# Contents

Abbreviations v

**Executive summary** vi

**Introduction** 1

Availability and quality of data 2
Impact of the COVID-19 pandemic 2
Progress against the EVAP indicators 4

**Goal 1. Sustain polio-free status** 6
Status of wild poliovirus circulation 6
Detection of vaccine-derived poliovirus in paralytic cases and in the environment 7
Polio vaccination coverage 7
Quality of surveillance 8
Future risks 9

**Goal 2. Eliminate measles and rubella** 10
Status of elimination 10
Incidence of measles and rubella cases 11
Measles vaccination coverage 11
Quality of surveillance 12
Risks to achieving measles and rubella elimination 13

**Goal 3. Control hepatitis B infection** 14
Results of ETAGE assessment of hepatitis B control 15

**Goal 4. Meet regional vaccination coverage targets at all administrative levels** 16
National coverage 16
Equity in coverage 17
DTP3 coverage 17
Measles coverage 18

**Goal 5. Make evidence-based decisions on the introduction of new vaccines** 21

**Goal 6. Achieve financial sustainability** 23

**Middle-income countries** 24
Disease elimination and eradication 24
Immunization coverage 25
Introduction of new vaccines 26

**Conclusions** 28

**References** 30
## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFP</td>
<td>acute flaccid paralysis</td>
</tr>
<tr>
<td>cVDPV</td>
<td>circulating vaccine-derived poliovirus</td>
</tr>
<tr>
<td>cVDPV2</td>
<td>circulating vaccine-derived poliovirus type 2</td>
</tr>
<tr>
<td>DTP</td>
<td>diphtheria-tetanus-pertussis</td>
</tr>
<tr>
<td>DTP1</td>
<td>diphtheria-tetanus-pertussis vaccine, first dose</td>
</tr>
<tr>
<td>DTP3</td>
<td>diphtheria-tetanus-pertussis vaccine, third dose</td>
</tr>
<tr>
<td>EIA2030</td>
<td>European Immunization Agenda 2030</td>
</tr>
<tr>
<td>ETAGE</td>
<td>European Technical Advisory Group of Experts</td>
</tr>
<tr>
<td>EVAP</td>
<td>European Vaccine Action Plan</td>
</tr>
<tr>
<td>HBsAg</td>
<td>hepatitis B surface antigen</td>
</tr>
<tr>
<td>HIC</td>
<td>high-income country</td>
</tr>
<tr>
<td>IPV</td>
<td>inactivated polio vaccine</td>
</tr>
<tr>
<td>JRF</td>
<td>Joint Reporting Form</td>
</tr>
<tr>
<td>LIC</td>
<td>low-income country</td>
</tr>
<tr>
<td>LMIC</td>
<td>lower middle-income country</td>
</tr>
<tr>
<td>MCV</td>
<td>measles-containing vaccine</td>
</tr>
<tr>
<td>MCV1</td>
<td>measles-containing vaccine, first dose</td>
</tr>
<tr>
<td>MCV2</td>
<td>measles-containing vaccine, second dose</td>
</tr>
<tr>
<td>MIC</td>
<td>middle-income country</td>
</tr>
<tr>
<td>NITAG</td>
<td>national immunization technical advisory group</td>
</tr>
<tr>
<td>PCV</td>
<td>pneumococcal conjugate vaccine</td>
</tr>
<tr>
<td>RCC</td>
<td>Regional Certification Commission</td>
</tr>
<tr>
<td>RV</td>
<td>rotavirus vaccine</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations Children's Fund</td>
</tr>
</tbody>
</table>
Executive summary

The European Vaccine Action Plan 2015–2020 (EVAP) was adopted unanimously at the 64th session of the WHO Regional Committee for Europe and set the course for immunization and the control of vaccine-preventable diseases for 2015–2020. EVAP provided a regional vision, established goals and targets, and defined strategic objectives, priority action areas and indicators, while considering the specific needs and challenges of WHO European Region Member States.

This report assesses the Region’s progress against EVAP’s defined goals, objectives and targets through December 2020, using 2014 as the baseline year and data reported through the WHO–United Nations Children’s Fund (UNICEF) Joint Reporting Form, as well as other publicly available documents and reports.

At the conclusion of EVAP, the Region had seen many important successes, such as sustaining its polio-free status, 57% of Member States achieving measles elimination, two countries verified as having achieved the hepatitis B control target, 49 Member States with established national immunization technical advisory groups (NITAGs) and 96% of its Member States being financially self-sufficient for vaccine procurement.

Although the Region achieved many successes, there were also some setbacks; for example, since 2017, some Member States have lost their measles elimination status, fewer Member States have sustained a coverage of ≥ 95% with the third dose of diphtheria-tetanus-pertussis vaccine (DTP3) and more of them have drop-out rates (between the first dose of diphtheria-tetanus-pertussis vaccine (DTP1) and DTP3) greater than 5% compared to 2014.

<table>
<thead>
<tr>
<th>GOAL</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Sustain polio-free status</td>
<td>Achieved</td>
</tr>
<tr>
<td>2 Eliminate measles and rubella</td>
<td>Not achieved</td>
</tr>
<tr>
<td>3 Control hepatitis B infection</td>
<td>Not achieved</td>
</tr>
<tr>
<td>4 Meet regional vaccination coverage targets at all administrative levels</td>
<td>Not achieved</td>
</tr>
<tr>
<td>5 Make evidence-based decisions about introduction of new vaccines</td>
<td>Achieved</td>
</tr>
<tr>
<td>6 Achieve financial sustainability of national immunization programmes</td>
<td>Achieved</td>
</tr>
</tbody>
</table>
Finally, the COVID-19 pandemic continues to have an impact on routine immunization programmes and contributed to the decline in performance seen in 2020. The impact of the pandemic also highlighted weaknesses in immunization systems in some countries and challenges in attaining and sustaining the EVAP goals. At the same time, the pandemic response has created opportunities and lessons that should be leveraged as the Region continues on its quest to complete its unfinished immunization agenda.
Introduction

Immunization is one of the most cost-effective public health interventions. Childhood immunization has contributed towards the achievement of Millennium Development Goal 4 to reduce childhood mortality. All-cause under-5 child mortality decreased by 47% between the year 2000 (9.7 million deaths) and 2019 (5.2 million deaths) \(^\text{1}\). Four of the top 10 causes of mortality whose reduction contributed to this decrease are fully or partially vaccine-preventable (i.e., pneumonia, diarrhoea, measles and meningitis) \(^\text{2}\). It is estimated that vaccination averted at least 37 million deaths (95% credible interval 30–48) between 2000 and 2019, representing a 45% decline in deaths due to eight vaccine preventable diseases\(^\text{1}\) in 98 low- and middle-income countries relative to no vaccination \(^\text{3}\). Additional deaths averted over a lifetime in the birth cohorts vaccinated from 2000 to 2030, including from hepatitis B and human papillomavirus (HPV) increase that to 120 million (93–150). The total annual global deaths averted by vaccination go far beyond these estimates as only 98 countries were modelled, and deaths averted from diphtheria, pertussis, polio, tetanus and from adult vaccinations were not modelled \(^\text{4}\).

The European Vaccine Action Plan 2015–2020 (EVAP) was adopted unanimously at the 64th session of the WHO Regional Committee for Europe \(^\text{5}\). It set the course for immunization and the control of vaccine-preventable diseases during the decade by providing a regional vision, establishing goals and targets, and by defining strategic objectives, priority action areas and indicators, while considering the specific needs and challenges of WHO European Region Member States.

A set of targets were agreed upon by the Member States as part of the framework to monitor and evaluate progress towards goals and objectives in the EVAP \(^\text{6}\). The robust monitoring and evaluation framework ensured that all stakeholders in the Region were able to optimize their efforts towards protecting the health of individuals in Member States, as it required regular review of progress towards defined targets and indicators and highlighted areas for course corrections.

This final report assesses the progress made against the goals, objectives and targets of EVAP through December 2020, using 2014 as the baseline year.

The Region aims to incorporate the lessons learned from EVAP to complete the unfinished agenda in the coming decade - to close the equity gaps in immunization both between and within countries; achieve the disease

\(^{1}\) *Haemophilus influenzae* type b, Japanese encephalitis, measles, *Neisseria meningitidis* serogroup A, rotavirus, rubella, *Streptococcus pneumoniae* and yellow fever.
eradication, elimination and control goals; and ensure that middle-income countries (MICs) do not lag behind the other Member States. The data in this report will also serve to establish the baseline for monitoring indicators that are common between EVAP and the European Immunization Agenda 2030 (EIA2030).

**Availability and quality of data**

This assessment is based on a review and analysis of data reported to WHO through the WHO–United Nations Children’s Fund (UNICEF) Joint Reporting Form (JRF), the WHO–UNICEF Estimates of National Immunization Coverage and other publicly available documents and reports, including the reports of the Regional Certification Commission (RCC) for polio eradication and the Regional Verification Commission for measles and rubella elimination.

The assessment of progress was affected by data quality issues, especially in 2020 and 2021 when the pandemic response led to disruptions in data collection and reporting. Completed JRFs reporting data for 2020 were received from all 53 Member States in the Region in 2021. Coverage data at the subnational levels were only available from 36–40 Member states for each of the years 2014–2019, and from 39 Member States for 2020.

For five of the six EVAP goals, complete data through 2020 were available to evaluate the Region’s progress against each of the EVAP indicators. The processes to assess the hepatitis B control goal were impacted by the COVID-19 pandemic and the assessment of achievement was limited by the lack of seroprevalence data generated through a standardized process and submission of country reports.

**Impact of the COVID-19 pandemic**

The COVID-19 pandemic has revealed the vulnerability of national immunization programmes and continues to impact routine immunization service delivery. Encouragingly, the regional immunization coverage did not decline substantially between 2019 and 2020 (Fig. 1). Despite a drop in immunization coverage in May 2020 during the peak of the COVID-19 pandemic, most countries were able to catch-up missed children.
However, the total number of children who missed doses in the Region did increase, with the number of Member States reporting coverage with DTP3 < 90% increasing from six in 2019 to 11 in 2020, which comprise 13% of the Region's birth cohort, compared to 6.4% in 2019.

The relative stability of DTP3 coverage did hide the unequal impact of the pandemic on immunization coverage in the Member States of the Region. Several countries experienced disruptions to routine immunization service delivery, evidenced by declines in DTP3 coverage and coverage with the first dose of measles-containing vaccine (MCV1); 10 countries reported a decline in coverage of either DTP3 or MCV1 (Fig. 2).

---

**Fig. 1.** Immunization coverage for routine vaccines, WHO European Region, 2019 and 2020

BCG: bacille Calmette-Guerin vaccine; DTP1: diphtheria, tetanus and pertussis vaccine, first dose; DPT3: diphtheria, tetanus and pertussis vaccine, third dose; HepB-BD: hepatitis B vaccine, birth dose; HPVc: complete human papillomavirus vaccination; IPV1: inactivated polio vaccine, first dose; MCV1: measles-containing vaccine, first dose; MCV2: measles-containing vaccine, second dose; PCV3: pneumococcal conjugate vaccine, third dose; POL3: polio vaccine, third dose.

---

**Fig. 2.** Variability of DTP3 and MCV1 coverage trend between 2019 and 2020

ALB: Albania; AND: Andorra; ARM: Armenia; AUT: Austria; AZE: Azerbaijan; BEL: Belgium; BGR: Bulgaria; BLR: Belarus; CHE: Switzerland; CYP: Cyprus; CZE: Czechia; DEU: Germany; DNK: Denmark; ESP: Spain; EST: Estonia; FIN: Finland; GBR: United Kingdom of Great Britain and Northern Ireland; GEO: Georgia; GRC: Greece; HRV: Croatia; HUN: Hungary; IRL: Ireland; ISL: Iceland; ISR: Israel; ITA: Italy; KAZ: Kazakhstan; KGZ: Kyrgyzstan; LTU: Lithuania; LUX: Luxembourg; LVA: Latvia; MDA: Republic of Moldova; MKD: North Macedonia; MLT: Malta; MNE: Montenegro; NLD: Netherlands (Kingdom of the); NOR: Norway; POL: Poland; PRT: Portugal; ROU: Romania; RUS: Russian Federation; SMR: San Marino; SRB: Serbia; SVK: Slovakia; SVN: Slovenia; SWE: Sweden; TJK: Tajikistan; TKM: Turkmenistan; TUR: Turkey; UKR: Ukraine; UZB: Uzbekistan.

DTP3 coverage is defined as: the percentage of one-year-olds who have received three doses of the combined diphtheria, tetanus toxoid and pertussis (DTP3) vaccine in a given year.

MCV1 coverage is defined as: the percentage of one-year-olds who have received measles-containing vaccine, first dose (MCV1) in a given year.
The data from 2020 will serve to highlight areas of vulnerability of immunization programmes and to assess the impact of innovative measures that Member States in the Region devised to respond to the pandemic. It will be important that the lessons learned guide efforts to identify and vaccinate missed children and to further strengthen immunization systems and build back better during the coming decade. The pandemic response also provides important lessons for establishing or strengthening life-course vaccination and for strengthening preparedness for future pandemics and outbreak response to epidemics of vaccine-preventable diseases.

**Progress against the EVAP indicators**

Table 1 provides an overview of the progress made against the EVAP goals and targets.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Target</th>
<th>Actual</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Sustain polio-free status</strong></td>
<td>No wild virus transmission re-established in the Region</td>
<td>Through 2020, no wild poliovirus or circulating vaccine-derived poliovirus (cVDPV) transmission in the WHO European Region</td>
<td>Achieved</td>
</tr>
<tr>
<td><strong>2 Eliminate measles and rubella</strong></td>
<td>By 2015, all Member States have interrupted endemic transmission of measles and rubella for &gt; 12 months and by 2018 regional elimination is verified</td>
<td>Through 2020, 30 (57%) Member States have interrupted endemic transmission of measles for &gt; 12 months and 45 (85%) Member States have interrupted endemic transmission of rubella for &gt; 12 months</td>
<td>Not achieved</td>
</tr>
<tr>
<td><strong>3 Control hepatitis B infection</strong></td>
<td>By 2020, all Member States reach hepatitis B control targets, and this achievement is validated by the European Technical Advisory Group of Experts (ETAGE)</td>
<td>Through 2020, 20 (37%) Member States have &gt; 95% coverage of the third dose of hepatitis B vaccine and 19 (36%) Member States have &gt; 90% coverage of the hepatitis B vaccine birth dose</td>
<td>Not achieved</td>
</tr>
<tr>
<td><strong>4 Meet regional vaccination coverage targets at all administrative levels</strong></td>
<td>By 2020, 90% of Member States achieve ≥ 95% DTP3 coverage at the national level</td>
<td>Through 2020, 24 (45%) Member States have &gt; 95% DTP3 coverage at the national level and 47 (89%) Member States have &gt; 90% coverage of the first dose of DTP at the national level</td>
<td>Not achieved</td>
</tr>
<tr>
<td></td>
<td>Make evidence-based decisions about introduction of new vaccines</td>
<td>By 2020, 90% of Member States with a national immunization technical advisory group (NITAG) have made an evidence-informed decision on introduction of a new vaccine</td>
<td>Through 2020, 49 (92%) Member States with a NITAG have made an informed decision on introduction of a new vaccine following review of the relevant evidence by the NITAG</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>5</td>
<td>Achieve financial sustainability of national immunization programmes</td>
<td>By 2020, 96% of Member States are financially self-sufficient for procuring routine vaccines</td>
<td>Through 2020, 51 (96%) Member states achieved financial sustainability of national immunization programmes</td>
</tr>
</tbody>
</table>
GOAL 1
Sustain polio-free status

Status of wild poliovirus circulation

At its 35th meeting held in September 2021, the RCC concluded, based on the available evidence, that there was no wild poliovirus transmission in the Region in 2020 (7). The risk categorization of Member States in the Region for 2014–2020 is shown in Fig. 3. Though the Region maintained its polio-free status, the number of countries assessed to be at high risk or intermediate risk increased. Member States were determined to be at high risk due to a combination of low vaccination coverage and population immunity, suboptimal surveillance quality and inadequate responses to other vaccine-preventable disease outbreaks. Member States assessed to be at high risk increased from two in 2014 to three2 in 2020, and those at intermediate risk increased from 16 in 2014 to 22 in 2020, while those categorized as low risk decreased from 35 in 2014 to 21 in 2020. Risk assessments could not be performed in seven Member States for 2020, due to a paucity of data.

Fig. 3.
Risk categorization for spread of polioviruses, WHO European Region, 2014–2020

2 Poland, Romania and Ukraine.
Detection of vaccine-derived poliovirus in paralytic cases and in the environment

In November 2020, the first circulating vaccine-derived poliovirus type 2 (cVDPV2) case with onset of acute flaccid paralysis (AFP) was reported in Khatlon Province, Tajikistan. An additional 30 cases of children with cVDPV2 with onset of AFP were detected in the first half of 2021 and WHO designated the situation a grade 2 emergency. Surveillance was intensified in response, including with the establishment of environmental surveillance, to ensure that any current or past cases of the virus were detected. As of 1 October 2021, the virus had also been isolated from 26 children without paralysis, and 20 environmental samples had tested positive for presence of the virus. All detected polioviruses are linked to a virus strain currently circulating in Pakistan.

Tajikistan completed a planned nationwide inactivated polio vaccine (IPV) catch-up campaign in February 2021 to ensure that all children who may have missed receiving protection against type 2 poliovirus are protected from becoming sick and suffering potential paralysis should they come into contact with the virus. The catch-up campaign achieved high coverage among the remaining type 2-naive children. To prevent continuation of the cVDPV2 outbreak, two national and one subnational supplementary immunization campaigns with the novel oral polio vaccine type 2 were conducted, which achieved at least 91% coverage of the target group of children under the age of 5. AFP and environmental surveillance is now ongoing in the outbreak area to detect further spread of poliovirus.

While no other country reported the isolation of cVDPV2 in 2020, Ukraine reported two such cases in 2021. The occurrence and spread of AFP due to cVDPV highlights the presence of immunity gaps that may impede efforts to achieve global polio eradication.

Polio vaccination coverage

In 2020, only 49 of the 53 Member States of the European Region reported coverage with three doses of polio vaccine. The number of Member States with coverage ≥ 95% declined from 35 in 2014 to 24 in 2020 (Fig. 4). In 2020, 12 Member States had coverage < 90%, of which Montenegro, North Macedonia and Ukraine had coverage rates of 84% each, raising concerns about increasing immunity gaps. Even in the Member States with sustained coverage of ≥ 95%, concerns remain about the quality of the coverage data and the presence of pockets of immunity gaps, especially among vulnerable and underserved populations.
Fig. 4.
National coverage with third dose of polio vaccine, WHO European Region, 2014–2020

All 53 Member States in the Region have provided at least one dose of IPV in their national immunization schedules. Of them, 41 (77%) Member States are administering a three-dose schedule of IPV, 5 (9%) are administering a two-dose schedule, and seven (14%) are administering a one-dose schedule. In the remaining 18 Member States oral polio vaccine remains a part of the national immunization schedule.

Quality of surveillance
Maintaining high-quality polio surveillance is important for maintaining certification, but also to mitigate the risks of importation and spread of wild and vaccine-derived polioviruses, even as the world progresses towards certification of polio eradication. Member States use varying surveillance strategies, therefore assessing poliovirus surveillance quality in the Region is challenging. As per reports available with WHO, in 2019, 42 Member States were conducting AFP surveillance, of which 30 also conducted supplementary surveillance; 10 conducted only supplementary surveillance (7). In 2018, two countries (Belgium and Switzerland) in the Region were assessed as having low-quality surveillance and 12 as having average quality. This represents an improvement from 2016 when five Member States were assessed as having low-quality surveillance and 17 as having average quality. The RCC expressed concern about the deterioration of quality of poliovirus surveillance in the Region, due to various factors and recommended that in the absence of high-quality AFP surveillance, the efficiency of enterovirus and environmental surveillance types should be enhanced.
Future risks

Though the Region has maintained its polio-free status for almost 10 years, all Member States in the Region remain at risk for importation or re-emergence of poliovirus, with three Member States identified as being at high risk for subsequent spread.

All Member States will need to enhance and/or sustain high vaccination coverage to maintain high population immunity, achieve and sustain high-quality surveillance, and be prepared to respond promptly in cases of importation or re-emergence of the virus. Member States with poliovirus essential facilities will also need to maintain a high level of vigilance to avoid breaches in containment and mitigate the risk of spread, should a breach occur.
GOAL 2
Eliminate measles and rubella

Elimination of measles and rubella is defined as the absence of endemic transmission in a defined geographic area (e.g. region or country) for ≥ 12 months and, in the case of rubella, the absence of congenital rubella syndrome cases, in the presence of a well-performing surveillance system (8).

Status of elimination

The target for interruption of endemic measles and rubella transmission for ≥ 12 months in all Member States in the Region by 2015 was not met and neither was the 2020 target for the verification of elimination of measles and rubella in the Region. The number of Member States in the Region that were verified as having interrupted endemic measles transmission did increase from 21 in 2014 to 29 in 2020. However, some ground in the effort to eliminate measles was lost after the midterm EVAP evaluation in 2017, as at least eight countries which were verified as having eliminated measles in 2017 lost their measles elimination status in 2020 (Fig. 5).³

Fig. 5.
Status of measles elimination, WHO European Region, 2014–2020

The number of Member States in the Region that were verified as having interrupted endemic rubella transmission increased from 20 in 2014 to 45 in 2020, representing steady progress during the implementation period of EVAP (Fig. 6).

³ In 2017 and 2018, 37 and 35 countries respectively, had successfully interrupted transmission.
Incidence of measles and rubella cases

During 2010–2020, the lowest reported number of cases for measles and rubella were in 2016. However, the number of measles cases increased substantially in 2017–2019, to levels higher than in 2014 (the baseline year for EVAP). Measles cases peaked at 101,879 in 2019, and declined considerably in 2020 to levels lower than in 2014, which could be attributed to disruptions to case surveillance, reporting and health-seeking behaviours caused by the COVID-19 pandemic and/or to lower transmission due to the public health and social measures put in place in response to the pandemic. In 2020, a total of 12,220 (country case range 1-4053) cases of measles were reported by 37 Member States in the Region, for a regional incidence of 13.08/million population (country incidence range 0–174.1/million); 10 measles-related deaths were also reported. Thirty Member States reported an incidence of < 1/million population in 2020, whereas six reported an incidence of > 10/million. The total number of rubella cases reported in 2020 was 598, for a regional incidence of 0.68/million population.

Measles vaccination coverage

Sustained immunization coverage of ≥ 95% with two appropriately spaced doses of measles-containing vaccines is needed to achieve and sustain measles elimination. The regional coverage with MCV1 and the second dose of measles-containing vaccine (MCV2) in 2020 was 91% and 90%, respectively, based on reporting from 49 Member States. While regional MCV2 coverage increased from 89% in 2014 to 90% in 2020, MCV1 coverage within the Region remained relatively constant (93–96%) over the same period. In 2020, of the 49 Members States that reported coverage, 27 had MCV1 coverage of < 95% (Fig. 7), of which the coverage was 90–94% in 18 and < 90% in 9; two Member States had coverage of < 70%. Of the 48 Member States for which MCV2 coverage data is available, 35 had MCV2 coverage of < 95%, with 16 of these having coverage of < 90% (Fig. 8).
Quality of surveillance

The implementation of standardized case-based measles and rubella surveillance and the assessment of surveillance quality remains a challenge in the Region because of divergent surveillance systems in the Member States. Though most Member States in the Region conduct case-based surveillance for measles, as of December 2021, seven Member States are still only reporting aggregate surveillance data rather than monthly case-based data to WHO. Evaluation of the recommended laboratory indicators in 2020 reveals that in five Member States, laboratory investigations were done for < 80% of suspected measles cases.

The case investigation rates for measles within the Region have improved from the 2014 baseline, with 65% of cases being investigated in 2020 compared to 55% in 2014. However, the COVID-19 pandemic impacted measles surveillance in the Region and case investigation rates declined by 25% from 2019 to 2020. Eighteen Member States did not achieve the 80% target for timeliness of investigation.
Similarly, for rubella, of the 49 Member States reporting cases, eight performed laboratory investigations for < 80% of suspected rubella cases. Case investigation rates increased substantially compared to 2014 with 93% of cases being investigated in 2020 compared to only 3.1% in 2014. Of the 49 reporting Member States, eight did not meet the 80% target for timeliness of investigation for rubella, which may have been impacted by the pandemic, with rates declining from 91% in 2019 to 85% in 2020.

Based on the evidence presented on population mixing rates and the risk of measles transmission (9), the WHO Strategic Advisory Group of Experts on Immunization (SAGE) recommended that countries where the scheduled age for the administration of MCV2 is after school entry, should consider lowering the age of MCV2 delivery. Currently, in the European Region, 30 Member States schedule MCV2 at the age of 6 years or later, with 18 Member States providing this dose at 6 years, highlighting the need for the Member States to review their schedules, together with epidemiological and coverage data to optimize the age of immunization to maximize disease control.

**Risks to achieving measles and rubella elimination**

While the Region made steady progress towards rubella elimination during the EVAP period, progress towards measles elimination stagnated, and the Region did not meet its goal of measles elimination by 2020. The declining number of Member States achieving the 95% coverage goal poses risk for endemic measles and rubella transmission in the Region. This highlights the need for Member States to achieve and sustain higher and more equitable immunization coverage to prevent the build-up of immunity gaps.

While all Member States in the Region demonstrated high-level political commitment by re-endorsing the measles elimination goal in 2014, there is complacency in translation of this commitment into action, as evidenced by stagnant or declining vaccination coverage, suboptimal surveillance quality, and inadequate preparedness for or response to outbreaks. The WHO Regional Office will need to support Member States to effectively design and deliver strategies during the implementation period of EIA2030 to reach the elusive goal of measles elimination.
GOAL 3
Control hepatitis B infection

Immunization is a critical early intervention in the control of hepatitis B. Following the recommendation for universal hepatitis B vaccination in the 1990s, the prevalence of chronic infection in children under 5 years of age declined globally from an estimated 4.7% in the pre-vaccination era to 1.3% in 2015; the estimated prevalence in children under 5 years in the European Region in 2015 was 0.4% (10).

The EVAP target for the control of hepatitis B infection includes the following indicators:

- 95% coverage with the three or four doses of hepatitis B vaccine recommended for infants in countries that implement universal vaccination;
- 90% coverage with timely hepatitis B birth-dose vaccination for countries that implement universal newborn vaccination;
- 90% coverage with screening in pregnant women and 95% coverage with post-exposure prophylaxis in infants born to infected mothers for countries that implement screening of pregnant women and post-exposure prophylaxis of newborns;
- ≤ 0.5% hepatitis B surface antigen (HBsAg) prevalence in vaccinated cohorts.

By 2020, 20 Member States had achieved at least 95% coverage with three doses of hepatitis B vaccine, while 19 Member States reported coverage of at least 90% with hepatitis B birth-dose vaccination. The number of Member States meeting these targets declined slightly after 2014, when 26 Member States reported at least 95% coverage with three doses of hepatitis B and 21 Member States reported at least 90% coverage with hepatitis B birth-dose vaccination (Table 2).
Table 2.
Hepatitis B control indicators, WHO European Region, 2014 & 2020

<table>
<thead>
<tr>
<th>Country category</th>
<th>n</th>
<th>Target</th>
<th>No (%) meeting target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Countries with universal infant immunization</td>
<td>44</td>
<td>95% coverage with the three or four doses of hepatitis B vaccine</td>
<td>26 (57%) 20 (45%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>recommended for children in countries that implement universal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>vaccination</td>
<td></td>
</tr>
<tr>
<td>Countries with vaccination at birth</td>
<td>21</td>
<td>90% coverage with timely(^a) hepatitis B birth-dose vaccination</td>
<td>21 (91%) 19 (90%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for countries that implement universal newborn vaccination</td>
<td></td>
</tr>
<tr>
<td>Countries with universal screening and</td>
<td>NA</td>
<td>90% coverage with screening in pregnant women and 95% coverage with</td>
<td>NA NA</td>
</tr>
<tr>
<td>post-exposure prophylaxis</td>
<td></td>
<td>post-exposure prophylaxis in infants born to infected mothers for</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>countries that implement screening of pregnant women and</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>post-exposure prophylaxis of newborns</td>
<td></td>
</tr>
<tr>
<td>Countries with data from serosurveys</td>
<td>NA</td>
<td>≤ 0.5% HBsAg prevalence in vaccinated cohorts</td>
<td>NA NA</td>
</tr>
</tbody>
</table>

NA: not available.
\(^a\) A timely birth dose is defined as a dose administered within 24 hours of birth.

Member States in the Region use different strategies for hepatitis B control, as appropriate to their situation. Vaccination coverage in the Member States implementing universal immunization is generally high, with a few exceptions. Currently data on the coverage of screening of pregnant women and prophylaxis to exposed infants are not routinely reported to WHO.

**Results of ETAGE assessment of hepatitis B control**

Assessment of the achievement of hepatitis B control, carried out by the ETAGE Hepatitis B Working Group, is not based on a single indicator but a composite assessment of coverage with the different strategies used by each country. This assessment was impeded by the absence of seroprevalence data generated through a standardized process. Submission of country reports and the process for assessment were also negatively affected by the COVID-19 pandemic. Though seroprevalence studies conducted by Italy, the Netherlands (Kingdom of the) and Turkmenistan have been assessed by the Working Group as a part of the validation process, the results cannot be directly compared as countries used different study populations and study design. The Working Group validated that Italy and the Netherlands (Kingdom of the) had reached hepatitis B control targets in 2020; the United Kingdom was validated provisionally in 2020, which was confirmed in 2021.
GOAL 4

Meet regional vaccination coverage targets at all administrative levels

While high and equitable coverage with all vaccines in national programmes and across the life-course is important, DTP3 is used as a proxy measure for Goal 4.

National coverage

The target for Goal 4 is the achievement of ≥ 95% DTP3 coverage nationally by 2020 in 90% of Member States. In 2020, 24 (45%) Member States had achieved DTP3 coverage of ≥ 95%; based on the available information from 49 reporting Member States this EVAP goal was not achieved. The number of countries that achieved the coverage target declined in 2020 compared to 2014, when 35 Member States had achieved the target coverage level (Fig. 9). It will be important to recover these gains in immunization coverage, which will also demonstrate the resilience of immunization systems in the Region to mitigate potential impacts of the pandemic.

**Fig. 9.**
National coverage with third dose of DTP-containing vaccines, WHO European Region, 2014–2020

<table>
<thead>
<tr>
<th>Year</th>
<th>&gt;95%</th>
<th>90-94%</th>
<th>&lt;90%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>28</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>2019</td>
<td>27</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>2018</td>
<td>26</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>2017</td>
<td>25</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td>2016</td>
<td>24</td>
<td>18</td>
<td>8</td>
</tr>
<tr>
<td>2015</td>
<td>23</td>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td>2014</td>
<td>22</td>
<td>20</td>
<td>8</td>
</tr>
</tbody>
</table>
In 2020, 13 Member States had drop-out rates ≥ 5% (range 5–13%) between DTP1 and DTP3, an increase compared to 2014 (seven Member States) (Fig. 10). At the same time, the number of Member States reporting drop-out rates < 1% increased between 2014 and 2020 from 12 to 16 Member States, representing a positive trend in the Region.

Fig. 10.
National DTP1-DTP3 dropout rate, WHO European Region, 2014-2020

Nine Member States showed a ≥ 5% decline in coverage in one or more years from 2015 to 2020, compared to 2014. Overall, 22 Member States reported a decline in DTP3 coverage in 2020 compared to coverage rates reported in 2014. However, 12 Member States also reported an increase in DTP3 coverage in 2020 compared to 2014, including Ukraine, which reported a 58% increase in DTP3 coverage during the EVAP period.

**Equity in coverage**

Achieving and maintaining high and equitable coverage underlies the achievement and maintenance of all the vaccine-preventable disease eradication, elimination and control goals.

**DTP3 coverage**

EVAP established a target for achieving ≥ 90% coverage in ≥ 90% of districts (or equivalent administrative levels) in a country. Subnational level coverage was reported from a variable number of countries each year, ranging from 36 to 40. Subnational coverage, whether at the district level or at a higher administrative level, was used as a proxy for district level coverage for assessing progress against this target. The number of reporting countries that achieved the target each year is shown in Fig. 11.
The number of reporting countries that achieved the target dropped to 20 or lower in 2018 and 2020.

While no country reported any subnational area with DTP3 coverage < 50% in 2014, in subsequent years, one or two countries reported one or more subnational areas with DTP3 coverage < 50%. In 2015 and 2016, Ukraine reported DTP3 coverage < 50% in 24 of the 25 reporting subnational areas (provinces). The situation improved in 2019 and 2020, when no province was reported with < 50% coverage.

**Measles coverage**

Achieving high and equitable coverage is especially important for achieving and sustaining measles and rubella elimination. Hence inequalities in coverage with measles containing vaccines was also examined. Figures 12a and 12b illustrate the inequalities in coverage with MCV1 for the years 2019 and 2020, respectively. Inequalities in subnational coverage were observed in several countries in 2019 and this inequality was exacerbated in 2020, most likely due to disruption in immunization services during the COVID-19 pandemic.
Inequalities in coverage with MCV1, 2019

Note: During 2019, subnational PAF ranged from 0.0% in Hungary, Israel and Uzbekistan, to 20% in Bosnia and Herzegovina. The mean score was 3.1%. PAF is a measure that represents the potential for improvement in the national average MCV1 coverage, in relative terms, that could be achieved if all subnational areas had the same coverage as the highest-performing one. *Countries indicated with an asterix are missing data from at least one sub-national area. Data are fully missing for France, Iceland, Montenegro, North Macedonia and Poland. Source: Authors.
Note: During 2020, PAF ranged from 0.0% in Hungary to 120% in Montenegro. The mean score was 8.9%. *Countries indicated with an asterix are missing data from at least one subnational area. Data are fully missing for Belgium, Bosnia and Herzegovina, France, Iceland, Poland, Romania, Slovenia, Turkmenistan and United Kingdom.
Source: Authors.

These inequalities will need to be rapidly addressed if the regional measles and rubella elimination goals are to be achieved in the coming decade.
GOAL 5
Make evidence-based decisions on the introduction of new vaccines

Evidence-informed decision-making through the advice of a competent and NITAG is a key factor in the introduction of new vaccines and their sustained and optimal use.

As of December 2020, 49 of the 53 Member States in the Region had established NITAGs including all five lower middle-income countries (Table 3).

Member States report annually on whether their NITAGs made a recommendation for or against introduction of three vaccines, namely pneumococcal conjugate vaccine (PCV), rotavirus vaccine (RV) or HPV vaccine, as per the indicator for this goal. NITAGs in 49 of the 53 Member States in the Region (92%) made evidence-informed recommendations related to either PCV, RV and/or HPV (by the end of 2020).

Table 3.
Evidence-informed NITAG decisions, WHO European Region, 2017 & 2020

<table>
<thead>
<tr>
<th>Year</th>
<th>Vaccine</th>
<th>2017 (Midterm review)</th>
<th>2020 (End-term)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PCV</td>
<td>RV</td>
</tr>
<tr>
<td></td>
<td>NITAG made a recommendation</td>
<td>40</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>NITAG did not make a recommendation</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Not known</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Not applicable (No NITAG)</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Based on this progress during the EVAP period, Goal 4 was successful achieved, as > 90% of Member States have made evidence-informed recommendations related to PCV, RV or HPV.
The NITAG recommendations for new introductions helped to support tangible improvements in the Region in the introduction of PCV, RV and HPV from 2014 through 2020 (Fig. 13). In some instances, Member States introduced one of these new vaccines into their national immunization programmes prior to the presence of a NITAG (e.g. PCV). Some Member States have not yet introduced vaccines recommended by NITAGs, therefore there is a discrepancy between the number of NITAG recommendations and introductions made for RV and HPV vaccines in the Region.

Fig. 13.
Number of PCV, RV and HPV introductions, WHO European Region, 2014-2020

<table>
<thead>
<tr>
<th>Year</th>
<th>PCV</th>
<th>RV</th>
<th>HPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>36</td>
<td>15</td>
<td>29</td>
</tr>
<tr>
<td>2020</td>
<td>47</td>
<td>28</td>
<td>38</td>
</tr>
</tbody>
</table>
GOAL 6

Achieve financial sustainability

The availability of adequate financial resources was determined to be vital to delivering the goals of EVAP and the vision of a Region free from vaccine-preventable diseases, where all countries provide equitable access to high-quality, safe, affordable vaccines and immunization services throughout the life-course.

EVAP targeted that by 2020, at least 51 (96%) Member States would be financially self-sufficient in procuring routine vaccines. This goal was assessed to have been achieved.

However, being self-sufficient to procure the vaccines included in their national immunization schedule does not imply that all national programmes receive sufficient financial resources to achieve the vision of EVAP and its ambitious targets. The midterm evaluation of EVAP, which included data on immunization expenditures collected from countries through a special project, suggested that some MICs may not be investing in their immunization programmes commensurate with overall government expenditures. These analyses could not be repeated in 2020 due to the inability to collect immunization expenditure data.

Realizing the vision of EVAP and its successor EIA2030 will require additional resources to support the introduction of new vaccines and to enhance performance to achieve the high and equitable coverage required to achieve the disease elimination and control targets. In a recent modelling study, it was estimated that from 2011 to 2030, immunization would avert US$ 1510.4 billion (2018 US dollars, 95% CL: US$ 674.3–2643.2) in costs of illness in 94 low- and middle-income countries, compared with no vaccination, and generate US$ 3436.7 billion (95% CL: US$ 1615.8–$5657.2) in benefits (11), representing a return of US$ 26.1 for every dollar invested, using the cost-of-illness approach (12). Communicating the return on investments in immunization, closely monitoring immunization expenditures and working with Member States to find innovative financing solutions to ensure that their programmes are adequately funded will be important objectives for the coming decade.
Middle-income countries

Most vaccine-preventable deaths globally now occur in middle-income countries (MICs), and there is concern that MICs in the Region that do not benefit from external support faced challenges in realizing EVAP goals and missed out on opportunities to benefit from new life-saving vaccines. The Region has 21 MICs that account for 46% of its population and 53% of the birth cohort. These include six lower middle-income countries (LMICs) and 15 upper middle-income countries. All LMICs were eligible for support from Gavi, the Vaccine Alliance, but Ukraine has not received direct support since 2008. The Region does not have any low-income countries at the time of this report (13).

In this section, the progress that Member States made with the implementation of EVAP is examined, based on stratification of income categories and Gavi eligibility. Eligibility for Gavi support since 2015 is used as a proxy stratification index for ease of securing external support for immunization in the Region.

Disease elimination and eradication

The European Region has maintained its polio-free status since 2002; however, 54% of its Member States were assessed to be at intermediate or high risk for the spread of polio following importation or emergence of a poliovirus (Fig. 14). The risk status for Member States stratified by income levels and Gavi-eligibility is detailed in Fig. 14. One country in each category was assessed to be at high risk for the spread of poliovirus.

Fig. 14.
Risk of spread following poliovirus importation or re-emergence by country income category and availability of donor support, WHO European Region, 2020

Note: HICs: high-income countries
High-income countries (HICs) are more likely to have interrupted or eliminated transmission of measles and rubella than MICs (Fig. 15). Over 78% of the measles cases reported in 2019 and 2020 occurred in MICs that did not receive any donor support.

Fig. 15. Status of measles and rubella elimination, by country income status and availability of donor support, WHO European Region, 2020

Measles

Rubella

Immunization coverage

High and equitable immunization coverage is critical to meeting and maintaining goals for disease control and to ensuring the health of populations and improving it among the most vulnerable groups.

A larger proportion of MICs have coverage of < 90% for both DTP3 and MCV1 compared to HICs, though the difference between MICs with and without donor support is not remarkable (Fig. 16). In these countries it is important that comprehensive analyses of the root causes of lower coverage are performed to develop appropriate mitigating interventions that can support coverage improvements.
Introduction of new vaccines

MICs without donor support continue to lag behind HICs, and MICs with donor support, in introducing new and underutilized vaccines into the national immunization programmes. As of 2020, of the 14 Member States that are MICs without donor support, seven had only introduced one of either PCV, RV or HPV into their national programmes and only six (43%) had introduced at least two of these vaccines. This represents an improvement from 2017. However, also as of 2020, 28 (88%) HICs and five (71%) MICs that benefit from donor support have introduced at least two or more of these vaccines (Table 4).
Table 4.
Introduction of new vaccines by income category and eligibility for donor support, 2020

<table>
<thead>
<tr>
<th>Income category</th>
<th>Number of vaccines introduced by Member States (of PCV, RV and HPV)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Number of HICs</td>
<td>0</td>
</tr>
<tr>
<td>Number of MICs (no donor support)</td>
<td>1</td>
</tr>
<tr>
<td>Number of MICs (donor support)</td>
<td>1</td>
</tr>
</tbody>
</table>

Evidence-based NITAG recommendations for the introduction of new vaccines are a key factor in supporting such introductions. Following a NITAG recommendation that a vaccine should be included in the national schedule, Member States must ensure that new vaccine introduction is a political priority and that adequate financing to support implementation of the recommendation is secured. Information on the nature of the NITAG recommendations was not available, hence it was not possible to assess whether the NITAG recommendations were followed and whether there was any difference between HICs and MICs.

Another factor that may be contributing to slower uptake of new vaccines in MICs without donor support is the allocation of domestic resources for vaccine procurement. Analyses conducted for the EVAP midterm review suggested that there is fiscal space available for Member States without donor support who are lagging behind to enhance the financing of immunization programmes to introduce new vaccines recommended by the NITAG and to improve performance against regional and global immunization goals.
Conclusions

This report provides an opportunity for all stakeholders in the Region to reflect on the immunization achievements made in 2015–2020. The lessons learned during the implementation period of EVAP should serve to inform the development and execution of EIA2030, to ensure that the benefits of immunization reach everyone, thereby contributing to the achievement of the vision of a European Region free of vaccine-preventable diseases.

There was good progress with the introduction of new vaccines grounded on evidence-based decisions. This was one of the six goals that was achieved. After the midterm evaluation, progress was made with the introduction of new vaccines in the MICs.

While two other goals for the decade were reached, efforts are required to sustain the achievement and further improve on this. Risks for maintaining the polio-free status remain and are indeed being exacerbated as vaccination coverage and surveillance quality declines. While the goal for achieving financial self-sustainability for the procurement of routine childhood vaccines was met, the resources required for the introduction of new vaccines that will improve the health and well-being of populations and for enhancing the performance of vaccination programmes to meet other regional immunization goals may not be forthcoming. The lack of financing data limits a full assessment of this goal.

Three important goals for the decade were not achieved and represent the unfinished agenda that needs to be carried forward into the next decade.

While the COVID-19 pandemic has exposed existing vulnerabilities and weaknesses of national immunization programmes and health systems in general, it has also highlighted new opportunities that could be leveraged in the coming decade to strengthen immunization programmes and accelerate progress against the goals and priorities of EIA2030. These include:

- using the lessons from the COVID-19 pandemic to update plans and processes for outbreak and pandemic preparedness, including the vaccination response;
- expanding and strengthening research capacity for developing and evaluating new vaccines and for conducting research on behavioural and social drivers of vaccination;
- further strengthening community engagement to increase awareness, and enhance community demand and acceptance of vaccination;
- establishing or strengthening platforms for vaccination across the life-course, especially for vaccination of older adults, health workers and those with comorbidities;
• expanding the use of digital systems for registering eligible individuals, scheduling vaccinations, sending reminders, and for reporting, analysing and using data to inform immunization policies, strategies and operations, thereby enabling high and equitable vaccination coverage; and

• strengthening communicable disease surveillance, including capacity for genomic surveillance.
References


The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

Member States

Albania
Andorra
Armenia
Austria
Azerbaijan
Belarus
Belgium
Bosnia and Herzegovina
Bulgaria
Croatia
Cyprus
Czechia
Denmark
Estonia
Finland
France
Georgia
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Kazakhstan
Kyrgyzstan
Latvia
Lithuania
Luxembourg
Malta
Monaco
Montenegro
Netherlands (Kingdom of the)
North Macedonia
Norway
Poland
Portugal
Republic of Moldova
Romania
Russian Federation
San Marino
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Tajikistan
Türkiye
Turkmenistan
Ukraine
United Kingdom
Uzbekistan

World Health Organization
Regional Office for Europe
UN City, Marmorvej 51,
DK-2100 Copenhagen Ø, Denmark
Tel.: +45 45 33 70 00
Fax: +45 45 33 70 01
Email: eurocontact@who.int
Website: www.who.int/europe