

## DATA SYSTEMS & MONITORING

### Principles

#### Principle 1. Establish registries and systems to track vaccine uptake

*Do countries have systems that can accurately track HPV vaccination uptake over time?*

Countries should establish and maintain accurate vaccination registries, or equivalent data systems, that allow HPV vaccination coverage to be routinely tracked over time, across age groups and sex, and that can identify gaps in uptake to support programme management and corrective action.

#### Principle 2. Connect vaccination data across health and administrative systems

*Can vaccination data be linked and used across relevant parts of the health system and other key administrative systems?*

Countries should ensure that HPV vaccination systems are interoperable with other relevant health and administrative systems so that data can be shared, linked, and used to support coordinated programme management, policy decision-making, and efficient delivery across settings. The European Health Data Space (EHDS) provides a key policy framework for advancing this interoperability.

#### Principle 3. Use data transparently to drive reporting, feedback, and improvement

*Is HPV vaccination coverage data routinely used to review performance and drive improvement?*

Countries should establish regular public reporting and feedback mechanisms that make HPV vaccination data visible and usable by responsible authorities for performance review, accountability, and timely corrective action when vaccination coverage falls short of agreed targets. This should include periodic monitoring of shifts in circulating HPV types to ensure vaccination strategies remain aligned with evolving epidemiology and sustained vaccine effectiveness.

### Justification & Scientific Evidence

**Reliable, comprehensive vaccination registries or equivalent data systems are a foundational condition for monitoring HPV vaccination coverage over time, identifying gaps across populations, and enabling timely programme management and corrective action.**

HPV vaccination programmes target different age groups and delivery platforms compared with routine infant immunisation, and a reduction in HPV cancer incidence cannot be detected for a significant time after the vaccine has been introduced in a country [1]. WHO guidance highlights that HPV vaccine coverage data is essential to guide strategy and interpret impact, and that monitoring HPV vaccination presents unique challenges due to wide age eligibility, multiple delivery settings, and doses delivered outside routine public-sector systems, reinforcing the need for comprehensive registries or equivalent data systems [1, 2].

European experience shows substantial variation in the availability, completeness, and functionality of vaccination registries, with implications for the ability to measure and manage HPV vaccination performance [3]. ECDC analyses of immunisation information systems (IIS) across EU and EEA countries highlight differences in whether countries can routinely monitor HPV vaccination coverage by age and sex, identify under-vaccinated groups, and use data to support programme oversight [4].

**Interoperable vaccination data systems enable HPV vaccination data to be linked, shared, and used across relevant health and administrative systems, which is fundamental to coordinated programme management and policy decision making.**

Once HPV vaccination data is captured, its value depends on whether it can be linked and used across systems involved in delivery, follow up, and planning. WHO guidance highlights that HPV vaccination programmes often involve multiple actors and settings, and that fragmented data systems limit the ability to coordinate programme management and decision making beyond basic coverage reporting [1,2]. This includes linkage with health management information systems, population or civil registration systems, education systems (when school-based delivery is used), and cancer screening and cancer registries [2,5].

European experience shows that differences in system interoperability affect whether vaccination data can be shared and used across the health system and relevant public services. ECDC analyses describe variation in the extent to which IIS interface with other health and administrative systems [3,4]. This shapes whether vaccination data can support coordinated oversight, planning, and evaluation across health, education, and other delivery settings, rather than remaining confined to stand-alone registries.

Recent European Joint Action work illustrates this variation. The PERCH project assessed countries' capacity to collect individual-level HPV vaccination data and link these records with cervical cancer screening and cancer registries, documenting wide differences across EU Member States, from countries with established national linkage to others where linkage is partial, not yet operational, or not planned, often due to technical, legal or administrative barriers [6].

Technical guidance on immunisation systems identifies interoperability as a core design feature that enables data linkage, reduces duplication, and improves the efficiency and usability of vaccination data for public health action [4,5]. Interoperable, individual level IIS can also support operational functions such as reminder-recall, helping programmes identify and follow up individuals who are due or overdue for HPV vaccination. Where systems are not interoperable, data use is constrained to basic coverage reporting, limiting their contribution to coordinated programme management.

**The availability and interoperability of HPV vaccination data are necessary but not sufficient. Vaccination data only drives programme improvement when it is routinely reported, reviewed, and acted upon through clear feedback and accountability mechanisms.**

Global immunisation guidance consistently emphasises that vaccination data are intended to inform programme review and decision making, rather than serving solely as a reporting function. Frameworks such as Immunization Agenda 2030 highlight the importance of using immunisation monitoring data within regular review and feedback processes to support accountability and course correction over time [7].

HPV-specific guidance further frames coverage reporting as a practical tool to assess progress, identify gaps in uptake, and adapt delivery strategies, particularly given the long time-lag before the impact of vaccination on disease outcomes can be observed [1].

Explicit vaccination targets and transparent reporting mechanisms provide a concrete basis for accountability and corrective action [7].

In the European context, the European Code Against Cancer frames HPV vaccination programmes as needing to be resourced and monitored to reach the 90% coverage target for both girls and boys [8].

Translating such targets into routine reporting dashboard-style monitoring helps make progress visible, enables performance review, and clarifies responsibility for action when coverage falls short [3].

Reporting national data through ECDC monitoring and reporting mechanisms can support regional comparison, accountability, and programme improvement. Ultimately, being able to demonstrate to the general public how vaccination and screening uptake reduces the burden of HPV cancers is a way to communicate the value of these interventions and can play a part in generating confidence in immunisation programmes.

## Case Studies

### Lithuania



The Lithuanian Human Papillomavirus (HPV) Vaccination Dashboard [11] enables real-time monitoring of vaccination coverage in different regions across the country, 'providing an opportunity to analyse HPV vaccination data at the level of the municipalities and healthcare institutions, and contributes to more accurate monitoring of the vaccination situation' [12]. Data can be filtered by age group, gender, geographical area, and number of doses, and insights will be used to prepare messages for the public, and train and educate healthcare professionals. The overall goal is to increase HPV vaccination coverage rates in girls and boys and reduce variations in uptake across Lithuania [12].

### Norway



In Norway, individual-level HPV vaccination records can be linked at the national level with cervical cancer screening and cancer registry data. European Joint Action PERCH documentation indicates that Norway has already performed such linkages and continues to do so. Additionally, several new linkage studies are underway including HPV genotypes from the national HPV surveillance programme. [6]. This illustrates how interoperability can support coordinated monitoring and analysis across prevention programmes.

### Australia



Australia records HPV vaccination in the Australian Immunisation Register (AIR) an individual-level national immunisation dataset into which HPV vaccination records were transferred in 2018 [9]. Coverage rates are broken down by year, sex, state and territory, and First Nation status, and data is annualised by calendar year based on quarterly coverage data [9]. HPV vaccination coverage data is also made available as part of the 'Cervical Cancer Elimination Progress Report: Australia's progress towards the elimination of cervical cancer as a public health problem', enabling analysis of both primary and secondary prevention measures [10].

### Slovakia



Slovakia has developed a public HPV vaccination dashboard through the National Health Information Center (NCZI), presenting data by birth cohort, age, sex, month and year of vaccination, and geography, including regional and district level variation. It distinguishes between children receiving at least one dose and those receiving two or more, includes monthly data that allow uptake to be tracked dynamically within the year rather than just annually, and also reports quarterly pharmacy issue data on HPV vaccines dispensed and changes over time [13]

## Further Reading & Bibliography

- [WHO: Human Papillomavirus \(HPV\) Vaccine Coverage Monitoring Manual](#)
  - [PAHO: Electronic Immunization Registry: Practical Considerations for Planning, Development, Implementation and Evaluation.](#)
  - [ECDC: Designing and implementing an immunisation information system](#)
  - [PATH: A realist review of what works to improve data use for Immunization: Evidence from low- and middle- income countries](#)
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