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on Vaccine-preventable Diseases**

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## Introduction

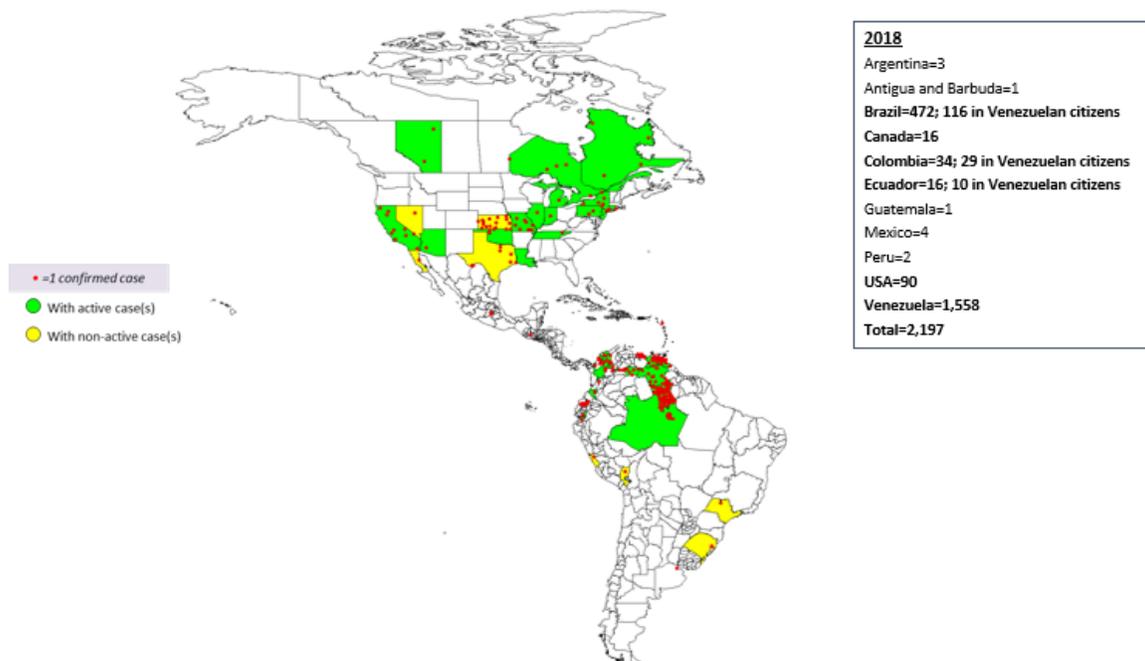
On 10 July 2018, PAHO convened an extraordinary meeting of its Technical Advisory Group (TAG) on Vaccine-preventable Diseases to discuss the grave situation concerning measles in the Americas and the implementation of recommendations from PAHO's TAG made in March 2018. As of 30 June 2018, measles transmission in Venezuela has been ongoing for over one year. Therefore, endemic transmission of measles is considered to have been reestablished in Venezuela. This situation calls for regional action and an urgent public health response to achieve and sustain the elimination of measles, rubella and congenital rubella syndrome in the Americas. There is also a pressing need for clear guidance on the requirements for the re-verification of measles elimination for countries that have reestablished endemic transmission. This guidance should be part of a new regional framework aiming to regulate the post-verification phase. Additionally, an update was provided to TAG members on the status of yellow fever, polio, and diphtheria, which were also addressed during the previous ad hoc meeting.

## Update on the Epidemiological Measles Situation and Implications for Measles Elimination in the Americas

### Epidemiological Situation

From 1 January to 30 June 2018, a total of 2,197 measles cases were confirmed in the Region of the Americas. Measles outbreaks are ongoing in six countries: Brazil (n=472); Canada (n=16); Colombia (n=34); Ecuador (n=16); United States (n=90) and Venezuela (n=1,558) (**Figure 1**). Eleven countries have reported measles outbreaks in 2018 compared to only four countries in 2017.

**Figure 1. Ongoing (active) and past (non-active/interrupted) outbreaks in the Americas, 2018\***



Sources: Surveillance country reports sent to PAHO/WHO's Comprehensive Family Immunization unit and by the Ministry of Popular Power of Venezuela.

\*Data as of epidemiological week 26-2018.

In **Venezuela**, measles has spread to 21 of the 23 states and to the Capital District, also known as the federal district. Between epidemiological week (EW) 26 of 2017, when the first confirmation of a measles case occurred in the state of Bolivar, and EW 22 of 2018, 2,285 confirmed measles cases were reported in Venezuela: 727 (32%) in 2017 and 1,558 (68%) in 2018 (**Figure 1**). The Capital District (Caracas) reported 59% of the confirmed cases in 2018, followed closely by Delta Amacuro, the second most affected state. The highest proportion of cases occurred among children under five years of age followed by children six–15 years of age. At the national level, 35 deaths were reported, 33 (94%) were from the state of Delta Amacuro, where cases have been reported since EW 33 of 2017. Additional deaths in Delta Amacuro are under investigation. Delta Amacuro borders Guyana and 25% of its population consists of indigenous Warao communities. Other local sources of information indicate that the Yanomami communities in the municipality of Alto Orinoco and the state of Amazonas, which border Roraima in Brazil, have also been affected by measles. It is important to highlight that Delta Amacuro is a remote area

of 40,200 km<sup>2</sup> located in the Orinoco Delta. Most of its indigenous populations live in isolated areas only accessible by hours-long water transport. This situation has increased the costs of implementing control measures for measles, malaria and other disease outbreaks. The lack of electricity, which affects 80% of Amazonas, poses an additional challenge to disease containment efforts.

The risk of spread within and outside Venezuela remains very high due to the continuous movement of population across the borders with Brazil and Guyana, as well as other factors, including the delayed implementation of control measures, absence of a national health alert, inadequate surveillance and case investigation, low capacity for isolation and case management. Additionally, insufficient vaccination coverage levels among certain birth cohorts have resulted in large pockets of susceptible populations. The ongoing outbreak in Venezuela represents a threat to the other countries of the Americas. Most of PAHO's Member States (30/35) reported their last endemic case before the year 2000, i.e. over 18 years ago.

On 22 June 2018, Venezuela's Ministry of Health expressed its willingness to intensify vaccination campaigns in the states with the highest proportion of measles cases and expand efforts nationwide, targeting children six months to 15 years of age. Special tactics and strategies will be implemented to reduce measles virus exportation to neighboring countries while achieving a homogeneous coverage of  $\geq 95\%$ . Although PAHO has been providing the Minister of Health with political, technical, financial and logistic support since the beginning of the measles outbreak, endemic transmission has been re-established in Venezuela since 30 June 2018, which corresponds to 12 months of continuous measles virus circulation.

Since the beginning of the outbreak in Venezuela, the measles cases identified in Colombia, Brazil and Ecuador have been confirmed to belong to the same genotype and clade as the cases previously detected in Venezuela. No measles cases have been confirmed in Guyana to date. The country has enhanced its measles and rubella surveillance and vaccination efforts as part of preparedness and response, including the areas bordering Venezuela and Brazil. With support from the PAHO office in Guyana, the country recruited additional staff to perform daily surveillance, conduct mop-up vaccination for those living in border communities and vaccinate individuals coming from Venezuela. Guyana also put provisions in place for the timely shipment of samples by courier service to the Caribbean Public Health Agency (CARPHA).

**In Brazil**, 472 measles cases have been confirmed since February 2018, a period of five months. The outbreak continues, with an increasing number of confirmed cases in Roraima (n=200) and Amazonas (n=265). At least 1,864 suspected cases are under investigation; 88% of which have been reported in Amazonas. Additionally, one highly suspected measles case was reported in the state of Rondônia, which borders southern Amazonas. Of 465 confirmed measles cases with available data on age, the highest proportion of cases (47%) occurred among children less than five years of age. 345 of the 472 (72%) confirmed cases were Brazilian citizens. Therefore, Brazil is at high risk of measles virus spread to the other federal states if more aggressive control measures are not taken, especially in Roraima and Amazonas. **Table 1** summarizes the measles epidemiological situation by federal state in Brazil, as of EW 26 2018.

**Table 1. Distribution of Confirmed Measles Cases by Federal State in Brazil, 2018**

Federal State	No. of Confirmed Cases (%)	Outbreak-related?
Amazonas	265 (56.2)	Yes, an outbreak in Venezuela; genotype D8

Roraima	200 (42.4)	Yes, an outbreak in Venezuela; genotype D8
Rio Grande do Sul	5 (1)	Yes, an outbreak in Venezuela; pending genotype
Rio Grande do Sul	1 (0.2)	No, an isolated case with travel history to Europe; genotype B3.
São Paulo	1 (0.2)	No, an isolated case with travel history to Lebanon; genotype D8.
<b>Total</b>	<b>472 (100)</b>	

In **Colombia**, between EW 11 and 26 2018, 34 measles cases were confirmed; 22 (65%) were imported from Venezuela, i.e. were individuals who crossed the Venezuela-Colombia border prior to or during their communicable period, seven (21%) were Venezuelan secondary cases residing in Colombia for at least four months with unknown vaccination history, two (6%) were Colombian citizens and three (9%) had no information on nationality. Thirteen of 32 (41%) departments reported confirmed cases. The Departments of Norte De Santander and Sucre reported the highest proportion of cases (48%). Moreover, a high proportion of the confirmed cases (74%) were young children less than five years of age.

In **Ecuador**, between EW 13 and 23 2018, 15 measles cases were confirmed. The cases were reported in Quito (eleven cases; 73% of the cases), Tulcán, located in the border area with Colombia (two cases), Riobamba (one case), and Cuenca (one case). Six (40%) of the cases were epidemiologically linked to the cases previously identified in Quito's southern sector. Eleven (73%) of the cases were male. The age of cases ranged from four months to 44 years. Eleven (73%) of the cases were imported from Venezuela. The genotypes of the viruses are being identified.

#### **PAHO Response**

The main actions taken by PAHO have been directed at supporting Venezuela, Brazil, Colombia and Ecuador. This was done through high-level political advocacy with the countries' Ministers of Health and Presidents, training in rapid public health response, deploying international consultants to support field activities, providing laboratory reagents, vaccines and other supplies, and mobilizing resources to cover operational costs of vaccination activities. The specific actions included:

- High-level advocacy and a face-to-face meeting between PAHO's Director and Venezuelan President Nicolás Maduro to discuss the emergency on 12-13 June 2018.
- PAHO/WHO presented an update on the situation in Venezuela and the neighboring Member States, as well as a plan to maintain an effective technical cooperation agenda during the 162<sup>nd</sup> session of the Executive Committee held in Washington, DC in June 2018.
- The Executive Committee urged Venezuela to urgently develop and implement a plan of action to stop measles and diphtheria transmission and recommended that all countries invest in and prioritize vaccination coverage reaching at least 95% in all municipalities and communities, as well as address outbreaks of vaccine-preventable diseases.
- Four PAHO regional advisors in immunization have been repeatedly deployed to support Venezuela, Guatemala, Haiti, Ecuador and Brazil since September 2017 for technical assistance and to maintain visibility of the epidemiological alerts at the highest political level.
- The PAHO regional immunization team closely monitors the current measles and diphtheria outbreaks through regular meetings and communication with the country immunization focal points.

- Strong advocacy for resource mobilization with the Measles and Rubella Initiative resulted in the donation of 2.7 million doses of measles-rubella-containing vaccines to support implementation of the vaccination plan in Venezuela. Negotiations with strategic partners are ongoing to mobilize additional financial resources for Venezuela and to cover expenses from the scheduled nationwide campaign.
- Two sub-regional workshops on rapid responses to measles outbreaks were conducted in 2017 with participation from all Spanish-speaking countries in the Region. A similar sub-regional training is programmed for the English-speaking Caribbean countries in October 2018. Ten equivalent national workshops were funded in Central and South America.
- PAHO's Comprehensive Family Immunization Unit (IM) has mobilized funds to finance the Plan of Action for the sustainability of measles and rubella elimination in many countries, raising more than USD \$500,000.
- IM has mobilized additional funding (approximately USD \$150,000) to support vaccination and surveillance activities in countries neighboring Venezuela, such as Colombia and Brazil.
- PAHO is working on four new technical resources that should be available in the next two months for use at the country level including 1) a *risk assessment tool for measles and rubella outbreaks*; 2) a *manual for measles/rubella outbreaks rapid response*; 3) a *case study for measles/rubella outbreak response training* and 4) a *manual for rapid monitoring of vaccination coverage*.

#### **Regional Framework for the Post-Verification of Measles Elimination Era**

In 2016, the International Expert Committee for Documenting and Verifying Measles, Rubella, and Congenital Rubella Syndrome declared the Region of the Americas free of measles. During the same year, the Americas reported 93 confirmed measles cases, none of which represented endemic transmission, with a regional incidence of 0.07 cases per million people, the lowest rate ever recorded. During the 29th Pan American Sanitary Conference in September 2017, the Ministers of Health approved a Plan of Action for the sustainability of measles, rubella, and congenital rubella syndrome (CRS) elimination, for the period 2018-2023, with the purpose of protecting this important public health gain.

While it was hoped that this achievement would be sustained, a measles outbreak has been ongoing since July 2017 in Venezuela. This outbreak has lasted more than twelve months and has resulted in the re-establishment of endemic transmission in the country.

In the *"Plan of Action for the documentation and verification of the measles and rubella elimination"* published in 2011, the geographical unit for the documentation of the interruption of endemic transmission was defined as the entire Region instead of individual countries. All PAHO Member States made considerable efforts to document and verify the interruption of endemic transmission of measles and rubella viruses in their territories during 2011–2016.

#### **Global Framework for the Post-Verification of Measles Elimination Era**

In 2017, SAGE endorsed WHO's update of the four categories used to classify countries as they progress towards measles and rubella elimination:

- 1) **Endemic:** Countries with continuous transmission of the measles and/or rubella virus that persists for  $\geq 12$  months in any defined geographical area and no previous verification of elimination.
- 2) **Eliminated/interrupted, but not verified:** Countries where there is an absence of endemic transmission for  $\geq 12$  months but  $< 36$  months in the presence of a high-quality surveillance system.
- 3) **Eliminated and verified:** Countries that have had no endemic transmission for  $\geq 36$  months.

- 4) **Re-established endemic transmission post-verification:** Countries that have evidence indicating the presence of a chain of transmission of a virus strain that continues uninterrupted for  $\geq 12$  months in a defined geographical area (region or country) following previous verification of elimination.

Countries with re-established endemic transmission post-verification would need to demonstrate again that they have no endemic transmission for  $\geq 36$  months in the presence of a high-quality surveillance system to be classified as measles-free and consequently verified as such.

To address this important topic, TAG recommended in March 2018 during an ad hoc meeting, to convene an expert group for the sustainability of measles, rubella and CRS elimination in the Region of the Americas with two main objectives:

1. Monitoring the sustainability of the elimination of measles, rubella, and CRS in the Region through its fulfillment of the objectives and indicators outlined in the regional plan of action for sustainability;
2. Developing or updating a regional framework for the Americas, to monitor the absence of endemic measles transmission in the Americas, as well as actions to take in the event of the re-establishment of endemic transmission.

The terms of reference of this expert group were presented to PAHO's Director and the proposed members are pending official designation. The immediate issues that the expert group will address include:

1. If the endemic transmission is re-established in one country, does the entire Region lose its measles, rubella or CRS elimination status?
2. If endemic measles or rubella transmission in a country or in the Region is re-established, what should be the criteria and process for the re-verification of measles, rubella or CRS elimination?

The PAHO secretariat proposed three scenarios to initiate discussions on the topic:

1. **Scenario 1:** If one country in the Americas loses its status as free of endemic measles following  $\geq 12$  months of ongoing virus transmission, **the 35 Member States of the Americas would lose their status as well.** In this situation, the Americas **would follow the guidelines of the "Plan of Action for the documentation and verification of measles, rubella and CRS elimination in the Region of the Americas" developed in 2011.**
2. **Scenario 2:** If one country in the Americas loses its status as free of endemic measles following  $\geq 12$  months of ongoing transmission (e.g. Venezuela), this country will be classified as a country that **"Re-established endemic transmission post-verification," according to the new WHO global framework.** To be re-verified, the affected country would have to demonstrate that transmission was interrupted for at least three years following the last known endemic case, in the presence of high-quality surveillance. The remaining 34 Member States of the Americas would maintain their status of elimination-verified. However, the Region could no longer be considered free of measles.
3. **Scenario 3:** If more than one country has reestablished endemic transmission with the same or a different virus genotype, the whole Region would lose its verification status. To be re-verified, all Member States would need to demonstrate interruption of endemic measles transmission for a

period of at least three years following the last known endemic case, in the presence of high-quality surveillance. In this case, **a new regional framework** would be developed to further provide guidance on the re-verification process.

The table below summarizes the proposed scenarios:

	<b>Scenario 1</b>	<b>Scenario 2</b>	<b>Scenario 3</b>
<b>Country</b>	Re-establishment of endemic measles transmission in one country	Re-establishment of endemic measles transmission in one country	Re-establishment of endemic measles transmission in more than one country
<b>Region</b>	All 35 Member States of the Region would lose the elimination status	The remaining 34 (non-affected) Member States of the Region would maintain the elimination status	All 35 Member States of the Region would lose the elimination status
<b>Action</b>	The <b>entire Region</b> would undergo re-verification as per the 2011 <b>Plan of Action</b>	The <b>affected country</b> would undergo re-verification, at least 3 years following the last endemic case	The entire Region would undergo re-verification following a <b>new regional framework</b>

### Conclusion

In view of the re-establishment of measles endemic transmission in Venezuela since 30 June 2018, the Region of the Americas is no longer considered free of measles. To provide guidance on the requirements and process for measles elimination re-verification, TAG reviewed the three scenarios proposed by the PAHO secretariat and opted for scenario two. Nevertheless, TAG emphasized that there should be regional action, including careful monitoring of vaccination coverage, as well as thorough risk assessment.

TAG agreed that the expert group should examine the question with more depth and define the elements of the re-verification process under scenario two. TAG urged the expert group to convene its first meeting promptly to begin adapting or developing a framework for the re-verification of measles elimination. TAG members agreed that the essential criteria of the 2011 Plan of Action shall be maintained, including the interruption of endemic measles for at least three years following the last known confirmed case, the presence of high-quality surveillance and the absence of endemic measles virus strains evidenced through viral surveillance. The PAHO secretariat shall organize high-level country visits of the expert group to high-risk countries, such as Venezuela and Brazil, to advocate for urgent public health action.

In the coming months, PAHO will focus its technical cooperation on high priority countries, i.e. those with ongoing outbreaks, to ensure optimal implementation of control measures. Focus will then be shifted to countries receiving significant migration influx from Venezuela, to reinforce surveillance and vaccination, and finally to countries with no measles cases, to sustain high vaccination coverage and measles elimination.

### Recommendations

- TAG reiterates its previous recommendation to the Venezuelan health authorities, to act decisively to control the current epidemic and prevent further exportation of the measles virus to other countries in the Region. There is an urgent need to achieve high and homogeneous

vaccination coverage levels among populations younger than 15 years of age, as well as to intensify outbreak control measures in high-risk municipalities, those located in border areas, and among indigenous communities (e.g. Warao, Yanomami and Wayuu populations).

- TAG urges Brazil to respond decisively and efficiently to the current measles outbreak to interrupt measles virus transmission and its spread to other parts of the country and to the rest of the Region. There is a serious risk of the re-establishment of endemic transmission in Brazil within seven months if a more aggressive response is not implemented immediately.
- Given the threats to measles elimination in the Americas, TAG urges countries/territories to reinforce measles and rubella surveillance, intensify vaccination activities to achieve coverage levels greater than 95% with two doses of the measles-rubella containing vaccines among all children under five years of age and respond rapidly to imported cases. Countries must urgently implement the Plan of Action for the Sustainability of Measles and Rubella Elimination endorsed by PAHO Member States in September 2017.
- TAG reminded countries of the importance of vaccinating at-risk populations that do not have proof of vaccination, such as health personnel, airports, tourism and transportation staff, and migration services, among others.

## Update on the Ongoing Diphtheria Outbreaks in the Americas

Two major diphtheria outbreaks have been reported in Haiti and Venezuela in recent years (**Table 1**), as well as other outbreaks associated with Venezuelan cases in Colombia, Brazil and the Dominican Republic. In both Haiti and Venezuela, the routine immunization coverage for DPT3 and boosters have been consistently below 95%, falling short of the goal set for the Region to reach coverage levels of 95% nationally and sub-nationally. These low coverage levels have resulted in an increase in the number of susceptible children and adults.

**Table 2. Characteristics of the Recent Diphtheria Outbreaks in Haiti and Venezuela**

	Haiti	Venezuela
Beginning of the outbreak	EW 50, 2014	EW 26, 2016
Number of confirmed cases since the beginning of the outbreak	170 (as of EW 25, 2018)	1019 (as of EW 16, 2018)
Most affected age group	<10 years of age	5-15 years of age
Routine vaccination coverage (WHO UNICEF Joint Report Form 2017)	DPT3: 72% DPT4: 32%	DPT3: 84% DPT4: 38%

In **Haiti**, the diphtheria outbreak began in December 2014 (EW 50), and until EW 25 of 2018, 555 probable cases (170 confirmed, 37 under investigation, and 283 discarded), and 79 deaths (31 confirmed cases, 34 under investigation, and 14 discarded cases) had been notified. The estimated case fatality rate for 2018 was 6%. In 2015 and 2017, a higher proportion of females than males were affected by the disease (57% and 60%, respectively). Also, the proportion of cases among children less than ten years of age was higher than among older children. Nine of the ten departments have been affected to date; seven have reported confirmed and probable cases, and two have reported probable cases.

As part of the outbreak control measures, the Ministry of Health planned three rounds of vaccination campaigns targeting children 1-14 years of age in 44 communes of nine departments. The pentavalent vaccine was used to vaccinate children aged 1-6 years, and the Td vaccine for children 7-15 years of age. The first phase of the first round of the campaign was conducted from 11-15 March 2018 in eight states (29 communes); and the second phase was conducted from 8 to 12 April 2018, in 15 communes of the West Department. Administrative coverage reached 98% in the first eight departments and 81% in the West Department. Independent monitoring was conducted, estimating coverage levels at 87% in the eight departments and 85% in the West Department. Since the end of the first phase of the campaign, the number of reported diphtheria cases and deaths has decreased. The dates for the implementation of the two remaining rounds have not been confirmed.

In **Venezuela**, the diphtheria outbreak that began in July 2016 (EW 26) continues. Since the beginning of the outbreak until EW 16 of 2018, a total of 1,716 suspected diphtheria cases have been reported (324 cases in 2016, 1,040 in 2017 and 352 in 2018); 1,086 (63%) of the suspected cases were confirmed by laboratory (n=350) or epidemiological link (n=736) and 160 died (17 in 2016, 103 in 2017, and 40 in 2018). The cumulative case fatality rate is 14.7%. In 2016, cases were reported in 5/23 states (Anzoátegui, Bolívar, Delta Amacuro, Monagas and Sucre), while in 2017, confirmed cases were reported in 22/23 states, as well as in the Capital District. In 2018, 9/23 states reported confirmed cases in all age groups; however, the highest incidence rate occurred among children aged 5-15 years. The vaccination campaign is in

progress, targeting children aged two months to six years with the pentavalent vaccine, and 7-15 years with the Td vaccine.

In **Colombia**, five cases of diphtheria have been confirmed in 2018, aged from 3-27 years. Three of the cases were Venezuelan citizens, and two did not have information on nationality. Two cases were not vaccinated, and three cases had unknown vaccination history. All cases were male. One of the five cases died.

In **Brazil**, 42 suspected cases were reported in 14/26 states in 2017; five (12%) were confirmed in four states: Acre (1), Minas Gerais (2), Roraima (one fatal case, imported from Venezuela) and São Paulo (1). The remaining 37 were discarded by national authorities. In 2018, Brazil reported eleven suspected cases of diphtheria between EW 1 and EW 20, but no cases have been confirmed to date.

In the **Dominican Republic**, three suspected diphtheria cases were reported in 2017; one was confirmed for diphtheria and two were discarded based on clinical criteria for one case and laboratory results for the other case. No fatalities were reported. No cases have been reported in 2018.

National health authorities of neighboring countries have intensified epidemiological surveillance, investigations and vaccination to prevent importation of diphtheria cases from the affected countries.

PAHO's Revolving Fund has supported countries in the Region to ensure the supply of diphtheria antitoxin in a constrained global market. Haiti and Venezuela have received diphtheria antitoxin annually over the past 3 years; while Colombia, the Dominican Republic and Panama have procured it to replenish their national strategic stocks. The Revolving Fund currently has a supply agreement with only one manufacturer located in India, that is expected to cover the anticipated needs of the Region for 2018 and 2019.

### **Vaccination Coverage**

Prior to 2016, the regional polio-3 vaccination coverage had ranged between from 90%-94% for over 20 years. In 2016, polio-3 vaccination coverage dropped to 87%, the lowest it had been in the previous two decades. Preliminary data from 2017, not including data from Uruguay and El Salvador, showed polio-3 coverage to be 88.4%. At the sub-national level, vaccination coverage levels were not homogeneous. Many municipalities in the Region have coverage levels <80%.

### **Surveillance Update**

The quality of acute flaccid paralysis (AFP) surveillance in the Region is suboptimal. In the past 52 weeks (EW 26 2017-EW 26 2018), the Region has met the reporting rate of at least one AFP case per 100,000 children under 15 years old and to investigate  $\geq 80\%$  of AFP cases within 48 hours but has failed to achieve  $\geq 80\%$  of adequate stool samples collection from cases. Only four countries have met all three indicators over the last 52 weeks: Bolivia, Mexico, Nicaragua and Paraguay.

### **Fractional Use of the Inactivated Poliovirus Vaccine (fIPV)**

In April 2017, the TAG recommended that all countries be prepared to respond to a shortage of the inactivated polio vaccine (IPV) and that countries (n=16) that administer more than 100,000 doses of IPV per year begin to prepare immediately for the implementation of fIPV vaccination. Of the 16 countries recommended to switch to fIPV, nine (56%) have already started training health workers (Ecuador, Cuba, Colombia, Dominican Republic, El Salvador, Guatemala, Nicaragua, Panama and Paraguay). Two countries have completed training at all levels and have started to implement fIPV as part of their routine programs: Ecuador (as of 1 January 2018) and Cuba (as of 1 May 2018).

In June 2018, members of PAHO's Comprehensive Family Immunization (IM) and Communications (CMU) units visited several locations in Ecuador to document the country's experience with preparing, implementing and supervising the use of fIPV. The lessons learned from Ecuador could benefit other countries in the Region and the world in their fIPV preparations. PAHO is preparing a technical report and a video explaining the preparation and implementation processes in Ecuador that will be made available to all countries in September 2018. The best practices identified included:

- Using quality cascade-style training of health care workers;
- Swaddling the child in blankets at the time of fIPV administration to help limit his/her movement and increase the chances of using the technique adequately and of a bleb forming;
- Administering fIPV in outreach settings;
- Achieving good acceptability of the new administration technique among parents;
- Reinforcing health care worker communication, a catalyst for increasing parents' acceptability and their understanding of the child's evolution and care immediately post-vaccination.

### **Vaccine Availability**

The availability of IPV remains limited; however, no country in the Region has faced stock-outs to date. IM and PAHO's Revolving Fund continue to work closely with all countries to monitor IPV stocks. The Revolving Fund has continued negotiations with the supplier of IPV10, resulting in a favorable supply agreement for 2018 and 2019. An update was provided on IPV supply during the 162<sup>nd</sup> Session of the Executive Committee.

## **Risk Analysis**

Until polio is eradicated everywhere, all countries remain at risk of poliovirus importation. In July 2017, PAHO presented a regional risk assessment to TAG endorsing the methodology and encouraged Member States to conduct annual subnational risk assessments. To align with some of the global risk assessment indicators, PAHO updated its regional risk assessment, repeating it in July 2018. Preliminary results showed that four countries were at very high risk (Dominican Republic, Guatemala, Haiti and Venezuela), five countries were at high risk (Argentina, Bolivia, Ecuador, Peru and Suriname), 15 countries were at medium risk (Anguilla, Antigua and Barbuda, Belize, Bermuda, Brazil, Colombia, Curacao, El Salvador, Guyana, Jamaica, Mexico, Panama, Paraguay, Trinidad and Tobago and the Virgin Islands), and the remaining 19 countries were at low risk (Aruba, Bahamas, Barbados, Canada, Cayman Islands, Chile, Costa Rica, Cuba, Dominica, Grenada, Honduras, Nicaragua, Saint Kitts, Saint Lucia, Saint Vincent, Sint Maarten, Turks and Caicos, United States, Uruguay).

It is worth noting that following improvements in vaccination coverage levels and surveillance performance, Brazil was reclassified from high risk to medium risk in this risk assessment update. Additionally, following TAG recommendations, PAHO developed a tool for countries to conduct their own national risk assessments down to the district/municipal level. PAHO is currently developing the tool further to include automated mapping of the risk areas. This tool will be presented to the countries during the 6<sup>th</sup> Regional Polio Meeting in December 2018.

## **Sabin 3 Isolation in Venezuela**

In May 2018, Venezuela reported a case of AFP in a 34-month-old child with no vaccination history against polio residing in a community with low vaccination coverage in Delta Amacuro. The case was reported through the national surveillance system. A stool sample was collected from the child, following surveillance guidelines, and the national laboratory isolated Sabin type 3 poliovirus. The virus isolate was then sent to the global specialized laboratory (US CDC, Atlanta), which confirmed the national laboratory results. The virus isolate was the same form of the Sabin type 3 virus found in the oral polio vaccine; meaning the virus had not mutated and was neither a wild poliovirus (WPV) nor a vaccine-derived poliovirus (VDPV). Thorough field investigations did not identify additional AFP cases or case clusters suggestive of WPV or VDPV circulation. To classify the case, in accordance with polio surveillance guidelines, a clinical evaluation was conducted on 28 June 2018, 60 days following the onset of AFP, to determine the presence of residual paralysis. The results of the investigation were inconclusive, and the neurologist requested another evaluation be done on 2 July 2018. PAHO has not yet received the results of the evaluation. Although this case was not due to WPV or VDPV poliovirus, any state or district in the Region with low polio-3 vaccination coverage is at risk of the emergence of a VDPV or importation of WPV and should strive to improve polio vaccination coverage and strengthen surveillance.

## **Investigation of Immunodeficiency-related VDPV1 (iVDPV1) in Colombia**

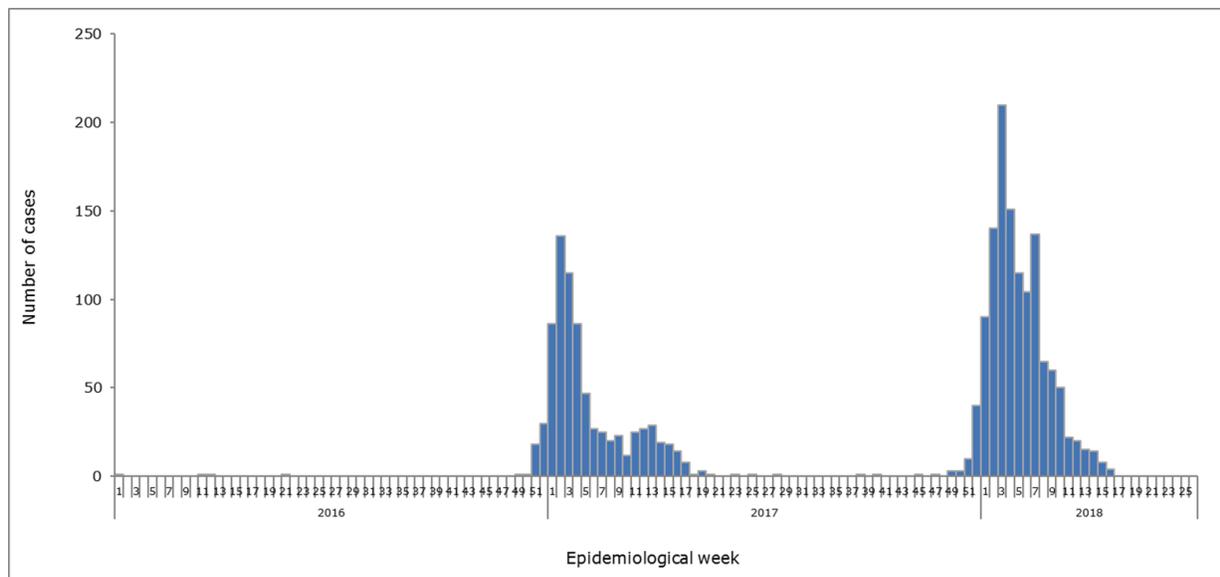
A suspected iVDPV1 case is currently under investigation in Colombia. An 11-month-old child with suspected severe primary immunodeficiency developed AFP on 1 March 2018 and VDPV poliovirus type 1 was subsequently isolated from the child. PAHO/WHO continues to evaluate the epidemiological situation and support the strengthening of surveillance and vaccination in the country.

PAHO/WHO is coordinating with partners of the Global Polio Eradication Initiative to obtain the antiviral Pocopavir. The child will be included in a treatment trial on the efficacy, safety and pharmacokinetics of Pocopavir. Cases of iVDPV are extremely rare and there has been no documentation of associated secondary spread of iVDPV to date. Colombia's national polio vaccination coverage is estimated at 91%, thus, the risk of further VDPV spread remains very low.

## Update on the Yellow Fever Epidemiological Situation in Brazil

From July 2017 to 16 May 2018, the State of Minas Gerais confirmed 520 cases of yellow fever, including 177 (34%) deaths. During the same period, the State of São Paulo reported 516 yellow fever confirmed cases, including 163 (32%) deaths. From 1 January to 24 May 2018, the State of Rio de Janeiro reported 265 yellow fever confirmed cases including 84 (32%) deaths in 23 of 91 (25%) municipalities. From 1 January to 16 May 2018, the state of Espírito Santo reported six yellow fever confirmed cases, including one death (17%). From July 2017 to 16 May, the Federal District reported one yellow fever fatal case. Yellow fever transmission has occurred through sylvatic vectors either in rural settings or in localized peri-urban areas. No yellow fever transmission by *Aedes aegypti* has been confirmed to date. There has been a steady decrease in the number of human and animal yellow fever cases reported in Brazil since the end of February 2018 (**Figure 2**).

**Figure 2. Distribution of confirmed yellow fever cases by epidemiological week (EW). Brazil, 2016–2018**



Yellow fever season in Brazil typically occurs from December to May of every year. For 2018-2019, epidemiological and environmental analyses suggest that the yellow fever virus could spread to the South, reaching the states of Parana, Santa Catarina and Rio Grande do Sul. The virus is also expected to move towards the Southwest through sylvatic corridors currently running from the state of São Paulo, through the Parana River basin on the way to eastern Paraguay and northern Argentina and to the Northeast, potentially reaching the states of Sergipe, Alagoas, Pernambuco, Paraíba and Rio Grande do Norte.

On 20 March 2018, the Ministry of Health announced the expansion of yellow fever vaccination to the entire country, including 1,586 new municipalities in the Southeast, South and Northeast regions, increasing the population to be vaccinated by 77.5 million individuals. Vaccination of these new populations will be done gradually until April 2019. This preventive measure aims to protect the entire population against the disease in case the areas of virus circulation geographically expand, as observed during the 2017 outbreak. Based on official reports, the total number of doses applied (fractional or full doses) in Rio de Janeiro, during the mass vaccination campaign that took place from 25 January to 5 May 2018, was 2,073,151. With 8,395,098 doses administered in the state, prior to the campaign, the total number of vaccine doses administered to date was 10,468,249, covering 65% of the target population.

In São Paulo, the total number of doses applied (fractional and full doses) during the campaign running January-May 2018, was 5,529,017. Considering the 13,300,000 individuals vaccinated prior to the campaign, the cumulative vaccination coverage for the population of São Paulo was 60%. In addition to the states of Rio de Janeiro, São Paulo, and Bahia, which will continue to vaccinate using a fractional dose, the states in the South (Paraná, Santa Catarina and Rio Grande do Sul) will begin vaccinating with a standard dose in July 2018, followed by standard dose vaccination in the Northeast Region (Piauí in January 2019; Alagoas and Sergipe in February 2019; Paraíba and Pernambuco in March 2019; and Ceará and Rio Grande do Norte in April 2019). Accordingly, by April 2019, 1,586 new municipalities will be included as areas with vaccine recommendations, covering 100% of the national territory.

In Minas Gerais, the cumulative vaccination coverage (2003-2018) was estimated at 95%. Unlike the states of Rio de Janeiro, São Paulo and Bahia, Minas Gerais did have recommendations for yellow fever vaccination of its residents and incoming travelers; however, an estimated 691,450 individuals remain unvaccinated, especially those 15–59 years of age. This age group was particularly affected during the last large yellow fever epidemic in Brazil in 2017. Among the 853 municipalities of Minas Gerais, 142 (15%) did not reach a coverage level of 80%. Another 283 (33%) municipalities reported coverage levels between 80% and 95%. More than half of the cities in Minas Gerais reached coverage levels  $\geq 95\%$ .

No shortage of yellow fever vaccine or syringes is expected to perturb vaccination plans for the states of São Paulo, Rio de Janeiro and Bahia. On 30 January 2018, the national yellow fever vaccine stockpile consisted of 17.9 million full doses. Twenty million syringes should be received shortly, allowing the national authorities to carry on with the vaccination activities.