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## Meeting of the Panel of Experts for the Documentation and Verification of Measles, Rubella, and CRS Elimination

In 2002, the Americas interrupted the transmission of endemic measles virus. In 2003, the Region set the goal of rubella and congenital rubella syndrome (CRS) elimination by 2010. In October 2007, the 27<sup>th</sup> Pan American Sanitary Conference approved Resolution CSP27.R2 calling for the formation of an international committee responsible for documenting and verifying the interruption of the transmission of endemic measles virus and rubella virus in the Region of the Americas. The resolution also urged Member States of the Pan American Health Organization (PAHO) to establish national commissions to compile and analyze data to document and verify measles, rubella, and CRS elimination, for review by an expert committee.

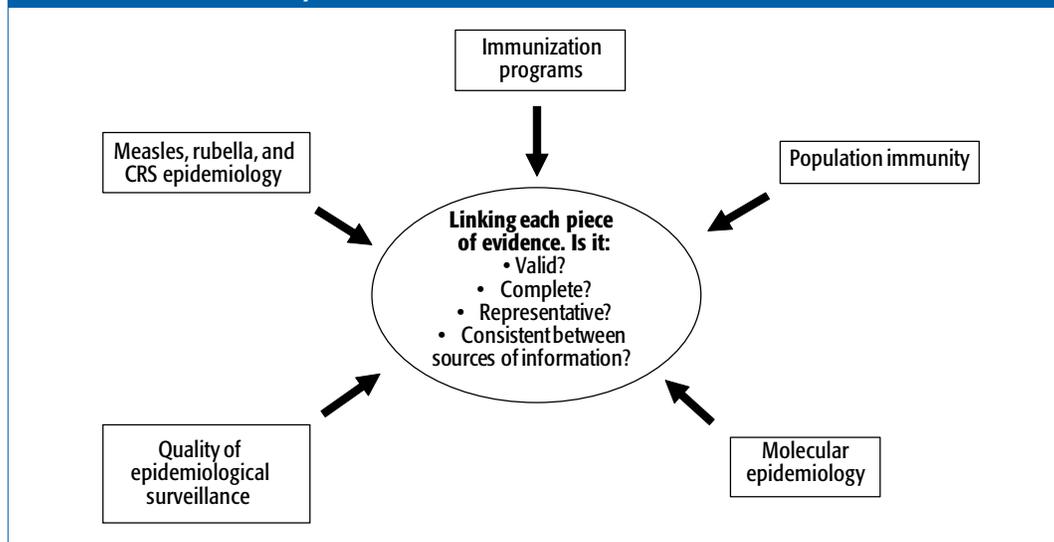
To that end, PAHO's Immunization Project gathered a panel of experts to discuss the elimination of measles, rubella, and CRS. The panel met in Washington, D.C., from 27-29 August 2008. The objective of the meeting was to discuss the main components of the Plan of Action (Figure 1), including indicators, for documenting and verifying measles, rubella, and CRS elimination. Experts and health authorities from Argentina, Brazil, Canada, Colombia, Chile, the English-speaking Caribbean, Guatemala, Mexico, Peru, and United States, PAHO immunization staff, and World Health Organization staff participated.

### Main Conclusions and Recommendations

The three essential criteria for documenting elimination are as follows: (1) Analysis of population immunity showing a level  $\geq 95\%$ ; (2) High quality epidemiological surveillance sufficiently sensitive to detect any case, whether imported or import-related; and (3) The disease effective reproductive number  $R$  is  $< 1$ .

The table on page 2 lists the expert's conclusions and recommendations on surveillance quality.

Figure 1. Essential Components of the Regional Plan of Action to Document and Verify Measles and Rubella Elimination in the Americas



### Brazil: Vaccination Campaign to Eliminate Rubella

In a phased manner, state by state, Brazil introduced routine childhood immunization with the measles-mumps-rubella (MMR) vaccine from 1992 until 2000. The implementation of vaccination strategies rapidly changed the epidemiology of rubella in Brazil. During 1997 and 1998, children aged 1-9 years experienced the highest incidence of rubella, with 15 cases per 100,000 children. During 1998 and 1999, peak incidence had shifted to the 15-29 year age group, with 13 cases per 100,000 adolescents and adults of both sexes. Follow-up MMR campaigns for children aged 1-4 years were conducted in 2000 and 2004. Mass vaccination of women of childbearing age (age groups ranging between 12-39 years depending on state) with MR vaccine was conducted between 2001 and 2002 in most states to prevent congenital rubella syndrome (CRS) cases. These strategies reduced rubella incidence in the population to a low of one case per 100,000 population in 2006. However, an outbreak of rubella that began in southern Brazil in 2006 led to rubella outbreaks in major cities in 2007, concentrated among persons not included in previous vaccination strategies. By 2006, rubella cases were occurring mainly among adolescent and adult men, while pools of susceptible individuals sustained viral circulation. As a consequence, 47 CRS cases were reported between 2007 and 2008 (data as of epidemiological week 28/2009). In order to reach the 2010

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The documentation process will address the following issues:

- Interruption of endemic transmission takes place at Regional level;
- An international committee of experts is formed and each country of the Region establishes a national commission;
- Each country develops a national plan of action and a timetable for the country evaluation on having achieved the Regional goal;
- Documentation will be based on achieving and maintaining the following:
  - High vaccination coverage against measles and rubella, and
  - Quality and efficient epidemiological and virological surveillance of measles, rubella, and CRS.

- Once the elimination goal is reached, countries of the Region will continue implementing strategies for epidemiological and virological surveillance and for vaccination, to maintain the interruption of endemic transmission.
- Given the progress achieved in the Region of the Americas, the experience should be made available to support the elimination process in other Regions of the world.

## Conclusions

Experts congratulated PAHO Member States for their progress towards eliminating rubella and CRS. They highlighted the importance of the lessons learned from the global eradication of smallpox and the regional eradication of polio

Among the lessons learned are the following:

1. Scientific evidence is essential to guide the documentation process, for example as it pertains to the time between the last known case and certification, i.e., 2 and 3 years for smallpox and polio, respectively.
2. The sensitivity of the required surveillance must be defined.
3. The national commission examining the data from a given country must be competent and diligent. The roles and responsibilities of the national commissions and the international expert committee must be thoroughly defined.
4. The Regional elimination process must be placed in the global context. ■

Areas	Conclusions and Recommendations
Proposed measles/rubella surveillance indicators	<ol style="list-style-type: none"> <li>1. Annual rate of suspect measles/rubella cases:               <ul style="list-style-type: none"> <li>– ≥80% of municipalities with ≥100,000 population reporting ≥2 cases</li> <li>– ≥80% of municipalities with &lt;100,000 populations reporting ≥1 case</li> </ul> </li> <li>2. Percentage of suspect cases with adequate investigation:               <ul style="list-style-type: none"> <li>– ≥80% of suspect cases were investigated within the first 48 hours after notification;</li> <li>– ≥80% of cases have complete data for the following: sex, age or date of birth, notification date, investigation date, rash onset date, type of rash, presence of fever, and date of previous vaccinations against measles/rubella<sup>1</sup>;</li> <li>– Follow-up of contacts for 30 days for ≥80% of confirmed cases.</li> </ul> </li> <li>3. ≥80 of suspect cases with an adequate specimen</li> <li>4. ≥80 of outbreaks with at least one case with adequate specimen for virology and at least one viral detection/isolate.</li> </ol>
Proposed CRS surveillance indicators	<ol style="list-style-type: none"> <li>1. Annual rate for CRS suspect cases per 1,000 live births by municipality: ≥1</li> <li>2. 100% of cases confirmed by laboratory</li> <li>3. 100 % of suspect cases with adequate investigation</li> <li>4. 100% of confirmed cases with viral detection/isolate</li> <li>5. 100% of confirmed cases with at least 2 negative viral detection/isolate, after age 3 months and with a one-month interval between specimens.</li> </ol>
Other operational surveillance considerations	<ol style="list-style-type: none"> <li>1. Active search of measles and rubella cases must be conducted on a periodic basis               <ul style="list-style-type: none"> <li>– in high-risk areas,</li> <li>– to detect recent circulation (within the last month),</li> <li>– to identify gaps in the surveillance system, and</li> <li>– to monitor timely and complete notification.</li> </ul> </li> <li>2. Retrospective CRS case search can be required to detect compatible clinical cases.</li> <li>3. Information should be shared between countries in the following situations:               <ul style="list-style-type: none"> <li>– outbreaks occurring in several countries,</li> <li>– notification of importations to the country of origin,</li> <li>– notification of expected population movements (for example, during a sporting event).</li> </ul> </li> </ol>
Case classification and laboratory testing	<ul style="list-style-type: none"> <li>• Cases must be classified by the case analysis committee after review of laboratory results and epidemiology.</li> <li>• Laboratory and epidemiology teams of each country must develop a specific algorithm to classify the cases. Component of the algorithm must include the following: (a) protocol for IgM result confirmation; (b) instructions for use of additional serological tests and viral detection techniques; (c) guidelines to determine when a second specimen must be collected; and (d) guidelines on when to conduct testing for other etiologies.</li> </ul>
Laboratory quality control	<p>To support documentation, it is essential that laboratory information be of the highest quality. Therefore, the following elements are required:</p> <ul style="list-style-type: none"> <li>• Laboratories must maintain their participation in the global proficiency testing program for serologic testing.</li> <li>• Laboratories must send specimens for confirmation twice a year, according to the schedule set by the PAHO/WHO Laboratory Coordinator.</li> <li>• All laboratories must be accredited according to the standards of the WHO Laboratory Network.</li> </ul>
Information reporting and sending to the Strain Bank	<ul style="list-style-type: none"> <li>• Laboratories conducting virus sequencing must notify the PAHO/WHO Laboratory Coordinator as soon as information on the virus genotype is known.</li> <li>• Laboratories must send the genotype information to the WHO database and to the PAHO/WHO Laboratory Coordinator within two months after sequencing is complete.</li> </ul>

1 When the number of doses is >0 and the information source can be verified.

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goal of rubella elimination, the government of Brazil planned the mass vaccination of adults for 2008. The national vaccination campaign would also help maintain measles elimination by vaccinating groups of susceptible adults against measles.

### Target Population for the Campaign

In order to define the target population for the national rubella campaign, national immunization program data on MR vaccine doses administered between 1992 and 2006 were analyzed to identify age groups with the greatest number of previously unvaccinated individuals. This analysis indicated that groups missed by previous rubella vaccination strategies were concentrated in adults aged  $\geq 20$  years: 60% of men between the ages of 21-25 years and 95% of those  $\geq 26$  years were likely unvaccinated. Although a much smaller percentage of women were likely to be unvaccinated as a result of prior vaccination campaigns, as much as 60% of women aged 36-40 years had likely been missed. Based on the analysis, the campaign would target adult men and women aged 20-39 years (an estimated 31.4 million men and 32.1 million women) in all 27 states. In addition, five states (Maranhao, Minas Gerais, Mato Grosso, Rio de Janeiro, and Rio Grande do Norte) would include adolescents aged 12-19 years, due to estimated MMR coverage below 90% during initial catch-up campaigns among children aged 1-11 years in these states. There were an estimated 6.7 million persons in this age range in the five states. The total population to be vaccinated was 70,149,025 persons.

### Vaccines

Two vaccines were used for the national campaign. For the 20-39-year old age group, approximately 70 million doses (in 10-dose vials) of MR vaccine produced by Serum Institute of India were imported and distributed to all state immunization programs. For the 12-19-year age group, 10 million doses (also in 10-dose vials) of MMR vaccine produced by Biomanguinhos, a Brazilian public sector vaccine manufacturer, were distributed to the five states vaccinating this age group. Both vaccines included the Wistar RA 27/3 rubella vaccine strain. The MR vaccine included the Edmonston Zagreb measles strain, while the MMR vaccine included the Schwartz measles strain and the RIT 4385 mumps strain derived from the Jerry-Lynn mumps strain.

### Vaccination Strategies

Prior to launching the campaign, vaccination activities were conducted in indigenous populations throughout Brazil, as well as in institutions and workplaces with populations in the target age range, including factories, large companies, public institutions, schools, and universities.

The national rubella elimination campaign was launched at a primary health care center in the city of Niteroi, in the state of Rio de Janeiro, on Saturday, 9 August 2008. The date was chosen to coincide with the second national immunization day against polio for children aged  $< 5$  years. The goal of the first phase of the rubella elimination campaign was to provide MR vaccine for adults aged 20-39 years (and MMR vaccine for adolescents aged 12-19 years in five states) at more than 30,000 vaccination posts throughout Brazil that routinely administer vaccines. Working hours were extended in many health centers during the period of the campaign, including

evening or weekend hours. Persons were vaccinated regardless of previous vaccination or history of rubella. Pregnant women were instructed to defer vaccination until after giving birth. MR vaccines for post-partum vaccination were distributed to maternities and health centers.

In addition to vaccination at health care centers, mobile teams set up vaccination booths in areas with concentrations of people and transit points, including marketplaces, shopping centers, ports, airports, bus terminals, metro stations, stadiums, recreational areas, churches, and regional fairs. Mobile vaccination teams were used throughout the campaign, providing flexibility to reach groups of individuals that had not been vaccinated at health care centers. Saturday, 30 August was chosen as a central day for national media to motivate those persons who had not yet been vaccinated to seek out a vaccination post.

### Communication and Social Mobilization

Prior to launching the media campaign, a survey of Brazilians in the target age population showed that 94% of those surveyed would receive vaccine to help eliminate rubella. As a result, the communication strategy focused on disease elimination. For the launch (together with the polio immunization day), the slogan was "*Vacinação virou programa família*" (Vaccination has become a family program). Television and radio spots reminded audiences that Brazil had eliminated polio and now the country was eliminating rubella. Parents were encouraged to take their children aged  $< 5$  years for polio vaccination and to be vaccinated themselves against rubella if they were in the target age group.

Following the media launch, mobilization strategies quickly switched to focus on the target population of adults and adolescents. Messages from sports stars, television celebrities, and popular musicians encouraged people to join the campaign to eliminate rubella. The slogan was "*Brasil livre da rubéola*" (Brazil free of rubella).

A final media strategy, as the campaign approached the goal of reaching 95% of the target population, focused on persons who had not yet been vaccinated during the campaign. The slogan was "*Só falta você*" (Only you are missing). The idea was to call attention to the risk of rubella and CRS cases in children because of unvaccinated adults in the population.

### Reaching Coverage Goals

The national rubella elimination campaign was scheduled to conclude on 12 September, five



Lula da Silva (center), President of Brazil, celebrates his country's successful vaccination campaign. At left is Dr. José Gomes Temporao, Minister of Health, and at right, Diego Victoria, PAHO/WHO Representative in Brazil.

Photo: Tatiana Stuckert/Ministry of Health, Brazil.

weeks after the official launch. At the conclusion of five weeks, an estimated 84% of the target population had been vaccinated. Over the next 14 weeks, immunization teams worked in areas with low coverage to find unvaccinated groups and provide additional vaccination opportunities.

When all vaccination activities were concluded, 67.5 million doses of MR and MMR vaccines had been administered, corresponding to 95.8% coverage of the target population. Coverage among females was 98.4% versus 93.1% among males. Estimated coverage among 20-39-year olds was 94.9 % while coverage among 12-19-year olds surpassed 100% of the target population in the 5 states. Possible explanations include underestimated populations of adolescents in these 5 states and vaccination of children younger than 12 years of age during the campaign.

## Vaccination in Border Areas

Brazil shares borders with all other countries of South America except Chile and Ecuador. With the exception of Argentina, all of Brazil's neighbors had completed supplemental immunization activities to eliminate rubella prior to 2008. During Brazil's national rubella campaign, vaccination activities were conducted in border areas in order to vaccinate Brazilians living in neighboring countries as well as populations in transit who may have missed previous opportunities to be vaccinated against rubella.

## Vaccine Safety

Brazil's national immunization program maintains a reporting system for events supposedly attributable to vaccination or immunization (ESAVIs). ESAVIs are reported by state or local immunization coordinators. Training materials for the rubella campaign included descriptions and frequencies of adverse events reported following administration of MR and MMR vaccines. Most frequencies were obtained from clinical studies.

During the national rubella campaign, the ESAVI surveillance system received 2,624 ESAVI notifications, corresponding to a rate of 3.6 events per 100,000 doses administered, which is much lower than rates reported in the literature. The most common were mild reactions: generalized rash (n=756: 29%); fever (313; 12%); lymphadenopathy (190: 7%); and local intense reactions (pain/redness/heat) (517: 20%).

## Information system

An online information system (available at <http://>

[pni.datasus.gov.br](http://pni.datasus.gov.br); accessed 13 April 2009) provided public access to vaccination coverage estimates in "real-time", as soon as data were entered by municipal health departments. Information available in tables and graphs included numbers of doses administered by age group, gender, state, and municipality, as well as the estimated percentage of the target population vaccinated in each stratification. Detailed information permitted targeting of population groups with low estimated coverage at the municipal level.

## Supervision

Technical support to state and municipal immunization programs from the national immunization program helped to plan and evaluate vaccination activities. During the campaign, PAHO assisted the Ministry of Health by bringing international campaign experts to assist in states with large populations and in those vaccinating both adolescents and adults. These consultants possessed vast experience in campaign planning, implementation, and evaluation and technical cooperation was achieved through the transfer of "know-how" from country to country in the Region. During the campaign, PAHO coordinated a visit of international observers to share the experiences and lessons learned in Brazil with countries in other regions of the world beginning the process of rubella elimination.

## Monitoring and Evaluation

To verify coverage estimates based on doses administered, vaccination teams were asked to interview 100 persons in the target age group in a randomly selected area when administrative coverage had reached 95%, or at the completion of planned activities. In total, 1-2% of the target population was interviewed. Based on data from 15 of 27 states, 658,000 (92%) of 719,000 persons interviewed had been vaccinated. These rapid assessments also helped to identify unvaccinated groups in areas where coverage had not reached 95%. In general, rapid coverage monitoring (RMC) found slightly lower coverage than administrative estimates, except in cities where the population figures may have overestimated the resident population. RCM also provided information about why some individuals remained unvaccinated. The main reason given was that the person had not had time to go to a vaccination post. As a result, more mobile vaccination teams were used during the extended period of the campaign to provide greater access to working people.

## Effect on Rubella Transmission

The launch of the rubella campaign coincided with a peak in the number of confirmed rubella cases. Some of these confirmed rubella cases may have been exposed both to wild-type rubella and vaccination. The rubella campaign led to a steep decline in the number of confirmed rubella cases after epidemiologic week 35. The last confirmed rubella cases in 2008 had onset of disease in epidemiologic week 53 and occurred in the states of São Paulo and Mato Grosso do Sul. There have been no confirmed rubella cases in 2009.

## Next Steps

With this campaign, Brazil is on the verge of eliminating rubella and CRS. Surveillance for febrile rash illnesses with laboratory testing of all suspect cases for evidence of acute measles or rubella infection will determine if rubella transmission has been interrupted. Twelve months after the last confirmed indigenous case of rubella, Brazil will apply to the Regional Commission for certification of elimination of measles, rubella, and CRS.

In Brazil, emphasis will be placed on obtaining specimens for viral isolation and characterization from any identified chains of transmission of measles or rubella virus. In persons presenting with suspect rash illness with a history of travel to areas where these viruses circulate, appropriate specimens must be collected at first contact with health services. Brazil recommends that international travelers entering the country have up-to-date vaccination against measles and rubella. While measles and rubella viruses circulate in other regions of the world, Brazil will remain at risk of importations. Highly sensitive surveillance and immediate initiation of control activities in response to suspect measles and rubella cases need to be maintained. ■

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# Health and Integration Processes in the Americas: Measles- and Rubella-free Borders

## Introduction

The regional integration processes promoted by the Pan American Health Organization (PAHO) in the Americas have created an opportunity for health and other social measures. In the Southern Cone, MERCOSUR<sup>1</sup> is exploring the harmonization of health regulations. The Andean Community of Nations (CAN)<sup>2</sup> has a health sector integration mechanism, the Hipólito Unanue Agreement, which promotes individual and joint country efforts to improve the health of their peoples.

Projects for technical cooperation among countries (TCC) are other examples of integration processes. As reciprocal horizontal processes, they are also described as South-South cooperation, in which two or more countries work together to build individual and joint capacities by sharing knowledge, skills, resources, and technologies. This article describes the first TCC to take place in South America with an emphasis on vaccination in border areas for the elimination of rubella

1 MERCOSUR countries are Argentina, Brazil, Paraguay, and Uruguay.

2 CAN countries are Bolivia, Colombia, Ecuador, and Peru.

and congenital rubella syndrome (CRS) and the consolidation of measles elimination.

## Background

Border areas are a priority for PAHO Member States. The improvement of health conditions among border area populations helps reduce inequities and contributes to the attainment of sustainable health benefits. For this reason, PAHO supported the TCC project to immunize populations against measles and rubella in border areas of all countries sharing a border with Argentina and Brazil. From August to December 2008, both countries conducted simultaneous mass vaccination campaigns for the elimination of rubella and CRS. Twelve countries were involved in the project: Argentina, Bolivia, Brazil, Chile, Colombia, French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay, and Venezuela.

The South American TCC benefited from the political and technical support from MERCOSUR member countries and associated states. The final report of the meeting of Ministers of Health, held in June 2008, stated that since Argentina and Brazil are virtually the last countries in MER-

COSUR to conduct mass vaccination activities to eliminate rubella and CRS, neighboring countries are requested to simultaneously conduct joint cross-border vaccination and surveillance activities.<sup>(1)</sup>

Brazil's border is 15,719 km long and runs along 11 states. The 121 municipalities on the border have an estimated population of 3 million. Argentina's border is 9,861 km long and runs along 23 provinces the Ciudad Autónoma of Buenos Aires and 77 municipalities. Migration to Argentina consists largely of foreigners born in neighboring countries (Bolivia, Brazil, Chile, Paraguay, and Uruguay) who are known as "border migrants."<sup>(2)</sup>

## Progress

At the meeting of the South American TCC in Asunción, Paraguay, from 1-2 April 2009, staff from the Ministries of Health of Argentina, Bolivia, Brazil, Colombia, Chile, Paraguay, Peru, and Uruguay discussed the progress made with vaccination in border areas. Nearly 20,000 people were vaccinated at largely formal border crossings during the period August-December 2008.

Among the agreements resulting from the meeting was the commitment to hold cross-border meetings to program and evaluate supplemental vaccination activities. Each country will issue a general directive to all border municipalities authorizing such meetings and will indicate the expected results. Bolivia will confirm the vaccination status of Brazilian students attending universities in Benin, Santa Cruz, and La Paz, given the heavy flow of this population at formal and informal crossings between the two countries.

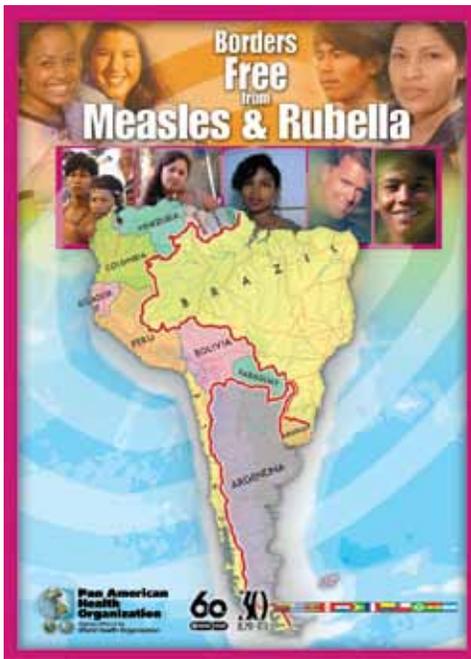
One of the main recommendations of the meeting was the formation of a permanent immunization committee in MERCOSUR and CAN to address issues of mutual interest and jointly implement solutions among countries. Among these issues are the intercultural approach that must be used for vaccination in border areas; vaccination mechanisms at informal border crossings; the flow of epidemiological surveillance information in border areas; and the preparation of regional recommendations for international travelers to the Americas vis-à-vis their measles-rubella immunity, within the framework of the implementation of the International Health Regulations (IHR 2005).

## Additional Activities at the Argentina-Brazil-Uruguay Border

One of the areas where measles and rubella elimination is considered to be at risk is the bor-

### Why Vaccinate in Border Areas?

- To eliminate rubella and congenital rubella syndrome and maintain measles elimination in the Americas, it is critical to identify groups that, because of sociocultural factors and access issues, are more likely to be excluded from regular vaccination activities.
- Border populations move from country to country, due to the agricultural cycle, tourism, and trade, among other factors. They are more likely to be excluded from vaccination as they find themselves in neighboring countries during their home country's vaccination campaigns for adolescents and adults (accelerated campaign). Moreover, adult measles and rubella vaccination is not part of the routine immunization program.
- The exclusion of border populations can lead to the formation of pockets of measles and rubella susceptibles. Because they move from country to country, these populations can put the Americas at higher risk of imported and secondary cases, thus jeopardizing the successes achieved to date in measles and rubella elimination.
- The implementation of an integrated vaccination strategy in border areas during the 2008 mass vaccination campaigns in Argentina and Brazil offered a valuable opportunity to capture these vulnerable populations. The result was the development of a differentiated vaccination strategy that is applicable to other regions with elimination goals.
- Improving the health status of people in border areas through vaccination and other health services that are frequently offered together (for example, vitamin A distribution) contributes to the reduction of health inequities in the Region.



der between eastern Argentina, southern Brazil, and northern Uruguay. Health authorities from Brazil and Uruguay recently met in the border city of Santa do Livramento to discuss specific activities to guarantee vaccination of the unvaccinated, how to handle the flow of people at borders, and coordinate cross-border surveillance for early detection of measles and rubella cases.

As part of Brazil's 2008 rubella campaign, rapid coverage monitoring (RCM) was conducted in all

municipalities in Rio Grande do Sul, one of the states most affected by the rubella outbreak of 2007-2008 (n= 2852).<sup>(3)</sup> The group most affected by the outbreak was those aged 20-29 years, with men representing a higher proportion of the unvaccinated (75%). RCM results showed a lack of uniform coverage in municipalities of Rio Grande do Sul, and low campaign coverage, resulting in a cohort of people, largely men, who would lack protection against measles and rubella.

The following activities will be conducted along the border with Argentina and Uruguay from June through December 2009:

- Identification and vaccination of the unvaccinated, based on data from the RCM;
- Reporting of the results of the campaign and RCM to municipal managers, immunization teams, and the general public;
- Frequent meetings among the health authorities of border cities to discuss and coordinate joint vaccination and surveillance activities and to share data on coverage and suspect cases; and
- Increased epidemiological information sharing between Uruguay and Rio Grande do Sul (preferably electronically).

## Conclusions

The South American TCC project is a mechanism that links two important systems in South

America: the Andean Community and MERCOSUR. It also reflected the desire of countries of the Region to integrate public health measures. The TCC is aligned with the PAHO principles of Pan-Americanism and solidarity, along with the integration principles of the Union of South American Nations (UNASUR). This project's area of execution also included the Chaco (territories shared by Argentina, Brazil, and Paraguay) and Amazon region (territories shared by Brazil, Colombia, and Peru), transnational areas designated a priority by PAHO because of the high vulnerability of the population living in these territories.

The best practices and lessons learned from the South American TCC should contribute to any ongoing activity that countries might wish to undertake along their borders for the benefit of transient populations. Continuing improvements in the coordination of activities among all levels of management—national, state, provincial, municipal—will be essential to the planning and execution of border activities. ■

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## Eliminating Rubella and CRS in the Americas: An Achievable Dream

Rubella elimination in the Americas has been defined as the interruption of endemic rubella transmission and the absence of cases of congenital rubella syndrome (CRS) associated with endemic transmission in all the countries over a period of 12 months or more. With the implementation of the elimination strategies recommended by the Pan American Health Organization (PAHO), approximately 440 million people—children, adolescents, and adults—have been vaccinated for the most part with measles-rubella (MR) vaccine in the catch-up (140 million), follow-up (50 million), and accelerated (250 million) campaigns conducted by the countries of the Region from 1998 to 2008.

The last countries to conduct and/or conclude their mass rubella vaccination campaigns in 2008 were Brazil, Haiti, and Argentina. With its "Rubella-free Brazil" campaign, that country

managed to immunize around 67 million people aged 20-39 years (96% coverage) and young people aged 12-19 years in five states. Despite many challenges, Haiti completed its national campaign against rubella, measles, and CRS in the age group 1-19 years. Due to the uncertainties in coverage results, the country will launch a national survey in June to evaluate coverage homogeneity and identify potential areas and/or groups that have not been vaccinated. Argentina achieved 76% coverage by late December 2008 with its campaign "If you're a man, get vaccinated" targeting men aged 16-39 years only. In 2006, the country had vaccinated women aged 15-39 years only, achieving 99% coverage. In June 2009, Argentina launched a supplemental vaccination campaign targeting men in order to obtain uniform 95% coverage in all its provinces. The Region of the Americas has limited endemic

virus circulation to Argentina, a country that reported three rubella cases as of epidemiological week 4 of 2009, in the Chaco Province, and two CRS cases. With the intensification of supplemental vaccination and surveillance activities, it is anticipated that it will finally be possible to interrupt endemic circulation in the Hemisphere. However, it is imperative countries do not let their guard down.

## Main Challenges

Maintaining measles, rubella, and CRS elimination presents many challenges for the Region, among them:

- The risk of importing the virus from other regions of the world;
- The emergence of secondary cases associated with importation;
- Outbreak prevention and rapid response;
- Reaching excluded populations by giving them a second opportunity to receive the MR vaccine through high-quality follow-up campaigns;

- Integrated surveillance system strengthening and active private-sector participation;
- Monitoring of viral excretion in CRS cases; and
- False positive/negative results of sporadic cases and limited specimens for viral detection/isolation.

Circulation of the measles and rubella viruses in other regions of the world puts the Americas at constant risk of importation. According to the World Tourism Organization, over 148 million tourists visited the Region in 2008: North America, 98.5 million South America, 21 million and the Caribbean, 20 million.

Imported cases are unavoidable. Therefore, countries must be adequately prepared by having high-quality surveillance systems in place to

identify such cases. They must maintain high levels of population immunity and conduct adequate monitoring of susceptibles to limit the number of secondary cases. One way to achieve this high level of outbreak preparedness is by developing and implementing a national rapid response plan.

Complacency about the success achieved can contribute to the reestablishment of endemic circulation of the measles virus, primarily because of low coverage obtained by the routine program and follow-up campaigns. Low coverage in the routine program could trigger mumps outbreaks and devastating rubella outbreaks.

Furthermore, despite country efforts to achieve high vaccination coverage in the routine pro-

gram and follow-up campaigns, pockets of measles and rubella susceptibles will accumulate. It is therefore essential to guarantee high-quality catch-up campaigns every four or five years and achieve coverage >95%. Excluded populations, i.e., people who have never been vaccinated, should be targeted, in an effort to promote equity. A thorough analysis of protected cohorts will need to be conducted to identify the population groups to vaccinate.

Rapid coverage monitoring (RCM) remains an integral element of supplemental vaccination activities and should be conducted at the end of

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## Measles Virus Importations: A Continuing Struggle for the Americas

Several imported measles outbreaks have occurred in the Region of the Americas in recent years, resulting in a relatively small number of cases secondary to importation. In the period 2008-2009, there were 187 secondary cases from a total of 63 importations (Tables 1 and 2). In 23 cases, the origin of the infection was unknown.<sup>1</sup> Sixty percent of imported measles cases in the Americas during that period came from Europe, with outbreaks occurring in Argentina, Canada, Chile, Ecuador, Jamaica, Peru, and the United States. Mounting a rapid response to limit these outbreaks has involved the intensive mobilization of human and financial resources in countries. Recent experiences in Chile and Peru reveal an estimated cost of US \$12,400 and \$40,000, respectively (as reported by countries), to contain the outbreak. No secondary cases were reported in either country.

The private sector plays a key role in the detection and rapid response to outbreaks. In the period 2008-2009, 77% of measles cases reported in Latin America and the Caribbean were detected in the private sector.<sup>2</sup> Therefore, private-sector participation in surveillance activities should be strengthened by establishing partnerships with medical associations and scientific societies. Partnerships should also be considered with tourism boards since the virus is usually imported by them to the Region.

Given the tremendous investment that coun-

tries are making to contain outbreaks, measles elimination efforts in other regions of the world

should be intensified. Such an initiative would be a step toward global measles eradication. The World Health Organization (WHO) will conduct a measles eradication feasibility study, whose final report will be submitted to the WHO Executive Board in 2010. ■

**Table 1. Imported Measles Cases, the Americas, 2008**

Country	Total Importations	Total Cases Associated With Importation	Source
Ecuador	1	0	Italy
Jamaica	1	1	United Kingdom
Peru	1	0	India
Canada	8	54	France, India, Israel, Morocco, Pakistan, Switzerland
United States*	24	102	Belgium, China, Germany, India, Israel, Italy, Philippines, Russia, Switzerland, United Kingdom, Vietnam

\* In 2008, the United States reported 14 cases whose source of infection was unknown.

**Table 2. Imported Measles Cases, the Americas, 2009\***

Country	Total Importations	Total Cases Associated With Importation	Source
Argentina	1**	2	United Kingdom
	1	0	United Kingdom
Canada	1	5	Belgium
	1	0	China
	1	0	United States
Chile	1	0	France
United States***	22	23	Cabo Verde, China, India, Italy, United Kingdom

\* Data as of EW 23/2009.

\*\* The case corresponds to EW 51/2008; however, the secondary cases appeared in EW 2/2009.

\*\*\* As of EW 22/2009, the United States reported 9 cases whose source of infection was unknown.

1 Data as of Epidemiological Week 23/2009.

2 Data as of Epidemiological Week 23/2009

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follow-up campaigns. RCM can confirm whether two doses of measles-mump-rubella vaccine have been administered to the population aged 1-4 years, which will then make it possible to identify needs for the strengthening of routine services.

Monitoring the excretion of rubella virus from CRS cases is also essential for elimination. In 2008-2009,<sup>1</sup> the Americas reported a total of 37 cases in Argentina (n=3), Brazil (n=31), Chile (n=2) and the United States (n=1). The rubella virus can be excreted for 12 months; thus, in all cases of CRS and congenital infection, a specimen should be collected for viral detection when the child reaches age 3 months. If the result is negative, a second specimen should be collected after 30 days. If the second specimen is negative, it can be established with certainty that the case has stopped excreting the virus.

One of the major challenges to the measles/rubella laboratory network is the handling of sporadic cases with positive or inconclusive re-

1 Data as of Epidemiological Week 23/2009.

sults, particularly suspect cases with no history of travel, epidemiological link, or vaccination history. As diseases become less common due to high vaccination coverage, the positive predictive value of laboratory tests declines, giving rise to a higher number of false positives. This issue has been extensively discussed in the *Immunization Newsletter* (see Vol. XXX, Number 1, February 2009).

Finally, viral surveillance needs to be improved. Very few specimens are currently processed for viral detection/isolation and molecular typing. These laboratory results would help determine the source of infection in imported cases. In the final stretch of the rubella elimination initiative, molecular epidemiological data will help with classifying cases and documenting the elimination of endemic transmission.

### The Way Forward

Following the adoption, in 2007, of resolution CSP27.R2 urging Member States to begin documenting and verifying the interruption of endemic transmission of the measles and rubella viruses in the Americas, PAHO developed a Plan

of Action (See page 1 article). Consideration has been given to implementing the documentation and verification process over a three-year period with a high-quality surveillance. The plan will be submitted to the XVIII Meeting of the Technical Advisory Group (TAG) on vaccine-preventable diseases for its recommendations. The plan will help guide countries and their national commissions as they prepare and consolidate evidence that endemic measles and rubella transmission has been interrupted, using complete and valid data. ■

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