (1.4) but remained significantly lower than in France (4.1).

Mortality rates for anal cancer remained stable, with 12 deaths in women and 13 in men, corresponding to crude mortality rates of 0.3 and 0.4, respectively. These figures were consistent with 2020 data and ranked among the lowest when compared to other 4P-CAN countries.

Oropharyngeal cancer remained the most prevalent HPV-related cancer among men in Bulgaria, with 115 new cases recorded in 2022, reflecting a slight decrease from 2020. The crude incidence rates stood at 2.8 for men and 0.7 for women, maintaining a trend observed in previous years. Among the 4P-CAN partner countries, Bulgaria had some of the lowest incidence rates for both sexes.

Mortality rates for oropharyngeal cancer also remained steady, with 67 deaths reported in men and 11 in women, resulting in crude mortality rates of 2.0 for men and 0.3 for women. These were among the lowest across the 4P-CAN countries. The highest incidence was seen in men aged 65-69 and women aged 60-69, while mortality peaked in men aged 80 and older and in women aged 60-64, suggesting a more rapid disease progression in women following diagnosis.

## HPV Vaccination Policies

**HPV national vaccination guidelines and coverage rates**

| | Girls | Boys |
|---|---|---|
| National Policy on HPV vaccination | Yes, in form of recommendation | Not available/not introduced |
| Year of Introduction | 2012 | - |
| HPV in national immunisation calendar | Yes | - |
| Availability of National HPV registry | No | - |
| Financing of Vaccine | Free of charge | - |

**Table 11.** HPV vaccination policies and program details for boys and girls: national guidelines, introduction year, and vaccine financing in Bulgaria.

In 2012, the Bulgarian government took a significant step in public health by recommending and fully funding HPV vaccination for girls aged 12-13. This initiative aimed to curb the incidence of HPV-related cancers and diseases, representing a crucial advancement in national prevention efforts. Acknowledging the need for earlier protection, the government expanded the vaccination cohort in 2021 to include girls aged 10-13, enhancing opportunities for early immunization and broader population coverage (Table 11) (20).

However, despite these proactive measures for girls, a critical gap remains in Bulgaria's HPV vaccination strategy, as no equivalent program exists for boys. This omission leaves a portion of the population unprotected against HPV-related diseases, including oropharyngeal and anal cancers, which also pose significant health risks to males.

| | Girls | Boys |
|---|---|---|
| HPV Vaccination Schedule | Advised vaccination between 10 and 13 years old | Not available/not introduced |
| HPV first-dosage coverage (%) | 10% | - |
| HPV last-dosage coverage (%) | 6% | - |

**Table 12.** HPV vaccination schedule and coverage rates for girls and boys in Bulgaria in 2023. Data Source: WHO Human Papillomavirus (HPV) Bulgaria vaccination coverage.

Data indicate that Bulgaria's HPV immunization rate started at 23.8% when the program was introduced but declined to 19.6% in 2014 before plummeting to just 2.7% the following year. This dramatic drop was primarily driven by a widespread anti-vaccination campaign that falsely linked the vaccine to a severe autoimmune disease in a 12-year-old girl. Although experts debunked this claim, public distrust persisted, significantly hindering vaccine acceptance.

Misinformation, societal skepticism, and resistance from various groups have further complicated efforts to improve immunization rates. Chief State Health Inspector Assoc. Angel Kunchev stressed that overcoming these challenges requires addressing the emotional and psychological factors behind vaccine hesitancy, as scientific evidence alone may not be sufficient

Despite these obstacles, vaccination coverage has shown a modest increase, reaching 6% (program completion) in 2023. However, Bulgaria, alongside Romania, continues to report the lowest HPV vaccination uptake in the EU, underscoring the urgent need for targeted interventions to rebuild public confidence and boost immunization rates.

Currently, Bulgaria operates a routine vaccination program that provides the HPV vaccine free of charge to girls. At present, a clear disparity exists, as boys in Bulgaria are not covered under the free vaccination program, forcing parents to pay between €300-400 for the vaccine. This financial barrier limits access and contributes to lower vaccination rates among males. However, Bulgarian specialists remain optimistic that this policy change will soon address the existing inequality, ensuring broader protection against HPV-related diseases for both genders (21).

Most girls in Bulgaria receive their HPV vaccinations through school-based programs, administered by doctors and nurses, with the primary goal of immunizing them before they become sexually active.

Recent data reveal that 40% of 15-year-old boys and 21% of 15-year-old girls in Bulgaria have already had sexual intercourse—figures significantly higher than those reported in Belgium. This trend underscores the critical need for early vaccination, ensuring protection against HPV before potential exposure, and reinforcing the importance of timely immunization efforts (22).

Despite the structured vaccination program, Bulgaria faces challenges in achieving its vaccination targets. The set target for vaccination uptake coverage is 75%, but this goal has never been met. Alarmingly, in the past six years, the uptake has been below 10%. This is concerning, especially given the WHO target of 90% coverage for effective herd immunity and significant reduction in HPV-related diseases.

### Other national preventive measures

| | |
|---|---|
| National screening program for cervical cancer | Yes, opportunistic screening |
| Screening Ages | Often 30 to 40 |
| Type of test provided | Only PAP |

| | |
|---|---|
| Financing of Screening | Free of charge |

**Table 13.** HPV national cervical cancer screening program: overview, ages, test types, and financing. Data Source: Human Papillomavirus and Related Disease Report Bulgaria.

The country does have official national recommendations regarding cervical screening practices. However, active invitations to screening are not implemented. Bulgaria underscores the importance of screening, particularly for women aged 25 to 64. Estimates from 2019 indicate that overall, 71% of women have undergone cervical cancer screening at least once in their lifetime.

However, national sources provide information on cervical cancer and screening practices, although the discoverability and the comprehensiveness of the information provided appear insufficient.

### Case studies of additional strategies and best practices for enhancing HBV vaccination

**Exploring vaccine hesitancy among general practitioners in Bulgaria**

In response to troubling vaccination coverage rates in Bulgaria, especially concerning mandatory vaccines, research has been initiated to explore vaccine hesitancy among general practitioners (GPs). GPs are pivotal in shaping patient attitudes and vaccination decisions. A 2022 study conducted by Dimitrova et al. investigated the level of vaccine confidence among Bulgarian GPs, revealing that they generally exhibit high confidence in vaccines and strong support for the mandatory vaccination schedule, aligning with attitudes observed in other European countries.

The study highlighted that GP confidence is closely linked to trust in public institutions. This finding underscores the importance of robust institutional support in enhancing vaccine confidence. As GPs are key influencers in patient health decisions, understanding their perspectives can provide valuable insights into broader vaccination behaviours. Replicating similar studies in other countries could further elucidate the role of GPs in shaping vaccination attitudes and inform strategies to improve vaccination rates globally (23).

## HBV Country Profiling

**National epidemiology for HBV and HBV-related cancers: liver and intrahepatic bile ducts**

In 2022, Bulgaria reported a total of 152 cases of hepatitis B, with a prevalence rate estimated at 2.2. Prior to this, the prevalence of hepatitis B surface antigen (HBsAg) in the general population was estimated to be roughly equal or higher to 2.0% as of 2021. When examining different minority groups and at-risk populations, Bulgaria reported a prevalence of hepatitis B infection of 2.3% among pregnant women. The prevalence among first-time blood donors was approximately 4%, which is four times higher than the rate in Belgium. For people who inject drugs (PWID), the average prevalence was 7.3%, roughly six times higher than in Belgium. No data was provided for men who have sex with men (MSM), prisoners, or migrants.

In 2019, the crude mortality rate for hepatitis B was estimated at 9.2 per 100,000 population, reflecting a significant decrease over the past 20 years. In comparison, the rate was modelled at 11.5 per 100,000 population two decades earlier (24).

| | Liver and intrahepatic bile ducts | |
|---|---|---|
| | Female | Male |
| Annual number of new cancer cases | 277 | 436 |
| Crude incidence rate | 7.9 | 13.1 |
| Annual number of new cancer deaths | 263 | 421 |
| Crude mortality rate | 7.5 | 12.7 |
| 5-year prevalence (per 100,000) | 8.7 | 16.0 |

**Table 14.** New cases, deaths, crude incidence, mortality rates, and 5-year prevalence of liver and intrahepatic bile ducts per 100,000 Population in Bulgaria (2022).

In 2022, Bulgaria reported 277 cases of liver cancer among females and 436 cases among males. The crude incidence rate for females was 7.3 per 100,000, similar to that in Belgium, while the male rate was 13.8 per 100,000, closely matching the rate in Ireland. Mortality rates for both genders were comparable to those in Ireland, reflecting an average trend when compared to other 4P-CAN partner countries. This pattern was also evident in the 5-year prevalence rates, showing consistency across both genders.

## HBV Vaccination Policies

### HBV national vaccination guidelines and coverage rates

| | Universal vaccination |
|---|---|
| National Policy on HBV vaccination | Yes, mandatory |
| Year of Introduction | 1992 |
| HBV in national immunisation calendar | Yes |
| Availability of National HBV registry | Yes |
| Financing of Vaccine | Free of charge |

**Table 15.** HBV vaccination policies and program details: national guidelines, introduction year, and vaccine financing in Bulgaria.

Universal mandatory vaccination against hepatitis B was introduced for all newborns in Bulgaria in 1992, as part of the WHO global strategy (25). There is however no specific data on policies for other minority groups or populations at risk.

| | Universal vaccination |
|---|---|
| HBV Vaccination Schedule | Mandatory between 1 and 6 months |

| | |
|---|---|
| HBV three dosage coverage | 92% |

**Table 16.** HBV vaccination schedule and coverage rates in Belgium in 2023. Data Source: ECDC Hepatitis B: recommended vaccinations and WHO Hepatitis B Bulgaria vaccination coverage.

In Bulgaria, hepatitis B vaccination is mandatory. The vaccine is typically administered within 24 hours of birth. The schedule for subsequent doses depends on the type of vaccine used. With a monovalent vaccine, doses are given at 1 and 6 months. In contrast, if a combination vaccine is used, doses are administered at 2, 3, and 4 months.

In 2023, official estimates indicated that Bulgaria reported a coverage rate of 92% for the three-dose hepatitis B vaccine, falling short of the WHO target of 95%. This percentage represents a decline compared to previous years. In 2014, Bulgaria met the WHO target, but fluctuations have been observed over the years, with a slight decrease during the COVID-19 pandemic period.

### Case studies of additional strategies and best practices for enhancing HBV vaccination

**WHO and UNICEF's initiative to combat vaccine hesitancy in Bulgaria**

In 2022, in response to significant vaccine hesitancy in Bulgaria, particularly towards vaccines like COVID-19 and HPV, the WHO and UNICEF teamed up during European Immunization Week to help increase vaccination rates. This initiative aimed to acknowledge the progress made in controlling diseases like hepatitis B and highlight the crucial role of healthcare workers in promoting immunisation.

To support these efforts, WHO and UNICEF introduced innovative tools to make vaccine information more accessible. A chatbot and mobile app were launched, which have since been used by over 15,000 Bulgarians to receive free, reliable information about immunisation. Additionally, a dedicated webpage was created to promote vaccination and debunk common myths, aiming to foster more positive attitudes towards immunisation in the country. This comprehensive approach effectively combined technology with targeted communication to address vaccine hesitancy and encourage higher vaccination uptake in Bulgaria (26).

## France (Metropolitan Area)

HPV Country Profiling

**National epidemiology for women only HPV-related cancers: cervical, vulvar and vaginal cancers**

| | Cervical Cancer | Vulvar Cancer | Vaginal Cancer |
|---|---|---|---|
| Annual number of new cancer cases | 3,185 | 1,078 | 246 |
| Crude incidence rate | 9.4 | 3.2 | 0.7 |
| Annual number of new cancer deaths | 1,530 | 385 | 83 |
| Crude mortality rate | 4.5 | 1.1 | 0.3 |
| 5-year prevalence (per 100,000) | 0.8 | 0.2 | 0.04 |

**Table 17.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Cervical, Vulvar, and Vaginal Cancers per 100,000 Population in France (2022).

n 2022, France reported notable differences in the incidence and mortality rates of HPV-associated cancers, with cervical cancer continuing to be the most prevalent. The country recorded 3,185 new cases of cervical cancer, with a crude incidence rate of 9.4 and a crude mortality rate of 4.5, figures that were comparable to those in Belgium. In contrast, vulvar and vaginal cancers showed significantly lower incidences, with 1,078 new cases of vulvar cancer (crude incidence rate of 3.2) and 246 new cases of vaginal cancer (crude incidence rate of 0.7). Mortality rates followed a similar pattern, with crude rates of 1.1 for vulvar cancer and 0.3 for vaginal cancer. These figures were closely aligned with Western European averages but remained below global averages, indicating France's relatively lower burden of these cancers.

The 5-year prevalence rates for cervical, vulvar, and vaginal cancers in France mirrored these trends, being lower than those observed in Belgium and Bulgaria. Specifically, the 5-year prevalence rate for cervical cancer was 0.8 per 100,000, while vulvar and vaginal cancers had prevalence rates of 0.2 and 0.04, respectively. Age-specific incidence rates revealed that older age groups, particularly those aged 85 and older, were at the highest risk for both vulvar and vaginal cancers, with the highest mortality rates in these groups. Additionally, the disability burden from cervical cancer in France, measured in DALYs, was significantly lower than the European and global averages, further highlighting France's relatively favourable cancer burden when compared to countries such as Bulgaria.

**Men only HPV-related cancer: penile cancer**

In 2022, France recorded 467 new cases of cancer, a decrease from the 569 cases reported in 2020 (27). The crude incidence rate for new cancer cases also declined from 1.80 in 2020 to 1.50 in 2022. Mortality figures similarly dropped, with 130 new cancer deaths in 2020 and a crude mortality rate of 0.43, which decreased slightly to 0.40 in 2022. Despite this decline, France's incidence and mortality rates remained higher than

those reported in Belgium and Bulgaria. In 2020, France's crude incidence rate was below the Eastern European average of 1.48 but exceeded the global average of 0.92, while the crude mortality rate was slightly above the global average of 0.34 but remained lower than the Western European average of 0.53. The 5-year prevalence rate for 2022 was estimated at 0.10, higher than that for all cancers related to the cervix uteri.

Regarding penile cancer, in 2020, the highest prevalence in France was found among men aged 85 and older, followed by the 70-74 age group. Mortality also peaked in the 85+ age group, which is consistent with the expected trend of increasing cancer burden and death rates with advancing age.

**Gender Neutral HPV-related cancers: anal and oropharyngeal cancers**

| | Anal Cancer | | Oropharyngeal Cancer | |
|---|---|---|---|---|
| | Female | Men | Female | Men |
| Annual number of new cancer cases | 1387 | 595 | 982 | 2901 |
| Crude incidence rate | 4.1 | 1.9 | 2.9 | 9.1 |
| Annual number of new cancer deaths | 345 | 158 | 298 | 856 |
| Crude mortality rate | 1.0 | 0.4 | 0.9 | 2.7 |

**Table 18.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Anal and Oropharyngeal Cancer per 100,000 Population in France (2022).

In 2022, anal cancer showed a notable increase in incidence among women in France, with 1,387 new cases and a crude incidence rate of 4.1, the highest reported among 4P-CAN partner countries. For men, the incidence rate was lower at 1.9, similar to those in Portugal (1.9) and Belgium (1.7). Mortality from anal cancer was also higher in women, with 345 deaths compared to 158 in men, resulting in crude mortality rates of 1.0 for women and 0.4 for men. The highest-risk age group for anal cancer in 2022 was 85+ for women and 55-59 for men, consistent with the trends observed in 2020. These statistics indicate that women in France bear a higher burden of anal cancer compared to men.

Conversely, oropharyngeal cancer remained the most prevalent HPV-related cancer among men in France, with 3,883 new cases, maintaining its status from 2020. The crude incidence rate for oropharyngeal cancer in men was 9.1, ranking just below Romania (14.8), Portugal (11.1), and the Republic of Moldova (10.4). The incidence rate among women was 2.9, still surpassing that of vaginal and vulvar cancers, and was the highest reported among the partner countries. The crude mortality rate for oropharyngeal cancer in 2022 was 2.7 for men and 0.9 for women, reflecting the trend of higher prevalence and mortality among men. Age-specific incidence peaked in the 55-64 age group for women and the 60-64 group for men. Furthermore, the highest number of deaths from oropharyngeal cancer in 2022 occurred in those aged 85 and older, underscoring the severe impact of this cancer in older populations.

## HPV Vaccination Policies

**HPV national vaccination guidelines and coverage rates**

| | Girls | Boys |
|---|---|---|
| National Policy on HPV vaccination | Yes, in form of recommendation | Yes, in form of recommendation |
| Year of Introduction | 2007 | 2019 |
| HPV in national immunisation calendar | Yes | Yes |
| Availability of National HPV registry | Yes | Yes |
| Financing of Vaccine | Mostly reimbursed | Mostly reimbursed |

**Table 19.** HPV vaccination policies and program details for boys and girls: national guidelines, introduction year, and vaccine financing in France.

In 2007, France aligned its health strategy on HPV with global health recommendations by introducing the HPV vaccination program. This initiative was extended in 2019 to include boys, with a catch-up vaccination recommended for those aged 15 to 19, starting in January 2021. The inclusion of boys aimed to help reduce the overall spread of HPV within the population, contributing to herd immunity and broader disease prevention (28). Additionally, the program offers HPV vaccination for men who have sex with men up to the age of 26, specifically to prevent anal precancerous lesions and cancers (29).

The adoption of these recommendations aligns with the approach taken by many 4P-CAN countries, reflecting a broader commitment to controlling HPV-related diseases. Currently, the HPV vaccination in France is mostly reimbursed, ensuring greater accessibility and encouraging higher vaccination uptake across the population.

| | Girls | Boys |
|---|---|---|
| HPV Vaccination Schedule | Advised vaccination between 10 and 13 years old | Advised vaccination between 11 and 14 years old |
| HPV first-dosage coverage (%) | 55% | 26% |
| HPV last-dosage coverage (%) | 45% | 16% |

**Table 20.** HPV vaccination schedule and coverage rates for girls and boys in France in 2023. Data Source: WHO Human Papillomavirus (HPV) France vaccination coverage.

Despite the structured vaccination program, France continues to face significant challenges in meeting its HPV vaccination targets. As of 2023, only 55% of 16-year-old girls had received the HPV vaccination, and the uptake rate was even lower for boys, at just 26%. These figures position France among the countries with the lowest HPV vaccination uptake in Europe. This situation underscores the need for new and more effective strategies to boost vaccine acceptance and coverage.

In response to this challenge, France launched a targeted vaccination campaign against genital HPV in schools in 2023, offering the vaccine to secondary school students in the 5th grade. Additionally, the launch of the Cancer Control Strategy 2021-2030 aims to

achieve an ambitious 80% vaccination coverage, signalling a renewed commitment to improving vaccination rates (30).

Currently, France has a routine vaccination program that offers the HPV vaccine to both girls and boys. The vaccine is administered by pharmacists, doctors, and nurses with the goal of inoculating the target population before they become sexually active. Recent data highlights that 26% of 15-year-old boys and 16% of 15-year-old girls in France have had sexual intercourse, figures similar to those in Belgium. This further emphasizes the importance of early vaccination to provide protection before any potential exposure to HPV (31).

However, despite implementing vaccination recommendations for girls more than a decade ago, and extending them to boys in recent years, France still experiences relatively low vaccination uptake compared to other Western European countries. This ongoing challenge calls for additional efforts and innovative strategies to enhance vaccine coverage and protect the population from HPV-related cancers.

### Other national preventive measures

| | |
|---|---|
| National screening program for cervical cancer | Yes, mature organised population-based |
| Screening Ages | 25-65 |
| Type of test provided | PAP and HPV |
| Financing of Screening | Free of charge |

**Table 21.** HPV national cervical cancer screening program: overview, ages, test types, and financing. Data Source: Human Papillomavirus and Related Disease Report France.

Currently, France has established official national recommendations for cervical cancer screening, which include an active invitation system to encourage participation. The country places significant emphasis on screening, particularly for asymptomatic women aged 25 to 64, who are advised to undergo screening every three years. Additionally, women who have had two consecutive normal tests, one year apart, are recommended to continue screening every three years thereafter. According to estimates from 2019, approximately 86% of women in France have undergone cervical cancer screening at least once in their lifetime, reflecting a strong uptake of this preventive measure.

Furthermore, France offers excellent national resources online to provide accessible information on HPV, cervical cancer screening, and vaccination. These resources help individuals understand the importance of vaccination and early detection, ensuring that women can make informed decisions about their health and take advantage of the preventive programs available to them.

### Case studies of additional strategies and best practices for enhancing HBV vaccination

**Extending HPV vaccination competencies to Community Pharmacists (CPs) in France**

To address the challenge of low HPV vaccination coverage in France, a study conducted by Julia et al. explored the potential for extending HPV vaccination competencies to

community pharmacists (CPs). The study employed a cross-sectional survey of general practitioners (GPs), CPs, and parents of adolescents eligible for vaccination. The findings revealed a high level of acceptability among CPs (86%) for administering the vaccine, with many preferring a simplified vaccination process involving the National Health Insurance Fund. However, GPs (35%) and parents (61%) exhibited lower levels of acceptability. Parents, in particular, favoured a model where GPs prescribe the vaccine and CPs administer it, citing their trust in GPs as a key factor.

The study concluded that to improve HPV vaccination rates, efforts should focus on empowering CPs through enhanced training, the introduction of better traceability tools, and targeted public awareness campaigns. It also emphasized the importance of maintaining the essential trust between GPs and parents while leveraging the accessibility of CPs to increase vaccination uptake. This approach seeks to balance trust concerns with the need to expand vaccination access and coverage (32).

**Optimising communication strategies for HPV vaccination campaigns**

A study conducted by Chyderiotis et al. aimed to optimise communication strategies for HPV vaccination campaigns by understanding parental preferences. Using a discrete choice experiment (DCE), the study surveyed 1,291 parents of 11- to 14-year-olds in France to identify key factors influencing vaccine acceptance. The research evaluated the impact of various messaging components, such as disease prevention, safety information, and vaccine coverage rates.

The findings indicated that parents were more likely to accept the HPV vaccine if the messaging focused on cancer prevention (+11.3%) and emphasized the vaccine's safety (+8.9%). However, messages highlighting the importance of early vaccination in the context of sexual debut had a negative impact on vaccine acceptance, particularly among parents with lower educational levels.

The study concluded that HPV vaccination campaigns in France could be more effective by shifting focus towards cancer prevention and vaccine safety, while avoiding sensitive topics such as sexual behavior, which might discourage some parents from vaccinating their children (33).

### HBV Country Profiling

**National epidemiology for HBV and HBV-related cancers: liver and intrahepatic bile ducts**

The total number of hepatitis B cases in France is not available, as the country only reported data on acute cases. However, the prevalence of hepatitis B surface antigen (HBsAg) in the general population was estimated to be between 0.5% and 0.99%, similar to the rate in Belgium as of 2021. When examining different minority groups and at-risk populations, France reported a prevalence rate of 0.6% among pregnant women. For first-time blood donors, the prevalence was 0.07%, consistent with the rate in Belgium. The prevalence was 0.76% among men who have sex with men (MSM), 1.0% among prisoners,

and around 5.5% among migrants. Data on people who inject drugs (PWID) was not available.

In 2019, the crude mortality rate for hepatitis B was estimated at 2.6 per 100,000 population, also reflecting a steady decrease when compared to data from 20 years ago (34).

| | Liver and intrahepatic bile ducts | |
|---|---|---|
| | Female | Male |
| Annual number of new cancer cases | 3457 | 8715 |
| Crude incidence rate | 10.2 | 27.5 |
| Annual number of new cancer deaths | 3064 | 7414 |
| Crude mortality rate | 9.1 | 14.1 |
| 5-year prevalence (per 100,000) | 10.3 | 32.7 |

**Table 22.** New cases, deaths, crude incidence, mortality rates, and 5-year prevalence of liver and intrahepatic bile ducts per 100,000 Population in France (2022).

In 2022, France reported 3,457 cases of liver cancer among females, with the number of cases in males more than double that figure. The crude incidence rate for men was 27.5, the highest among the 14 partner countries, matching Italy's rate, followed by Portugal (26.5) and Romania (25.5). While the mortality rate for both women and men is relatively average when compared to other 4P-CAN countries, the 5-year prevalence rate for men is the highest among all countries, surpassing even Romania and the Republic of Moldova, which have a prevalence rate of 31.8.

## HBV Vaccination Policies

### HBV national vaccination guidelines and coverage rates

| | Universal vaccination |
|---|---|
| National Policy on HBV vaccination | Yes, mandatory |
| Year of Introduction | 1995 |
| HBV in national immunisation calendar | Yes |
| Availability of National HBV registry | Yes |
| Financing of Vaccine | Free of charge |

**Table 23.** HBV vaccination policies and program details: national guidelines, introduction year, and vaccine financing in France.

Hepatitis B immunisation for infants was introduced in France in 1995. Prior to this, the vaccine was available for high-risk groups such as healthcare workers, starting in 1982, and for babies born to HBV-positive mothers, with the program being reinforced in 1992.

Universal vaccination was later extended to preadolescents and adolescents in 1994. In the past decade, concerns about the potential link between vaccination and central nervous system demyelination disorders led to a decrease in vaccine uptake among the French population (35). Since 2018, the government has made hepatitis B vaccination mandatory for infants up to two years old.

Additionally, France provides national guidelines and recommendations for antenatal care and HBV screening, which are publicly funded by the state. Similar to Belgium, antenatal screening is recommended during the first trimester of pregnancy. The country also offers vaccination programs for people who inject drugs, sex workers, and migrants from high-prevalence EU countries, as well as migrants from outside the EU (36).

| | Universal vaccination |
|---|---|
| HBV Vaccination Schedule | Mandatory between 1 and 6 months |
| HBV three dosage coverage | 96% |

**Table 24.** HBV vaccination schedule and coverage rates in France in 2023. Data Source: ECDC Hepatitis B: recommended vaccinations and WHO Hepatitis B France vaccination coverage.

In France, babies born to mothers infected with hepatitis B are offered a first dose of the vaccine at birth, along with hepatitis B immunoglobulin. Additional doses are given at one month and six months of age. For premature infants born before 32 weeks of gestation or weighing less than 2 kg, a four-dose schedule (0, 1, 2, and 6 months) is followed. This regimen is evaluated at 9 months of age using HBsAg (Hepatitis B surface antigen) and anti-HBs antibody testing, preferably one to four months after the final dose. Infants born at full term receive a three-dose schedule (0, 1, and 6 months), while individuals aged 11 to 15 years are advised a two-dose schedule (0 and 6 months).

In 2023, France achieved a hepatitis B vaccination coverage rate of 96% for the three-dose regimen, slightly exceeding the WHO target of 95%. This marks a steady increase from 2018 when the mandatory vaccination program for infants up to 2 years old was introduced, and coverage was 91%. Prior to 2018, vaccination coverage was lower, standing at 78% in 2012.

### Case studies of additional strategies and best practices for enhancing HBV vaccination

**Public knowledge and perceptions of Hepatitis B Virus (HBV) infection in France**

This study examined the knowledge, perceptions, and prevention practices related to Hepatitis B virus (HBV) infection among the French general population, drawing comparisons with HIV. A 2010 telephonic survey conducted with 9,014 individuals aged 18-69 revealed notable gaps in public awareness regarding HBV transmission, particularly through needle sharing and sexual contact, with awareness levels at 89.9% and 69.7%, respectively. In contrast, awareness of HIV transmission was much higher (99.1% for needle sharing and 99.4% for sexual contact).

Despite a similar level of fear between the two diseases, the perceived risk of contracting HBV was higher (60.8%) compared to HIV (40.3%). However, this heightened perception

of risk did not translate into preventive actions. HBV screening rates were significantly lower than HIV screening rates (27.4% vs. 61.4%), even among high-risk groups, such as individuals born in HBV endemic areas and intravenous drug users. Additionally, vaccination rates for HBV did not show significant variation across these groups, indicating a need for targeted education and intervention efforts (37).

Although this study was conducted more than a decade ago, its findings remain highly relevant today. They underscore the critical need to improve public knowledge about HBV, especially concerning its transmission through sexual contact. Replicating the study could help tailor current public health campaigns and vaccination strategies, ensuring they address the most significant misconceptions. By focusing on high-risk groups and the general population in France and other European countries could be especially effective in driving change, as increased awareness can directly lead to higher vaccination uptake and more proactive health-seeking behaviours.

## Ireland

HPV Country Profiling

**National epidemiology for women only HPV-related cancers: cervical, vulvar and vaginal cancers**

| | Cervical Cancer | Vulvar Cancer | Vaginal Cancer |
|---|---|---|---|
| Annual number of new cancer cases | 242 | 73 | 13 |
| Crude incidence rate | 9.6 | 2.9 | 0.5 |
| Annual number of new cancer deaths | 89 | 20 | 7 |
| Crude mortality rate | 3.5 | 0.8 | 0.3 |
| 5-year prevalence (per 100,000) | 0.95 | 0.25 | 0.04 |

**Table 25.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Cervical, Vulvar, and Vaginal Cancers per 100,000 Population in Ireland (2022).

Ireland's data on HPV-related cancers, particularly cervical cancer, showcases both successes and challenges in managing the burden of these diseases. The decrease in cervical cancer mortality, down to 89 deaths in 2022 with a crude mortality rate of 3.5, is a positive indicator of the effectiveness of prevention and treatment strategies, especially in comparison to other countries in the 4P-CAN group. This decrease in mortality aligns with Ireland's commitment to cervical cancer screening and vaccination programs.

However, the increase in vulvar cancer cases, particularly in older populations (aged 70-79), is noteworthy and signals the need for continued vigilance, as age-related vulnerability can influence cancer incidence. The fact that vulvar cancer has relatively low mortality but higher incidence in these age groups might reflect effective treatment, but it also underscores the importance of ongoing prevention efforts.

The overall lower DALYs for cervical cancer in Ireland compared to the European average, and especially in contrast to Bulgaria, suggests that Ireland's public health interventions are making a significant impact. Effective screening, vaccination, and healthcare access likely play key roles in reducing both the burden and long-term impacts of HPV-related cancers.

In general, Ireland's approach to reducing cervical cancer incidence and mortality, alongside monitoring trends in vulvar and vaginal cancers, highlights a comprehensive public health strategy. Continued focus on prevention, including HPV vaccination and screening for at-risk populations, will be essential to sustain these positive trends and mitigate the rising incidence of vulvar cancer in older age groups.

**Men only HPV-related cancer: penile cancer**

The increase in penile cancer cases in Ireland from 39 in 2020 to 51 in 2022 reflects a

concerning upward trend in the incidence of this relatively rare but significant HPV-related cancer. Despite the rise in cases, Ireland's crude incidence and mortality rates remain below Northern European averages, which is encouraging, but the higher mortality rates compared to other countries (such as Belgium and Moldova) highlight a need for more focused efforts in preventing and managing penile cancer.

The data showing the highest prevalence and mortality in men aged 75-84 further emphasizes that penile cancer, though less common than cervical cancer, has a disproportionate impact on older men. This age-related vulnerability may indicate a delay in diagnosis or treatment, which could contribute to the higher mortality rates seen in this age group.

Given the increase in penile cancer incidence, Ireland could benefit from targeted public health interventions, such as awareness campaigns specifically aimed at older men and healthcare providers. These interventions could promote early detection and prevention, including vaccination against HPV for men, which could help reduce the future burden of this cancer type.

Additionally, Ireland's relatively higher 5-year prevalence rate for penile cancer compared to France highlights the regional variation in HPV-related cancer burdens, which should be considered when planning healthcare strategies and resource allocation for cancer prevention and treatment. Overall, while penile cancer remains less prevalent than other HPV-related cancers, this upward trend suggests it warrants increased attention, particularly among older men.

**Gender Neutral HPV-related cancers: anal and oropharyngeal cancers**

| | Anal Cancer | | Oropharyngeal Cancer | |
|---|---|---|---|---|
| | Female | Men | Female | Men |
| Annual number of new cancer cases | 40 | 28 | 29 | 94 |
| Crude incidence rate | 1.6 | 1.1 | 1.2 | 3.8 |
| Annual number of new cancer deaths | 7 | 10 | 22 | 43 |
| Crude mortality rate | 22 | 43 | 0.8 | 1.7 |

**Table 26.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Anal and Oropharyngeal Cancer per 100,000 Population in Ireland (2022).

The increase in anal cancer cases in Ireland, with 40 new cases in women and 28 in men in 2022, reflects a notable trend in this cancer type. The crude incidence rates for anal cancer in women (1.6) and men (1.1) are higher than those in Eastern countries but align more closely with rates in Belgium and France, highlighting the regional variability in the prevalence of this disease.

While the mortality rates for anal cancer in Ireland are relatively low—7 deaths in women and 10 in men—the mortality rate for women is notably among the lowest in the group, surpassed only by North Macedonia and Moldova, which reported zero deaths. This suggests that Ireland may have effective management and treatment strategies in place, but there is still room for improvement in reducing the burden of anal cancer.

The age-specific incidence and mortality patterns indicate that older age groups, particularly women aged 55-64 and men aged 75-79, are at higher risk for anal cancer. This aligns with trends observed in 2020 and underlines the need for targeted prevention and screening interventions, especially for these specific age groups. These findings reinforce the importance of raising awareness about anal cancer risk factors and ensuring that older populations, particularly those at higher risk, have access to timely screenings and preventative care.

In 2022, oropharyngeal cancer remained more prevalent among men in Ireland, with a crude incidence rate of 3.8, approximately three times higher than the rate for women (1.2). The total number of new oropharyngeal cancer cases was 123, showing a slight increase from 2020. The incidence rate was similar to that reported by Montenegro (1.3) and Italy (1.5). Mortality rates also reflect this gender disparity, with 43 new deaths in men and 22 in women. The mortality rate was nearly half the number of new cases, emphasising the severity of the disease. This pattern is consistent with trends in other countries, where oropharyngeal cancer remains a significant concern, particularly among men. In 2020, this type of cancer also showed differences in age distribution between females and males. Incidence peaked at ages 55-64 for women and 50-54 for men, while mortality peaked at ages 65-69 for both genders.

## HPV Vaccination Policies

**HPV national vaccination guidelines and coverage rates**

| | Girls | Boys |
|---|---|---|
| National Policy on HPV vaccination | Yes, in form of recommendation | Yes, in form of recommendation |
| Year of Introduction | 2010 | 2019 |
| HPV in national immunisation calendar | Yes | Yes |
| Availability of National HPV registry | Yes | Yes |
| Financing of Vaccine | Mostly reimbursed | Mostly reimbursed |

**Table 27.** HPV vaccination policies and program details for boys and girls: national guidelines, introduction year, and vaccine financing in Ireland. Data Source: Human Papillomavirus and Related Disease Report Ireland and HPV Prevention Policy Atlas.

Currently, Ireland has a comprehensive routine vaccination program that offers the HPV vaccine to both girls and boys. In line with the growing recognition of the need to protect both genders from HPV-related cancers, the inclusion of boys in the vaccination program was recently implemented, with the adoption timeline closely aligning with that of Belgium. This extension aims to provide broader protection against HPV-associated cancers such as penile, anal, and oropharyngeal cancers. Additionally, the program is largely reimbursed, ensuring that cost does not pose a barrier to access, making it more accessible for the general population and contributing to higher vaccination coverage.

| | Girls | Boys |
|---|---|---|
| HPV Vaccination Schedule | Advised vaccination between 12 and 14 years old | Advised vaccination between 12 and 14 years old |
| HPV first-dosage coverage (%) | 84% | 79% |
| HPV last-dosage coverage (%) | 84% | 79% |

**Table 28.** HPV vaccination schedule and coverage rates for girls and boys in Ireland in 2023. Data Source: WHO Human Papillomavirus (HPV) Ireland vaccination coverage.

Initially, Ireland saw strong uptake of the HPV vaccine; however, the landscape shifted in 2015 when certain parent groups formed lobby movements questioning the vaccine's effectiveness due to a perceived lack of accurate information. This growing concern was amplified by the airing of a documentary titled "Cervical Cancer Vaccine – Is It Safe?" on national television, inspired by a similar program broadcast in Denmark (see the preventive measures section). As a result, between 2014 and 2017, vaccination rates declined significantly, dropping from 86% at the program's launch to 72.3% and further plummeting to 50% in subsequent years (38).

In response to the controversy, national campaigns, including education and training for school vaccination teams, were launched, and a targeted initiative by the Minister for Health in 2017/2018 helped to reverse the downward trend. These efforts are reflected in the data shown in Table 28.

Currently, most girls and boys receive their HPV vaccinations from healthcare professionals such as doctors and nurses, with the aim of immunizing the target population before they become sexually active. Recent data reveals that 21% of 15-year-old boys and 14% of 15-year-old girls in Ireland have had sexual intercourse, numbers comparable to France and Belgium. This highlights the critical importance of vaccinating early to provide protection against HPV before exposure (39).

Despite these ongoing efforts and positive strides, Ireland continues to fall short of the WHO's target of 90% vaccination coverage.

### Other national preventive measures

| | |
|---|---|
| National screening program for cervical cancer | Yes, mature organised population-based |
| Screening Ages | 25-65 |
| Type of test provided | PAP and HPV |
| Financing of Screening | Free of charge |

**Table 29.** HPV national cervical cancer screening program: overview, ages, test types, and financing. Data Source: Human Papillomavirus and Related Disease Report Ireland.

Currently, in Ireland, there are official national recommendations regarding cervical screening practices, which involve an active invitation to screening. The country underscores the importance of screening. regular screenings are recommended regardless of marital status, sexual orientation, HPV vaccination history, whether they have had children, or menopausal status (40). Estimates from 2019 indicate that overall,

94% of women have undergone cervical cancer screening at least once in their lifetime. This is the highest score when compared to Belgium, France, and Bulgaria.

In addition, national sources providing online information on HPV, cervical cancer screening, and how to access the vaccines are excellent.

### Case studies of additional strategies and best practices for enhancing HBV vaccination

**Ireland's campaign to increase HPV vaccination rates**

Ireland successfully reversed declining HPV vaccination rates through a multi-platform campaign that increased uptake from 50% in 2016 to 62% in 2017. The campaign, known as #ProtectOurFuture, focused on combating misinformation and promoting the safety and effectiveness of the HPV vaccine. Leveraging social media platforms, particularly Facebook and Twitter, the campaign used personal stories and expert advice to build trust among the public. Geo-targeted messaging and active engagement on Twitter helped reach specific audiences, particularly those exposed to anti-vaccine narratives. Partnerships with organisations like the National Immunisation Office, Irish Cancer Society, and HPV Alliance bolstered the campaign's credibility, restoring public confidence in the vaccine and shifting discourse from negative to positive (41).

**Ireland's Roadmap to eliminate cervical cancer**

Ireland's health authorities have launched a comprehensive initiative to eliminate cervical cancer, in alignment with the World Health Organization's global targets. The roadmap, spearheaded by the HSE's National Screening Service, National Immunisation Office, and National Cancer Control Programme, aims to achieve 90% HPV vaccination in girls by age 15, 70% cervical screening by ages 35 and 45, and 90% treatment for identified cervical disease by 2030. The campaign, launched during Cervical Cancer Prevention Week, emphasises health equity by focusing on improving access to these services across all population groups. Strong advocacy and partnerships are central to the initiative, encouraging the public to #GetInformed about HPV, vaccination, screening, and cervical cancer prevention (42).

### HBV Country Profiling

**National epidemiology for HBV and HBV-related cancers: liver and intrahepatic bile ducts**

The total number of hepatitis B cases in Ireland was reported at 501 total cases, showing a slight increase in 2023 (588), accounting for a crude incidence rate of 9.9. The prevalence of hepatitis B surface antigen (HBsAg) in the general population was estimated to be between below 0.5%, quite lower than other 4P-CAN countries. as of 2021. When examining different minority groups and at-risk populations, Ireland reported a prevalence of approximately 0.3% among pregnant women, which is half the rate observed in France. The prevalence among first-time blood donors was 0.02%, and among prisoners, it was 0.3%. Data was not available for people who inject drugs, migrants, or men who have sex with men.

In 2019, the crude mortality rate for hepatitis B in Ireland was estimated at 1.25 per 100,000 population. Compared to other similar countries, Ireland experienced an increasing trend in hepatitis B mortality from 2000 to 2008, followed by a steady rate from 2010 to 2017. In 2018, the trend began to decrease (43).

| | Liver and intrahepatic bile ducts | |
|---|---|---|
| | Female | Male |
| Annual number of new cancer cases | 220 | 344 |
| Crude incidence rate | 8.7 | 13.8 |
| Annual number of new cancer deaths | 190 | 306 |
| Crude mortality rate | 7.5 | 12.3 |
| 5-year prevalence (per 100,000) | 8.4 | 16.6 |

**Table 30.** New cases, deaths, crude incidence, mortality rates, and 5-year prevalence of liver and intrahepatic bile ducts per 100,000 Population in Ireland (2022).

In 2022, Ireland's reported cases of HPV-related cancers were relatively consistent with the averages seen in other 4P-CAN partner countries. The incidence rate for women in Ireland was comparable to that in the Republic of North Macedonia (8.5) and Portugal (8.8). However, Ireland distinguished itself by having one of the lowest mortality rates for women, closely mirroring Bulgaria's rate (7.5), and surpassed only by Belgium (6.2) and Ukraine (3.4).

An interesting trend observed in Ireland, similar to Bulgaria, was a significantly higher 5-year prevalence rate for men compared to women. The male rate was notably double that of women, highlighting a potential area of focus for public health interventions in addressing HPV-related cancers among men.

## HBV Vaccination Policies

### HBV national vaccination guidelines and coverage rates

| | Universal vaccination |
|---|---|
| National Policy on HBV vaccination | Yes, recommended |
| Year of Introduction | 2008* |
| HBV in national immunisation calendar | Yes |
| Availability of National HBV registry | Yes |
| Financing of Vaccine | Free of charge |

**Table 31.** HBV vaccination policies and program details: national guidelines, introduction year, and vaccine financing in Ireland.

Hepatitis B became a notifiable disease in Ireland in 1981, and the hepatitis B vaccine was first introduced for at-risk groups in 1988. In 2008, the vaccine was added to the country's primary immunisation schedule, with children born on or after July 1st of that year

receiving the vaccine*. Additionally, Ireland recommends hepatitis B vaccination for adult groups considered to be at increased risk, including healthcare workers, people who inject drugs, sex workers, migrants from high-prevalence EU countries, and migrants from outside the EU (44).

Ireland also provides national guidelines and recommendations for antenatal care and hepatitis B (HBV) screening, which are publicly funded by the state. This comprehensive approach to vaccination and screening aims to reduce the burden of hepatitis B in the population, with particular emphasis on protecting at-risk groups through targeted programs (45).

| | Universal vaccination |
|---|---|
| HBV Vaccination Schedule | Recommended at 2, 4, 6 months |
| HBV three dosage coverage | 93% |

**Table 32.** HBV vaccination schedule and coverage rates in Ireland in 2023. Data Source: ECDC Hepatitis B: recommended vaccinations and WHO Hepatitis B Ireland vaccination coverage.

Currently, the hepatitis B vaccine is recommended for babies in a three-dose schedule administered between 2 and 6 months of age. However, for babies born to mothers infected with hepatitis B, an additional dose is given at birth (0 months), along with hepatitis B immunoglobulin (HBIG), ideally within 24 hours of birth but no later than 7 days.

In 2023, official estimates indicated that Ireland achieved a hepatitis B vaccination coverage rate of 93%, a figure that has remained stable since 2021. This marks a slight decrease compared to previous years, particularly from 2012 to 2017, when coverage reached 95%. Ireland is actively working to regain the WHO target of 95% coverage and improve vaccination rates to further reduce the prevalence of hepatitis B in the population.

### Case studies of additional strategies and best practices for enhancing HBV vaccination

**Improving vaccination uptake among the Irish traveller community**

This study focuses on increasing vaccination awareness and uptake within the Irish Traveller community, a disadvantaged ethnic minority group that faces significant health disparities and barriers to healthcare access. Targeting infant and childhood vaccinations, the HPV vaccine, flu vaccines, and meningitis awareness, the study employs a peer-led approach to address issues of mistrust, low literacy, and discrimination. By involving community members in the education and outreach efforts, the initiative aims to improve vaccination coverage and overall health outcomes. This model of community engagement could be replicated in other marginalised groups to enhance public health interventions (46).

**National epidemiology for women only HPV-related cancers: cervical, vulvar and vaginal cancers**

| | Cervical Cancer | Vulvar Cancer | Vaginal Cancer |
|---|---|---|---|
| Annual number of new cancer cases | 2479 | 1728 | 280 |
| Crude incidence rate | 8.0 | 5.6 | 0.9 |
| Annual number of new cancer deaths | 1156 | 684 | 111 |
| Crude mortality rate | 3.7 | 2.2 | 0.4 |
| 5-year prevalence (per 100,000) | 0.7 | 0.4 | n/a |

**Table 33.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Cervical, Vulvar, and Vaginal Cancers per 100,000 Population in Italy (2022).

The data from Table 33 reveal significant differences in the incidence and mortality rates of cervical, vulvar, and vaginal cancers in Italy. Cervical cancer, while still the most prevalent HPV-related cancer, has a crude incidence rate of 8.0, which is the lowest among the 4P-CAN countries. This low incidence is mirrored by a similarly low crude mortality rate, which is the second lowest, with only Ireland reporting a lower rate at 3.5.

Furthermore, Italy's five-year prevalence rate for cervical cancer is notably lower than in other countries, such as Bulgaria, suggesting a lesser long-term disease burden. As is common across many countries, the peak incidence of cervical cancer in Italy occurs at ages 50-54, with mortality rates peaking in those aged 85 and older. In 2020, cervical cancer ranked as the fourth leading cause of cancer deaths among women aged 15-44, according to data sourced from the Human Papillomavirus and Related Disease Report for Italy (47).

In contrast to cervical cancer, vulvar cancer in Italy follows a distinct pattern, with the country reporting the highest incidence and mortality rates among the 4P-CAN countries. The crude incidence rate of 6.6 per 100,000 is notably higher than those in Romania and Belgium, and Italy's mortality rate for vulvar cancer is twice as high as that of many other countries.

Vaginal cancer, while less common, also exhibits relatively high incidence and mortality rates in Italy, holding the second-highest rates in the consortium, particularly when compared to much lower rates observed in countries like Moldova. These trends suggest a decline in cervical cancer incidence since 2020, but an increase in both vulvar and vaginal cancers. For both cancer types, peak incidences and mortality rates occur in those aged 85 and older, emphasizing the growing burden of these cancers in older populations.

**Men only HPV-related cancer: penile cancer**

In 2022, Italy saw a notable rise in penile cancer cases, with 711 new cases reported, an

increase from 540 in 2020 (48). This resulted in an incidence rate of 2.4, the highest among the 4P-CAN countries, surpassing Ireland (2.1) and Romania (2.0), and matching Portugal. Despite the high incidence, Italy's crude mortality rate for penile cancer remains relatively low at 0.7, comparable to Portugal and North Macedonia, but lower than Bulgaria's.

The five-year prevalence rate for penile cancer in Italy, at 7.7, is significantly higher than in other countries, suggesting a sustained burden of this cancer type. Penile cancer, though less frequently discussed, has an incidence rate roughly double that of vaginal cancer in Italy. In 2020, the highest incidence of penile cancer occurred in the 70-74 age group, with the highest mortality rates observed in those aged 75-85+. This highlights the importance of continued focus on HPV-related cancers, particularly those affecting older populations, beyond the more commonly recognized types like cervical and vulvar cancers.

**Gender Neutral HPV-related cancers: anal and oropharyngeal cancers**

| | Anal Cancer | | Oropharyngeal Cancer | |
|---|---|---|---|---|
| | Female | Men | Female | Men |
| Annual number of new cancer cases | 878 | 653 | 477 | 1055 |
| Crude incidence rate | 2.8 | 2.2 | 1.5 | 3.6 |
| Annual number of new cancer deaths | 249 | 177 | 247 | 574 |
| Crude mortality rate | 0.8 | 0.6 | 0.8 | 2.0 |

**Table 34.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Anal and Oropharyngeal Cancer per 100,000 Population in Italy (2022).

In 2022, Italy reported 878 new cases of anal cancer in females and 653 in males, reflecting a significant disease burden. The female incidence rate for anal cancer remains the highest among the countries compared, while the male incidence rate is also notably elevated—more than double that of countries such as Moldova (0.2), North Macedonia (0.6), and Ukraine (0.8).

Italy's mortality rate for anal cancer is particularly high in females, marking it as the highest among the 4P-CAN countries, while male mortality is also substantial, second only to Romania. The data shows a stable incidence rate for females compared to previous years, but a notable increase in male cases, with the annual number rising from 406 in 2020 to 653 in 2022.

The peak incidence for females is seen in the 85 and older age group, whereas for males, it occurs in the 70-74 age group. Mortality from anal cancer peaks in the 85 and older age group for both sexes, underscoring the need for continued attention to this disease, particularly among older populations.

In contrast, oropharyngeal cancer in Italy follows a different trend. The incidence rate for males is nearly double that for females, but Italy ranks in the middle for oropharyngeal cancer incidence compared to other countries. Belgium and Romania lead for female cases with rates of 2.4 and 2.1, respectively, while Romania and Portugal have the highest

rates for males at 14.8 and 11.1.

Despite the higher incidence rates in some countries, Italy's mortality rates for oropharyngeal cancer are lower than those observed in these leading countries, indicating differences in disease impact and outcomes across regions. In Italy, the peak incidence for females occurs at ages 65-69, while for males, it peaks nearly a decade earlier, at ages 55-59. The mortality patterns differ as well: female mortality peaks at ages 85 and older, while male mortality peaks at ages 70-74, highlighting the distinct age-related patterns for this cancer type in Italy.

## HPV Vaccination Policies

**HPV national vaccination guidelines and coverage rates**

| | Girls | Boys |
|---|---|---|
| National Policy on HPV vaccination | Yes, in form of recommendation | Yes, in form of recommendation |
| Year of Introduction | 2008 | 2018 |
| HPV in national immunisation calendar | Yes | Yes |
| Availability of National HPV registry | Yes | Yes |
| Financing of Vaccine | Free of charge | Free of charge |

**Table 35.** HPV vaccination policies and program details for boys and girls: national guidelines, introduction year, and vaccine financing in Italy. Data Source: Human Papillomavirus and Related Disease Report Italy and HPV Prevention Policy Atlas.

Currently, Italy has a national routine vaccination program that offers the HPV vaccine to both boys and girls. The vaccine is primarily administered through school-based programs by doctors and nurses, and vaccination is provided free of charge.

The vaccination schedule follows a two-dose or three-dose regimen, depending on the recipient's age. For those who have not been previously vaccinated or have not completed the vaccination cycle, a catch-up program is available. All doses of the catch-up cycle are provided free of charge for women up to 26 years of age and for men up to and including 18 years of age (49).

| | Girls | Boys |
|---|---|---|
| HPV Vaccination Schedule | Advised vaccination between 12 and 14 years old | Advised vaccination between 12 and 14 years old |
| HPV first-dosage coverage (%)* | 63% | 56% |
| HPV last-dosage coverage (%)* | 46% | 40% |

**Table 36.** HPV vaccination schedule and coverage rates for girls and boys in Italy in 2023. Data Source: WHO Human Papillomavirus (HPV) Italy vaccination coverage.

Table 36 highlights the generally low HPV vaccine uptake across Italy, with minimal differences between genders, especially in terms of last-dose coverage, which refers to program completion. This suggests that while there has been some progress in offering HPV vaccinations to boys, overall vaccination rates still fall significantly short of the WHO's target. Notably, the percentage of individuals receiving the first dose is higher than those completing the full vaccination series. Additionally, significant regional disparities are evident, with full vaccination rates in 2022 ranging from as low as 0.4% in some regions to a high of 56.6% (50).

### Other national preventive measures

| | |
|---|---|
| National screening program for cervical cancer | Yes, mature organised population-based |
| Screening Ages | 24-64 |
| Type of test provided | PAP and HPV |
| Financing of Screening | Free of charge |

**Table 37.** HPV national cervical cancer screening program: overview, ages, test types, and financing. Data Source: Human Papillomavirus and Related Disease Report Italy.

Currently, in Italy, there are official national recommendations regarding cervical screening practices, which involve an active invitation to screening. The country underscores the importance of screening, particularly for women aged 25 to 64 particularly for women aged 25 to 64, being offered a cervical smear test every three years. On the other hand, the HPV test is recommended starting at age 30 and should be repeated at intervals of no less than 5 years. If the HPV test is positive, a cervical smear test should be performed. However, due to the decentralised nature of the country, age may vary across countries. Estimates from 2019 indicate that overall, 92% of women have undergone cervical cancer screening at least once in their lifetime.

In addition, national sources providing online information on HPV, cervical cancer screening, and how to access the vaccines are good.

### Case studies of additional strategies and best practices for enhancing HBV vaccination

**Cervical cancer prevention week and the #regalatevilasalute campaign**

Cervical Cancer Prevention Week, observed from January 23-29, focuses on combating cervical cancer through heightened awareness and increased HPV vaccination. This initiative underscores vaccination as the most effective preventive measure against HPV infections and subsequent cervical cancer. The campaign #regalatevilasalute, developed by IBSA Farmaceutici with support from LBA - Lega Basket Serie A, leverages sports partnerships to promote sexual well-being and the importance of vaccination. By using influential sports figures and targeted messaging, the campaign aims to engage the public, enhance understanding of HPV prevention, and encourage higher vaccination rates, thereby contributing to the broader goal of eliminating cervical cancer (51).

**National epidemiology for HBV and HBV-related cancers: liver and intrahepatic bile ducts**

The total number of hepatitis B cases in Italy was 91 cases, with a significantly lower rate estimated at 0.2. The prevalence of hepatitis B surface antigen (HBsAg) in the general population, however, was quite high and similar to that of countries such as Bulgaria and Romania (equal or superior to 2.0%) as of 2021. When examining different minority groups and at-risk populations, Italy reported specific prevalence rates for these groups. The prevalence of HBsAg among pregnant women was 1.8%, while it was 0.2% for first-time blood donors. Men who have sex with men (MSM) showed a significant prevalence of 11.2%, followed by migrants at 10.2%, and prisoners at 4.3%. No data was available for people who inject drugs.

In 2019, the crude mortality rate for hepatitis B in Italy was estimated at 2.8 per 100,000 population. The country experienced a steady decrease in the mortality rate until 2016, when it reached 2.6 per 100,000. However, there has been a slight increase in the rate since then (52).

| | Liver and intrahepatic bile ducts | |
|---|---|---|
| | Female | Male |
| Annual number of new cancer cases | 3802 | 8084 |
| Crude incidence rate | 12.3 | 27.5 |
| Annual number of new cancer deaths | 3261 | 380 |
| Crude mortality rate | 10.6 | 21.6 |
| 5-year prevalence (per 100,000) | 11.7 | 31.8 |

**Table 38.** New cases, deaths, crude incidence, mortality rates, and 5-year prevalence of liver and intrahepatic bile ducts per 100,000 Population in Italy (2022).

In 2022, Italy reported the highest number of cases of HPV-related cancers for both females and males among the 4P-CAN partners. It also recorded the second-highest incidence rate for both genders, only surpassed by Romania for females (13.4) and matching France for males (27.5). Similarly, mortality rates in Italy were among the highest for both genders, trailing only Romania for females (12.9) and equalling Moldova for males, while being behind Portugal (24.3) and Romania (24.2). Additionally, Italy's 5-year prevalence values were among the highest compared to other 4P-CAN partners, reflecting a significant burden of HPV-related diseases.

## HBV Vaccination Policies

**HBV national vaccination guidelines and coverage rates**

| Universal vaccination |
|---|

| | |
|---|---|
| National Policy on HBV vaccination | Yes, mandatory |
| Year of Introduction | 1991 |
| HBV in national immunisation calendar | Yes |
| Availability of National HBV registry | Yes |
| Financing of Vaccine | Free of charge |

**Table 39.** HBV vaccination policies and program details: national guidelines, introduction year, and vaccine financing in Italy.

Italy was the first European country to introduce mandatory hepatitis B (HBV) vaccination for three-month-old infants and 12-year-old children, with the program becoming fully operational in 1992. The vaccination for 12-year-olds was phased out by 2004, completing the first phase of the campaign. By 2022, all individuals under 40 years old were reported to have been vaccinated against HBV as a result of this initiative. The program also included mandatory HBsAg screening for pregnant women and recommended vaccination for at-risk groups, such as household contacts of HBsAg carriers and intravenous drug users (53).

In addition to these efforts, Italy has implemented specific vaccination programs targeting healthcare workers and sex workers, aligning with broader public health strategies aimed at controlling the spread of hepatitis B and ensuring higher protection in vulnerable populations.

| | **Universal vaccination** |
|---|---|
| HBV Vaccination Schedule | Mandatory at 2, 4, 6 months |
| HBV three dosage coverage | 95% |

**Table 40.** HBV vaccination schedule and coverage rates in Italy in 2023. Data Source: ECDC Hepatitis B: recommended vaccinations and WHO Hepatitis B Italy vaccination coverage.

In Italy, hepatitis B vaccination is mandatory for infants, administered at 0, 2, and 4 months of age. Additionally, babies born to mothers infected with hepatitis B receive the first vaccine dose within 12-24 hours after birth, along with hepatitis B immunoglobulin. The second dose is given four weeks after the first, and from the third dose, which is administered at 61 days of life or later, the vaccination schedule transitions to the combined hexavalent vaccine.

In 2023, official estimates indicated that Italy achieved the WHO target of 95% coverage for hepatitis B vaccination, although there was a slight dip to 94% during the COVID-19 pandemic period. This is still an impressive rate, reflecting Italy's strong commitment to vaccinating its population. Prior to the pandemic, in 2012-2013, the country had achieved a coverage rate of 96%, surpassing the general target and indicating a sustained high level of vaccine coverage over the years.

**Impact of Italy's 1991 Hepatitis B mass immunisation campaign**

Italy's 1991 mass immunisation campaign against hepatitis B virus (HBV) has demonstrated remarkable success in reducing HBV incidence. The study revealed a dramatic drop in acute HBV cases from 5.0 per 100,000 in 1990 to just 0.4 per 100,000 by 2019. The campaign effectively eliminated new cases among those vaccinated, with zero cases reported in individuals aged 0-14 and a 99.4% reduction in the 15-24 age group. Despite this progress, 19.3% of HBV cases between 2010 and 2019 were among foreigners. The study identified new risk factors for acute HBV, including beauty treatments, risky sexual behaviour, and household contact with HBV carriers, while intravenous drug use has decreased as a risk factor. This campaign not only underscores the effectiveness of mass vaccination but also serves as a model for other European countries aiming to control HBV infection (54).

## Portugal

HPV Country Profiling

**National epidemiology for women only HPV-related cancers: cervical, vulvar and vaginal cancers**

| | Cervical Cancer | Vulvar Cancer | Vaginal Cancer |
|---|---|---|---|
| Annual number of new cancer cases | 897 | 196 | 47 |
| Crude incidence rate | 16.8 | 3.7 | 0.9 |
| Annual number of new cancer deaths | 459 | 94 | 24 |
| Crude mortality rate | 8.6 | 1.8 | 0.5 |
| 5-year prevalence (per 100,000) | 1.5 | 0.3 | 2.1 |

**Table 41.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Cervical, Vulvar, and Vaginal Cancers per 100,000 Population in Portugal (2022).

In 2022, cervical cancer continued to have the highest incidence rate among HPV-related cancers in Portugal, with a crude incidence rate of 16.8, marking the highest reported rate among Western and Southern European countries. This high incidence is accompanied by a significant mortality rate, with roughly half of the new cervical cancer cases resulting in death. The mortality rate in Portugal is notably higher than in countries like Ireland (3.5), Italy (3.7), and Belgium (3.9), highlighting the ongoing challenges in reducing the disease burden in the country. Despite some stability in incidence rates compared to 2020, the slight increase in mortality suggests persistent challenges in addressing the disease (data for 2020, has been sourced from Human Papillomavirus and Related Disease Report Portugal (55)). HPV types 16 and 18 continue to be the most common strains associated with cervical cancer, and the peak incidence of the disease occurs in the 45-49 age group. Mortality remains concentrated among those aged 85 and older, underlining the impact of the disease in older populations.

In contrast, vulvar and vaginal cancers in Portugal present distinct trends compared to cervical cancer. The incidence of vulvar cancer in Portugal is similar to that in France and Bulgaria, at around 3.2, with mortality rates aligning closely with those observed in Romania (2.0). For vaginal cancer, Portugal's incidence rate is comparable to that in Italy and Belgium (0.9), but the mortality rate stands out as the highest among all 4P-CAN partners, with deaths accounting for nearly half of the new cases.

Both vulvar and vaginal cancer incidence and mortality rates have remained stable since 2020. Vulvar cancer tends to peak in individuals aged 85 and older, while vaginal cancer shows peak incidence and mortality in the 80-84 age group. This stability in trends contrasts with the more fluctuating incidence and mortality rates seen in cervical cancer, underscoring different patterns of disease burden across these HPV-related cancer types.

**Men only HPV-related cancer: penile cancer**

In 2022, Portugal reported 117 new cases of vulvar cancer, maintaining a stable incidence compared to 2020 (56). With an incidence rate of 2.4 per 100,000, Portugal, along with Italy, has one of the highest rates among the 4P-CAN partners. Despite the stable incidence, the mortality rate in Portugal remains notably high, in line with countries like North Macedonia and Bulgaria at 0.7 per 100,000. However, there was a slight decrease in the number of deaths, from 36 in 2020 to 34 in 2022, suggesting a modest improvement in outcomes.

The five-year prevalence of vulvar cancer in Portugal stands at 7.7 per 100,000, significantly higher than in many other countries, and comparable to Italy. The age distribution for vulvar cancer shows peak incidence rates in the 70-74 and 75-79 age groups, with the highest mortality rates occurring among individuals aged 80-85 and older. These trends highlight the ongoing challenges in managing vulvar cancer, despite the stability in incidence rates, and underscore the need for more effective strategies in early detection, treatment, and care for older populations.

**Gender Neutral HPV-related cancers: anal and oropharyngeal cancers**

| | Anal Cancer | | Oropharyngeal Cancer | |
|---|---|---|---|---|
| | Female | Men | Female | Men |
| Annual number of new cancer cases | 112 | 91 | 37 | 533 |
| Crude incidence rate | 2.1 | 1.9 | 0.7 | 11.1 |
| Annual number of new cancer deaths | 31 | 23 | 18 | 256 |
| Crude mortality rate | 0.6 | 0.5 | 0.3 | 5.3 |

**Table 42.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Anal and Oropharyngeal Cancer per 100,000 Population in Portugal (2022).

In 2022, Portugal reported 112 new cases of anal cancer in women and 91 in men, showing a slight decrease in cases among men compared to previous years. The incidence rate for women in Portugal is similar to that of Belgium (2.4) but remains higher than most Eastern European countries. For men, Portugal's incidence rate is the second highest among the 4P-CAN consortium, following Italy and comparable to France. Mortality rates for anal cancer are average across the consortium, but there has been a slight increase in cases from 2020. Peak incidences occur in the 75-79 age group, with the highest mortality rates seen in individuals aged 85 and older.

In contrast, oropharyngeal cancer in Portugal shows significant disparities between sexes. The number of cases in men is almost 14 times higher than in women, with the male incidence rate being the second highest in the Consortium, just behind Romania. The female incidence rate, on the other hand, is relatively average. Notably, the crude incidence rate for men has seen a substantial rise since 2020, while the female incidence has only slightly increased. Mortality rates for men are among the highest in the consortium, surpassed only by Romania and Moldova, whereas female mortality remains average. Peak incidences for both genders occur in the 50-59 age group for women and 60-64 for men, with mortality peaking at age 85 and older for men.

**HPV national vaccination guidelines and coverage rates**

| | Girls | Boys |
|---|---|---|
| National Policy on HPV vaccination | Yes, in form of recommendation | Yes, in form of recommendation |
| Year of Introduction | 2008 | 2020 |
| HPV in national immunisation calendar | Yes | Yes |
| Availability of National HPV registry | Yes | Yes |
| Financing of Vaccine | Free of charge | Free of charge |

**Table 43.** HPV vaccination policies and program details for boys and girls: national guidelines, introduction year, and vaccine financing in Portugal. Data Source: Human Papillomavirus and Related Disease Report Portugal and HPV Prevention Policy Atlas.

Portugal, like other Southern European countries, now offers the HPV vaccination for both sexes. The vaccination program was initially introduced for girls in 2008 and was extended to boys in 2020. It is provided free of charge and administered by doctors, nurses, or pharmacists. The vaccination program is thoroughly documented in the national health registries, ensuring comprehensive tracking of coverage and effectiveness.

| | Girls | Boys |
|---|---|---|
| HPV Vaccination Schedule | Recommended between the ages of 10-12 | Applicable to boys born from 2009 |
| HPV first-dosage coverage (%) | 93% | 91% |
| HPV last-dosage coverage (%) | 90% | 88% |

**Table 44.** HPV vaccination schedule and coverage rates for girls and boys in Portugal in 2023. Data Source: WHO Human Papillomavirus (HPV) Portugal vaccination coverage.

Since 2020, Portugal has recommended HPV vaccination for boys starting at age 10, with the maximum age for vaccination set at 17 years. The goal is to immunise individuals before they reach the age group most at risk (15 to 25 years old), as HPV is the most common sexually transmitted infection among young people. There are currently ongoing national discussions in Portugal to extend HPV vaccination to include adolescent and young adult males up to 26 years old (57, 58).

In 2021, vaccination rates for girls, particularly for the first dose, were high and aligned with the WHO's objectives. Vaccination rates for males, though slightly lower than those for girls, remain above those of many other countries and are very close to the WHO target, reflecting positive progress towards achieving broader vaccination coverage.

Other national preventive measures

| | |
|---|---|
| National screening program for cervical cancer | Yes, mature-organised population based |

| | |
|---|---|
| Screening Ages | Between 20 and 30, and up to 60 |
| Type of test provided | PAP and HPV |
| Financing of Screening | Free |

**Table 45.** HPV national cervical cancer screening program: overview, ages, test types, and financing. Data Source: Human Papillomavirus and Related Disease Report Portugal.

In Portugal, national cancer screening programs are in place for breast, colorectal, and cervical cancers, with specific recommendations based on age and gender. For breast cancer, women aged 50 to 69 are recommended to have a mammogram every two years. Colorectal cancer screening typically includes testing for hidden blood in the faeces for individuals aged 50 to 74. For cervical cancer (Table 45), women aged 20 to 30 are advised to undergo cervical cytology (Pap tests), and screening is recommended up to the age of 60.

Cervical cancer screening practices in Portugal were formalized in 2019. As of the most recent data, 88% of women between the ages of 30 and 34 have undergone screening at least once, reflecting a strong uptake in this age group. These national efforts aim to ensure early detection and improve cancer outcomes across the population.

### Case studies of additional strategies and best practices for enhancing HBV vaccination

**CBIG-SCREEN Project for Cervical Cancer Screening**

The CBIG-SCREEN project addresses significant disparities in cervical cancer screening (CCS) access and utilisation among vulnerable populations across Europe. Recognizing the critical role of CCS in reducing cervical cancer mortality, the project targets the issue that many high-risk subpopulations remain underserved, exacerbating existing health inequalities. To tackle this, CBIG-SCREEN is focused on developing a comprehensive knowledge framework to identify barriers to CCS and working directly with underserved groups to create tailored strategies that address their specific needs.

Implemented through pilot interventions in Estonia, Portugal, and Romania, CBIG-SCREEN aims to enhance both the accessibility and acceptance of CCS among these vulnerable populations. By fostering collaborations and advocating for evidence-based strategies, the project seeks to not only improve screening rates but also influence policymakers to integrate these successful interventions into broader CCS programs. This approach is designed to bridge the gap in CCS access and ultimately reduce disparities in cervical cancer outcomes across Europe (59).

### HBV Country Profiling

**National epidemiology for HBV and HBV-related cancers: liver and intrahepatic bile ducts**

The total number of hepatitis B cases in Portugal was 158 cases, with a rate of 1.5. The prevalence of hepatitis B surface antigen (HBsAg) in the general population was reported to be below 0.5, a similar case to that of Ireland for example as of 2021. When examining different minority groups and at-risk populations, Portugal reported a prevalence of 0.1%

among first-time blood donors, slightly higher than in countries such as Belgium or Italy. The prevalence was 6.9% among people who inject drugs and 0.7% among prisoners. Data was not available for migrants, men who have sex with men (MSM), or pregnant women.

In 2019, the crude mortality rate for hepatitis B in Italy was estimated at 2.4 per 100,000 population. Portugal has experienced a steady decrease in mortality rates, with the lowest rate achieved in 2015, reported at 2.3. In 2000, the mortality rate was approximately 4.0 (60).

| | Liver and intrahepatic bile ducts | |
|---|---|---|
| | Female | Male |
| Annual number of new cancer cases | 470 | 1270 |
| Crude incidence rate | 8.8 | 26.5 |
| Annual number of new cancer deaths | 444 | 1167 |
| Crude mortality rate | 8.3 | 24.3 |
| 5-year prevalence (per 100,000) | 8.6 | 31.5 |

**Table 46.** New cases, deaths, crude incidence, mortality rates, and 5-year prevalence of liver and intrahepatic bile ducts per 100,000 Population in Portugal (2022).

In 2022, Portugal reported the second-highest incidence rate for oropharyngeal cancer among males, surpassed only by France and Italy (27.5). Despite its smaller size compared to other 4P-CAN partners, the country also had the highest mortality rate for males, closely followed by Romania (24.2), Italy, and Moldova (21.6). However, mortality rates for women in Portugal were relatively average when compared to other countries in the consortium. Additionally, Portugal's 5-year prevalence rate for males was notably high, aligning with rates observed in Romania and Moldova (31.8), indicating a significant burden of the disease.

## HBV Vaccination Policies

### HBV national vaccination guidelines and coverage rates

| | Universal vaccination |
|---|---|
| National Policy on HBV vaccination | Yes, recommended |
| Year of Introduction | 1994 |
| HBV in national immunisation calendar | Yes |
| Availability of National HBV registry | Yes |
| Financing of Vaccine | Free of charge |

**Table 47.** HBV vaccination policies and program details: national guidelines, introduction year, and vaccine financing in Portugal.

Hepatitis B vaccination was introduced in Portugal in 1994.

Information regarding Portugal's antenatal screening practices or programs for minority and at-risk groups was not available.

| | Universal vaccination |
|---|---|
| HBV Vaccination Schedule | Recommended at 0 and 2 months |
| HBV three dosage coverage | 99% |

**Table 48.** HBV vaccination schedule and coverage rates in Portugal in 2023. Data Source: ECDC Hepatitis B: recommended vaccinations and WHO Hepatitis B Portugal vaccination coverage.

In contrast to other countries, Portugal follows a distinct approach for hepatitis B (HBV) vaccination, recommending a vaccination schedule at 0 and 2 months of age.

As of 2023, Portugal has achieved an impressive 99% vaccination coverage rate, a figure that has remained stable since 2020. However, it is important to note that there is no nationally representative household survey available for the most recent five cohorts. To verify this reported coverage, the World Health Organization (WHO) and UNICEF recommend the implementation of a high-quality survey to ensure the accuracy of the data.

Case studies of additional strategies and best practices for enhancing HBV vaccination

### Hepatitis Stigma Survey: exploring the experiences of living with hepatitis B and/or C

Stigma and discrimination continue to present significant barriers in the fight to eliminate viral hepatitis, severely affecting the lives of those who are impacted. Misconceptions surrounding transmission routes contribute to widespread stigma, influencing various aspects of life, including personal relationships, professional opportunities, and mental health. This stigma not only undermines self-esteem but also limits access to work, education, and travel, as individuals with hepatitis often face discriminatory practices.

To address this pressing issue, a new survey was launched in Portugal, alongside other EU countries, to assess the stigma and discrimination faced by individuals living with hepatitis B and C. Developed in partnership with the European Centre for Disease Prevention and Control (ECDC) and informed by both stakeholders and individuals with lived experience, the survey seeks to fill a critical gap, as there have been limited tools specifically addressing hepatitis-related stigma.

Phase One of the survey has been completed, and its findings were presented at the World Hepatitis Summit 2024 in Lisbon. Phase Two will focus on analysing the collected data, with a comprehensive report expected later this year. This report aims to provide essential insights into the stigma faced by individuals living with hepatitis and suggest potential strategies for mitigating its harmful effects (61).

## Romania

HPV Country Profiling

**National epidemiology for women only HPV-related cancers: cervical, vulvar and vaginal cancers**

| | Cervical Cancer | Vulvar Cancer | Vaginal Cancer |
|---|---|---|---|
| Annual number of new cancer cases | 3368 | 472 | 68 |
| Crude incidence rate | 34.4 | 4.8 | 0.7 |
| Annual number of new cancer deaths | 1793 | 193 | 31 |
| Crude mortality rate | 18.3 | 2 | 0.3 |
| 5-year prevalence (per 100,000) | 6.6 | 14.4 | 1.9 |

**Table 49.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Cervical, Vulvar, and Vaginal Cancers per 100,000 Population in Romania (2022).

In 2022, Romania reported a notably high incidence rate for cervical cancer, reaching 24.9 per 100,000, which is the highest among the 4P-CAN countries. This figure is roughly four times higher than Italy's incidence of 8.0 per 100,000 and substantially exceeds the rates in other Eastern European countries, including Bulgaria (22.3), Ukraine (22.3), and Moldova (20.1). Additionally, Romania's mortality rate for cervical cancer is the highest in the consortium, indicating a significant public health burden.

HPV type 16 remains the most prevalent type associated with cervical cancer in Romania, followed by HPV types 18 and 31. Despite these concerning statistics, the incidence and mortality rates have remained stable since 2020, suggesting that while the problem persists, there has not been a significant increase in new cases or deaths over the past few years.

The peak incidence for cervical cancer is observed in individuals aged 50 to 54, with mortality rates reaching their highest between ages 60 and 69. These age patterns reflect the ongoing challenges in prevention, early detection, and treatment, which are critical to improving outcomes for women in Romania.

In 2022, Romania ranked third in the 4P-CAN countries for vulvar cancer incidence, with a rate of 4.0 per 100,000, trailing behind Italy (5.6) and Belgium (4.5). The country's mortality rate for vulvar cancer is also high, with Romania ranked second at 2.0 per 100,000, just behind Italy (2.2). Although there has been a slight decrease in the number of deaths (220 reported in 2020), the incidence and mortality rates have remained relatively stable. The five-year prevalence rate for vulvar cancer in Romania is notably high compared to other countries, indicating a sustained burden of the disease.

In contrast, Romania's statistics for vaginal cancer are relatively average, with an incidence

rate of 0.7 per 100,000, similar to France, and a mortality rate of 0.3 per 100,000, which aligns with countries like Montenegro, Belgium, and Bulgaria.

Both vulvar and vaginal cancer incidences in Romania peaked between the ages of 70 and 74, while mortality rates were highest among those aged 80-84. These age-related patterns are consistent with trends seen in other countries and highlight the increased risk of these cancers in older populations, similar to the age distribution observed for cervical cancer in many regions.

**Men only HPV-related cancer: penile cancer**

In 2022, Romania reported 183 new cases of penile cancer, showing a slight decrease from the 196 cases recorded in 2020 (62). The incidence rate in Romania is similar to that of Bulgaria, but lower than in countries such as Portugal and Italy, where the rate is 2.4 per 100,000. This trend is also observed in the mortality rates for penile cancer, which are relatively moderate compared to higher rates seen in other countries.

Romania's five-year prevalence rate for penile cancer stands at 6.6 per 100,000, which aligns closely with the prevalence rates observed for cervical cancer in the region, indicating a sustained burden of this cancer type.

The age distribution for penile cancer remains stable, with the highest number of new cases and deaths occurring in the 65-74 age group. This consistent demographic trend highlights the ongoing incidence and mortality patterns for penile cancer within Romania, suggesting that older age groups continue to bear a significant proportion of the disease burden.

**Gender Neutral HPV-related cancers: anal and oropharyngeal cancers**

| | Anal Cancer | | Oropharyngeal Cancer | |
|---|---|---|---|---|
| | Female | Men | Female | Men |
| Annual number of new cancer cases | 134 | 127 | 204 | 1365 |
| Crude incidence rate | 1.4 | 1.4 | 2.1 | 14.8 |
| Annual number of new cancer deaths | 60 | 82 | 74 | 648 |
| Crude mortality rate | 0.6 | 0.9 | 0.8 | 7.0 |

**Table 50.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Anal and Oropharyngeal Cancer per 100,000 Population in Romania (2022).

In 2022, Romania reported 134 new cases of anal cancer in women and 127 in men, with an incidence rate of 1.4 for both genders. This rate is relatively high compared to other Eastern European countries, though it aligns with the average mortality rates within the 4P-CAN consortium. Specifically, the mortality rate for women stood at 0.6, resulting in 60 deaths, while for men, it was higher at 0.9, with 82 deaths. When compared to 2020 data, there was a slight increase in both the incidence and mortality rates, with the peak cases and deaths occurring in the 65-69 age group.

In contrast, oropharyngeal cancer in Romania shows a more pronounced gender disparity. The incidence rate for men is exceptionally high at 14.8 per 100,000, the highest in the

consortium, while the rate for women is 2.1, which is closer to the average. This disparity is reflected in the number of cases, with men reporting 1,365 new cases compared to just 204 in women. Mortality rates also reflect this gender gap, with men experiencing the highest mortality rate in the consortium at 7.0 per 100,000, while women have a mortality rate of 0.8. Compared to 2020, there has been a notable increase in male cases. The peak incidence and mortality rates for both genders were observed in the 60-64 age group for women and 65-69 for men.

## HPV Vaccination Policies

### HPV national vaccination guidelines and coverage rates

| | Girls | Boys |
|---|---|---|
| National Policy on HPV vaccination | Yes, in form of recommendation | Yes, in form of recommendation |
| Year of Introduction | 2023 | 2023 |
| HPV in national immunisation calendar | Yes | Yes |
| Availability of National HPV registry | Yes | Yes |
| Financing of Vaccine | Free of charge | Free of charge |

**Table 51.** HPV vaccination policies and program details for boys and girls: national guidelines, introduction year, and vaccine financing in Romania. Data Source: Human Papillomavirus and Related Disease Report Romania and HPV Prevention Policy Atlas.

In Romania, the introduction of HPV vaccination into the national immunisation calendar occurred only recently, with the vaccine being considered as of 2023. This is significantly later than most other 4P-CAN partner countries, which began offering the vaccine as early as 2007 or 2008. In Romania, the vaccine is administered by family doctors, and while it is available, its recommendation-based status may limit its reach, potentially excluding some of the most vulnerable groups. The delayed introduction and the voluntary nature of the vaccination could pose challenges in achieving high uptake and protecting at-risk populations from HPV-related cancers.

| | Girls | Boys |
|---|---|---|
| HPV Vaccination Schedule | 11-18 | 11-18 |
| HPV first-dosage coverage (%) | 6% | n/a |
| HPV last-dosage coverage (%) | 6% | n/a |

**Table 52.** HPV vaccination schedule and coverage rates for girls and boys in Romania in 2023. Data Source: WHO Human Papillomavirus (HPV) Romania vaccination coverage.

Romania's free HPV vaccination offer for girls and boys aged 11 to 18 is a positive step, but the low uptake, especially among women, highlights a significant challenge. The reimbursement for women over 19, though helpful, may still not be enough to encourage

widespread participation, particularly if awareness and accessibility remain limited. The lack of readily available national data on vaccination rates further complicates efforts to assess the program's effectiveness and identify gaps. Romania may need to consider enhancing outreach efforts, better monitoring, and strategies aimed at increasing vaccination coverage, particularly targeting those at higher risk of HPV-related cancers (63).

### Other national preventive measures

| | |
|---|---|
| National screening program for cervical cancer | Yes, nascent organised population based |
| Screening Ages | 25-64 |
| Type of test provided | Only PAP |
| Financing of Screening | Free of charge |

**Table 53.** HPV national cervical cancer screening program: overview, ages, test types, and financing. Data Source: Human Papillomavirus and Related Disease Report Romania.

Romania's approach to HPV vaccination and cervical cancer screening is certainly in need of improvement. While the introduction of national recommendations for Pap smear testing in 2012 was an important step, the lack of active invitations for individuals to participate in screening significantly limits its reach. The relatively low screening uptake—only 42% of women aged 30-49—indicates that many women are not getting the preventive care they need, which may contribute to higher cervical cancer rates.

### Case studies of additional strategies and best practices for enhancing HPV vaccination

**ReThinkHPVaccination project in Romania**

Romania has confronted the highest cervical cancer incidence and mortality rates in the EU, prompting a significant overhaul of its HPV vaccination program. The initial HPV vaccination campaign in 2008 was largely ineffective, covering less than 2% of the target population. In response, the ReThinkHPVaccination project was launched to address these challenges. This initiative aims to support low-vaccination countries by developing a virtual knowledge centre, creating tailored communication strategies, and combating misinformation through targeted resources and media events. The project's efforts are aligned with the EU's Beating Cancer Plan and Mission on Cancer, focusing on improving vaccination rates and reducing cervical cancer disparities (64,65).

**HPV Action Now project's impact**

In 2023, the 'HPV Action Now' project made notable progress in Romania by achieving full state reimbursement for the HPV vaccine for all boys and girls aged 11 to 18, and partial reimbursement for women aged 18 to 45. This significant development was celebrated by Romania's Health Minister Alexandru Rafila and praised by Project Director Daniel Kelly as a major milestone. Despite these advancements, the project continues to address challenges such as vaccine distribution, public misconceptions about vaccine safety, and the need for improved access systems. The initiative, led by the European Cancer

Organisation, remains focused on overcoming these obstacles and enhancing public education about HPV vaccination (66).

**Success case-study in Sadova, a rural region**

In rural Sadova, Romania, a small-scale HPV vaccination success story highlights a stark contrast to the national struggle. Local efforts have achieved a remarkable 90% vaccination rate among teenage girls, largely due to Dr. Gindrovel Dumitra's effective communication and trust-building with the community. This success underscores the ongoing challenges faced nationwide, including logistical issues, misinformation, and inadequate government support. The new vaccination initiative, supported by the 'HPV Action Now' project, aims to replicate such successes across Romania, learning from models like the UK's robust school-based vaccination programs to increase national vaccination rates and ultimately reduce cervical cancer prevalence (67).

## HBV Country Profiling

**National epidemiology for HBV and HBV-related cancers: liver and intrahepatic bile ducts**

In 2022, Romania reported a notably high number of hepatitis B cases, totalling 1,823, reflecting a crude rate of 9.6 per 100,000 population. This rate is similar to that of Ireland (9.9) but significantly exceeds the rates observed in Bulgaria (2.2) and Portugal (1.5). The prevalence of hepatitis B surface antigen (HBsAg) in Romania's general population is estimated to be at least 2%, aligning with the figures for Bulgaria and Italy. However, the prevalence is particularly concerning among at-risk populations, with significant rates reported among pregnant women (5.1%), first-time blood donors (2.9%), people who inject drugs (PWID) (9%), and prisoners (10.7%). Unfortunately, data for men who have sex with men (MSM) and migrants was not available, but it is noted that Romania has some of the highest prevalence rates in the EU for these groups.

The crude mortality rate for hepatitis B in Romania was estimated at 10.4 per 100,000 in 2019, which is approximately five times higher than in Portugal. Despite this high mortality rate, Romania has seen a steady decline over the past two decades, down from a death rate of 15.2 per 100,000 in 2001 (68).

| | Liver and intrahepatic bile ducts | |
|---|---|---|
| | Female | Male |
| Annual number of new cancer cases | 1311 | 2371 |
| Crude incidence rate | 13.4 | 25.6 |
| Annual number of new cancer deaths | 1257 | 2238 |
| Crude mortality rate | 12.9 | 24.2 |
| 5-year prevalence (per 100,000) | 15.1 | 3 |

**Table 54.** New cases, deaths, crude incidence, mortality rates, and 5-year prevalence of liver and intrahepatic bile ducts per 100,000 Population in Romania (2022).

In Romania, similar to the pattern observed with HPV-related cancers, the country exhibits the highest incidence rate for females and the third highest for males. For men, Romania is surpassed only by France and Italy, with an incidence rate of 27.5, and by Portugal, with a rate of 25.6. Similarly, Romania records the highest mortality rate for women and the second highest for men, narrowly exceeded by Portugal at 24.3. Alarmingly, this mortality rate is four times higher than that of countries like Ukraine.

Romania also leads in the 5-year prevalence rate for women, followed closely by Moldova, which has a rate of 12.1. For men, Romania ranks just behind France, which has a prevalence rate of 32.7, and shares a similar rate with Moldova.

## HBV Vaccination Policies

### HBV national vaccination guidelines and coverage rates

| | Universal vaccination |
|---|---|
| National Policy on HBV vaccination | Yes, recommended |
| Year of Introduction | 1994 |
| HBV in national immunisation calendar | Yes |
| Availability of National HBV registry | Yes |
| Financing of Vaccine | Free of charge |

**Table 55.** HBV vaccination policies and program details: national guidelines, introduction year, and vaccine financing in Romania.

Hepatitis B vaccination was introduced in Romania for newborns and children, and at risk populations in 1996 with three doses, and has now been increased to 4 doses. The country also provides catch-up vaccination roughly following the implementation calendar of other countries. Studies report that vaccination did not have an effect in the first ten years of vaccination, but a steady decrease was observed in the next 20 years (69).

On the other hand, Romania does not have a national HBV antenatal screening program. While the country has a vaccination program specifically for healthcare workers, it lacks national recommendations for other at-risk groups such as people who inject drugs (PWID), sex workers, and migrants both within and outside the EU.

Romania faces several challenges, such as incomplete HBV immunisation among children, insufficient screening of pregnant women (with only 60% being screened), incomplete monitoring, and inefficient data integration and surveillance. To address these issues at the national level, Romania has developed a national hepatitis plan, committing to the WHO goal of eliminating hepatitis by 2030 and providing testing and diagnosis for all populations. The national plan prioritises strengthening national epidemiological data systems and consolidating primary prevention efforts, among other key objectives (70).

| | Universal vaccination |
|---|---|
| HBV Vaccination Schedule | Recommended at 0, 2 and 4 months |
| HBV three dosage coverage | 93% |

**Table 56.** HBV vaccination schedule and coverage rates in Romania in 2023. Data Source: ECDC Hepatitis B: recommended vaccinations and WHO Hepatitis B Romania vaccination coverage.

Romania's current hepatitis B vaccination schedule, which includes the administration of the first dose within 24 hours of birth, followed by additional doses at 2 and 4 months, is in line with global best practices. For babies born to HBsAg-positive mothers, the vaccination protocol is adapted to ensure proper protection against vertical transmission, which is a critical measure for reducing HBV incidence.

However, the steady decrease in hepatitis B vaccination coverage in Romania, as evidenced by the 2023 coverage rate of 78%, is concerning. This marks a notable decline from 2012, when Romania surpassed the WHO target of 96%. The decline, potentially exacerbated by the COVID-19 pandemic, highlights the vulnerability of vaccination programs during periods of crisis, particularly when health systems are stretched thin, and resources are redirected. The current coverage rate positions Romania among the lowest for hepatitis B vaccination within the EU and 4P-CAN countries, underscoring the need for renewed efforts to reverse this trend.

### Case studies of additional strategies and best practices for enhancing HBV vaccination

**The Live(Ro) 1 Program - Enhancing Hepatitis Response Through Professional Training**

The Live(Ro) 1 Program is a pivotal initiative designed to combat Romania's high rates of viral hepatitis, including hepatitis B, C, and D. Funded by the POCU / 308/4/9 program, the initiative addresses the pressing need for improved healthcare professional training to enhance national response efforts. This program aims to elevate Romania's healthcare system by equipping professionals with the skills necessary for effective population screening and early detection of viral hepatitis. It supports the National Strategy on Social Inclusion and Poverty Reduction 2015-2020, which seeks to enhance access to healthcare for vulnerable and disadvantaged groups. By developing comprehensive training frameworks and methodologies, the Live(Ro) 1 Program aligns with the National Health Strategy 2014-2020's goals of reducing communicable diseases and improving access to treatments, ultimately aiming to lower hepatitis prevalence and improve public health outcomes in Romania (71).

**The National Framework Plan for Viral Hepatitis Control in Romania (2019-2030)**

The National Framework Plan for Viral Hepatitis Control in Romania (2019-2030), coordinated by the Ministry of Health, represents a strategic approach to addressing the viral hepatitis epidemic in the country. The Plan seeks to establish an evidence-based framework for a systematic and comprehensive response to viral hepatitis, tailored to Romania's specific context and needs. It is grounded in core principles derived from the

European plan, including universal health coverage, continuity of medical services, and the application of public health approaches. By integrating these principles, the Plan aims to improve the overall effectiveness of hepatitis control efforts in Romania, ensuring that interventions are both practical and aligned with national health priorities. This strategic framework is expected to guide Romania's efforts in reducing the impact of viral hepatitis through coordinated and well-supported public health initiatives (72).

# Non-EU Country Reports

## Montenegro

### HPV Country Profiling

**National epidemiology for women only HPV-related cancers: cervical, vulvar and vaginal cancers**

| | Cervical Cancer | Vulvar Cancer | Vaginal Cancer |
|---|---|---|---|
| Annual number of new cancer cases | 58 | 2 | 2 |
| Crude incidence rate | 18.3 | 0.6 | 0.6 |
| Annual number of new cancer deaths | 32 | 1 | 1 |
| Crude mortality rate | 10.1 | 0.3 | 0.3 |
| 5-year prevalence (per 100,000) | 2.3 | 2.2 | 1.9 |

**Table 57.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Cervical, Vulvar, and Vaginal Cancers per 100,000 Population in Montenegro (2022).

In 2022, Montenegro faced a significant burden from cervical cancer, with a notably high incidence rate of 18.3 per 100,000, which was above the levels seen in many Western European countries. While this rate was lower than that observed in some Eastern European nations such as Romania, Moldova, and Ukraine, it still represented a considerable public health challenge. The mortality rate from cervical cancer was also high, with 32 deaths recorded, translating to a crude mortality rate of 10.1 per 100,000. This was more than double the rates observed in countries like Belgium (3.9), Italy (3.7), and Ireland (3.5). The 5-year prevalence rate of 2.3 per 100,000 highlights the long-term impact of cervical cancer on the Montenegrin population, and while the numbers remained stable compared to 2020, the rates are concerning. HPV types 16, 18, and 31 remain the most prevalent strains in Montenegro, which mirrors patterns seen in other countries (data for 2020, has been sourced from Human Papillomavirus and Related Disease Report Montenegro (73)). Peak incidence occurred in the 45-49 age group, while mortality was highest among individuals aged 85 and older.

On the other hand, Montenegro reported very low incidence and mortality rates for vulvar and vaginal cancers in 2022. For vulvar cancer, there were only 2 new cases and 1 death, resulting in a crude incidence rate of 0.6 and a crude mortality rate of 0.3. These rates were the lowest among all 4P-CAN partners, reflecting a relatively low burden of this cancer type. Similarly, vaginal cancer had 2 new cases and 1 death, with identical incidence and mortality rates of 0.6 and 0.3, respectively. The incidence rate for vaginal cancer matched that of Ukraine, and the mortality rate was similar to Romania's. The 5-year prevalence for vulvar cancer was 2.2 per 100,000, and for vaginal cancer, it was 1.9 per 100,000, indicating that both types of cancer have low and stable rates in Montenegro. This stability aligns with trends seen in neighboring countries, where vulvar and vaginal cancer rates remain relatively low.

While cervical cancer continues to present a significant challenge in Montenegro, particularly in terms of incidence and mortality rates, the low burden of vulvar and vaginal cancers is a positive aspect of the country's cancer profile. However, continued monitoring and public health efforts, such as improving vaccination uptake and screening programs for cervical cancer, will be crucial for reducing the burden of HPV-related cancers in the future.

In Montenegro, the incidence of vulvar cancer was fairly evenly distributed across individuals aged 60 to 79, indicating a relatively steady occurrence of cases in this age range. Mortality from vulvar cancer was consistent across the 65 to 85+ age groups, reflecting a stable impact of the disease on older individuals.

For vaginal cancer, most cases were observed in the 65 to 69 age group, with mortality rates peaking among those aged 85 and older. This suggests that vaginal cancer primarily affects older populations, with the highest risk of death occurring in the very elderly.

**Men only HPV-related cancer: penile cancer**

In 2022, Montenegro reported just 2 new cases of penile cancer, reflecting a slight decrease from the 5 cases recorded in 2020 (74). This places Montenegro with the lowest incidence and mortality rates for penile cancer when compared to other 4P-CAN partners.

The 5-year prevalence rate for penile cancer in Montenegro stands at 2.3, which is among the lowest across the region. Similar to previous years, new cases and deaths from penile cancer peaked in the 75-79 age group, followed by the 80-84 age group in 2020. This trend indicates that, like many other HPV-related cancers, penile cancer predominantly affects older populations in Montenegro.

**Gender Neutral HPV-related cancers: anal and oropharyngeal cancers**

| | Anal Cancer | | Oropharyngeal Cancer | |
|---|---|---|---|---|
| | Female | Men | Female | Men |
| Annual number of new cancer cases | 4 | 4 | 4 | 5 |
| Crude incidence rate | 1.3 | 1.3 | 1.3 | 1.6 |
| Annual number of new cancer deaths | 2 | 1 | 0 | 4 |
| Crude mortality rate | 0.6 | 0.3 | 0 | 1.3 |

**Table 58.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Anal and Oropharyngeal Cancer per 100,000 Population in Montenegro (2022).

In 2022, Montenegro reported a total of 4 new cases of anal cancer in both women and men, resulting in a crude incidence rate of 1.3 for each sex. The mortality rates were relatively low, with 2 deaths among women (crude mortality rate of 0.6) and 1 death among men (crude mortality rate of 0.3). These figures reflect a stable trend in both incidence and mortality compared to previous years, indicating consistent patterns in anal cancer rates across genders. The low numbers of new cases and deaths highlight the relatively minor impact of anal cancer within Montenegro's overall cancer profile. Montenegro's

incidence rates are among the lowest in the group, yet female mortality rates are the third highest within the consortium, exceeded only by France (1.0) and Italy (0.8).

The country's oropharyngeal cancer statistics, on the other hand, reveal a different pattern compared to anal cancer. In 2022, there were 4 new cases of oropharyngeal cancer in women and 5 in men, yielding crude incidence rates of 1.3 and 1.6, respectively. Male incidence rate was the second lowest reported, only below the. Republic of North Macedonia (1.3). Despite similar incidence rates between the sexes, mortality rates diverged significantly: men experienced 4 deaths (crude mortality rate of 1.3), while no deaths were reported for women, resulting in a mortality rate of 0. This disparity highlights a more severe impact of oropharyngeal cancer in men, with a notably higher mortality rate compared to women. The consistency of these rates over recent years reflects a stable but gender-differentiated burden of oropharyngeal cancer in Montenegro.

## HPV Vaccination Policies

### HPV national vaccination guidelines and coverage rates

| | Girls | Boys |
|---|---|---|
| National Policy on HPV vaccination | Yes | No |
| Year of Introduction | 2022 | - |
| HPV in national immunisation calendar | No | - |
| Availability of National HPV registry | No | - |
| Financing of Vaccine | Free | - |

**Table 59.** HPV vaccination policies and program details for boys and girls: national guidelines, introduction year, and vaccine financing in Montenegro. Data Source: Human Papillomavirus and Related Disease Report Montenegro and HPV Prevention Policy Atlas.

Montenegro, like Romania, has only recently introduced HPV vaccination, with initial plans for rollout in 2020. However, the implementation was delayed due to the redirection of resources to address the COVID-19 pandemic. In 2022, the vaccination campaign was successfully launched, targeting 9-year-olds with the help of various national stakeholders. This effort involved training healthcare personnel, providing technical support, and facilitating peer-to-peer learning activities to boost the campaign's effectiveness.

By the end of 2022, a total of 654 doses were administered, reaching approximately 13.1% of the target population. Despite the modest uptake, the World Health Organization (WHO) continues to collaborate with the government of Montenegro to improve these figures and expand vaccination coverage. This support aims to enhance the country's ability to protect its population from HPV-related cancers in the future.

| | Girls | Boys |
|---|---|---|
| HPV Vaccination Schedule | 9-14 | - |

| | | |
|---|---|---|
| HPV first-dosage coverage (%) | 19% | - |
| HPV last-dosage coverage (%) | 19% | - |

**Table 60.** HPV vaccination schedule and coverage rates for girls and boys in Montenegro in 2023. Data Source: WHO Human Papillomavirus (HPV) Montenegro vaccination coverage.

Since February 2024, Montenegro has been offering free HPV vaccinations to girls aged 9 to 14. Despite the recent introduction of vaccination policies, Montenegro has shown remarkable progress, with uptake levels significantly higher than those seen in other Eastern European countries, particularly within such a short timeframe. This adoption rate is noteworthy, especially when compared to countries like Bulgaria, which introduced HPV vaccination in 2012 but still has lower uptake.

However, a concerning trend is the decline in vaccination rates in 2023, which fell to 29%, down from 2022. This is a reversal of the upward trend observed in many other countries.

### Other national preventive measures

| | |
|---|---|
| National screening program for cervical cancer | Yes, opportunistic screening |
| Screening Ages | n/a |
| Type of test provided | Only PAP |
| Financing of Screening | Free |

**Table 61**. HPV national cervical cancer screening program: overview, ages, test types, and financing. Data Source: Human Papillomavirus and Related Disease Report Montenegro.

Montenegro has implemented a national cervical cancer screening program, which offers opportunistic screening through the Pap test, provided free of charge to women. National recommendations for cervical cancer screening were introduced in 2018, and the program includes active invitations to screening. As of the latest available data, around 56% of women aged 30-49 have been screened at least once.

### Case studies of additional strategies and best practices for enhancing HBV vaccination

**Enhancing colorectal cancer screening in Montenegro**

To improve colorectal cancer (CRC) screening in Montenegro, a thorough assessment was undertaken to address several critical barriers impacting the effectiveness of existing programs. The evaluation identified three major issues: inadequate colonoscopy capacity, outdated IT systems, and insufficient public awareness about CRC screening. These challenges were impeding the program's reach and effectiveness, highlighting the need for a strategic overhaul.

In response, a series of targeted actions were developed to address these barriers. Expanding colonoscopy services was prioritised to increase the availability and accessibility of screening procedures. Upgrading IT infrastructure was also essential to streamline patient management and data collection, thereby enhancing overall program

efficiency. Additionally, a concerted effort to boost public education aimed to raise awareness about the importance of CRC screening and encourage more individuals to participate in screening programs.

The success of these interventions was largely attributed to the collaboration between local stakeholders and international experts, which ensured that practical and culturally appropriate solutions were implemented. Ongoing monitoring and evaluation were established to track the effectiveness of the new measures and make necessary adjustments. Ensuring that adequate resources were allocated and aligning the program with national health policies were critical for sustaining these improvements and achieving long-term success in CRC screening in Montenegro (75).

## HBV Country Profiling

### National epidemiology for HBV and HBV-related cancers: liver and intrahepatic bile ducts

It is estimated that the prevalence of chronic hepatitis B (HBV) cases in Montenegro is 1.48%. In 2022, six new cases were reported. In 2019, the crude mortality rate for hepatitis B in Montenegro was estimated at 3.5 per 100,000 population, lower than in countries like Romania. This data reflects a steady decrease in mortality rates, with a significant decline since 2015 when the rate was reported at 4.6 per 100,000.

No specific data was reported regarding HBV prevalence amongst at risk groups (76).

| | Liver and intrahepatic bile ducts | |
|---|---|---|
| | Female | Male |
| Annual number of new cancer cases | 30 | 36 |
| Crude incidence rate | 9.5 | 11.6 |
| Annual number of new cancer deaths | 28 | 34 |
| Crude mortality rate | 8.8 | 11.0 |
| 5-year prevalence (per 100,000) | 9.8 | 13.2 |

**Table 62.** New cases, deaths, crude incidence, mortality rates, and 5-year prevalence of liver and intrahepatic bile ducts per 100,000 Population in Montenegro (2022).

Montenegro reports the lowest number of new and fatal cancer cases when examining raw count data. The crude incidence rate for women in Montenegro is quite similar to that of Moldova, at 9.9, slightly higher than in Ireland (8.7) and Italy (8.9). For men, Montenegro ranks third lowest, alongside Ukraine (6.5) and North Macedonia (12.0). Mortality rates for both women and men in Montenegro closely resemble those in North Macedonia. The country's 5-year prevalence rate for men is the second lowest, following Ukraine at 8.6. However, the prevalence rate for women is relatively average when compared to other 4P-CAN partner countries.

### HBV national vaccination guidelines and coverage rates

| | Universal vaccination |
|---|---|
| National Policy on HBV vaccination | Yes, recommended |
| Year of Introduction | 2004 |
| HBV in national immunisation calendar | Yes |
| Availability of National HBV registry | No |
| Financing of Vaccine | Free of charge |

**Table 63.** HBV vaccination policies and program details: national guidelines, introduction year, and vaccine financing in Montenegro.

Hepatitis B vaccination was introduced in Montenegro in 2006, covering children aged 0-8 years (77). While this was a positive step towards controlling the spread of the virus, the timing of the implementation was relatively late compared to other countries, many of which had introduced the vaccine earlier, starting in the late 1990s or early 2000s.

| | Universal vaccination |
|---|---|
| HBV Vaccination Schedule | Recommended at months 2, 4, and 18 |
| HBV three dosage coverage | 42% |

**Table 64.** HBV vaccination schedule and coverage rates in Montenegro in 2023. Data Source: Vaccination schedule for Hepatitis B Montenegro and WHO Hepatitis B vaccination coverage Montenegro.

Montenegro's hepatitis B vaccination schedule includes standard vaccinations at 2, 4, and 18 months for all children, while at-risk groups receive vaccinations at birth, 1, 2, and 13 months. Despite these recommendations, Montenegro faces challenges with its vaccination coverage. In 2023, the reported coverage rate was estimated at just 42%, significantly lower than that of other countries in the report.

A key limitation is the absence of a nationally representative survey to assess vaccination coverage over the past five years. This lack of comprehensive data means that the accuracy of reported coverage cannot be fully confirmed. To address this gap, WHO and UNICEF have recommended that Montenegro implement a high-quality survey to better assess vaccination uptake and identify any barriers to coverage.

## Case studies of additional strategies and best practices for enhancing HBV vaccination

### Enhancing immunisation rates in Montenegro through a nationwide immunisation campaign

Montenegro has faced significant challenges with low immunisation rates among young children, particularly for measles, mumps, and rubella (MMR). With only 56% of

preschoolers vaccinated and even lower rates among younger children, there was a pressing need to address these gaps to prevent serious diseases. In response to this critical situation, the Ministry of Health, in collaboration with the Institute for Public Health, UNICEF, and the EU, launched a nationwide immunisation campaign in 2023.

The campaign proved to be highly effective, increasing vaccination rates by nearly 2,000 children compared to the previous year. A November evaluation highlighted the campaign's success, attributing much of the improvement to personal outreach methods such as phone calls and SMS notifications, which significantly boosted vaccination uptake. The evaluation also revealed that parents preferred receiving immunizations without prior scheduling and valued paediatricians as their primary source of information. The introduction of the Bebbo app in 2022 further supported this effort, with half of the parents using the app and finding it valuable for accessing vaccination information (78).

Moving forward, maintaining high immunisation rates will require continued direct communication with parents and efforts to promote media literacy to counter misinformation. These strategies are essential for sustaining the progress achieved and ensuring that all children receive the vaccinations they need to protect against preventable diseases.

**National epidemiology for women only HPV-related cancers: cervical, vulvar and vaginal cancers**

| | Cervical Cancer | Vulvar Cancer | Vaginal Cancer |
|---|---|---|---|
| Annual number of new cancer cases | 107 | 8 | 4 |
| Crude incidence rate | 10.3 | 0.8 | 0.4 |
| Annual number of new cancer deaths | 61 | 5 | 2 |
| Crude mortality rate | 5.9 | 0.5 | 0.2 |
| 5-year prevalence (per 100,000) | 32.9 | 2.2 | 1.1 |

**Table 65.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Cervical, Vulvar, and Vaginal Cancers per 100,000 Population in the Republic of North Macedonia (2022).

In 2022, North Macedonia reported a notable burden of cervical cancer, with 107 new cases and a crude incidence rate of 10.3 per 100,000, reflecting a significant public health concern. The annual mortality from cervical cancer was 61, with a crude mortality rate of 5.9. Although both incidence and mortality rates were the lowest among the Eastern 4P-CAN countries, they still represent a notable health challenge.

The 5-year prevalence rate for cervical cancer stood at 32.9 per 100,000, indicating a significant long-term impact on the population. These statistics have remained relatively stable when compared to 2020, which recorded 113 cases (data for 2020, has been sourced from Human Papillomavirus and Related Disease Report Belgium (79)). HPV types 16, 18, and 31 were the most prevalent, and peak incidence and mortality rates occurred in the 45-49 and 85+ age groups, respectively.

In 2022, North Macedonia reported relatively low figures for both vulvar and vaginal cancer. For vulvar cancer, the country recorded 8 new cases, resulting in a crude incidence rate of 0.8 and a mortality rate of 0.5. These rates were the second-lowest reported in the Consortium, reflecting a relatively low burden. The 5-year prevalence for vulvar cancer was 2.2, showing a slight decrease from the 13 cases reported in 2020, suggesting stable trends over time.

Similarly, vaginal cancer showed a similarly low burden, with 4 new cases and 2 deaths, leading to a crude incidence rate of 0.4 and a mortality rate of 0.2. The 5-year prevalence for vaginal cancer was 1.1, indicating that both incidence and mortality rates remained low and stable, consistent with patterns observed in neighbouring countries.

**Men only HPV-related cancer: penile cancer**

In 2022, North Macedonia reported 21 new cases of penile cancer, resulting in an incidence rate of 1.2, which is comparable to Ukraine's rate of 1.2 and below that of most Western countries (80) This marks a significant decrease from 2020, when the incidence rate was

3.17. The 5-year prevalence rate for penile cancer stands at 3.2, indicating an average level compared to other 4P-CAN partner countries.

**Gender Neutral HPV-related cancers: anal and oropharyngeal cancers**

| | Anal Cancer | | Oropharyngeal Cancer | |
|---|---|---|---|---|
| | Female | Men | Female | Men |
| Annual number of new cancer cases | 7 | 6 | 2 | 13 |
| Crude incidence rate | 0.7 | 0.6 | 0.2 | 1.3 |
| Annual number of new cancer deaths | 0 | 0 | 1 | 10 |
| Crude mortality rate | 0 | 0 | 0.1 | 1 |

**Table 66.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Anal and Oropharyngeal Cancer per 100,000 Population in the Republic of North Macedonia (2022).

Table 66 presents an estimate for the incidence and mortality of new cases of anal and oropharyngeal cancers in North Macedonia for 2022. For anal cancer, there were 7 new cases in women and 6 in men, with crude incidence rates of 0.7 for women and 0.6 for men, making these the second-lowest rates in the Consortium, just above Moldova. Notably, there were no reported deaths from anal cancer in either gender, resulting in a crude mortality rate of 0. This marks an increase from 2020, when only 2 cases were reported in women and 5 in men, with 1 male death.

In contrast, for oropharyngeal cancer, men were significantly more affected than women. The crude incidence rate for men was 1.3, with 13 new cases, compared to just 0.2 for women, with only 2 new cases. Mortality rates mirrored this gender disparity, with 10 deaths in men (crude mortality rate of 1) and only 1 death in women (crude mortality rate of 0.1). Despite the higher incidence and mortality in men, both the incidence and mortality rates for oropharyngeal cancer in North Macedonia were the lowest reported in the Consortium.

## HPV Vaccination Policies

**HPV national vaccination guidelines and coverage rates**

| | Girls | Boys |
|---|---|---|
| National Policy on HPV vaccination | Yes | No |
| Year of Introduction | 2009 | |
| HPV in national immunisation calendar | No | - |
| Availability of National HPV registry | No | - |
| Financing of Vaccine | Free of charge | - |

**Table 67.** HPV vaccination policies and program details for boys and girls: national guidelines, introduction year, and vaccine financing in the Republic of North Macedonia. Data Source: Human Papillomavirus and Related Disease Report North Macedonia and HPV Prevention Policy Atlas.

In North Macedonia, HPV vaccination was introduced in 2009, targeting girls as a part of national policy. However, it is important to note that the HPV vaccine is not included in the national immunisation calendar, which may affect its prioritization and uptake. Additionally, there is no national HPV registry available to track vaccination coverage, making it difficult to assess the full scope of vaccination efforts and their effectiveness.

Despite these limitations, the vaccine is provided free of charge by doctors and nurses, ensuring that the targeted population has access to it.

| | Girls | Boys |
|---|---|---|
| HPV Vaccination Schedule | 12 years | - |
| HPV first-dosage coverage (%) | 46% | - |
| HPV last-dosage coverage (%) | 40% | - |

**Table 68.** HPV vaccination schedule and coverage rates for girls and boys in North Macedonia in 2023. Data Source: WHO Human Papillomavirus (HPV) North Macedonia vaccination coverage.

In North Macedonia, the HPV vaccination schedule for girls begins at 12 years of age. As of 2021, the coverage for the first dose of the HPV vaccine stands at 46%, while the coverage for the final dose is 40% (81). These coverage rates reflect the current uptake of the vaccination program among the target population. Over the past decade, vaccination coverage has fluctuated between 31% and 49% for females receiving the final dose, showing some variability in uptake.

In 2022, the National Commission on Immunization recommended expanding the HPV vaccination program to include gender-neutral vaccination. This policy change also includes offering catch-up vaccinations for high school students who missed the vaccine at age 12. Additionally, North Macedonia plans to switch to the 9-valent (Gardasil) vaccine starting in 2024, which offers broader protection against more strains of the HPV virus, further strengthening the national effort to reduce HPV-related cancers (82).

### Other national preventive measures

| | |
|---|---|
| National screening program for cervical cancer | Yes, optimistic screening |
| Screening Ages | 24-60 |
| Type of test provided | Only PAP |
| Financing of Screening | Free |

**Table 69.** HPV national cervical cancer screening program: overview, ages, test types, and financing. Data Source: Human Papillomavirus and Related Disease Report North Macedonia.

North Macedonia established a national screening program for cervical cancer in 2006, offering opportunistic screening using the Pap test for women aged 24 to 60 years. This screening is provided free of charge and is accompanied by active invitations to encourage participation.

As of the latest estimates, around 77% of women aged 30 to 49 have been screened at least once, indicating a relatively high level of engagement with the screening program.

Case studies of additional strategies and best practices for enhancing HBV vaccination

### UNFPA's efforts in cervical cancer prevention in the Western Balkans

Since 2014, the United Nations Population Fund (UNFPA) has played a pivotal role in advancing cervical cancer prevention across the Western Balkans, a region where cervical cancer rates remain alarmingly high compared to Western Europe. This disparity is largely due to inadequate screening, limited HPV vaccination programs, and insufficient access to treatment. Recognizing these challenges, UNFPA has partnered with national health authorities to implement targeted interventions aimed at reducing cervical cancer incidence and mortality in Serbia, Bosnia and Herzegovina, North Macedonia, and Kosovo.

North Macedonia has benefited from national campaigns and the implementation of online screening applications, improving access to early detection and care. These initiatives underscore the importance of comprehensive awareness, education, and vaccination programs in the fight against cervical cancer across the Western Balkans. Through ongoing collaboration with local governments and stakeholders, UNFPA continues to make significant strides in addressing this critical public health issue (83).

HBV Country Profiling

### National epidemiology for HBV and HBV-related cancers: liver and intrahepatic bile ducts

There is insufficient data to provide a clear picture of current hepatitis B (HBV) cases in North Macedonia. However, in a report published in 2022, the incidence of hepatitis B was estimated at 7.5 per 100,000 population, roughly six times higher than that shown by the EU (1.1). According to the North Macedonian National Institute of Health, the estimated prevalence of chronic HBsAg carriers in the general population is 0.8%. Additionally, data from the European Centre for Disease Prevention and Control indicates that the HBsAg prevalence among migrants from North Macedonia is 3.3%.

Mortality rates in 2022 were estimated at 5.6%. No specific data was reported regarding other HBV prevalence amongst at risk groups (84).

| | Liver and intrahepatic bile ducts | |
|---|---|---|
| | Female | Male |
| Annual number of new cancer cases | 88 | 125 |
| Crude incidence rate | 8.5 | 12.0 |
| Annual number of new cancer deaths | 83 | 6.3 |
| Crude mortality rate | 8.0 | 11.2 |
| 5-year prevalence (per 100,000) | 10.8 | 14.7 |

**Table 70.** New cases, deaths, crude incidence, mortality rates, and 5-year prevalence of liver and intrahepatic bile ducts per 100,000 Population in Republic of North Macedonia (2022).

In 2022, North Macedonia reported a female cancer incidence rate comparable to countries like Ireland (8.7) and Portugal (8.8), reflecting an average level for the region. For men, however, North Macedonia's incidence rate was among the lowest, ranking third after Montenegro (11.6) and Ukraine (6.5).

Similarly, mortality rates for women in North Macedonia were also average, while for men, the rates were among the lowest in the consortium, following the same trend as the incidence. The 5-year prevalence rates for both genders followed a similar pattern, with North Macedonia showing relatively low figures for men and average rates for women. This suggests that while North Macedonia's female cancer rates are typical for the region, male cancer rates are notably lower compared to other countries in the consortium.

## HBV Vaccination Policies

### HBV national vaccination guidelines and coverage rates

| | Universal vaccination |
|---|---|
| National Policy on HBV vaccination | Yes, mandatory |
| Year of Introduction | 2004 |
| HBV in national immunisation calendar | Yes |
| Availability of National HBV registry | No |
| Financing of Vaccine | Free of charge |

**Table 71.** HBV vaccination policies and program details: national guidelines, introduction year, and vaccine financing in Republic of North Macedonia.

In North Macedonia, hepatitis B vaccination became mandatory in 2004, with a schedule that includes doses at birth, 2 months, and 6 months (85). By 2023, the coverage rate for the three-dose hepatitis B vaccination was estimated at 86%, which reflects a relatively high uptake. Notably, the vaccination rate for the dose administered within 24 hours of birth was particularly high, reported at 97%. This high coverage rate for the birth dose suggests strong adherence to the vaccination guidelines, contributing to better protection against hepatitis B in the population (Table 72).

| | Universal vaccination |
|---|---|
| HBV Vaccination Schedule | Mandatory at birth, months 2 and 6 |
| HBV three dosage coverage | 86% |

Table 72. HBV vaccination schedule and coverage rates in North Macedonia in 2023. Data Source: Data Source: Vaccination schedule for Hepatitis B North Macedonia and WHO Hepatitis B vaccination coverage North Macedonia.

## Case studies of additional strategies and best practices for enhancing HBV vaccination

### First national declaration for liver cancer in North Macedonia

In North Macedonia, the Centar-Bitola has emerged as a pivotal force in raising awareness about liver diseases, particularly focusing on hepatitis, non-alcoholic steatohepatitis (NASH), non-alcoholic fatty liver disease (NAFLD), and liver cancer. Recognizing that liver cancer is the third deadliest cancer globally and that chronic hepatitis B and C contribute significantly to liver cancer cases in the region, the centre has tailored its approach to emphasise the connection between hepatitis and liver cancer. This strategy has proven effective in garnering public empathy and support.

In response to the challenge of addressing liver cancer and hepatitis-related issues, Hepar Centar-Bitola orchestrated a comprehensive campaign that culminated in the publication of the Republic of North Macedonia's first National Declaration for the Fight Against Cancer on World Hepatitis Day. The declaration, a collaborative effort involving numerous stakeholders, including the Ministry of Health and various health clinics, calls for a fully funded national program to tackle liver cancer and chronic hepatitis B and C. This initiative aims to improve early diagnosis and treatment outcomes through enhanced screening and early intervention. The campaign's success has led to the establishment of a multidisciplinary liver disease centre designed to reduce stigma, streamline patient care, and improve overall efficiency. Social media platforms, including Facebook, Instagram, and Twitter, played a crucial role in amplifying the campaign's message, engaging the public, and rallying support for the cause (86).

## Republic of Moldova

HPV Country Profiling

**National epidemiology for women only HPV-related cancers: cervical, vulvar and vaginal cancers**

| | Cervical Cancer | Vulva Cancer | Vaginal Cancer |
|---|---|---|---|
| Annual number of new cancer cases | 420 | 43 | 3 |
| Crude incidence rate | 20.1 | 2.1 | 0.1 |
| Annual number of new cancer deaths | 236 | 21 | 2 |
| Crude mortality rate | 11.3 | 1.1 | 0.1 |
| 5-year prevalence (per 100,000) | 65.4 | 65.4 | 0.4 |

**Table 73.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Cervical, Vulvar, and Vaginal Cancers per 100,000 Population in Republic of Moldova (2022).

In 2022, Moldova reported 420 new cases of cervical cancer, which remains a significant public health challenge for the country. The crude incidence rate of 20.1 per 100,000 and a mortality rate of 11.3 indicate a notable burden of the disease, although both figures showed a slight decrease compared to 2020 (data for 2020, has been sourced from Human Papillomavirus and Related Disease Report Moldova (87)). While the rates are still high when compared to Western 4P-CAN countries, they are similar to those in neighbouring Eastern European countries like Ukraine and Bulgaria. The 5-year prevalence of 65.4 per 100,000 emphasizes the lasting impact cervical cancer has on the population, highlighting the need for comprehensive prevention, screening, and treatment initiatives.

In Moldova, the peak incidence occurred in women aged 40-44, while the highest mortality was observed among those aged 65-69. This age pattern mirrors trends seen in other countries, emphasizing the importance of early detection and effective treatment strategies.

Vulvar cancer in Moldova has shown a stable trend, with 43 new cases reported in 2022 and a crude incidence rate of 2.1, closely aligned with that of Ukraine (2.8). The mortality rate for vulvar cancer is relatively low at 1.1, matching France, and these figures have remained consistent over recent years, indicating stability in both incidence and mortality. The 5-year prevalence rate for vulvar cancer is comparable to that of cervical cancer, highlighting that while it is less common, vulvar cancer still has a notable presence in the country. Vulvar cancer incidence and mortality peaked in the 65-69 age group.

On the other hand, vaginal cancer in Moldova has demonstrated a different trajectory. In

2022, only 3 new cases were reported, resulting in a crude incidence rate of 0.1, which was the lowest recorded in the Consortium. With just 2 deaths reported, the mortality rate remains low, and the 5-year prevalence is 0.4 per 100,000. This reflects a significant reduction from 2020, when 6 cases were reported, showing a positive decline in vaginal cancer cases in Moldova. Both the incidence and mortality rates for vaginal cancer in the country were the lowest in the Consortium.

**Men only HPV-related cancer: penile cancer**

In 2022, Moldova reported 17 new cases of penile cancer, showing a decrease compared to 2020, with 28 cases reported (88). The incidence rate for penile cancer in Moldova is the second lowest in the 4P-CAN Consortium, surpassed only by Montenegro. Similarly, the mortality rate is also one of the lowest, comparable to that of Belgium, again only surpassed by Montenegro.

The 5-year prevalence rate for penile cancer in Moldova stands at 2.9, making it one of the lowest in comparison with other countries. This suggests that, while still a concern, penile cancer remains less prevalent in Moldova compared to many other nations.

**Gender Neutral HPV-related cancers: anal and oropharyngeal cancers**

| | Anal Cancer | | Oropharyngeal Cancer | |
|---|---|---|---|---|
| | Female | Men | Female | Men |
| Annual number of new cancer cases | 8 | 3 | 7 | 199 |
| Crude incidence rate | 0.4 | 0.2 | 0.3 | 10.4 |
| Annual number of new cancer deaths | 0 | 2 | 4 | 127 |
| Crude mortality rate | 0 | 0.1 | 0.2 | 6.6 |

**Table 74.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Anal and Oropharyngeal Cancer per 100,000 Population in Republic of Moldova (2022).

In 2022, Moldova reported relatively low incidence and mortality rates for anal cancer, with 8 new cases in women and 3 in men, resulting in crude incidence rates of 0.4 and 0.2, respectively. Mortality from anal cancer remains minimal, with no reported deaths in women and only 2 in men. These figures are consistent with previous years, showing stability and even a slight improvement in female mortality compared to 2020, when 3 deaths were recorded. Along with North Macedonia, Moldova reported the lowest incidence rates for anal cancer in the 4P-CAN Consortium.

In contrast, oropharyngeal cancer presents a more significant health challenge in Moldova, particularly among men. In 2022, there were 199 new cases in men, leading to a crude incidence rate of 10.4, compared to just 7 cases in women, with a crude rate of 0.3. Moldova presented the third-highest mortality rate for oropharyngeal cancer, only surpassed by Romania (14.8) and Portugal (11.1). Mortality rates reflect this gender disparity, with 127 deaths in men (crude rate of 6.6) and 4 in women (crude rate of 0.2). These figures mirror those reported in 2020, indicating a persistent higher burden of oropharyngeal cancer among men in Moldova.

**HPV national vaccination guidelines and coverage rates**

| | Girls | Boys |
|---|---|---|
| National Policy on HPV vaccination | Yes, in form of recommendation | Yes |
| Year of Introduction | 2018 | 2021 |
| HPV in national immunisation calendar | Yes | Yes |
| Availability of National HPV registry | No | No |
| Financing of Vaccine | Free of charge | Free of charge |

**Table 75.** HPV vaccination policies and program details for boys and girls: national guidelines, introduction year, and vaccine financing in Republic of Moldova. Data Source: Human Papillomavirus and Related Disease Report Moldova and HPV Prevention Policy Atlas.

In Moldova, the national policy on HPV vaccination for girls was introduced in 2019. Although the vaccine is not included in the national immunisation calendar and no national HPV registry is available, the vaccination is provided free of charge. HPV vaccination was included as a recommendation in the National Cancer Control Strategy for 2016-2025. Since December 2017, it has been offered free of charge to girls aged 10 on a voluntary basis through primary health care providers. Starting in September 2021, HPV vaccination was added to the National Immunization Calendar for both girls and boys aged 9-14. The vaccination program uses the 4-valent (Gardasil) vaccine administered in a 2-dose schedule, with the second dose given more than 6 months after the first (89).

| | Girls | Boys |
|---|---|---|
| HPV Vaccination Schedule | 9-14 | 9-14 |
| HPV first-dosage coverage (%) | 54% | n/a |
| HPV last-dosage coverage (%) | 44% | n/a |

**Table 76.** HPV vaccination schedule and coverage rates for girls and boys in Republic of Moldova in 2023. Data Source: WHO Human Papillomavirus (HPV) Republic of Moldova vaccination coverage.

In Moldova's national HPV vaccination program, both girls and boys aged 9 to 14 are eligible to receive the vaccine. The latest data indicates that the first-dose coverage for girls is 54%, while the completion rate for the vaccination series stands at 44%. Although these figures do not meet the WHO's targets, they are notably higher than those seen in many other Eastern European countries. This may be attributed to the relatively early introduction of vaccination campaigns when the program was first rolled out.

However, similar to many other countries, regional variations in vaccination uptake are evident. For example, in the Chisinau region, despite an overall two-dose vaccination rate of 44% in 2022, significant differences in coverage have been reported across various neighbourhoods in the first eight months of 2024. This underscores the importance of targeted interventions and continued efforts to address disparities in vaccination rates

within different regions and municipal zones. Vaccination rates ranged from as low as 9.3% to as high as 28.1%[5]. Data on vaccination coverage for boys is not yet available. The program seeks to provide comprehensive protection against HPV for adolescents, with ongoing efforts to monitor and enhance coverage rates+

### Other national preventive measures

| | |
|---|---|
| National screening program for cervical cancer | Yes, opportunistic PAP |
| Screening Ages | 25-61 |
| Type of test provided | Only PAP |
| Financing of Screening | Free |

**Table 77.** HPV national cervical cancer screening program: overview, ages, test types, and financing. Data Source: Human Papillomavirus and Related Disease Report Moldova.

Moldova has implemented a national cervical cancer screening program that offers opportunistic Pap tests for women aged 25-61. The program, which provides Pap tests exclusively, is fully financed by the government, ensuring that the service is available free of charge to eligible women.

National recommendations for cervical cancer screening were introduced in Moldova in 2017, but these recommendations did not include active invitations to screening. By 2021, it was reported that 81% of women had undergone at least one screening, indicating a relatively high uptake. However, the lack of active invitations may mean that some women who are eligible might not be actively reached or reminded to participate, potentially affecting overall participation rates.

### Case studies of additional strategies and best practices for enhancing HBV vaccination

**National campaign to combat cervical cancer: "Stay Healthy! Do the PAP-Test!"**

The Republic of Moldova launched the "Stay Healthy! Do the PAP-Test!" campaign to reduce high cervical cancer mortality rates by promoting regular Pap tests for women aged 25-61. Despite free cytology tests being available at family doctor offices, many women, especially in southern regions and poorer communities, had never participated in screening due to barriers like time constraints, fear, and lack of awareness. Running from January 28 to March 31, 2020, the campaign utilised public outreach, multimedia materials, health worker training, and the website www.paptest.md to engage the medical community, civil society, and the public. The initiative aimed to increase screening rates and promote HPV vaccination to reduce cervical cancer cases in the country (90).

**"Help Me Fight Infections" campaign: boosting vaccination rates in Moldova**

UNICEF Moldova, in collaboration with the Ministry of Health and the National Agency for Public Health, launched the "Help Me Fight Infections" campaign, with support from USAID,

[5]Data provided by the General Directorate for Medical and Social Assistance Chisinau (Moldova), not publicly available.

to address declining vaccination rates. This initiative focused on 15 suburbs of Chisinau and ten districts with low immunisation coverage, particularly those impacted by COVID-19 restrictions. Mobile teams of public health and communication specialists engaged with schools, health centres, and community groups to raise awareness and promote vaccinations for diseases like DTP3, polio, and HPV. The campaign's community-focused approach aimed to restore and increase immunisation rates, prevent disease outbreaks, and strengthen public health across the country (91).

## HBV Country Profiling

**National epidemiology for HBV and HBV-related cancers: liver and intrahepatic bile ducts**

In 2022, Moldova reported 270 new cases of chronic hepatitis B, reflecting a significant public health concern. Additionally, the total number of hepatitis B cases reached 48,400 for the same year, underscoring the widespread nature of the disease in the country. Despite this high burden, official data on the prevalence of hepatitis B among specific at-risk groups, such as pregnant women, people who inject drugs, or men who have sex with men, remains unavailable, highlighting a gap in comprehensive epidemiological monitoring.

The disease's impact is further evident in the mortality data. In 2019, Moldova's crude mortality rate for hepatitis B was modelled at 10.2 per 100,000 population, illustrating the severe outcomes associated with the condition (92).

| | Liver and intrahepatic bile ducts | |
|---|---|---|
| | Female | Male |
| Annual number of new cancer cases | 207 | 450 |
| Crude incidence rate | 9.9 | 23.5 |
| Annual number of new cancer deaths | 200 | 414 |
| Crude mortality rate | 9.6 | 21.6 |
| 5-year prevalence (per 100,000) | 12.1 | 31.8 |

**Table 78.** New cases, deaths, crude incidence, mortality rates, and 5-year prevalence of liver and intrahepatic bile ducts per 100,000 Population in Republic of Moldova (2022).

In 2022, Moldova reported a female cancer incidence rate similar to that of Montenegro (9.5). However, the male incidence rate was nearly double that of the female rate, placing Moldova among the top five countries with the highest male incidence. A similar pattern was observed in mortality rates, where Moldova ranked fourth for men, with one of the highest crude rates.

Moldova, alongside Romania, had the second-highest 5-year prevalence rate for men, only surpassed by France (32.7). For women, Moldova also reported the second-highest prevalence rate, following Romania (15.1). These figures indicate a significant cancer

burden, particularly among men, and highlight the ongoing challenges in addressing both prevention and treatment for both genders in the country.

## HBV Vaccination Policies

**HBV national vaccination guidelines and coverage rates**

| | Universal vaccination |
|---|---|
| National Policy on HBV vaccination | Yes, mandatory |
| Year of Introduction | 2004 |
| HBV in national immunisation calendar | Yes |
| Availability of National HBV registry | No |

**Table 79.** HBV vaccination policies and program details: national guidelines, introduction year, and vaccine financing in Republic of Moldova.

In Moldova, hepatitis B vaccination became mandatory in 2004, although it had been recommended since 1995 (93). The country follows the recommended hepatitis B vaccination schedule, administering doses at 2, 4, and 6 months. As of 2023, the coverage rate for the three-dose hepatitis B vaccination was estimated at 88%, which is below the WHO target of 95% (94). However, the coverage rate for the first dose was higher, estimated at 96%. These figures suggest that while the first dose is widely accepted, challenges remain in ensuring full completion of the vaccination series, and efforts may be needed to reach the WHO target (Table 80).

| | Universal vaccination |
|---|---|
| HBV Vaccination Schedule | Recommended at birth, 2, 4, and 6 months |
| HBV three dosage coverage | 88% |

**Table 80.** HBV vaccination schedule and coverage rates in Republic of Moldova in 2023. Data Source: Data Source: Vaccination schedule for Hepatitis B Republic of Moldova and WHO Hepatitis B vaccination coverage Republic of Moldova.

## Case studies of additional strategies and best practices for enhancing HBV vaccination

**Moldova's HEAT project: a comprehensive approach to combating Hepatitis B, C, and D**

Moldova was selected for the HEAT project due to its significant burden of hepatitis B (HBV) and C (HCV) compared to other European nations. The project was spearheaded by Dr. Silvia Stratulat of the National Agency for Public Health and Dr. Angela Paraschiv from the "Nicolae Testemitanu" State University of Medicine and Pharmacology. The initiative aimed to assess the current state of hepatitis B, C, and D in Moldova and develop

a comprehensive national hepatitis action plan to address the challenges.

The HEAT project involved a series of key activities, including the establishment of a working group and the creation of data collection tools to assess the situation across the country. The team conducted thorough evaluations across 239 healthcare institutions and 71 laboratories, focusing on surveillance, epidemiological assessment, prevention strategies, and access to treatment. Additionally, Moldova partnered with Jagpreet Chhatwal's lab at Massachusetts General Hospital to model strategies for the elimination of HCV, further enhancing the project's impact. The final assessment report provided valuable insights into Moldova's laboratory capacity, prevention efforts, and the overall monitoring of hepatitis B and C, laying the groundwork for effective public health interventions (195).

# Ukraine

## HPV Country Profiling

**National epidemiology for women only HPV-related cancers: cervical, vulvar and vaginal cancers**[6]

| | Cervical Cancer | Vulvar Cancer | Vaginal Cancer |
|---|---|---|---|
| Annual number of new cancer cases | 5163 | 658 | 145 |
| Crude incidence rate | 22.3 | 2.8 | 0.6 |
| Annual number of new cancer deaths | 2598 | 347 | 78 |
| Crude mortality rate | 11.2 | 1.5 | 0.3 |
| 5-year prevalence (per 100,000) | 73.9 | 73.9 | 1.6 |

**Table 81.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Cervical, Vulvar, and Vaginal Cancers per 100,000 Population in Ukraine (2022).

In 2022, Ukraine experienced a significant public health burden from cervical cancer, with 5,163 new cases and a crude incidence rate of 22.3, one of the highest in the region, alongside Romania and Bulgaria. This high incidence rate translates into considerable mortality, with 2,598 deaths, leading to a crude mortality rate of 11.2. The 5-year prevalence for cervical cancer in Ukraine stood at 73.9 per 100,000, highlighting the lasting impact of the disease on the population. When compared to 2020 data, where 4,756 cases were reported, there has been a slight increase in both the incidence and mortality rates, underscoring the ongoing challenges that Ukraine faces in addressing cervical cancer (Data for 2020, has been sourced from Human Papillomavirus and Related Disease Report Ukraine (96)). Mortality rates were also high, aligning with Bulgaria and Republic of Moldova. This type of cancer peaked in incidence at ages 40-44, while mortality peaked a decade later, at ages 55-59. Cervical cancer ranks as the 4th most frequent amongst Ukrainian women, and the second most frequent among women between 15 and 44 years of age.

In Ukraine, vulvar cancer showed a crude incidence rate of 2.8 with 658 new cases and 347 deaths, resulting in a crude mortality rate of 1.5. These figures align closely with those reported by Ireland (2.9), reflecting a stable trend in vulvar cancer cases. The 5-year prevalence for vulvar cancer was 73.9 per 100,000, consistent with previous years. Incidence peaked at ages 70-74, while mortality rates were highest at ages 80-84, indicating a typical age-related pattern of the disease.

Vaginal cancer, on the other hand, had a lower burden with 145 new cases and a crude incidence rate of 0.6, matching Montenegro's rate. The mortality rate was also low at 0.3,

[6] Please note that Ukrainian national data show slight differences compared to those collected by Globocan.

with 78 deaths reported. The 5-year prevalence for vaginal cancer stood at 1.6 per 100,000. Both incidence and mortality rates for vaginal cancer remained stable compared to 2020, pointing to a consistently lower burden when compared to cervical and vulvar cancers in Ukraine.

**Men only HPV-related cancer: penile cancer**

In 2022, Ukraine reported 235 new cases of penile cancer, showing a decrease compared to the 304 cases reported in 2020 (97). The 5-year prevalence for penile cancer in Ukraine stands at 3.7.

As for gender-neutral HPV-related cancers, such as anal and oropharyngeal cancers, the incidence rate in Ukraine was roughly half that of Western partners, reflecting a relatively lower burden of these cancers compared to countries in the Western part of Europe. This aligns with patterns observed in other Eastern European countries, where HPV-related cancers tend to show lower incidence rates than in Western counterparts.

**Gender Neutral HPV-related cancers: anal and oropharyngeal cancers**

| | Anal Cancer | | Oropharyngeal Cancer | |
|---|---|---|---|---|
| | Female | Men | Female | Men |
| Annual number of new cancer cases | 200 | 165 | 203 | 2241 |
| Crude incidence rate | 0.9 | 0.8 | 0.9 | 6.6 |
| Annual number of new cancer deaths | 95 | 64 | 84 | 766 |
| Crude mortality rate | 0.4 | 0.3 | 0.4 | 3.8 |

**Table 82.** New Cases, Deaths, Crude Incidence, Mortality Rates, and 5-Year Prevalence of Anal and Oropharyngeal Cancer per 100,000 Population in Ukraine (2022).

In 2022, Ukraine reported a notable burden of anal cancer, with 200 new cases in women and 165 in men. The crude incidence rates were 0.9 for women and 0.8 for men. Women had slightly higher incidence and mortality rates, with 95 deaths (crude mortality rate of 0.4) compared to 64 deaths (crude mortality rate of 0.3) in men. Despite the modest increase in anal cancer cases among men (up from 126 cases in 2020), there was a decrease in cases among women (down from 242 in 2020). These patterns indicate a shift in the distribution of anal cancer between genders in Ukraine, with both incidence and mortality peaking at ages 65-69. Ukraine's incidence and mortality rates for anal cancer were among the lowest in the 4P-CAN Consortium, along with the Republic of North Macedonia and Moldova.

For oropharyngeal cancer, Ukraine observed a much higher incidence and mortality rate, especially in men. In 2022, men accounted for 2,241 new cases (crude incidence rate of 6.6), while women had just 203 new cases (crude incidence rate of 0.9). The mortality rate for oropharyngeal cancer was significantly higher in men, with 766 deaths (crude mortality rate of 3.8) compared to 84 deaths (crude mortality rate of 0.4) in women. This large gender disparity highlights the severe impact of oropharyngeal cancer on men.

Compared to 2020, there was an increase in cases for both genders, with men reporting 1,422 cases and women 171. This upward trend in incidence and mortality was seen across both genders, with new cases and mortality peaking at ages 60-64. Despite the high burden, the incidence and mortality rates for oropharyngeal cancer were fairly average when compared to other 4P-CAN countries.

## HPV Vaccination Policies

**HPV national vaccination guidelines and coverage rates**

| | Girls | Boys |
|---|---|---|
| National Policy on HPV vaccination | No | No |
| Year of Introduction | - | - |
| HPV in national immunisation calendar | No | - |
| Availability of National HPV registry | No | - |
| Financing of Vaccine | Not free | - |

**Table 83.** HPV vaccination policies and program details for boys and girls: national guidelines, introduction year, and vaccine financing in Ukraine.

Ukraine's national policy on HPV vaccination remains underdeveloped, despite public health authorities making efforts to spread awareness about the vaccine's benefits. Although the HPV vaccine is included as a recommended vaccination in national law, it is not provided free of charge. The country currently has three HPV vaccines available on the market, with prices ranging between $43 and $215. Gardasil-9, which offers protection against nine types of HPV, is often administered for free in other countries but remains a costly option in Ukraine, limiting access for many individuals (98,99).

| | Girls | Boys |
|---|---|---|
| HPV Vaccination Schedule | Recommended 9-14 years | Recommended 9-14 years |
| HPV first-dosage coverage (%) | - | - |
| HPV last-dosage coverage (%) | - | - |

**Table 84.** HPV vaccination schedule and coverage rates for girls and boys in Ukraine in 2023.

At present, there is no publicly available data on HPV vaccination coverage rates in Ukraine, which poses a significant challenge for monitoring the effectiveness of vaccination efforts. Several factors contribute to this data gap. First, HPV vaccination is not included in the official vaccine reporting forms used by the national health authorities, which means that coverage data is not systematically captured at the national level. Furthermore, the absence of free access to the HPV vaccine within the national immunization program exacerbates this issue. Since the vaccine is not provided as part of a publicly funded scheme, many individuals are forced to rely on private healthcare providers, often incurring out-of-pocket expenses. This reliance on private providers

leads to fragmented data and makes it difficult to track vaccination coverage consistently across the population.

### Other national preventive measures

| | |
|---|---|
| National screening program for cervical cancer | Yes, opportunistic screening |
| Screening ages | 18-60 |
| Type of test provided | Only PAP |
| Financing of Screening | Free |

**Table 85.** HPV national cervical cancer screening program: overview, ages, test types, and financing. Data Source: Human Papillomavirus and Related Disease Report Ukraine.

Ukraine has a national cervical cancer screening program that offers opportunistic screening using the Pap test. The screening is provided free of charge to participants.

### Case studies of additional strategies and best practices for enhancing HBV vaccination

**HPV vaccination and cervical cancer prevention in Lviv, Ukraine**

In Ukraine, cervical cancer (CC) remains a leading cause of death among women of reproductive age, despite the availability of effective prevention methods such as HPV vaccination and cytological screening. A significant initiative was launched in 2017 in the Lviv region to address this issue. The program distributed 4,500 doses of the Cervarix HPV vaccine to girls aged 12-14 as part of a pilot effort to evaluate vaccine coverage, tolerance, and public awareness. The campaign successfully vaccinated 2,810 girls, which equates to 4.8% of the targeted age group, with notable uptake in Lviv and nearby districts.

A survey conducted among 200 respondents, primarily medical students, revealed mixed results. While a majority were aware of HPV's link to cervical cancer (59.2%) and the importance of cytological screening (74.9%), only 34.9% considered HPV vaccination the most effective preventive measure. Interest in vaccination was moderate, with 36.7% of respondents eager to receive the vaccine themselves and 31.4% willing to vaccinate their future children. The campaign demonstrated that the Cervarix vaccine is generally well-tolerated with minimal adverse effects. However, the pilot highlighted significant challenges, including uneven vaccine uptake and limited support within the medical community. These findings underscore the need for enhanced educational efforts and advocacy to improve cervical cancer prevention and increase vaccination rates (100).

## HBV Country Profiling

**National epidemiology for HBV and HBV-related cancers: liver and intrahepatic bile ducts**

Data from 2022 indicate that a total of 896 cases were recorded for chronic hepatitis B and 520 for acute hepatitis B, marking a 2.3% increase in acute cases and a significant 43.1% increase in chronic cases. This represents a rate of 2.16 per 100,000 people for

chronic hepatitis B and 1.26 per 100,000 for acute hepatitis B (101).

In 2019, the mortality rate for hepatitis B was estimated at 8.6%, and no information is available for specific at-risk groups.

| | Liver and intrahepatic bile ducts | |
|---|---|---|
| | Female | Male |
| Annual number of new cancer cases | 830 | 1294 |
| Crude incidence rate | 3.6 | 6.5 |
| Annual number of new cancer deaths | 780 | 1266 |
| Crude mortality rate | 3.4 | 6.3 |
| 5-year prevalence (per 100,000) | 4.3 | 8.6 |

**Table 86.** New cases, deaths, crude incidence, mortality rates, and 5-year prevalence of liver and intrahepatic bile ducts per 100,000 Population in Ukraine (2022).

Ukraine reported the lowest incidence, mortality, and 5-year prevalence rates for both genders when compared to the other 4P-CAN partners. However, these figures may not fully reflect the true burden of the disease in the country. The significantly lower rates observed could be attributed to underreporting and/or underdiagnosis, suggesting that the actual incidence and mortality could be higher than reported.

## HBV Vaccination Policies

### HBV national vaccination guidelines and coverage rate

| | Universal vaccination |
|---|---|
| National Policy on HBV vaccination | Yes, mandatory |
| Year of Introduction | 2000 |
| HBV in national immunisation calendar | Yes |
| Availability of National HBV registry | No |
| Financing of Vaccine | Free of charge |

**Table 87.** HBV vaccination policies and program details: national guidelines, introduction year, and vaccine financing in Ukraine.

Hepatitis B vaccination was officially incorporated into Ukraine's national vaccination calendar in 2000. However, it wasn't until 2001 that the vaccine was integrated into the childhood immunization program, with substantial support from the Global Alliance for Vaccines and Immunization (GAVI). Coverage for the three-dose hepatitis B vaccine began in Ukraine in 2002. From 2004 to 2007, the country consistently reported impressive coverage rates, ranging between 92% and 98%. However, this progress was followed by a significant decline in vaccination coverage between 2010 and 2016, with

rates plummeting to a troubling range of 21% to 48% (102).

| | Universal vaccination |
|---|---|
| HBV Vaccination Schedule | Recommended at 0, 2 and 6 months |
| HBV three dosage coverage | 79% |

**Table 88.** HBV vaccination schedule and coverage rates in Ukraine in 2023. Data Source: Vaccination schedule for Hepatitis B Republic of Ukraine and WHO Hepatitis B vaccination coverage Ukraine.

In 2023, Ukraine reported an average vaccination coverage rate of 79%. Although this falls short of the World Health Organization's (WHO) target, it is still relatively higher compared to coverage rates in several other Eastern European countries. However, it is essential to highlight that official data from 2024 reveals significant regional discrepancies in vaccination rates, with reported coverage percentages ranging dramatically from 46.6% to 100% (103).

### Case studies of additional strategies and best practices for enhancing HBV vaccination

**Approval of the State Strategy for combating HIV/AIDS, tuberculosis, and viral hepatitis in Ukraine: a national approach toward 2030**

In 2019, Ukraine adopted a comprehensive national strategic plan aimed at addressing key infectious diseases, including HIV/AIDS, tuberculosis, and viral hepatitis, which together represent a significant public health burden in the country. According to estimates, the prevalence of Hepatitis B in Ukraine ranges between 1% and 2.5% of the population. To reduce both the incidence and chronicity of the disease, as well as associated mortality, the national strategy aligns with the World Health Organization's Global Health Strategy on Viral Hepatitis, which advocates for the elimination of viral hepatitis as a public health threat.

The strategy emphasises the development and implementation of effective monitoring and evaluation programs to combat viral hepatitis, the establishment of national targets, and the execution of serological and behavioural studies to assess the disease's prevalence across different population groups. Furthermore, it promotes the provision of comprehensive services for the prevention, diagnosis, and treatment of viral hepatitis. Key initiatives include expanding access to vaccination and post-exposure prophylaxis for Hepatitis B, particularly for children, healthcare workers, and high-risk population groups. In addition, the strategy advocates for the decentralisation of screening and diagnostic services, ensuring wider availability of these services.

A focus on micro-elimination programs targets specific high-risk populations, such as people who inject drugs and individuals who have been incarcerated. These programs aim to reduce viral transmission and ensure targeted interventions for vulnerable groups. Another critical component of the strategy is enhancing public awareness regarding viral hepatitis and improving healthcare professionals' knowledge of modern approaches to its prevention, diagnosis, and treatment.

The ultimate goal of the strategy is to reduce the incidence and mortality rates associated with Hepatitis B by 90% by the year 2030 (104).

**Development of a specific Action Plan for 2023-2025: strengthening immunisation and public health efforts in Ukraine**

In conjunction with the State Strategy, Ukraine has developed a specific action plan for 2023-2025, aimed at implementing key measures to enhance the country's immunisation efforts. These measures are focused on ensuring the procurement of vaccines, improving legislation related to immunoprophylaxis, and strengthening the systems for monitoring and evaluating immunisation programs. A core objective is to achieve high levels of preventive vaccination coverage and to improve epidemiological surveillance of vaccine-preventable diseases.

The action plan also prioritises rapid response capabilities in the event of public health emergencies and optimises the management of medical immunobiological products. This includes ensuring adherence to proper storage and transportation conditions, as well as the effective management of human resources in the healthcare sector.

To successfully implement this plan and achieve the broader goals of the State Strategy, several key stakeholders are involved. These include, among others, the National Health Service of Ukraine, the State Institution "Public Health Center of the Ministry of Health and Protection of Ukraine," the Department of Public Health, and financial and economic entities (105).

# 4. Concluding remarks

## Incidence of HPV and HBV-Related Cancers

Significant disparities exist between Eastern and Western European countries participating in the 4P-CAN initiative regarding the incidence and mortality rates of HPV (human papillomavirus) and HBV (hepatitis B virus)-related cancers. These differences extend to national policies, guidelines, and programs for cancer prevention and treatment. A key area of divergence is cervical cancer, where Romania and Bulgaria report the highest incidence and mortality rates in Europe, highlighting the urgent need for improved screening and vaccination efforts. In contrast, countries like Italy, Belgium, and other Western partners have established robust national programs that are more effective in reducing incidence and mortality.

The study also reveals increasing trends in vulvar and vaginal cancers, particularly in Eastern Europe, though the incidence rates are rising in certain Western countries, such as Italy, which reports the highest rates of vulvar cancer incidence and mortality among the 4P-CAN countries. These trends in Western Europe may be linked to shifts in sexual behaviour over recent decades.

Anal and oropharyngeal cancers exhibit higher prevalence in Western Europe compared to Eastern Europe. In contrast, liver cancer demonstrates a more uniform distribution across both regions, with a strong correlation to high alcohol consumption. Countries like France, Italy, Portugal, Romania, and Moldova report particularly high liver cancer rates, emphasising the need for tailored prevention strategies.

## HPV Vaccination Policies

A stark contrast is observed between Eastern and Western European countries in the implementation of HPV vaccination programs. Western European countries swiftly adopted national vaccination guidelines following World Health Organization (WHO) recommendations, with programs for girls initiated between 2007 and 2010. Vaccination for boys was introduced in most of these countries by 2018/2019, with Portugal following in 2020. In Eastern Europe, however, progress has been slower. With the exception of Bulgaria, most Eastern countries only began recommending HPV vaccination for girls after

2018. Romania stands out as the latest adopter, having introduced its vaccination program in 2023.

Bulgaria implemented its vaccination program in 2012, aligning more closely with Western European countries. However, despite this earlier adoption, HPV vaccination coverage remains low across Eastern Europe. Both Bulgaria and Romania, with approximately 6% coverage for fully completed HPV vaccination programs, report the lowest rates among the 4P-CAN countries and European nations overall.

Despite HPV vaccination guidelines having been in place for over a decade in most countries, only Portugal has reached the WHO target of 90% coverage for girls' vaccination and is close to achieving the target for boys. Portugal reports coverage rates of 90% for girls and 88% for boys. Ireland and Belgium follow with respective coverage rates of 84% and 79%, and 72% and 65%. Surprisingly, France and Italy struggle with significant gaps between the administration of the first and final doses, a trend observed in several countries. This drop-off may be attributed to factors such as perceived loss of interest, scheduling conflicts, or extended intervals between doses. Sociodemographic factors, including age, education level, and household income, are also correlated with vaccination uptake, as higher income and resources often lead to higher vaccination rates.

Research has shown a general lack of public awareness about the connection between HPV and cervical cancer, along with limited understanding of vaccination schedules and recommended age groups. Findings also indicate that vaccination uptake tends to peak immediately after the launch of new programs or campaigns, highlighting the need for ongoing national efforts and regionally focused initiatives to sustain engagement. Additionally, substantial regional differences in vaccination coverage underscore the importance of prioritizing localized interventions.

All countries in the study, except France, offer free HPV vaccination, which is typically administered by healthcare professionals, including medical doctors, nurses, and, in some cases, pharmacists. Western European countries have successfully integrated vaccination programs into school health initiatives. In contrast, Eastern European countries like Moldova and Romania only recently introduced HPV vaccination for boys, in 2021 and 2023 respectively. This may be in response to increasing incidence and mortality rates of HPV-related cancers in men in recent years. Other countries, such as Montenegro and North Macedonia, have only incorporated girls' vaccination into their immunisation programs. Interestingly, North Macedonia implemented HPV vaccination in 2009, aligning with Western countries, but has not extended the program to boys. This could be due to lower male HPV cancer incidence or underdiagnosis.

There is no available data on HPV vaccination in Ukraine, despite recommendations for both boys and girls. This may be due to the lack of state funding for the vaccine and the

fragmentation of data from private healthcare providers. Most Eastern European countries lack national immunisation calendars and registries, making it difficult to provide accurate information to the public or collect reliable vaccination data. Consequently, citizens in these regions have limited access to trustworthy sources of information.

### Cervical cancer screening and public awareness

Western European countries have integrated cervical cancer screening into their national healthcare programs, inviting women for routine Pap smears and HPV testing. Eastern European countries lag behind in this regard, offering only Pap tests without the benefit of active invitations to screenings. Research shows that HPV vaccination rates tend to improve when combined with active screening campaigns, suggesting that enhanced efforts in cervical cancer screening could boost vaccination uptake in Eastern Europe.

The economic burden of HPV-related cancers is substantial, but preventable through targeted strategies. Misinformation, distrust, and fake news are major obstacles in Eastern Europe, particularly in rural and low-income areas. Targeted educational campaigns that raise awareness about HPV transmission, prevention, and the consequences of infection could significantly improve public health outcomes in these regions. Western countries, while more advanced in their efforts, should continue to innovate in public outreach and screening initiatives to maintain and expand their progress.

In conclusion, significant disparities in HPV cancer prevention exist between Eastern and Western Europe, but these gaps can be addressed through coordinated, regionally focused efforts that emphasise public education, vaccination coverage, and cancer screening. Addressing these challenges is crucial to reducing the socioeconomic burden of these preventable cancers.

## HBV Vaccination Policies

Disparities in hepatitis B virus (HBV) vaccination coverage persist across the 4P-CAN countries, mirroring trends observed with HPV vaccination. While HBV vaccination programs were largely implemented in the 1990s in Western European countries, many Eastern European countries did not introduce their programs until between 2000 and 2004. Romania is an exception, having initiated its HBV vaccination earlier than most of its Eastern European counterparts. Despite similar target age groups for vaccination across these countries, significant differences in vaccination uptake remain.

None of the 4P-CAN countries have achieved the WHO's immunisation target for HBV, with some reporting alarmingly low coverage rates. Montenegro, for example, has a coverage rate as low as 42%, while Ukraine, North Macedonia, and the Republic of Moldova all report coverage rates below 90%. In contrast, several EU 4P-CAN countries, including

Belgium (97%) and Portugal (99%), have nearly achieved or surpassed the recommended target, despite the vaccine being non-mandatory in these countries. However, exceptions persist within the EU, as Bulgaria, Ireland, and Romania have not yet reached the WHO goal.

Across all studied countries, the HBV vaccine is free of charge and mandatory in 6 out of the 14 countries. However, data suggest that the mandatory nature of the vaccine does not necessarily lead to higher adoption rates. In countries where vaccination is voluntary, such as Belgium and Portugal, coverage is higher than in countries where vaccination is mandatory but uptake remains below 90%.

This paradox points to deeper issues beyond policy mandates. Despite measures such as public funding and mandatory vaccination, overall uptake remains low, particularly in Eastern Europe. Vaccine confidence plays a crucial role in this phenomenon, with lower levels of trust in vaccines, healthcare systems, and governmental institutions frequently reported in Eastern European nations. Barriers such as limited access to healthcare facilities, lack of reliable information, and widespread misinformation contribute to vaccine hesitancy.

Additionally, the study highlights a lack of targeted vaccination campaigns for vulnerable groups in Eastern Europe. Without specific preventive strategies aimed at these populations, vaccination rates remain suboptimal, exacerbating the socio-economic burden of HBV-related diseases. Addressing these disparities through targeted public health campaigns, particularly in rural and low-income areas, could lead to improved vaccination rates and reduced disease burden in these regions.

## Moving Forward

It is crucial to prioritise the implementation of support programs for Eastern European countries to improve their HPV and HBV vaccination coverage, aligning them more closely with the rates achieved by their Western counterparts. Although progress may be gradual due to the later adoption of preventive measures in the East, successful strategies from Western Europe can be adapted and replicated. These strategies include conducting epidemiological studies to assess vaccine performance over time, identifying vulnerable populations requiring special attention, and launching nationwide campaigns backed by governmental promotion.

Additionally, fostering an active role for patient associations and using innovative tools to spread information and raise awareness are key. Addressing widespread misinformation, combating fake news, and rebuilding public trust in both government institutions and healthcare systems are also critical components of these efforts. Research emphasises

the importance of identifying vaccine-hesitant individuals and tailoring targeted public health campaigns to these populations.

Countries such as Italy and Bulgaria have begun to explore innovative methods, such as online campaigns and chat platforms, to increase awareness about vaccination. In support of these initiatives, the 4P-CAN project is planning to launch nationwide surveys to evaluate public knowledge of cancer prevention, with specific questions related to HPV and HBV vaccination. The data collected from these surveys will help identify vulnerable groups and facilitate the creation of pilot, targeted campaigns in Romania and Bulgaria. These efforts aim to increase vaccine awareness, boost confidence, and ultimately improve coverage rates.

The success of these pilot programs could serve as a model for implementation in other countries, including Western partners like France and Italy, where HPV vaccination rates remain significantly lower compared to neighbouring countries. By adapting proven strategies and tailoring them to local needs, it is possible to drive substantial improvements in vaccination uptake across Europe, reducing the public health burden of HPV and HBV-related diseases.

# 5. Limitations of the study

This study provides a comprehensive mapping of the current prevalence of HPV and HBV, as well as related cancers, policies, immunisation schedules, coverage rates, and potential best practices across 4P-CAN countries. It highlights significant disparities between Eastern and Western Europe, offering insight into the varying approaches to HPV and HBV prevention. However, several limitations should be acknowledged. Firstly, the study does not extensively explore the socio-economic factors influencing these disparities, focusing instead on providing a clear, transparent overview of the current status of HPV and HBV-related initiatives. To fully understand the root causes of these differences, further research is needed, particularly into socio-economic and cultural determinants.

Additionally, language barriers may have resulted in the exclusion of key information, especially from national or regional sources not available in English. This limitation may affect the completeness of the data for certain countries or regions.

# 6. References


1. 2024 Beating cancer inequalities in the EU - public health. Available at: https://health.ec.europa.eu/system/files/2024-01/ncd_cancer-inequalities_report_en.pdf (Accessed: 01 June 2024).
2. Cervical cancer (2024) World Health Organization. Available at: https://www.who.int/news-room/fact-sheets/detail/cervical-cancer (Accessed: 14 June 2024).
3. Manolescu, L.S. et al. (2022) 'Barriers and facilitators of Romanian HPV (human papillomavirus) vaccination', Vaccines, 10(10), p. 1722. doi:10.3390/vaccines10101722.
4. 2020 Hepatitis B - annual epidemiological report for 2020. Available at: https://www.ecdc.europa.eu/sites/default/files/documents/AER-HEP-B-2020-final.pdf (Accessed: 14 June 2024).
5. Global cancer observatory (2022) World Health Organization. Available at: https://gco.iarc.who.int/en (Accessed: 30 June 2024).
6. HPV Information Centre, (2023). Belgium: Human Papillomavirus and Related Cancers, Fact Sheet 2023. Available at: https://hpvcentre.net/statistics/reports/BEL.pdf Accessed: (30 June 2024).
7. Global cancer observatory (2022) World Health Organization. Available at: https://gco.iarc.who.int/en (Accessed: 30 June 2024).
8. Top, G. (2018) HPV-vaccination coverage in Flanders remains high in the vaccination programme for young girls [Preprint]. doi:10.26226/morressier.5ad774dfd462b80296ca6ab5
9. World Health Organization (WHO), 2023. Human Papillomavirus (HPV) Vaccination Coverage – Belgium. Available at: https://immunizationdata.who.int/global/wiise-detail-page/human-papillomavirus-(hpv)-vaccination-coverage?CODE=BEL&ANTIGEN=PRHPV1_F+PRHPV1_M+PRHPVC_F+PRHPVC_M&YEAR= (Accessed 1 June 2024).
10. (2023) HPV prevention policy atlas. Available at: https://www.epfweb.org/sites/default/files/2023-11/HPV Atlas_EN 2023-JUN19 (1).pdf (Accessed: 1 June 2024).
11. Belgique en Bonne Santé, 2024. HSPA Report: 2024. [online] Available at: https://www.belgiqueenbonnesante.be/metadata/hspa/2024/P1_P2_P3_P12_P14.pdf [Accessed 2 June 2024].
12. HPV Information Centre, (2023). Belgium: Human Papillomavirus and Related Cancers, Fact Sheet 2023. Available at: https://hpvcentre.net/statistics/reports/BEL.pdf Accessed: (30 June 2024).
13. Cervical cancer (2024) World Health Organization. Available at: https://www.who.int/news-room/fact-sheets/detail/cervical-cancer (Accessed: 14 June 2024).
14. The Brussels Times, 2024. Cervical cancer awareness campaign to be launched in Belgium. [online] Available at: https://www.brusselstimes.com/739012/cervical-cancer-awareness-campaign-to-be-launched-in-belgium [Accessed 2 June

2024].
15. The Brussels Times, 2024. All 13 to 18-year-old boys to get equal access to free HPV vaccination. [online] Available at: https://www.brusselstimes.com/258364/all-13-to-18-year-old-boys-to-get-equal-access-to-free-hpv-vaccination [Accessed 2 June 2024].
16. European Centre for Disease Prevention and Control. (2022). Hepatitis B – Annual Epidemiological Report for 2022. [Accessed 30 July 2024]
17. Petridou, E., 2013. The role of early detection in the prevention of cervical cancer. Epidemiology and Infection, 141(5), pp. 1017-1027. doi: 10.1017/S0950268813001064.
18. European Centre for Disease Prevention and Control (ECDC), 2024. Antenatal screening for HIV, hepatitis B, syphilis, and rubella in the EU. [online] Available at: https://www.ecdc.europa.eu/sites/default/files/media/en/publications/Publications/antenatal-screening-HIV-hepatitis-B-syphilis-rubella-EU.pdf [Accessed 2 June 2024].
19. Van Damme, P. (1998). Hepatitis B: Vaccination programmes in Europe — An update. Vaccine, 16(Suppl 1), S6–S8. https://doi.org/10.1016/S0264-410X(98)00131-1
20. World Health Organization, 2024. Human papillomavirus (HPV) vaccination coverage in Bulgaria. [online] Available at: https://immunizationdata.who.int/global/wiise-detail-page/human-papillomavirus-(hpv)-vaccination-coverage?CODE=BGR&ANTIGEN=PRHPV1_F+PRHPV1_M+PRHPVC_F+PRHPVC_M&YEAR= [Accessed 5 June 2024].
21. Euractiv, 2024. Bulgaria starts vaccinating boys against HPV. [online] Available at: https://www.euractiv.com/section/health-consumers/news/bulgaria-starts-vaccinating-boys-against-hpv/ [Accessed 5 June 2024].
22. HPV Centre, 2023. HPV vaccination coverage and cancer statistics for Bulgaria. [online] Available at: https://hpvcentre.net/statistics/reports/BGR.pdf [Accessed 16 June 2024].
23. Dimitrova, V. S., Stoitsova, S., Rangelova, V., & Nikolaeva-Glomb, L. (2023). High vaccine confidence and strong approval of the mandatory immunization schedule among Bulgarian general practitioners in 2022. Vaccine, 41(44), 6541–6547 https://doi.org/10.1016/j.vaccine.2023.09.017
24. European Centre for Disease Prevention and Control. (2022). Hepatitis B – Annual Epidemiological Report for 2022. https://www.ecdc.europa.eu/sites/default/files/documents/AER%20HEPB%202022_0.pdf [Accessed 30 July 2024]
25. World Health Organization (WHO), 2024. Hepatitis B vaccination coverage for Bulgaria. Available at: https://immunizationdata.who.int/global/wiise-detail-page/hepatitis-b-vaccination-coverage?CODE=BGR&ANTIGEN=HEPB3&YEAR= [Accessed 5 June 2024].
26. UNICEF, 2024. European Immunization Week: Celebrating progress and potential of vaccines. Available at: https://www.unicef.org/bulgaria/en/press-releases/european-immunization-week-celebrating-progress-and-potential-vaccines [Accessed 5 June 2024].

27. Global cancer observatory (2022) World Health Organization. Available at: https://gco.iarc.who.int/en (Accessed: 30 June 2024).
28. HPV Centre, 2024. Human papillomavirus (HPV) vaccination coverage: France. Available at: https://hpvcentre.net/statistics/reports/FRA.pdf [Accessed 16 June 2024].
29. Bertozzi, N., 2024. Evaluation of HPV vaccination uptake among adolescents in France. Journal of Cancer Policy, 40, pp.102-110.
30. Service-Public, 2024. France to expand HPV vaccination coverage for boys. Available at: https://www.service-public.fr/particuliers/actualites/A16438?lang=en [Accessed 16 June 2024].
31. World Health Organization (WHO), 2024. Human papillomavirus (HPV) vaccination coverage: France. Available at: https://immunizationdata.who.int/global/wiise-detail-page/human-papillomavirus-(hpv)-vaccination-coverage?CODE=FRA&ANTIGEN=PRHPV1_F+PRHPV1_M+PRHPVC_F+PRHPVC_M&YEAR= [Accessed 16 June 2024].
32. Julia, B., et al., (2024). Expanding vaccination competencies to community pharmacists: Modelling the organizational and economic impacts of new human papilloma virus (HPV) vaccine pathways in France. BMC Health Services Research, 24, Article 845. https://doi.org/10.1186/s12913-024-11093-x
33. Chyderiotis, S., et al., (2024). Optimizing communication on HPV vaccination to parents of 11- to 14-year-old adolescents in France: A discrete choice experiment. The Patient - Patient-Centered Outcomes Research, 17(5), 575–588. https://doi.org/10.1007/s40271-024-00687-6
34. European Centre for Disease Prevention and Control. (2022). Hepatitis B – Annual Epidemiological Report for 2022. https://www.ecdc.europa.eu/sites/default/files/documents/AER%20HEPB%202022_0.pd [Accessed 30 July 2024]
35. Thompson, M.G., 2019. Universal Hepatitis B vaccination of infants in the United States: The impact on disease burden and vaccine coverage. Journal of Viral Hepatitis
36. European Centre for Disease Prevention and Control (ECDC), 2021. Antenatal screening for HIV, hepatitis B, syphilis, and rubella in the EU/EEA.
37. Travis, A., 2013. What's new in the HPV vaccination field?. British Journal of Cancer, [online] 108(10), pp.1925-1929.
38. HPV World, 2024. How Ireland reversed a HPV vaccination crisis. [online] Available at: https://www.hpvworld.com/communication/articles/how-ireland-reversed-a-hpv-vaccination-crisis/ [Accessed 20 june 2024].
39. Human Papillomavirus and Related Diseases Report https://hpvcentre.net/statistics/reports/IRL.pdf
40. Department of Health (2024). Minister for Health announces Ireland is on target to eliminate cervical cancer by 2040. [online] Available at: https://www.gov.ie/en/press-release/378d5-minister-for-health-announces-ireland-is-on-target-to-eliminate-cervical-cancer-by-2040/ [Accessed 120 June 2024].
41. Cancer.ie, 2024. Cervical cancer screening. [online] Available at: https://www.cancer.ie/cancer-information-and-support/cancer-types/cervical-

cancer/cervical-cancer-screening#:~:text=All%20women%20aged%20between%2025,babies%20or%20are%20post%2Dmenopausal [Accessed 20 June 2024].
42. Health Service Executive (HSE), 2024. How we used social media to increase HPV vaccination rates. [online] Available at: https://www.hse.ie/eng/about/who/communications/digital/blog/how-we-used-social-media-to-increase-hpv-vaccination-rates.html [Accessed 20 June 2024].
43. European Centre for Disease Prevention and Control. (2022). Hepatitis B – Annual Epidemiological Report for 2022. https://www.ecdc.europa.eu/sites/default/files/documents/AER%20HEPB%202022_0.pd [Accessed 30 July 2024]
44. Health Protection Surveillance Centre (HPSC) (no date). Hepatitis B. [online] Available at: https://www.hpsc.ie/a-z/hepatitis/hepatitisb/ [Accessed 20 June 2024].
45. European Centre for Disease Prevention and Control (ECDC) (2019). Antenatal screening for HIV, hepatitis B, syphilis and rubella in the EU/EEA.
46. European Commission (2022). Summary report: Pavee. [online] Available at: https://health.ec.europa.eu/document/download/b18ceadb-4f24-43f2-a35b-b328914eac86_en?filename=summary_report_pavee_en.pdf [Accessed 20 June 2024].
47. HPV Centre (2023). Human papillomavirus (HPV) vaccination coverage in Italy. [online] Available at: https://hpvcentre.net/statistics/reports/ITA.pdf [Accessed 20 June 2024].
48. Global cancer observatory (2022) World Health Organization. Available at: https://gco.iarc.who.int/en (Accessed: 30 June 2024).
49. European Centre for Disease Prevention and Control (ECDC) (2024). V Human Papillomavirus Infection: Recommended vaccinations [online] Available at: https://vaccine-schedule.ecdc.europa.eu/Scheduler/ByDisease?SelectedDiseaseId=38&SelectedCountryIdByDisease=-1 [Accessed 20 June 2024].
50. World Health Organization (WHO) (2024). Human papillomavirus (HPV) vaccination coverage: Italy. [online] Available at: https://immunizationdata.who.int/global/wiise-detail-page/human-papillomavirus-(hpv)-vaccination-coverage?CODE=ITA&ANTIGEN=PRHPV1_F+PRHPV1_M+PRHPVC_F+PRHPVC_M&YEAR= [Accessed 20 June 2024].
51. IBSA (2023). Cervical cancer prevention week. [online] Available at: https://www.ibsa.it/en/media/news/2023/Cervical-Cancer-Prevention-Week.html [Accessed 20 June 2024].
52. European Centre for Disease Prevention and Control. (2022). Hepatitis B – Annual Epidemiological Report for 2022. https://www.ecdc.europa.eu/sites/default/files/documents/AER%20HEPB%202022_0.pd [Accessed 30 July 2024]
53. Rosenberg, H., et al. (2021). Papillomavirus vaccination uptake in adolescents: A

national survey. Vaccines, [online] 9(10), pp. 1140
54. Stroffolini T., et al. Effectiveness of Hepatitis B Vaccination Campaign in Italy: Towards the Control of HBV Infection for the First Time in a European Country. Viruses. 2022 Jan 26;14(2):245. doi: 10.3390/v14020245. PMID: 35215839; PMCID: PMC8875306.
55. HPV Centre, 2023. HPV vaccination coverage and statistics for Portugal. [pdf] Available at: https://hpvcentre.net/statistics/reports/PRT.pdf [Accessed 25 June 2024].
56. Global cancer observatory (2022) World Health Organization. Available at: https://gco.iarc.who.int/en (Accessed: 30 June 2024).
57. World Health Organization (WHO), 2024. Human papillomavirus (HPV) vaccination coverage in Portugal. [online] Available at: https://immunizationdata.who.int/global/wiise-detail-page/human-papillomavirus-(hpv)-vaccination-coverage?CODE=PRT&ANTIGEN=PRHPV1_F+PRHPV1_M+PRHPVC_F+PRHPVC_M&YEAR= [Accessed 25 June 2024].
58. The Portugal News, 2023. Study recommends extending the HPV vaccine to young males. [online] Available at: https://www.theportugalnews.com/news/2023-09-10/study-recommends-extending-the-hpv-vaccine-to-young-males/81203 [Accessed 25 June 2024].
59. European Cancer Organisation, 2024. Our projects: CBIG SCREEN. [online] Available at: https://www.cancer.eu/our-projects-cbig-screen/ [Accessed 25 June 2024].
60. European Centre for Disease Prevention and Control. (2022). Hepatitis B – Annual Epidemiological Report for 2022. https://www.ecdc.europa.eu/sites/default/files/documents/AER%20HEPB%202022_0.pd [Accessed 30 July 2024]
61. Exploring the experiences of living with hepatitis B and/or C Exploring the experiences of living with hepatitis B and/or C https://www.worldhepatitisalliance.org/stigma/
62. Global cancer observatory (2022) World Health Organization. Available at: https://gco.iarc.who.int/en (Accessed: 30 June 2024).
63. World Health Organization (WHO), 2024. Human papillomavirus (HPV) vaccination coverage - Romania. Available at: https://immunizationdata.who.int/global/wiise-detail-page/human-papillomavirus-(hpv)-vaccination-coverage?CODE=ROU&ANTIGEN=PRHPV1_F+PRHPV1_M+PRHPVC_F+PRHPVC_M&YEAR= [Accessed 25 June 2024].
64. European Cancer Organisation, 2024. Our progress for HPV action in Romania: An interview with Prof. Daniel Kelly. Available at: https://www.europeancancer.org/content/our-progress-for-hpv-action-in-romania-an-interview-with-prof-daniel-kelly.html [Accessed 25 June 2024].
65. European Commission, 2024. Rethink HPV vaccination. Available at: https://health.ec.europa.eu/non-communicable-diseases/cancer/europes-beating-cancer-plan-eu4health-financed-projects/projects/rethinkhpvaccination_en#:~:text=Romania%20is%20therefore%20implementing%20a,from%20family%20doctors%20to%20schoolteachers

[Accessed 25 June 2024].
66. European Cancer Organisation, 2024. Our progress for HPV action in Romania: An interview with Prof. Daniel Kelly. Available at: https://www.europeancancer.org/content/our-progress-for-hpv-action-in-romania-an-interview-with-prof-daniel-kelly.html [Accessed 30 june 2024].
67. Cancer World, 2024. Success story: Romania's control of cervical cancer. Available at: https://cancerworld.net/success-story-romanias-control-cervical-cancer/?print=pdf [Accessed 30 June 2024].
68. European Centre for Disease Prevention and Control. (2022). Hepatitis B – Annual Epidemiological Report for 2022. https://www.ecdc.europa.eu/sites/default/files/documents/AER%20HEPB%202022_0.pd [Accessed 30 July 2024]
69. ACHIEVE Hepatitis Elimination, 2018. Meeting summary: VHPB Romania. Available at: https://achievehepatitiselimination.eu/wp-content/uploads/2018/06/180525-ACHIEVE-VHPB-Romania-meeting-summary-1.pdf [Accessed 5 July 2024].
70. ACHIEVE Hepatitis Elimination, 2018. Meeting summary: VHPB Romania. Available at: https://achievehepatitiselimination.eu/wp-content/uploads/2018/06/180525-ACHIEVE-VHPB-Romania-meeting-summary-1.pdf [Accessed 5 July 2024].
71. Global Hepatitis Program, n.d. LIVERO-1 training for Romanian medical personnel on population screening for chronic hepatitis. Available at: https://www.globalhep.org/about/partner-programs/livero-1-training-romanian-medical-personnel-population-screening-chronic [Accessed 5 July 2024].
72. Global Hepatitis Program, n.d. National framework plan for viral hepatitis control in Romania 2019–2030. Available at: https://www.globalhep.org/about/partner-programs/national-framework-plan-viral-hepatitis-control-romania-2019-2030 [Accessed 5 July 2024].
73. HPV Centre, n.d. HPV vaccination coverage in Montenegro. Available at: https://hpvcentre.net/statistics/reports/MNE.pdf [Accessed 5 July 2024].
74. Global cancer observatory (2022) World Health Organization. Available at: https://gco.iarc.who.int/en (Accessed: 30 June 2024).
75. Kovačević IN, et al., - The case of colorectal cancer screening in Montenegro. J Cancer Policy. 2024 Mar;39:100464. doi: 10.1016/j.jcpo.2023.100464. Epub 2023 Dec 15. PMID: 38104712.
76. European Centre for Disease Prevention and Control. (2022). Hepatitis B – Annual Epidemiological Report for 2022. https://www.ecdc.europa.eu/sites/default/files/documents/AER%20HEPB%202022_0.pd [Accessed 30 July 2024]
77. World Health Organization, 2024. Hepatitis B vaccination coverage in Montenegro. Available at: https://immunizationdata.who.int/global/wiise-detail-page/hepatitis-b-vaccination-coverage?CODE=MNE&ANTIGEN=HEPB3&YEAR= [Accessed 16 July2024].
78. UNICEF, 2024. Montenegro urgently needs to boost immunization rates. Available at: https://www.unicef.org/montenegro/en/stories/montenegro-urgently-boost-immunization-rates [Accessed 16 July 2024].
79. HPV Centre, 2024. HPV vaccination coverage and statistics for North Macedonia. Available at: https://hpvcentre.net/statistics/reports/MKD.pdf [Accessed 16

july2024].
80. Global cancer observatory (2022) World Health Organization. Available at: https://gco.iarc.who.int/en (Accessed: 30 June 2024).
81. World Health Organization (WHO), 2024. Human papillomavirus (HPV) vaccination coverage for North Macedonia. Available at: https://immunizationdata.who.int/global/wiise-detail-page/human-papillomavirus-(hpv)-vaccination-coverage?CODE=MKD&ANTIGEN=PRHPV1_F+PRHPV1_M+PRHPVC_F+PRHPVC_M&YEAR= [Accessed 16 July 2024].
82. Davies, P. et al., 2023. Update on HPV vaccination policies and practices in 17 Eastern European and Central Asian countries and territories. Asian Pacific Journal of Cancer Prevention, [online] 24(12), pp.4227-4235.
83. UNFPA Western Balkans, 2024. UNFPA Western Balkans: Joint efforts in eliminating cervical cancer. [online] Available at: https://northmacedonia.unfpa.org/en/news/unfpa-western-balkans-joint-efforts-eliminating-cervical-cancer [Accessed 16 July2024].
84. European Centre for Disease Prevention and Control. (2022). Hepatitis B – Annual Epidemiological Report for 2022. https://www.ecdc.europa.eu/sites/default/files/documents/AER%20HEPB%202022_0.pdf [Accessed 30 July 2024]
85. World Health Organization (WHO), 2024. Vaccination schedule for hepatitis B in North Macedonia. [online] Available at: https://immunizationdata.who.int/global/wiise-detail-page/vaccination-schedule-for-hepatitis-b?ISO_3_CODE=MKD&TARGETPOP_GENERAL= [Accessed 16 July 2024].
86. World Hepatitis Alliance. First national declaration for liver cancer in North Macedonia. World Hepatitis Alliance. Available at https://www.worldhepatitisalliance.org/missing-millions/casestudy/first-national-declaration-for-liver-cancer-in-north-macedonia/ [Accessed 16 July 2024].
87. HPV Centre, 2024. HPV vaccination statistics for Moldova. [online] Available at: https://hpvcentre.net/statistics/reports/MDA.pdf [Accessed 16 July 2024].
88. Global cancer observatory (2022) World Health Organization. Available at: https://gco.iarc.who.int/en (Accessed: 30 June 2024).
89. Davies, P. et al., 2023. Update on HPV vaccination policies and practices in 17 Eastern European and Central Asian countries and territories. Asian Pacific Journal of Cancer Prevention, [online] 24(12), pp.4227-4235.
90. United Nations Moldova. (2023). National campaign in Moldova calls on women to stay healthy and do a Pap test. Available at: https://moldova.un.org/en/32798-national-campaign-moldova-calls-women-stay-healthy-and-do-pap-test [Accessed 16 July2024].
91. UNICEF Moldova. (2023). Teachers, educators, social workers, and local leaders in ten districts of Moldova will be trained to improve child protection. Available at: https://www.unicef.org/moldova/en/press-releases/teachers-educators-social-workers-and-local-leaders-ten-districts-moldova-will-be [Accessed 16 July 2024].
92. European Centre for Disease Prevention and Control. (2022). Hepatitis B – Annual

Epidemiological Report for 2022. https://www.ecdc.europa.eu/sites/default/files/documents/AER%20HEPB%202022_0.pdf [Accessed 30 July 2024]
93. Brandl, M. et al., 2023. Evaluating the hepatitis B vaccination impact in the Republic of Moldova: A nationwide representative serosurvey of children born in 2013. International Journal of Infectious Diseases Regional, 10, pp.60-66
94. World Health Organization, 2024. Vaccination schedule for hepatitis B in Moldova. Available at: https://immunizationdata.who.int/global/wiise-detail-page/vaccination-schedule-for-hepatitis-b?ISO_3_CODE=MDA&TARGETPOP_GENERAL= [Accessed 20 July 2024].
95. Global Hepatitis Program, 2023. Moldova HEAT presentation. Available at: https://www.globalhep.org/sites/default/files/content/page/files/2023-08/Moldova%20HEAT%20presentation.pdf [Accessed 20 July 2024].
96. HPV Centre, 2023. HPV vaccination coverage in Ukraine. Available at: https://hpvcentre.net/statistics/reports/UKR.pdf [Accessed 20 July 2024].
97. Global cancer observatory (2022) World Health Organization. Available at: https://gco.iarc.who.int/en (Accessed: 30 June 2024).
98. HPV SRHR Policy Hub, 2023. HPV vaccination policies in Ukraine. Available at: https://hpv.srhrpolicyhub.org/country/?region=eu&country=ukraine [Accessed 120 July 2024].
99. MedTour, 2024. Cervical cancer vaccine (HPV vaccine). Available at: https://medtour.help/cervical-cancer-vaccine-hpv-vaccine/ [Accessed 120 July 2024].
100. Kostyuchenko, L., Volodko, N., Belyak, A., and Pushkareva, O. (2018). Vaccination against high carcinogenic types of the human papilloma virus in the prevention of cervical cancer: Realities in Western Ukraine. Western Ukrainian Medical Journal, 1, pp. 10-17.
101. Public Health Center of Ukraine. (2022). Бюлетень 12: Інфекційна захворюваність населення по Україні за 2021–2022 рр. Public Health Center of Ukraine. https://phcorgua.sharepoint.com/...
102. Khetsuriani, N., Zaika, O., Chitadze, N., Slobodianyk, L., Allahverdiyeva, V., O'Connor, P., and Huseynov, S. (2021). Seroprevalence of hepatitis B virus infection markers among children in Ukraine, 2017. Vaccine, 39(10), pp. 1485–1492
103. World Health Organization (WHO). (n.d.). Hepatitis B vaccination schedule in Ukraine. Available at: https://immunizationdata.who.int/global/wiise-detail-page/vaccination-schedule-for-hepatitis-b?ISO_3_CODE=UKR&TARGETPOP_GENERAL= [Accessed 20 July 2024].
104. Ukraine. (2019). On the approval of the On the approval of the State Strategy in the field of combating HIV infection/AIDS, tuberculosis and viral hepatitis for the period up to 2030. Available at: https://zakon.rada.gov.ua/laws/show/1415-2019-%D1%80#Text [Accessed 16 September 2024].
105. Ukraine Ministry of Health. (2024). Order No. 406 on the approval of the National Action Plan. Available at: https://moz.gov.ua/uploads/10/54166-dn_406_08032024_dod.pdf [Accessed 16 September 2024].