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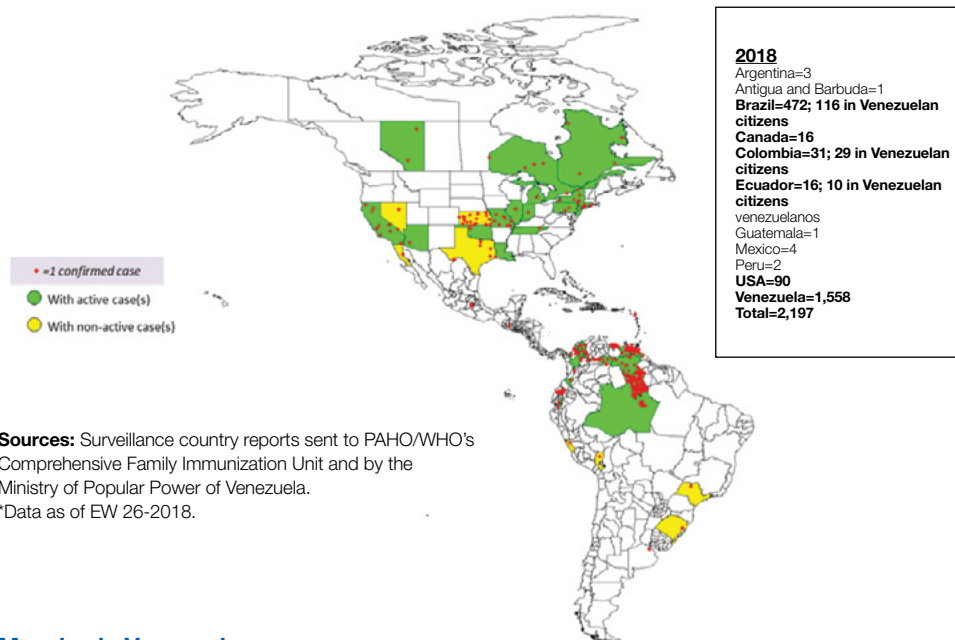


The Challenge of Maintaining the Elimination of Measles in the Americas, 2017-2018

Epidemiological Situation in the Region

As of 30 June 2018 (epidemiological week [EW] 26), a total of 2,197 measles cases have been 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. The countries that had outbreaks in 2017 were Brazil, Canada, United States and Venezuela.

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 EW 26-2018.

Measles in Venezuela

Between 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. The Capital District (Caracas) reported 59% of the confirmed cases in 2018, followed closely by Delta Amacuro, the second most affected state. Measles virus genotype D8 was identified in specimens collected from the cases, corresponding to a new imported D8 genotype with no link to the endemic D8 genotype virus that had previously circulated in the Americas. The highest proportion of cases occurred among children under five years old followed by children 6-15 years of age. At the national level, 35 deaths were reported, 33 (94%) of which were from the state of Delta Amacuro, where cases have been reported since EW 33 of 2017.

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In Memoriam: Anthony Burton

WHO retiree, co-creator of Epi Info™, public health and surveillance pioneer and a passionate mentor to many public health practitioners



Anthony Burton.

Anthony Hilton Burton, best known simply as Tony, died while on duty travel in Bishkek, Kyrgyzstan on 12 July 2018. He was 63. Tony retired from the World Health Organization (WHO) in 2014, after having served WHO for 25 years in the HIV

Program and later in the Expanded Program on Immunization (EPI).

In his youth, Tony played the violin, worked in a psychiatric ward and majored in philosophy at Georgia State University in the United States. He also went on to become a systems analyst with expertise in biostatistics.

Tony Burton worked for the United States Centers for Disease Control and Prevention (CDC) from 1978 through 1987. At the CDC, he was at the forefront of developing the National Electronic Disease Surveillance System (NEDSS), where he wrote the BASIC version of the Epidemiologic Analysis System (EAS), one of the first tools to allow epidemiologists to define questions, enter data, and summarize results in a tabular format without the aid of a programmer. He also helped create the first versions of Epi Info™.¹⁰

Initially based on a Disk Operating System (DOS), Epi Info™ is a public health software tool that professionals continue to use worldwide for outbreak investigations, surveillance systems, and as a data-intensive study software, for statistical analyses. It revolutionized public health across the globe, as it was one of the first statistical tools to be provided free of charge to researchers and public health practitioners everywhere.

Tony first worked with then intern Jeff Dean – current head of Artificial Intelligence at Google – in the ANALYSIS module of Epi Info™, in the summer of 1986. Tony and Jeff continued to collaborate on later versions of Epi Info™, even

¹⁰ "The Epi Info™ Story," available at <https://www.cdc.gov/epiinfo/storyall.html>

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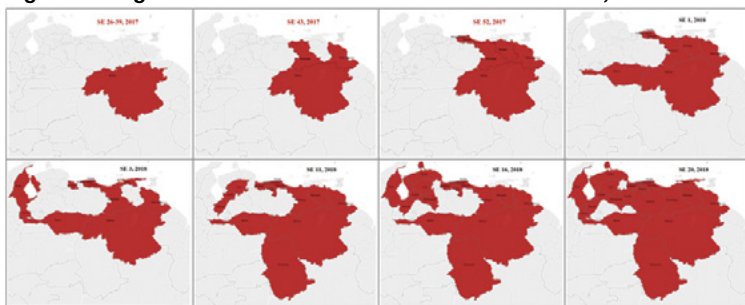
Delta Amacuro borders Guyana and 25% of its population consists of indigenous Warao communities. Other local sources of information indicate that the Yanomami communities in the municipality of Alto Orinoco and the state of Amazonas, which border Roraima in Brazil, have also been affected by measles. It is important to highlight that Delta Amacuro is a remote area of 40,200 km² located in the Orinoco Delta. Most of its indigenous population lives 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 for disease containment efforts.

The risk of spread within and outside Venezuela remains very high due to the continuous movement of populations across 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 other countries in the Americas. Most of PAHO's Member States (30/35) reported their last endemic case before the year 2000 over 18 years ago.

On 22 June 2018, Venezuela's Ministry of Health expressed its willingness to intensify vaccination campaigns in 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 homogeneous coverage of >95%. Although PAHO has been providing the Minister of Health with political, technical, financial and logistical support since the beginning of the measles outbreak, endemic transmission has been re-established in Venezuela since 30 June 2018, corresponding 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 until EW 26 2018. 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).

Figure 2. Progression of the Measles Outbreak in Venezuela, 2017-2018



Source: Ministry of Popular Power for Health, Venezuela; SE: EW.

¹ Government of Brazil, Ministry of Health. Report No. 1, 2017/2018. Situation of measles cases in Roraima and Amazonas states-2018. Available in Portuguese only, at: <http://portalarquivos2.saude.gov.br/images/pdf/2018/marco/29/Informe-Sarampo.pdf> [accessed on: 21 July 2018].

² Government of Brazil, Ministry of Health. Report No. 4, 2017/2018. Situation of measles cases in Roraima and Amazonas states. 2018. Available in Portuguese only, at: <http://portalarquivos2.saude.gov.br/images/pdf/2018/abril/23/Boletim-4.pdf> [accessed on: 21 July 2018].

³ Government of Brazil, Ministry of Health, Special Secretariat of Indigenous Health (SESAI), Yanomami and Yekuana Special Indigenous Health District (DSEI), and Division of Indigenous Health Care (DIASI). Presentation and assessment of measles cases. July 2018.

⁴ Government of Brazil, Ministry of Health. Report No. 14, 2017/2018. Measles situation in Brazil. 2018. Available in Portuguese only, at: <http://portalarquivos2.saude.gov.br/images/pdf/2018/julho/18/Informe-Sarampo-14.pdf> [Accessed on: 21 July 2018].

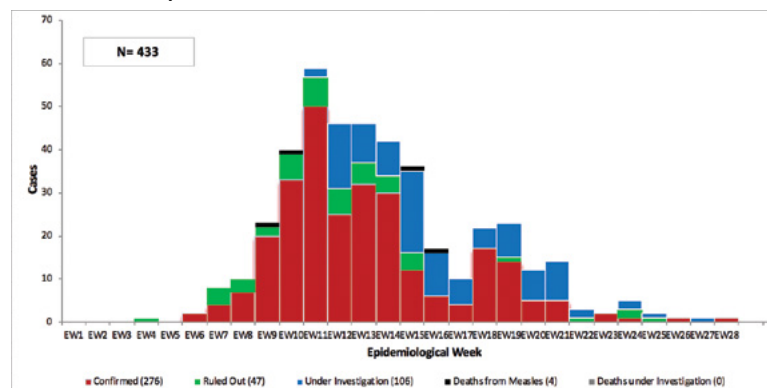
⁵ Foundation for Health Surveillance in the Amazon. Epidemiological Bulletin for Measles in the Amazon. No. 17. 2018. [Available in Portuguese only.]

Measles in Brazil

Roraima

On 14 February 2018 (EW 7), Brazil's Ministry of Health received a report from the state of Roraima, of a laboratory-confirmed case of measles in a child under 1 year of age, of Venezuelan nationality.¹ The case appeared in the context of the measles outbreak that Venezuela has been facing since July 2017 and the migratory movement of its population toward bordering countries, which contributed to spread of the virus. By EW 28, Roraima had reported 422 suspected measles cases in 11 of its municipalities and cases also coming from Venezuelan municipalities, such as Gran Sabana, Ciudad Bolívar, Maracaibo, Sifontes, and El Tigre, among others, of which 272 (64.4%) have been confirmed. Of the confirmed cases, 191 (70.2%) are people from Venezuela, 79 (29%) from Brazil, one (0.4%) from Guyana, and one (0.5%) from Argentina (these last two patients have been living in Boa Vista, a municipality of Roraima, for more than one year). Four measles deaths were confirmed among children under 5, two Brazilians and two Venezuelans, all reported in the Boa Vista municipality² (see figure 3).

Figure 3. Reported Measles Cases by EW of Rash Onset, Roraima (EW 1-28 of 2018)



Source: PAHO/WHO, according to data from the Roraima Ministry of Health.

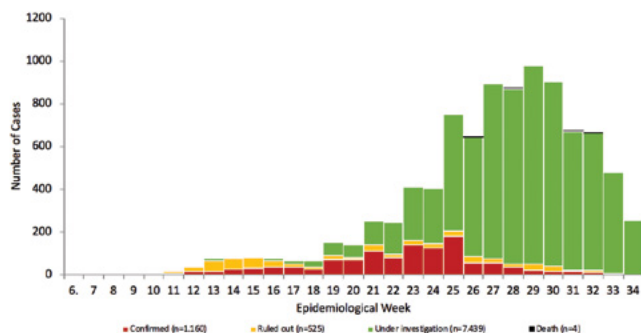
Of the total confirmed cases in Roraima, 89 (41.2%) are members of indigenous populations. Among those who are Yanomami, 60 are Venezuelan nationals, and another seven are Brazilians. The most affected age group is 10 to 14 years (which includes 18 Venezuelans and one Brazilian), followed by age group 5 to 9 years (with 13 Venezuelans). The last case confirmed as of EW 28 is that of a Venezuelan indigenous person, with onset of symptoms on 11 June 2018.³ With regard to cases confirmed in Roraima, the most affected age group is 1-4 years (56 cases), followed by children under 1 year (51 cases). The incidence rate of cases confirmed in Roraima is 48.7 cases per 100,000 population. By subgroups, the highest rate is among children under 1, with 505.1 per 100,000 population, followed by the 1-4 years group, with 41.8 cases per 100,000 population.⁴ In EW 28, 160 cases (38.6%) are still under investigation, although 38 (9.2%) have been ruled out.

Amazonas

On 6 February 2018, the Amazonas state reported one suspected measles case, which was ruled out, and another case in a 4-year-old Brazilian girl, with onset of symptoms on 12 February, who had had contact with Venezuelan citizens. This was subsequently confirmed as a measles case. From EW 6 to EW 28, 3120 suspected cases have been reported from 15 municipalities and one case of a resident in another state. Of the total suspected cases, 444 cases (14.2%) have been confirmed, all residents from the Manaus municipality⁵ (see figure 4).

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Figure 4. Reported Measles Cases by EW of Rash Onset, Amazonas (EW 6-34 of 2018)



Source: PAHO/WHO, according to data from the Amazonas Ministry of Health.

The most affected age group in Amazonas is children under 6 years, with 220 cases (49.6%), and a considerable number of cases (114) among children under 1 year. This is followed by the 20-29 years age group, with 71 cases (16%). The incidence rate of cases confirmed in Amazonas is 21.2 per 100,000 population. Children under 1 year of age have the highest incidence, with 306.2 cases per 100,000 population, followed by the 1-4 years age group, with 61.7 cases per 100,000 population, and the 15-19 age group, with 22.2 per 100,000 population.⁶

Other states

At EW 28 of 2018, in addition to the two aforementioned states, four more states confirmed measles cases: Rio Grande do Sul (eight cases), Rio de Janeiro (seven cases), Rondônia (one case), and São Paulo (one case). Dates of rash onset for confirmed cases in these states were from 4 February to 30 June. In EW 26, the United States Centers for Disease Control and Prevention (CDC) reported a measles case confirmed by polymerase chain reaction (PCR) in a 1-year-old child without vaccination history who visited Manaus and returned on 18 June to the United States, where the child resides, with rash onset on 30 June. The case was associated with genotype D8, like the one circulating in Venezuela and Manaus.

Laboratory testing by the Oswaldo Cruz Foundation (FIOCRUZ) showed that the genotype identified in all confirmed cases in Amazonas and Roraima is D8, with an identical lineage to that identified in Venezuela in 2017. In São Paulo, the genotype was D8, identical to the one circulating in countries outside the Region of the Americas (the patient had travelled to Lebanon). In Rio Grande do Sul, genotype B3 was identified, like the one circulating in countries outside the Region (there was a history of travel to European countries), and D8, identical to the one circulating in Manaus. In Rondônia, genotype D8 was also identified and it was also identical to the one circulating in Manaus.⁷

The Ministry of Health, in coordination with PAHO/WHO, carried out plans for state microplanning, and during May, June, and July, in priority municipalities, vaccinated the population aged 6 months to 29 years at schools and door-to-door on different schedules and weekends.

The following were also carried out: rapid response measures, mass communication and coordination among human resources to ensure vaccination, data entry, mobilization logistics, and cold chain maintenance. Furthermore, activities were expedited for training, reorganization of rapid response teams and situation rooms, and support measures for reorganization of the health services delivery network in Roraima and its 15 municipalities. Vaccination and community surveillance actions continue in public shelters, streets, and plazas in which Venezuelans are identified, as well as indigenous people identified in shelters, primarily from the Warao ethnic group, and in the six municipalities with health districts where there is Yanomami population.

In addition, with support from PAHO, a vaccination room was opened on 1 March on the Brazil-Venezuela border, in the Pacaraima municipality, where 27,875 people of Venezuelan nationality were vaccinated as of 17 July, and 71,675

doses of all vaccines on the Brazilian vaccination schedule were provided, mainly the measles, mumps, and rubella (MMR) (22,378 doses, 31.2%) and yellow fever (21,344 doses, 29.8%) vaccines. Since March, PAHO/WHO has hired three international consultants who are specialists in immunization, epidemiological surveillance of measles, and care of migrants in conditions of vulnerability, located in Roraima. On 14 March, Boa Vista's City Hall declared a 180-day health emergency due to the increase in measles cases among foreign migrants who were arriving from across the Brazil-Venezuela border.⁸ Meetings have been held with health workers around setting up the measles outbreak situation room among the Pacaraima municipality, Roraima, and Gran Sabana municipality, in Venezuela's Bolivar state.

Beginning in EW 21, and with the aforementioned actions, there has been a significant reduction in reporting suspected measles cases in the Brazilian population as secondary cases. Most confirmed cases are in Venezuelans who arrive in Roraima during the transmission period (see figure 3).

At the request of the Ministry of Health, Amazonas state, and Manaus municipality, PAHO/WHO initiated the support plan in the second half of June. On 29 June, PAHO issued a technical note with key information to support decision-making in Manaus related to the emergency that was declared on 3 July (for 180 days), to facilitate promotion and prevention actions to contain the measles transmission chain.



Figure 5. Measles outbreak containment actions in Brazil, 2018. Source: PAHO/WHO.

Furthermore, preparation and implementation of the new microplanning scheme for Manaus (which began with mobilization, starting 16 July, of 200 vaccination teams at schools and door-to-door on different schedules and weekends) was supported by the police and army in neighborhoods that are difficult to enter because of law and order issues. Additionally, microplanning in the 14 priority municipalities is being strengthened through increased technical capacity. Training was expedited for 36 state staff members with organizational responsibilities in the framework of the rapid response plan, along with training of the rapid response teams of the state's 62 municipalities. Support was also provided for actions aimed at reducing nosocomial transmission in hospitals and health units, and for reorganization of triage care, clinical management, isolation in hospital units, and urgent care services. In EW 28, PAHO/WHO assigned international consultants who are specialists in integrated measles response, as well as national consultants. They are supporting reorientation of the new strategy for mass communication, education, and information targeting the general public and health professionals, which includes messages such as "Measles is Back" and "Measles-Free Family," in addition to vaccination campaigns for people aged 6 months to 29 years.

From the onset of the measles outbreak until 19 July, financing was provided through cooperation agreements between the Ministry of Health and PAHO/WHO, in addition to the use of PAHO/WHO's own resources. Joint investment has totaled approximately US\$937,000. The PAHO/WHO Revolving Fund supported the federal administration in the purchase of 16.4 million doses of MMR vaccine to meet demand during the second half of the year, with an approximate value of US\$68 million.

The greatest challenges for the country are to attain and maintain at least 95% vaccination coverage with the first and second doses on the national schedule (12 and 15 months of age); ensure vaccination of 100% of health workers with two doses of the MMR vaccine; procurement and distribution of laboratory inputs,

⁶ Government of Brazil, Ministry of Health. Report No. 14, 2017/2018. Measles situation in Brazil, 2018. Available in Portuguese only, at: <http://portal.arquivos2.saude.gov.br/images/pdf/2018/julho/18/Informe-Sarampo-14.pdf> [Accessed on: 21 July 2018].

⁷ Government of Brazil, Ministry of Health. Report No. 14, 2017/2018. Measles situation in Brazil, 2018. Available in Portuguese only, at: <http://portal.arquivos2.saude.gov.br/images/pdf/2018/julho/18/Informe-Sarampo-14.pdf> [Accessed on: 21 July 2018].

⁸ Government of the Municipality of Boa Vista. News. Measles – City hall declares emergency health situation. Available in Portuguese only, at: <https://www.boavista.ror.gov.br/noticias/2018/03/sarampo-prefeitura-decreta-situacao-de-emergencia-na-saude> [Accessed on: 22 July 2018].

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which has made confirmation difficult and evidenced the increase in measles cases under investigation; case confirmation through epidemiological link; consistency of information published in the media; and up-to-date official issuance of bulletins and reports containing information on epidemiology, vaccination, rapid response, and communication.

Noteworthy challenges in service delivery are equally important: monitoring implementation of triage protocols and clinical management, including hospital isolation, identification of suspected disease and its immediate reporting, as well as monitoring and implementation of the household and social isolation protocol; timely administration of two doses of vitamin A in children with measles; and observation of recommended clinical practices, such as administering immunoglobulin⁹ to people with compromised immune systems, susceptible or diagnosed pregnant women, and children aged <6 months.

In conclusion, the country, led by the Ministry of Health with state and municipal health secretaries, is committed to the actions and the objectives, but it needs to align efforts and engage strategic, political, community, scientific, governmental, and nongovernmental partners, among others, to improve vaccination coverage and improve the provision of health services; rapid response; and the quality of epidemiological surveillance, mass communication, and community participation. The objective is to interrupt the chain of transmission of measles, which began with the first confirmed case on 4 February 2018, before it lasts for 12 consecutive months. This is necessary to maintain elimination of the disease in the Region of the Americas.

Measles in Colombia

In Colombia, between EW 11 and 26 2018, 34 measles cases were confirmed. Twenty-two (65%) of these were imported from Venezuela, i.e. 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 children less than five years old. No deaths have been recorded as of EW 26 2018. The genotyping performed on samples from 22 cases indicated that it is genotype D8, lineage MV1/HuluLangat.MYS / 26.11, as was identified in Venezuela.

Measles in Ecuador

On 6 February 2018, PAHO activated an epidemiological alert for measles in Ecuador. On 9 March 2018, Ecuador's Minister of Health, Verónica Espinosa, declared a preventive early warning for measles, diphtheria, and yellow fever, which resulted in actions in the country's nine planning areas, such as intensification of vaccination, detection, and early diagnosis of suspected measles cases; proper case management; and implementation of immediate control measures to break the chain of transmission and prevent deaths. PAHO/WHO supported these actions, as well as trainings requested by the Ministry of Public Health and implementation of the immediate intervention plan.

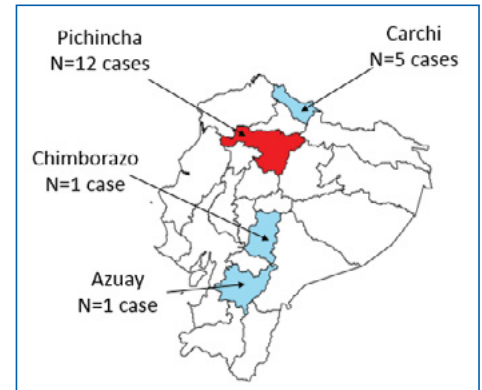
Ecuador is in the response phase of the contingency plan, which involves activation and intensification of surveillance and vaccination, as well as active case-finding for suspected cases and measles virus blockade actions. To meet the vaccination goal in this plan, a contingent of vaccinators was hired, who joined the brigades. Furthermore, early vaccination uptake was strengthened with two doses of the MMR vaccine in children aged 12 and 18 months, according to the national vaccination schedule, and vaccination was expanded for the 2-15 years age group throughout the country, as late uptake. Immunization interventions for foreigners aged 1 to 15 years were also recommended in various activities. At the Rumichaca international bridge, on the border with Colombia, a healthcare station for foreigners was installed with vaccination 24 hours a day, 7 days a week, which was successful in uptake by unvaccinated people and active case-finding at the entry point.

Vaccinators and epidemiologists formed more than a thousand brigades that work in the nine planning areas, mainly in the four (Carchi, Pichincha, Chimborazo, and Azuay provinces) where confirmed imported measles cases (11 in total) and import-related cases (3 cases) have reported as of EW 25 2018. They provide vaccination and conduct thorough epidemiological investigation of all cases to determine their travel routes and identifying direct and indirect contacts and places where vaccination should be increased. Isolation measures and a call-and-visit system for contact monitoring were also implemented. PAHO has accompanied the fieldwork by the brigades and has provided constant technical guidance to national health authorities.

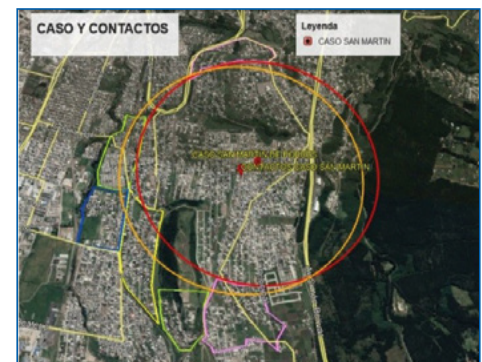
With the information obtained in epidemiological investigation of cases, the health bureaus of the affected areas decided to expand the vaccination area. This was done after identifying direct contacts of confirmed cases who worked in trade and who, as a result, could spread measles virus. New suspected cases were found and were subsequently confirmed. Action was also taken to facilitate voluntary reporting of indirect contacts.

Measles in Mexico

Mexico has carried out effective interventions for vaccination, epidemiological surveillance, and laboratory diagnosis. The last death from measles was documented in 1995, and the last endemic case in 1996. Vaccination is one of the most cost-effective interventions for disease prevention worldwide and should be considered a national security issue. Mexico has carried out the recommended PAHO/WHO elimination



Measles cases by province in Ecuador, EW 33-2018. Source: PAHO/WHO with official data from Ecuador's Ministry of Health.



Map of the assigned and amplified area for vaccination, zone 9, Ecuador. Source: Technical team, zone 9, Ministry of Public Health, Ecuador.



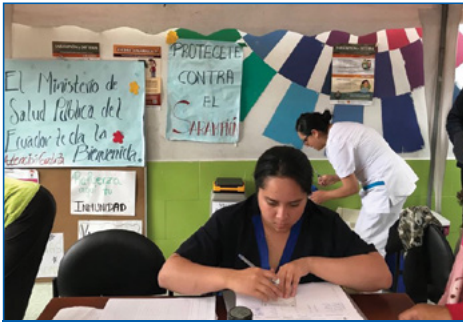
Educational talks to users of interprovincial transportation. Source: Sanitary Immunization Strategy [Estrategia Sanitaria de Inmunizaciones], Ministry of Public Health, Ecuador.



Intervention at the ground terminal, Ecuador/Colombia border. Source: PAHO-Ecuador (Samia Samad).

⁹ Brazilian Pediatric Society. Practical update guide. Scientific departments of immunology and immunization. Update on measles. 2018. Available in Portuguese only, at: <http://www.sbp.com.br/imprensa/detalhe/nid/atualizacao-sobre-sarampo/> [Accessed on: 21 July 2018].

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Vaccination at a post bordering Colombia, located at the International Rumichaca Bridge. Source: PAHO-Ecuador (Samia Samad).



Vaccination at a post bordering Colombia, located at the International Rumichaca Bridge. Source: PAHO-Ecuador (Samia Samad).



Measles vaccination campaign in Venezuela, January 2018. Credit: PAHO/WHO.

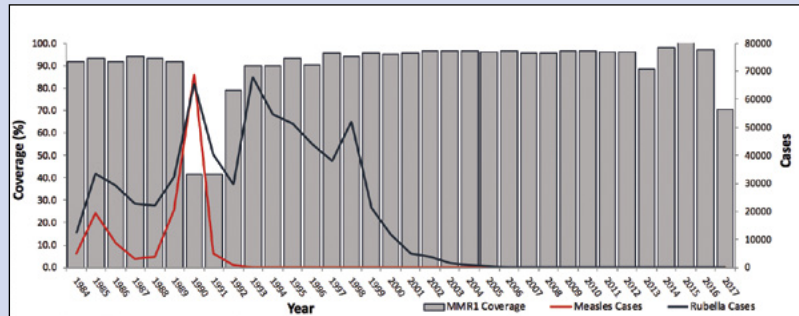


Measles vaccination campaign in Venezuela, January 2018. Credit: PAHO/WHO.

strategies, such as catch-up campaigns (1993), rapid vaccination of adults aged 19 to 29 years (2008), and monitoring (1998, 2002, 2010, 2011, and 2016), as well as administration of measles and rubella vaccine (MR) to schoolchildren and adolescents. All these strategies have led to coverage above 90%.

Vaccination coverage with the first dose of MMR vaccine is shown in **figure 6**.

Figure 6. Measles and Rubella Cases and Vaccination Coverage with the First Dose of the MMR Vaccine in Mexico, 1984-2017



Data Sources for Figure 6

- Population: Estimates based on population censuses in 1980, 1990, 2000, 2010, and projections by the National Population Board (CONAPO) of Mexico.
- 1984-1989: Doses of MR vaccine administered in the 2008 speed-up campaign.
- 1990-1991: These cohorts were vaccinated in the period 2000-2005 with MR vaccine.
- 1992-2017: Greatest coverage reached, either by a routine program or in follow-up campaigns.

The result of the last follow-up campaign against measles and rubella, carried out in 2016 with an investment of more than 300 billion pesos, achieved national coverage of 94.1%.

Given the regional situation, Mexico’s Ministry of Health has established the following response measures:

1) Vaccination action in outbreaks

- **Case control:** This will be done in localities when cases appear. This stage includes two operational strategies: first, an immediate vaccination blockade; second, immediately following the vaccination blockade, vaccination activities are carried out in areas identified as high-risk for measles transmission.
- **Reduction of susceptible individuals:** This will be done in all states as a way of blocking transmission of the disease in the event of virus importation from a country with cases. It also involves two simultaneous strategies: first, stepping up vaccination of people identified as at-risk for measles transmission; and second, strengthening routine vaccination.

When vaccination history is negative, the vaccine will be administered as follows: in children aged 1 to 6 years without primary vaccination history, the MMR vaccine will be administered; in children, adolescents, and adults aged 7 to 39 years without a history of primary or booster vaccination, the MR vaccine will be administered.

In localities where cases are confirmed, children aged 6 to 11 months should be vaccinated with one dose of the MMR vaccine, which is not included in the vaccination schedule. The corresponding dose of the MMR vaccine will also be applied when the child turns 1, or two months later, when administered to children aged >10 months..

2) Routine vaccination

Routine vaccination activities are carried out continuously throughout the year in services at the first, second, and third levels of care in the national health system, aimed at administering the necessary biologicals for the vaccination schedule in different age groups. These activities are conducted through intramural vaccination in the health services network and extramural vaccination at vaccination posts set up in various community locations and the organization of door-to-door brigades by the Ministry of Health.

3) National response plan

Mexico has established actions and procedures to prevent the introduction and spread of measles and rubella viruses in the country to ensure sustainable elimination of these diseases.

Five imported measles cases were confirmed in Mexico between EW 1 and 26 of 2018. The first case was a vaccinated 38-year-old female resident of Tijuana, Baja California, who reported rash onset on 11 February of 2018. She had received only one dose of the measles-rubella vaccine. The case had travel history to several European countries and to the United States during her exposure period. Measles virus genotype B3 was identified, confirming likely acquisition in Europe. The three additional measles cases were confirmed in Mexico City,

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with rash onset occurring between EW 7 and 10. These cases were a 39-year-old woman, her one-year-old son and the infant's 48-year-old caregiver. The fifth case was confirmed in a 20-year-old woman in Veracruz; rash onset on 16 April 2018 (EW 16). She had travel history to various cities in China from 6-23 March 2018. No secondary cases were generated and the infection source could not be identified. The virus genotyping results for this case and for the cases confirmed in Mexico City are not yet known.

Three rubella outbreaks have been detected in the last five years. One occurred in 2017 in Querétaro state, in a 39-year-old who had travelled to Hong Kong (China). Thus far this year, 2018, two outbreaks have been detected, one in Guanajuato state in a 3-year-old child, and another with one confirmed case (a 27-year-old man), reported in Quintana Roo state. In these last two cases, the source of infection could not be identified; however, both people live in places with a heavy flow of people of other nationalities.

Routine evaluation of the epidemiological surveillance system using operational indicators for febrile rash illnesses is essential to ensure quality information for decision-making. These indicators should meet standards established by international entities, such as those in **Table 1**.

Table 1. Evaluation Indicators for Febrile Rash Illnesses (Mexico, 2017)

Rate*	Timely Detection	Timely Notification	Timely Study	Good Sample	Complete Information	Laboratory Timeliness	
						Sample Submission	Result
2.8	92%	95%	96%	98%	100%	93%	86%

Source: SINAVE/DGE/SS: Epidemiological Surveillance System for Febrile Rash Illnesses.

The measles vaccination strategies implemented in the last 27 years have been effective in preventing reintroduction of the virus in the country. Mexico is greatly interested in and committed to maintaining measles and rubella elimination, and it complies with regulations on epidemiological surveillance of measles and rubella, including provisions of the National Plan for Sustainability of Measles, Rubella, and Congenital Rubella Syndrome Elimination. Nevertheless, if measles and rubella are not eradicated worldwide, there is a latent risk of importation of these diseases. Vaccination, epidemiological surveillance, and laboratory work must continue.

PAHO Response to Measles Outbreaks in the Region

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

- High-level advocacy and a face-to-face meeting between PAHO Director Carissa Etienne 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 162nd 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 Brazil, Ecuador, Guatemala, Haiti and Venezuela since September 2017 for technical assistance and to maintain visibility of the epidemiological alerts at the highest political level.
- PAHO's Comprehensive Family Immunization unit (IM) monitors the current measles and diphtheria outbreaks daily through regular meetings and communication with the country immunization focal points.
- Negotiations with strategic partners are ongoing to mobilize additional resources to face the epidemiological measles situation in the Region.

- 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, Colombia and Honduras, to be held in October 2018. Ten equivalent national workshops were funded in Central and South America.
- PAHO's IM unit 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.
- PAHO's IM unit 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 to rapidly monitor 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 (CRS) 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 the "Plan of Action for the Sustainability of Measles, Rubella, and Congenital Rubella Syndrome Elimination in the Americas, 2018-2023" with the purpose of protecting this important public health gain.

While it was hoped that this achievement would be sustained, an ongoing measles outbreak 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.

To address this important topic, PAHO's Technical Advisory Group (TAG) on Vaccine-preventable Diseases 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.

Conclusions

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, due to a sustained transmission in Venezuela for more than 12 months. The remaining 34 Member States, however, will maintain their status as free of endemic measles circulation. To provide guidance on the requirements and process for measles elimination re-verification, TAG reviewed three scenarios proposed by the PAHO secretariat in July 2018 and emphasized that there should be regional action, including careful monitoring of vaccination coverage, as well as thorough risk assessment. ■

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TAG Recommendations for Measles Outbreaks in the Americas, July 2018

- 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, Rubella and Congenital Rubella Syndrome 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.

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PAHO Publishes Electronic Immunization Registry: Practical Considerations for Planning, Development, Implementation and Evaluation



The document *Electronic Immunization Registry: Practical Considerations for Planning, Development, Implementation and Evaluation* is designed to support EPI managers and their teams in the implementation of information systems related to Electronic Immunization Registries (EIRs), using the various experiences compiled at the global level — and, especially in the Region of the Americas — as a foundation.

Within this context, the main objectives of this document are as follows: 1) to generate knowledge related to information systems and immunization registries for immunization program managers at the national and subnational levels; 2) to provide teams, EPI managers, and experts in health information systems with relevant background and experiences for development, implementation, maintenance, monitoring, and evaluation of EIR systems, so as to support planning of their implementation; 3) to provide technical, functional, and operational recommendations that can serve as a basis for discussion and analysis of the standard requirements needed for development and implementation of EIRs in countries of the Region of the Americas and other regions; 4) to serve as a platform for documentation and sharing of lessons learned and successful experiences in EIR implementation.

This document is structured into three major sections: background; EIR planning and design; and EIR development and implementation, considering the relevant processes and their structure. The content of the chapters is supported by a literature review of aspects related to EIR requirements and summarizes the experiences of the countries of the Region of the Americas and other regions that already have EIRs in place or are at the development and implementation stage.

The document can be found in the following languages:

- English
(iris.paho.org/xmlui/handle/123456789/34865)
- Spanish
(iris.paho.org/xmlui/handle/123456789/34864)
- French
(iris.paho.org/xmlui/handle/123456789/34957)

Errata

We would like to issue two corrections for past issues of the Immunization Newsletter:

- In “Haiti Eliminates Neonatal Tetanus” from the English version of the **June 2018** issue (p. 5), the Td vaccine was incorrectly written as “DT.” The corrected text is as follows:

“2. Organize routine immunization activities with the Td vaccine in women of childbearing age in high-risk departments;

3. Adopt and implement a policy of administering additional

doses of Td (children 4-6 years old and adolescents 13-17 years old);”

- The data chart in the **December 2017** issue titled “Measles/Rubella/ Congenital Rubella Syndrome Surveillance Data, Final Classification, 2016” (p.7) had incorrect case quantities for Bermuda, Brazil, Panama and Peru. We fixed these quantities in the electronic version of the Newsletter, but the print versions have not been corrected:

- Bermuda

- “80” should be “0”

- Brazil

- “33” should be “0”
- “181” should be “0”
- “214” should be “0”
- “89” should be “80”

- Panama

- “1” should be “0”

- Peru

- Both instances of “4” should be “0”

The Immunization Newsletter is published four times a year, in English, Spanish and French by the Comprehensive Family Immunization Unit of the Pan American Health Organization (PAHO), Regional Office for the Americas of the World Health Organization (WHO). The purpose of the Immunization Newsletter is to facilitate the exchange of ideas and information concerning immunization programs in the Region and beyond.

An electronic compilation of the Newsletter, "Thirty years of Immunization Newsletter: the History of the EPI in the Americas," is available at: www.paho.org/inb.

References to commercial products and the publication of signed articles in this Newsletter do not constitute endorsement by PAHO/WHO, nor do they necessarily represent the policy of the Organization.

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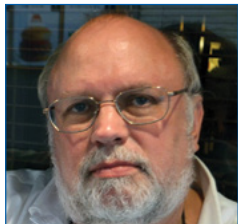
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Health
Organization**



**World Health
Organization**

REGIONAL OFFICE FOR THE **Americas**

IN MEMORIAM continued from page 1



Anthony Burton.

after Tony moved to WHO, with Jeff traveling to Geneva during college vacations.

In April 1989, Tony joined the HIV/AIDS Department of WHO and in 1995, he moved to the Immunization Department.

In HIV/AIDS, Tony contributed to estimate the burden of disease. In immunization, he became central to the establishment of many information management systems, with a focus on surveillance and coverage data at a country level. Following recommendations from the 1998 Strategic Advisory Group of Experts (SAGE) on immunization "to increase the efforts and resources for improving the quality of national immunization data (and validating these data) in the context of strengthening national health information systems," Tony led the development of a methodology to estimate national immunization coverage. This WHO/UNICEF Estimates of National Immunization Coverage (WUENIC) methodology, with some improvements since its creation, is still used by WHO and UNICEF today and has resulted in annual coverage estimates for various vaccines/doses for all WHO and UNICEF Member

States since 1980. Tony's vision and contributions to the strategic use of data to inform program planning, with a focus on addressing under-vaccination, have been invaluable. Dr. Kaushik Banerjee, from the EPI team at WHO, and former EPI manager of India, said that Tony "helped us use data to manage the EPI [of India]."

Since his retirement in 2014, Tony had continued to be engaged with the EPI, having participated in several meetings and trainings, in the production of WUENIC and supporting vaccination coverage surveys. At the time of his passing, he was supporting a vaccination coverage survey in Kyrgyzstan. "He died doing what he loved," said his wife of 24 years at Tony's funeral in Geneva.

Tony's generosity knew no limits. He mentored and touched the lives of countless people around the world. These quotes reflect some of Tony's traits:

- "He will be remembered for his practical problem-solving approach and generosity in mentoring and sharing his expertise around the world with Ministry of Health staff, colleagues, partners, and interns."¹¹
- "Tony was one of the finest people I have ever met. I learned not only about statistics, public health and immunization with him; I learned

about what it means to care, to be humble and what selfless service means."

- "We celebrate a life well lived."

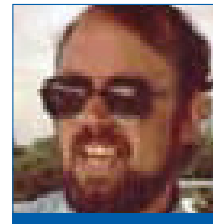
Tony was an avid reader and conversationalist, he would talk to

everyone and always had a great book recommendation to give; one of his favorite books was "The Master and Margarita" by Mikhail Bulgakov. His intellectual curiosity was epic; he loved multiple topics, traveling and intelligent debate.

At the time of his death, he was reading about the mind and where it resides, as well as learning Tai Chi. His laugh and jokes will not be forgotten. He treasured at-home time completing puzzles in the salon, taking Sunday morning walks along the shores of the Lac Léman in Geneva, or filling the world travel map posted on the kitchen wall with prospects for new holiday adventures.¹² He is survived by his wife Claudine, and his children Ian and Fiona.

His passing leaves a huge void in our hearts and is a great loss for the EPI family across the world, but his life and his teachings will always be remembered by all of us who had the honor and were blessed enough to have met him. ■

Contributed by: Carolina Danovaro, WHO



Anthony Burton.

¹¹ From note sent to WHO staff by Dr. Tedros, Director-General, WHO, 19 July 2018.

¹² From note sent to CDC staff, 26 July 2018.