

## Risk Assessment on vaccine-preventable diseases (diphtheria, measles, yellow fever and polio): implications for the Region of the Americas

28 February 2023

### Summary

Date of assessment: 22 February 2023

Overall risk
Regional
High

Confidence in available information
Regional
High

Criteria		Assessment		Risk	Rationale
		Likelihood	Consequences		
Potential risk for human health	Regional	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Between 2019 and 2022, cases of vaccine-preventable diseases (VPD) such as measles, diphtheria, polio (cVDPV2), and yellow fever have been reported in countries of the Region of the Americas (<i>See exposure assessment</i>).</li> <li>The case fatality rate (CFR) of vaccine-preventable diseases increases in risk groups which include children under 5 years of age, older adults, pregnant women, immunocompromised people, displaced people, people with acute or chronic malnutrition, among others. The current conditions in the countries and territories of the Region leave these vulnerable groups exposed, which could have a potential impact on the severity of the clinical presentation and lethality of disease among these groups.</li> <li>The untimely health care of cases due to decreased demand for health care or lack of experienced healthcare workers could negatively influence the disease prognosis.</li> </ul>
Risk of event spreading	Regional	Likely	Moderate	High	<ul style="list-style-type: none"> <li>The increase of susceptible population is a result of <i>low vaccination coverage in general, for all immunobiologics</i> (<i>See context assessment</i>).</li> <li>Low performance in the surveillance of vaccine-preventable diseases has been observed, which can be evidenced by the poor performance of surveillance indicators (<i>See context assessment</i>). This could delay detection, notification, confirmation, and control actions at the source.</li> <li>Active transmission of diphtheria persists in Haiti.</li> <li>Persistently susceptible among indigenous populations living along borders.</li> <li>Difficulty in maintaining adequate levels of vaccination in the migrant population within the Region and from other Regions.</li> </ul>
Risk of insufficient control capacities with available resources	Regional	Likely	Moderate	High	<ul style="list-style-type: none"> <li>Health service capacity overburdened due to the impact of concurrent public health emergencies.</li> <li>Limitations to provide vaccination services to migrants, as well as vulnerable populations.</li> <li>The population's perception of skepticism<sup>1</sup> regarding vaccination is high in some countries of the Region and has been boosted by the COVID-19 pandemic.</li> </ul>

<sup>1</sup> Our World in Data. Vaccination. Available in: <https://ourworldindata.org/vaccination#note-24>

## Background information<sup>2</sup>

### Exposure assessment

<p><b>Diphtheria</b></p>	<p>Between 2012 and 2021, the Region of the Americas recorded an annual median of 57 confirmed cases reported to PAHO/WHO in 10 countries (annual range from 2 to 894 cases). The highest number of reported cases was in 2017 and 2018 with 872 cases and 894 cases, respectively. During the same period, cases were reported in 7 countries (<i>Brazil, Canada, Colombia, Dominican Republic, Haiti, Peru, and Venezuela</i><sup>3</sup>); 88% of cases were reported in <i>Venezuela</i>, followed by <i>Haiti</i> with 10%. Since December 2014, active transmission has been recorded in <i>Haiti</i>, where the disease is currently considered endemic (1, 2).</p> <p>In 2022, 2 countries reported confirmed cases of diphtheria: <i>Brazil</i> (2 cases) and <i>Haiti</i> (As of 16 September 2022, 32 confirmed cases, including 6 confirmed deaths were reported)</p> <p>In 2023, active transmission is being recorded in <i>Haiti</i>, where the disease is considered endemic. Currently, a social-political and economic crisis is ongoing.</p>
<p><b>Measles</b></p>	<p>Between 2012 and 2021, the Region of the Americas recorded an annual median of 778 confirmed cases reported to PAHO/WHO in 20 countries and territories (annual range from 97 to 21,971 cases). The highest proportion of reported cases was recorded between 2018 and 2020 (2018: 16,714 cases, 2019: 21,971 cases, and 2020: 9,996 cases). During the same period, cases were reported in 18 countries and territories (<i>Antigua and Barbuda, Argentina, Aruba, Bahamas, Bolivia</i><sup>4</sup>, <i>Brazil, Canada, Chile, Colombia, Costa Rica, Curaçao, Ecuador, Guatemala, Mexico, Peru, United States, Uruguay, and Venezuela</i>), 82% of cases were reported in <i>Brazil</i>, followed by <i>Venezuela</i> with 13% (1, 2).</p> <p>In 2022, between epidemiological week (EW) 1 and EW 52, six countries in the Region of the Americas reported confirmed cases of measles: <i>Argentina</i> with 2 confirmed cases, <i>Brazil</i> with 43 confirmed cases, <i>Canada</i> with 3 confirmed cases, <i>Ecuador</i> with 1 confirmed case, <i>United States</i> with 121 confirmed cases, and <i>Paraguay</i> with 1 confirmed case (3).</p> <p>In 2023, between EW 1 and EW 8 in the WHO Region of the Americas, 177 suspected cases were reported. As of 3 February of 2023, the United States of America confirmed 2 measles cases were reported in 2 jurisdictions.</p> <p>It is important to mention that <i>Brazil</i> and <i>Venezuela</i> reported their last endemic cases in EW 28 of 2022 and EW 33 of 2019, respectively. The Region could achieve reverification of measles elimination if the recommendations of the Regional Commission are met in these two countries.</p>
<p><b>Poliovirus</b></p>	<p>In 2019, PAHO/WHO was notified of the detection of three VDPVs (2 VDPV1 and 1 VDPV3) in environmental samples in <i>Guatemala</i>. These vaccine-derived polioviruses were genetically different and not related to each other. A poliovirus outbreak response assessment (OBRA) was conducted in July-August 2021. No evidence of the circulation of VDPV was found; therefore, all three VDPVs were classified as aVDPV (ambiguous VDPV) (3).</p> <p>On July 21, 2022, as a result of the surveillance conducted in the <i>United States</i>, the New York State Department of Health reported a case of paralytic polio in an unvaccinated individual in Rockland County. Initial sequencing by the United States Centers for Disease Control and Prevention (US-</p>

<sup>2</sup> *Hazard assessment*, is available in the document: Regional Risk Assessment of Vaccine-Preventable Diseases (Diphtheria, Measles, Yellow Fever and Poliomyelitis) in the Context of the COVID-19 Pandemic: Implications for the Region of the Americas, published on 15 December 2021. Available at: <https://bit.ly/3lmWWt7>

<sup>3</sup> Bolivarian Republic of Venezuela.

<sup>4</sup> Plurinational State of Bolivia.

<p><b>Poliovirus</b></p>	<p>CDC) identified a vaccine-derived poliovirus type 2 (VDPV2). On 13 September 2022, the US-CDC reported the detection of poliovirus in environmental samples collected on 3 August and 11 August, which contained six or more nucleotide changes. The detection of these new VDPV2 that are genetically related, demonstrated community transmission; therefore, it was classified as circulating vaccine-derived poliovirus type 2 (cVDPV2). On 6 January 2023, US-CDC sequencing analysis confirmed the presence of poliovirus type 2 in a total of 100 wastewater samples<sup>5</sup> (3).</p> <p>On 23 December 2022, <i>Canada</i> reported the detection of vaccine-derived poliovirus type 2 (VDPV2) in two wastewater samples collected in August 2022. The first environmental sample collected on 27 August 2022, originating from a wastewater treatment plant, contained 8 nucleotides difference with respect to the VP1 region of Sabin virus type 2. A second environmental sample collected on 30 August at a sampling site, contained 6 nucleotides difference from Sabin virus type 2<sup>6</sup> (3). Genetic sequencing confirmed it is linked to the cVDPV2 that was detected in New York, United States<sup>7</sup>.</p> <p>On July 2022, according to the report of the Regional Certification Commission (RCC) Meeting,<sup>8</sup> the regional polio risk assessment was updated. In this regard, the final regional risk classification, considering national and subnational vaccination coverage, epidemiological surveillance, containment status, health determinants and outbreak preparedness, identified 4 countries as very high risk (<i>Brazil, Dominican Republic, Haiti, and Peru</i>), 8 as high risk (<i>Argentina, Bahamas, Bolivia, Ecuador, Guatemala, Panama, Suriname and Venezuela</i>), 18 as medium risk and 14 as low risk (4).</p>
<p><b>Yellow fever</b></p>	<p>Between 2012 and 2021, the Region of the Americas recorded an annual median of 32 confirmed cases reported to PAHO/WHO in 9 countries (annual range from 16 to 1,326 cases). During 2017 and 2018, the highest number of cases were reported, 1,326 cases and 823 cases, respectively. During the same period, cases were reported in 7 countries (<i>Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, and Peru</i>); 98% of cases were reported in Brazil (1, 2).</p> <p>In 2022, between EW 1 and EW 52, two countries in the Region of the Americas reported confirmed cases of yellow fever: <i>Brazil</i> (During the seasonal period 2021-2022 a total of 5 cases, including 4 deaths were reported<sup>9</sup>) and <i>Peru</i> (13 probable cases<sup>10</sup>).</p>
<p><b>Pertussis</b></p>	<p>Between 2019 and 2021, the Region of the Americas recorded an annual median of 7,761 confirmed cases reported to PAHO/WHO in 23 countries and territories (annual range from 6,709 to 72,328 cases). During the last 3 years, 2020 was the year in which the highest number of reported cases was recorded, 20,496 cases. That year, cases were reported in 19 countries and territories (<i>Argentina, Bermuda, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Panama, Paraguay, Peru, United States, Uruguay, and Venezuela</i>); 91% of cases were reported in the <i>United States</i>, followed by <i>Canada</i> with 5% (1,2).</p>

<sup>5</sup> New York State Department of Health. Wastewater monitoring. January 2023. Accessed 22 February 2023. Available in: <https://on.ny.gov/3IKLw3w>

<sup>6</sup> Canada International Health Regulations (IHR) National Focal Point (NFP) report received by PAHO/WHO via email communication.

<sup>7</sup> Polio Global Eradication Initiative, Canada, Status: affected by circulating vaccine-derived poliovirus type 2 (cVDPV2). Available at: <https://bit.ly/3kxIQhL>

<sup>8</sup> 14th meeting of the Regional Certification Commission (RCC) for the Polio Endgame in the Region of the Americas - Meeting report Available in: <https://bit.ly/3IURrdn>

<sup>9</sup> Brazil Ministry of Health. Epidemiological Bulletin. 2022. Available in Spanish at: <https://bit.ly/3L1YOKT>

<sup>10</sup> Peru Ministry of Health. Situation room. Available in Spanish at: <https://bit.ly/3J20Fh8>

## Context assessment

### Vaccination coverage

In 2021, according to WHO/UNICEF estimates of national immunization coverage (WUENIC<sup>11</sup>), vaccination coverage for vaccine-preventable diseases has been low in the Region of the Americas and has declined significantly over the past 10 years.

#### Diphtheria – Tetanus – Pertussis

In 2021, vaccination coverage with the third dose of the diphtheria, tetanus, and pertussis (DTP3) vaccine greater than or equal to 95% was not achieved in 28 countries/territories of the Region of the Americas, and 15 countries (*Argentina, Bahamas, Bolivia, Brazil, Ecuador, El Salvador, Grenada, Guatemala, Haiti, Honduras, Mexico, Panama, Paraguay, Suriname, and Venezuela*) had DTP3 coverage of less than 80% (5) (Figure 1).

**Figure 1.** Vaccination coverage with the third dose of diphtheria, tetanus, and pertussis (DTP3) vaccine. Countries and territories of the Region of the Americas, 2012-2021.

Country/territory	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Antigua and Barbuda	92	96	95	95	95	92	99	99	99	98
Argentina	76	74	83	86	86	92	94	94	94	91
Bahamas	75	83	89	90	94	94	95	96	97	98
Barbados	82	85	90	95	90	97	97	94	91	87
Belize	83	79	98	96	88	95	94	95	95	98
Bolivia (Plurinational State of)	70	68	75	83	84	87	89	85	87	93
Brazil	68	77	70	87	89	89	96	93	97	95
Chile	95	93	96	95	93	95	96	95	91	90
Colombia	86	88	94	92	92	91	91	90	91	91
Costa Rica	99	97	95	94	96	97	92	91	95	91
Cuba	99	99	99	99	99	99	99	99	99	99
Dominica	92	96	99	94	91	99	98	97	96	97
Dominican Republic	84	82	89	87	84	87	85	91	83	85
Ecuador	72	70	85	85	85	83	78	83	87	87
El Salvador	79	72	81	81	85	93	91	94	92	92
Grenada	72	72	92	95	96	96	92	97	97	97
Guatemala	79	83	85	85	91	83	70	74	96	96
Guyana	91	99	99	95	97	97	95	98	98	97
Haiti	51	51	64	64	64	64	64	63	65	66
Honduras	77	80	88	91	90	95	98	99	99	98
Jamaica	90	96	96	97	93	99	91	92	93	96
Mexico	78	72	82	88	85	93	87	87	83	99
Nicaragua	87	92	98	98	98	98	98	98	98	98
Panama	74	74	88	88	81	86	73	80	80	85
Paraguay	70	79	86	88	91	92	92	93	91	91
Peru	82	72	88	84	83	89	90	88	88	95
Saint Kitts and Nevis	96	99	97	98	98	98	94	98	97	98
Saint Lucia	80	86	92	95	80	95	99	99	99	98
Saint Vincent and the Grenadines	97	97	97	97	99	99	99	98	97	96
Suriname	72	51	77	81	67	77	73	71	76	76
Trinidad and Tobago	94	96	93	99	89	97	96	92	92	92
Uruguay	89	92	94	91	93	95	95	95	94	95
Venezuela (Bolivarian Republic of)	56	54	64	60	66	84	87	78	82	81

<80%

80-89%

90-94%

>=95%

Source: WHO/UNICEF WUENIC vaccination coverage estimates. Available at: <https://bit.ly/3c2ZAEr>

<sup>11</sup> WHO/UNICEF Estimates of National Immunization Coverage. Available at: <https://bit.ly/349293G>

## Measles

Between 2020 and 2021, vaccination coverage with the first dose of the measles, mumps and rubella (MMR1) vaccine decreased in 16 countries and territories in the Region of the Americas. The largest decrease was observed in 5 countries and territories: *Barbados, Grenada, British Virgin Islands, Paraguay and Ecuador*, respectively. In 2021, seven countries concentrated the highest number of children who did not receive MMR1 at 12 months: *Brazil, Venezuela, Colombia, Ecuador, Argentina, Haiti, and Guatemala*, constituting the most exposed population. In 2021, MMR1 coverage greater than or equal to 95% was not achieved in 28 countries and territories in the Region of the Americas, including 11 countries (*Barbados, Belize, Bolivia, Brazil, Ecuador, Haiti, Paraguay, Peru, Saint Lucia, Suriname, and Venezuela*) that had MMR1 coverage less than 80% (5) (Figure 2).

Between 2020 and 2021, vaccination coverage with the second dose of measles, mumps, and rubella (MMR2) vaccine decreased in 19 countries and territories in the Region of the Americas. The largest decrease was observed in 5 countries/territories: *Grenada, Chile, British Virgin Islands, Ecuador and Costa Rica*, respectively. In 2021, MMR2 coverage greater than or equal to 95% was not achieved in 29 countries and territories in the Region of the Americas, including 20 countries (*Antigua and Barbuda, Argentina, Barbados, Belize, Bolivia, Brazil, Chile, Costa Rica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Haiti, Honduras, Paraguay, Peru, Saint Lucia, Suriname, and Venezuela*) that had MMR2 coverage of less than 80% (5) (Figure 3).

**Figure 2.** Vaccination coverage with the first dose of measles, mumps, and rubella (MMR1) vaccine. Countries and territories of the Region of the Americas, 2012-2021.

Country/territory	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Antigua and Barbuda	85	89	93	96	99	88	91	93	96	98
Argentina	81	77	86	94	89	90	89	95	94	94
Bahamas	82	87	83	89	90	89	94	92	92	91
Barbados	77	89	92	85	92	92	96	95	87	90
Belize	79	82	96	97	90	95	96	95	99	96
Bolivia (Plurinational State of)	75	74	79	89	83	94	95	89	87	92
Brazil	73	79	91	92	91	95	96	97	98	99
Chile	92	91	95	93	93	93	96	97	90	90
Colombia	86	90	95	95	93	93	94	91	92	94
Costa Rica	89	95	95	94	96	93	93	95	91	90
Cuba	99	98	99	99	99	99	99	99	99	99
Dominica	92	92	92	84	77	96	96	94	93	99
Dominican Republic	88	82	96	91	86	85	90	88	83	88
Ecuador	65	81	83	83	81	86	84	85	97	96
El Salvador	86	71	82	81	85	90	95	95	94	93
Grenada	83	83	94	84	85	95	99	94	94	94
Guatemala	81	88	90	89	94	89	79	68	91	93
Guyana	94	98	98	98	99	99	99	99	99	99
Haiti	65	65	65	69	69	69	69	69	68	66
Honduras	81	82	89	91	98	98	98	97	97	97
Jamaica	88	93	94	89	95	95	91	92	94	93
Mexico	99	92	73	97	76	96	97	97	89	99
Nicaragua	83	97	99	99	99	99	99	99	99	99
Panama	80	80	97	98	98	95	93	90	92	98
Paraguay	68	80	87	93	92	85	78	84	88	88
Peru	78	77	85	85	83	88	92	89	85	94
Saint Kitts and Nevis	96	95	97	96	93	98	95	93	99	95
Saint Lucia	77	89	96	86	87	99	97	99	99	99
Saint Vincent and the Grenadines	99	99	99	99	99	99	99	99	99	94
Suriname	58	45	64	77	76	76	76	70	81	64
Trinidad and Tobago	93	91	99	90	93	86	89	96	91	85
Uruguay	96	95	96	97	96	95	96	96	96	96
Venezuela (Bolivarian Republic of)	68	76	93	74	96	88	92	89	85	87

<80%

80-89%

90-94%

>=95%

Source: WHO/UNICEF WUENIC vaccination coverage estimates. Available at: <https://bit.ly/3c2ZAEr>

**Figure 3.** Vaccination coverage with the second dose of measles, mumps, and rubella vaccine (MMR2). Countries and territories of the Region of the Americas, 2012-2021.

Country/ territory	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Antigua y Barbuda	76	80	80	95	95	68	84	99	87	90
Argentina	79	71	84	99	89	88	87	96	83	89
Bahamas	82	83	83	69	76	74	76	72	69	73
Barbados	70	78	77	74	77	87	89	91	89	90
Belize	77	87	95	91	88	96	95	92	92	93
Bolivia (Plurinational State of)	56	46	44	38						
Brazil	46	44	54	76	76	77	80	89	69	70
Chile	58	83	91	93	90	87	89	88	78	74
Colombia	86	88	89	88	89	87	86	88	72	80
Costa Rica	69	81	93	93	93	87	90	90	92	95
Cuba	99	99	99	99	99	99	99	98	97	96
Dominica	88	90	92	81	81	92	94	89	91	94
Dominican Republic	60	55	60	31						
Ecuador	58	70	76	74	73	64	76	59	70	81
El Salvador	71	56	87	85	86	87	88	85	85	95
Grenada	79	79	82	74	79	85	89	92	85	75
Guatemala	72	79	78	78	89	67				
Guyana	83	97	92	84	93	94	95	91	95	90
Haiti	41	41	41	38	25	26				
Honduras	75	79	85	94						
Jamaica	85	89	92	82	95	85	83	72	71	76
Mexico	97	79	55	99	62	98	96	95	76	92
Nicaragua	83	98	99	95	84					
Panama	97	97	97	99	93	93	92	90	68	72
Paraguay	67	72	83	83	82	87	72	76	76	75
Peru	60	52	66	66	66	66	63	44	54	63
Saint Kitts and Nevis	94	99	98	96	95	96	90	90	94	90
Saint Lucia	66	71	75	68	73	88	95	79	62	80
Saint Vincent and the Grenadines	99	99	99	99	99	99	99	98	96	92
Suriname	43	24	32	31	32	34	21	15	15	
Trinidad and Tobago	88	90	92	92	90	65	79	93	86	85
Uruguay	84	91	99	91	92	92	93	93	92	
Venezuela (Bolivarian Republic of)	37	28	13	39	59	53	52	50	38	33

<80%

80-89%

90-94%

>=95%

Source: WHO/UNICEF WUENIC vaccination coverage estimates. Available at: <https://bit.ly/3c2ZAEr>

## Poliovirus

In 2020, third dose coverage against poliomyelitis OPV or IPV (polio3) greater than or equal to 95% was not achieved in 28 countries/territories of the Region of the Americas and 17 countries had coverage of less than 80%: *Argentina, Bahamas, Bolivia, Brazil, Ecuador, El Salvador, Grenada, Guatemala, Haiti, Honduras, Mexico, Panama, Paraguay, Peru, Saint Lucia, Suriname and Venezuela* (5) (**Figure 4**).

Regional vaccination coverage for the third dose of polio vaccine (Polio3) in 2021 was 80%. The decline in coverage began before the pandemic; comparing to the coverage of 2018 and 2019, a decrease was observed in 20 of the 39 countries and territories of the Region. When comparing coverage between 2018 and 2021, coverage decreases in 33 of the 39 countries/territories. According to the information available for 2021, approximately 5.7 million children under 1 year of age (corresponding to 46% of the regional birth cohort) live in areas where coverage is <80% and 1.3 million of these children live in municipalities with coverage <50% (4) (**Figure 4**).

Declining mucosal immunity to type 2 virus among young children born after the switch (from tOPV to bOPV + IPV), added to low immunization coverage with IPV are contributing to the risk of an outbreak of cVDPV2.

Some countries have repeatedly reported coverage below 80% in some areas at the subnational level, increasing the risk of an emergence of a VDPV.

**Figure 4.** Vaccination coverage with the third dose of polio vaccine OPV or IPV (polio3). Countries and territories of the Region of the Americas, 2012-2021.

Country/territory	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Antigua and Barbuda	92	95	95	94	94	87	86	96	98	97
Argentina	74	74	83	84	84	87	93	92	90	90
Bahamas	75	83	89	90	94	94	95	96	97	99
Barbados	84	85	91	94	91	97	97	95	91	88
Belize	83	79	98	96	88	96	94	95	95	98
Bolivia (Plurinational State of)	70	68	75	83	83	87	88	85	88	93
Brazil	68	74	85	85	75	72	98	96	96	96
Chile	95	93	96	95	93	95	96	95	90	90
Colombia	86	88	94	92	92	91	91	90	91	91
Costa Rica	99	96	94	96	96	97	92	91	95	90
Cuba	98	98	99	99	98	98	99	99	99	98
Dominica	92	96	99	94	91	99	98	97	96	97
Dominican Republic	83	80	92	86	80	82	87	90	82	85
Ecuador	62	72	85	85	83	79	84	84	87	85
El Salvador	79	69	81	83	89	95	92	93	92	93
Grenada	72	72	94	96	91	98	99	81	98	98
Guatemala	67	72	73	74	79	73	69	55	83	94
Guyana	80	91	97	94	94	94	92	97	98	97
Haiti	51	51	64	64	64	64	64	63	64	66
Honduras	77	80	88	91	90	95	98	99	99	98
Jamaica	90	95	96	98	93	99	91	93	86	96
Mexico	78	72	82	88	85	93	87	87	83	99
Nicaragua	88	93	99	99	99	99	99	99	99	99
Panama	74	74	88	88	81	86	72	80	81	87
Paraguay	66	78	84	88	92	93	93	93	89	89
Peru	79	72	87	83	83	88	88	78	71	94
Saint Kitts and Nevis	96	99	97	98	97	99	91	96	97	98
Saint Lucia	75	88	91	95	80	95	99	99	99	98
Saint Vincent and the Grenadines	99	99	99	99	99	99	99	97	97	96
Suriname	72	51	76	81	51	77	78	76	78	79
Trinidad and Tobago	94	93	93	99	94	84	88	94	94	91
Uruguay	89	91	93	91	93	95	95	95	94	95
Venezuela (Bolivarian Republic of)	50	62	62	53	79	82	87	79	82	73

<80%

80-89%

90-94%

>=95%

Source: WHO/UNICEF WUENIC vaccination coverage estimates. Available at: <https://bit.ly/3c2ZAEr>

## Yellow fever

Between 2019 and 2021, yellow fever vaccine coverage decreased in 10 of the 13 countries and territories with yellow fever endemic areas in the Region of the Americas. Regional coverage levels of yellow fever vaccine were not optimal prior to the COVID-19 pandemic; however, the decline was accentuated, which in turn increased the accumulation of those susceptible in all endemic countries. In 2021, none of the endemic countries achieved yellow fever vaccine coverage greater than or equal to 95% and only two countries had coverage greater than 90%. Additionally, 9 countries had yellow fever vaccine coverage of less than 80%: *Argentina, Bolivia, Brazil, Ecuador, Panama, Paraguay, Peru, Suriname, and Venezuela* (5) (Figure 5).

**Figure 5.** Vaccination coverage with yellow fever vaccine. Countries and territories of the Region of the Americas\*, 2012-2021.

Country/territory	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Argentina	6	8	8	7	6	6	5	7	7	8
Bolivia (Plurinational State of)	71	72	77	84	82	89	88	73	83	90
Brazil	58	57	60	58	55	43	46	47	45	42
Colombia	86	84	90	87	88	77	85	92	92	92
Ecuador	70	79	84	85	84	81	78	86	73	74
Guyana	93	95	94	96	99	99	99	99	99	99
Panama	5	5	7	6	6	6	5	5	4	5
Paraguay	74	87	92	99	99	99	93	85	97	87
Peru	61	50	57	65	63	64	67	65	64	58
Suriname	61	44	57	63	67	61	68	61	58	55
Trinidad and Tobago	91	89	98	88	95	85	91	96	89	85
Venezuela (Bolivarian Republic of)	75	82	80	35	83	84	85	82	85	87

<80%
80-89%
90-94%
>=95%

\* In Argentina and Panama, the indication for the application of the yellow fever vaccine applies only to risk areas.

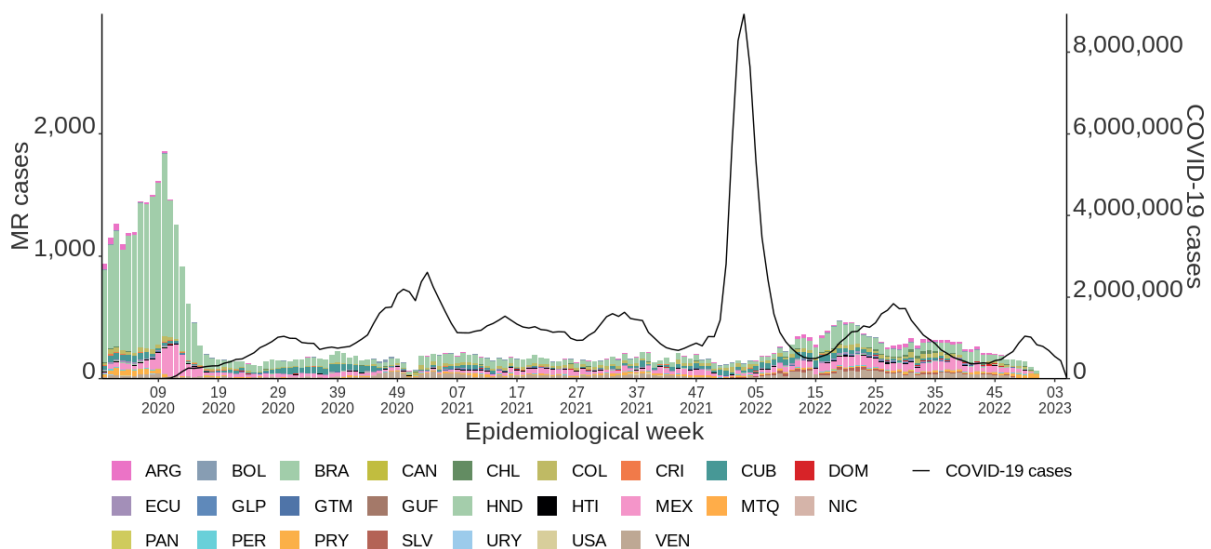
Source: WHO/UNICEF WUENIC vaccination coverage estimates. Available at: <https://bit.ly/3c2ZAEr>

## Surveillance indicators

### Integrated measles/rubella surveillance indicators

Several factors have contributed to the occurrence of measles outbreaks in the Region of the Americas between 2017 and 2022, including the absence of a rapid response to imported cases, vaccination coverage below 95% with MMR1 and MMR2, and gaps in the performance of international indicators for integrated measles and rubella (MR) surveillance. Between 2020 and 2022, there has been a significant decrease in the notification of suspected cases of MR in the Region of the Americas, evidencing the impact of the COVID-19 pandemic on this surveillance indicator. According to the information published in the PAHO/WHO, Weekly Bulletin - Measles-Rubella-Congenital Rubella Syndrome (available at: <https://bit.ly/3YWqXXL>), the performance of the surveillance system decreased due to the priority given to surveillance and response to the COVID-19 pandemic. As a result, countries and territories that have not yet optimally re-established surveillance may not be able to detect and control an outbreak in a timely manner (Figure 6).

**Figure 6.** Impact of the COVID-19 pandemic on the notification of suspected cases of measles and rubella (MR) in the Region of the Americas by epidemiological week (EW) and country/territory, EW 1 2020 to EW 52 of 2022



Source: PAHO/WHO, Weekly Bulletin - Measles-Rubella-Congenital Rubella Syndrome. Available in: <https://bit.ly/3YWqXXL>

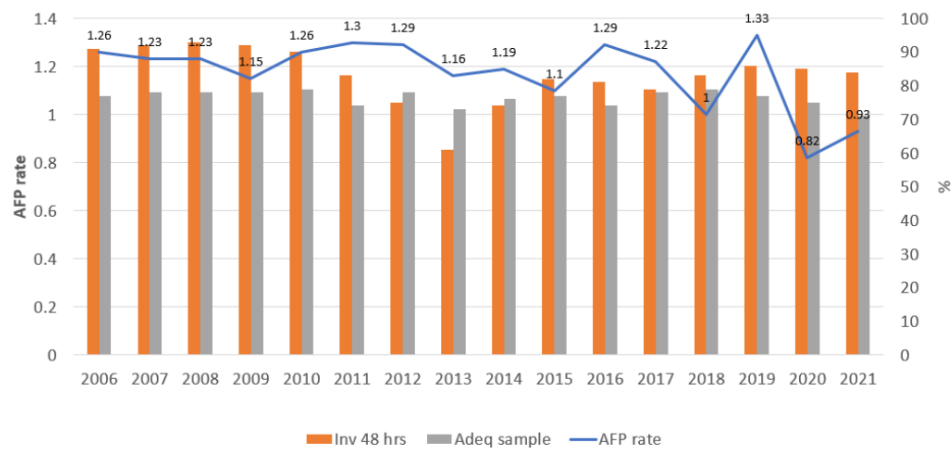


## AFP Notification Rate

Between 2006 and 2018, the performance of the AFP notification rate had been higher than the regional target of 1 case per 100 000 children under 15 years of age; however, since 2020, the indicator has been below the target. The adequate sample indicator has not met the target for many years; however, the current trend could be influenced by the impact of the COVID-19 pandemic, due to the low reporting of AFP cases; the 48-hour research indicator has been met (4) (Figure 7). Since 2019, surveillance performance has been affected in six countries and suboptimal performance has been maintained in 3 countries and the Caribbean subregion (4) (Figure 8).

Some countries are not following up for AFP cases for 60 days, which is a major concern, particularly for cases where adequate stool sampling was not obtained.

Figure 7. AFP surveillance indicators. Region of the Americas, 2006-2021\*



\*2021 Preliminary data

Source: PAHO/WHO. 14th Meeting of the Regional Certification Commission (RCC) on Polio Eradication in the Region of the Americas. Report of the meeting. Available in: <https://bit.ly/3xSDIXa>

Figure 8. Overall AFP surveillance performance, Region of the Americas, 2019-2021



Source: PAHO/WHO. 14th Meeting of the Regional Certification Commission (RCC) on polio eradication in the Region of the Americas. Report of the meeting. Available at: <https://bit.ly/3xSDIXa>

## Effects of concurrent Public Health Emergencies of International Concern (PHEIC) (COVID-19, Mpox, Polio) on health systems and services over the past 3 years:

- Chronic challenges of health systems have been accentuated, such as fragmentation, inequity in access to comprehensive health services, deficit of health workers, inequitable access to health technologies, limited capacities for essential public health functions (EPHF), infection prevention and control (IPC) programs with insufficient funding, and limited compliance with IPC practices.
- The continuity of essential services provided at the first level of care has been limited, mainly in peri-urban and rural areas and in indigenous populations.
- Fluctuation in demand for vaccination services.
- Postponement of vaccination campaigns.
- Negative impact on social and economic action.

## Vulnerable Populations and Indigenous Communities:

- Migration within the Region of the Americas and from other regions has increased, due to social, political, and economic crises in countries and territories.
- Populations of indigenous communities are particularly susceptible to developing diseases due to various barriers in access to health care and vaccines. Therefore, they have an increased risk of becoming ill and developing life-threatening complications.
- Unvaccinated children under 5 years of age, school-age children, pregnant women, health workers, military service personnel, inmates and persons who, by the nature of their occupation, are in contact with large numbers of people on a daily basis.

**Table 1: Strengths and vulnerabilities of the countries and territories of the Region of the Americas by Subregion related to vaccine-preventable diseases (VPDs), February 2023.**

Southern Cone Subregion <sup>12</sup>
<b>Strengths</b>
<ul style="list-style-type: none"> <li>• DTP3 vaccination coverage for 2021 is above 80% in 2 countries. DTP3 vaccination coverage for 2021 has increased in 2 countries compared to 2020 coverage (5).</li> <li>• MMR1 vaccination coverage for 2021 is above 80% in 3 countries and is equal to or greater than 95% in 1 country. MMR1 vaccination coverage for 2021 has increased in 3 countries compared to 2020 coverage (5).</li> <li>• MMR2 vaccination coverage for 2021 has increased in 2 countries compared to 2020 coverage (5).</li> <li>• Polio3 vaccination coverage for 2021 is above 80% in 2 countries and is equal to or greater than 95% in 1 country (5).</li> <li>• In 2022, as of EW 52, 4 of the 5 countries of the Subregion (<i>Argentina, Brazil, Chile, and Paraguay</i>), the number of AFP cases reported is above the expected number (6).</li> <li>• Two countries in the subregion (<i>Argentina and Paraguay</i>) have implemented follow-up vaccination campaigns against measles, rubella, and polio, which have reduced population immunity gaps. However, contingency plans are still required in countries whose campaigns have not reached 95% coverage at national and subnational levels (10).</li> <li>• Three countries of the subregion (<i>Argentina, Brazil and Paraguay</i>) conducted the measles and rubella reintroduction risk analysis workshop and have the risk map at the municipal level to implement vaccination, surveillance and rapid response interventions in the municipalities most at risk (10).</li> </ul>
<b>Vulnerabilities</b>
<ul style="list-style-type: none"> <li>• Between 2020 and 2021, DTP3 coverage decreased in 3 out of 5 countries; coverage greater than or equal to 95% was achieved in one of the 5 countries (5).</li> <li>• Between 2020 and 2021, MMR1 vaccination coverage decreased in 2 of the 5 countries. MMR2 vaccination coverage decreased in 3 of the 5 countries (5).</li> <li>• In 2021, MMR1 coverage greater than or equal to 95% was not achieved in 4 of the 5 countries. In 2021, MMR2 coverage greater than or equal to 95% was not achieved in any of the 5 countries (5).</li> </ul>

<sup>12</sup> Argentina, Brazil, Chile, Paraguay, and Uruguay.

- Between 2020 and 2021, Polio3 vaccination coverage declined in 3 of the 5 countries. In 2020, Polio3 coverage greater than or equal to 95% was only achieved in one of the 5 countries (5).
- In 2022, only one country in the subregion maintained or performed well in measles/rubella (SR) epidemiological surveillance; however, it did not meet the minimum threshold<sup>13</sup> for reporting rate of suspected cases of MR (10).
- Health systems and epidemiological surveillance systems overburdened by public health events occurring simultaneously.
- Migratory movements and challenges in reaching unvaccinated immigrants.
- Exposure of vulnerable populations.
- Overcrowding in temporary and residential shelters, rural and peri-urban areas; challenges in the implementation of prevention and control measures.
- Challenges to maintain the cold chain in rural and peri-urban areas.

## Andean Subregion<sup>14</sup>

### Strengths

- Between 2020 and 2021, DTP3 coverage increased in 3 of the 5 countries (5).
- MMR1 vaccination coverage for 2021 is above 80% in 1 of the 5 countries (5).
- MMR2 vaccination coverage for 2021 is above 80% in 1 of the 5 countries (5).
- In 2022, up to EW 52, in 3 of the 5 countries of the Subregion (*Bolivia, Colombia and Venezuela*), the number of AFP cases reported is above the expected number (6).
- Three countries of the subregion (*Bolivia, Colombia, and Venezuela*) have implemented follow-up vaccination campaigns against measles, rubella, and polio that have reduced population immunity gaps. However, contingency plans are still required in countries who did not reach 95% coverage at the national and subnational levels (10).
- Four countries of the subregion (*Bolivia, Ecuador, Peru and Venezuela*) conducted the measles and rubella reintroduction risk analysis workshop, in addition to having the risk map at the municipal level to implement vaccination, surveillance and rapid response interventions in the municipalities most at risk (10).

### Vulnerabilities

- Between 2020 and 2021, DTP3 coverage decreased in 2 of the 5 countries, any of the 5 countries of the subregion reached coverage greater than or equal to 95% (5).
- Between 2020 and 2021, MMR1 vaccination coverage decreased in 3 of the 5 countries and MMR2 vaccination coverage decreased in 2 of the 5 countries. In 2021, any of the 5 countries of the subregion achieved MMR1 and MMR2 coverage greater than or equal to 95% (5).
- Between 2020 and 2021, polio3 vaccination coverage decreased in 3 of the 5 countries. In 2021, any of the 5 countries achieved polio3 coverage greater than or equal to 95% (5).
- The number of AFP cases reported to EW 52 in 2022 is below the number expected in 2 of the countries of the Subregion (6).
- In 2022, only two countries in the subregion (*Colombia and Venezuela*) maintained a good performance of MR epidemiological surveillance; however, they did not meet the minimum threshold for the annual reporting rate of suspected cases of MR (10).
- Indigenous communities that move along the border between Brazil, Colombia, and Venezuela.
- Health systems and epidemiological surveillance systems overburdened by public health events occurring simultaneously.
- Migratory movements and challenges in reaching unvaccinated immigrants.
- Exposure of vulnerable populations.
- Overcrowding in temporary and residential shelters, rural and peri-urban areas; challenges in the implementation of prevention and control measures.
- Challenges to maintain the cold chain in rural and peri-urban areas.

## North America Subregion<sup>15</sup>

### Strengths

- DTP3 vaccination coverage for 2021 is equal to or greater than 90% in the two countries (5).
- MMR1 vaccination coverage for 2021 is at or above 90% in the two countries (5).
- Polio3 vaccination coverage for 2021 is at or above 90% in the two countries (5).

### Vulnerabilities

- MMR2 vaccination coverage is below 90% in one of the countries (5).
- In 2022, one of the countries identified a circulating vaccine-derived poliovirus type 2 (cVDPV2) case (3).
- In 2022, two of the countries identified vaccine-derived poliovirus type 2 (VDPV2) in wastewater samples (3).

<sup>13</sup> The minimum threshold for the annual rate of suspected measles and rubella cases nationwide is  $\geq 2$  per 100,000 population. In case the administrative unit has a population  $< 100,000$ , it is expected to be notified annually by at least 1 suspected case. *Annex 2. Surveillance indicators for measles, rubella and congenital rubella syndrome*. Available at: <https://bit.ly/3ZcsF7D>

<sup>14</sup> Bolivia, Colombia, Ecuador, Peru, and Venezuela

<sup>15</sup> United States of America and Canada.

- In 2022, as of EW 52, the number of AFP cases reported is below the number expected in one of the countries of the Subregion (6).
- Migratory movements.

## Latin Caribbean Subregion<sup>16</sup>

### Strengths

- MMR1 and MMR2 vaccination coverage for 2021 is above 95% in one (*Cuba*) of the two countries (5).
- DTP3 and Polio3 vaccination coverage for 2021 is above 95% in one of the two countries (5).
- In 2022, as of EW 52, in one of the countries of the Subregion (*Cuba*), the number of AFP cases reported is above the expected number (6).
- In 2022, one of the countries in the subregion (*Cuba*) reached the recommended value for the reporting rate of suspected cases of MR (10).
- In 2022, one of the countries in the subregion (*Dominican Republic*) had successfully implemented its follow-up vaccination campaign against measles, rubella and polio, which has reduced population immunity gaps, reaching 97% nationwide and still continues with documented sweeps to further reduce immunity gaps (10).
- One of the countries of the subregion (*Dominican Republic*) conducted the measles and rubella reintroduction risk analysis workshop and has the risk map at the municipal level to implement vaccination, surveillance and rapid response interventions in the municipalities most at risk (10).

### Vulnerabilities

- The number of AFP cases reported as of EW 52 of 2022 is below the expected number in one country (6).
- In 2022, one of the countries in the subregion (*Dominican Republic*) did not reach the minimum threshold for the annual notification rate of suspected cases of MR (10).
- Health systems and epidemiological surveillance systems overburdened by public health events occurring simultaneously.
- One of the countries is experiencing an active cholera outbreak.
- Social, economic, and political crisis in a border country.
- Migratory movements.

## Non-Latin Caribbean Subregion<sup>17</sup>

### Strengths

- Three countries in the subregion (*Saint Kitts and Nevis, Monserrat and Saint Vincent and the Grenadines*) achieved coverage with MMR1  $\geq 95\%$ .
- DTP3 vaccination coverage for 2021 is above 80% in 8 countries/territories (5).
- MMR1 vaccination coverage for 2021 is above 80% in 9 countries/territories (5).
- MMR2 vaccination coverage for 2021 is above 80% in 6 countries/territories (5).
- Polio 3 vaccination coverage for 2021 is above 80% in 7 countries/territories (5).

### Vulnerabilities

- Diphtheria is considered endemic in one of the countries of the Subregion (3).
- Between 2020 and 2021, DTP3 coverage decreased in 9 countries/territories (5).
- Between 2020 and 2021, MMR1 vaccination coverage decreased in 9 countries/territories. In 2021, MMR1 coverage greater than or equal to 95% was only achieved in 2 countries/territories (5).
- Between 2020 and 2021, MMR2 vaccination coverage decreased in 9 countries/territories. In 2021, MMR2 coverage greater than or equal to 95% was only achieved in one of the countries/territories (5).
- Between 2020 and 2021, Polio3 vaccination coverage decreased in 8 countries/territories. In 2021, Polio3 coverage greater than or equal to 95% was only achieved in two of the countries/territories (5).
- Countries and territories in this subregion did not meet the minimum threshold for the reporting rate of suspected RS cases, reaching 0.3 cases per 100 000 population (10).
- Health systems and epidemiological surveillance systems are overburdened by other public health events occurring simultaneously.
- One of the countries is experiencing an active cholera outbreak.
- Social, political, and economic crisis in one of the countries.
- Migratory movements.

<sup>16</sup> Cuba, Dominican Republic, and Puerto Rico.

<sup>17</sup> Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Bermuda, Bonaire, British Virgin Islands, Cayman Islands, Curacao, Dominica, French Guiana, Grenada, Guadeloupe, Guyana, Haiti, Jamaica, Martinique, Montserrat, Saba Saint Barthélemy, Saint Lucia, Saint Kitts and Nevis, Sint Eustatius, Saint Martin, Sint Maarten, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Turks and Caicos, and United States Virgin Islands.

## Central American Isthmus and Mexico Subregion <sup>18</sup>

### Strengths

- Between 2020 and 2021, DTP3 coverage increased in 4 of the 8 countries (5).
- MMR1 vaccination coverage for 2021 is above 80% in 6 of the 8 countries (5).
- In 2022, as of EW 52, in 6 of the countries of the subregion (*El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Panama*), the number of AFP cases reported is equal to or above the expected number (6).
- Four countries in the subregion (*El Salvador, Honduras, Mexico, and Nicaragua*) implemented follow-up vaccination campaigns against measles rubella and polio that have reduced population immunity gaps. However, contingency plans are still required in countries whose campaigns did not reach 95% at the national and subnational levels (10).
- In 2022, a total of 3 countries in the subregion (*El Salvador, Guatemala, and Honduras*) implemented the risk analysis for measles and rubella reintroduction at the municipal level using PAHO's methodology (10).

### Vulnerabilities

- Between 2020 and 2021, DTP3 coverage decreased in 2 of the 8 countries. In 2021, in 7 countries of the subregion coverage greater than or equal to 95% was not reached (5).
- Between 2020 and 2021, MMR1 and MMR2 vaccination coverage decreased in 5 of the 8 countries. In 2021, MMR1 coverage greater than or equal to 95% was not achieved in 7 of the 8 countries (5). In 2021, MMR2 coverage greater than or equal to 95% was not reached in 6 out of 8 countries (5).
- Between 2020 and 2021, Polio3 vaccination coverage decreased in 3 out of 8 countries. In 2021, polio3 coverage greater than or equal to 95% was not achieved in 7 out of 8 countries (5).
- In 2022, only two countries in the subregion (*El Salvador and Nicaragua*) reached the minimum threshold for the reporting rate of suspected cases of MR (10).

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<sup>18</sup> Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama.