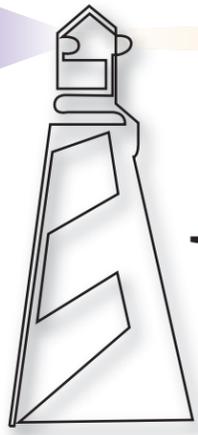




Comprehensive Family Immunization Project / FCH



Measles, Rubella and CRS

Rubella Watch

Compendium of Rubella and Congenital Rubella Syndrome Articles

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Prologue



In 1994, the Member States of the Pan American Health Organization/World Health Organization (PAHO/WHO) adopted the initiative to eliminate measles from the Americas. In 2003, they adopted the initiative to eliminate rubella and congenital rubella syndrome (CRS) from the Region. In order to implement both initiatives, vaccination and surveillance strategies were executed with the objective of rapidly reducing the number of new cases and interrupting endemic transmission of both diseases.

It is my privilege to present this compendium of rubella and CRS articles, designed to tell the story of measles, rubella, and CRS elimination and compiling all the articles published on these diseases in the PAHO/WHO *Expanded Program on Immunization (EPI) Newsletter*, now the *Immunization Newsletter*. The objective of the present publication is to document the regional experience. In particular, it aims to convey to countries and other regions of the world the lessons learned, along with experiences gained from other vaccine-preventable disease elimination initiatives and best practices developed. A growing body of knowledge on how to implement these initiatives and achieve the elimination goal has been accumulated over the 15 years of this process.

The compendium also attempts to pay a graphic and written tribute to the legion of men and women—health workers and volunteers—who have contributed to measles and rubella elimination through their work in and with communities, even under unfavorable circumstances. Without their persistence, dedication, and unwavering determination, the initiative could not have moved forward.

The Americas have laid the foundation for the elimination of vaccine-preventable diseases. The experience of the Region in measles and rubella elimination has demonstrated that we can conquer a disease if we work in unison, recognizing the strength of team work and embracing the richness of diversity among people and communities. The pages of this book highlight Pan-Americanism in action, which has promoted continuous exchange and learning between peoples of the Americas.

Finally, this publication contributes to the strengthening of one of PAHO's institutional principles by which shared information and knowledge is a source of power and serves to improve the condition of all people —*pro salute Novi Mundi*.

Mirta Roses Periago
Director

Preface



The partnership between countries and the international community has played a decisive role in the achievement of immunization goals in the Western Hemisphere. The focus of this partnership has been to support country efforts to build robust and equitable national immunization programs that can effectively control vaccine-preventable infectious diseases and respond to emergency epidemics as these arise. The legacy of this joint collaboration is a Region with the world's lowest morbidity and mortality rates from vaccine-preventable diseases and one of the largest and most sophisticated network embracing countries, civil society, nongovernmental organizations, bilateral and multilateral organizations, the scientific community, and the private sector.

The proven impact of national immunization programs in the Americas in reducing poor health due to vaccine-preventable diseases has placed immunization goals prominently on the global agenda for sustainable development and poverty reduction. The Region remains a pioneer in generating valuable knowledge and experience in the use of strategies and tactics which continue to benefit immunization programs worldwide. Breakthroughs include critical knowledge in

improving managerial capabilities and accountability of public health staff responsible for immunization programs at the national and sub-national levels, even in countries undergoing political and economic hardship.

The *EPI Newsletter*, established in 1979, has chronicled the history of the successful partnership between the Pan American Health Organization (PAHO), national immunizations programs, and the international community, beginning at a time when vaccination coverage for children under the age of 1 year old barely reached 25%–30% for diphtheria, tetanus, pertussis, polio, measles, and tuberculosis, to today's coverage of over 90%. The *EPI Newsletter* has documented PAHO's critical work with countries in establishing an adequate surveillance, services delivery, and diagnostic infrastructure, and in ensuring the utilization of quality vaccines and the presence of regional production capacity for vaccines of public health importance. The *EPI Newsletter* has underscored the contribution of the Revolving Fund for Vaccine Procurement, created as part of the Expanded Program on Immunization (EPI) 32 years ago. The Revolving Fund is a public good that has facilitated the availability of high-quality vaccines supplied in adequate quantities, in a timely fashion, and at the lowest prices. Likewise, it has highlighted PAHO's work with its Members States in the achievement of broad-based community and public-private partnerships that continue to bring us closer to realizing the goal of equitable vaccination.

Immunization programs in the Region are now responding to the rapid technological changes in the field of vaccination brought about by the development of new generations of vaccines of public health importance. These vaccines have the potential to simplify immunization delivery, improve the performance of existing vaccines, and protect against other vaccine-preventable diseases. However, this new breed of vaccines is considerably more costly calling for heightened cooperation among public and private partners alike.

I congratulate the *EPI Newsletter*, as it celebrates its 30 years, for its efforts to keep us abreast of important milestones achieved by the countries of this Region in partnership with the international community and urge it to continue its strategic role of sharing critical information and knowledge that will enable immunization programs throughout the world to face the challenges that lie ahead.

Socorro Gross-Galiano
Assistant Director



Gina Tambini, MD, MPH
Area Manager for Family and Community Health
Pan American Health Organization

Contributing to the Sharing of Experiences and Continuous Learning in the Americas

Effective knowledge management is essential for improving the efficacy of interventions aimed at increasing gains in health and improving the quality of life of the people of the Americas. The documentation of experiences, lessons learned, and/or good practices in a specific area is a classical example of a public good that has become critically important in a world where booming communication technologies play a dominant role.

This publication is a compendium of all the rubella and congenital rubella syndrome (CRS) articles published in the *Immunization Newsletter*, taking on the challenge of systematizing the cumulative experience of the Americas in eliminating rubella and CRS. On reviewing the content of this publication, the reader will discover that the vast national and local experiences presented reflects both the diversity of our Region as well as common epidemiological trends, achievements, and challenges of the elimination initiative.

For almost 30 years, timely dissemination of these experiences through the pages of the *Immunization Newsletter* has enabled health professionals in the countries to develop and strengthen a wide range of capacities. Many of the articles required the collaboration of these professionals, thus helping to improve their skills in analysis, synthesis, and praxis, demonstrating that knowledge derived from the rubella elimination initiative could be applied in daily practice. Scientific writing skills are another competency that was developed, leading to quality improvements in scientific knowledge production in the Region.

Perseverance in the publication of rubella and CRS articles has contributed to the dissemination of knowledge on the elimination of vaccine-preventable diseases to the Member States of the Pan American Health Organization and to strategic partners. The Region of the Americas is facing a changing landscape, and with it, new challenges to the continued promotion of health and equity. It is therefore essential that inspiring instruments, such as this publication, are available to facilitate the implementation of successful health initiatives and to improve the quality of life in the countries of the Americas. I am certain that this publication will provide a public health legacy for present and future generations.

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Cuauhtémoc Ruiz Matus, MD, MPH
Senior Immunization Advisor
Pan American Health Organization

Promoting Equitable Access to Information and Knowledge

For 30 years, the *Immunization Newsletter* has been the mechanism for disseminating information on best practices and lessons learned from the Expanded Program on Immunization (EPI) in the Region of the Americas. Each of its articles has been testimony to the resolve, dreams, hopes, and achievements of intrepid health workers and communities in their efforts to control vaccine-preventable diseases. Examples of these triumphs are the epidemiological control of measles and rubella, which, through the firm tenacity of the countries of the Americas and the Pan American Health Organization/World Health Organization (PAHO/WHO), the lofty dream of a Hemisphere free of measles, rubella, and congenital rubella syndrome (CRS) is becoming a reality.

This compendium of measles and rubella articles presents historical proof of the joint efforts to eliminate the two diseases, thus revealing the commitment, effort, humanity, and extraordinary technical capacity provided at local and national levels to make elimination possible. It also reflects the Pan American spirit and ideal; through united efforts we have made these achievements possible. We cannot forget that this success is a victory of partnerships.

Today, when the world is discussing the possibility of eradicating measles, documentation of the experience of the PAHO/WHO Member States in measles and rubella elimination represents a wealth of knowledge for the annals of public health, promoting equitable access to knowledge and information to foster evidence based decision-making and best practices. The ability to disseminate and share knowledge has been key to the success of the measles and rubella elimination initiatives in our Region: through communication we have been able to inform, encourage, recognize, and motivate the people of the Americas to remain faithful to their intense commitment to equity and to reach the highest attainable level of health for all by all.

May this compendium serve as homage to all those, who from diverse locations, positions, and responsibilities have managed to make the Americas a measles- and rubella-free hemisphere. This publication will surely foster a heightened awareness of history and a better understanding of the present. Above all, it will better prepare us for a bright future in public health, especially in the control of vaccine-preventable diseases.



Ciro A. de Quadros, MD, MPH
President of the Technical Advisory Group on
Vaccine-preventable Diseases
Executive Vice President
Albert B. Sabin Institute

Testimony of the First Editor

The Pan American Health Organization (PAHO) Expanded Program on Immunization (EPI) was established by Resolution XXVII of the XXV Meeting of the Organization's Directing Council, in September, 1977. In May, 1979, the Program published the first issue of what was then called the *EPI Newsletter*.

Introducing this PAHO periodical publication, the then Chief of the PAHO's Division of Disease Control, Dr. Luis Carlos Ochoa, stated that the newsletter was "created in response to the suggestions and recommendations of more than 130 nationals from all the Latin American countries that participated in the four regional EPI courses held from May 1978 to January 1979." He also stated that the purpose of the periodical publication was "to continue the process begun at these courses, of exchanging skills, knowledge and information relevant to the Expanded Program on Immunization in the Region of the Americas."

The publication, he stated "was intended to create a flow of information in the Region about all aspects of program implementation, from scientific articles on the target diseases and vaccination to practical matters of the day-to-day running of an immunization program."

And indeed, over the last 30 years this publication, now called *Immunization Newsletter* has maintained a high standard of scientific quality in all these aspects serving as one of the main vehicles of information to program managers and policy makers.

Most importantly, the newsletter has stimulated program officers, both at the country level as well as members of the EPI staff at PAHO, to strive to collect and analyze information relevant to program implementation and contribute with articles and news that most certainly have helped set and/or modify strategies relevant to the control and eradication of vaccine-preventable diseases in the Region of the Americas. It has also served as a forum for the discussion of issues and ideas that helped improve the quality of national programs, as well as created an *esprit de corps* or group morale, among those involved with the program.

I want to take this opportunity to congratulate the entire staff of immunization programs throughout the Region and those at PAHO for the outstanding work that has been developed over these last 30 years, and that have been reflected in the quality of the publication.

Finally, I pay tribute to the Editors and Co-Editors that have followed after my tenure, as well as all the contributors to the various issues of the newsletter, for maintaining the same spirit that guided the launching of this important periodical publication.



Jon Kim Andrus, MD
Immunization Advisor
Pan American Health Organization

Through Information Exchange, Cultivating a Culture of Prevention

In the 32 years since the Expanded Program on Immunization was launched in the Americas, polio has been eradicated and measles has been eliminated. Perhaps more importantly, thousands of health workers working at the point of service have been trained in the principles of good public health practice and prevention. These same health workers have consistently executed the necessary strategies to reduce morbidity and mortality of vaccine-preventable diseases. Improving management of immunization services at district-level is the cornerstone of their work. It is upon this foundation of good public health practice that the vision for future public health improvements rests.

Critical for the progress achieved and this vision of the future has been the sharing of information and experiences between countries. To that end, we believe the *EPI Newsletter* subsequently renamed the *Immunization Newsletter*, has played a vital role in the documentation of strategies and tactics that are successful in reducing the disease burden of vaccine-preventable diseases. Continuously improving the way we manage information should also lead to increased knowledge and improved behavioral practices.

While protecting and sustaining the achievements in polio and measles initiatives, the program is posed to complete and sustain the elimination of rubella and congenital rubella syndrome (CRS). Like polio, CRS causes life-long suffering for children and their families. Efforts to reach and vaccinate adults should impact women's health given that rubella elimination has reached those who are marginalized and otherwise do not benefit from preventive services.

Ultimately, the future of immunization will hinge upon how well we leverage inter-disciplinary partnerships, and how well we share our experiences in reducing existing health disparities. New, life-saving vaccines must be made available to those who need them most. Within the next 10 years as many as 10 new vaccines may become available. We now have vaccines for prevention of human papillomavirus infection and cervical cancer, but they are not accessible to our communities in need at their current prices. As these vaccines are introduced, PAHO's role will be to ensure that they are made available in a sustainable fashion to those who need them most, in particular the poor, the underserved, and the marginalized populations of our hemisphere. To that end, the *Immunization Newsletter* will continue to be ready and willing to support health program services in all Member States of the Pan American Health Organization.

1983

February 1983,
Volume V, Number 1

Rubella Experience in the US

The 1964-65 epidemic of rubella in the United States left approximately 20,000 infants affected with the congenital rubella syndrome (CRS), caused an estimated 30,000 stillbirths, and resulted in an estimated 5,000 therapeutic abortions. The cost to the U.S. economy was about \$1.5 billion.

In 1969 three rubella vaccines were licensed and a national rubella immunization program was developed to distribute and administer vaccine. Since 1969 rubella vaccine has been used widely and more than 100 million doses have been distributed. Currently, only the RA 27/3 strain of rubella virus vaccine is distributed in the U.S. RA 27/3 was licensed in 1979 and has replaced the earlier rubella vaccines.

Use of vaccine has led to a dramatic decline in reported cases of rubella. Compared to the 57,686 cases reported in 1969, the 2,077 cases reported in 1981 represent a 96% decrease and an all-time low of reported cases of rubella (Figure 1).

and older. This has been achieved, and rubella immunization levels of U.S. school children in kindergarten through first grade in 1981-82 are now greater than 96 percent. This level of vaccine coverage has been achieved because of wide vaccine availability in combination with the U.S. Childhood Immunization Initiative launched in 1977 supported by strong federal funding, and school immunization laws requiring proof of immunization or exemption from immunization for school entry. Rubella vaccination is required at school entry in all 50 states and the District of Columbia. In 38 states these laws apply to children in kindergarten through grade 12, but in many cases the requirement is waived for females 12 years or older.

Use of rubella vaccine has led not only to a substantial decline in the overall level of the disease but also to a change in the age distribution of those affected. Prior to vaccine licensure, the highest incidence rates were reported in young school-age children.^{(1) (2)} Since vaccine licensure, the incidence rate of rubella has declined in all age groups, with the greatest decline among children 5-9 years old reflecting the initial immunization efforts to vaccinate school-age children. As a result, there was a change in the epidemiology of rubella, with peak disease occurrence shifting to the 15-19 year-old age group during the mid to late 1970's. Approximately 71 percent of reported rubella cases from 1976 through 1979 occurred in persons 15 years of age or older.⁽²⁾

The reported incidence rate of congenital rubella syndrome has not declined as markedly as that of rubella (Table 1). Because of the change in the epidemiology of rubella and the continuing occurrence of CRS, emphasis was subsequently given to vaccinating susceptible post-pubertal women. This has now resulted in a decline in the age-specific incidence rate of rubella in 19-29 year olds, and although it is too early to know with certainty, there appears to be a decline in the CRS incidence rate.

Concern about vaccinating a woman who may not know she is pregnant has impeded immunization efforts directed at pubertal and postpubertal women. Evidence gathered to date suggests that the risk of vaccine-induced malformation is very low or nonexistent.⁽³⁾ Because 10-20 percent of young adults are still susceptible to rubella in the postvaccine era, outbreaks of

Table 1. Reported incidence rates of acquired rubella and confirmed and compatible cases and estimated rates of reported congenital rubella syndrome (CRS). United States, 1969-1981.

Year of birth	Acquired rubella		Congenital rubella	
	Overall incidence rate/100,000 pop.	Est. Incidence rate/100,000 pop >15 years*	Confirmed and compatible cases **	Rate/100,000 live births
1969	28.9	...	62	1.7
1970	27.8	...	69	1.8
1971	21.9	...	45	1.3
1972	12.2	...	32	1.0
1973	13.2	8.6	30	1.0
1974	5.6	3.5	22	0.7
1975	7.8	6.4	32	1.0
1976	5.8	5.4	23	0.7
1977	9.4	8.6	29	0.9
1978	8.4	8.2	26	0.8
1979***	5.4	4.8	57	1.6
1980***	1.7	1.0	14	0.4
1981***	0.9	0.4	7	0.2

* Cases per 100,000 population estimated by extrapolating age distribution of cases with known age to overall number of cases.
 ** Confirmed cases are those with defects and laboratory evidence of congenital rubella infection. Compatible cases are defined as any two complications from list a) below, or one from a) and one from b), but do not have laboratory confirmation.
 a) Cataracts/congenital glaucoma (either or both count as one), congenital heart disease, loss of hearing, pigmentary retinopathy
 b) Purpura, splenomegaly, jaundice (with onset beginning 24 hrs. after birth), microcephaly, mental retardation, meningoencephalitis, radiolucent bone disease.
 ***Provisional data
 ... Data not available

rubella continue to be reported in settings where such persons congregate, including schools, universities, hospitals and other places of employment. Several reports of nosocomial rubella have been described and emphasis is now being given to developing guidelines for immunization of all susceptible hospital personnel.

Benefit-cost estimates of current U.S. rubella immunization practices demonstrate a ratio of 8:1 when rubella vaccine is given alone and 23:1 when it is given in combination with measles vaccine.⁽⁴⁾

In summary, the U.S. program has reduced transmission among young school children, eliminated the cyclic periodicity of rubella occurrence, and prevented major epidemics of rubella with resultant congenital rubella. It has not been as successful in reducing endemic CRS. However, with the continued aggressive use of rubella vaccine and vaccination of susceptible adolescents and women of childbearing age, it may be possible in the near future to eliminate CRS and perhaps rubella.

Source: Greaves WL, Orenstein WA, Bart K. Immunization Division, Center for Prevention Services, Centers for Disease Control, U.S. Public Health Service, Department of Health and Human Services, Atlanta, Georgia 30333 (USA).

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1991

December 1991,
Volume XIII, Number 6

Global Advisory Group Addresses Rubella Control

The World Health Organization's (WHO) Expanded Program on Immunization Global Advisory Group (GAG) met from October 14 to 18, 1991 in Antalya, Turkey. Among the major conclusions and recommendations of the meeting were several addressing rubella and congenital rubella syndrome (CRS) control.

Despite the insufficient data available regarding the epidemiology of rubella and CRS in the developing world, WHO is aware of an increase in the interest to introduce rubella-containing vaccines in this area. There are three basic approaches to rubella control: universal vaccination of young children, or the selective vaccination of pre-pubescent school girls and susceptible adult women, or a combination of the two. The first strategy strives for interruption of transmission of the rubella virus, whereas the second seeks to protect women during their childbearing years. While interruption of transmission through high coverage from delivery of vaccine at the same time as measles vaccine may appear attractive, there are some potential risks associated with such a strategy. If coverage is not sufficient to interrupt transmission but merely shifts the age-specific infection rate to older groups, then the potential exists for more cases of CRS than would have occurred in the absence of vaccination. On the other hand, the combined strategy may be harder to implement due to inherent difficulties in reaching the target populations and the inefficiency of vaccinating those who may already be immune.

The GAG recommended that WHO promote research on the epidemiology of rubella and CRS in developing countries and develop specific guidelines that would assist countries when considering the introduction of rubella control strategies.

Introduction of MMR or rubella vaccines in any immunization program should be within a strategy that aims primarily at the prevention of CRS. Therefore, universal immunization with MMR should be avoided in developing countries unless very high coverage can be assured and vaccination of post-pubertal females is simultaneously introduced. The preferred strategy for those countries wishing to embark on a rubella control program is selective vaccination, with an emphasis on high risk groups (postpubescent females).

1984

February 1984,
Volume I, Number 1

Symposium on Prevention of Congenital Rubella Infection

A Symposium on the Prevention of Congenital Rubella Infection will take place on 13-15 March 1984 at the Pan American Health Organization's headquarters in Washington, D.C. The meeting will be divided into seven sessions, covering the following topics: definition of the problem, epidemiology of rubella and congenital rubella infection, rubella vaccines, use of the laboratory, research needs, immunization strategies, and conclusions and recommendations.

Over 200 persons are expected to attend, including research scientists, epidemiologists, public health officials, representatives of national and international organizations, and participants from the corporate sector.

Information on preregistration can be obtained by writing to: Chief, International Studies Branch, Fogarty International Center, Building 16A, Room 205, National Institutes of Health, Bethesda, Maryland 20205 (USA).

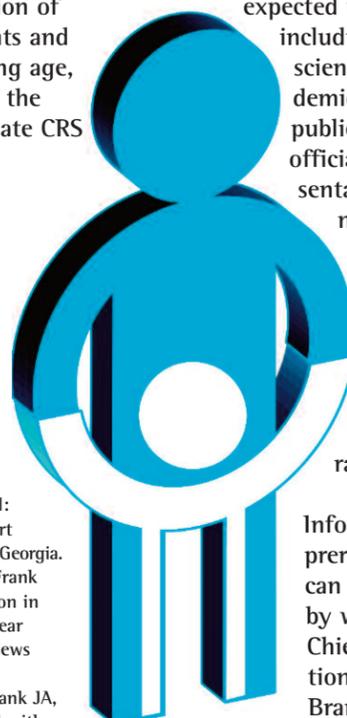
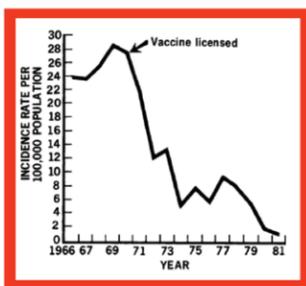


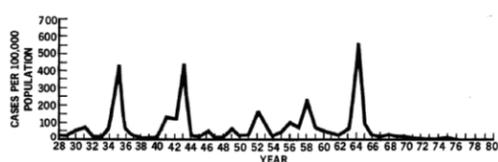
Figure 1. Reported rubella incidence rate per 100,000 population by year of report. United States, 1966-1981*



* 1981 provisional data

No major epidemics have occurred since 1964 and the previously noted six to nine-year cycles of peak rubella activity have been interrupted (Figure 2).

Figure 2. Rubella incidence, ten selected areas*. United States, 1928-1980**



* Maine, Rhode Island, Connecticut, New York City, Ohio, Illinois, Wisconsin, Maryland, Washington, Massachusetts

**Preliminary data (MMWR Weekly Report 29:52, 9 January 1981)

Initial efforts in the U.S. program were directed towards vaccinating young children of school age since it was thought that the primary transmission of rubella occurred in schools and that school-age children infected their siblings and susceptible women of childbearing age. The initial goal of the U.S. program was, therefore, to reduce the transmission of rubella through vaccination of young school-age and pre-school children 1 year of age

1993

August 1993,
Volume XV, Number 4

English-Speaking Caribbean Rubella Policy

A survey was conducted in 1992 to determine the status of rubella immunization in the English-speaking Caribbean and obtain an impression of its impact on rubella and congenital rubella syndrome. Questionnaires were sent to each of the 19 EPI National Program Managers, all of whom responded. The following report outlines the results of the survey and ensuing recommendations.

Policy

Ten of the 19 countries stated that they did have an agreed national policy on rubella immunization. Seventeen of them were using some form of rubella vaccine. Four countries were using MMR vaccine administered to children aged one to two years and four others were also using some other vaccine containing rubella, the extent of which was difficult to establish.

Recommendation: All countries should establish an agreed national rubella immunization policy.

Strategy

The ideal rubella strategy aims to interrupt virus transmission among young children and to ensure that any adult women who might be exposed to rubella are already immune.

The second objective involves either screening adult women or immunizing susceptibles or routine immunization of women of child-bearing age. Both options can be linked to pregnancy (prenatal screening, post-partum immunization). Additionally, rubella vaccine can be given to all girls at puberty. Bermuda and BVI had the best developed rubella policies, involving routine immunization with two doses of rubella vaccine, prenatal screening for rubella susceptibility, and post-partum immunization. A similar program had almost been achieved in Saint Lucia; although rubella serology was not available, immunization was provided according to previous history. In some circumstances, rubella immunization is cheaper than screening and immunizing a woman who is already immune does not involve any risk.

Recommendation: National policies should aim to interrupt rubella transmission and to ensure that women of child-bearing age are immune to rubella.

The Extent of Rubella Infection during Pregnancy

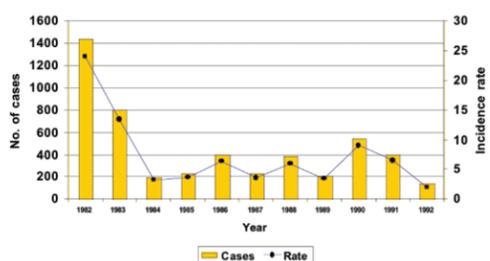
Only nine of the 19 replies considered that women were aware of the risks of rubella infection during pregnancy. In only one country was it routine for a pregnant woman with a rash to be tested properly for rubella infection, although such testing may be carried out in eight other countries. It would not be undertaken in 10 countries. Barbados was able to identify 19 laboratory-confirmed rubella infections during pregnancy and two rubella-associated terminations in the 1986-1991 period. Over the same period, there were 24 known cases of congenital rubella syndrome reported from 12 countries.

Recommendation: Health education should be directed toward alerting women to the importance of rashes during pregnancy and mechanisms should be set in place so that any pregnant women with rashes can be appropriately investigated.

The Extent of Rubella in the English-Speaking Caribbean

Rubella is a notifiable disease in 15 of the 19 countries. Between 1986 and 1991, 2,321 cases were reported by 12 countries. The number of cases per country ranged from 2 to 1,162 cases. Seven countries did not report any cases of rubella. Of all the cases reported, 307 were confirmed by laboratory testing. There can be little doubt that rubella continues to circulate in the English-speaking Caribbean and it is likely that there is considerable under-reporting.

Figure 1. Rubella Cases and Incidence Rates* English-speaking Caribbean and Suriname, 1982-1992



* Rate/100,000 population
Source: CAREC/PAHO

Recommendation: Present strategies need to be examined to investigate why transmission has not been interrupted when MMR vaccine coverage has been high. Rubella may be circulating among older individuals and age-stratified serology might well be helpful. Efforts should be made to identify any age-specific susceptible cohorts toward whom rubella immunization may need to be targeted.

Conclusions

- Rubella is still present in much of the Caribbean.
- There are and will continue to be outbreaks until susceptible groups are identified and immunized.
- There are cases of congenital rubella syndrome. The life-time costs of children that suffer multiple handicaps as a result far exceed the costs of preventing congenital rubella syndrome.
- Surveillance of rubella and its effects is not strong and could be improved.
- Although many countries are pursuing a policy to interrupt rubella transmission among young children, they have not made efforts to protect all susceptible adult women.
- Women did not appear to be sufficiently aware of the risks of rubella during pregnancy, nor was there adequate investigation of cases of pregnant women with rashes.

Source: Dr. D. M. Salisbury MB BS FRCP, Principal Medical Officer, Department of Health, London, UK

1994

February 1994,
Volume XVI, Number 1

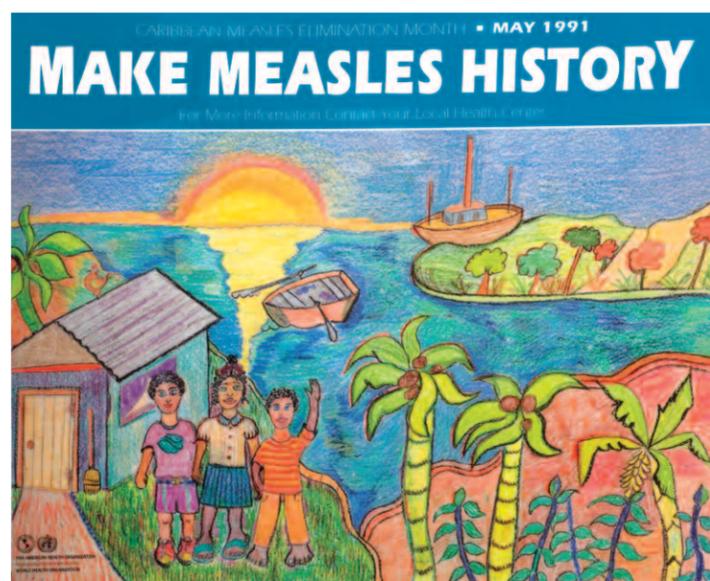
Measles Campaign Improves Anti-Rubella Coverage

The Tenth EPI Sub-Regional Managers' Meeting was held in Tobago on 22-26 November, 1993.

Over ninety participants attended. Plans of Action for 1994 were revised and the following topics covered: immunization coverage, poliomyelitis eradication, measles elimination, rubella surveillance, tuberculosis control and social mobilization. One of the papers presented was "Rubella Seroprevalence in a Sample of Antenatal Clinic Attendees in Trinidad and Tobago" from which we include the main points below.

The rubella antibody status of pregnant females is at best a surrogate measure for the potential risk of occurrence of Congenital Rubella Syndrome (CRS) in a population, as measures of seroprevalence are not time-related to incidence. Furthermore, the risk of CRS is determined not only by rubella incidence rates among women of child-bearing age, but also by age-specific patterns of susceptibility and fertility.

The ultimate goal of rubella immunization is the protection of a future fetus against damage from intrauterine infection. Even though a large



The Ministers of Health of CARICOM promise to "make measles history" in 1988, unanimously resolving to eliminate indigenous measles transmission from the Caribbean by 1995.

proportion of the female population (80-90%) is immune to rubella by adolescence and young adulthood, notable exceptions were detected in a study of certain islands and isolated populations where fewer women possess rubella antibodies when compared to women from urban areas.

Serum samples were randomly obtained at the 81 government health centers and hospitals across Trinidad and Tobago from 2003 pregnant women routinely tested for the IgG antibody to rubella using an Enzyme Linked Immunosorbent Assay (ELISA test). Of the 1838 effective samples taken, 986 (53.6%) antenatal clinic attendees were found to possess IgG antibody to rubella.

The mean age of the sample women was 32.7 years, with very small variance between the seropositive and the seronegative. Of the women between 15 and 24 years of age, 46.6% (370/794) were seronegative and of those between 25 and 34, 48% (336/700) were nonimmune. Despite the fact that selected rubella immunization for prepubertal girls was started in 1982, 40.5% of attendees aged 20 and under were seronegative and therefore remain potentially susceptible to infection with rubella virus.

Even though these results can be used as indicators of the effectiveness of rubella vaccination strategies, it must be pointed out that some of the seropositive clients might have naturally acquired the antibody due to previous infection. The decision by the Ministry of Health in 1991 to use divalent measles/rubella vaccine for its Measles Elimination Campaign resulted in 92% coverage in children age 12 months to 14 years. This strategy showed immediate and significant increase in rubella immune levels in the entire cohort. Selective immunization is successful only at reducing the risk of CRS for each woman who is immunized and hence, it can only be entirely successful when 100% of all at-risk women are immune.

In choosing a strategy to eliminate CRS, careful consideration must be given to the very

important variables of cost, the ease of accessibility to the different target populations, the levels of coverage that can be reasonably attained and most of all, its long-term effectiveness of any chosen strategy. Rubella vaccination in childhood is entirely compatible with the traditional approaches to immunization advocated by the national and regional EPI programs. Such programs have gained widespread acceptance among both its consumers and its providers, as an adequate infrastructure already exists for the delivery of vaccine.

Within the current context of a very limited financial and human resources, it is essential to carefully reexamine the selective immunization strategies for rubella.

Source: Rubella Seroprevalence in a Sample of Antenatal Clinic Attendees in Trinidad and Tobago. Merle J. Lewis, Glenda Maynard, Terrence Ovid and Karen Williams of the Ministry of Health, Government of Trinidad and Tobago, and Yvette Holder. Caribbean Epidemiology Centre.

1997

June 1997,
Volume XIX, Number 3

Rubella and Congenital Rubella Syndrome in the USA

Indigenous rubella and congenital rubella syndrome (CRS) have been targeted for elimination in the United States by the year 2000. From 1969 through 1989, the numbers of annual reported cases decreased 99.6% for rubella and 97.4% for CRS. Following a slight resurgence during 1990-1991, the number of reported rubella cases reached record lows during 1992-1996 (annual average: 183 reported cases). Findings indicate sustained low incidence of rubella and CRS since 1992 and possible interruption of transmission of rubella virus in late 1996.

Rubella: During 1994-1996, a total of 32 states, the District of Columbia and New York City reported 567 rubella cases. Based on provisional data as of 18 April

1997, symptom onset for the last case in 1996 was 6 November and for the first case in 1997 was 5 January, representing approximately three incubation periods with no reported rubella cases. Of the 561 (98.9%) patients for whom age was known, 171 (30.5%) were women of childbearing age (15-44 years); of these, five were pregnant at the time of rash onset.

considered susceptible to rubella unless they have documentation of vaccination or serologic evidence of immunity.

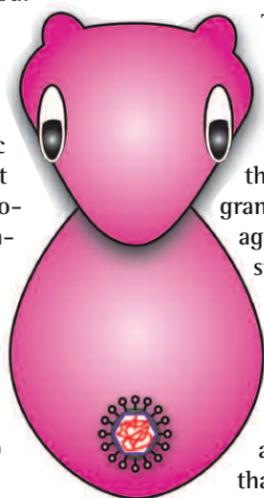
The changing epidemiologic pattern of rubella underscores the importance of ongoing collection and analysis of information on reported rubella and CRS cases, including demographics, vaccination history, source of exposure (i.e., indigenous or im-

ported), relation to outbreaks, and mode of transmission. Such analysis is important for effectively targeting vaccination activities, evaluating the effectiveness of rubella and CRS prevention programs, and

designing more efficient prevention strategies.

The effectiveness of efforts to control and prevent rubella in the United States is reflected by the possible interruption of transmission of rubella during November-December 1996; the dramatic decline in reported cases when compared with the prevaccine era, and the low annual average number of cases since 1991. Elimination of rubella will further require:

- maintenance of high vaccination levels in preschool and school-aged children and young adults,
- intensification of diagnosis of and surveillance for rubella and CRS,
- prompt control of outbreaks.



The shift in the increasing proportion of cases accounted for by persons aged 15-44 years indicates that vaccination programs targeting school-aged children have been successful in preventing rubella in that age group, but that vaccination activities also should include adolescents and adults. Because more than half of CRS cases in recent years have re-

sulted from missed opportunities for vaccination, health care providers should screen reproductive-aged women for rubella immunity (e.g. during prenatal screenings and premarital health care visits) and vaccinate when appropriate (e.g., postpartum). Elimination of indigenous transmission of rubella in the United States also will require collaboration with other countries to develop and implement national rubella vaccination policies.

Reported by: State and Territorial epidemiologists, Child Vaccine Preventable Diseases, Br, Epidemiology and Surveillance Div, National Immunization Program, CDC.

Source: MMWR (46)16; 350-54; April 25, 1997, CDC.

Editorial Note:

Situation in the Americas: The United States' surveillance system for rubella suggests that the virus is circulating in Latin America and the Caribbean (Figure 1). Moreover, the cases detected in the United States may only be the tip of the iceberg. Unfortunately, relatively little data are available concerning the epidemiology of rubella in the Americas.

In 1995 and 1996, the Caribbean Epidemiological Center (CAREC) confirmed the circulation of rubella virus in seven countries, including among pregnant women. Regarding CRS, most of the available experience in surveillance comes from the Caribbean, where countries have started notification and follow-up of cases. Four countries in that region selected as pilots for CRS surveillance in 1996, have found eight confirmed cases (6 in Jamaica and 1 in Barbados and Trinidad).

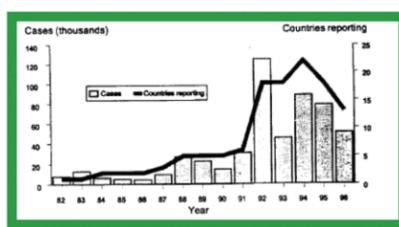
In Barbados, 20 suspected cases of CRS were identified through an active search in 1996, and eight additional cases were being investigated. In the same country, 17 of 52 pregnant women (33%) with fever and rash illnesses tested positive for rubella. In Guyana, six suspected cases of CRS have been identified in children born between 1992 and 1996. The Regional Measles Surveil-

many as two million cases annually in children under the age of 15. In Colombia, an average of 7,000 rubella cases has been reported annually since 1985. The most affected populations are children under the age of five, followed by those between the ages of 5 and 14 years of age. In Colombia congenital malformations are among the leading five causes of deaths in the 0-4 age range; and within these, the congenital cardiopathies compatible with CRS represent between 59 and 62% of all the congenital anomalies which occurred during those three years. In Canada, in 1996 there were five clinically-confirmed cases of CRS, two of these were from children born in Central America and subsequently adopted by Canadian parents.

Current Control Strategies: Several countries in the Americas are developing strategies for the control of rubella aimed at groups identified as a priority and based on the availability of financial resources. In the Andean region, only Colombia has introduced the measles, mumps and rubella vaccine in the national vaccination schedule for children between the ages of 1 and 3. Ecuador is planning to include this vaccine in 1998, as part of its regular schedule. In Central America, Costa Rica, El Salvador and Honduras are using MMR. In the English-speaking Caribbean and Suriname, MMR vaccine is part of the routine vaccination schedule.

Future Activities: Taken together, rubella and CRS surveillance data from the United States and the limited data from other countries of the Region strongly suggest that rubella is a significant public health problem in most of the Hemisphere.

Figure 1. Reported cases of rubella Latin American and Caribbean Countries, 1982-1996



Source: PAHO/EPI Information Systems

lance System has highlighted rubella as a health problem. Of the total suspected measles cases investigated by laboratory in 1996, 17% had rubella as a final diagnosis. The countries presenting the highest percentage of positive cases for rubella through the surveillance system include: Nicaragua with 38%, El Salvador with 33%, Costa Rica with 32% and Peru with 20%.

CAREC has proposed a set of case definitions for CRS, a CRS case reporting form, and guidelines for CRS surveillance. The guidelines include the creation of a registry of pregnant women with laboratory-confirmed rubella whose infants need to be followed through the neonatal and postnatal periods. Countries in the English-speaking Caribbean have been encouraged to strengthen their measles surveillance system, in order to improve rubella surveillance.

In Mexico, there were 26,286 cases of rubella reported in 1996 and 51,157 cases during 1995. However, the Mexican Ministry of Health has estimated that there may be as

The first step to developing appropriate interventions against rubella in Latin America and the Caribbean is to better define the burden of disease in these countries. Once the magnitude of the rubella and CRS problem is known and persons at risk of disease are identified, targeted vaccination strategies can be developed. Therefore, the immediate PAHO goal is to develop CRS surveillance throughout the Region.

Many countries are adopting MMR vaccine for routine infant immunization and for use in the measles follow-up campaigns. While this will surely reduce the circulation of rubella virus, it will not prevent CRS. In order to prevent CRS, we must assure that women of childbearing age are protected against rubella infection. Infant and childhood immunization are necessary, but not sufficient to eliminate CRS. New vaccination strategies are needed to effectively eliminate rubella and CRS. The availability of quality surveillance data will help greatly in developing targeted and effective rubella vaccination strategies.

Caribbean Community Establishes Rubella Elimination Goal

Resolution on the Elimination of Rubella

The Council for Human and Social Development:

Recognizing the importance of human resources to the continued development of the Caribbean Community.

Conscious that rubella in pregnancy gives rise to miscarriage and stillbirths while Congenital Rubella Syndrome gives rise to children with severe birth defects such as congenital heart disease, cataracts, deafness, mental retardation and micro-cephaly;

Further conscious of the continued transmission of rubella resulting in cases of Congenital Rubella Syndrome within the community with the concomitant costs for the care and rehabilitation of children with Congenital Rubella Syndrome;

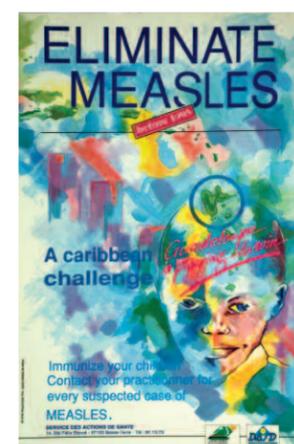
Aware that cost-benefit studies in several Caribbean countries clearly indicate that the investment in Rubella elimination will bring tangible benefits within five years, given the high cost of care and rehabilitation of children with Congenital Rubella Syndrome;

Noting that, should an elimination program not be implemented, there could be a substantial number of cases of Congenital Rubella Syndrome over a 15-year period;

Further noting that the cost of the elimination program is estimated at seven per cent of the cost of providing care and rehabilitation for those cases;

Resolves that every effort will be made to eliminate Rubella and prevent the occurrence of new cases of Congenital Rubella Syndrome in the Caribbean Community by the end of the year 2000;

Urges PAHO to coordinate the mobilization of resources and technical support toward this end.



The main rubella and CRS elimination strategies implemented by the countries of the Caribbean were based on the experience of measles elimination. One of the strategies was mass vaccination campaigns in large population cohorts, such as the campaign "Make Measles History," implemented in 1991.

Editorial Note: In 1988, the Caucus of CARICOM Ministers Responsible for Health unanimously established the goal of measles eradication from the Caribbean by the year 1995. Adopting the vaccination strategy recommended by PAHO to eradicate measles, the Caribbean countries have achieved and maintained high levels of measles population immunity in preschool-age and school-age children. As a result, no laboratory-confirmed cases of indigenous measles have been reported in the English-speaking Caribbean since 1992.

To monitor progress towards achieving the goal of measles eradication, the countries of the English-speaking Caribbean and Suriname established measles surveillance throughout the Region. Data from this surveillance system have confirmed the absence of measles virus circulation, but have reported wide circulation of rubella virus in many countries. Between 1992–1997, twelve countries reported confirmed cases of rubella.

Limited surveillance data were available concerning the prevalence of Congenital Rubella Syndrome (CRS). Since late 1996, several countries, including Barbados, Belize, Guyana, Jamaica, and Trinidad & Tobago have implemented CRS surveillance systems, which have confirmed over 30 CRS cases, with an equal amount under investigation. Since there are likely to be many undetected and unreported cases, these CRS cases can merely be considered the tip of the iceberg. The estimated average cost for rehabilitation and care of an infant with CRS is over \$40,000. Rubella is clearly a major public health problem in the Caribbean and Latin American countries.

As a first step, PAHO is working with countries in developing surveillance case definitions and guidelines, to accurately define disease burden. Once the magnitude of the rubella and CRS problem is known and persons at risk for the disease are identified, countries can develop appropriate vaccination strategies.

In the near future, the 1998 CARICOM resolution for rubella eradication by the year 2000 will be seen as a milestone in the history of public health in the Americas. The countries of the English-speaking Caribbean and Suriname will work together to develop and implement effective strategies to halt rubella circulation and prevent CRS cases. Similar to the measles eradication experience, once again the countries of the English-speaking Caribbean and Suriname will lead the way for rubella eradication. The lessons-learned from these countries will pave the way for the eradication of rubella and CRS from the Americas.

August 1998,
Volume XX, Number 4

Public Health Burden of Rubella and CRS

This article is the first of a series focusing on the public health importance of rubella and congenital rubella syndrome (CRS) in the Americas and worldwide. In April the Caribbean Community established the goal to eliminate rubella by the year 2000 (EPI Newsletter, June, 1998). The following article discusses the public health burden of rubella. A future article will address the characteristics of rubella vaccine and adequate vaccination strategies for rubella and CRS elimination.

The recorded history of the rubella virus dates back to the mid-18th century when it was first described by German authors as Rötheln. Until the early 19th century, rubella was still known as the “third disease,” a variant or combination of measles and/or scarlet fever. In 1814, Dr. George Maton further investigated a rash illness diagnosed as “scarlatina.” He came to the conclusion that the disease did not fit the description of any known disease. In 1866, English Royal Artillery surgeon, Dr. Henry Veale, coined the name rubella. It was, according to him, short, pleasant sounding, and indicative of the disease.

Although formally recognized as an individual entity in 1881 at the International Congress of Medicine in London, rubella, the plural of Latin *rubellus* “red,” was often referred to as “German Measles” until the second half of the 20th century. The term German may have referred to the initial identification made by Germans or it may have taken on the connotation of “closely akin to” because rubella was seen as a disease similar to measles. Acquired rubella, however, is milder than measles. It often causes mild fever, 3-day rash spreading from head to foot, and lymphadenopathy. Arthralgia and arthritis are common in adult women.

Following a severe rubella epidemic that swept across Australia in 1940, came the recognition of Congenital Rubella Syndrome (CRS) by an ophthalmologic surgeon, Dr. Norman McAlister Gregg. In 1941, Dr. Gregg noted an unusually large number of infants with con-

genital cataracts among his own patients. After inquiry to his colleagues, he found that similar observations had been made throughout Australia. In his report, “Congenital Cataract Following German Measles In The Mother,” he described the infants as being “of small size, ill nourished, and difficult to feed,” as having congenital heart defects, and developing an eczematous condition or high fever. As has been discovered more recently, CRS clinical manifestations can be grouped into three categories: 1) transient conditions which present themselves at birth (eg. low birth weight), 2) permanent structural manifestations which may be present at birth or may become apparent during the first year of life (eg. cataract), and 3) late emerging conditions (eg. diabetes mellitus).

After extensive investigation, Dr. Gregg concluded that the

He asked the question which sparked interest and focus on rubella and CRS: “what can we do to prevent a repetition of the tragedy in any future epidemic?” He also made a suggestion that has withheld the test of time and still applies today, “we must recognize and teach the potential dangers of such an epidemic.” Unfortunately, Dr. Gregg’s observations did not immediately receive the attention it deserved.

It was not until the 1960’s, with the rubella pandemic of 1962–1965, that the world became fully aware of the damage that rubella could cause. The morbidity-mortality rates in the United States alone were astonishing. In 1964–1965, there was an estimated 12.5 million acquired rubella cases. As for the consequences of infection during pregnancy, there were over 11,000 reported abortions (spontaneous and

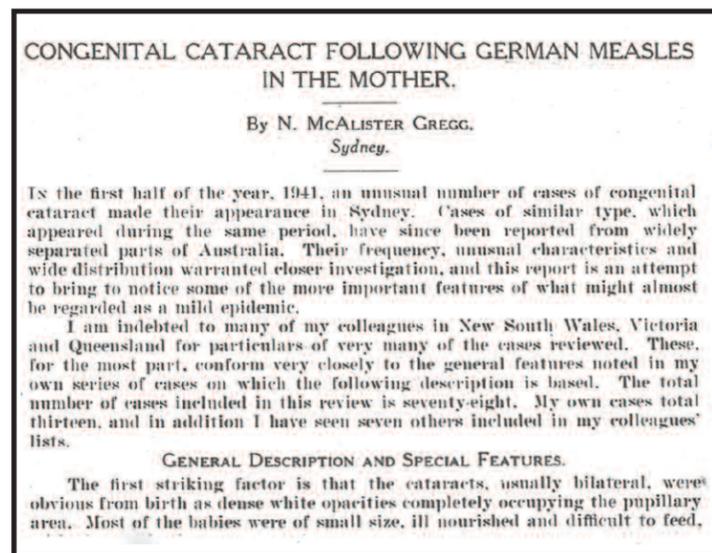
incidence rate among 5–9 year olds. The greatest number of total annual rubella cases, 57,686, was reported in 1969. Throughout the following decades, communities continued to endure the aftermath of the epidemic. In 1980, more than 6,000 students with hearing impairment due to CRS were enrolled in special programs throughout the country.

As for financial costs today, in the English-speaking Caribbean, it was estimated that expenditures for care and rehabilitation of 1,500 CRS cases expected to occur over the next 15 years would be approximately US\$ 60 million. The lifetime cost of treating one patient with CRS in the United States today is estimated to be over US\$ 200,000. Direct annual national cost of care for persons with multiple rubella defects was estimated in 1985 to be US\$ 90 million.

The figures recorded and documented are not highly accurate due to the problem of underreporting. Factors contributing to this underreporting are 1) 30–50% of rubella infections are subclinical, 2) in the case of mild symptoms, no medical care is sought, and 3) symptoms are not highly specific and sporadic cases frequently go unrecognized by physicians.

Susceptibility is an indicator of the likelihood of an outbreak. Epidemiological observations suggest that outbreaks may occur when rates are >10%. In the 1980’s some Latin American countries reported relatively high susceptibility rates (30–60%) among women of childbearing age. In Mexico, where rubella is not included in the Health Ministry’s Universal Vaccination Program, results of studies testing susceptibility support the assumption that women living in lower socio-economic areas and rural areas are less likely to be immune than those in urban settings. This is due to the fact that those in areas of low population density are less frequently exposed to the virus. These studies suggest that CRS is an under-recognized public health problem and improved CRS surveillance is necessary.

In the Caribbean, rubella epidemics occurred annually between 1989–1991. From 1991 to 1995, there was decreased incidence reported until a resurgence occurred in 1995. In some countries in the



Excerpt from the publication entitled, “Congenital cataract following German measles in the mother” published by the Australian ophthalmologist Norman McAlister Gregg in 1941. In this article Gregg described a series of problems identified as congenital rubella syndrome (CRS) and observed that more harm was done to the fetus if rubella infection occurred in the first months of the pregnancy.

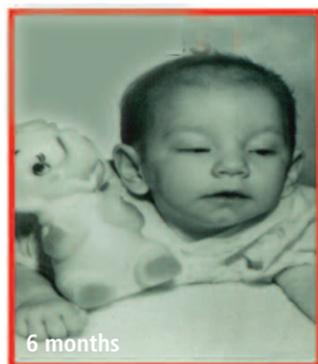
cataract condition observed throughout the country was “the result of some constitutional condition of toxic or infective nature.” He realized that the approximate period of early pregnancy corresponded with the peak of the “German Measles” epidemic. These findings allowed Dr. Gregg to make two correct assumptions: 1) rubella infection had inhibited fetal development, and 2) the earlier the mother is infected, the worse the damage is. He also noted that the group primarily affected was young mothers because older women were more likely to have acquired natural immunity.

Dr. Gregg commented in his prognosis, however, that “we cannot at this stage be sure that there are not other defects present which aren’t evident now but which may show up as development proceeds.”

surgical) and approximately 20,000 infants born with CRS, of whom 2,100 died in the neonatal period. Of the CRS infants, almost 12,000 reported deafness, 3,580 blindness, and 1,800 were mentally retarded. An example of a city that suffered greatly is New York. The number of children affected by rubella represented 1% of births in the city. This may have been due to high population density and immigration. The epidemic took a financial toll on the country as well. The estimated cost of this epidemic is estimated to have been over US\$ 800 million.

The ultimate outcome was the recognition of the significance of CRS. In 1966, rubella and CRS became reportable on a national basis in the United States. Rubella was found to be a disease primarily of young children with the highest

Evaluation of a Congenital Rubella Syndrome Case for 40 Years



Photos: Dr. Lou Cooper

Evaluation of the Bahamas' MMR Campaign

From July to December of 1997, the Bahamas carried out its first mass measles, mumps and rubella campaign (MMR) targeting the population between the ages of 4 to 40 residing in 19 islands. New Providence and Grand Bahama account for 68% of the total population in the Bahamas. The objectives of the campaign were to keep the country free of measles, interrupt rubella virus transmission and prevent further cases of congenital rubella syndrome (CRS), by eliminating susceptible populations for rubella, as well as eliminating susceptible populations for mumps infection. Since the campaign, no cases of measles and rubella have been reported, in spite of the fact that the Island receives over one million tourists every year. In July of 1998, the Ministry of Health of the Bahamas requested that PAHO/SVI carry out an evaluation of the MMR campaign. Given the shortage of manpower, the campaign was extended up to May 1998, in an attempt to reach the entire target population. The following is a summary of the evaluation report.

Measles and Rubella Situation

In 1996 the country's fever and rash surveillance system identified one case of rubella; since then there have been 13 laboratory-confirmed cases of the disease. During 1998 four women gave birth to babies with congenital rubella syndrome, three of which died from complications due to CRS within three, five and 15 months of their birth. A large pool of susceptible individuals that could potentially contract rubella was expected, since there had never been a vaccination program targeting adults. In April 1997, the Bahamas also reported its first laboratory confirmed measles case in seven years due to an importation.

In order to prevent outbreaks of both measles and rubella, the Ministry of Health conducted an MMR campaign between July and September of 1997. *Mop-up* operations were carried out during the months of October and December, 1997. The MMR campaign targeted the population (both female and male) between 4 and 40 years on the 19 family islands. All persons were immunized, except those individuals with a documented history of two doses of MMR vaccine and/or medical contraindications. Estimated target population for the MMR campaign was initially 180,980 (1995 midyear projection), but 27,800 showed adequate vaccination prior to the campaign, and the number was adjusted to 153,180. Approximately, 80% of the target population or 122,844 are in the work force, and 30,296 (20%) are in the age group 4 to 14 years.

sub-region, susceptibility has been found to be as high as 40-50%. Although rubella is a notifiable disease throughout the sub-region, CRS is not. For 1997, 20 CRS cases were found in the Caribbean. Nevertheless, it has been estimated that there may be 20,000 or more infants born with CRS each year in Latin America and the Caribbean. One source of rubella data is through measles surveillance. To increase reporting, the criteria for clinical diagnosis have been simplified. Health care workers should suspect rubella and/or measles in patients exhibiting fever and rash illnesses. In these patients, a single blood specimen should be collected and tested for both rubella and measles IgM antibodies.

From the above information, it is clear that rubella and CRS pose serious public health problems throughout the world. Since Dr. Gregg's discovery in 1941, there has been a great deal of progress towards prevention of these diseases. Since vaccine licensure in 1969, rubella incidence has dropped significantly in the countries where it is used. A tool to eliminate rubella and CRS exists. It is important to continue this effort and improve surveillance and vaccination so as to free the world of the threat of rubella and CRS.

October 1998,
Volume XX, Number 5

Rubella Vaccine and Vaccination Strategies

One of the consequences of the devastating rubella pandemic in Western Europe and the United States in 1964-1965 was extended research and progress towards the development of an effective vaccine. Following isolation of the rubella virus in 1962 by Parkman, Beuscher, and Arenstein in Washington D.C., and Weller and Neva in Boston, three rubella vaccine strains were initially licensed in the United States in 1969. These were soon replaced by the vaccine now used throughout the world; the RA 27/3 rubella vaccine. This vaccine was developed by Dr. Stanley A. Plotkin between 1965 and 1967 at the Wistar Institute in the United States. The RA 27/3 vaccine was licensed in the United States in January 1979.

The vaccine is a weakened live rubella virus and produces immunity by mimicking natural rubella infection. It is attenuated by 25-30 passages in tissue culture. The resulting viremia and pharyngeal excretion, however, are of a much lower magnitude than natural infection, and are noncommunicable. Rubella vaccination induces IgM and IgG antibody responses. The long-term presence of IgG antibody eliminates the possibility of viremia

following subsequent exposure to circulating rubella virus. By generating secretory IgA responses to block replication in the nasopharyngeal mucosa, vaccination protects the body against re-infection.

The rubella vaccine is very safe. It is generally noncommunicable. However, a mother may transmit the vaccine virus to her infant via breastfeeding. Infection in the infant, however, remains subclinical. Adverse reactions to the vaccine are rarely severe and are generally self-limiting. RA 27/3 is administered mostly in a combination with measles and mumps vaccines (MMR). The most common adverse reactions of the rubella component of vaccination are joint symptoms. Arthralgia may occur in approximately 25% of susceptible women. Moreover, approximately 10% of susceptible women may have acute arthritis-like symptoms.

Due to its safety, as well as consistent immunogenicity, the RA 27/3 vaccine strain is preferred over previously licensed rubella vaccines. Seroconversion occurs in over 95% of those vaccinated. The vaccine induces higher antibody titers and produces an immune response that more closely resembles natural infection. It is highly effective, with immunity thought to be lifelong.

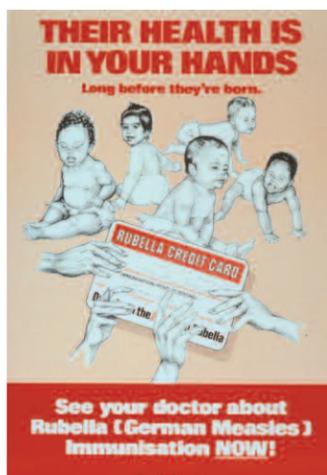
The preferred form of rubella vaccine administration is through the MMR or MR (measles and rubella) vaccination. Children should receive MMR vaccine at 12-15 months of age. In addition, MMR vaccine may be used for the measles *follow-up* campaign. Indications for vaccine use in adults include: international travelers, persons in post-high school educational institutions, health care workers, and women of childbearing age who lack acceptable evidence of immunity.

The main contraindication to rubella vaccination is pregnancy. Although there is no evidence to suggest that rubella vaccination causes Congenital Rubella Syndrome (CRS), it is prudent to avoid rubella vaccination, as well as other live virus vaccines, during pregnancy. Another contraindication is persons with impaired immunity. Therefore, persons infected with HIV and exhibiting signs of severe immunosuppression should not be vaccinated. Other contraindications include moderate to severe febrile illnesses and persons who have recently received

injections of immune globulins.

Rubella Control Strategies

In the past 30 years, two major rubella control strategies have been implemented; however, both vaccination strategies have only been moderately successful. In the United Kingdom, a national rubella immunization program was implemented in 1970. The initial target population of this strategy was prepubescent girls 11-14 years of age. The objective was to attain high levels of rubella immunity among women. In 1976, the strategy was expanded to vaccinate all susceptible women of childbearing age. This strategy proved partially successful. While the number of CRS cases dropped significantly there were still quite a few persons



In 1984, the United Kingdom's National Board of Rubella launches a vaccination campaign with the objective of increasing rubella vaccination coverage in schoolgirls and women of childbearing age.

who remained susceptible and the virus continued to circulate.

The strategy initially adopted in the United States in 1969 was to target the primary transmission group—young school children of both sexes. This strategy assumed that decreased rubella virus transmission among children would protect susceptible women of childbearing age. Routine vaccination of all children aged 12-15 months was later implemented. Studies showed, however, that although a decline in rubella transmission in children had occurred, the number of susceptible childbearing aged women had remained relatively unchanged.

Recently in the United States, outbreaks of rubella have occurred in South Carolina, New York, California, and Texas. Young adults of Hispanic ethnicity have accounted for the majority of the cases in recent-year outbreaks. In fact, over 80% of the rubella cases reported to the Centers for Disease Control and Prevention

(CDC) during 1997 occurred in persons of Hispanic ethnicity. These data suggest that rubella virus is being imported to the United States from Latin America.

Rubella vaccination has only been recently introduced into Latin America. While rubella incidence has greatly decreased in the United States, rubella remains endemic in the countries of Latin America and the Caribbean. Thus, persons born in countries without rubella vaccination programs are at an increased risk.

Although a goal to eliminate rubella and CRS in the Americas has yet to be established, there are steps to be taken to improve rubella control and decrease CRS incidence. From the above, it is apparent that much work is needed to control and eventually eliminate rubella. A vaccination strategy combining the strategies used by the United Kingdom and the United States would likely be successful in interrupting rubella virus circulation. The vaccination program would integrate individual protection for women of childbearing age, with the vaccination of all children to interrupt transmission.

At the Technical Advisory Group (TAG) Meeting on Vaccine-Preventable Diseases in 1997, the following recommendations for the countries of the Americas were made:

- Rubella vaccine (as MR or MMR) should be incorporated into routine childhood vaccination programs of all countries in the Region.
- CRS surveillance should be established before or concurrent with rubella vaccination program implementation.
- Because each country is in a different situation and moving at a different pace towards improved rubella and CRS control, there are recommendations that apply to certain countries.
- Countries wishing to prevent and control CRS promptly should carry out a mass campaign to vaccinate all females ages 5-39.
- Countries wishing to prevent and control both rubella and CRS promptly should carry out a mass campaign to vaccinate persons of both sexes ages 5-39.
- Countries that are unable to do either of the above, in addition to routine infant vaccination, should target women of childbearing age for rubella vaccination.



The campaign was carried out in four phases: Phase I: targeted postnatal mothers; Phase II: targeted young adults 17 to 18 years of age, who were graduating from high school in June, 1997; Phase III: targeted work-sites

Surveillance of Adverse Reactions

Given the scope of the campaign and the inclusion of MMR vaccine in adults for the first time in the Americas, special training was given to health workers to

Table 1. Vaccination Coverage of the Bahamas MMR Campaign

Age group	Population target ¹	Population vaccinated	% Coverage
4-14 years	30,296	29,218	96%
15-24 years	50,084	31,127	62%
25-40 years	72,800	42,825	59%
Total	153,180	103,170	67%

¹The denominator has been adjusted to account for the number of persons with documented history of having received two doses of MMR vaccine.

(40% of the target population); and Phase IV: targeted school-aged children (5 to 16 years of age). MMR vaccine from two laboratories were used, a total of 5000 single-dose vials from a laboratory producing an MMR strain containing the Jeryl Lynn mumps strain, and the remaining doses in ten-dose vials were supplied from another laboratory containing the Leningrad-Zagreb mumps strain.

Safe Syringe Practices

Single use disposable syringes and biohazards containers were supplied to clinics and vaccination teams. Some of the family islands used large plastic bottles found at clinics. An information sheet was provided to health workers addressing safe syringe practices. On the islands of Grand Bahama and New Providence, where incineration facilities exist, all used sharps were disposed using this method. On islands with no incineration facilities, used syringes and needles were disposed of by burning or burying.

A post-campaign survey confirmed that 97% of all health workers had not re-capped used sharps and 100% of all health care workers responded that they had not heard or

strengthen surveillance activities for adverse reactions. Information coming from previous MMR vaccination campaigns of children 0-14 years of age in countries outside the region had reported an increased rate of aseptic meningitis in children receiving MMR vaccine containing the Urabe mumps strain. PAHO's evaluation of the campaign sought to document the experience of MMR vaccination in mass campaigns, particularly in adults, to address the issue of adverse reactions and provide clear technical guidelines for other countries.

A total of 212 adverse reactions were reported to the Ministry of Health after receiving a dose of MMR vaccine (Table 2). Approximately 62 % of the cases were females; with a male to female ratio of 1:1.65. The most common events reported were: parotitis, n =123, with a rate of 120 reports per 100,000 persons immunized, followed by rash and itching, n = 41. Most cases of parotitis (80%) were in adults. No cases of anaphylactic reaction were reported. There were five cases presenting an allergic reaction that needed hospitalization, one of these requiring overnight stay. Only one case of aseptic meningitis was reported, giving a rate of 0.96 per 100,000 vaccinated persons. This case was transitory-temporary

Table 2. Frequency Distribution of Adverse Events during MMR Campaign, Bahamas, 1997

Types of Adverse Events	Frequency of Adverse Events	Rate Per/100,000 Vaccines	Average Time between Vaccination and Event (Days)
Parotitis	123	120	14
Rash/Itching	41	40	6
Fever	28	27	13
Headaches	25	24	6
Respiratory Symptoms	19	19	10
Fever/rash	15	15	5
Malaise/Myalgia	15	15	6
G.I. symptoms	11	11	1
Arthralgia/Arthritis	9	9	4
Orchitis	3	3	17
Aseptic meningitis	1	.96	129

Source: SVI Evaluation Report, July 1998. For a complete copy of the evaluation, please contact the Ministry of Health in the Bahamas, or the Special Program for Vaccines and Immunization in Washington D.C., USA.

seen any accidental needle sticks. Results for the supervisors were the same.

Vaccination Coverage

Coverage attained in the MMR campaign for the target population of 153,180 was 67.4% (103,170). Analysis of survey data from the capital city of New Providence, Nassau, indicates that 26% of the population in the age group 25-40 remains unvaccinated (Table 1).

condition with no sequelae.

Vaccination during Pregnancies

The surveillance system put in place for monitoring adverse reactions identified 33 women who had been accidentally vaccinated during the first trimester of their pregnancy in the Grand Bahama. Of these women, 15 met the criteria of having a specific date written in their maternal records or a vaccination card for having received a dose of MMR vaccine.

All 33 delivered normal, healthy newborns. Hospital dockets from Princess Margaret Hospital in Nassau also confirmed that seven women who had been accidentally vaccinated in the first trimester gave birth to normal, healthy babies.

June 1999, Volume XXI, Number 3

XIII Technical Advisory Group Meeting

The Thirteenth Technical Advisory Group Meeting on Vaccine-Preventable Diseases (TAG) was held in Ottawa, Canada, April 12-16, 1998. TAG meets every two years and functions as the leading forum to promote regional initiatives aimed at controlling and eradicating vaccine-preventable diseases. During the Ottawa meeting emphasis was placed on the need to highlight the role that immunization has played in reducing the incidence of vaccine-preventable diseases. This impact can be further increased if countries find the means to introduce other vaccines in a sustainable way. The following are some of the TAG's conclusions and recommendations.

Rubella and Congenital Rubella Syndrome

Rubella virus continues to circulate freely in most countries of the Region. After a complete investigation, many suspected measles cases are ultimately found to be rubella. Moreover, cases of Congenital Rubella Syndrome (CRS) have been found in all countries of the Region that have established CRS surveillance systems. This suggests that CRS is a major public health problem in all countries of the Americas.

Vaccination Strategies

All countries should incorporate rubella-containing vaccine into childhood vaccination programs, both as part of routine childhood immunization at 12 months, and as part of the follow-up campaigns. Moreover, targeted efforts are needed to reduce the number of rubella susceptible women of childbearing age. Strategies, such as post-partum immunization, immunization in family planning clinics, immunization in schools and the workplace can be used to protect these women.

There are substantial data available documenting the absence of significant risk of rubella vaccination during pregnancy. However, pregnant women are generally not vaccinated. This is to avoid the risk of the vaccine being implicated should there be an unrelated adverse outcome of the pregnancy. For women who are vaccinated and then subsequently found to be pregnant, abortions are not recommended. Finally, it is not necessary to counsel women to avoid pregnancy for 3 months following

rubella vaccination because no known risk of adverse fetal outcomes has been established.

Surveillance and Laboratory

Rubella surveillance should be integrated with measles surveillance. The purpose of rubella surveillance is to detect circulation of rubella virus, not to detect every case of rubella. A separate rubella surveillance system is not needed. All sera from suspected measles cases which test negative for measles IgM antibodies should be tested for rubella IgM antibodies and vice versa.

CRS surveillance should be initiated throughout the Americas. The purpose of CRS surveillance is to detect new or incident CRS cases in infants; efforts should not be routinely made to confirm CRS in older children.

Similar to measles/rubella surveillance, laboratory confirmation is crucial for the diagnosis of CRS. A blood sample should be collected from every infant with suspected CRS. For surveillance purposes, a single serum specimen is generally considered adequate to either confirm or discard CRS. If, however, the first sample tests negative for rubella IgM and there exists compelling clinical and/or epidemiologic suspicion of CRS, then a second serum specimen may be requested to confirm CRS.

Little information is available concerning the molecular epidemiology of rubella in the Americas. Similar to measles surveillance, rubella virus surveillance may provide important information concerning the viral subtypes that are currently circulating in the Region. Efforts should be made to collect several appropriate clinical specimens for viral isolation from every documented rubella outbreak. Nasopharyngeal aspirates are the preferred specimens for rubella virus isolation. Specimens should be collected within 4 days of rash onset and forwarded to an appropriate reference laboratory.

August 1999, Volume XXI, Number 4

Rubella Outbreak in Costa Rica

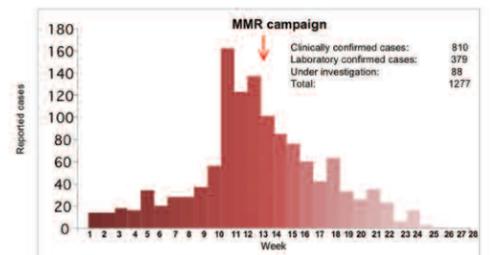
As of July 3, 1999 (epidemiological week 26), the provisional total of confirmed rubella cases reported in Costa Rica was 1,189. This total included 379 laboratory confirmed cases and 810 clinically confirmed cases. This is Costa Rica's first rubella outbreak since 1987, when 1,105 cases were reported.

The rubella outbreak reached its peak between weeks 10 and 14 (Figure 1). The age group primarily affected by the current outbreak was adults between the ages of 25 and 34 years. Of the cases in which age was known, 480 (44%) were reported from this age group alone.

The groups aged 20-24 years 133 (12%) and 35-44 years 186 (17%) were also affected by the outbreak. Of the cases which occurred in children, 96 (9%) were aged <1-4 years, and 85 (8%) were aged 5-14 years. Overall, females made up a slightly greater percentage (56%) of reported cases.

The attack rates for children in the age groups of <1-4 years and 5-14 years were notably lower than for ages 15-50. One explanation for this distribution is the introduction and continued presence of MMR vaccine. MMR vaccine was introduced into Costa Rica's immunization program in 1972. It is for this reason, that the group aged 25-34 years reported the highest attack rate. The age group 35-44 years reported a lower attack rate. This may be due to their having

Figure 1. Number of rubella cases reported by week Costa Rica, 1999*



*Week # 28 ending 17 July. Source: Ministry of Health, Costa Rica. Note: 21 cases without weekly classification.

been infected as children and consequently having developed a natural immunity against rubella. It is important to note that of all the age groups under the age of 50 years, the groups aged 5-9 years and 10-14 years reported the lowest attack rates. This is a result of improved coverage as well as proper vaccination through routine immunization and campaigns since the introduction of MMR vaccine.

As of 5 June, according to case distribution by region, Costa Rica's central area reported 83% of the country's total. 701 (51%) cases were from the Southern Central region and 385 (28%) cases were from the Northern Central region. Many cases were found among persons living in densely population areas, especially factory workers and market vendors

In response to the outbreak, the country's Ministry of Health implemented a vaccination campaign using MMR vaccine between the end of March and the beginning of April (week 13). The selective campaign targeted adults, placing priority on women of childbearing age (15-44 years). As a result of the campaign, there has been a decline in the number of cases reported (Figure 1).

Source: Epidemiological Surveillance Unit, Ministry of Health Costa Rica

December 1999,
Volume XXI, Number 6

Rubella Campaign in Chile

Background

In 1990, Chile began immunizing children 1 year of age with measles, mumps and rubella (MMR) vaccine, adding a booster dose in 1993 for children 6 years of age. Between 1992 and 1996 a decline of rubella incidence was observed, but in 1997 and 1998 outbreaks (Figure 1) were reported in various health services of the country. These outbreaks showed a shift in the age groups being affected with rubella cases towards adolescents and young adults, with an increase in the incidence of the disease beginning at the age of 10 and 11 years. In order to prevent the occurrence of congenital rubella syndrome (CRS) cases, the Ministry of Health in Chile designed in 1999 a strategy of three components:

- a mass vaccination campaign aimed at women between the ages 10 and 29 years;
- strengthening Chile's laboratory diagnostic capabilities for rubella; and
- the establishment of a surveillance system for congenital rubella syndrome.

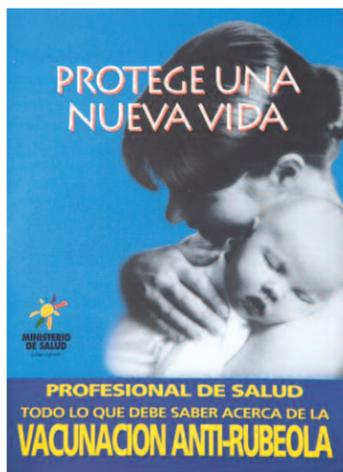
Mass Rubella Campaign

A national mass vaccination campaign was carried out between August and September 1999, with the participation of the country's 28 health services, private health institutions, and the Armed Forces. The target population of the 30-day campaign was non-pregnant women between 10-29 years. Chilean health authorities decided to target the 10-29 age group

reflected by the low incidence rates of rubella shown in these two cohorts, as well as by the low number of susceptible population.

The campaign was divided into two phases. The second was added to reach women within the target age group (6%) that were pregnant at the time of the campaign. This group was vaccinated post-partum, and the second phase is still underway.

The national reference laboratory carried out a differential diagnosis of rubella for the remaining reported rashes. A surveillance system for CRS began operating mid-September 1999, at hospitals and selected reference centers and was evaluated at the end of 1999.



The campaign utilized the monovalent rubella vaccine (vaccine strain Wistar RA 27/3M). There were approximately 6,000 vaccinators, working from 4,000 vaccination posts, as well as from private posts and those organized by the Armed Forces. An intensive communications campaign through radio, television and the press

was carried out prior to the campaign.

Current data indicate that the use of rubella vaccine during pregnancy is safe, presenting no risk of CRS for the fetus. However, Chile's

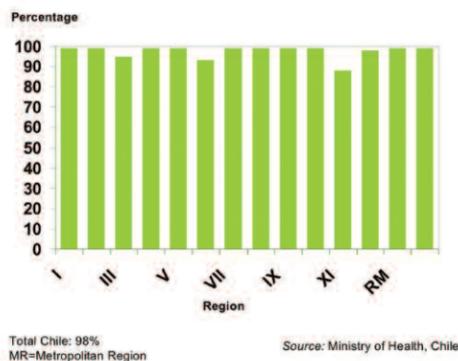
rubella campaign followed international recommendations and decided that pregnant women would not be vaccinated. (Refer to *EPI Newsletter* of June 1999, for recommendations of PAHO's Technical Advisory Group on Vaccine-Preventable Diseases on rubella vaccination during pregnancy).

Results

The estimated target population for the whole campaign was 2,507,448 women between the ages of 10 and 29 years. For the second phase, the target population is 153,173 women, who are to be vaccinated during the nine months following the mass campaign. Results obtained are based on data received from Chile's Epidemiology Department of women vaccinated through September 17. The mass campaign was

finished by September 10 in most health areas, except in two health services where it took an extra week due to bad weather conditions. At the national level, vaccination coverage reached 98%, ranging between 88 and 100% in the different regions (Figure 2).

Figure 2. Vaccination coverage of mass rubella campaign by region, Chile, 1999 (Phase I)



The success achieved can be attributed in part to the high-level of consciousness of women about their own health and that of their families. Moreover, the success can also be attributed to the efficiency, effectiveness and commitment of the health teams involved in the campaign and the clear and precise messages disseminated by the mass media.

The total number of women vaccinated was 2,467,924. Based on age group the numbers were as follows: between 10 and 14 years, 701,605 (102%); between 15 and 19 years 601,853 (97%); between 20 and 24 years, 547,479 (92%); between 25 and 29 years, 616,987 (102%). Women between 20 and 24 years show the lowest vaccination coverage at the national level, with 92%. This group has the highest birth rate, therefore, a greater percentage of them would have been pregnant at the time of the first vaccination phase. This means that a greater proportion of women being vaccinated during the second phase should correspond to this age group.

The Ministry of Health implemented a surveillance system with the following objectives:

- 1) to provide information on the effectiveness of the campaign and policies, to measure the impact on the occurrence of rubella and CRS,
- 2) to collaborate in identifying groups of people or geographical areas where additional control efforts are needed to reduce disease incidence, and
- 3) to evaluate the vaccine effectiveness, duration of vaccine-induced immunity, as well as other aspects related to the efficacy and safety of the vaccine.

Source: Summary of the report on the Strategy for the Prevention of Congenital Rubella Syndrome in Chile. For a complete version, contact: X. Aguilera; A. Guerrero; C. Gonzalez; M. Concha; A. Olea; M. Chiu; V. Sotomayor; D. Ulloa; H. Giorgi; and V. Child at the Department of Epidemiology, Ministry of Health, Mac-Iver 541, Santiago, Chile.

Editorial Note: PAHO congratulates the Ministry of Health in Chile for the high vaccination coverage attained in their recent mass rubella campaign and joins the Ministry in commending the great dedication, effort, and work of Chilean health care workers to reach this high coverage. PAHO as well as other Member States of the Region will monitor with great anticipation the impact of the campaign on reducing rubella virus circulation in females in child bearing age, and thereby the occurrence of CRS.

PAHO recommends that countries wishing to promptly prevent and control both rubella and CRS, should consider using a measles containing vaccine. The use of measles vaccine will also support the measles eradication efforts underway in the Region of the Americas (refer to Final Report of Conclusions and Recommendations of PAHO's Twelfth Meeting of the Technical Advisory Group on Vaccine-Preventable Diseases, Guatemala, 1997).

December 1999,
Volume XXI, Number 6

Collection and handling of laboratory samples for measles eradication and rubella control

Blood samples from suspected cases:

- In outbreak situations, blood samples should be taken from the first few suspected measles or rubella cases of the outbreak and from all other cases that do not occur in the same municipality or district. Samples may also be taken from any atypical or unusual cases. Samples are not needed from cases epidemiologically linked to other already confirmed cases.
- When sporadic suspected measles or rubella cases occur (dispersed geographically and/or in time), blood samples should be taken from every case.
- Blood samples from all suspected rubella cases that are IgM negative for rubella should be tested for measles, ideally within 24 hours* and vice versa.
- Blood samples from at least 10% of the suspected dengue cases with rash that are IgM negative for dengue should be regularly tested for measles.*

Samples for viral isolation from suspected measles cases:

- In outbreak situations, urine samples should be taken from the first few cases of the outbreak (5-10 samples).

If attempts to isolate virus are unsuccessful, then additional urine samples should be taken from new cases as they occur. Urine samples should also be taken from cases that do not occur in the same municipality or district. They may also be taken from any atypical or unusual cases.

- When sporadic cases occur (dispersed geographically and/or in time), urine samples should be taken from every case at the first opportunity.
- Whenever urine samples cannot be taken (i.e. in some young children), a wipe of the nose and throat with a sterile swab (nasopharyngeal swab) should be taken instead.
- Ideally, samples for virus isolation should be taken within 1-3 days after rash onset, and no more than 5 days after rash onset. However, for sporadic cases, because there may be limited opportunities to take the sample, samples can be taken up to 7 days after rash onset.
- Samples for virus isolation should be shipped to the laboratory indicated in your country as soon as possible.
- The national laboratory responsible for managing measles specimens will test (or forward to a reference laboratory for testing) the specimens of those cases with measles serum IgM positive results.
- Ideally, only half of the sample should be used for viral isolation. The other half should be stored at minus 40-70C° as a backup in case of contamination or other technical problems with the sample tested.

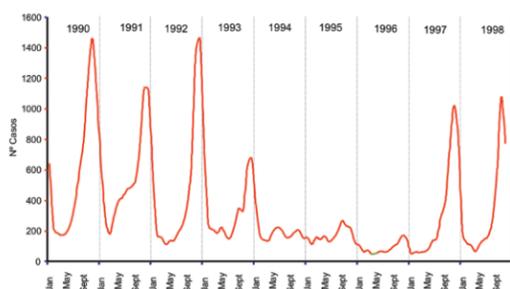
Samples for viral isolation of suspected rubella cases:

- In outbreak situations, nasopharyngeal swabs should be taken from the first few cases of the outbreak (5-10 samples). If attempts to isolate virus are unsuccessful, then additional samples should be taken from new cases as they occur. Nasopharyngeal swabs should be used to wipe the nose and throat. The virus is extremely cell-associated, so attempt to swab the throat and nasal passages to collect epithelial cells. Place both swabs (from the nose and throat) in a sterile tube containing 0.5- 2 ml of viral transport media.

Storage and transport of samples for viral isolation:

- 50-100 ml (1.5-3 ounces) of urine should be taken in a sterile container. If no sterile container is available, a clean container can be boiled and used instead.
- The urine should be kept refrigerated at 4-8C° until it can be centrifuged.
- Ideally, all urine samples should be cold before centrifugation.
- The urine should be centrifuged, ideally on the same day it was taken, at 1500 RPM (about 500 x g) for 5 minutes.

Figure 1. Seasonal rubella transmission in Chile by month, 1990-1998



Source: Ministry of Health, Chile

based on data showing that rubella outbreaks were affecting primarily adolescent and young adult women in their childbearing age. During the 1997 and 1998 rubella outbreaks, over 70% of cases corresponded to people between 10 and 29 years (74% in 1997 and 78% in 1998), half of these were women. Women in the 10-29 age group were considered to be at highest risk for rubella infection that could result in a CRS outcome of their newborn infants. The campaign sought to immediately control the problem of CRS, by dramatically reducing the number of women of childbearing age likely to become infected. Younger cohorts were already covered by vaccination efforts at 1 year of age and older cohorts had natural immunity. This was

A refrigerated centrifuge is not a requirement.

- The pellet should be immediately re-suspended in 0.5–2 ml of viral transport media (VTM).**
- In the field, centrifuged urine and nasopharyngeal swab specimens can be refrigerated at 4–8°C for up to five days until they can be stored in a –70 or –40°C freezer.
- As soon as possible, the sample should be sent to a laboratory equipped with –70 or –40°C freezers. *Because of the risk of damaging the viruses, samples should never be kept at –20°C.*
- When samples are ready to be sent to the national laboratory, they should be shipped in coolers with ice packs.
- In the case of samples that have been frozen at –70 or –40°C, they must be shipped in dry ice to the national laboratory.
- If for any reason centrifugation is not possible, *the urine can still be shipped immediately to the national laboratory in coolers with ice packs.* It might still be viable for virus isolation if it reaches the laboratory within five days from the day it was taken.
- In the case of a nasopharyngeal swab, the swab should not be centrifuged. It should be placed in a sterile tube with 0.5–2 ml of VTM.

Information regarding the samples:

- Information to be sent with the sample should include the following:
 - unique identifier number (MESS number where available)
 - full address and complete phone number to which results should be reported
 - age of patient
 - date of rash onset
 - date of collection of sample
 - date of last vaccination with a measles-containing vaccine
 - date of last vaccination with a rubella-containing vaccine
 - if the case is sporadic or part of an outbreak.
- Paper documents should be well protected from the ice in a well-sealed plastic bag or similar.
- The laboratory that receives the samples should record the condition of the sample upon arrival (did the container leak?, was there an ice pack?, were the contents kept cold in transit from the point of collection?). This information should be shared with the sender so errors can be corrected in future shipments.

* In the case of laboratory-confirmed rubella or dengue outbreaks, the total number of samples that are negative for either rubella or dengue might be overwhelming. In such a case, the surveillance team, in conjunction with the laboratory, should decide which samples to test for measles.

** VTM should be made available to all health centers by the national laboratory of each country. VTM usually contains sterile phosphate buffered saline (PBS) or suitable isotonic solution such as Hank's BSS, etc., containing antibiotics (100

units/ml penicillin, or 100 mg/ml streptomycin) and either 2 % fetal bovine serum or 0.5 % gelatin in plastic, screw-cap, centrifuge tubes. VTM should be kept either frozen or refrigerated until it is used.

2000

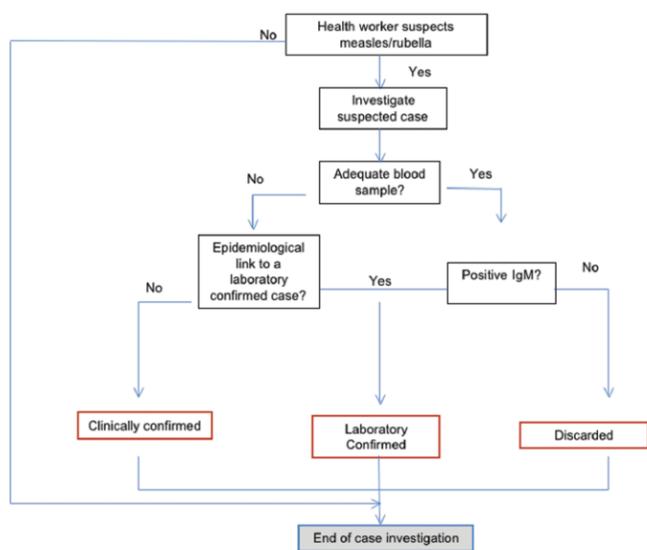
April 2000, Volume XXII, Number 2

Measles and Rubella Surveillance Integration in the Americas

The goal to eradicate measles in the Americas and the development of the Measles Eradication Surveillance System (MESS) have increased and enhanced epidemiological surveillance in the Region. Through MESS it has become evident that rubella virus is circulating widely in various countries in the Americas, with marked increases every year. It has been calculated that in non-epidemic years, approximately 20,000 children are born with congenital rubella syndrome (CRS) each year. This epidemiological situation makes rubella and CRS serious public health problems in the Region.

In 1998, there were 41 countries reporting 135,947 rubella cases: Argentina, Mexico and Venezuela accounted for 92% of these cases. In 1999, the information about rubella obtained through the MESS system showed that out of 33,633 laboratory analyses performed on samples from suspected measles cases, 26% (8,657) were confirmed as rubella. Ecuador, Brazil, Nicaragua, Dominican Republic and Guatemala accounted for 80% of those cases.

Figure 1. Investigation & Classification of a Suspected Measles or Rubella Case



In response to the threat for rubella epidemics, the resulting CRS burden and the current endemic course of the disease, the XIII Meeting of the Technical Advisory Group on Vaccine-Preventable Diseases (TAG) of the Pan American Health Organization, recommended the implementation of a regional initiative to integrate rubella and measles surveillance and the strengthening of CRS prevention efforts already in place.

The objectives of rubella surveillance are to determine where the virus is circulating; to timely detect cases in order to carry-out outbreak control and CRS prevention measures; to help quantify the magnitude of the problem; and to provide evidence of the impact of interventions.

For the purpose of an integrated surveillance system, any patient in whom a health worker suspects measles or rubella infection is considered a suspected measles or rubella case. These patients generally present fever and a generalized maculopapular rash (Figure 1).

This seemingly simple change has had significant implications for the Measles Eradication Surveillance System, particularly in the classification scheme, clinical data and the way in which the data are analyzed. To manage the surveillance of two diseases simultaneously, while maintaining the ability to analyze them separately, the concept of *initial* and *final diagnosis* were introduced. This allows to assign a classification to each case, and also segregate or group cases based on their initial or final diagnosis.

Case classification still includes the three options of the previous version: Suspect, Discarded and Confirmed. However, it is now necessary to be more specific and designate the type of suspicion, *measles* or *rubella*. Similarly, when confirming a case one has to specify that the case is either confirmed as *measles* or confirmed as *rubella*.

When the classification assigned is *Discarded*, it is also necessary to specify a final diagnosis as either *dengue*, *vaccine reaction*, *other* or *unknown* (Table 1).

It is relevant to point out at this time the difference between the options of *Other* and *Unknown* as final diagnosis. Usually, when the final diagnosis is indicated as *Other*, it means that it is known that it is not dengue, and that there is also certainty about the other diagnosis. In these cases a space is provided to allow for a specific description. In contrast, an *Unknown* final

Table 1. Classification of Measles and Rubella Cases

Classification	Initial Diagnosis	Final Diagnosis
A-Suspected	A-Measles B-Rubella	N/A
B-Discarded	N/C	I-Dengue V-Vaccine Reaction Y-Other Z-Unknown
C-Confirmed	N/A	A-Measles B-Rubella

diagnosis implies that the case is not measles, rubella, or dengue, and that there is also insufficient information to make a final determination.

Another area that had an impact by the integration of measles and rubella surveillance was the section on clinical data. Here, fields were added to indicate the presence of arthralgia; whether the case is a pregnant woman and if so, the number of weeks into the pregnancy and probable place for delivery; as well as whether the case had contact with a pregnant woman. These data can be used as an early opportunity to take preventive or control measures regarding CRS.

It is important to keep in mind that the system now maintains both measles and rubella suspected cases, and that this greatly affects all reporting, listings, tables (such as the indicators) and their interpretation.

For reporting purposes, and when applicable, there is an option to specify which cases are to be included in the analysis, by means of different criteria such as classification, initial and final diagnosis among others. In this way the exact set of cases desired can be analyzed.

If for example a report is needed with the indicator about the investigation of cases (measles suspected only) within 48 hours following reporting, **Measles** needs to be specified as the initial diagnosis.

The initial initiatives towards the integration of measles and rubella surveillance are already contributing to increasing the sensitivity of measles surveillance allowing the detection of all measles suspected cases that could possibly occur. This is critical at this stage of the eradication goal.

Countries like Brazil, which have implemented an integrated surveillance system, show an increased sensitivity in measles surveillance. In 1999, Brazil reported 32,248 measles and rubella suspected cases (about 23,000 rubella and 9,000 measles) of which 23% were confirmed as rubella. Of the cases reported as suspected rubella, 154 were confirmed as measles and of those reported as suspected measles, 246 were confirmed as rubella.

October 2000, Volume XXII, Number 5

XIV Technical Advisory Group Meeting

The fourteenth Technical Advisory Group Meeting on Vaccine-Preventable Diseases (TAG) was held in Foz do Iguacu, Brazil, October 2–5, 2000. TAG meets every year and functions as the principal forum to promote regional initiatives aimed at controlling and eradicating vaccine preventable diseases. The following are the TAG's conclusions and recommendations as presented in the Final Report.

Rubella and Congenital Rubella Syndrome (CRS)

Although congenital rubella syndrome (CRS) is a readily preventable public health problem, rubella virus continues to circulate in most countries in the Region. In the absence of accelerated efforts to control rubella, outbreaks of the disease are likely to continue, with the resulting CRS cases adding heavily to the disease burden in all countries.

Considerable progress has been achieved with the introduction of rubella vaccine in national immunization programs. Of the 47 countries in the Americas, 42 have already introduced rubella vaccine, while the remaining five countries will include it in 2001. During 2000, the surveillance system for measles was expanded to include rubella.

Recommendations

Vaccination Strategies

1. All countries should incorporate rubella-containing vaccine (MMR/MR) into childhood vaccination programs, both as part of routine childhood immunization at 12 months, and as part of *follow-up* campaigns. Moreover, targeted efforts are needed to reduce the number of rubella susceptible women of child-bearing age. Immunization strategies, targeting post-partum women, those attending family planning clinics, as well as those in schools and the workplace can be used to protect them.
2. Countries wishing to prevent and control both rubella and CRS promptly should conduct a one-time mass campaign to vaccinate both males and females 5–39 years of age with measles and rubella containing vaccine.

3. There are substantial data available documenting the absence of any risk of rubella vaccination during pregnancy. For women who are vaccinated and then subsequently found to be pregnant, abortions are not recommended. It is not necessary to counsel women to avoid pregnancy following rubella vaccination because there is no known risk of adverse fetal outcomes.

Surveillance and Laboratory

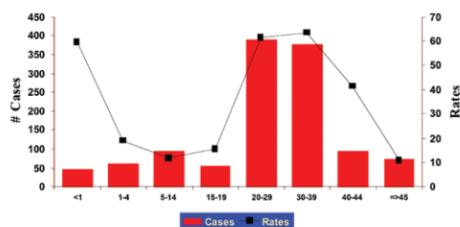
1. Rubella surveillance should be completely integrated with measles surveillance. All sera from suspected measles cases which test negative for measles IgM antibodies should be tested for rubella IgM antibodies and vice versa.
2. CRS surveillance should be initiated throughout the Americas in order to detect CRS cases in children under one year of age. Countries should follow the case definitions for CRS surveillance, which were recommended at the 1999 TAG meeting. It is not necessary to routinely confirm CRS in older children.
3. A single serum specimen is generally considered adequate to either confirm or discard CRS.
4. Countries should improve the collection of samples for virus isolation in outbreak situations. Nasopharyngeal aspirates or swabs are the preferred specimens for rubella virus isolation and should be collected within four days of rash onset. This will provide important information concerning the virus sub-types that are currently circulating in the Region.
5. National programs should actively promote the collaboration with the medical sector (especially obstetricians, neonatologists and pediatricians) to enhance rubella/CRS surveillance and vaccination efforts.

in the number of cases (Figure 1). For the last 14 years, rubella outbreak cycles were reported in 1987-1988 (1,079 cases), 1993-1994 (492 cases) and 1998-1999 (1,282 cases). A progressive reduction in the proportion of cases was observed in these outbreaks in the 15-24 age group from 45% between 1987-1988, to 25% between 1993-1994, to 11% between 1998-1999. In the 25-44 age group, a steady increase to 23%, 31% and 41% respectively was observed. Furthermore, when analyzing attack rates by age group in the last two outbreaks it was observed that those at greater risk were in the 20-29 age group, followed by the 30-39 age group (Figure 2).

Rubella incidence by sex has not shown important differences since the introduction of the vaccine. The 1998-1999 rubella outbreak affected both men and women (a ratio of 1.15 female/1 male). Results of a national serological survey conducted in 1996 indicated that the seroprevalence of susceptibles to rubella was 7% among preschool children and 36% for women of childbearing age.

The endemicity of rubella in Costa Rica and the fact that recent outbreaks (1998-1999) had affected primarily women

Figure 2. Distribution of rubella cases and attack rates by age group. Costa Rica, 1999*

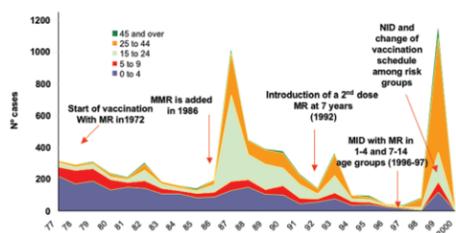


* Preliminary data
Source: Costa Rica Ministry of Health

of deafness conducted between 1996-1997, which evaluated the hearing of a total of 12,612 first graders in 250 schools in the country. The survey detected a 4% prevalence of deafness among school-aged children, whose source was unknown in 40% of the cases, congenital in 38% and acquired in 22%. A history of rubella during pregnancy was reported as one of the leading causes of acquired deafness.

These results only partially reflect the severity of CRS in the country, since they only correspond to cases of children under 3 months of age detected at the National Children's Hospital, and to a study showing the situation of deafness among schoolchildren, as well as their difficulties in being inserted into society. This information also pointed to a serious underreporting of CRS cases in the notification system.

Figure 1. Number of rubella cases by age group and vaccination strategies. Costa Rica, 1977 to 1999



Source: Information Center, Epidemiological Surveillance, Ministry of Health

of childbearing age suggested that cases of congenital rubella syndrome (CRS) were occurring. However, the country's compulsory notification system had not reported any case of CRS since 1992.

An active search of CRS cases was carried out at the National Children's Hospital by analyzing the database of the immunology section of that hospital's laboratory. Cases of children under 3 months of age were identified which had undergone an IgM test for rubella virus with positive results between the periods of 1996 to 2000. Forty-nine children with CRS showing the following diagnosis were detected: 20 cases with hepato-splenomegaly (41%); 10 with microcephaly (20%); 10 multi-malformation (20%); 7 without a known cause (15%); and 2 cases with cataracts (4%). None of the records hinted to any suspicion of rubella, and the main diagnosis was TORCHS (toxoplasmosis, rubella, cytomegalovirus, herpes simplex virus, varicella-Zoster virus and syphilis).

The magnitude of CRS in Costa Rica also became evident in the preliminary results of a study

Action Plan for Rubella and CRS Prevention

The analysis of epidemiological data on rubella and CRS from the early seventies, the results of seroprevalence studies, the evaluation

of coverage and the experience of the country with rubella vaccination for several decades prompted Costa Rica's health authorities at the Ministry of Health and its Social Security Administration (CCSS) to work towards the prevention of rubella and CRS. In support of this goal, both the Ministry and Costa Rica's Social Security have developed an Action Plan which seeks the:

- Implementation of a national mass campaign for men and women 15-39 years of age with rubella and measles-containing vaccines.
- Maintenance of MMR in childhood vaccination schedules.
- Vaccination against measles and rubella of all postpartum women that have not been previously vaccinated.
- Updating and strengthening of the integrated measles and rubella surveillance system.
- Development of a CRS surveillance system.

The national campaign will take place May 2-31, 2001.

The Action Plan promotes the use of an integrated vaccination strategy and strengthening of epidemiological surveillance

aimed at consolidating measles eradication and ensuring rubella and CRS prevention.

The Plan incorporates the following strategies:

- Intersectoral action, especially with the education and labor sectors.
- Social mobilization with the community as well as political, union and religious leaders, community associations, presidents of student federations, representatives of secondary education, artists, entrepreneurs, local non-governmental organizations, and the media.
- Integrated management between the Ministry of Health and CCSS.
- Planning and management of the country's health service networks.
- Interagency cooperation for effective resource mobilization.
- International cooperation for technical cooperation and resource mobilization.

A National Commission of Immunization chaired by the Health Minister is directing the Action Plan, and a Commission led by the Vice Minister of Health will coordinate the activities. A Coordinating Commission has been established to oversee vaccination campaigns and epidemiological surveillance. As part of the vaccination campaign component, the Commission will oversee the areas of logistics, cold chain and immunization safety, mass media, social communication, social participation, system of registries, staff training and supervision. For the epidemiological surveillance components, two working teams will focus on strengthening measles and rubella monitoring, as well as the development and implementation of a CRS surveillance system.

The national campaign will be coordinated with the regional and local epidemiology and vaccination commissions throughout the entire country. Social mobilization is expected to be widely used. Activities have included:

- Identification of needs of the different organizations at the community level (municipalities, schools, trade, church, and local organized groups).
- Identification of national personalities that should participate in the social communication efforts during vaccination campaigns (soccer players, singers, actors, religious and political leaders, societies and professional schools).
- Preparation and dissemination of a mass media proposal for the vaccination campaign.

This initiative represents a joint effort of national health institutions represented in the Ministry of Health and the CCSS, specialized agencies and

the international community. The Pan American Health Organization and the Centers for Disease Control and Prevention are providing financial and technical support.

Source: For more information regarding this initiative, please contact Dr. Xinia Carvajal, Vice-Minister of Health, Ministry of Health, and Dr. Guillermo Santiesteban, Deputy Director, Social Security Administration.

Editorial Note: Together with the efforts of the English-speaking Caribbean countries and Chile, the initiative of Costa Rica's Ministry of Health and its Social Security Administration will generate useful knowledge and experience for the development of strategies for rubella and CRS prevention and control in the Americas, and for their eventual eradication. Costa Rica's Action Plan is consistent with the recommendations of PAHO's Technical Advisory Group on Vaccine-Preventable Diseases in regards to vaccination strategies and implementation of surveillance systems.

February 2001, Volume XXIII, Number 1

March of Dimes Foundation Renews Support to PAHO

The March of Dimes Birth Defects Foundation has renewed its support to PAHO's regional activities to control and eventually eradicate rubella and congenital rubella syndrome (CRS), with a grant in the amount of US\$ 200,000 for 2001-2002. The first agreement was signed in 1998. PAHO has focused its collaboration with countries on the development, implementation and monitoring of strategies aimed at the control of rubella and prevention of CRS; support in the implementation of a regional surveillance system for rubella and CRS; strengthening of the collaboration with the regional Measles Laboratory Network to carry out rubella and CRS surveillance; and analysis of rubella and CRS surveillance, which includes the preparation of regular surveillance reports and contributions to scientific publications.

During the upcoming phase emphasis is being placed on the standardization of a rubella and CRS surveillance system; the implementation of strategies to reduce the number of susceptible women of childbearing age; follow-up mechanisms of all pregnant women who have developed rubella; collection of samples for viral isolation from every outbreak and development of virus isolation capabilities in countries; as well as the promotion of appropriate vaccination strategies.

Costa Rica Embarks on Accelerated Rubella and Congenital Rubella Syndrome Program

Background

Costa Rica introduced rubella vaccine into the national vaccination schedule in 1972. No significant changes in the trend of the disease were observed for the first two decades due to the low coverage (40%) obtained. It was only in 1984 that vaccination coverage of approximately 80% was reached. In 1992 a booster dose was included at 7 years of age resulting in further decrease

Rubella and CRS in the Americas

For 2000, data on rubella obtained through PAHO's regional measles eradication surveillance system showed that out of 71,723 laboratory analyses performed on samples of suspected measles cases, 11,992 (21%) were confirmed as rubella. Bolivia, Brazil, the Dominican Republic, Ecuador, Guatemala and Peru reported 92% of all confirmed rubella cases. Brazil, Honduras and Peru have integrated their measles and rubella surveillance systems.

By January of 2001 already 44 of the 47 countries in the Americas had included rubella vaccine in their national immunization program. The Dominican Republic, Guatemala and Peru plan to introduce the vaccine during the second semester of 2001. To reduce the risk of rubella infection in women of childbearing age, Brazil, Chile, all CAREC Member States, Colombia, Costa Rica, Honduras and Panama have scheduled vaccinations using rubella vaccine during the postpartum period. Canada, Cuba, the United States and Uruguay have used measles/mumps/rubella (MMR) vaccine for several years and large cohorts of women of childbearing age are being protected.

Most of the available experience in CRS surveillance continues to originate from the English-speaking Caribbean. Given the importance of surveillance in preventing CRS and the still limited available data, two additional sources of information have been added - the Latin American Center for Perinatology (CLAP) and the Collaborative Latin American Study Project of Congenital Malformations (ECLAM).

February 2001, Volume XXIII, Number 1

WHO Position on Use of Measles Mumps and Rubella (MMR) Vaccine

The World Health Organization (WHO) strongly endorses the use of MMR (measles, mumps and rubella) vaccine on the grounds of its convincing record of safety and efficacy. The combination vaccine is recommended rather than monovalent presentation when available and the disease burden justifies its use.

There has been no new scientific evidence that would suggest impaired safety of MMR. On the contrary, all results from vaccine trials published reaffirm the high safety and efficacy of MMR vaccine.

Background

Measles is a major killer of children mainly in developing countries, accounting for approximately 875,000 deaths each year. However, recent outbreaks in industrialized countries have highlighted the

importance of improving measles immunization coverage throughout the world. Congenital rubella syndrome (CRS) is an important cause of deafness, blindness and mental retardation. It is estimated that more than 100,000 cases of congenital rubella syndrome occur each year worldwide. Mumps is an acute infectious disease. Although the disease is mild, up to 10% of patients can develop aseptic meningitis; a less common but more serious complication is encephalitis, which can result in death or disability. These three communicable diseases can be easily prevented through immunization.

Source: World Health Organization

April 2001, Volume XXIII, Number 2

Institute of Medicine (IOM) Committee Rejects Causal Relationship Between Measles-Mumps-Rubella Vaccine and Autism Spectrum Disorder

At a public briefing on Monday, April 23, the Institute of Medicine's (IOM) Committee on Immunization Safety Review released a report in which they conclude that the evidence favors rejection of a causal relationship between the measles-mumps-rubella (MMR) vaccine and autism spectrum disorder, commonly known as autism. The Committee concluded that:

- the epidemiological evidence shows no association between MMR and autism;
- case studies based on small numbers of children with autism and bowel disease do not provide enough evidence to draw a conclusion about a causal relationship between these symptoms and administration of the vaccine;
- biological models linking MMR and autism are fragmentary;
- there is no relevant animal model linking MMR and autism.

Therefore, the Committee recommended maintaining the current policies relating to licensure and administration of the MMR vaccine in the United States. The Committee Chair, Marie C. McCormick, M.D., Sc.D., professor of maternal and child health at the Harvard School of Public Health, stated at the briefing that while no vaccine is 100% safe, the MMR vaccine is as safe as a vaccine can get.

The Committee reviewed published and unpublished material, and also heard testimony from a variety of witnesses, including Dr. Andrew Wakefield, the author of a well-publicized study published in *The Lancet* in 1998. This study seemed to indicate that the onset of autism and gastrointestinal problems were associated with the receipt of the

MMR vaccine. Dr. McCormick noted that the Wakefield study was published as an observation for further investigation and never claimed to prove the relationship. She further noted that the Committee reviewed numerous studies that examined Wakefield's hypothesis and were unable to find evidence to support it.

Current research on autism has established that there is a strong genetic component to the disease; however, the Committee report notes that 'other factors, including infectious, neurologic, metabolic, immunologic, and environmental insults, may play significant roles.' Therefore, although the Committee felt that a relationship between MMR vaccine and autism would be extremely rare, if it occurred at all, they recommend that research to examine this possible relationship continue.

The IOM's Committee on Immunization Safety Review was convened in Fall 2000 to provide an independent review and assessment of increasingly prominent vaccine safety concerns. It will examine nine vaccine-safety hypotheses over the next three years. The 15 Committee members have expertise in pediatrics, internal medicine, immunology, neurology, infectious diseases, epidemiology, biostatistics, public health, risk perception, decision analysis, nursing, genetics, ethics, and health communications. To prevent any perception of conflict of interest, anyone with financial ties to vaccine manufacturers or their parent companies, and anyone who had served on vaccine advisory committees, provided expert testimony, or published papers on issues of vaccine safety are excluded from participating on the Committee.

Source: Institute of Medicine, April 24, 2000.

June 2001, Volume XXIII, Number 3

Progress and lessons learned from Costa Rica's rubella campaign

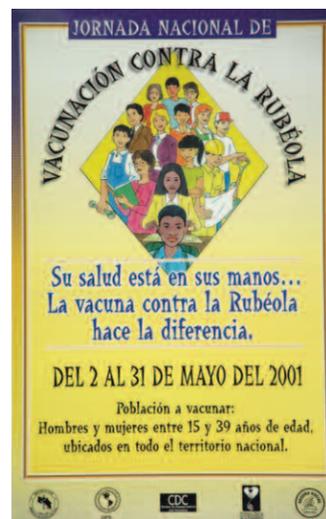
As a result of the epidemiological surveillance analysis of rubella and congenital rubella syndrome (CRS) in Costa Rica, and to prevent the risk of having a population of young adults susceptible to rubella, the Ministry of Health, in close coordination with the Social Security System of Costa Rica (CCSS), implemented a National Immunization Day against rubella and measles, targeting men and women between the ages of 15-39 years, regardless of their immunization status (EPI Newsletter, February 2001).

The magnitude of the target group to be vaccinated, 42% (1,606,329) of the country's total population, and its heterogeneous character (the inclusion of men and women,

teenagers and young adults ages ranging from 15-39 years), put to the test the country's health services network. This initiative, however, provided the opportunity to gain useful experiences from the implementation of rubella vaccination strategies.

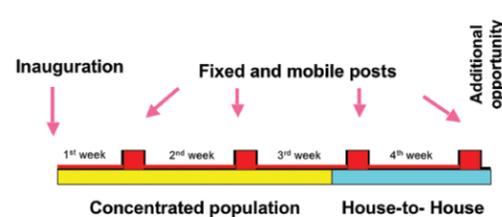
Dynamics of the National Immunization Days

A National Plan of Action and national guidelines were used as the basis to elaborate local and regional plans of actions. These included activities related to the campaign's preparation, training, supervision, monitoring and evaluation. Through these, the health areas and establishments identified the target population during the campaigns, calculated with the population registered in that specific area of influence, plus the population only residing in the area for work or study purposes. Furthermore, for vaccination coverage estimates, the population was determined by canton or municipality based on data from the country's 2000 census.



Based on the target population, established programming criteria and each particular situation, plans specified the vaccination modalities (Figure 1), along with the financial and human resource needs, as well as the location and number of vaccination teams and vaccination posts (fixed and mobile). In general, the vaccination team consisted of a minimum of three individuals: a vaccinator, a recorder and a supervisor per every 10 vaccinators or vaccination posts. The number of teams was increased for health posts expected to show a greater demand.

Figure 1. Modalities of Vaccination in Urban Areas



The definition of vaccination strategies was based on the particular situation of the target population, access to existing services, availability of resources, and previous experience with similar activities. Notwithstanding, the campaign was also developed in a way that it would provide the population with different opportunities and times for vaccination.

- During the first two weeks, vaccination was carried out among the population clustered in working and studying centers.

- In rural areas with disperse population, vaccination began in hard-to-reach areas followed by vaccination in urban areas. Several tactics were used to ensure reaching disperse population groups, such as mobile posts, a call to gather at strategic locations, the use of brigades, house-to-house vaccination, and flexible hours, as well as in some areas initiation of vaccination activities prior to the established period of the campaign.

- During the whole month, including weekends, vaccination was carried out at identified fixed and mobile posts. For the distribution and location of vaccination posts, special attention was given to the most densely populated areas, means of transportation, urban outskirts, irregular human settlements, as well as known gathering points, such as supermarkets, shopping malls, churches, transportation terminals, agricultural fairs and education centers.

- A third step consisted in a door-to-door vaccination using drawings

or maps to guarantee vaccination of the entire population in the area, and to identify pockets of non-vaccinated groups. Given that the target population consisted of teenagers and young adults, this activity was preferably carried out after 4:00 p.m. In some areas, mop-up activities were also implemented.

- During the last weekend, an additional opportunity for vaccination was given by making available a greater number of posts. This was complemented with a social mobilization campaign.

Social mobilization was a determining factor for the success the campaign, both in terms of the activities of social participation and those of mass communication. The overall slogan, "Your health

is in your hands... The vaccine against rubella makes the difference," was complemented with a specific slogan aimed at adolescents, "Decide your future today... The vaccine against rubella makes the difference."

Similarly, the widespread dissemination of the location and schedule of operations of vaccination posts, visits to the localities and institutions were also a positive factor.

The inter-sectorial action and the creation of alliances were essential elements of this joint effort. They included the

participation of health institutions and that of other sectors, such as government and non-government, the private sector, community organizations, professional associations, as well as international technical and financial cooperation agencies. The strategy used allowed for the mobilization of resources from various types and sources, as well as the articulation of all initiatives towards a common objective. Activities were carried out both, at the national, regional and local levels.

The availability of timely and quality information of the target groups allowed for the quick implementation of corrective measures, to ensure the achievement of goals. Special formats were used for the campaign, both for the daily registration as for the consolidation of doses applied. Furthermore, a software was designed for the consolidation of regional and national data. Information was obtained by age group, sex, canton, and health establishment. The local and regional teams obtained weekly information on the campaign results, for analysis of progress being made and decision-making purposes. The data were validated by rapid monitoring of vaccination coverage and presented graphically.

Another critical aspect of the campaign was the supervision at the various levels. The figures of "godfathers or godmothers" were created to facilitate both communication and coordination among teams, as well as for advisory services of the planning and evaluation aspects.

Results

The campaign was officially initiated May 2, although some health areas were allowed to begin a week earlier because of difficulties of access or for weather reasons. The campaign was programmed to end May 31, but was extended to June 3, to take advantage of the weekend to vaccinate in some cantons that still had unvaccinated population. Preliminary data of the campaign reported a national coverage above 95%, which included 7% of foreigners. Men and women were vaccinated in similar proportions, with a slightly greater coverage for men.

By age group, the groups from 15 to 19 and from 35 to 39 years achieved a preliminary coverage of more than 100%. This can be explained because people vaccinated included those that had already turned 15 years of age, as well as those turning 15 years in 2001. Furthermore, it is possible that people were vaccinated and registered with ages outside the range defined for the campaign. The other age groups achieved coverage greater than 95%, except for the 30-34 age group, which obtained 90%.

Given the modality used and the fact that vaccination was initiated earlier in some health areas, at the end of the first week the country had already achieved 31% of vaccination coverage, even though only 3 days had elapsed from the official inauguration date. This figure climbed to 63% and 83% upon the conclusions of the second and third weeks. After having reached the captive audiences and reduced the number of unvaccinated, progress in coverage and the number of vaccinated began to fall.



Left to right: Dr. Rogelio Pardo Evans, Minister of Health; Dr. Miguel Ángel Rodríguez, President of Costa Rica, Lorena Facio de Rodríguez, First Lady; Mr. Rodolfo Piza Rocafort, Executive President of the Costa Rican Social Security Fund and Dr. Philippe Lamy, PAHO Representative in Costa Rica.

In all the regions coverage was higher than 95% and some surpassed 100%. Based on the first analyses, the teams of the Metropolitan Area were the ones administering the greatest number of vaccines, which included 18% more people that reside in other regions of the country and 96% of the residents registered in those cantons. In the Central Southern Region, 83% of the population was vaccinated by the teams, which means that an important proportion of the target population was vaccinated outside its area of influence. The Northern Central Region vaccinated 93% of the population. The regions of Chorotega, Huetar Norte, Huetar Atlántica, Brunca, and Central Pacific vaccinated more than 92% of their target population. The Metropolitan Area, the Central Regions, Chorotega, and Huetar Norte showed the highest values.

The regional levels provided support to the local levels in the definition of strategies at the beginning of the campaign and in the adaptation of these strategies when required. This continuous support was critical to ensure that new concentrations of the population were being taken into account, as well as any geographical barriers and other factors that could hinder vaccination.

Progress toward the achievement of the goal varied for the different establishments, health areas and regions since the strategies that were used for reaching the target population were based on rural conditions, geographical access, and special socio-cultural characteristics of

the areas. However, all regions surpassed the goal of the campaign and 75% of the cantons achieved a preliminary coverage of 95% or more.

Lessons learned

Many lessons have arisen from this campaign. They include the satisfaction of having achieved the target vaccination coverage, but also the experiences shared by the working teams at all levels of management.

1. The epidemiological information supported the decision

and, together, with technical-managerial components, political and analysis of cost effectiveness, facilitated the involvement of thousands of staff members, social mobilization efforts and the overwhelming response of the population.

2. Inter-sectoral coordination of both public and private institutions was facilitated by the involvement and motivation of thousands of staff members throughout the country and the political support at the highest level within the health sector and that of the Presidency and the Governing Council, which issued an executive decree in support of the national campaign.

3. The need to have a well-defined organization at all levels of management, which allows for flexibility during the process. The active involvement of all managers at every level was also fundamental.

4. Important lessons from the campaign are related to the complexity of mass vaccinating an adult population:

- The identification of the population of the area of influence and the population to vaccinate including those captive at their workplace and study areas was critical for planning and programming purposes.
- The use of biologicals, inputs and materials should contemplate the proportion of the population that is programmed as residents in a health area and as captive

in others, as well as the number of teams of vaccinators.

- The use of different strategies for rural and urban areas adapted to each particular situation and at different moments of the campaigns implementation proved effective. In remote rural areas, activities should begin at the periphery and then advance towards the most populated centers. In urban areas, they should begin at work and educational places and end with door-to-door mop-ups.
- The implementation of adequate social mobilization strategies was vital. These strategies should be directed to health workers and the population. Efforts in this area are never too excessive. Various innovative experiences arose during the campaign: the involvement of hospitals and their work with the community, the participation of the education and private sectors, the creativity of staff members in implementing new forms of education and mobilization of the population to be vaccinated, are only some of the examples. Furthermore, of great use were the involvement of medical societies and that of others professions, as well as the active participation of health workers.
- The availability of simple instruments that allow for the registration of the target population by age group, sex and canton of residency; as well as the development and monitoring of indicators, the monitoring of coverage obtained, both that of the registered population, as well as that of the total population to be vaccinated, (including the population that studies or works in the area), helped the reformulation of strategies and the achievement of goals. To this end, the availability of timely partial progress reports was critical.
- The need to respond to specific situations such as: the organization of blood banks in view that the

donor population was being vaccinated in a short period of time, vaccination of risk groups, such as people with HIV/AIDS, chronic diseases and treatments; monitoring of post-vaccination events and the immediate investigation of serious ones.

• For monitoring and evaluation, sketch and maps, graphs of coverage and fast monitoring of coverage in convenience samples of dwellings and workplaces complement the official registry, since they facilitate the identification of unvaccinated groups and contribute to providing qualitative information.

5. This experience demonstrates that it is feasible to implement strategies and recommendations of international health organizations for the accelerated control of rubella and prevention of congenital rubella syndrome.

The success of this campaign, which achieved vaccination coverage above 95%, both in men and in women, had not been possible without the involvement of Costa Rica's citizens, who once again showed their commitment with their health, both individual and collective, their social conscience and high spirit of collaboration. The same can be said about the health sector staff that worked throughout the country at the various levels of management. Without their enthusiasm, involvement, initiative, and arduous work, the successful culmination of this national vaccination campaign would not have been possible.

Costa Rica's health authorities thank the support of the Presidency of the Republic, the Governing Council, the Office of the First Lady, the private sector, the mass media, the Pan American Health Organization, the Centers for Disease Control and Prevention of the United States and all those people and organizations that collaborated in this effort.

Source: Dr. Xinia Carvajal, Vice Minister, Ministry of Health; Dr. Guillermo Santiesteban, Deputy Director, Costa Rica's Social Security and Dr. Mario León, Executive Coordinator of the Campaign, CCSS.

August 2001, Volume XXIII, Number 4

Rubella Vaccination of Women of Childbearing Age in the Americas

In 1997, the Technical Advisory Group (TAG) on Vaccine-Preventable Diseases of the Pan American Health Organization recommended developing appropriate vaccination strategies aimed at reducing the number of susceptible women of childbearing age (WCBA) to rubella in response to the potential for major rubella outbreaks and ongoing incidence of congenital rubella syndrome.

Specifically, TAG's recommendations state that:

- Countries wishing to prevent and control CRS promptly should conduct a one-time mass campaign to vaccinate all females 5–39 years of age with measles and rubella containing vaccine.
- Countries wishing to prevent and control both rubella and CRS promptly should conduct a one-time mass campaign to vaccinate both males and females 5–39 years of age with measles and rubella containing vaccine.

In an effort to reduce the risk of rubella infection in women of childbearing age, the United States, Canada, Cuba, Chile, Costa Rica, Panama and Uruguay are using measles/mumps/rubella vaccine (MMR) for many years, thereby protecting large cohorts of WCBA. Brazil, Colombia and Honduras have scheduled vaccination against rubella in the postpartum period, and Mexico has initiated vaccination among risk groups (Figure 1).

December 2001,
Volume XXIII, Number 6

FLASOG to participate in the implementation of strategies to control rubella and prevent CRS in the Americas

Evidence shown at several meetings of PAHO's Technical Advisory Group on Vaccine-Preventable Diseases (TAG) has indicated that in the Americas over 20,000 infants are born each year with congenital rubella syndrome (CRS). Accordingly, and given the availability of safe, affordable and efficient vaccines, TAG recommended the development and implementation of a regional initiative aimed at strengthening rubella control and CRS prevention.

On 23 August 2001, the President of the Latin American Federation of Obstetricians and Gynecologists (FLASOG) met with the presidents of each chapter in the countries of Latin America, to discuss the participation of the Region's

immunization activities during the postpartum period, and Mexico has begun vaccinating risk groups.

In 1998, countries of the Caribbean community (CARICOM) announced an initiative calling for the elimination of rubella and the prevention of CRS in the countries of the English-speaking Caribbean. In September 1999, Chile implemented a mass rubella immunization campaign targeting women between the ages of 10–29 years and, in May 2001, Costa Rica completed a mass rubella campaign on a national level, targeting both men and women between 15–39 years of age. Finally, Brazil carried out a rubella campaign in November 2001, aimed at women 15–19 years.

The Latin American Federation of Obstetrics and Gynecology agreed on the following recommendations:

- The Chapters of Obstetrics and Gynecology in each country must seek the political and financial commitment of their government in support of an accelerated

coordinate with the respective Chapters of Obstetrics and Gynecology in each country.

- Specialists in routine gynecological consultations must insure that all women of childbearing age are immunized with rubella, as well as with diphtheria and tetanus toxoid vaccines.
- Scientific evidence shows that immunization against rubella during pregnancy is safe, yet pregnant women are generally not vaccinated. This is to avoid the risk of the vaccine being implicated should there be an unrelated adverse outcome of the pregnancy. Furthermore, for women who were inadvertently vaccinated and subsequently found to be pregnant, interruption of pregnancy is not recommended. Also, it is not necessary to counsel women to avoid pregnancy following rubella vaccination because no known risk of adverse fetal outcome has been established.
- Countries that decide not to launch campaigns for the rapid control of rubella and CRS must direct their efforts toward decreasing the number of susceptible women of childbearing age. To this end, strategies such as vaccination during the postpartum period and immunization in family planning clinics, schools, and in the workplace are recommended.
- FLASOG members are called upon to actively participate in the strengthening of rubella and CRS surveillance, in order to detect virus circulation promptly. They should also report and follow-up with all pregnant women who have contracted rubella.
- The Perinatal Information System (SIP 2000) is an appropriate tool for the notification of CRS cases. It includes information regarding the immunization status of the mother, rubella diagnosis, either laboratory confirmed, or clinically during the mother's pregnancy or, if exposed to the disease, congenital malformations, hepatosplenomegaly, and purpura.
- As part of surveillance, confirmation by laboratory is essential for rubella and CRS diagnosis.
- The subject of vaccination of women of childbearing age and during pregnancy must be introduced during national and international OB/GYN meetings.
- PAHO must update and widely disseminate all available information regarding immunization during pregnancy.
- The Chapters of Obstetrics and Gynecology must participate in the national immunization committees of their respective country.

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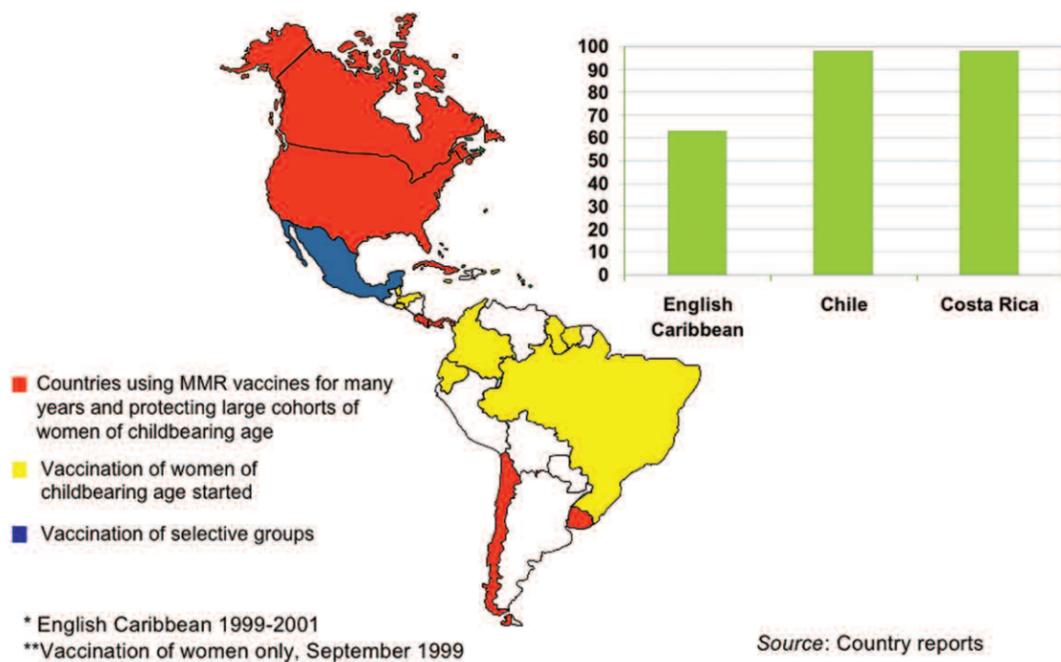
Cross-learning: sharing experiences of a rubella campaign

Costa Rica became the first country of Central America to implement the recommendations on rubella of PAHO's Technical Advisory Group on Vaccine-Preventable Diseases (TAG). Following an analysis of the epidemiological situation of rubella and congenital rubella syndrome (CRS) in the country, the Ministry of Health and the Social Security System of Costa Rica (CCSS) adopted a strategy of accelerated rubella control and prevention of CRS, and carried out a one-month National Immunization Campaign against rubella and measles, targeting men and women between the ages of 15–39 years, regardless of their immunization status (refer to *EPI Newsletter*, February and June, 2001). Recommendations on rubella vaccination strategies at the 1999 TAG (XIII Meeting of the PAHO Technical Advisory Group on Vaccine-Preventable Diseases, Hull, Quebec, Canada, April 12–16, 1999) state that "countries wishing to prevent and control both rubella and CRS promptly should conduct a one-time mass campaign to vaccinate both males and females 5–39 years of age with measles and rubella containing vaccine."

The campaign presented several challenges for Costa Rica's health services network: foremost was the size of the target group for vaccination (42% of the country's total population), followed by its composition – men, women, teenagers and young adults. Furthermore, a vaccination campaign aimed at adults called for an entirely different set of planning and logistical tools than those generally used for campaigns aimed at children.

The Costa Rica campaign has been a unique opportunity to gain useful experiences in the implementation of the rubella accelerated vaccination strategy. In order to optimize this experience with other countries in the sub-region, PAHO convened the managers of national immunization programs of all Central American countries for a two-day session during the May campaign in Costa Rica. Managers of neighboring Central American countries had a firsthand view of a rubella immunization campaign targeting adults from a managerial, administrative and operational perspective. Disseminating these best practices among immunization managers will be key as other countries embark on similar rubella campaigns targeting both men and women.

Figure 1. Accelerated control of rubella and CRS English-Speaking Caribbean*, Chile and Costa Rica**



Source: Country reports

Adult rubella vaccination campaigns in the framework of accelerated rubella and CRS programs are being implemented. CARICOM established in 1998 the goal to eliminate rubella and CRS in the English-speaking Caribbean, and are in the process of completing their adult rubella mass campaigns.

In September 1999, Chile implemented a mass vaccination campaign aimed at women between the ages 10 to 29 years, reaching a vaccination coverage of 98%. Costa Rica embarked on a national mass campaign targeting men and women from 15 to 39 years old, reaching a national vaccination coverage of 98% (*EPI Newsletter*, February and June, 2001).

Chapters of Obstetrics and Gynecology in the implementation of this initiative.

The initiative has three objectives:

- Ensure that rubella immunization reduces the number of susceptible women of childbearing age.
- Support countries in their efforts towards developing integrated systems for the surveillance of measles and rubella.
- Develop a surveillance system for CRS.

To reduce the risk of rubella infection in women of childbearing age, Canada, Cuba, the United States, and Uruguay have used measles-mumps-rubella vaccine (MMR) for several years, and large cohorts of women of childbearing age are being protected. Brazil, Colombia, and Honduras have started

rubella control program and CRS prevention.

- Reiterate the TAG recommendations for countries wishing to prevent and promptly control CRS, and for countries wishing to prevent and promptly control rubella and CRS.
- Lessons learned from similar campaigns launched in countries of the Region have demonstrated the importance of having an appropriate social communication strategy; the participation of scientific and medical societies; monitoring of post-vaccination events and immediate investigation during the campaign; and coordination with blood banks.
- FLASOG will play an active role in the implementation of strategies for the control of rubella and CRS prevention in each of the countries of the Region. National immunization programs will



The rubella and congenital rubella syndrome elimination initiative has provided an opportunity for the American people to join forces in order to reach isolated and disadvantaged populations and offer them the gift of vaccination. The initiative has represented a genuine expression and an unforgettable reminder of the best of what Pan-Americanism has to offer and of what we can achieve thanks to the consensus and leadership of PAHO Member States.

Immunization managers were given a presentation by Costa Rica's entire multidisciplinary and inter-sectoral team involved in the planning and organization of the campaign. They also visited health establishments at the various levels of the health system where the campaign had taken place (regional, health areas, health posts, hospitals and clinics). Here they were able to review all the technical and managerial aspects that came into play during the implementation of the campaign. Finally, immunization managers met with the central Coordinating Commission, which had oversight responsibilities over the vaccination campaign (logistics, cold chain and immunization safety, mass media, social communications, social participation, registries, staff training and supervision) and epidemiological surveillance (rubella and measles), as part of the Action Plan developed by the Ministry of Health and the CCSS.

Participants welcomed the opportunity to monitor the implementation of all components of the campaign while it was being carried out. Managers of immunization programs learned of the importance of harnessing the support of health authorities and members of government at the highest level for the national campaign, of having readily-available epidemiological information on disease burden, as well as analyses on cost-effectiveness. Equally important were the active involvement of the country's medical and scientific societies, the implementation of adequate strategies of social mobilization, the availability of simple instruments that allow for the registration of the target population by age group, and the effective management of particular situations, such as monitoring of post-vaccine events during the campaign, planning for safe injections and disposal of hazardous material, and coordination with blood banks.

During the two-day meeting, the following plans were outlined for rubella control and CRS prevention in Central American countries:

- **Guatemala:** Following an external evaluation of the national immunization program in October 2001, a plan has been proposed to implement a strategy of rubella control and CRS prevention in stages, commencing in 2002 with the vaccination of the <5 years age group.
- **Honduras:** A National Immunization Day in support of the accelerated control of rubella and prevention of CRS will be carried out in 2002, targeting men and women ages 5 to 39.
- **Nicaragua:** A National Immunization Day, supporting the accelerated control of rubella and CRS prevention is to be carried out in 2002, aimed at men and women ages 7 to 39 years using the rolling campaign strategy.

- **El Salvador:** An analysis of vaccination coverage reached against measles and rubella during previous campaigns will be undertaken, to determine susceptible groups and age groups to vaccinate.
- **Panama:** An analysis of existing rubella vaccination coverage data, investigation of cases of CRS starting from the last outbreak will be carried out, as well as the planning of a National Immunization Day targeting men and women in at-risk age groups.
- **Costa Rica:** Results and experiences of the successful rubella campaign will be disseminated in a final report and scientific journals.

April 2002,
Volume XXIV, Number 2

Brazil accelerates control of rubella and prevention of congenital rubella syndrome

Background

Seroprevalence studies for rubella antibodies conducted in Brazil in the late 1980s and early 1990s laid the groundwork for the implementation of the country's rubella vaccination strategies. Serological testing in Fortaleza (Rey CL, *et al.*) in 1997 revealed that the most susceptible group among pregnant and post-partum women were those 15 to 19 years of age (39%).

The introduction of MMR (measles/mumps/rubella) vaccine or MR (measles/rubella) vaccine to the basic immunization schedule in Brazil's 27 States was initiated in 1992. Technical criteria considered for their introduction included: DPT and/or measles vaccination coverage, adequate surveillance of vaccine-preventable diseases, rubella and congenital rubella syndrome (CRS) surveillance, and improved prenatal monitoring of pregnant women exposed to rubella virus.

It was, however, with the implementation of the measles eradication initiative in Brazil that the magnitude of rubella as a public health problem became known. Between 1993 and 1996, nearly 50% of the cases in which measles was ruled out were subsequently diagnosed as rubella (with ~75% of them laboratory-confirmed). In 1992 an incidence of 1.5 per 100,000 was reported; in 1997, this figure was 20.6 per 100,000, and in 1999/2000, 9.0 per 100,000.

Data from 1997 to 2000 showed a shift in the incidence of rubella by age group. In 1997/1998, with the exception

of children under 1 year of age, the highest incidence rate occurred in the 1 to 9-year age group (15.0 per 100,000), followed by children aged 10 to 14. In 1999/2000, the incidence in the 15 to 29-year group rose from 7.0 to 13.0 per 100,000 higher than observed in the 5 to 9 and 10 to 14-year age groups. This shift in the transmission of the virus toward susceptible young adults is related to the gradual introduction of the triple viral vaccine, and the 95% vaccination coverage achieved in the 1 to 11-year age group in most Brazilian States between 1992 and 2000.

In the 1998/2000 rubella outbreaks reported in several States, São Paulo and Paraná notified most cases and the highest incidence in the 20 to 29-year age group (23 per 100,000 pop.); and Rio Grande do Norte the highest proportion of cases (61%) in adolescents and young adults. Two of the States in which these outbreaks occurred adopted the strategy for accelerated rubella control and CRS prevention as a control measure. In Paraná, a campaign was carried out in April 1998, targeting 1.7 million women between the ages of 15 and 39 years and reached a vaccination

coverage of 86%. A campaign in Rio Grande do Norte held in September 2000, with the goal of vaccinating over 750,000 women between the ages of 12 to 49 years reached coverage levels of 72%.

Prior to the introduction of the vaccine in Brazil, a study (Salerno R, *et al.*) had reported deafness attributable to CRS in 3% of children under 15 years of age. In another study (Herdy GVH, *et al.*) during autopsies on cadavers with acute myocarditis, 4% of the cases were attributed to CRS. In 1996, CRS was added to the list of notifiable diseases in Brazil. Following the rubella outbreaks of 1998–2000 that reported a high incidence among young adults, an increase in the incidence of CRS was observed. From 1997 to 2000, 876 suspected cases of CRS were reported, and 132 were confirmed during that same period. The number of CRS cases rose from 38 in 1999 to 78 in 2000. Still, given the underreporting of such cases, these numbers continue to represent only the tip of the iceberg in terms of the real incidence of the disease.

Based on epidemiological analyses of rubella and CRS, Brazil developed a two-phase vaccination plan using MR vaccine (Edmonston-Zagreb and RA 27/3 strains) to accelerate the prevention of CRS. The first phase was undertaken in 13 States during the month of November that targeted over 15 million women of

childbearing age – São Paulo, Santo Espírito, Paraíba, Pernambuco, Sergipe, Rio de Janeiro, Minas Gerais, Goiás, Amazonas, Halagaos, Marrano, Rondonia, and Acre. Each State determined the age group to vaccinate, utilizing the following variables: (a) Vaccination coverage and year of MMR or MR introduction; (b) Vaccination coverage achieved during measles *follow-up* vaccination campaigns (as part of the measles eradication initiative) that had utilized MMR or MR vaccine; (c) Analysis of rubella incidence by age group and among pregnant women between 1997 and 2000; and (d) Proportion of live births by age of the mother.

The decision of age groups to be targeted for vaccination included the participation of all immunization coordinators of each of the 13 States, as well as the participation of the National Technical Committee on Immunization. Overall, the age group targeted for vaccination was set between 12 and 39 years of age. However, some States have adjusted the target age group.

The campaign

Planning: Estimates of the target population were developed by looking at institutions and places with large concentrations of people, such as universities, institutes, factories, stores, shopping centers, businesses, hotels, recreation and tourist centers, banks, State Secretariats, municipal Secretariats and public institutions. Another listing was devised in those areas where a program of community health agents (PACS) and a Family Health Program (PSF) are being implemented. Potential urban and rural target population groups were also identified. Based on the population of the municipal area of influence and transient population, every locality established its own time-table and vaccination tactic.

Social mobilization: Considered a key component for the success of a vaccination campaign targeting adults, social mobilization and public awareness committees were set up in each State. These were comprised of the municipal and State Health Secretariats, the Secretariat of Education, the Federal Council of Medicine and its regional chapters, the Brazilian Society of Pediatrics, the Brazilian Society of Gynecology and Obstetrics, state chapters of the National Commission of Nurses, the Communication Advisory and the National Foundation of Health/FUNASA. Among their first tasks were those of raising awareness, ensuring that people understood the campaign's objectives, and rallying for political support with State and municipal governments.

A technical arm of these committees included regional advisers on exanthematic diseases

and technical staff from the areas of immunization, epidemiological surveillance, and women's health, the PACS/PSF, representatives of national reference laboratories, and the associations representing the physically disabled. Together with the municipal secretaries, this team closely monitored the campaign's plan to ensure reaching a high vaccination coverage. Critical were also the campaign's inter-sectorial activities. The following groups collaborated in this effort: the National Confederacy of Women, non-governmental organizations, social clubs such as the Lions and Rotary Clubs, the Federation of Industries, the State Chambers of Commerce, and unions, among others.

Public awareness campaign:

A major challenge was the preparation of a public awareness campaign that would effectively persuade, inform and guide the adult population, which had little knowledge of CRS, its relation to rubella virus, the existing, high rubella infection rate and the severity of the disease. Another objective of the public awareness campaign was to convince women who had deferred pregnancy to get immunized, in order to protect the health of other women. In this regard, the mass media played an important role and their efforts throughout the campaign have been monitored to determine the impact. Other media used to raise public awareness among the population included messages on paychecks, automatic teller machines (ATM), as well as messages on water, electricity, and phone bills.

Public awareness messages were developed to clearly point to the location and time of the campaign, and to inform the public to carry their vaccination cards during the month of the campaign's implementation, to avoid revaccination. Health professionals who are known and respected opinion leaders in the country were used for clarifications and in case of problems. With the collaboration of the communication's staff of FUNASA, a rapid response plan was also developed to address any crisis situation.

An information hotline was set up for the public: the most frequently asked questions included where to go for vaccination (36%), what to do if a pregnant woman was inadvertently vaccinated (14%); and about adverse events (10%). A national teleconference was also held at every stage of the initiative, to clarify the campaign's objectives, as well as technical and organizational aspects, issues related to vaccine safety, and queries of campaign staff and health professionals.

Vaccination tactics: Outreach vaccination activities (mobile clinics and fixed posts) were carried out during the first two



weeks and targeted the following population: public and private schools, government institutions, factories and businesses, as well as supermarkets, shopping centers, bus and train stations, ports and major highways. In the last two weeks of the campaign, house-to-house visits targeted women of childbearing age during hours when they were most likely to be home. At the same time, in areas where the PSF was operating, vaccination in rural areas was conducted by summoning people to a central point or door-to-door.

Monitoring and evaluation: The campaign took into consideration the difficulties in identifying population groups in large urban centers that had not been vaccinated through house-to-house visits. In order to ensure vaccination coverage of over 95%, a rapid assessment guide was developed to identify the main obstacles and population groups that had not been vaccinated. The findings of the assessment allowed for the re-definition of the campaign's strategies, placing greater emphasis on public awareness campaigns, participation of managers at the different levels, and rapid monitoring of coverage to guarantee homogeneity. Criteria used for monitoring vaccination coverage included: neighborhoods in large cities; major work centers, remote areas with poor access to vaccination services (indigenous areas, makeshift settlements), border areas, and small municipalities with persistent low coverage. Vaccination was done simultaneously with monitoring of coverage.

Once the campaign was over, health authorities used the rapid assessment guides to determine population groups that had not been vaccinated, and to design effective means of reaching them. Emphasis was also placed on municipalities that had failed to obtain 95% vaccination coverage. This painstaking local effort during the final phase of the campaign boosted coverage by approximately 10%.

Safety of the vaccine: A rapid response system was set up for the public for the notification of adverse events. Similarly, to reduce the risks to health workers and the community of blood borne infections due to accidental needle sticks, a disposal system was developed for the safe collection and final disposal of syringes and needles. A protocol was also implemented to follow-up on women who were inadvertently vaccinated while they were pregnant. As of the first phase of the campaign, there were 6,634 pregnant women registered who had been vaccinated, of these 1,037 were susceptible during the time of vaccination, and 566 were pending laboratory results.

Initial campaign results Preliminary reports indicate that Brazil's rubella vaccination campaign carried out in 13 States has reached a vaccination coverage of 93% of a target population of over 15 million women of childbearing age. Municipalities that failed to reach coverage over 95% have continued with mop-up vaccination among unvaccinated groups that were identified through rapid coverage monitoring. Women who were pregnant (1,126,585) during the campaign will be vaccinated immediately after they give birth.

Next phase During the second phase of the initiative, over 12 million women of childbearing age between the ages of 12 to 39 years will be vaccinated in 11 States - Rio Grande do Sul, Santa Catarina, Mato Grosso, Mato Grosso do Sul, Pará, Roraima, Amapá, Tocantins, Bahia, Ceará, and Piauí. The campaign is scheduled between 15 June and 5 July 2002, and will include the vaccination of more than 370,000 susceptible indigenous population.

Source: Maria de Lourdes Maia, National Immunization Program/National Health Foundation; Jarbas Barbosa da Silva, National Health Foundation; Rosa Castalia Soares, National Immunization Program/National Health Foundation; Teresa Cristina Segatto, National Health Foundation; Maria Salet Parise, National Health Foundation; Tatiana M. Lanzieri, National Health Foundation; Marília Ferraro Rocha, National Immunization Program/National Health Foundation; Maria Salet Parise, National Health Foundation; Cristiana Toscano, PAHO/Brazil; Carlos Castillo-Solórzano, PAHO/Washington, USA.

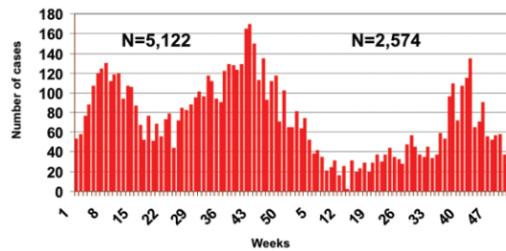
August 2002, Volume XXIV, Number 4

Lessons learned: First two years of regional rubella surveillance – An analysis of national rubella data

During the last two years, national immunization programs began expanding their measles surveillance systems to include cases suspected of being rubella and, in many instances, began to include all febrile rash illnesses into their systems. The regional measles database (MESS) developed by PAHO for measles eradication, was also expanded to reflect the changes in surveillance activities. Variables were added for important aspects of rubella infection, e.g., pregnancy status, and classification codes were modified to allow a suspected case to be confirmed as rubella. An analysis is presented of the first two years of regional rubella surveillance data that were sent to Washington via weekly transmissions of surveillance data from national MESS databases. For the purposes of this analysis, only laboratory-confirmed cases were included.

During the last two years, 7,696 laboratory-confirmed cases of rubella were reported in the Region from national MESS databases, 5,122 cases were reported in 2000 and 2,574 cases in 2001. During both years, notification peaks for confirmed cases were observed in October (Figure 1). During year 2000, 75% of all laboratory-confirmed cases were reported from four countries. Peru reported 2,126 cases (42% of all cases) for an annual notification rate of 8.3

Figure 1. Distribution of laboratory – confirmed rubella cases by week of onset, The Americas, 2000-2001*



*Source: National MESS reports

per 100,000. The Dominican Republic reported 799 cases (16% of all cases) for an annual notification rate of 9.4 per 100,000. Ecuador reported 486 cases (9% of all cases and a notification rate of 3.8 per 100,000) and Bolivia reported 420 cases (8% of all cases) for a rate of 5.0 per 100,000. It should be noted, that these countries are those that have integrated measles and rubella surveillance. In year 2001, 87% of all confirmed cases were reported from three of these same countries (i.e., Peru with 1,319 cases, Bolivia with 558 cases, and Ecuador with 372 cases). The regional notification rate per 100,000 persons was 1.6 in year 2000 and 0.8 in 2001.

Fifty-four percent of all cases during both years were females and cases in all age groups were reported. The majority of cases during both years of surveillance were 1 to 14 years of age, i.e., 73% in 2000 and 83% in 2001. However, persons 5 to 9 years of age accounted for the greatest proportion of cases in any age group studied, or 39% in 2000 and 47% in 2001. Persons 1 to 4 years of age accounted for 16% of cases in 2000 and 18% of cases in 2001 while persons 20 to 39 years of age accounted for 15% of cases in 2000 and 9% in 2001.

Persons 5 to 9 years of age had the highest notification rate per 100,000 for laboratory-confirmed rubella, i.e., 6.7 in year 2000 and 4.1 in year 2001. Persons 1 to 4 years of age and 10 to 14 years of age had similar notification rates for both years, i.e., approximately 2.6 in 2000 and 1.5 in year 2001.

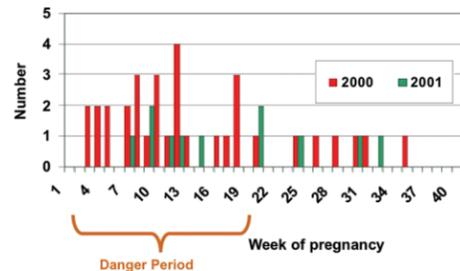
According to information provided by national MESS databases, 72% of laboratory-confirmed cases in 2000 and 78% of cases in 2001 were not vaccinated. In addition, 26% of cases in 2000 and 19% of cases in 2001 had no information on their vaccination status.

Analysis of the MESS database shows that important numbers of women in child-bearing age (WCBA) in numerous countries had laboratory-confirmed infections with rubella. Unfortunately, information on their pregnancy status was not uniformly collected, or at least was not uniformly reported. In year 2000, of 703 women 15 to 39 years of age with confirmed rubella infections, information on their pregnancy status was not reported for 249 (35%). Thirty-nine (6%) of the 703 women

were reported to be pregnant while the remaining 415 (59%) were reported as not being pregnant. Of the 1,394 women in 2001 with rubella infection, 223 were 15 to 39 years of age. Of these 223 women, 19 (9%) did not have information on their pregnancy status, 11 (5%) were reportedly pregnant and 193 (87%) were reportedly not pregnant. Thus, during the two years of study, 268 WCBA had laboratory-confirmed rubella without any information on their pregnancy status. These women were reported from 10 countries in 2000 (Argentina, Bolivia, Colombia, Dominican Republic, Ecuador, El Salvador, Guatemala, Mexico, Nicaragua and Peru) and from 5 countries in 2001 (Argentina, Colombia, Ecuador, El Salvador and Guatemala). Thus, 5 countries reported cases of laboratory-confirmed rubella in WCBA with no information on their pregnancy status during both years of study.

A total of 50 women were reportedly pregnant during a rubella infection. These women were reported from 9 countries (Bolivia – 1, CAREC – 2, Colombia – 6, Dominican Republic – 4, Ecuador – 9, Honduras – 1, Mexico – 10, Nicaragua – 3, and Peru – 14 women). Of these 50 pregnant women with rubella, 36 (72%) were reported to be 1 to 20 weeks pregnant at the time of infection (Figure 2).

Figure 2. Rubella infection in pregnant women by week of pregnancy, The Americas, 2000-2001*,**



*There is no information for 6 (12%) of 50 pregnant women in 2000, 36 of the 50 were 1-20 wks pregnant
** Source: National MESS reports

Information on the number of weeks that they were pregnant was not available for 6 of the 50 women. The 36 women reportedly with rubella during weeks 1 to 20 of their pregnancy were reported from Colombia (3), the Dominican Republic and Honduras (1 each), Ecuador (9), Mexico (8), Peru (10), and Nicaragua and the Caribbean (2 each).

Finally, the number of both laboratory-confirmed cases of rubella and the number of all confirmed cases of rubella (by either laboratory diagnosis or by epidemiologic linkage) was compared to the number of cases reported to PAHO/Washington in the national EPI Tables (EPI Tables indicators developed by PAHO collect data on immunization twice a year). Differences were noted for many countries. In some instances, the EPI Tables had greater numbers of cases reported than those entered in MESS. In other instances, MESS had more cases than those reported by the EPI Tables.

October 2002, Volume XXIV, Number 5

Accelerated rubella control and prevention of CRS: Evolving strategies

In response to ongoing rubella virus circulation and the potential for major rubella epidemics in the Region, PAHO's 1997 Technical Advisory Group on Vaccine-Preventable Diseases (TAG) addressed the issue and recommended the implementation of a regional initiative to strengthen rubella control and congenital rubella syndrome (CRS) prevention efforts. At the time, the initiative included the introduction of a rubella-containing vaccine into routine childhood immunization programs; vaccination of women of childbearing age; the development of specific vaccination strategies for the accelerated rubella control and CRS prevention; the development of integrated surveillance systems for measles and rubella; the implementation of a CRS surveillance system; and support for enhanced laboratory capabilities in rubella virus isolation.

In 1986, sixteen years after licensure of the rubella vaccine, six countries (the United States, Canada, Cuba, Panama, Costa Rica and Uruguay) had introduced MMR vaccine into their childhood programs. It was only in 2002, that 41 of the 44 countries and territories in the Americas had finally introduced a rubella-containing vaccine (MR or MMR) in their national childhood immunization program. The remaining three countries, Peru, Haiti and the Dominican Republic will follow suit between 2003 and 2004.

Using a combined strategy that targeted adult women and children with a rubella-containing vaccine, Cuba was the first country to eliminate rubella and CRS, with the last CRS case reported in 1989, and the last rubella case in 1995. This goal was largely achieved through the implementation of two mass vaccination campaigns in 1985 and 1986, initially targeting

women aged 18 to 30 years, and subsequently children aged 1 to 14 years.

At the 1999 TAG held in Canada, an accelerated rubella control and CRS prevention strategy was developed for the Americas, which followed the experience of the English-speaking Caribbean countries and Cuba in adult mass vaccination campaigns against rubella. The strategy rests on the combined vaccination of adult men and women, coupled with rubella vaccine introduction into national childhood immunization programs. This combined vaccination strategy seeks to achieve rapid reduction of rubella virus circulation, while preventing the shift of disease burden to susceptible young adults, particularly women of childbearing age, thus, avoiding the incidence of CRS. The principal rationale of an accelerated

Lessons have been gained in the mass vaccination of heterogeneous population groups that have included men, women and adolescents. In Costa Rica for example, 42% of the population (1.6 million), which included men and women were vaccinated within the timeframe of one month. The mass vaccination of 28 million women in Brazil against rubella has further provided important lessons on the vaccination of large population groups. All of these countries have used the MR vaccines with the exception of Chile, which used the rubella vaccine in its single presentation.

The experience of the English-speaking Caribbean countries has also provided useful insights on the cost-benefits of immunizing against rubella infection. These studies show that the benefits of accelerated control

Human Development (CLAP) and the Congenital Malformation Latin-American Collaborative Study (ECLAMC). Information collected includes: history of exposure to rubella, clinical illness during the mother's pregnancy, vaccination status of the mother, as well as laboratory confirmation of maternal rubella and any congenital malformations, hepatospleno-megaly and purpura in the newborns.

As countries in the Americas embark on the accelerated control of rubella, documenting the endemic strain in each country will become critical in determining whether the case is imported or not. As with measles, even though a country has eliminated rubella, importations of the virus may occur and can only be avoided when other regions worldwide carry out similar efforts. Laboratory

Countries are reporting great progress in their efforts to control rubella and prevent CRS. Health authorities in the Region have embraced the challenge by providing key political support at the country level. At the 26th Pan American Sanitary Conference celebrated in September, 2002, PAHO's Governing Bodies approved a resolution calling for Member States to undertake accelerated control of rubella and congenital rubella syndrome prevention initiatives, and to continue improving epidemiological surveillance of rubella and CRS, as well as laboratory diagnosis and investigation procedures.

December 2002,
Volume XXIV, Number 6

XV Meeting of the PAHO Technical Advisory Group

The XV Meeting of PAHO's Technical Advisory Group on Vaccine-Preventable Diseases (TAG) was held in Washington D.C., November 22-23, 2002. TAG meets every two years and functions as the principal forum to provide advice to PAHO Member States on vaccine policies and disease control efforts. The following is a summary of TAG's conclusions and recommendations as presented in the Final Report.*

Rubella

Benefits have already accrued as a result of the heightened attention given to rubella and congenital rubella syndrome in the Region, following the 1997 TAG recommendations that called for the prompt implementation of a regional initiative to strengthen rubella and CRS prevention efforts by reducing widespread circulation of rubella virus. At the 1999 TAG held in Canada, an accelerated rubella control and CRS prevention strategy was developed for the Americas, which followed the successful adult mass vaccination campaigns against rubella in the English-speaking Caribbean and Cuba.

Chile, Costa Rica, Brazil and Honduras have conducted adult mass vaccination campaigns for accelerated rubella control and CRS prevention: Brazil and Chile have targeted these campaigns to women only; Costa Rica and Honduras have carried out rubella campaigns that included men and women. Critical knowledge to guide further development of successful (greater or equal to 90% coverage) and sustainable strategies for vaccination of adults is being gained. CRS is now recognized as a serious public health problem, but limited surveillance data remain a source of concern, because they underestimate the true disease burden and complicate assessment of the initiative's success. Furthermore, few clinical cases of rubella are being confirmed by laboratory testing, and few virologic specimens are being submitted for molecular

typing. Efforts to follow-up on pregnant women who have contracted rubella need to be strengthened.

Recommendations

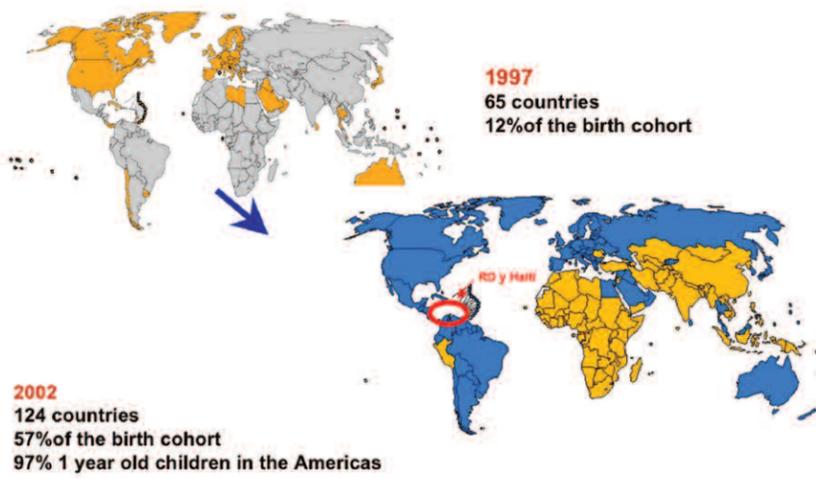
Vaccination Strategies

- All countries are encouraged to prevent circulation of rubella virus, which will lead to a reduction in CRS. This is best accomplished by reducing the number of susceptible persons which will result in decreased rubella transmission. Accordingly, countries should conduct a one-time mass campaign vaccinating both males and females. The age group to be vaccinated should be determined based on the country's epidemiology. However, groups to be targeted include children who may not have been vaccinated in the routine program, e.g., children >5 years of age, and adults of both sexes. The upper age limit should be determined from known patterns of fertility and expected susceptibility. Countries conducting successful campaigns have used upper age limits ranging from 29 to 39 years.
- Additional targeted efforts are needed to reduce the number of rubella susceptible women of childbearing age. Immunization strategies, targeting post-partum women, those attending family planning clinics, as well as those in schools and the workplace can be used to protect them.

Surveillance

- Rubella surveillance should be completely integrated with measles surveillance.
- CRS surveillance should be strengthened throughout the Americas through collaboration with the regional Perinatal Information System (SIP 2000) from the Latin American Center for Perinatology and Human Development (CLAP) and the Congenital Malformation Latin-American Collaborative Study (ECLAMC). Special emphasis should be placed on ensuring that thorough investigations of pregnant women with rubella are conducted and that their newborns receive detailed follow-up evaluations.

Figure 1. Countries Using Rubella Vaccine in National Immunization Programs, 1997 and 2002



Source: WHO/IVB data base until October, 2002

vaccination strategy is to reduce the time it takes to interrupt rubella virus circulation and prevent CRS occurrence. Most countries in the Region have already implemented routine childhood rubella vaccination, and this strategy is protecting children as they reach their first year of life. Nevertheless, this vaccination strategy is likely to take over 20 years to control CRS, as several cohorts of childbearing women will remain susceptible to rubella virus.

Cuba's experience and that of the English-speaking Caribbean countries have helped shape the initiatives of accelerated control in Chile, Costa Rica, Brazil and Honduras. These four countries have conducted adult mass vaccination campaigns for accelerated rubella control and CRS prevention: Brazil (refer to *EPI Newsletter*, April 2002) and Chile (*EPI Newsletter*, December 1999) have targeted these campaigns to women only, while Costa Rica (*EPI Newsletter*, February and June 2001) and Honduras (to be published in the February 2003 issue of the *EPI Newsletter*) have carried out rubella campaigns that included men and women. Critical knowledge is being developed for the continuous development of successful and sustainable vaccination strategies of adults that reach coverage levels of at least 90%.

vaccination far outweighs the costs associated with the treatment and rehabilitation of CRS. The cost-benefit ratio was estimated at 13.3:1 for the interruption of rubella and CRS prevention in the entire English-speaking Caribbean. The cost-effectiveness of mass campaigns has been estimated to average US\$ 2,900 per case of CRS prevented. The countries of Barbados and Guyana estimated their own costs for interruption of transmission, with a cost benefit ratio of 4.7:1 for Barbados, and of 38.8:1, for Guyana, and a cost-effectiveness of US\$ 1,633 per CRS case prevented.

The impact of accelerated rubella vaccination strategies on rapid reduction of CRS morbidity in Cuba, the English-speaking Caribbean and in Chile is being reported, as well as the rapid interruption of rubella virus transmission in Costa Rica. CRS is now recognized as a serious public health problem, but limited surveillance data remains a source of concern, providing only a partial view of real disease burden and success of initiatives. In response, additional tools that can enhance the identification of suspected CRS cases are being implemented. These include the collaboration with regional systems such the Perinatal Information System (SIP 2000) from the Latin American Center for Perinatology and

confirmation of the diagnosis is therefore recommended. Rubella IgM is readily detected in the first six months of life. Rubella virus may be isolated from nasopharyngeal swab 6 to 12 months following birth. Currently, however, few clinical cases of rubella are being confirmed by laboratory testing, and few virologic specimens are being submitted for molecular typing. As countries establish accelerated rubella control and CRS programs, these areas will need to be strengthened. Testing viral isolates for molecular typing will allow for understanding of the source and the propagation of rubella outbreaks and CRS cases, as well as determination of the variations of rubella strains.

Countries with the strategy of accelerated rubella control already underway will need to maintain effective surveillance systems. The surveillance of rash and fever is currently the most effective tool. Surveillance systems and adequate laboratory diagnosis should be able to detect rubella activity, document the impact of the rubella vaccination strategy being implemented, as well as closely investigate and obtain knowledge of each confirmed case, rather than simply tracking the location where the virus is circulating. Emphasis should be placed on laboratory confirmation of all suspected rubella cases.

2003

April 2003,
Volume XXV, Number 2

The Use of Rapid Coverage Monitoring: The Vaccination Campaign against Measles and Rubella in Ecuador

Background

In Ecuador, the results of immunization campaigns are generally measured against the administrative coverage. On occasion, international agencies have carried out cluster surveys at the national and provincial level, with the support of external researchers. The results of these surveys were

rapidly produced, but the information did not reach immunization managers in a timely manner to undertake the necessary corrective steps.

It is not unusual for coverage rates in some provinces and health areas to exceed 100% while in others repeated reports of low coverage are registered, with health workers claiming an overestimation of the assigned population. This has led PAHO to recommend that simple methods for rapid coverage monitoring (RCM) be used to validate the percentage of individuals vaccinated, but without replacing the use of administrative coverage information.

Methodology

Staff at the provincial and local (health areas) levels were trained to use RCM as a supervisory tool for local level staff (**internal RCM**) during the implementation of a vaccination campaign, and also as a final evaluation tool to be used by staff from the province or health area level after the campaign ended (**external or crossed RCM**).

The following criteria were used to select areas with probable low coverage: remote areas, border areas, marginal urban areas, indigenous communities, communities of African descent, and migrant communities. Since the blocks or localities were chosen intentionally or by convenience, the results cannot be applied to the health area. The methodology recommends having a map or sketch, choosing three to four non-bordering blocks, visiting homes to identify children within the ages targeted for vaccination, proceeding to the following block after surveying five to seven children in a block, and ending the process after surveying at least twenty members of each age group: 6 months to 4 years (less

Among the variables collected were the number of health areas with RCM, number of internal and external RCMs carried out, number of children under five and school-age in each RCM, number of vaccinated children with MR according to each RCM, the range of the number of children in RCMs in every health area and province; administrative vaccination coverage according to province; and the range in coverage of the operational units within each health area.

Indicators for the analysis included: the percentage of vaccinated children in each RCM according to age group; average number of children by RCM; percentage of RCMs with 18 or more children of each age group; classification of RCMs according to range of the number of vaccinated children found (<90%, 90-94%, >94%).

Results

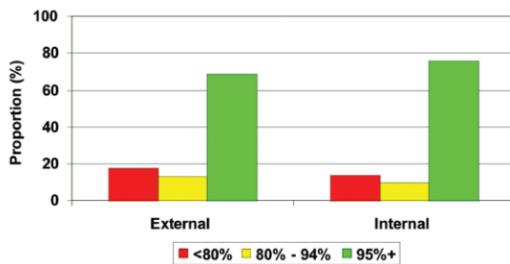
The national administrative coverage was 100.7% in the target population (range: 85.3%-124.4% in provinces), 90% in children under 5 (range: 66%-125.2%), and 105.4% in schoolchildren (range: 89.6%-124%), as seen in Figure 1. Seventeen provinces (77%) exceeded 95% administrative coverage, two (9%) did not reach 95%, and three (14%) were below 90%.

Among children under 5, four provinces (18%) had more than 95% administrative coverage, seven (32%) had between 90% and 94%, and eleven (50%) had less than 90%.

In 18 out of the 22 provinces (88%), both internal and external RCMs were carried out, 2 provinces (9%) conducted only internal RCMs, and another 2 provinces (9%) conducted only external RCMs. Sixty nine percent of the 167 health areas (116) carried out both RCMs, 7% carried out only the internal

internal RCMs and 69% of external RCMs indicated a percentage of vaccinated children of 95% or above, while 14% of internal RCMs and 18% of external RCMs indicated that the percentage of vaccinated children was below 90% (Figure 2). In schoolchildren, 80% of internal and external RCMs showed 95% or more of schoolchildren were

Figure 2. Distribution of external and internal RCMs among children under five according to percentage range of vaccinated in MR campaigns – Ecuador, 2002



vaccinated, while 10% of internal RCMs and 7% of external RCMs showed that less than 90% were vaccinated.

Seventy four percent of internal RCMs and 89% of external RCMs included 18 or more children under five per RCM. Eighty five percent of internal RCMs and 96% of external RCMs surveyed 18 or more school-age children per monitoring.

Conclusions

It bears repeating that RCM results are exclusively applicable to the small number of children questioned and the percentage of vaccinated obtained cannot be used for statistical purposes since it is not the objective of the RCM.

In the majority of health areas where both internal and external RCMs were performed, the classification of health areas according to the percentage of vaccinated children was similar, which means that the analysis and decisions taken were consistent. As a consequence of this finding, it is recommended that internal RCM be solely used as an efficient method for validating coverage.

RCMs are recommended to be conducted once activities by the vaccination brigade have ended in the area or when the activities are no longer announced on loudspeakers and when the number of vaccinated in fixed posts or health units has decreased. In many health areas, mention was made that the decision to launch mop-up activities was due to non-satisfactory results of the RCM. However, no information was available regarding subsequent RCM or the number of doses applied during mop-up.

RCM is recommended for use mainly in urban or marginal urban areas, and centers of rural parishes, so as to survey in a relatively short time the twenty individuals required by the methodology.

It is recommended the number of RCMs be expanded to four in the catchment area of each operational unit and that they be carried out according to a schedule suitable to the dynamics of the community.

The RCM tool can easily be adapted to different vaccines or various circumstances depending on the objective pursued, such as assessing the percentage of vaccinated children or those with completed schedules during regular EPI supervision.

Also, during supervision of a campaign, it might be necessary to learn the percentage of participation or the number of people having received any dose included in the schedule, be it a booster or additional shot. It is essential and of great assistance for local managers to be able to analyze the reasons for non-vaccination, because it indirectly pinpoints the existence and type of missed opportunities for vaccination and is an indication of the adjustments needed in the management of EPI.

Finally, RCM should be a widely-used tool to guide supervision, programming, and training; to validate the reporting of FNVR cases when used in conjunction with active search; to create opportunities for community participation; and to evaluate EPI at the local level.

Source: Nancy Vásconez (EPI/Ministry of Public Health), Nelly Idrobo (EPI/MOH), Jackeline Pinos (EPI/MOH), María del Carmen Grijalba (EPI/MOH), Fátima Franco (EPI-DPS Guayas), María Pazos (EPI-DPS Pichincha), Gonzalo Macías (EPI-DPS Esmeraldas), Mariana Nagua (EPI-DPS Los Ríos), Vance Dietz (PAHO-Immunization, Washington, DC), and Rodrigo Rodríguez (PAHO-Immunization, Ecuador).

October 2003, Volume XXV, Number 5

Sustaining Immunization Programs – Elimination of Rubella and Congenital Rubella Syndrome

Background

Important breakthroughs in the fight against vaccine-preventable infectious diseases have occurred in the past 25 years. The proven impact of vaccination programs in the Americas has placed immunization at the center stage in the global agenda for sustainable economic growth and poverty reduction. The Region has had no indigenous measles transmission since November 2002. Advances have been reported in reaching the goal of uniform high quality immunization in all municipalities.

At the same time, fluctuations in the allocation of resources as a result of economic downturns and uneven management of health reform and decentralization processes are jeopardizing the implementation of national immunization programs, potentially opening the way for higher costs in case of an outbreak of a vaccine-preventable disease. Another key challenge has been the development of a level of complacency by some Member States because of the absence of circulation of some vaccine-preventable diseases.

PAHO Resolution CD44.R1

The 44th Directing Council of the Pan American Health Organization took place in Washington, D.C. during 22-26 September 2003. The Directing Council adopted the following Resolution:

THE 44th DIRECTING COUNCIL, Having seen the progress report of the Director on sustaining immunization programs (Document CD44/11);

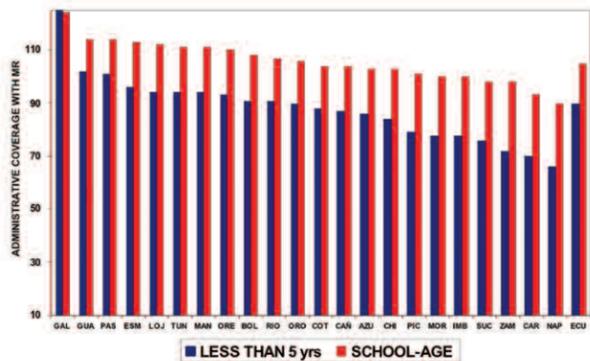
Recognizing the important breakthroughs in the fight against vaccine-preventable diseases to protect the children of the Region made possible through the close partnership of the Member States and the international development community;

Noting with great pride the sustained collective efforts by the Member States in fulfilling the goal of interruption of indigenous measles transmission in the Western Hemisphere;

Considering the remarkable progress and experience gained by the Member States in the accelerated control of rubella and the prevention of congenital rubella syndrome (CRS) initiatives, which seek to achieve a more rapid decrease of rubella cases and infants born with CRS;

Taking note of the spirit of solidarity and Pan Americanism in the implementation of the first *Vaccination Week* in the

Figure 1. Administrative coverage with MR vaccine among children less than 5 years old and school-age in follow-up campaigns, by province – Ecuador, 2002



than five years old) and 5 to 14 years (school children). Two to three RCMs were programmed in each selected locality.

A form was designed to register the homes, the number of children surveyed, and the number of children vaccinated with MR (measles/rubella) vaccine during the campaign, and the percentage of vaccinated was calculated. The results of each RCM at the health area and provincial levels were tabulated on a separate form. An internal RCM was carried out in all health areas, while an external RCM was programmed in some urban and rural areas at the end of the campaign, due to budget limitations.

RCM, 5% carried out only the external RCM; 19% did not conduct a RCM.

In total, 1,172 internal RCMs were carried out in 127 health areas (average: 9 RCMs per area) and 574 external RCMs were carried out in 107 health areas (average: 5 RCMs per area). On average, 25 children under 5 (Range: 2-302) were questioned through internal RCM and 23 children under 5 (Range: 2-101) were questioned through external RCM. The average among schoolchildren was 34 (Range: 2-700) for internal RCMs and 27 (Range: 6-180) for external RCMs. In the group of children under 5 years of age, 76% of

June 2003, Volume XXV, Number 3

Hemispheric Goal of Rubella and Congenital Rubella Syndrome Elimination by 2010

The rapid reduction in disease burden which has resulted from the implementation of an accelerated rubella control strategy, combined with the extensive experience gained by the Region in vaccinating large and heterogeneous population groups, the availability of a safe, affordable and efficacious vaccine, the evidence on the cost-benefit of immunizing against rubella, and the ample support provided by the public and health authorities from countries, have paved the way for the decision to establish the goal of rubella and CRS elimination in the Americas by the year 2010. During its June session, PAHO's Executive Committee endorsed the goal of rubella and CRS elimination by 2010 and urged countries to draft national plans of action within one year, and for the Director of the Organization to elaborate a regional plan of action and mobilize resources in support of the rubella/CRS elimination goal.

Americas that targeted immunization services to high-risk and underserved areas;

Concerned with the fluctuations in the allocation of resources in public budgets to these activities at the national level, mainly due to economic downturns; and

Cognizant of the potential negative impacts of certain health sector reform and decentralization processes on the implementation of national immunization programs, including disease surveillance activities,

RESOLVES:

1. To urge Member States to:
 - a) encourage the establishment of a specific line item for immunization in their national budgets and the timely allocation of financial resources towards vaccines, supplies, and operational costs;
 - b) inform the finance ministers and senior budgetary decision-makers about the benefits of sustaining immunization programs and the risk resulting from pockets of low immunization coverage;
 - c) implement health sector reform and decentralization policies and programs in a manner that safeguards the achievements made in immunization;
 - d) support the implementation of an annual hemispheric Vaccination Week, to be held in April, targeting high-risk population groups and underserved areas;
 - e) maintain the Region free of indigenous measles through high, routine (>95%) measles vaccination coverage by municipality or district, and follow-up measles vaccination campaigns at least every four years, timely surveillance, and outbreak investigation and control;
 - f) maintain high (95%) and homogenous vaccination coverage by municipality or district for all antigens;
 - g) eliminate rubella and congenital rubella syndrome (CRS) from their countries by the year 2010; to accomplish this, they are requested to draft the respective national plans of action within one year.
2. To request the Director to:
 - a) elaborate a regional plan of action and mobilize resources in support of a rubella/CRS elimination goal for 2010;
 - b) continue advocating for an active mobilization of national and international resources to sustain and expand the investments made in immunization programs by the Member States;
 - c) foster joint action by the International Monetary

Fund, the World Bank, and the Inter-American Development Bank and Member States, ministries of health and finance, to establish provision within the public budgets that ensure the uninterrupted allocation of funds to national immunizations programs;

- d) promote the annual hemispheric Vaccination Week to improve equity in immunization.

October 2003, Volume XXV, Number 5

Andean and Southern Cone Sub-Regional Meetings on Vaccine-Preventable Diseases, 1-3 September 2003

The XIII Meeting of the Andean Region countries and the XVII Meeting of the Southern Cone countries on Vaccine-Preventable Diseases were held as a joint event in Lima, Peru during 1-3 September 2003. PAHO has been promoting these sub-regional meetings for two decades to evaluate progress in controlling vaccine-preventable diseases. This article summarizes the final report and recommendations regarding the elimination of rubella and congenital rubella syndrome.

Elimination of Rubella and Congenital Rubella Syndrome

Since the introduction of the rubella vaccine in the Region and the implementation of the strategy for accelerated rubella control and the prevention of congenital rubella syndrome (CRS), rubella virus circulation has decreased. Forty-two of the Hemisphere's 44 countries and territories currently include the rubella vaccine in their national vaccination schedule. Every country in the Andean and Southern Cone Sub-Regions includes the MMR vaccine in its national schedule and the MR vaccine in follow-up campaigns to maintain measles elimination.

The main reason for adopting the accelerated vaccination strategy for rubella is to reduce the time required to interrupt the circulation of rubella and prevent CRS. With the introduction of the rubella vaccine alone, it would take more than 20 years to achieve what has already been achieved in countries such as Uruguay. According to the data sent by the countries, major cohorts of women of childbearing age (WCBA) are susceptible to rubella.

Vaccination activities that target adults are yielding information that is key to developing successful, sustainable vaccination strategies in this age group—strategies that will help boost coverage levels to ≥90%. Brazil and Chile have

conducted mass vaccination campaigns that target adult women to accelerate CRS prevention. Likewise, Ecuador has begun the first phase of its strategy, vaccinating children of both sexes aged <15 years.

CRS is now recognized as a serious public health problem. However, the limited information obtained through epidemiological surveillance gives only a partial understanding of the actual burden of the condition and the success of the initiatives to combat it. Peru has conducted studies indicating that CRS is a public health problem and that 12.8% of pregnant women are susceptible; this year, the country initiated vaccination with MMR.

Few clinical cases of rubella are laboratory-confirmed, and very few viral samples are sent for molecular typing. This may be due in part to inadequate coordination and communication among clinicians, epidemiologists, and laboratory workers.

Nevertheless, it is critical to isolate the virus to identify genotypes and evaluate the strategy for the post-elimination phase.

Furthermore, the data presented indicate the need for additional work to monitor pregnant women who have contracted rubella.

will enable countries that are just beginning to implement the elimination strategy to know where the virus is circulating and allow countries that have already implemented the strategy to detect and confirm every case. In outbreaks, the first five cases in each chain of transmission should be laboratory-confirmed.

2. Vaccination strategies to prevent circulation of the rubella virus should continue to be implemented. This will lead to a reduction in CRS through a single mass campaign in which both men and women are vaccinated. Ecuador should complete the second stage of this strategy.
3. Age groups to vaccinate should be determined by the epidemiology of rubella in the country. Nevertheless, the target groups should include boys and girls who have not been vaccinated as part of the routine program—that is, children aged >5 years and adults of both sexes. The upper age limit should be based on documented fertility patterns and the expected susceptibility.
4. Countries should investigate and follow all women infected with rubella during pregnancy, providing thorough periodic evaluations of their newborns.

December 2003, Volume XXV, Number 6

Caribbean EPI Managers' Meeting, 17-20 November 2003

The 20th Meeting of the Caribbean EPI Managers was held in Curaçao, Netherlands Antilles, from 17-20 November 2003. The meeting brought together over 60 health officials from 25 countries of the English-speaking Caribbean, Suriname, the Netherlands Antilles, Aruba, the French Departments of Guadeloupe, Martinique and French Guiana, the United States and the US Virgin Islands, Canada, and the United Kingdom. Several Netherlands Antilles Representatives were present. PAHO Immunization staff and consultants, as well as staff from the Caribbean Epidemiology Center (CAREC) and the Caribbean Program Coordination Office (CPC) also attended.

Achievements in the Sub-Region

Control of vaccine-preventable diseases remains exemplary in the countries of the sub-region, and all should be congratulated on their efforts. No measles cases were confirmed up to week 43 2003 despite careful surveillance, and there were no confirmed rubella cases for 2002 and 2003 to date (see Figure 1). The last case of CRS occurred in 1999 in Suriname.

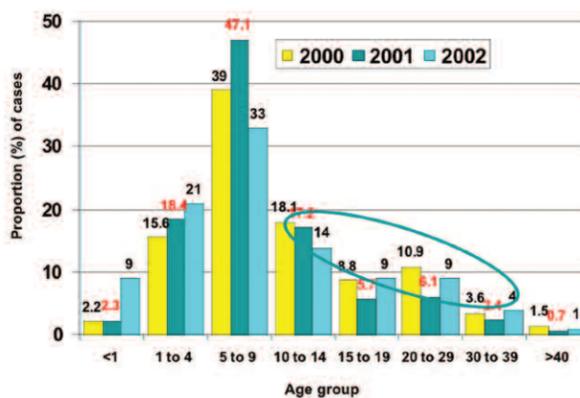
More than 90% of the countries in the sub-region are providing a two-dose MMR strategy. Those countries must measure coverage of each dose and calculate the number of children who have received two doses, one dose, or no doses of vaccine. Coverage for the second dose of MMR must be 95% or greater to prevent the accumulation of susceptibles. If there are significant numbers of susceptible children who have not been protected by the second dose, then a further catch-up campaign must be conducted. For both measles and rubella, importation still remains the greatest risk for re-emergence.

Seventeen of 21 countries have completed and submitted laboratory inventories, and only one laboratory (CAREC) holds material potentially infectious for wild polioviruses. AFP rates have remained constant and there has been improvement in indicators such as timeliness and completeness of specimen collection. These improvements must be maintained.

Challenges

Integrated measles and rubella surveillance must be strengthened, especially for women who acquire rubella in pregnancy. The proportion of clinical specimens that were received within 5 days is still very low and must be improved. If the first specimen is

Figure 1. Proportion of Laboratory Confirmed Rubella Cases by Age Group, The Americas, 2000-2002



Source: Country reports to PAHO/WHO.

Recommendations

- Once the goal of eliminating rubella and CRS has been set, each country should draw up a plan of action for elimination, and if total implementation of the plan is not immediately feasible, it should be done in stages, always vaccinating both sexes.
- Programs should plan carefully to guarantee a timely supply of vaccines needed for adult vaccination campaigns.
- Countries should continue efforts to implement vaccination strategies to reduce the number of rubella susceptibles and improve surveillance in preparation for the major challenges posed by the elimination of rubella and CRS, among them:
 1. Rubella surveillance should be fully integrated with measles surveillance; this
 - Program managers should ensure that all sera from suspected cases of measles that are negative for IgM measles antibodies are assayed for IgM rubella antibodies and vice versa.
 - Greater emphasis should be placed on developing the logistics to guarantee the collection of samples for viral isolation as well as the adequacy and proper shipping of the samples.
 - CRS surveillance should be improved in all of the countries of the Region, identifying hospitals that have been using the Perinatal Information System (IAPA 2000) of the Latin-American Center for Perinatology and Human Development (CLAP) and the Latin American Collaborative Study on Congenital Malformations (ECLAMC) to facilitate implementation.

taken within the first three days of the appearance of rash in a pregnant woman or is collected from cases in clusters of fever/rash, and is negative by IgM testing, second specimens should be obtained.

Each specimen sent for measles and rubella IgM testing must have an epidemiologic case identification number. Evaluation reveals that some countries have no funding or mechanism in place for in-country transportation of specimens. Every effort is being made to encourage countries to ship specimens to the CAREC laboratory as quickly as possible and have in-country mechanisms for specimen transportation. Molecular typing of rubella virus isolates will facilitate better understanding of the source of rubella outbreaks, CRS cases, and rubella strain variations. To date, few virologic specimens are submitted for molecular typing. Countries embarking on rubella elimination must document strains to determine whether cases are indigenous or imported.

2004

February 2004,
Volume XXVI, Number 1

Perspectives on Measles and Rubella Elimination Initiatives in the Region of the Americas

Background

During the 38th Meeting of PAHO's Directing Council, held in September 1995 in Washington, D.C., the Ministries of Health of the Americas unanimously approved the Measles Eradication Plan of Action, calling for the eradication of measles by the year 2000. The hemispheric interruption of indigenous measles transmission has been achieved as a result of intensified vaccination efforts guided by surveillance activities and the active search of cases in health centers, schools, and high-risk communities. The meeting in November 2002 of the Technical Advisory Group (TAG) on Vaccine-preventable Diseases recognized that the full implementation of PAHO's recommended strategy for measles eradication, endorsed by all Ministries of Health in all countries of the Americas, has remained the cornerstone of the efforts in interrupting indigenous measles virus transmission.

Eradication Strategies

As part of the measles eradication goal, the development and/or improvement of national surveillance capabilities was emphasized, which include technical, logistical, training, and management aspects. These efforts helped health managers in measuring the impact of vaccination programs and in identifying areas that require additional technical cooperation. Vaccination coverage levels have exceeded 80% throughout the Region.

Enhanced measles surveillance throughout the Region was expanded and integrated with rubella surveillance. Following the lead of the Caribbean community, many countries have intensified activities to control rubella and prevent CRS. Data from the measles surveillance system confirmed widespread circulation of rubella in many countries. This was further documented by data collected throughout the Region by integrated measles and rubella surveillance systems. Accordingly, all but two countries have introduced measles, mumps, and rubella (MMR) vaccination

into their routine immunization schedule. The remaining two countries, the Dominican Republic and Haiti, are planning to introduce the rubella vaccine into their regular programs in 2004 and 2005 respectively.

Integration of measles and rubella surveillance is a major tool to meet the challenge of rubella and CRS elimination. Other strategies involve vaccinating both men and women, improving the follow-up of pregnant women who contracted rubella or had contact with a rubella case during pregnancy, and collecting samples for viral isolation.

Activities and Opportunities

Data suggest that the last indigenous confirmed case of measles was reported in November 2002. Taking into consideration the historic achievements in measles elimination, PAHO's 44th Directing Council passed Resolution CD44/R1 in September 2003 urging Member States to eliminate rubella and CRS by the year 2010.

For the current year, El Salvador, Ecuador, Colombia, and Nicaragua have programmed mass vaccination campaigns targeting both men and women. Mexico will continue with its vaccination activities according to risk groups. Brazil, a country that has already conducted vaccination campaigns targeting women, will begin routine rubella vaccination efforts among men. In 2005, Argentina, Bolivia, Paraguay, and Peru will conduct vaccination campaigns targeting men and women. In 2006, Guatemala, Venezuela, the Dominican Republic, and Haiti will conduct their own campaigns (see Figure 1).

generates increased interest in women's health and brings health services closer to the adult population, particularly adult men. As a consequence, rubella elimination also produces savings for the health system, helps with the integration of health services, while contributing to the strengthening of their infrastructure and quality. Another key element is that the experience gained through adult vaccination will help establish new mechanisms for the introduction of future adult vaccines, for example against HIV and Human Papillomavirus (HPV).

Program and Surveillance Strengthening

Increased efforts are needed to strengthen the Region's national immunization programs and surveillance infrastructure as a means of sustaining coverage levels, accommodating the introduction of new vaccines, and ensuring that all recommended EPI vaccines reach populations living in remote areas, as well as underserved population groups in urban areas. Special emphasis must be placed on ensuring that national immunization programs are capable of sustaining the achievements of measles elimination and can guarantee the success of the new rubella and CRS elimination initiative.

The shift in decision-making to local entities as part of the ongoing decentralization processes in the Americas represents a formidable challenge to the uniform delivery of immunization programs in all areas of a country and to the implementation of current and future elimination strategies. The responsibility of first-level monitoring and reporting has moved to the local level. How-

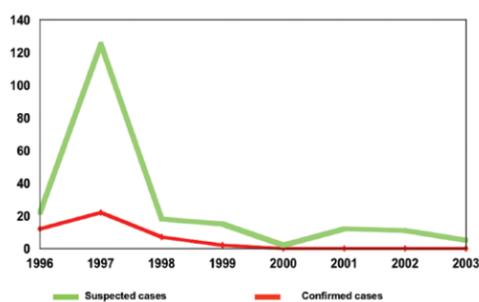
the required infrastructure to conduct surveillance for other vaccine-preventable diseases of public health importance, such as hepatitis B, *Haemophilus influenzae* type b, yellow fever, and most recently rotavirus.

The endorsement of a regional vaccine initiative by all Heads of State in the Americas has placed PAHO's technical cooperation with countries in the area of immunization and vaccines at the highest political level. PAHO collaborated with several partners in the Region, including the First Ladies of the Americas on the goal of measles eradication from the Americas; the countries' legislative branch to establish laws that ensure national financing of recurrent costs of vaccines and other inputs; the private sector to ensure their inclusion into immunization and surveillance activities; and municipal governments to guarantee the implementation of immunization programs.

In 2003, the importations of the measles genotype H1 from Asia into Chile and Mexico underscored the real risk of importations from other regions. The importation to Chile failed to result in secondary transmission and demonstrated high population immunity, clearly due to the impact of the measles elimination initiative in the Region. However, efforts need to be applied in Mexico where the importation has resulted in 44 cases in 2003 and 15 more in 2004. This outbreak has highlighted several important issues for maintaining the achievements of the measles elimination initiative in the Americas. The countries of the Americas will always be at risk for importations and subsequent outbreaks. The data from Mexico suggest that the importation of measles virus did not result in widespread transmission, largely due to high coverage.

To reduce the risk of widespread transmission after importation, as happened in Venezuela in 2002, countries must maintain high levels of measles vaccination coverage in all municipalities. Monitoring measles vaccination coverage in all municipalities and targeting those with <95% coverage for special vaccination activities remain essential strategies in all countries (see Figure 2). That, coupled with the implementation and maintenance of high-quality surveillance, will be the first line of defense to prevent widespread transmission when importations occur.

Figure 1. Reported Suspected and Confirmed CRS Cases, English-speaking Caribbean & Suriname, 1996-2003*



Source: MOH Reports to EPI-CAREC

*Week 43

The IBIS system implemented in five countries –Barbados, Guyana, Jamaica, St. Vincent, and Trinidad-and-Tobago–requires additional technical support to be sustainable.

The immunization programs in the Caribbean are facing major challenges in achieving and sustaining high vaccination coverage in a climate of reform and economic difficulties in the health sector. In larger countries, overall immunization coverage needs to be increased. In addition, pockets of low immunization coverage exist in some countries. In addition, governments must ensure that invoices for vaccine supplies are paid in a timely fashion (i.e. within 60 days). Failure to pay for supplies jeopardizes maintenance of routine immunization and may lead to widespread rather than localized shortages.

Conclusions

Effective management and supervision of the implementation of EPI Plans of Action in each country remain the backbone of the Caribbean program. The EPI Managers participating in this meeting should be congratulated for their tireless efforts to reach all children and protect them from vaccine-preventable diseases. At the same time, governments must continue to keep immunization high on their list of priorities.

Figure 1. Planned vaccination campaigns for the elimination of rubella and CRS, by country and by year.



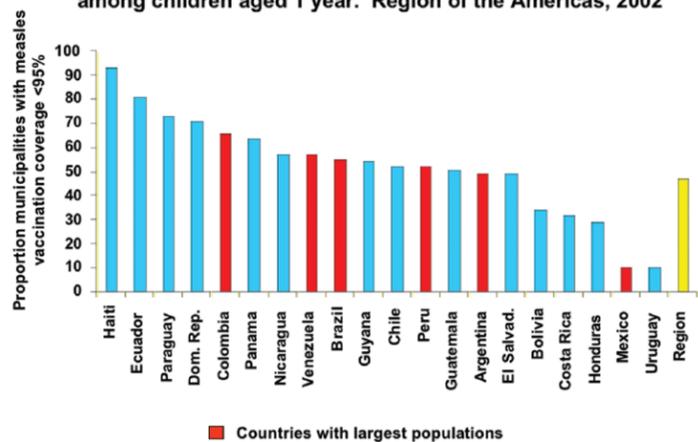
Rubella elimination by 2010 presents many opportunities. It contributes to the strengthening of surveillance and health services directed at newborns. It allows for improved services and follow-up for children born with congenital malformations and handicaps. It helps build bridges between children health services and special education services. It

ever, central health authorities will need to increase national capacity for supervising and monitoring the work of district authorities.

As a by-product of the measles initiative, national immunization programs and surveillance infrastructure have been greatly strengthened. National health authorities are determining



Figure 2. Proportion of municipalities with measles coverage <95% among children aged 1 year. Region of the Americas, 2002



February 2004, Volume XXVI, Number 1

Revision of the plans of action for the elimination of rubella and congenital rubella syndrome in the Region of the Americas

A workshop was held on 28 January 2004 in Quito, Ecuador, to review the plans of action for the elimination of rubella and congenital rubella syndrome in the Region of the Americas. EPI Managers, professionals in charge of epidemiological surveillance, and members of PAHO's Immunization Unit met to measure progress to date and standardize the actions to be carried out. Countries were divided into four groups according to their progress level:

Group I: Countries that introduced rubella vaccine 20 years ago.

Group IIA: Countries that have conducted immunization campaigns (men and women) to eliminate rubella.

Group IIB: Countries with partial immunization activities (by cohort, by gender, by risk group, or by geographical area).

Grupo III: Countries that have yet to conduct immunization activities towards rubella elimination.

The participants reviewed the development, monitoring, and evaluation of the plans of action. The forecasting of vaccine needs and the vaccine procurement process through the Revolving Fund were two other components examined.

Countries agreed to prepare national plans for rubella and CRS elimination before 28 February 2004 in order to comply with the requirements of Resolution CD44/R1 adopted during PAHO's 44th Directing Council. The plans of action will serve as tools that managers can use to prioritize, coordinate, and implement activities. They will also help managers to better forecast the demand in MR/MMR vaccines and allow them to better manage costs and resources.

April 2004, Volume XXVI, Number 2

Meeting of Ad-Hoc Panel of Experts on Rubella and Measles

During its September 2003 session, PAHO's 44th Directing Council endorsed the goal of rubella and congenital rubella syndrome (CRS) elimination by 2010 and urged countries to draft national plans of action

within one year. It also requested the Director of the Organization to elaborate a regional plan of action and mobilize resources in support of the rubella and CRS elimination goal.

These recommendations were based on rapid reduction in diseases burden from the implementation of an accelerated rubella control strategy; the extensive experience gained by the Region in vaccinating large and heterogeneous population groups; the cost-benefit data from the English-speaking Caribbean; the availability of a safe, affordable, and efficacious vaccine; and the existing political commitment of Member countries.

Within this context, PAHO's Immunization Unit (IU) held a Meeting of an Ad-Hoc Panel of Experts on Rubella and Measles in Washington, D.C., from 3-4 March 2004. The goals of the meeting were to review the current strategies for rubella and CRS elimination, review current PAHO measles surveillance indicators and definitions for measles elimination, and make suggestions for revisions where needed.

The meeting brought together experts and health officials from Brazil, Canada, Chile, Honduras, Mexico, the United Kingdom, and the United States. PAHO IU staff and consultants, as well as staff from WHO, also attended. The experts reaffirmed that the strategies to eliminate rubella and CRS being advocated by PAHO are correct. These include routine high level coverage of children; mass vaccination campaigns of adults to reduce the pool of susceptibles; inclusion of rubella vaccine in "follow-up" measles campaigns; and high-quality surveillance of rubella and CRS.

The following table lists several of the issues addressed by the experts.

<p>What definition of rubella elimination should be used in the Americas?</p>	<ul style="list-style-type: none"> • Elimination of rubella and CRS in the Americas is the interruption of endemic rubella virus transmission in all countries. There are no indigenously acquired cases of CRS. • Re-establishment of endemic transmission is a situation in which a chain of transmission continues uninterrupted for a period ≥12 months. • Other definitions and classifications should be comparable to those established for measles.
<p>Is there any reason to modify the current approach to vaccination of women of childbearing age?</p>	<ul style="list-style-type: none"> • Experience in mass vaccination of millions of women of childbearing age has allowed follow-up of several thousand women who were vaccinated without being aware of pregnancy. Follow-up of their pregnancies has yielded very reassuring results. Although ~3.6% of infants born to susceptible women vaccinated in early pregnancy were IgM positive, NONE had anomalies compatible with congenital rubella syndrome. Virus isolation studies are continuing. • Other countries undertaking mass vaccination of adult women should conduct similar studies.
<p>What are the potential benefits of the rubella initiative on strengthening the health system?</p>	<ul style="list-style-type: none"> • Helps strengthen surveillance and services to newborns (e.g., hearing screening, birth defects surveillance). • May potentially improve services and follow-up to children with birth defects such as impaired hearing and learning disabilities. • Provides contact between official health services and adults, particularly adult males, who often are not in contact with these services. • Increases awareness of health issues for women. • Offers an opportunity to link child health and child education services. • Strengthens infrastructure and quality of services. • Creates cost savings for the health system. • Helps establish structure/mechanism for introducing future vaccines for use in adults (e.g., HIV, human papillomavirus).
<p>Given the program will be moving to integrated measles/rubella surveillance, do the current case definitions need to be modified? If so, to what?</p>	<ul style="list-style-type: none"> • Full integration of measles and rubella surveillance requires definition of a suspected measles/rubella case. Since younger health care workers are not familiar with measles, the following is proposed for a case definition: <i>a fever and rash illness or when a health care worker suspects measles or rubella infection.</i> • All notified suspected cases should be reported to the EPI notification system as well as to standard disease surveillance systems.
<p>What criteria/indicators should be used/established to document the adequacy of integrated surveillance?</p>	<ul style="list-style-type: none"> • For purposes of discussion, integration is defined as not having totally separate reporting/surveillance systems for measles and rubella. Except for outbreak settings, all specimens will be tested for both measles and rubella. • Indicators should be developed for adequacy of combined/integrated measles/rubella surveillance. Many of the existing measles indicators can be used as is; some may require modification. • An important indicator of sensitivity of surveillance is the reported rate of suspected cases. It would be useful to have a minimum indicator of sensitivity comparable to the AFP rate used in polio. Participants asked that national experiences be reviewed so that proposals for a baseline rate could be discussed at the November 2004 Technical Advisory Group on Vaccine-preventable Diseases (TAG) meeting (i.e. 1-5/100,000 is being used in Mexico and the United Kingdom). The age group to which the baseline rate would be applied also needs to be established. • An indicator of specific city of surveillance relates to the results of lab testing.
<p>Are the case definitions for surveillance of CRS useful?</p>	<ul style="list-style-type: none"> • Case definitions for surveillance of CRS are very useful. It must be remembered that there is a difference between surveillance and diagnosis. A sensitive definition for reporting suspected CRS to trigger investigation is important in the context of elimination. The present definition appears adequate for surveillance: <i>a health care worker at any level of the health care system should suspect CRS in an infant when (1) One or more of the following birth outcomes are detected: congenital cataracts, hepatosple-nomegaly, patent ductus arteriosus, purpura, or hearing impairment and (2) An infant's mother was known to have had laboratory confirmed rubella infection during pregnancy AND after a thorough physical examination, for any reason, there is clinical suspicion of CRS in the infant.</i> For diagnosis, a more specific definition might be appropriate. Laboratory confirmation remains the gold standard. • For purposes of monitoring trends, CRS surveillance should be strengthened throughout the Americas through collaboration with the regional Perinatal Information System from CLAP (Latin American Center for Perinatology and Human Development) and the ECLAMC (Latin American Collaborative Study of Congenital Malformations).
<p>What should be the guidelines for CRS case investigation and follow up?</p>	<ul style="list-style-type: none"> • The present system of sentinel CRS surveillance is appropriate for countries in early stages of elimination activities. As the program matures, surveillance should probably extend to secondary hospitals as well as tertiary centers. In the end stages, attempts should be made to identify/investigate every case.



Some members of the expert panel (from left to right): Dr. Carlos Castillo-Solórzano, Dr. Peter Strebel, Dr. Louis Cooper, Dr. Stanley Plotkin, Dr. Michael Katz, Dr. Alan Hinman and Dr. Jon Andrus. Washington, D.C., 3 and 4 March 2004.

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Towards Elimination of Rubella and Congenital Rubella Syndrome

Among the activities marking the celebration of the Vaccination Week in the Americas, El Salvador and Ecuador are conducting vaccination campaigns among men and women to eliminate rubella and congenital rubella syndrome. In El Salvador, 2.9 million persons aged 15-39 years will be vaccinated, while in Ecuador 5.1 million persons aged 16-39 years are being targeted. This strategy is designed to rapidly reduce the circulation of the rubella virus, as well as to prevent the shift of disease burden to susceptible young adults, particularly women of child-bearing age. Both campaigns will be ongoing until 31 May 2004.



This intervention has a high cost-benefit ratio, generates savings for the health system, and is an opportunity to reduce inequities in the care of young adults and in maternal health. In addition, this activity promotes a culture of prevention and plays a critical role in reducing mortality and congenital malformations among children. During vaccination campaigns, advocacy, promotion, and social mobilization generate enormous benefits for strengthening health services directed at the adult population. The use of the combined measles-rubella (MR) vaccine further strengthens measles elimination in the Americas.

We salute the political commitment of the national authorities who, through presidential decrees, have declared the vaccination campaigns to be of national interest and have assigned the resources required for such effort. We also recognize health workers for their dedication and enthusiasm. Finally, we congratulate international cooperation agencies who have contributed to the success of the campaigns with their technical and financial support.



Vaccination of Adults to Sustain the Interruption of Measles Transmission and to Eliminate Rubella and Congenital Rubella Syndrome in Ecuador

Background

Like the other countries of the Hemisphere, Ecuador is a signatory to the resolution of the 44th Directing Council of the Pan American Health Organization/World Health Organization (PAHO/WHO), a resolution which established the goal of eliminating rubella and congenital rubella syndrome (CRS) by the year 2010.

As a first step toward to rubella and CRS elimination, Ecuador conducted a successful campaign with the measles and rubella (MR) vaccine in November 2002. During this campaign, nearly 100% of the country's 4,151,839 children aged 5-14 years were vaccinated.

In 2004, Ecuador continued its efforts to achieve rubella and CRS elimination by conducting a nationwide mass vaccination campaign with the MR vaccine targeting the population aged 16-39 years.

The objectives of the campaign were as follows:

1. Achieving 95% coverage or more in every municipality during the campaign.
2. Interrupting rubella transmission in order to eliminate rubella and CRS.
3. Reducing the risk of measles outbreaks secondary to the importation of cases, thus consolidating the interruption of indigenous measles transmission.



Methodology

The campaign was conducted between 3 May and 5 June 2004, with the goal of vaccinating 2,469,877 men and 2,347,727 women aged 16-39 years (excluding 315,829 pregnant women).

The vaccine was procured through the PAHO Revolving Fund for Vaccine Procurement. The vaccine lots reached Ecuador between October 2003 and March 2004 and were distributed to the provinces one month before campaign start-up.

National committees were created to promote inter-sectorial cooperation in both the public

and private sectors, as well as to garner support from political institutions and technical agencies. They were also asked to provide logistical support. Similar committees involving local authorities and non-governmental organizations were set up in the provinces, cantons, and health areas.

To raise campaign awareness, visits were made to senior executives of workplaces employing people within the campaign's target group. Partnerships for social mobilization were built with organizations that could collaborate with or participate in the campaign. A month before the campaign, the President of the Republic issued a decree urging governmental and non-governmental institutions and the civil society at large to actively participate in the campaign.

The campaign guidelines of the information and social mobilization strategy enabled provinces and health areas to develop complementary activities. Television and radio spots were broadcast in Spanish, Quechua, and Shuar. The print media, especially the national press, devoted extensive coverage to the campaign.

The first phase of the campaign was aimed at vaccinating the captive population, which weeks earlier had been tallied in order to define vaccination targets and to better program vaccination activities. Meanwhile, all health units served as fixed vaccination posts. Mobile teams were sent to places where the public congregates. In a second phase, the campaign focused on conducting "mop-up" activities in urban areas, densely populated rural areas, and marginalized urban neighborhoods.

The doses administered were tabulated weekly, with a breakdown by location (province and canton), sex, and five age-groups: 16-19, 20-24, 26-29, 30-34, 35-39 years. To facilitate data consolidation at the national level, the doses administered within a province were classified according to the canton of origin of each person vaccinated. When the person vaccinated resided in a different province, doses were assigned to the province of origin.

Rapid coverage monitoring (RCM) activities were programmed and conducted in conjunction with an active search for unvaccinated persons. Under the campaign's RCM guidelines, at least 40 individuals were to be interviewed per RCM. People were encouraged to carry their vaccination card during the campaign to document their vaccination status. Results were divided into three categories: <90% vaccinated, 90%-94% vaccinated, and ≥95% vaccinated. To evaluate the campaign's social communication component, a survey protocol was also developed.

<p>Are there additional tests or collection methodologies that should be incorporated into the laboratory network system?</p> <p>For elimination purposes, when should a second specimen to measure IgM be collected? Are there any special groups in which test samples should routinely be repeated?</p> <p>What is the appropriate use of IgM and avidity tests in pregnancy?</p>	<ul style="list-style-type: none"> • Serum IgM testing within 5 days of rash onset may be negative in persons who are infected with rubella. For surveillance purposes of identifying chains of transmission, this is adequate in the earlier stages of elimination activities but will not be as elimination is approached. • In later stages, it may be necessary to take a second specimen if the initial IgM test (taken within 5 days of rash onset) is negative. This will allow testing of paired sera for both IgM and IgG. • Assessing suspected rubella in pregnant women will require taking a second specimen if the initial IgM taken within five days of rash onset is negative. This will allow testing of paired sera for both IgM and IgG. • Avidity testing can be a useful adjunct to IgM testing in assessing how recently infection occurred. However, it may not be helpful in re-infection, which may result in an IgM response. • In some areas of some countries, pregnant women are routinely tested for both IgG and IgM antibodies. Unless there is a suspicion of recent exposure to rubella, IgM testing should not be done because of the low, but real, possibility of false positivity or true detection of persistently positive IgM circulating antibodies. • Studies to assess the utility of other approaches to diagnosis, including RT-PCR (reverse transcriptase-polymerase chain reaction) testing of oral fluids or other pharyngeal samples, should be pursued actively by PAHO. At the same time, the practical issues involved in widely disseminating PCR testing need to be addressed.
<p>What should be the guidelines for obtaining specimens for rubella virus culture?</p>	<ul style="list-style-type: none"> • In countries where the incidence of rubella is still high, specimens should be obtained from a range of settings sufficient to establish the distribution of circulating strains of rubella virus. • In every country, one or more persons should be identified with the responsibility to assure collection of specimens for rubella virus isolation. This could well be the person responsible for measles virus isolation. • As elimination is approached, efforts should be made to isolate rubella virus from all sporadic cases and from every chain of transmission, both for diagnostic purposes and to characterize the origin of the virus. • Isolates obtained from these efforts should be characterized to enable appropriate use of molecular epidemiology. • Development of, for example, oral fluid (or other pharyngeal sample) RT-PCR technology could obviate the need for virus isolation for purposes of diagnosis.
<p>What are the most appropriate definitions of measles elimination and re-establishment of endemic/indigenous measles transmission for use in PAHO?</p>	<ul style="list-style-type: none"> • Measles elimination in the Americas is the interruption of endemic measles virus transmission in all countries. • Re-establishment of endemic transmission is a situation in which a chain of transmission continues uninterrupted for a period ≥12 months. • Imported cases are cases exposed outside the Western hemisphere during the 7-21 days prior to rash onset as supported by epidemiological and/or virologic evidence. • Measles import-related cases are locally-acquired infections occurring as part of a chain of transmission originated by an imported case as supported by epidemiologic and/or virologic evidence. • Measles cases with unknown source of infection are cases where source has not been identified after a thorough investigation.
<p>Are the surveillance indicators proposed by PAHO appropriate?</p>	<ul style="list-style-type: none"> • An indicator for rate of rash illness investigated should be established, based on the experience in the countries. • Current indicators appear useful.
<p>What surveillance criteria in PAHO should be used to assess interruption of indigenous transmission (post-eradication)?</p>	<ul style="list-style-type: none"> • A range of indicators will be needed, including level of population immunity, adequacy of surveillance and investigation, laboratory capacity and performance.
<p>What criteria in PAHO should be used to certify measles elimination?</p>	<ul style="list-style-type: none"> • In addition to criteria relating to duration of interruption of transmission and other factors mentioned above, operational criteria relating to program performance will be needed (e.g., review of clinic registries).
<p>What should be the priority research issues for rubella and measles elimination?</p>	<ul style="list-style-type: none"> • Impact of rubella program on routine immunization services and on strengthening health services. • Epidemiologic/economic implications of immunizing adult males in rubella programs. • Document the health/economic burden of rubella and CRS in the Americas and the costs and benefits of rubella elimination. • Document the impact of rubella and rubella elimination on sectors other than health - e.g., education. Evaluate tests (e.g., RT-PCR, avidity testing), alternative clinical specimens (e.g., oral fluid, dried blood spots), and testing algorithms in PAHO countries. • Review country experience with surveillance indicators/strategies. • Evaluate different approaches to CRS surveillance. • Evaluate the hemispheric Vaccination Week. • Review surveillance of events supposedly attributable to vaccines and immunization (ESAVI) and injection safety practices in PAHO.



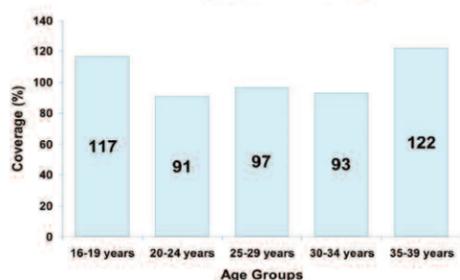
"440 million people, children, adolescents, and adults (men and women) of the countries of the Americas have been protected against measles and rubella thanks to the measles, rubella, and congenital rubella syndrome elimination initiatives, implemented since 1994. Certainly, the benefits of the vaccination have known no borders."

In addition, with support from the National Institute of Hygiene, a protocol was designed to ascertain the immunological status of pregnant women who were inadvertently vaccinated. These women and their infants are being followed up.

Results

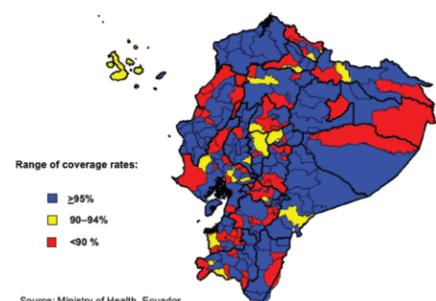
Based on the estimated target population, national coverage reached 103.2%: 101% for men and 105% for women. Figure 1

Figure 1. Coverage by Age Group, Measles/Rubella Adult Immunization Campaign, Ecuador, May-June 2004



shows coverage rates by age group. Coverage levels were above 100% in the 16-19 and 35-39-year age groups, in part because both age-groups are more likely to be affected by vaccination of persons outside the target age. Of the 22 provinces, 21 exceeded 95% coverage. Among the 217 cantons, 61.3% (133) had ≥95% coverage, 11.5% (25) had coverage of 90%-94%, and 27.2% (59) had <90% coverage (Figure 2). The last two groups are cantons where 10% and 12.5%, respectively, of the population resides.

Figure 2. Coverage by Cantons, Measles/Rubella Adult Immunization Campaign, Ecuador, May-June 2004



In all, 6,661 RCMs were carried out (range: 23 to 2,194 per province), and 315,927 people were surveyed, i.e., an average of 47 people per RCM (range: 29 to 102). Of the people surveyed, 92.6% (293,169) had been vaccinated (range: 69.5% to 100% in the individual health areas). Most (75.8%) of the RCMs showed that ≥95% of the respondents had been vaccinated, 13.8% showed that 90%-94% of the respondents had been vaccinated, and 10.4% showed that <90% of the respondents had been vaccinated.

Broadcasting of radio and television spots began the second week of the campaign because of delays in the disbursement of funds. A total of 3,447 surveys to assess campaign awareness were conducted in 8 provinces, 88.6% of the surveys in urban areas and 11.4% in rural zones. Among respondents, 96.5% had heard a message about a special vaccination event, 88.2% related it to the campaign, and 6.1% related it to the vaccination week. The media most frequently cited as a source of information were TV (78.1%), radio (47.9%), health unit (44.5%), mobile megaphone

(32.3%), newspaper (22.8%), note from school (18.4%), and other (0.6%). In addition, 80.7% of the respondents recognized that pregnant women should not be vaccinated, and 75.3% correctly answered questions about the target group. Some mass media articles created controversy regarding the safety of the vaccine for pregnant women and the adequate conduct for follow-up of pregnant women inadvertently vaccinated. Clarification

statements from independent key persons from the medical community, as well as EPI staff and PAHO collaborators, were needed to manage these incidents.

A total of 1,316 pregnant women inadvertently vaccinated were reported.

Among them, 13.6% (179) were susceptible and should be followed until they give birth so clinical and serological assessment of their newborns can be performed.

Discussion

Planning started nine months before the campaign. It was instrumental for timely procurement of supplies, training tools, and information material, and development of the social mobilization and training components. It also helped during budget negotiation, especially for brigade mobilization and social communication.

The campaign components to be supervised in priority were assessed weekly in light of preliminary findings and problems encountered. Plan adjustment was

emphasized in major cities mainly. RCMs, which can be used as a tool to quickly assess campaign progress, were unevenly conducted from province to province. This indicates the need to make RCM a regular part of supervision and promote its usefulness.

The only province that failed to meet the >95% target coverage borders with Colombia and achieved 94.2% coverage. Of the 59 cantons with <90% coverage, 48% are in the Sierra, 37% are on the coast, and 15% are in the Amazon Region. In 76% of these cantons with low coverage, over 70% of the population lives in rural areas where access is difficult, which may explain the lower coverage achieved. Additionally, a lower administrative coverage was reached in cantons in the vicinity of major cities. This may be the result of reporting problems regarding the origin of the vaccinated person.

The confusion over the reason not to vaccinate pregnant women and the safety of the MR

vaccine in pregnant women lies partly in the inadequate dissemination of information to health professionals and lack of continuing education on vaccines.

Several valuable lessons were learned from the immunization campaign. They are listed in the box below.

Lessons Learned

The following are lessons learned from the measles-rubella vaccination campaign conducted in Ecuador in 2004:

- Express political will and commitment through an official act, such as the presidential decree directed to the public at large;
- Ensure timely execution of each program component to achieve 95% or greater coverage in adults, especially components related to the procurement of supplies, local programming of vaccination activities, supervision and rapid coverage monitoring, social mobilization, information systems, and communication. Under the communication component, information must be made available to community leaders, journalists, and columnists;
- Adopt a health promotion approach to ensure inter-institutional and inter-sectorial partnerships with NGOs and cooperation agencies;
- Ensure financing of the social mobilization component and the timely kick-off of the mass media campaign; prioritize television, radio, and mobile megaphone messages; create radio spots in the country's main languages; improve mechanisms for coordination between the EPI and the people in charge of publicity and health education at all levels; and encourage local authorities to promote the display of the *vacunometro*, a graph displaying the progress of the campaign in terms of increasing coverage;
- Ensure that the agreements and declarations signed with the heads of federations of health professionals are distributed to their members or partners. Also, ensure that members receive technical information about vaccine safety and management of pregnant women inadvertently vaccinated;
- Ensure that the information system shows coverage by cantons and that ages of people vaccinated are recorded. If possible, use a software that facilitates data processing; and
- Improve the implementation of rapid coverage monitoring as a supervision tool.

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XVI Meeting of the PAHO Technical Advisory Group on Vaccine-preventable Diseases: Conclusions and Recommendations

The XVI Meeting of PAHO's Technical Advisory Group (TAG) on Vaccine-preventable Diseases was held 3-5 November 2004 in Mexico City, Mexico. TAG meets every two years and functions as the principal forum for providing advice to PAHO Member States on vaccine policies and disease control efforts. The following is a summary of TAG's technical deliberations and recommendations as presented in the Final Report on rubella and CRS.

Since the last TAG meeting, held in Washington, D.C. in November 2002, the immunization programs of the Region of the Americas have maintained the continent free of indigenous wild poliovirus transmission, have interrupted endemic transmission of indigenous measles virus, and have made great strides toward the goal of eliminating rubella and congenital rubella syndrome (CRS). Over the years, vaccination has saved millions of children and has contributed to a decrease in childhood mortality in the Americas; for the period 1990-1995, there were 51.4 deaths per 1,000 live births, and by 2003 the mortality rate had dropped to 30.7.

TAG acknowledged the remarkable progress achieved by PAHO's Immunization Unit over the last two years in coordinating technical support to Member States. Activities have included advancing the Directing Council Resolution CD44.R1 in September 2003 for rubella and CRS elimination, organizing ad-hoc expert group meetings on rubella and measles, convening regional and global rotavirus meetings, assisting in the development of country and regional Plans of Action, conducting three country evaluations, organizing and supporting the Vaccination Week in the Americas, and advising on numerous country-based surveillance activities.

Rubella Recommendations

1. Surveillance

- TAG endorses the rubella/CRS definitions based on the deliberations of the Meeting of the Ad-hoc Panel of Experts in Rubella and Measles held in Washington, D.C. in March 2004 cited in PAHO's EPI Newsletter of April 2004 (*Meeting of Ad-Hoc Panel of Experts in Rubella and Measles*, April 2004, Vol.XXVI, (2), available at http://www.paho.org/english/ad/fch/im/Epi_newsletter.htm). The definitions cited in this report also apply in full to rubella elimination.
- For elimination purposes, full integration of measles and rubella surveillance is required; integrated laboratories are an important aspect of this surveillance system. Emphasis must be on active surveillance. Except in an outbreak setting, all specimens must be tested for both measles and rubella.
- TAG endorses the indicators currently reported in the PAHO Measles/Rubella Bulletin, with the revisions suggested by the March 2004 Ad-Hoc Panel of Experts in Rubella and Measles. Three indicators are particularly critical: the proportion of suspected cases with an adequate investigation, the proportion of suspected cases with an adequate blood sample, and the proportion of transmission chains with representative samples for virus isolation.
- An adequate case investigation includes a home visit within 48 hours of notification, completeness of relevant data (i.e., date of notification, date of investigation, date of rash onset, date sample taken, type of rash, presence of fever, dates of previous measles/rubella vaccinations), and active case searches.
- Efforts to monitor reported measles/rubella cases by age, sex, location, and vaccination status should continue.
- In the context of CRS elimination, high-quality surveillance requires an active component and a sensitive case definition. To guarantee rapid investigation of suspected CRS cases, TAG recommends the following definition of a suspected CRS case: *A health care worker at any level of the health care system should suspect CRS in an infant when (1) one or more of the following birth outcomes are detected: congenital cataracts, congenital cardiac defects, purpura or deafness; or (2) an infant's mother was known to have had laboratory-confirmed or suspected rubella infection during pregnancy. For diagnosis, a more specific definition may be appropriate, with laboratory confirmation remaining the gold standard.*
- During elimination, all suspected CRS cases should have specimens collected for IgM testing and virus isolation.
- TAG recommends that PAHO convene an ad-hoc



2005

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Rubella and Congenital Rubella Syndrome Elimination in the Americas: The Beginning of the End

Rubella is a febrile rash illness sometimes considered as a mild disease; however it has devastating consequences when contracted by a woman in the early stages of her pregnancy. Infection during pregnancy can result in miscarriage, stillbirth, and serious birth defects such as deafness, blindness, and congenital cardiopathy, together known as congenital rubella syndrome (CRS).

Rubella virus circulation in the Americas has been documented through data from the epidemiological surveillance system. Rubella outbreak investigations have identified CRS cases. It has been estimated that before vaccine introduction into national immunization schedules, more than 20,000 children were born with CRS in the Region each year.

Direct and indirect costs of CRS are very high due to the need for specialized diagnostic procedures and treatment, as well as the chronic nature and severity of its symptoms. Studies conducted in the Americas have determined that the cost of care for a child with CRS is US\$ 50,000 to \$63,900 throughout the child's lifespan. This does not account for indirect and social costs.² Elimination of rubella and CRS has shown to be cost-effective.

Progress to date

To date, 72% of countries in the Region have large cohorts of protected adults through implementation of different strategies. On the other hand, countries such as Canada, Cuba, Panama, the United States, and Uruguay introduced the rubella vaccine into their childhood immunization schedules more than 30 years ago.

From 1998 to 2004, the English-speaking Caribbean, Costa Rica, Ecuador, El Salvador, and Honduras have conducted mass vaccination campaigns in adult men and women to quickly interrupt rubella virus transmission and prevent CRS. Similarly, between 1999 and 2002, Brazil and Chile implemented strategies for CRS prevention, and mass vaccinated only women of childbearing age. Campaign

coverage reached over 95% in several countries.

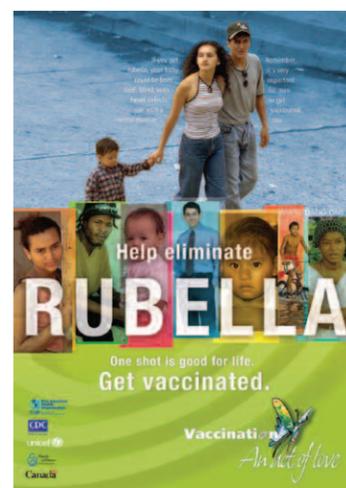
Bolivia, Colombia, and Peru have programmed a joined campaign in the Andean Sub-Region for September 2005. Other countries in the Region have also planned to conduct rubella vaccination campaigns in men and women between 2005 and 2006 as shown in Figure 1.

Given the complexity of adult vaccination and the lessons learned during the campaigns recently conducted in countries of the Region, PAHO's Immunization Unit (IM) is programming two workshops on rubella and CRS elimination. One will be held in Bogotá, Colombia, from 2-6 May 2005 and the other in Santa Cruz, Bolivia, from 12-16 May 2005.

Following vaccine introduction and implementation of vaccination campaigns, rubella incidence decreased by 99.5%, from 135,000 reported cases in 1998 to 1,652 cases in 2004. Indicators of integrated measles/rubella surveillance are >80%. At this stage of the elimination initiative in the Americas, two new indicators have been proposed to monitor surveillance quality: proportion of transmission chains with representative samples for virus isolation and proportion of cases with adequate investigation.

The number of countries/territories in the Americas reporting CRS cases has increased from 18 (13%) in 1998 to 100% in 2003. However, CRS surveillance is still not complete. Argentina, Brazil, Costa Rica, El Salvador, and Peru have conducted retrospective studies in children and obstetrics hospitals, schools for the death and blind, and the community to identify children with probable or confirmed CRS. In other countries, like Peru, research is being conducted jointly with the World Health Organization. The goal of these studies is to identify ways to improve CRS surveillance and detect suspected cases at the primary care level, while involving specialists. Later this year, IM will convene an ad-hoc meeting of experts from different countries of the Region to determine lessons learned, define good public health practices for establishing CRS surveillance, and help with refining strategies for surveillance and case detection.

High quality CRS surveillance is essential for the detection of birth defects in infants. It also contributes to the strengthening of integrated perinatal care and promotes consultations for



meeting of experts to determine lessons learned and define good public health practice for establishing CRS surveillance. Issues to consider include review of existing literature and country experience, as well as reaching out to tap the expertise of professionals in various fields who come into contact with CRS-affected children. This includes, but is not limited to, ophthalmologists, cardiac surgeons, schools for the deaf, otorhinolaryngologists, and pediatric infectious disease specialists. This meeting should help to refine surveillance approaches and case detection strategies, for instance the use of low-birth weight as an investigation trigger to narrow the scope of perinatal screening.

- Collaboration with the regional Perinatology Information System of the Latin American Center for Perinatology and Human Development (CLAP) and the Latin American Collaborative Study of Congenital Malformations (ECLAMC) should help strengthen surveillance.
- TAG recommends further research on testing algorithms and evaluation of alternative clinical specimens such as oral fluids and dried blood spots. Furthermore, indicators and strategies should be reviewed in the context of country experience with integrated surveillance. The impact of the rubella elimination initiative on strengthening health services, particularly services for women, should also be documented.

2. Vaccination Strategies

- TAG encourages the implementation of one-time mass vaccination campaigns in both men and women in all remaining endemic countries. The age group to be vaccinated, whether 15-29 years of age, 15-39 years of age, or else, should be determined based on the likely susceptibility of adults. This would depend on the year of introduction of the MMR vaccine in the national schedule, the extent of follow-up MR or MMR

vaccination campaigns to maintain measles elimination, and the rubella epidemiology in the country. The TAG commends the countries that have successfully conducted adult mass vaccination campaigns.

- The countries that have conducted mass vaccination campaigns only in women will need to determine the extent of the virus transmission and susceptibility in men, and develop appropriate strategies to reduce the number of rubella-susceptible men.
- Substantial evidence has accumulated from many studies, including recent studies in Brazil and Costa Rica, indicating that there is no identifiable link between vaccinating pregnant women and giving birth to a child with CRS. Therefore, there is no reason to modify the current approach of vaccinating all women of childbearing age (WCBA) during campaigns. Brazil and Costa Rica should be congratulated on their studies and encouraged to submit their findings for publication.

3. Laboratory

One day prior to the TAG Meeting, the PAHO Measles/Rubella Laboratory Network met to discuss a number of technical and logistical issues. Recommendations emerged relating to IgM kit selection, viral isolation and genotyping, preferred sample types, laboratory accreditation, classification of vaccine-related cases, treatment of false positives, treatment of suspected cases in pregnant women, and laboratory monitoring. These recommendations can be found in Annex 2 of the TAG final report.

December 2004,
Volume XXVI, Number 6

Rubella and Congenital Rubella Syndrome: The New Challenge

In September 2003, PAHO's 44th Directing Council adopted a resolution to eliminate rubella and CRS by 2010 and urged Member States to prepare national Plans of Action in support of that objective. The elimination of rubella and CRS in the Americas has been defined as the successful interruption of

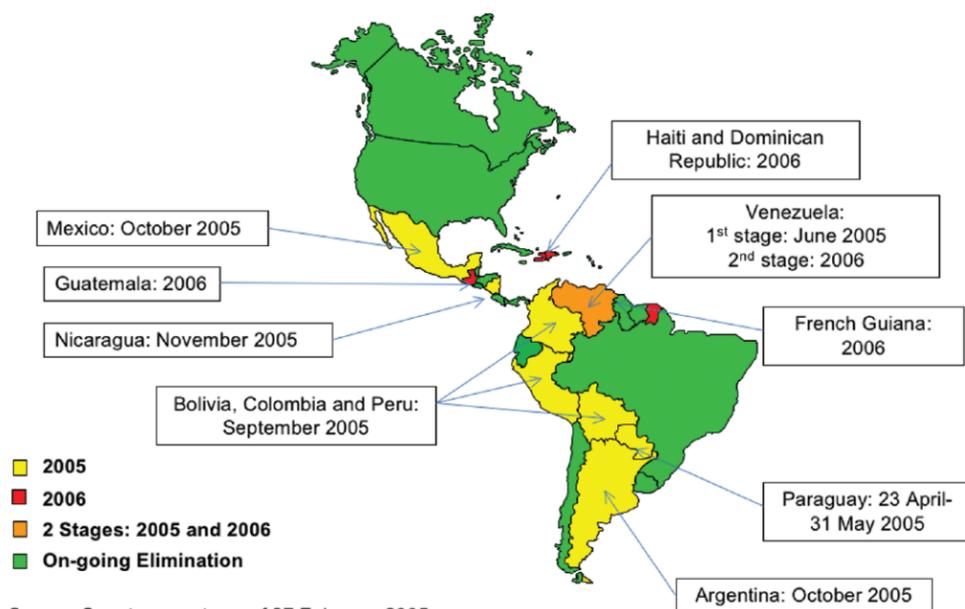
endemic transmission of rubella virus in all countries of the Region without the occurrence of CRS cases associated with endemic transmission.

As of July 2004, approximately 99% of new birth cohorts in the Region of the Americas have had access to the combination measles, mumps and rubella vaccine (MMR). Only Haiti has yet to include the rubella antigen in its vaccination schedule. In 2002, all countries of the Region began conducting follow-up campaigns (second immunization opportunity for children aged <5 years) using the measles-rubella vaccine (MR), achieving >90% coverage. Between 1998 and July 2004, the English-speaking Caribbean, Costa Rica, Honduras, El Salvador, Mexico and Ecuador conducted adult vaccination campaigns targeting women and men. Campaigns in Brazil and Chile targeted only women of childbearing age. The remaining countries in the Region plan to conduct adult vaccination campaigns between 2005 and 2007.

Particular challenges of conducting adult vaccination campaigns included monitoring vaccine safety and ensuring safe immunization practices. Also, since persons cannot donate blood for one month following rubella vaccination, campaigns must be coordinated with blood banks to avoid shortages in blood supply. Since the introduction of the vaccine and launch of vaccination campaigns, rubella incidence has fallen 99.3% - from 135,000 reported cases in 1998 to only 923 in 2003.

While only 18 countries/territories in the Americas reported on CRS in 1998, by 2003 the entire Region was conducting CRS surveillance. In 2004, five of the six indicators for integrated rubella/measles surveillance were >80% at the regional level. High-quality surveillance is essential to the detection of congenital conditions and provision of comprehensive perinatal care. Sensitive surveillance will also improve clinical follow-up and case management of affected children.

Figure 1. Planned Immunization Campaigns for Rubella and CRS Elimination, by Country and by Year



Source: Country reports as of 27 February 2005

congenital infections and newborns at risk and a more thorough check-up of healthy children.

Currently, few specimens are processed for viral isolation and molecular typing, which could help us determine the source of infection and rubella virus variations. Phylogenetic studies of rubella viruses have shown two virus clades (formerly called genotypes) and 7 genotypes. In the Americas, the 1C rubella virus has been identified as endemic.* Clade 2 viruses have not been found circulating in the Region; thus, if clade 2 viruses were to be isolated, they would be considered importations. In order to improve the viral isolation technique, IM, FIOCRUZ in Brazil, and the US Centers for Disease Control and Prevention (CDC) will hold a workshop on this technique at the FIOCRUZ laboratory in Rio de Janeiro from 4-8 April 2005. Also, to increase timeliness and facilitate laboratory diagnosis, Peru, PAHO/WHO, and CDC are

conducting a study for rubella diagnosis using filter paper and oral fluids.

Implementing the rubella elimination strategy greatly contributes to the reduction of inequities in maternal health outcomes,³ strengthens the political commitment for immunization services, and promotes the culture of prevention. In addition to CRS prevention, women's health care can be further improved by the strengthening of adult health services, staff education, improvements in epidemiological surveillance, decentralization of decision-making, boost in program management, enhanced health awareness, and community participation that result from the implementation of the strategy.⁴

* *Molecular Epidemiology of Rubella.* Presented by Dr. J. Icenogle, Team Leader, Rubella Virus Laboratory, Centers for Disease Control and Prevention, at the Measles/Rubella Laboratory Meeting during the Technical Advisory Group Meeting in Mexico City, November 2004.

Besides being technically sound, PAHO's rubella elimination strategy is backed by political will, financial sustainability, social acceptance, and feasibility. The support and involvement of the Inter-agency Coordinating Committee within each country will be critical for sustaining commitment and galvanizing necessary resources to achieve the goal.

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February 2005, Volume XXVII, Number 1

Cleaning Up the Regional MESS Database

Previous *EPI Newsletter* articles have addressed the importance of data quality and the "cleaning" of data after entry into the Measles Eradication Surveillance System (MESS) database. Ideally, country managers should review the quality of the data entered prior to sending weekly data files to PAHO/Washington. Such efforts will likely decrease errors and improve data quality for all aspects of surveillance. To evaluate the quality of the data entered into the MESS database, thirty key variables were reviewed for the years 2002-2003. A similar assessment of data quality of the MESS system was conducted for the years 2000-2001.

Data for each year were extracted into EPI INFO 2002 and simple frequencies were tabulated on the selected variables. For each variable the following was determined: the number of variables that lacked information or were left blank, the number of "ZZ" responses indicating the information was unknown, and the number of obvious data entry errors, e.g., entering an impossible date of onset such as 2022 or entering a "D" when only "A", "B", "Y", or "Z" are options. No attempt was made to verify the accuracy of the data entered. The evaluation is summarized in Table 1.

In 2002, a total of 21,021 records were examined with a possible 566,941 responses. In 2003, 10,326 records were evaluated with 280,232 possible responses. As seen in Table 1, during both years only 0.012% of possible responses had obvious errors (0.013% in 2002, and 0.012% in 2003). Most of these errors dealt with incorrectly entered dates, i.e., of the total 108 data entry errors detected in the two years, 75 (69%) were associated with dates. Some dates were entered as DD/MM/YY instead of the standard DD/MM/YYYY format. Others had dates of onset in 2004 or 2202. However, the number of data entry errors overall was very small - indicating high quality of data entry at the country level.

Conversely, numerous fields lacked information in both years. For year 2002, 6.67% of all responses had missing information with 1.9% of the responses left blank and 4.7% marked "ZZ" for unknown. For year 2003, 7.10% of all responses had missing information with 1.9% of the responses left blank and 5.2% marked "ZZ" for unknown. The amount of missing information varied greatly by variable. Three variables contained no blanks or "ZZ" responses: (1) date reported, (2) date of rash onset, and (3) case classification.

In 2002, among the 15,398 suspected cases at least one year of age, 3,021 (19.6%) had no information on their measles vaccination status. Among persons with at least one dose of measles vaccine, 15.6% had no date of vaccination. In 2003, the comparable percentages were 24.5% and 9.2%. In 2002, of 3,550 persons vaccinated against rubella 12.2% had no date of vaccination. In 2003, 4.1% of the 2,678 persons vaccinated against rubella had no date of vaccination.

Assessment of the quality of data on pregnancy status shows that in 2002, of the 104 females aged 15-39 years who were diagnosed with rubella, 10 (9.6%) were missing information on their

pregnancy status. In 2002, four women were diagnosed with rubella during pregnancy. All had information on their gestational age in weeks.

In 2003, only 13 (17%) of 75 women aged 15-39 years diagnosed with rubella were missing information on their pregnancy status. Four pregnant women diagnosed with rubella had information on their gestational age.

Editorial Comment: Overall quality of data entered into the MESS database remains high and substantial improvements have been made in rubella surveillance when compared to the previous evaluation of years 2000 and 2001. In 2000, the 30 variables above were evaluated for 24,552 records, or 657,175 possible responses. In 2001, 16,675 records were evaluated with 440,077 possible responses. During both years, 0.017% of possible responses had obvious errors. Of the total 183 data entry errors detected in the two years, 134 (73%) were associated with dates.

This evaluation (which did not address accuracy of the data entered) suggests that there are few obvious errors, and that errors have decreased in 2002 and 2003. In fact, comparing "error ratios" (number of errors/number of possible responses) from the year 2000 to 2003, data entry errors were 1.83 times more common in 2000 than in 2003 (p<0.005). Thus, even though the number of errors is small, the number of data entry errors has decreased over time.

When compared to 2000 and 2001, the evaluation of years 2002 and 2003 showed less missing data for vaccination status, with the greatest improvements on the date of vaccination (Table 2). The importance of documenting vaccination status and obtaining information on the date of vaccination was stressed in the previous review and data managers have succeeded in greatly improving the quality of this data.

Final diagnosis was missing (blank or "Unknown") in 24% of suspected cases for 2000 and 2001. Final diagnosis was missing in 35% of suspected cases for 2002 and 2003. Data managers should ensure that final diagnosis is reported for all suspected cases by utilizing the "Measles," "Rubella," "Dengue," or "Other" categories, as final diagnosis is a critical component of the surveillance system. Suspected cases with negative laboratory results for measles, rubella, and dengue should be classified as "Other."

When compared with data from 2000-2001, rubella surveillance data in 2002-2003 was of better quality (Table 3).

Main Strategies for Rubella and CRS Elimination in the Americas

In September 2003, the 44th Directing Council of the Pan American Health Organization adopted a resolution to eliminate rubella and CRS by 2010. The elimination of rubella and CRS in the Americas has been defined as the successful interruption of endemic transmission of rubella virus in all countries of the Region without the occurrence of CRS cases associated with endemic transmission.

The main strategies for rubella and CRS elimination in the Americas, based on knowledge acquired about the disease, the vaccine, and rubella control experiences, are as follows:

- Introducing the rubella vaccine in routine immunization schedules and reaching >95% vaccination coverage in the target population in each municipality;
- Implementing a one-time mass vaccination campaign of men and women in all countries with endemic transmission. This strategy reduces significantly the time to interrupt rubella virus circulation and rapidly prevents the occurrence of CRS;
- Continuing the use of the measles-rubella vaccine in follow-up campaigns for measles elimination;
- Integrating rubella surveillance to the epidemiological surveillance system used for measles elimination, immediately investigating cases, and rapidly implementing response measures;
- Implementing CRS surveillance implementation before rubella vaccine introduction, which will provide base information to document impact of immunization programs;
- Strengthening laboratory diagnosis of rubella and CRS and virus isolation in all countries of the Region; and
- Disseminating information for action at all levels of the health system.

Table 1. Missing Information and Data Entry Errors by Variables in MESS. The Americas, 2002-2003

Year 2002 (n=21,021)			Year 2003 (n=10,326)			
Variable	Blank	ZZ	Error	Blank	ZZ	Error
Date reported	0	0	9	0	0	1
Date of rash onset	0	0	2	0	0	0
Site type	193	128	0	4	81	0
Type of rash	482	685	10	167	202	1
Date investigated	2898	784	2	878	290	0
Source	418	155	0	12	95	0
Case classification	0	0	0	0	0	0
Classification code	10	0	0	7	0	0
Gender	20	16	3	5	3	2
Age	51	109	8	5	32	2
Number of doses (Measles)*	389	2632	10	137	1688	12
Date of last measles dose**	550	565	0	392	8	0
Fever	262	144	17	122	31	12
Date of fever onset	409	0	0	263	263	0
Trip	468	2224	0	295	0	0
Conjunctivitis	356	629	0	246	871	0
Coryza	340	555	0	225	222	0
Cough	314	439	0	187	188	0
Contact	603	3588	0	343	156	1
Date of confirmation	36	1	0	1	1492	0
Lymphatics	397	769	0	271	0	0
Hospitalization	338	524	0	200	303	0
Death	344	601	0	263	349	0
Initial diagnosis	3	0	0	43	355	0
Final diagnosis	10	7287	0	7	3579	0
Number of doses (Rubella)*	633	3125	4	261	1974	1
Date of last rubella dose**	403	21	7	98	1804	2
Arthralgias	640	1604	0	532	687	0
Pregnancy status***	386	232	1	273	215	0
Weeks pregnant****	14	9	1	11	13	0
TOTAL	10967	26826	74	5248	14638	34

* Among persons at least 1 year of age
 ** Among persons at least 1 year of age and with at least 1 dose of vaccine
 *** Among women 15-39 years of age
 **** Among pregnant women

National managers should continue to ensure the quality of data entered into the national MESS databases. This evaluation suggests many improvements have been made in data quality, including the number of obvious errors, missing data, and information on vaccination status. Most importantly, pregnancy status indicators for females aged 15-39 years with confirmed rubella infection have greatly

Table 2. Selected Missing Data Over Time, 2000-2003

	2000	2001	2002	2003
Overall missing information	11.2%	7.7%	6.7%	7.1%
Percentage missing measles vaccination status*	30%	21%	19.6%	24.5%
Percentage of persons without last measles vaccination date**	52%	47%	15.6%	9.2%

* Among persons at least 1 year of age
 ** Among persons at least 1 year of age and with at least 1 dose of vaccine

Table 3. Rubella Surveillance in The Americas, 2000-2003

	2000	2001	2002	2003
Percentage of missing date of rubella vaccination	78%	62%	12.2%	4.1%
Percentage of women ages 15-39 without pregnancy status	35%	39%	9.6%	17%
Percentage of pregnant women with rubella missing gestational age	16%	7%	0%	0%

improved. Documentation of immunization status, information on the date of last immunization, and pregnancy status of women with rubella should remain high priorities in data collection. Infants born to women with rubella during pregnancy must be closely followed and evaluated for signs of congenital rubella syndrome (sensorineural hearing loss, cataracts, and congenital heart disease).

April 2005, Volume XXVII, Number 2

Meeting of the Interagency Coordinating Committee for Immunization, Guatemala, March 2005: Pushing the Unfinished Immunization Agenda

From early on, the Interagency Coordinating Committees (ICCs) for immunization have been a cornerstone in the success of immunization programs in the Region of the Americas. ICCs channel efforts by international agencies, governments, and the civil society to help countries strengthen their immunization programs and control vaccine-preventable diseases. ICCs are charged with the task of



From left to right, Dr. J. Andrus, Chief, Immunization Unit, PAHO; Dr. J. Molina Leza, PAHO/WHO Representative, Guatemala; Dr. M. Roses Periago, Director, PAHO; Mr. M. Tulio Sosa, Minister of Health, Guatemala; and Dr. E. Asturias, International Cooperation Advisor, Ministry of Public Health and Social Assistance, Guatemala.

ensuring coordination of all inter-agency inputs. They review the progress made and the needs for additional assistance. They also play a critical role in the implementation of immunization Plans of Actions.

In March 2005, Guatemala held an ICC meeting. The meeting brought together prominent Guatemalan authorities, including the Minister of Health and the Vice-Minister of Finances, and major international partners. It also included the participation of Pan American Health Organization Director, Dr. Mirta Roses Periago. As she stated in her

presentation, the primary focus of the meeting was to complete the unfinished immunization agenda: the conviction that in spite of the Region's great strides in the fight against vaccine-preventable diseases (eradication of poliomyelitis, elimination of endemic measles transmission), new challenges loom ahead, and much remains to be accomplished. The participants also recognized that immunization plays a significant role in reaching the Millennium Development Goals of reducing child mortality and improving maternal health, and is a key tool for the promotion of socioeconomic development.

Dr. Roses Periago praised Guatemala for its achievements in immunization over the last 25 years. She particularly commended the country for the introduction of the pentavalent vaccine 1 into its childhood immunization schedule in 2005. Dr. Roses Periago summarized future challenges to be: eliminating rubella and congenital rubella syndrome from the Americas; sustaining immunization programs as they introduce new vaccines; and achieving equity by striving to immunize every child. To achieve these goals, Dr. Roses Periago emphasized the importance of partnerships for external cooperation, and mobilization

of resources under the umbrella of the Ministry of Health.

Dr. Roses Periago made an appeal to ICC members to enact an Immunization Law ensuring a budget line for vaccines and operational expenses of the immunization program. This would help ensure program sustainability, and would assist the Guatemalan Government in guaranteeing the right of its people to immunization.

The Minister of Health, Mr. Tulio Sosa thanked the participating partners for their technical cooperation, particularly in the areas of social communication,

strengthening of the surveillance system for vaccine-preventable diseases (including the national laboratory capacity), and support to activities aimed at increasing vaccination coverage, all leading to improved health for the people of Guatemala.

The participating embassies, technical cooperation agencies, and non-governmental agencies congratulated Guatemala for the achievements of its immunization program. They pleaded for a stronger strategic alliance between immunization partners to promote an Immunization Law, called for innovative modalities to involve the private sector, asked that alternatives be considered to exempt vaccination supplies from taxes, and called for an increase in social investment for prevention through immunization. Similarly, participants expressed the need to follow up, in subsequent ICC meetings, on the topics discussed. They also suggested that a similar approach be adopted to channel the cooperation in other health areas.

¹ Pentavalent vaccine: Combination vaccine against diphtheria-pertussis-tetanus-Haemophilus influenzae type b-hepatitis B.

August 2005, Volume XXVII, Number 4

Rubella and Congenital Rubella Syndrome Elimination Strategy: Contributing to Primary Health Care Renewal

Background

Following the success of the global smallpox eradication, the World Health Assembly resolved to introduce the Expanded Program on Immunization (EPI) in May 1974. Since the creation of the EPI, immunization coverage rates have steadily increased. New vaccines have been added in response to the availability of appropriate technology and the priorities dictated by the health situation.

The development of the EPI in turn spearheaded several initiatives and achievements in the Americas. These include:

- Poliomyelitis eradication, with 6,653 cases reported in 1970 and no wild polio cases reported since August 1991;
- The elimination of indigenous measles transmission, with approximately 250,000 cases reported in 1990 and the last confirmed indigenous case, due to the D9 genotype, reported in November 2002; and
- The elimination of neonatal tetanus (NNT) as a public health problem (defined as less than 1 case per 1,000 live births), a reachable goal since Haiti is currently the only country in the Region where NNT remains endemic.

Today, the Region faces a new challenge: the elimination of rubella and congenital rubella syndrome (CRS) by the year 2010.¹

EPI and Primary Health Care

In the last thirty years, notable political, economic, and social changes have contributed to health sector reform. The objectives of health sector reform have been to redirect health care financing, to decentralize decision-making for project planning and implementation, and, more recently, to seek improved quality of care and increased equity in health. At the same time, the main objectives of the EPI have been to protect, sustain, and enhance the program's achievements. While initiatives for the eradication and elimination of vaccine-preventable diseases have made significant and rapid progress, concerns remain that a focused initiative might interfere with the general development of primary health care, the strengthening of health services, and the health sector reform process.

Sustainability has also been a concern, as doubts have been raised that achievements can not be sustained after eradication or elimination to prevent the reintroduction and reestablishment of endemic transmission of a disease. However, the results achieved by national programs have provided the ministries of health and their partners with extraordinary confidence. They have assigned adequate resources to sustain immunization programs and implement new initiatives.

The Declaration of Alma-Ata in 1978, following the International Conference on Primary Health Care, called for *Health for All* and outlined the components of primary health care (PHC). The Declaration emphasized that it was not necessary to achieve all components simultaneously. Rather, a limited number of priorities should be set and articulated to serve as access points for other activities.

The results achieved by the EPI over the years through its initiatives for disease eradication and elimination are examples of effective collaboration between governments, non-governmental organizations, the private sector, and the community. Lessons learned from social mobilization have contributed to the strengthening of intersectorial and interagency cooperation, and have led to the involvement of multiple actors from the civil society.

Implementation of diverse immunization methods or strategies to reach coverage goals have brought health services closer to the community. The experiences gained from the immunization strategies are inputs for other health

interventions and contribute to the development of the fundamental pillars of PHC: expanding health services coverage to reach individuals in their homes and communities, community participation, and intersectorial cooperation.²

Rubella and CRS in the Americas

Rubella is a self-limited febrile rash illness with few complications. However, if a woman contracts the infection in the early stages of her pregnancy, the rubella virus has devastating consequences and may cause a syndrome known as CRS. The high probability of fetal infection (90% if the infection occurs before the 11th week of gestation) and the severity of its manifestations, among them miscarriage, stillbirth, mental retardation, and serious birth defects such as deafness, blindness, and congenital cardiopathy, highlight the importance of implementing effective strategies for prevention of this disease.

It has been estimated that, before vaccine introduction into national immunization schedules, more than 20,000 children were born with CRS each year in the Region. Rubella vaccination is 95% effective, and a single dose grants immunity for life. A study performed in the Caribbean determined that the cost of eliminating CRS is 7% of the total cost of health and rehabilitative services children with

gram. In 2005, three countries (Colombia, Peru, and Venezuela) have launched immunization campaigns. Nicaragua will follow in October 2005. The remaining countries –Argentina, Bolivia, the Dominican Republic, Guatemala, Haiti, and Mexico– have programmed campaigns in 2006. Following vaccine introduction and immunization campaigns, rubella incidence in the Region has decreased from 135,000 cases reported in 1998 to 3,103 reported in 2004, and 1,169 cases reported as of week 32 of 2005. Eighty-three percent of the cases reported in 2005 are concentrated in three countries: Canada, Peru, and Venezuela. Countries that have not yet conducted campaigns still have epidemic patterns of disease (Figure 1).

Basic Components of the Rubella Elimination Strategy:

- Achieving high coverage in the routine immunization program;
- Implementing a mass vaccination campaign against rubella, targeting men and women in all countries with endemic transmission;
- Integrating measles and rubella surveillance;
- Implementing CRS surveillance; and
- Strengthening the laboratory diagnostic of rubella and CRS, as well as viral isolation.

Rubella elimination requires that coverage rates >95% be

during campaigns and planning for safe injections and disposal of waste. More importantly, supervision of health workers at different levels of the health care system must be strengthened. All these activities have the potential to also promote primary health care services.

To successfully implement a mass vaccination campaign against rubella, the following are essential activities: information-based decision making, political commitment, participation of medical societies and professional associations during the campaign, intersectorial cooperation, involvement and commitment of health workers, capacity-building, enhancement of human resource performance, high community participation, innovative social mobilization strategies, and powerful and properly tailored communication messages.

Lessons learned from the social mobilization and participation can contribute to the promotion of health care and safe maternity practices. The rubella elimination initiative is an opportunity to put adults in contact with health care services on a more frequent basis. In particular, it promotes a culture of prevention in adult males who, in some communities, make decisions that often have an impact on women seeking care for themselves or their newborns. The promotion of men's participation as companions and fathers is crucial

borns with congenital infections or at high risk. In monitoring and following-up infants with CRS, there is increased involvement with rehabilitation and special education services. This is an opportunity to improve the quality of child development services and broaden access to them.

Final Considerations

PAHO's Regional Immunization Unit is planning an inter-programmatic analysis to document the effect of the rubella elimination strategy on the basic components of PHC. These assessments will specifically attempt to demonstrate the effect of rubella elimination on the efficiency of the health system, costs, health outcomes, satisfaction among the users of the services, and equity and access to services.

A major challenge for maternal and perinatal care has been to guarantee universal access, given that services in high-risk communities, where the population is poor, are often insufficient. Since rubella immunization aims to reach 100% of the population, it contributes to the reduction of inequities based on gender, race or ethnicity, social status, and geographical location.

In summary, preliminary experience indicates that rubella elimination contributes to the basic components of PHC (equity, community participation, prevention, intersectorial participation, adequate technology, sustainability, and quality). It also promotes the strengthening of health services in areas such as the information system, management, development of human resources, logistics, and research. Ultimately, rubella elimination should contribute to the Millennium Development Goals (MDGs) of reducing child mortality (MDG 4) and improving maternal health (MDG 5).

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CRS would require without an elimination program.³ Accordingly, in 2003 PAHO's Directing Council adopted Resolution CD44/11 setting the goal of rubella and CRS elimination by the year 2010.⁴

The rubella elimination strategy relies on immunizing susceptible population, (through the routine immunization system and through mass campaigns) and conducting effective surveillance.⁵ To date, 74% of countries in the Americas have large cohorts of adults protected against rubella, with coverage >95%. Since 1998, close to 50 million rubella vaccine doses have been administered during campaigns, in addition to the routine pro-

reached. This prevents widespread transmission of imported viruses. Pockets of susceptibles can contribute to reestablishment of endemic transmission, which ultimately could have far-reaching consequences on health services.

Rubella elimination also requires the vaccination of adult populations. Given the complexity of the *catchment* strategies for these populations, several new vaccination approaches must be implemented to reach high coverage. Consequently, innovative communication strategies must be designed and implemented. Attention must be paid to special technical situations such as monitoring post-vaccine events

to achieve their involvement and support.

Adult rubella vaccination will definitely help with accelerating other initiatives for adult vaccination, such as those for human papillomavirus and HIV control.⁶ Rubella elimination should also improve maternal and perinatal health.

CRS surveillance and perinatal information systems contribute to promoting wider detection of birth defects in infants, thereby strengthening perinatal care. To achieve high-quality CRS surveillance, perinatal services must provide comprehensive care, such as well-baby checkups and/or dedicating consultation areas for new-

The Elimination of Rubella and Congenital Rubella Syndrome in Nicaragua

Background

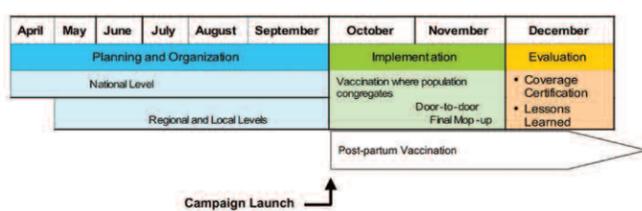
In October and November 2005, Nicaragua conducted a national immunization campaign against rubella, targeting all men and women aged 6 to 39 years. The slogan for the campaign was “*Together let’s eliminate rubella once and for all.*” The entire population of Nicaragua came together during the campaign to achieve rubella elimination. Their efforts have left a legacy: no child in Nicaragua will be born deaf, blind, or mentally handicapped due to the fetal infection caused by the rubella virus.

The national immunization campaign has proven to be a cost-effective intervention. Estimates indicated that the campaign would help avoid 810 cases of congenital rubella syndrome (CRS) over the next 15 years. In economic terms, this translates to savings of an estimated US\$ 48.6 million in medical costs. The campaign’s cost was US\$ 4.2 million; therefore, each dollar invested produced a savings of US\$ 11.6. These figures are very conservative since they do not take into account the social cost from disabilities associated with the disease, nor its impact on families and society.

Planning and Organization

The vaccination strategy used to eliminate rubella required that 100% coverage rates be achieved in diverse target groups (school-age children, adolescents, and adult males and females) over eight weeks. Accordingly, Nicaragua developed a detailed plan of action beginning six months before the start of the campaign (Figure 1).

Figure 1. Measles-Rubella Vaccination Campaign in Men and Women Aged 6-39 Years: Timeline and Activities, Nicaragua, 2005



One of the conditions of this first stage of planning was to establish **technical and operational guidelines**. Those represented the strategic and methodological framework for the documents used in the campaign (Vaccination Manual, ESAVI Surveillance Protocol, Protocol for the Follow-up of Pregnant Women Inadvertently Vaccinated, Questions and Answers, and Advocacy Packet). The guidelines also helped serve to monitor vaccination safety during the campaign.

Starting in July 2005, **training** was implemented, specially

adapted to the national, departmental, and local levels. The objectives of the training workshops were to form the vaccination teams, develop specific work schedules, and develop microplans in all the country’s 162 municipalities. This training was an opportunity to improve staff performance and strengthen the Expanded Program on Immunization as a whole.

Since close to 70% of the country’s total population was vaccinated during this campaign, **monitoring vaccination safety** was an essential component. Forming crisis-response teams, funding the purchase of supplies for storing and administering vaccines, as well as appropriate waste disposal, were also important activities. Joint collaboration



between the National Committee for Immunization Practices, the medical and scientific societies, and the media served to better inform the population regarding vaccine safety.

The Ministry of Health (MINSA) launched a strong **communication strategy** to raise awareness among a multitude of social actors and involve them in the campaign. The strategy also served to mobilize resources and establish agreements and commitments with the media, scientific societies, community movements, non-governmental organizations, international cooperation entities, the Ministries of Education, Culture and Sports, and Nicaragua’s Institute of Social Security. A ministerial resolution declared the campaign a

public health priority, which strengthened political participation at the highest level.

Social mobilization efforts were extraordinary. The Government of Japan donated the vaccines and strengthened the national cold chain; the Centers for Disease Control and Prevention of the United States, the Sabin Vaccine Institute, the Canadian International Development Agency, the Pan American Health Organization (PAHO), and the United Nations Children’s Fund (UNICEF) provided technical and financial support throughout the campaign, as did other technical and financial cooperation agen-

cies, such as the Inter-American Development Bank and the Governments of Scandinavian countries. At local and departmental levels, many public and private organizations became new allies for the promotion of the rubella elimination strategy.

Supervision was implemented at all levels (national, departmental, and local). This process focused on strategies targeting three separate key stages of the campaign: (1) before it began, to jointly revise the microplans; (2) after vaccinating in areas where the population congregates (work places, schools, markets, etc.), to evaluate the results obtained in relation to the plan; and (3) after completing the door-to-door vaccination, to perform rapid coverage monitoring (RCM).

Campaign Implementation

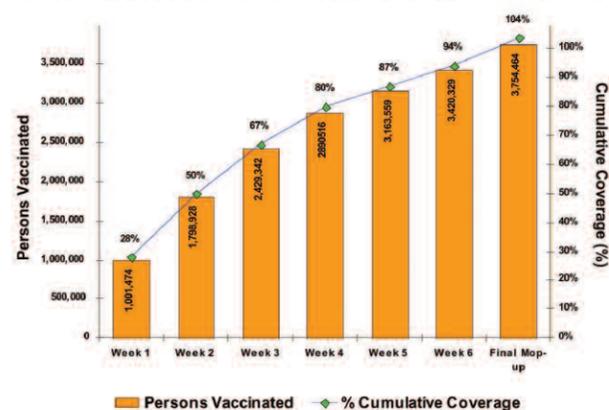
The campaign was launched, showcasing the involvement of Nicaragua’s society and the commitment of the media (“*Hablación Nacional por la Salud*”). For this event, radio and television broadcasters signed a collaboration agreement with the Ministry of Health. On Saturday, 1 November 2005, those media simultaneously broadcasted for three hours to all the local health care systems of the country with a single slogan: “*A united community for a healthy Nicaragua.*”

Implementing the national strategy required the use of different tactics to reach the entire target population. These tactics included vaccination at works sites, markets, bus stops, schools and other educational centers, and health facilities, using both fixed and mobile posts, followed by door-to-door vaccination. The response of the population was overwhelming, as individuals spontaneously presented themselves to be vaccinated at fixed and mobile posts located throughout the country.

The information system and the work of the “operation centers” were instrumental in the implementation stage of the campaign. Teams at the centers analyzed the coverage on a daily basis, identified the areas that were falling behind, monitored the implementation of safe vaccination practices, and assessed the need to strengthen information messages, modify tactics and adapt priorities for action. The teams reported advances daily to all stakeholders.

After the first month of the campaign, 80% of the target

Figure 2. Measles-Rubella Vaccination Campaign in Men and Women Aged 6-39 Years: Cumulative Coverage, Nicaragua, 2005



Source: Operations Center, Rubella Campaign, Ministry of Health, Nicaragua.

population had been vaccinated. Final mop-up activities brought the coverage rate up to 105% (Figure 2); 101% in men and 109% in women. Figures >100% can be explained by the lack of accurate population denominators, and by the vaccination of individuals outside the target population. In all age and gender groups, coverage rates were >95%. RCM results revealed that local coverage was >98%. Furthermore, the “non-vaccinated” people identified during the RCM were then vaccinated.

During campaign implementation, Nicaragua encountered several complications. These included a dengue outbreak, communities stranded due to heavy rains and flooding, strikes among medical staff, and the effects from Hurricane Beta, which battered the Caribbean coast at the end of October. Health authorities and personnel kept moving ahead in spite of these critical situations. Where problems existed opportunities were sought. Vaccination took place in the camps where people took refuge from the hurricane. In addition to vaccinating against rubella, educational messages for the prevention of dengue and respiratory infections were dispersed. The campaign was seen as an opportunity to raise the coverage rate of primary health care services throughout the country’s most remote areas. Since the combined measles-rubella (MR) vaccine was administered, the intervention also helped with strengthening measles elimination.

Final Evaluation and Coverage Certification

To verify that all of the population (males and females aged 6-39 years) was vaccinated, municipalities not only conducted door-to-door RCM, but also checked vaccination cards in coordination with businesses, schools, and universities and reviewed campaign results to ensure completion with microplanning objectives. This process allowed for the identification and vaccination of the “non-vaccinated” and the completion of official campaign coverage registries.

A team of external evaluators was formed to support local efforts and certify campaign coverage at national and local levels. Data collected by each

municipality was analyzed, including reviewing the completion of microplans and production goals, municipal coverage data by age and gender, RCM results, and decisions taken based on the findings. On the basis of this analysis and joint discussions with local teams, the external evaluators conducted additional RCM in selected communities, as a prior step to final certification.

Lessons Learned

The rubella vaccination campaign in Nicaragua generated many lessons, most importantly the systematic monitoring of the campaign’s progress, starting at the planning stage. Other key lessons are described in the box below.

Nicaragua has demonstrated that, even when facing difficult socio-economic and epidemiological circumstances, it is possible to identify opportunities and reach the disease elimination goals while impacting other health crisis. The motivation, positive attitude, and commitment characterizing the staff from the Ministry of Health; the active participation of a network of volunteers and brigade members; and the enthusiastic response of the population were the cornerstones of the campaign’s success.

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Key Components for Success

- Political commitment and effective advocacy;
- Extensive communication and social participation;
- Thorough organization, training, and planning;
- Adequate use of information for decision making;
- Partnerships at all levels with multiple social actors;
- Effective and adequate monitoring of vaccination safety;
- Identifying vaccination opportunities;
- Implementing integrated health activities; and
- Seeking opportunities when faced with difficult situations.

December 2005,
Volume XXVII, Number 6

XIV Meeting of the Andean Region and XVII Meeting of the Southern Cone on Vaccine-Preventable Diseases

The XIV Meeting of the Andean Region and the XVII Meeting of the Southern Cone on Vaccine-preventable Diseases were held in Asunción, Paraguay, from 25-26 October 2005.

In an unprecedented fashion, the President of Paraguay, Dr. Nicanor Duarte Frutos, attended the meeting. Dr. Jon Andrus, Chief, Immunization Unit at PAHO Headquarters, handed him a certificate of appreciation to recognize Paraguay's achievements during the rubella campaign the country conducted in April and May 2005. In his address, President



Dr. Nicanor Duarte Frutos, President of Paraguay, receiving the certificate of appreciation on behalf of his country.

Duarte thanked each member of the team that made the campaign a success. He indicated that public health is a priority in Paraguay, as it represents a means to achieving social development, prosperity, and peace. He stressed that increasing the health budget is necessary, but that better spending and innovation are also critical. President Duarte added that health workers had written a new chapter in Paraguay's history and helped with improving the life of its people. Dr. Maria Teresa León Mendaro, Minister of Health of Paraguay, presented the results and lessons learned from the vaccination campaign for the elimination of rubella and congenital rubella syndrome (CRS) conducted in Paraguay in 2005.

Rubella and CRS

Following the resolution to eliminate rubella and CRS by the year 2010, adopted by PAHO's 44th Directing Council in 2003, the countries of the Andean Region and Southern Cone have shown notable advances in the implementation of strategies for effective interruption of endemic rubella transmission. Chile (1999) and Brazil (2001-2002) have conducted vaccination campaigns targeting only women. Ecuador (2004) and Paraguay (2005) have conducted mass vaccination campaigns targeting adolescents and adults (men and

women), reaching coverage levels over 95%. Venezuela conducted the first phase of its campaign, vaccinating children aged under 16 years in June 2005. At the time of the meeting, Colombia was in the midst of a campaign targeting men and women aged 14-39 years. All ten countries are reporting rubella cases to PAHO weekly. Seven of them also report CRS weekly; however, CRS surveillance is still incomplete.

Recommendations:

- The complexity of adult vaccination and the lessons learned from the campaigns recently conducted in the Region have shown that very good planning, particularly microprogramming with community participation for the search for resources, is required. Also, the surveillance data presented showed the need to include men in the vaccination campaigns.
- Countries should continue their efforts to mobilize and allocate sufficient resources,

breaks, samples of 5-10 cases collected at the beginning of the outbreak, followed by subsequent samples collected at periodic intervals every 2 to 3 months, and towards the end of the outbreak, will be required.

- For special situations, such as pregnant women, cases thought to be vaccine-related, and "false positives" or "cross-reactions," a detailed epidemiological analysis should be done on a case-by-case basis. Complementary methods of laboratory confirmation, such as viral detection and isolation should always be considered. Special cases should be classified by a national panel of experts who are part of the National Committee of Immunization Practices.
- CRS surveillance activities should be strengthened by: a) improving the monitoring of pregnant women exposed to or suffering from rubella during pregnancy; b) identifying the signs that should trigger an alert for CRS suspicion at the first level of care (periodic checkup of healthy children); c) using the computerized CRS surveillance system for weekly report; and d) collecting samples for IgM testing and viral detection from all CRS suspected cases.

- 4. Thorough field investigation did not identify the index case or any secondary cases; and
- 5. Field and laboratory investigation failed to identify other causes (including failure to identify wild measles virus in culture).

As part of periodic data quality reviews of the Measles Elimination Surveillance System (MESS), the compliance of cases classified as vaccine-related has been checked against the criterion defining the acceptable time period between vaccination and rash onset (criterion 2). The MESS database included a total of 38,894 suspect measles/rubella cases with rash onset between 2003-2005 (as of epidemiological week 9, 2006). Of those cases, 259 (0.67%) were classified as vaccine-related. Figure 1 shows the distribution of cases classified as vaccine-related by the number of days between vaccination and rash onset. For the years 2003-2005, only 34% of the cases classified as "vaccine-related" met the criterion of rash onset 7-14 days following MMR vaccination. To prove whether evidence existed supporting the onset

importantly, these studies were not placebo-controlled. The above-mentioned placebo-controlled clinical trials showed that the proportion of rash cases beyond the second week after MMR vaccination was not significantly different between the group receiving MMR and the placebo group.^{3,4} This finding suggests that rash seen in MMR vaccines 14 days or later after MMR vaccination is not likely related to the vaccine.

For those MESS cases classified as vaccine-related but with rash onset beyond 7-14 days following vaccination, the etiology is likely to be other rash-illnesses that typically occur in the pediatric population, such as parvovirus B19 and human herpes virus 6, or could represent missed cases of measles or rubella. The "vaccine-related" MESS cases are being evaluated to determine if this may be the case. The Immunization Unit recommends that countries review the definition of a vaccine-related case as recommended by PAHO and classify potential vaccine-related cases accordingly.

Acknowledgement: This summary was prepared with assistance from Dr. Riyadh Muhammad, Preventive Medicine Resident, Johns Hopkins University.

2006

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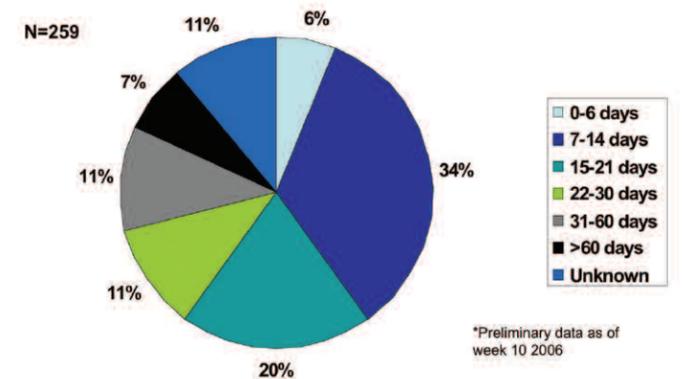
Classification of Suspect Measles/Rubella Cases as "Vaccine-related": Compliance with PAHO Recommendations

In a setting of low or absent transmission of the measles/rubella virus, surveillance will detect patients with eruptive febrile illnesses who have positive serological results for measles or rubella but no wild-type measles/rubella virus infection.¹ One explanation for such occurrence is a reaction to the measles-mumps-rubella vaccine (MMR). In 2000, the PAHO Technical Advisory Group on Vaccine-preventable Diseases defined five criteria for concluding that a rash-illness is related to a measles/rubella-containing vaccine.²

A case can be classified as having a vaccine-related rash if it meets ALL of the following criteria:

1. Presence of rash illness, with or without fever, but no cough or other respiratory symptoms related to the rash;
2. Rash onset began 7-14 days after vaccination with a measles-containing vaccine;
3. Serum sample, taken between 8 and 56 days after

Figure 1. Days between Vaccination and Rash Onset in MESS Cases Classified as "Vaccine-related," 2003-2005*



Source: Measles Elimination Surveillance System (MESS)

*Preliminary data as of week 10 2006

of MMR-related rash beyond the 7-14 day period following vaccination, a literature review and discussions with experts were conducted. This process showed overwhelming evidence of MMR-related rash occurring specifically between 7 and 14 days following vaccination.

Two placebo-controlled clinical trials^{3,4} are the main basis for defining the 7-14 day period. In these studies, the authors followed groups of MMR vaccinees after injection and found that the peak period for vaccine-related rash onset was during the second week after vaccination. Additionally, several other prospective studies and case reports reached the same conclusion.

A few studies report cases of rash occurring beyond 14 days after MMR vaccination, but such cases are the exception rather than the rule. Im-

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April 2006,
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Rubella Watch: A Special News Supplement to the PAHO Immunization Newsletter

Since the PAHO Directing Council adopted the initiative to eliminate rubella and congenital rubella syndrome in the Americas by the year 2010, much progress has been achieved. In fact, given the accumulating national experiences, it is believed that the target will be reached well in advance of 2010.

As a special supplement to the *Immunization Newsletter*, *Rubella Watch* should be a useful tool to share more of the success stories that countries are achieving. *Rubella Watch* is an electronic newsletter distributed every other month (during the months the *Immunization Newsletter* is not published). *Rubella Watch* will provide updates on rubella activities in the countries of the Americas. If you would like to receive *Rubella Watch*, please send a request to fch-im@paho.org, providing your name and e-mail address.

June 2006,
Volume XXVIII, Number 3

PAHO and Sabin Vaccine Institute: Second Year of Partnership

On 14 April 2006, Dr. Ciro de Quadros, President and CEO, a.i., Sabin Vaccine Institute (SVI), and Dr. Mirta Roses Periago, Director, PAHO, signed an agreement for a second year of partnership to support PAHO's regional efforts in the fight against rubella and congenital rubella syndrome (CRS). "The renewal agreement signed today reinforces SVI's commitment to contributing to rubella elimination and the importance of the Institute's association with the public health programs of PAHO," said Dr. de Quadros.

Rubella virus circulation in the Americas has been documented through epidemiological

surveillance, while rubella outbreak investigations have identified CRS cases. It has been estimated that before vaccine introduction into national immunization schedules, more than 20,000 children were born with CRS in the Region each year.

With support from partners such as SVI, PAHO's Immunization Unit hosted two workshops on rubella and CRS elimination to address the complexities of adult vaccination and share the lessons learned from completed campaigns. One workshop was conducted in Bogotá, Colombia, from 2-6 May 2005 and the other in Santa Cruz, Bolivia, from 12-16 May 2005. Later this year, the Immunization Unit will convene an ad-hoc meeting of experts from the Region to determine lessons learned, define good public health practices for establishing CRS surveillance, and help with refining strategies for surveillance and case detection.

The new project (March 2006-March 2007) will bolster the adult vaccination campaigns needed to complete supplemental immunization activities in the Andean Sub-region and Central America as well as implement such activities in Hispaniola and the Southern Cone Sub-region¹. The project will serve as a pilot program for rubella and CRS elimination that might be adapted and applied in other Regions of the world.

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Rubella and Congenital Rubella Syndrome Elimination: Fast Becoming a Reality

Rubella elimination in the Americas has been defined as the interruption of endemic rubella virus transmission in all countries and the lack of indigenously acquired cases of congenital rubella syndrome (CRS). This goal is achievable since humans are the only host of the rubella virus, and a very effective vaccine (>95% efficacy) conferring lifelong immunity is available.

Table 1. Rubella Elimination in the Americas: Last Countries to Conduct Vaccination Campaigns

Country	Target population	Age group	Scheduled	Comments
Guatemala	7.8 million women and men	8-39 years	September 2006	An alliance of partners is currently mobilizing resources to purchase all vaccines.
Dominican Republic	5 million women and men	7-39 years	October 2006	An international evaluation of the immunization program was conducted prior to the vaccination campaign.
Peru	19.8 million women and men	2-39 years	October 2006	Activities are planned and organized to ensure that the campaign is conducted as scheduled.
Argentina	7.4 million women Captive male population High-risk male population to be determined ^a	15-39 years	October 2006	Target population will be 100% of the female population, the captive male population (students, members of armed and police forces, medical and nursing students, staff in health, education, and tourism sectors), and the male population considered at high risk.
Mexico	20.3 million women and men	17-29 years	February 2007	During the first 2006 semester, the Distrito Federal and the state of Mexico have completed MR ^b vaccination in the 13-39-year age group to control a measles outbreak stemming from an imported case. The remaining 34 states are expected to follow in 2007.
Venezuela	9.6 million women and men	18-39 years	April-May 2007	Response measures to the measles outbreak during the first 2006 quarter have generated lessons on vaccination strategies in crisis situation and contributed to rubella elimination.
Haiti	3.7 million women and men	1-15 years ^a	April-May 2007	During the campaign, the MMR ^c will be introduced in the regular program for children aged 1 year.

^a provisional
^b Measles-Rubella Vaccine
^c Measles-Mumps-Rubella Vaccine

The high population density and migratory movements that characterize many cities in the Americas, combined with the real possibility of rubella virus importations resulting from international travel mean that coverage levels >95% need to be achieved to avoid cases secondary to importations.

To reach the goal of rubella and CRS elimination by 2010 in the Americas, rapid interruption of endemic rubella transmission is necessary. Using the slogan, "Once and for all," countries have been implementing mass vaccination campaigns targeting men and women. However, if coverage rates close to 100% are not reached by campaign end, pockets of susceptibles will remain. These pockets of susceptibles coupled with continued rubella transmission in other Regions of the world will pose the constant threat of rubella cases occurring secondary to importations.

Among countries that have conducted rubella mass vaccination campaigns, only Brazil continues to have transmission and Chile had an outbreak among men in 2005. Both countries did not include the male population in their campaigns.

Even though the cost-benefit of a rubella campaign has been estimated at approximately 1:13, campaigns require significant attention to microplanning and effective implementation. Countries are using innovative tactics to vaccinate all adults and developing new best practices. With so much at stake, it is critical to reach 100% coverage in all municipalities, and among all age groups in both men and women. Coverage levels below this goal will likely result in the continued occurrence of cases, resulting in less commitment, a sense of failure, and distrust in the strategies recommended for rubella elim-

ination. It should also be highlighted that, in the context of disease elimination, the large resources needed to investigate and respond to an outbreak compete with the needs of other health interventions, including other immunization activities.

August 2006,
Volume XXVIII, Number 4

Ad-hoc Meeting of Experts to Establish Best Practices in CRS Surveillance

During the XVI Meeting of the Technical Advisory Group (TAG) on Vaccine-preventable Diseases in November 2004, recommendations were made to enhance the progress already achieved in the Region toward the goal of rubella and congenital rubella syndrome (CRS) elimination. One principal recommendation was the proposal for PAHO to convene an *ad-hoc meeting* of experts to define good public health practices for strengthening CRS surveillance.

The rubella and CRS elimination strategies implemented in the Americas have resulted in substantial progress to date. As countries of the Region progress towards elimination, new challenges for the detection of suspected CRS cases have become evident. Quality of rubella and CRS surveillance remains a key challenge.

The *Ad-hoc Meeting of Experts to Establish Best Practices in CRS Surveillance* was held in Washington, D.C., on 10-11 July 2006. Experts from Argentina, Australia, Brazil, Canada, Costa Rica, Ecuador, India, Mexico, Nicaragua, Peru, the United Kingdom, the United States, and Venezuela presented lessons learned from their experiences. Professionals in areas of ophthalmology, cardiology and audiology shared their experiences in working with CRS-affected children.

The goal of the meeting was to develop best practices for the detection and surveillance of suspect CRS cases in the Region. Meeting participants shared experiences and lessons learned in order to generate recommendations for enhanced detection and improved surveillance of suspect CRS cases. They upgraded the existing guidelines to be disseminated to public health workers, and also identified opportunities to increase awareness among physicians and other health workers regarding CRS detection.

The following table summarizes the final conclusions and recommendations of the meeting.



Dr. Ciro de Quadros, President and CEO, a.i., Sabin Vaccine Institute, and Dr. Mirta Roses, Director, PAHO signed an agreement for a second year of partnership to eliminate rubella and congenital rubella syndrome. Behind them, from left to right, Dr. Jon Andrus, Lead Advisor, Immunization Unit, PAHO, Dr. Peter Hotez, Chair, Scientific Advisory Council, SVI, and Dr. Gina Tambini, Manager, Family and Community Health Area, PAHO.

Topics	Conclusions and Recommendations
Goals of CRS surveillance	The main goals of CRS surveillance should include: a) Monitoring trends; b) Assessing the impact of immunization programs; c) Identifying reservoirs of transmission; d) Helping to develop or modify program policy, if appropriate; e) Verifying the interruption of endemic transmission of rubella virus in the Americas, including identification of imported cases; and f) Serving as a critical advocacy tool.
Defects and key findings in a neonate or infant that should alert a physician to a suspect CRS case	<ul style="list-style-type: none"> Hearing impairment is the most common defect, followed by cardiac and eye defects. Key findings that may alert a physician include: <ol style="list-style-type: none"> Suspicion of hearing impairment by simple observational testing; Sweating, palpitations, rapid heart beat, and changes of skin color for cardiac problems; and Absence of red eye reflex.
Sensitivity and quality of CRS surveillance	<ul style="list-style-type: none"> A sensitive case definition should be implemented by using key findings/signals that can be detected at the primary care level. Clinical guidelines and practical tools should be developed for use at the primary care level to improve detection of signals/alerts for hearing impairment, cardiovascular problems, and eye defects. Awareness of health workers, health students, communities, and families should be increased through training. Sentinel site reporting – including secondary and tertiary hospitals, specialty clinics, specialists, and the use of TORCH¹ as a differential diagnosis – should be strengthened. Serological and virological laboratory testing of all suspect CRS cases should be encouraged. Partnerships with specialists should be built and interprogrammatic coordination strengthened. Quality and flow of information should be maintained through staff training and feedback to all levels of health services.
Role of the laboratory in CRS surveillance in the context of rubella and CRS elimination	<ul style="list-style-type: none"> Laboratory confirmation of cases is critical. The collection of specimens for viral isolation is necessary to understand the molecular epidemiology and differentiate between endemic transmission and imported cases. The coordination between epidemiologist and the laboratory is critical. Both groups should actively participate in activities pertaining to the surveillance system.
Rubella IgM in a pregnant woman	<ul style="list-style-type: none"> IgM should be obtained ONLY when there is a history of rash or contact with a rubella-like rash. IgM is NOT recommended for routine antenatal testing.

¹ TORCHS stands for Toxoplasma gondii; other viruses (HIV and more); rubella (German measles); cytomegalovirus; herpes simplex; and syphilis.

dence was greater in the group of countries that have not yet implemented vaccination campaigns (N = 4,618, rate = 1.6 per 100,000) (Figure 1). By June 2006, 37 (80%) of the countries and territories of the Americas had implemented vaccination campaigns (accounting for 75% of the population of the Region), obtaining coverage of over 95%. The seven remaining countries are expected to complete their campaigns by June 2007.

Comprehensive surveillance of measles and rubella has been strengthened. By epidemiologic week 26 of 2006, 97% of suspect cases had been discarded following laboratory testing. Prior to implementing the elimination strategy, less than 20% of rubella cases were confirmed by laboratory or epidemiological link; this figure rose to 96% in 2005.

The seven surveillance indicators endorsed by the 2004 TAG are as follows: the percentage of sites reporting weekly, the percentage of suspect cases with adequate epidemiological investigation, the percentage of cases with adequate blood sample, the percentage of samples received by the laboratory ≤5 days, the percentage of laboratory results reported ≤4 days, the percentage of cases discarded by laboratory, and the number of chains of transmission with representative samples for viral isolation. Overall, performance for three of these indicators is weak. Up to week 26 of 2006, the percentage of cases with adequate investigation was only 78%, only 56% of samples reached the laboratory within 5 days, and only 69% of laboratory results were reported within 4 days. Furthermore, very few samples for virus isolation have been collected to date.

The best public health practices are being identified to improve CRS surveillance at the primary care level, strengthen the capacity to diagnose deficiencies in health services, and ensure expert review of suspect CRS cases. The goal of CRS surveillance is to monitor trends, help identify reservoirs of transmission, and to serve as a critical advocacy tool. In 2005, 1,952 suspect CRS cases were reported and 20 were confirmed.* By epidemiological week 26 of 2006, 342 suspect CRS cases had been reported and one was confirmed.

Advances have been made in the development of laboratory capacity to detect and isolate rubella viruses, increasing knowledge of the endemic genotypes in the Region. The most frequent genotype is 1C, followed by 1E, and 1g. The last two genotypes were linked to imported cases in epidemiologic investigations. However, the number of specimens for rubella virus isolation is still limited (in 2005, only 93 specimens were collected for isolation) and should be substantially increased to better document endemic virus reservoirs and imported virus genotypes.

TAG was concerned that insufficient laboratory results are being reported within 4 days of receipt of the sample at the laboratory. In some countries, the timeliness of this indicator is being affected by the number of subnational laboratories that do not receive enough samples to process them immediately. These laboratories wait to accumulate samples before processing them in order to avoid wasting their kits. In other countries, the indicator is being affected by the delayed entry of the laboratory result into the national database.

Recommendations:

1. Vaccination Strategies

- In accordance with previous TAG recommendations, all endemic countries are encouraged to implement a one-time mass vaccination campaign targeting both men and women and achieving >95% coverage.
- TAG recommends that the criteria for high quality campaigns be included in the design and implementation of rubella mass vaccination campaigns. Those countries that did not vaccinate all susceptibles in the population should analyze their data, in particular to identify the susceptible male population (in which sustained transmission can occur) that should be vaccinated. PAHO should provide support in this process.
- TAG encourages countries to document the experiences, successes, and lessons learned from their adult mass campaigns in order to share them with other countries. These lessons will be useful for the introduction of HPV vaccine and eventually a vaccine against HIV/AIDS.

2. Surveillance

- Full integration of measles and rubella surveillance is required; integrated laboratories are an important aspect of this surveillance system. Emphasis must be placed on active surveillance. Except in outbreak settings, all specimens must be tested for both measles and rubella.
- Countries should ensure that the seven indicators meet the recommended standards. Special attention should be given to checking clusters of suspect cases as well as “silent areas.”

3. Laboratory

- The number of clinical specimens collected for viral isolation should be increased in order to document the endemic genotypes of rubella and the interruption of endemic transmission of rubella in the Americas.
- In a pregnant woman, IgM should be obtained only when there is a history of rash or contact with a rubella-like rash. IgM is NOT recommended for routine antenatal testing.
- The serological and virological laboratory testing of all suspected CRS cases should be encouraged.
- TAG recommends that PAHO review the laboratory network, with special attention to the subnational networks, to identify the possible bottlenecks and propose corrective actions.

* Provisional data as of Epidemiological Week 28, 2006.

How to Achieve Rubella Elimination:

In their efforts to achieve elimination, countries should conduct a one-time mass campaign, vaccinating both men and women with MR or MMR¹ vaccine. To ensure the implementation of the highest quality campaigns, the following criteria should be fulfilled:

- The age group to be vaccinated should be determined based on the epidemiology of rubella in the country, an assessment of the susceptible population, the year of vaccine introduction, subsequent rubella vaccination campaigns, and the need to protect women of childbearing age (WCBAs).
- Quality campaigns require vaccinating both females and males, including susceptible adults, and reaching coverage levels close to 100% of the targeted population.
- The highest political commitment and participation should be ensured.
- Full population participation requires intensive social mobilization and local micro-planning.
- Information system should be practical and useful.
- Capacity to detect and rapidly respond to safety concerns and other emerging issues during campaigns.

¹ Safety and supply/cost concerns should be considered when using MMR.

August 2006, Volume XXVIII, Number 4

XVII TAG Meeting—Protecting the Health of the Americas: Moving from Child to Family Immunization

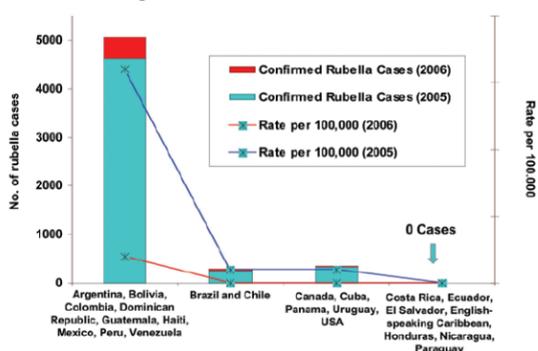
The XVII Meeting of the Technical Advisory Group (TAG) on Vaccine-preventable Diseases of the Pan American Health Organization (PAHO) was held from 25-27 July 2006 in Guatemala City, Guatemala. TAG meets every two years and functions as the principal forum for providing advice to PAHO Member States on vaccine policies and disease control efforts. The following is

summary of TAG’s conclusions and recommendations as presented in the final report on rubella and CRS

Rubella and Congenital Rubella Syndrome

TAG congratulates member countries for the significant progress made toward the goal of rubella and Congenital Rubella Syndrome (CRS) elimination by 2010. The number of confirmed rubella cases decreased by 96.2% between 1998 and 2005 (from 135,947 to 5,209).* The impact has been greater in countries that vaccinated men and women (0 rubella cases, after the campaigns) compared with countries where only women were vaccinated (N = 254, rate = 0.1 per 100,000). Rubella inci-

Figure 1. Confirmed Rubella Cases and Rates (per 100,000) According to Elimination Strategy Implemented in Countries, Region of the Americas, 2005 to 2006*



* Includes data reported by countries up to Epidemiological Week 26/2006. Source: Country Reports

Measles and Rubella Laboratory Network in the Region of the Americas

The Measles/Rubella Laboratory Network continues to be fully functional in support of measles and rubella surveillance in the Region of the Americas. The network was established in 1995 and has been providing crucial information to confirm or discard suspect cases, identify circulating virus strains, and evaluate the impact of mass campaigns activities. Laboratory analyses include IgM and IgG antibody detection, virus isolation, detection of viral nucleic acid, and molecular characterization. The Measles/Rubella Laboratory Network is composed of 21 national laboratories, 124 sub-national laboratories, 2 regional reference centers, and 1 global special-

ized laboratory (Figure 1). The main activity of national and sub-national laboratories is to test specimens from suspect measles/rubella cases by IgM ELISA. Some national laboratories are also responsible for virus isolation and quality control of sub-national laboratories.

False Positive Results

Currently, the main challenge for the Measles/Rubella Laboratory Network is dealing with sporadic cases of "false positive results," particularly for suspect cases with no travel or vaccine history. As the disease becomes less common due to high vaccine coverage and active surveillance for rash illness and fever, the positive predictive value of laboratory test will diminish, resulting in an increased number of false positive results. Parvovirus B19, human herpes virus 6 and 7, and cytomegalovirus may be clinically misdiagnosed as measles and rubella and their antibodies can cross-react with measles/rubella IgM tests, giving false-positive results.

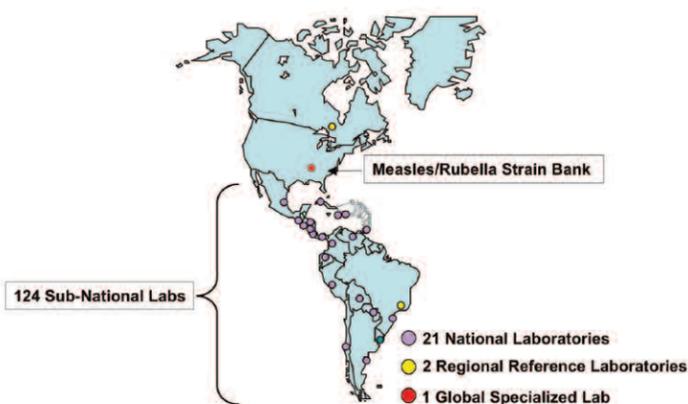
laboratories since 2005, ensuring data quality and comparison of results within the network. PAHO is providing support to ensure that the laboratory network has adequate supplies and equipment. PAHO also promotes training activities, research, quality assurance, accreditation, data management, and the use of laboratory indicators.

Recommendations

Although considerable progress has been made in ensuring access to quality services throughout the laboratory network, further efforts are needed to improve virologic surveillance. Logistical problems due to shipping of infectious samples must also be resolved since they represent a major obstacle for transporting the specimen to regional laboratories or the specialized laboratory.

Genetic data for rubella virus circulation in the Region needs continued support. Samples for virus isolation must be obtained from every chain of transmission and from all congenital rubella syndrome cases in the first six months of life. If genetic information regarding circulating genotypes is enhanced, molecular epidemiologic data will help to document viral transmission pathway, classify cases, and confirm the elimination of endemic transmission.

Figure 1. Measles/Rubella Laboratory Network



Source: Immunization Unit, PAHO.

To improve virologic surveillance, nine national laboratories were trained on virus isolation and detection in 2005. This was done by conducting supervisory visits and holding a regional workshop. For 2007, the goal is to increase the number of laboratories performing virus isolation/detection in the Region from 11 laboratories to 18. The regional reference laboratories are responsible for the validation of IgM tests results of the national laboratories. Regional reference laboratories also assist in ruling out measles/rubella cases with possible false-positive or indeterminate results by using additional tests for other febrile rash illness, virus isolation and genotyping. In addition to tasks performed by regional laboratories, the global specialized laboratory distributes the proficiency panels to the national labora-

An in-depth discussion can be found in the second edition of *Recent Advances in Immunization*, in the chapter entitled *Interpretation of Measles and Rubella Serology*. A key message in this chapter is that the clinical, epidemiologic, and laboratory data are equally important to decide the final case classification.

Quality Assurance

In the Region of the Americas, an accreditation process was implemented at the end of 2005. The process requires annual evaluation of a laboratory, using timeliness and quality indicators. The accreditation is essential for documenting the quality of the laboratory network. An annual proficiency test is administered to ensure the reliability and quality of serological work performed in the national and regional laboratories. In 2005, the overall proficiency test score of the network was 100%. For 2006, 20 out of 23 laboratories reached the score of 100%. In 2006, 70% of national laboratories received an on-site visit and fulfilled the criteria needed to for accreditation.

A standardized, well validated assay for IgM detection is used in all national and regional

2007

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Rubella Elimination in the Americas: Last Countries to Conduct Vaccination Campaigns

The Region has demonstrated remarkable progress in the implementation of strategies for the effective interruption of endemic rubella transmission through the vaccination of adolescent and adult populations. In 2007, six countries will finalize high-quality mass rubella elimination campaigns: Cuba, Bolivia (2nd stage), Guatemala, Haiti, Mexico (2nd stage), and Venezuela (2nd stage). In addition, El Salvador and Uruguay will conduct follow-up campaigns to decrease susceptible populations to measles and rubella in their respective countries (see Table 1).

High quality campaigns are a critical. Important factors to consider include:

1. The age group to be vaccinated should be determined based on the epidemiology of rubella in the country, an assessment of the susceptible population, the year of

Table 1. Countries of the Region of the Americas Conducting Rubella Vaccination Campaigns in 2007

Country	Target Population	Age Group	Date of Implementation	Comments
Cuba*	2.1 million men and women	12-24 years	February-May 2007	Vaccination is based on a susceptibility study and response to a mumps outbreak.
Guatemala	7.8 million men and women	9-39 years	13 April 2007	An alliance of partners has mobilized resources for campaign efforts.
Haiti	4.7 million men and women	1-19 years	October 2007	The MMR vaccine will be introduced in the regular program for children aged 1 year.
Bolivia (2nd stage)	3.5 million children	1-15 years	September 2007	A follow-up campaign is included to strengthen measles and rubella elimination efforts.
Venezuela (2nd stage)	9.6 million men and women	18-39 years	October 2007	The second stage will finalize rubella and measles elimination.
México ** (2nd stage)	20.3 million men and women	17-29 years	November 2007	Rubella vaccination will be implemented throughout the remaining 34 states.
El Salvador	800,000 children	1-4 years	June 2007	A follow-up campaign is included to strengthen rubella and measles elimination.
Uruguay	200,000 children	1-4 years and susceptible population	October 2007	A follow-up campaign is included to strengthen rubella and measles elimination. A campaign in adolescent and adult populations will depend on susceptible cohorts.

* Uses MMR vaccine.

** To be confirmed

Note: Argentina, Brazil, and Chile are determining susceptible adolescent and adult cohorts to complete their campaign for the elimination of rubella and congenital rubella syndrome and the strengthening of measles elimination.

vaccine introduction, subsequent rubella vaccination campaigns, and the need to protect women of childbearing age.

2. Social communication should be emphasized during campaign planning.
3. Quality campaigns require vaccinating both female and male populations, including susceptible adults, and reaching coverage levels close to 100% of the targeted population.
4. The highest political commitment and participation should be ensured.
5. Full participation of the population, scientific societies, social sectors, and media requires intensive social mobilization efforts and local micro-planning activities.
6. Information systems should be practical and useful.
7. The capacity should exist to detect and rapidly respond to safety concerns and other emerging issues during campaigns.

Olympics sports. The Pan American Games are held every four years (one year before the Olympic Games) and the first event took place in 1951, in Buenos Aires, Argentina. Rubella incidence in Brazil decreased dramatically following large vaccination campaigns targeting women of childbearing age in 2001-2002. However, rubella transmission and outbreaks continue to occur. Since July 2006, the State of Rio de Janeiro is experiencing a rubella outbreak. Seventy percent of all cases are men. Although this outbreak has affected all age groups, persons aged 20-29 years are at the highest risk.



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XV Pan American Games in Rio de Janeiro and Risk of Rubella

From 13-29 July 2007, Rio de Janeiro, Brazil, will be hosting the XV Pan American Games, a continental version of the Olympic Games including Olympic and non-

Since it is likely that residents of the Americas and other Regions traveling to Rio de Janeiro will be exposed to the rubella virus, the Pan American Health Organization recommends that:

1. Any resident of the Americas, including teams participating in the Pan American Games and other tourists, traveling to Rio de Janeiro be immune to rubella before departure; and

2. Health care workers in the **public and private sectors** be alerted to the possibility of rubella occurrence.

Travelers can be considered immune to rubella if:

- They have written **proof of receipt of a rubella-containing vaccine**. However, countries can establish an upper age limit beyond which the vaccination requirement does not apply. This age limit should be based on the year of rubella vaccine introduction, rubella vaccine coverage thereafter, and occurrence of rubella epidemics; or
- They have **laboratory evidence of rubella immunity** (rubella-specific IgG antibodies).

Travelers aged >6 months who cannot provide the above documents should be advised to receive rubella-containing vaccines, preferably as measles-mumps-rubella (MMR) or measles-rubella (MR), ideally at least two weeks before departure. Exceptions include travelers with medical contraindications to rubella-containing vaccines. Infants aged <6 months should not be vaccinated. Infants who receive MMR before their first birthday must be re-vaccinated following the country's schedule.

It is essential to include the **private health care sector and facilities providing health care to tourists in the surveillance system**, since people who can afford international travel are more likely to seek care in private health facilities.

In addition to the measures mentioned above, PAHO encourages the practice of requiring **proof of rubella (and measles) immunity for employment in the health care sector** (medical, administrative, and security personnel). PAHO also advises that personnel from the tourism and transportation industries be also immune to rubella (and measles).

June 2007, Volume XXIX, Number 3

Resource Mobilization and Partnerships for Achieving the Regional Goal of Rubella and CRS Elimination

Intensified measles elimination activities in the early 1990s identified rubella as a significant public health problem in the Region of the Americas. Since then, progress has been achieved toward the interruption of endemic rubella virus transmission in the Region, resulting in a rapid reduction in the number of rubella cases and infants born with congenital rubella syndrome (CRS) (Figure 1).

Existing cost-benefit data and the availability of a safe, affordable, and efficacious vaccine prompted PAHO's Directing Council to adopt Resolution CD44.R1 in 2003, calling for rubella and CRS elimination in the Americas by 2010. Three years later, the 47th Directing Council reaffirmed rubella elimination as a priority for the Region, acknowledging that sustained commitment of Member States and their partners was required to achieve the elimination goal. Considering the progress achieved to date, the 27th Pan American Sanitary Conference is expected to adopt next October a resolution establishing an international Expert Committee to document the interruption of endemic measles virus and rubella virus transmission in the Region.

rubella and CRS elimination initiative would cost an additional US\$ 210 million (2003-2010). This included the provision of approximately US\$ 35 million (17% of the total budget) in external budgetary funds from PAHO, WHO, and partners. The resources would supplement the estimated US\$ 175 million (83%) that national immunization programs would invest in activities related to surveillance, laboratory, supplemental vaccination activities, supervision, social mobilization, training, research, program evaluation, and documentation of rubella elimination.

Resource Mobilization

Following the 2003 Directing Council, PAHO developed a regional Plan of Action to mobilize the resources needed to

activities.

In order to meet the rubella elimination target by 2010, an additional US\$ 112.5 million will be required to complete rubella vaccination campaigns, and maintain and strengthen integrated measles/rubella and CRS surveillance in the Region. Of that amount, a total of US\$ 95.5 million (85%) will be financed by governments and the remaining US\$ 17 million (15%) is currently being mobilized by PAHO in collaboration with its partners. In addition, PAHO's Revolving Fund for vaccine procurement, which historically has successfully procured an uninterrupted supply of high-quality vaccines and syringes at affordable prices for countries of the Region, will continue to address country vaccine shortfalls as elimination is realized.

Partnerships

PAHO's partners have been essential to the success in meeting the challenge set forth in Resolution CD44.R1 to eliminate rubella and CRS in the Region by 2010. Partners include the American Red Cross, the US Centers for Disease Control and Prevention, the Canadian International Development Agency, the Global Alliance for Vaccines and Immunization, the Inter-American Development Bank, the International Federation of Red Cross and Red Crescent Societies, the Japanese International Cooperation Agency, the March of Dimes, the Sabin Vaccine Institute, the United Nations Children's Fund, the US Agency for International Development, the Church of Jesus Christ of Latter-day Saints, and the Serum Institute of India. Each partner has played a strategic role in implementing and/or evaluating one-time mass vaccination campaigns throughout the Region. Large vaccine suppliers have also contributed to campaign successes by donating high-quality vaccines to overcome country shortfalls and financing gaps.

Conclusion

Due to the unwavering support and dedication of PAHO's partners—multilateral and bilateral agencies, non-governmental organizations, and local-level contributors—great strides have been made in the Region, not only towards interrupting rubella virus transmission, but also in contributing to the strengthening of measles elimination.

June 2007, Volume XXIX, Number 3

Measles and Rubella Vaccination Campaign in Honduras

In the 1990s, an average of 133 rubella cases per year were reported in Honduras, resulting in an annual incidence rate of 2.55 cases per 100,000. However, under-reporting was probably very high. In 1998 and 1999, a rubella outbreak resulted in 1,507 reported cases, 64.5% of which were confirmed by laboratory. Sixty-seven percent of cases occurred in women. Between 1998 and 2001, 210 suspect congenital rubella syndrome (CRS) cases were investigated and 11 confirmed by laboratory.

Honduras introduced the MMR (measles-mumps-rubella) vaccine in 1997 with a single-dose schedule in children aged 12 months. In 1999, in an effort to control rubella and CRS, the MR (measles-rubella) vaccine was introduced for women of child-bearing age (WCBAs) aged 12-49 years. Coverage in WCBAs during 1999-2001 was 67%.

Elimination Strategy

The 2000 PAHO Technical Advisory Group on Vaccine-preventable diseases recommended that a Regional initiative be launched to prevent rubella and CRS. Consequently, in 2001, the Ministry of Health, through the Expanded Program on Immunization (EPI), adopted the PAHO-recommended strategy seeking to accelerate rubella control and CRS prevention while strengthening measles elimination.

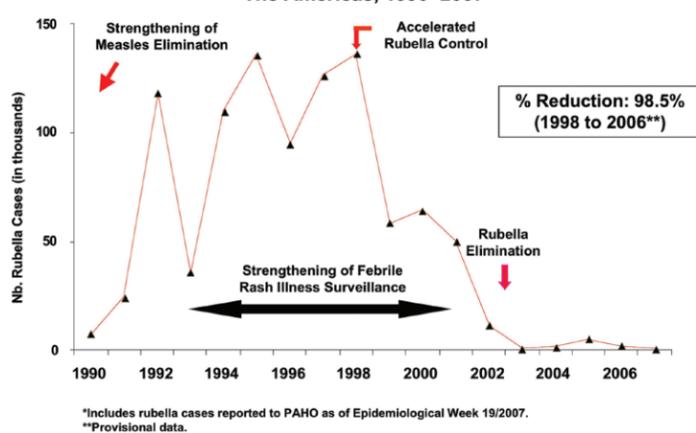
Honduras based its decision to consolidate measles elimination and accelerate rubella control and CRS prevention on the epidemiological analysis of rubella and the cost-benefit of the strategy, using the method described by Stray Pedersen.¹ It was estimated that conducting a campaign to vaccinate 3.2 million individuals would result in a cost-benefit ratio of 1:10.

Campaign Objectives

The national plan for the vaccination campaign was articulated around the following objectives:

- Accelerating rubella control and preventing CRS;
- Reaching 95% coverage with one MR dose at national level

Figure 1. Impact of Rubella Control and Elimination Strategies, The Americas, 1990-2007*



*Includes rubella cases reported to PAHO as of Epidemiological Week 19/2007.
**Provisional data.

Source: Country Reports

Elimination Strategy

PAHO's rubella and CRS elimination strategy includes the introduction of rubella-containing vaccine into the routine childhood immunization schedule, the completion of periodic follow-up campaigns with measles-rubella (MR) vaccine, the integration of measles and rubella surveillance, the implementation and strengthening of CRS surveillance, and the implementation of a one-time mass campaign in both men and women to rapidly reduce susceptible populations.

The critical elements of a high-quality mass vaccination campaign include high political commitment and participation; strong social communication; intensive social mobilization and local micro-planning to ensure full community participation; the involvement of scientific societies and other social actors; and the inclusion of the media.

Cost of the Strategy

Rubella disease burden data generated through improved measles elimination activities resulted in the accelerated control of rubella and CRS (1998-2003). Countries at the forefront of rubella vaccination strategy implementation, such as the English-speaking Caribbean, Chile, Costa Rica, Brazil, and Mexico, invested US\$ 110 million towards rubella elimination. Following PAHO's 2003 Directing Council Resolution, it was estimated that the implementation of the

achieve the rubella and CRS elimination goal by 2010.

The period from 2003 to present has been marked by intense resource mobilization efforts directed at diversifying funding sources to ensure the sustainability of the initiative. To this end, inter-sectoral coordination with PAHO partners, external governmental agencies, non-governmental organizations, and community based groups has been essential to mobilize the resources needed above government funding to conduct rubella elimination activities. From 2003 to December 2006, US\$ 100.4 million were invested in the Regional initiative: US\$ 76.5 million from countries and an additional US\$ 1.3 million from PAHO and WHO regular budgets. In addition, PAHO partners, vaccine suppliers, and non-governmental organizations have contributed over US\$ 22.6 million. These funds have covered surveillance, campaigns, training, evaluation, and research costs associated with elimination



- in women aged 5–49 years and men aged 5–39 years; and
- Initiating and completing the vaccination schedule with all antigens in children aged 5 years and other groups targeted by the program.

The population to vaccinate was defined using projections from the 1988 national population and housing census and the analysis of female cohorts aged 12–49 years vaccinated with MR during the years 1999–2001. The following targets were established: 1,101,933 women aged 5–49 years and 2,115,967 men aged 5–39 years (total=3,217,900), representing 53% of the country's total population.

Campaign Implementation
Community participation was the main focus of the campaign. Public sector institutions, international cooperation agencies, private sector companies, and civil society united their efforts to reach a common goal.

The main strategies for campaign implementation were as follows:

- Announcing that the campaign was a national priority, through the release of a presidential accord encouraging strategic alliances at national, departmental, municipal, and local levels to assist throughout the process.
- Establishing strategic alliances with stakeholders from the public and private sectors, to ensure their active participation and full commitment in the planning, implementation, and evaluation stages of the campaign.
- Identifying the target population concentrated in work and school settings to establish vaccination tactics, needs for biologicals, syringes, and other supplies.
- Promoting the campaign as part of the EPI social mobilization strategy.
- Introducing training, monitoring, supervision, and evaluation as control mechanisms for process management, from planning to implementation.

The campaign started in June 2002. To optimize resources, the launch was held during the first week of the National Immunization Days (NIDs), organized annually to strengthen polio eradication. The phases of the campaign are as follows:

- Phase I (one week): vaccinate with one dose of oral polio vaccine children aged <5 years, and with MR vaccine the population, largely female, accompanying children aged <5 years.
- Phase II (two weeks): vaccinate with one MR dose women (5–49 years) and men (5–39 years) concentrated in preschools, elementary and high-schools, and universities in the private and public sectors. In addition to students,

- teaching and administrative staff received vaccines at fixed and mobile vaccination posts.
- Phase III (two weeks): vaccinate women (5–49 years) and men (5–39 years) in workplaces, through fixed vaccination posts.
- Phase IV (one week): conduct searches in health units, communities, the workplace, and education centers to identify and vaccinate non-vaccinated individuals. At the same time, rapid coverage monitoring (RCM) activities were conducted in at-risk communities.

Campaign Results

The campaign did not progress as planned due to a national emergency related to an outbreak of hemorrhagic dengue. Vaccination activities were interrupted in the country's two main health regions, accounting for over 60% of the target population. The impact was also felt in the remaining seven health regions, where the pace of vaccination activities slowed down. Six weeks into the campaign, the coverage rate was only 82% (2,635,502 vaccinated). Therefore, national authorities decided to continue with the campaign once the dengue epidemic was controlled. The campaign was launched again in late November and extended until December 2002, reaching a national coverage of 93% (2,992,647 vaccinated).

Because the goal of 95% MR coverage was not reached in 2002, exhaustive searches and RCM were conducted in 2003 to identify the non-vaccinated population.

After the NIDs held from 2–7 June 2003, Honduras finally reached 98% coverage at national level: 100% of women and 97% of men were vaccinated (Figure 1). Mistaken beliefs associating vaccination with sterilization methods were likely responsible for the lower coverage among men. Up to 25% of WCBA, previously vaccinated during 1999–2001, were probably revaccinated because they had lost their vaccination cards.

The systematic use of RCM during NIDs, mass campaigns, and regular program activities facilitated the identification of areas at risk of obtaining coverage rates <95%.

All health regions of Honduras obtained coverage >95%, by age group and gender, except health region number 4 (Choluteca and Valle Departments) where coverage for men was <95%. Among the country's 298 municipalities, 78% (231) reached administrative MR coverage >95% in men aged 5–39 years. In women aged 5–49 years, >89% of municipalities reached coverage >95%.

In hospitals, MR vaccination was introduced postpartum and 80,000 women were vaccinated.



No severe adverse event was reported at national level. Only two cases of pregnant women inadvertently vaccinated during the campaign were reported. Both were followed-up and delivered a healthy newborn.

The total cost of the 2002 NIDs and the national measles and rubella vaccination campaign was US\$ 2,638,750. Eighty-nine percent of the total (US\$ 2,354,997) came from the government of Honduras, in the form of funds assigned to the EPI by the Ministry of Health, from municipalities, and from the private sector. The remaining US\$ 283,753 were donated by the United States Agency for International Development, the Swedish Agency for International Development, the United Nations Children's Fund, PAHO, and other organizations such as the Rotary Club and Merck Laboratories.

Conclusion
Honduras conducted a successful mass vaccination campaign against measles and rubella despite difficulties linked to a national health emergency. Because coverage for the 2002

campaign was only 93% in men aged 5–39 years and women aged 5–49 years, supplementary activities were required to reach the original objective. During the 2003 NIDs, searches for non-vaccinated population were conducted and MR coverage reached 98% at national level.

Authors: Ida Berenice Molina, Regina Trinidad Durón, María Aparicia Palma; Expanded Program on Immunization, Ministry of Health, Honduras.

Reference:
1 Stray-Pedersen B. Economic evaluation of different vaccination programs to prevent congenital rubella. NIPH Ann. 1982;5(2):69-83.

campaign targeting men and women aged 15–39 would be cost-beneficial.

Planning the mass vaccination campaign took six months. At local levels, detailed micro-plans were developed in one month. As part of the planning stage, a mass communication campaign calling for volunteer blood donations was conducted prior to the campaign launch since blood shortages are a chronic problem in El Salvador. This was necessary because international regulations discourage blood donations following vaccination with live-attenuated vaccines such as MR (measles-rubella), and it was crucial for the country to ensure an uninterrupted blood supply

Campaign Implementation
Between April and May 2004, El Salvador conducted a mass vaccination campaign targeting men and women aged 15–39 years (47% of the country's population), using the MR vaccine (Table 1). For the first two weeks of the campaign, activities targeted captive populations in workplaces, schools, and universities. In addition vaccination posts were set up in areas where people congregate, such as markets, malls, and bus stops. The following four weeks were devoted to door-to-door vaccination, a strategy that was essential to reach the country's rural areas. Over 4000 health workers worked exclusively for the campaign. The overall coverage reached 99%, with 2,796,391 persons vaccinated.

Daily progress monitoring at municipal level and weekly monitoring at central level played a key role in detecting problems so they could be corrected in a timely fashion. For example, by the fourth week of the campaign, it had become evident that males aged 20–34 years had coverage levels significantly lower than other groups. Therefore, the communication messages were directed at this age group and helped with improving coverage.

Another key component of the campaign, besides weekly administrative coverage monitoring, was rapid coverage monitoring (RCM) conducted to verify that vaccination targets had been achieved. RCM was key in identifying pockets of unvaccinated populations. In the end, more than 380 RCM were conducted, all reporting coverage levels ≥95%. It is worth noting that El Salvador was the first country in the Americas to conduct so many RCM activities as an integral part of its rubella elimination campaign.

MR was not offered to pregnant women, yet 909 pregnant women were inadvertently vaccinated. Fifty-nine (6.5%) of them were classified as being rubella susceptible at the time of vaccination. All babies

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Rubella and CRS Elimination in El Salvador

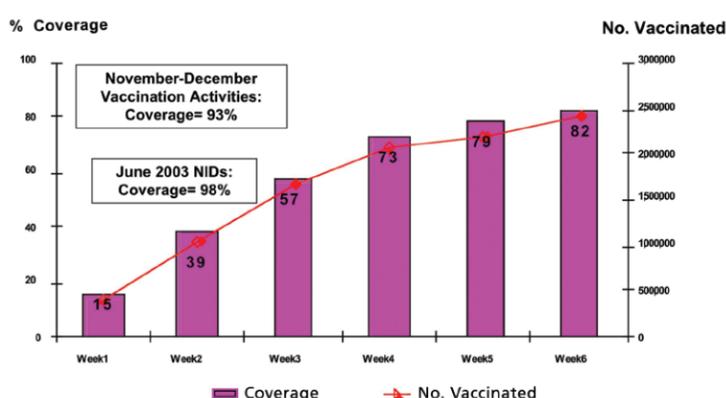
Introduction

Between 1997 and 2004, El Salvador implemented an accelerated rubella control strategy. In 1997, the MMR (measles-mumps-rubella) vaccine was introduced into the routine childhood immunization schedule for children aged 1 year. Since its introduction, reported MMR coverage levels have been close to 95%. A year earlier, MMR had been included in the "Healthy School" program aiming to reach about 600,000 students aged 6–12 years. During the following two years, MMR was offered upon school entry. Additionally, between 1997 and 1998, 640,000 women aged 15–25 years were vaccinated against rubella. After the end of the "Healthy School" program, the second MMR dose was offered in all health units to children aged 6 years. However, in 2000 the age was lowered to 4 years because coverage was only 60% when administered at age 6 (Table 1).

Campaign Planning

In 2004, El Salvador embarked on an initiative to eliminate rubella and congenital rubella syndrome (CRS). Besides strengthening surveillance for rubella and CRS, health authorities decided to conduct a mass vaccination campaign aimed at rapidly interrupting endemic rubella transmission. A local study determined that conducting a mass vaccination

Figure 1. MR Coverage by Week, Honduras, 2002

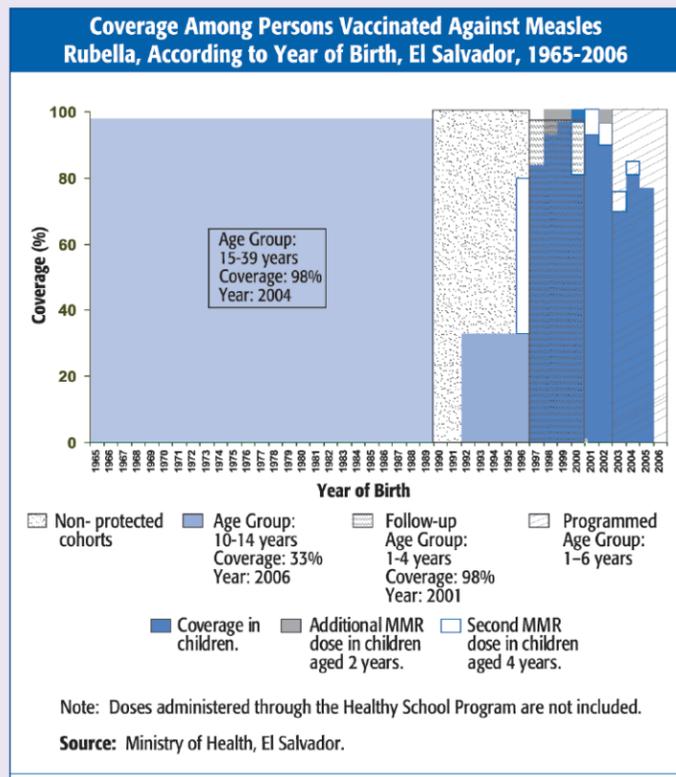


Source: Expanded Program on Immunization, Ministry of Health, Honduras.

Rubella Transmission and Susceptibility Following the Campaign in El Salvador

Because of a small rubella outbreak (2 confirmed cases) among students aged 10–14 years in August 2006, a cohort analysis was conducted to evaluate if all cohorts were protected against rubella. The analysis demonstrated that (1) Some groups had not been targeted for MMR or MR vaccination; (2) Not all children had received an MMR dose prior to their fifth birthday (Figure 1); and (3) The measles *follow-up* campaign planned for 2005, to counteract the build-up of susceptibles, since the MMR vaccine is not 100% effective, had not been conducted. Therefore, to prevent the reestablishment of rubella transmission, over 180,000 students aged 10–14 years were vaccinated in November 2006. To achieve rubella elimination, sustain measles elimination, and limit outbreaks following importations, it is necessary to ensure that all cohorts are protected. To this end, a follow-up campaign targeting children aged 1–6 years (born between 2002–2006) is scheduled for June–July 2007 and a mass vaccination campaign for students aged 11–17 years is planned for 2008.

The 2006 outbreak in El Salvador and the subsequent cohort analysis illustrates how, despite high routine MMR coverage and a successful mass vaccination campaign, some groups may remain unprotected. When planning mass vaccination campaigns for disease elimination, countries must thoroughly analyze the strategies implemented and the results obtained to ensure that all potentially susceptible groups are targeted. Also, even when the routine immunization schedule recommends the administration of two MMR doses, *follow-up* campaigns remain necessary if 95% coverage cannot be guaranteed for both doses in all municipalities.



the province programs through four regional workshops. To strengthen training and microplanning at local level, the workshops were repeated in the 512 departments of the provinces with funds from the national government. Vaccinators and supervisors were trained in 2,171 municipalities.

The campaign included diverse organizations, such as scientific societies (pediatrics, obstetrics and gynecology, perinatology, neurology, speech therapy, the Argentinean Medical Association, the Family Medicine Association, and nursing), the Rotary Club, *Asociación Apoyo Familiar* (Association for Family Support), *Asociación Mensajeros de la Paz* (Association of Messengers for Peace), and international cooperation agencies (UNICEF and PAHO). The Argentinean Federation of OB-Gyn Societies, the Argentinean Pediatrics Society, the Argentinean Perinatology Society, the Argentinean Association of Family Medicine, and the Argentinean Nursing Federation signed a declaration of support to the vaccination campaign.

The national social communication campaign was designed with clear messages directed at two population groups: adolescents and university students and women with children. Spots were aired during peak listening and viewing time on the favorite radios and TV channels of the two target groups. Posters and leaflets were distributed to the provinces for placement in hightraffic public areas. Messages were published in nationally circulated magazines and newspapers. In addition, the material was distributed in digital format to the provinces to be adapted according to local situations. Campaign information was also disseminated through web pages, toll-free numbers, and an e-mail address created specifically for the campaign.

Campaign Implementation
The campaign was launched on 1 September, 2006 and was planned to last 60 days. After the first month, only 5 of the 24 provinces had reached coverage rates >80% and the national coverage was only 46%. Provinces with high populations, such as Buenos Aires, Capital Federal, and Santa Fe had coverage around 40%.

Table 1. Rubella and CRS Elimination in El Salvador: Vaccination Strategies, 1997-2007

Years	Strategy	Vaccine	Target Population	Coverage
1997	Introduction of the first dose (Regular Immunization Program)	MMR	Children aged 1 year	>90%
1996-1999	Healthy School Program	MMR	Children aged 6-12 years	100%
1997-1998	Door-to-Door Vaccination	Rubella	Women aged 15-25 years	80%
2000	Introduction of the second dose (Regular Immunization Program)	MMR	1999: cohort of children aged 6 years 2000-2006: cohort of children aged 4 year	80%
2001	Follow-up Campaign	MR	Children aged 1-4 years	98%
2004	Vaccination Campaign	MMR	Men and women aged 15-39 years	99%
2007*	Follow-up Campaign	MR	Children aged 1-6 years	95% (goal)

* Scheduled to end July 2007.

born to these women were evaluated at birth: one had evidence of infection with vaccine virus, but none had birth defects compatible with CRS.

Conclusion

Vaccinating men and women aged 5–39 years was the first stage in El Salvador’s efforts to eliminate rubella and CRS. To complete the vaccination strategies, health authorities will need to evaluate protected cohorts.

Many lessons were learned from the rubella campaign in El Salvador, such as the impor-

tance of involving all components of the health system (including the Salvadorean Institute of Social Security) and emphasizing communication and social mobilization efforts, the need for a detailed vaccination strategies at local levels, and how critical the use of RMC is to ensure coverage goals are achieved. The communication campaign regarding blood donation was a success since blood availability was not affected during the campaign. These lessons are now being applied by the country during vaccination campaigns against other dis-

eases such as influenza (2004) and rotavirus (2006). It is also expected that the knowledge gained during the mass rubella campaign in El Salvador will be crucial when new vaccines are introduced in the country.

Authors: Nora Villatoro, Expanded Program on Immunization(EPI), Ministry of Health (MOH), El Salvador; Ana Elena Chévez, previously EPI, MOH, El Salvador; Desirée Pastor, Immunization Unit (IM), PAHO/El Salvador; Carlos Castillo-Solórzano, IM, PAHO/Washington, D.C.

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Rubella Vaccination Campaign in Argentina

Since 1998, the Ministry of Health (MOH) of Argentina has been implementing immunization and surveillance strategies based on the analysis of rubella trends, susceptible groups, and the cost-benefit of interventions. The MOH is committed to reach the goal of rubella and congenital rubella syndrome (CRS) elimination by 2010.

Based on seroprevalence studies, the vaccination coverage through the routine program with two doses of MMR (measles-mumps-rubella) vaccine, the behaviors of the adult population, and the availability of vaccinators, the country defined the group of women aged 15–39 years (n=6,795,786) as the target for its 2006 rubella and CRS elimination campaign. To reduce the risk of virus transmission, men in captive groups, such as work setting and other institutions, and groups at greater risk for infections were also vaccinated.

Organization and Planning

The organization and planning of the campaign was coordinated with the political and technical authorities from the country’s provinces. Decisions, based on the analysis of cover-

age progress, were taken by the Federal Health Council (COFESA or *Consejo Federal de Salud*) in monthly meetings attended by the Minister of Health and province health authorities.

A ministerial resolution provided political and legal backing at national level. Provinces prepared declarations of support to the campaign and their governments adopted resolutions. The MOH established a budget (US\$ 10,833,750) and transferred the funds to the provinces. Budget items included biologicals and syringes (55.3%), the social communication campaign (17.6%), and operating costs (27.1%). The provinces also assigned resources from their own budgets. The cold chain was strengthened through the purchase of refrigerators (n=2,300) and cold boxes (n=2,000) for vaccination activities in the field.

Campaign organization began eight months before implementation. Technical documents were developed in support of the campaign, such as technical and operational guidelines, local microplanning guides, vaccinator manuals, question and answer documents, and follow-up protocols for pregnant women inadvertently vaccinated. Training was provided, first for managers of



To make matters worse, a rumor began to circulate in late September through e-mail chain messages alleging that the vaccine had sterilizing properties. To clear all doubts among the population, the MOH developed a document on the quality and safety of the vaccine. The document was widely disseminated throughout the provinces and to the media. Health authorities granted radio, television, and newspaper interviews while scientific societies put out technical statements.

In order to reach the campaign goal, vaccination activities were extended until November. Vaccination strategies were adjusted based on coverage evaluations among different age groups.

Campaign Results

By campaign end, the national coverage reached 98.86% (n=6,718,314 women vaccinated) (Figure 1). All provinces except Buenos Aires (89%) exceeded the goal of 95% coverage. Coverage in groups aged 15-19 years and 20-29 years reached levels >95%. In major cities the coverage in the group aged 30-39 years did not meet expectations, reaching 88% at national level. During monitoring activities, reasons given by women for not being vaccinated were that they had been previously vaccinated, they had positive serology results, they did not plan to have more children, they were absent when the vaccinators visited their place of employment or house, or they did not have time to come to the health center.

A total of 1,257,555 men were vaccinated, mostly men in captive groups such as the armed forces, students, health care personnel, and employees at border posts. Provinces that vaccinated the highest proportion of men (>50% of male population) were Córdoba, Mendoza, and Catamarca.

The MOH national toll-free line received more than 25,000 calls and staff answered 32,273 questions during the campaign. Close to 3,000 electronic messages were answered and the e-mail address remains in use since vaccination is still provided, upon demand, by the health services. Reasons for consultation were as follows: where to get vaccinated (55%), vaccination and pregnancy (20%), indication and contraindication (15%), and rumor on the hormone contained in the vaccine (10%).

To verify coverage level, health authorities are using rapid coverage monitoring, the tool recommended by PAHO, in each of the country's department. The total number of persons to survey is 83,275 in 2,256 clusters.

Conclusions

The hard work of the health personnel, who demonstrated

its strong commitment to disease prevention, and the response from the population to vaccination activities, primarily the adolescents, must be commended. Thanks to the rubella campaign, the immunization program at national and province levels has been strengthened in key areas, such as organization and microplanning, effective vaccination tactics, management of vaccination safety crisis, design and use of information systems, supervision, monitoring, and evaluation.

Following the campaign, a national technical team was formed to analyze and implement the strategies required to reach those not vaccinated during the campaign, particularly men. RCM will be used as part of the strategy to complete the vaccination of men. The strengthening of rubella and CRS surveillance is an essential component of the plan since it will allow for the eval-



efforts, and must include the preparation of crisis management plans to confront any problem that may arise during the campaign.

- Systematic coordination between the Ministry of Health and health authorities at all levels is essential for campaign success, particularly when developing educational materials, integrating management levels (local, province, and national), or-

mobilization and vaccination tactics, data analysis and decision-making, monitoring, supervision, and evaluation.

- Launching ceremonies and active participation from the President, Minister of Health, other dignitaries, and the media are key in maintaining the campaign on the public agenda throughout its duration.
- Progress monitoring, performed daily by municipalities and weekly by the Ministry of Health, is necessary to identify low coverage areas.
- Supervisory teams must be empowered and maintained to identify situations requiring adjustments or additional support to reach the campaign goal.

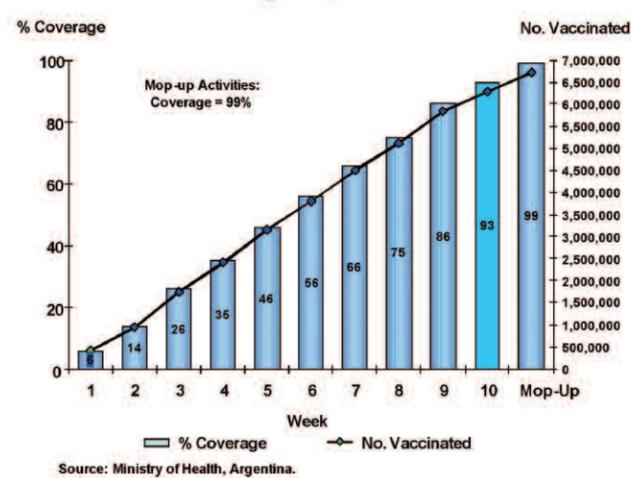
Lessons Learned in Honduras

- Vaccines, syringes, and supplies must arrive in the country at least two months before the campaign start. Honduras was forced to place emergency orders for syringes through PAHO's Revolving Fund due to non-delivery by an international provider.
- Efforts to respond to outbreaks of diseases not targeted by the campaign benefited from an existing infrastructure and mobilized communities.
- Joint implementation of the NIDs² and the MR campaign was key to optimize resources.
- Systematic use of RCM³ during NIDs, mass campaigns, and regular program activities helped with identifying areas at risk of obtaining coverage rates <95% and allowed for timely implementation of activities, thus facilitating the achievement of coverage targets.

Lessons Learned in El Salvador

- Support from the Salvadoran Social Security Institute, which provides services for 20% of the population, was instrumental during the social mobilization efforts targeting adults.
- The communication and social mobilization campaign targeting volunteer blood donors before the campaign's launch was successful in avoiding blood shortages.

Figure 1. Coverage by Week, Rubella and CRS Elimination Campaign, Argentina, 2006



uation of results and the certification of the goal of rubella and CRS elimination in Argentina by 2010.

Authors: Direction of Epidemiology, Ministry of Health, Argentina.

June 2007, Volume XXIX, Number 3

Lessons Learned from Rubella Vaccination Campaigns in the Americas

General Lessons Learned

- The vaccination of both men and women is required to achieve the elimination of rubella and congenital rubella syndrome, and to strengthen measles elimination efforts in the Americas.
- Planning for a mass vaccination campaign targeting women and men of different age groups not usually targeted by national immunization programs requires intensive planning, programming, and promotion, beginning at least six months before campaign launch.
- The planning stage must be systematically conducted to strengthen coordination and productivity of vaccination

ganizing, programming, mobilizing and using resources, and developing systems for information, monitoring, and evaluation.

- The information, education, and communication strategy is critical to reach the vaccination goal. Messages must be adapted to the audience (men or women) and the place of residence (rural or urban areas).
- Social mobilization and participation of different actors from the public and private sectors, at national and local levels, are also paramount to reach the objectives.
- The availability of guidelines, methodologies, tools, and microprogramming guides is key to facilitate organization, implementation, and evaluation activities. Training of vaccination teams must ensure that immunization safety practices are followed, and result in the absence of ESAVIs¹ due to programmatic errors.
- Workshops provide a great learning experience as they allow workers to update their skills pertaining to the main components of the routine immunization program, such as microprogramming and planning, cold chain, vaccination safety and crisis management, effective

Lessons Learned in Argentina

- Training and joint collaboration between all sectors from the onset of campaign organization allowed an effective response to a rumor regarding the composition and quality of the vaccine. Permanent access to information through toll-free lines, web pages, and e-mail was extremely useful to clear doubts. Consequently, the rumor had a minimal impact on coverage results while the faith of the population in the routine vaccination program was strengthened.
- The weekly analysis on coverage progress took place in the office of the Ministry of Health, and was useful to strengthen strategies.



- The experimental use of an on-line information system during the campaign was an invaluable contribution to the routine immunization program. It will help accelerate the program's implementation and will allow the registering of coverage for all vaccines in the immunization schedule by place of residence.
- RCM, implemented in a coordinated manner by each province down to its local levels, with cooperation from the Ministry of Health, proved to be a valuable supervision and evaluation tool.
- The diversity and efficiency of the tactics used by each province to mobilize and immunize the population were a useful contribution to immunization strategies targeting adolescents and adults

¹ Events supposedly attributable to vaccination and immunization.

² National Immunization Days

³ Rapid coverage monitoring.

June 2007,
Volume XXIX, Number 3

Vaccination Campaign Phases for Rubella and CRS Elimination in the Americas

Most countries of the Americas that implemented rubella elimination campaigns conducted their activities according to the steps described in Figure 1:

1. Targeting the captive population in work places, schools, and institutional settings (jails, armed forces quarters) by vaccination teams in addition to vaccination posts located in high traffic areas or places where people congregate, and health units where vaccination is routinely provided.
2. Adding door-to-door vaccination to regular activities.
3. Conducting rapid coverage monitoring (RCM) towards the end of the campaign to ensure that no population group or remote area is left unvaccinated.
4. Offering MR (measles-rubella) post-partum since the vaccine is not administered to pregnant women to avoid any association between the vaccine and adverse pregnancy outcome.
5. Conducting independent coverage verification, and recognizing each municipality that has achieved the campaign goal.

In addition to the above-steps, some countries introduced a "Central Day," at the campaign's half-way point, to provide an additional opportunity for those who have not yet sought vaccination. This served as a "re-launching" of the campaign with support from the media, the President, and other dignitaries to reinforce the public messages. A similar activity can be repeated toward the end of the campaign.

As shown in the figure, MR campaigns for rubella elimination, unlike vaccination campaigns targeting children, emphasize vaccination on

weekends when adolescents and adults are more available. Social communication and mobilization are adapted to each step so that messages are targeted to the populations most likely to be captured during each phase.

August 2007,
Volume XXIX, Number 4

Changing Lives: Newborn Hearing Screening in Costa Rica

During rubella immunization activities, conversations between Dr. María Luisa Ávila, then Director of Infectious Diseases at the National Children's Hospital and now Minister of Health, PAHO Advisor Dr. Louis Z. Cooper, and Drs. Carlos Castillo-Solórzano and Jon Andrus from the PAHO Immunization Unit, focused on the possibility of implementing an Early Hearing Detection and Intervention (EHDI) demonstration program in Costa Rica. Since congenital hearing loss is the most frequent manifestation of congenital rubella syndrome (CRS), an EHDI program would have the combined advantage of serving as an excellent surveillance instrument for CRS and for changing the lives of children found to be congenitally hearing-impaired, based on the new technologies for hearing testing and amplification, and early education.

Babies rely on hearing to develop spoken language. An infant's auditory system and brain are shaped by sound and by caregivers' voices long before a first word is spoken. However, because hearing loss is an "invisible" condition even trained health care professionals cannot reliably identify young children with hearing loss through observation alone. And when hearing loss goes undetected, early language learning is impeded and subsequent reading, academic, and social skills can also be severely compromised. This severe morbidity can now be prevented by EHDI, changing the lives of children and their families, and providing cost-saving benefits over their lifespan.



Dr. Karen Muñoz teaching newborn hearing screening.

In the United States, 95% of infants are screened for hearing loss before hospital discharge or shortly thereafter. This represents a dramatic increase from fifteen years ago when only 3% of newborns received such screening. Due to advances in technology, screening for hearing has become the standard of care.

The Ministry of Health (MOH) of Costa Rica, PAHO, the American Academy of Pediatrics, the Costa Rican Pediatric/Neonatology Academy, and the US National Center for Hearing Assessment and Management (NCHAM, located at Utah State University), have collaborated to provide newborn hearing screening and follow-up services to better serve children born with hearing loss. The MOH is leading a movement to identify hearing loss early through a comprehensive screening and management program. A needs assessment brought Dr. Karl White, the NCHAM director, Dr. Karen Muñoz, an audiologist, and Dr. Cooper to work with the MOH in September of 2006. The team visited hospitals and intervention programs to learn about current services. Screening procedures were also demonstrated.

Six Costa Rican physicians representing pediatrics, audiology, otolaryngology, and the MOH then came to St. Louis, Mis-

souri, in February 2007 to learn more about screening, diagnosis, and intervention procedures. This was an opportunity to observe programs "in action" and discuss next steps for Costa Rica.

Infants who are found to have a hearing loss benefit the most when they are enrolled in early intervention programs prior to 6 months of age. To reach this goal, health care providers play a central role. Ensuring that every child with hearing loss is identified and is provided necessary services as early as possible requires a systematic approach to screening and follow-up. That is what the collaboration is establishing in Costa Rica. Since the critical periods for language development are so time-sensitive, the goals will include screening by age one month, diagnosis by age three months, and intervention, including amplification and educational intervention, by age six months.

Early hearing detection and intervention presents many challenges. But the benefits obtained from implementing such programs may prove to be as significant as what has been found elsewhere. In the final analysis, the EHDI demonstration program in Costa Rica is another example where rubella and CRS elimination strategies serve to promote excellence in primary health care.

August 2007,
Volume XXIX, Number 4

XIX Meeting of the Central American Region, Mexico, and the Latin Caribbean

The XIX Meeting of the Central American Region, Mexico, and the Latin Caribbean on vaccine-preventable diseases took place in Santo Domingo, Dominican Republic, from 6-8 June 2007. Delegations from Costa Rica, Cuba, the Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, and Panama participated in the meeting.

Rubella and Measles

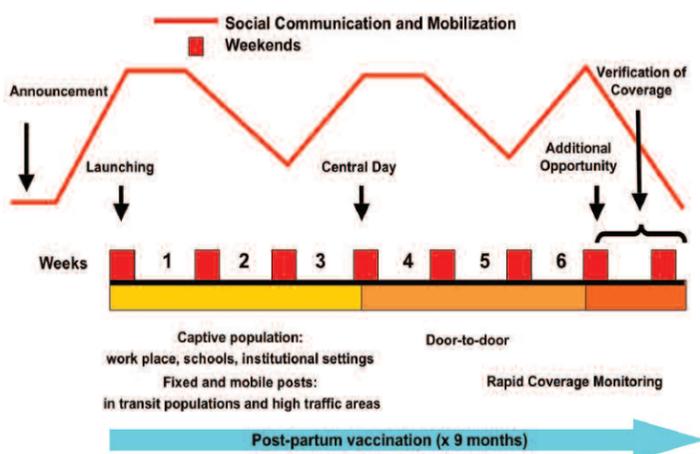
Countries of the Region have demonstrated progress in effectively interrupting endemic rubella transmission.¹ In addition, mass vaccination campaigns conducted in the Region have been essential to sustain measles elimination. All but one of the 345 measles cases reported in the Americas since 2005 have been in countries that still had not conducted or concluded a mass vaccination campaign against measles and rubella in adolescents and adults.

Integrated and quality epidemiological surveillance of measles and rubella, including case confirmation through laboratory tests, is a fundamental element to document the rubella and measles elimination in the Americas. Furthermore, molecular epidemiological data can be used to confirm rubella elimination. Finally, CRS surveillance is recommended to identify infants in whom this syndrome is suspected.

Recommendations:

- The Dominican Republic and Guatemala should be congratulated for the excellent coverage obtained during their national vaccination campaigns to eliminate rubella and CRS. Both countries should document and publish the lessons learned.
- Haiti and Mexico should be congratulated on their decision to program mass vaccination campaigns targeting men and women (adolescents and adults) with the MR (measles-rubella) vaccine in the second 2007 semester and the first 2008 semester, respectively. El Salvador should also be congratulated for implementing a follow-up campaign for measles and rubella elimination in 2007.
- The accumulation of measles susceptibles should continue to be monitored. A high quality follow-up campaign (coverage >95% in every municipality) is necessary whenever there is evidence of an accumulation of susceptibles.
- Countries should identify municipalities with MMR

Figure 1. Vaccination Campaign Phases for Rubella and CRS Elimination



Source: Immunization Unit, PAHO.

For more information on newborn hearing screening and management visit these websites:

- www.babyhearing.org
- www.infantheating.org
- www.medicalhomeinfo.org/screening/hearing.html
- www.cdc.gov/ncbddd/ehdi/

To view a 6-minute video explaining more about the hearing screening process, go to <http://www.infantheating.org/videos/index.html> and select the Sound Beginnings (new) video.

coverage <95% and design strategies to achieve and maintain 95%-100% coverage in all municipalities.

- Countries should ensure that all residents of the Americas that travel to endemic measles and/or rubella areas are immune to measles and rubella before their departure.

- Countries should develop plans to deal with importations, ensuring that a dedicated team is on hand and available funds can be rapidly released.

- Countries should maintain active epidemiological surveillance of measles and rubella in all the municipalities, with a sensitivity of at least 2 suspect cases per 100,000 inhabitants and at least 1 suspect case in municipalities with <100,000 inhabitants, and conduct active case-finding in high-risk municipalities and silent areas. Furthermore, rapid investigation should be the norm (before serology results are available) and include representative samples for viral detection.

- Experience in the Region has proven that CRS surveillance presents many challenges. Since CRS clinical manifestations during the first year of life are not specific and vary widely, it can be difficult to suspect and diagnose this syndrome. Creative methods should be investigated to improve the sensitivity and quality of the surveillance system, strengthen report through sentinel sites, and encourage the use of TORCHS as part of the surveillance system.

- While investigating sporadic suspect cases during the last stages of measles and rubella elimination, a second sample should be collected for serology and an epidemiological analysis conducted when the laboratory result is not clear. Also, samples should be collected for viral isolation or detection by molecular method.

- A second sample for rubella IgM testing should be collected in pregnant women from whom a serum sample was collected in the five days following disease onset, regardless of a positive or negative result.

- Meetings among EPI epidemiologists and laboratory staff must be held as a crucial step toward promoting coordination and exchange of information.

- Countries should start documenting the interruption of measles and rubella endemic transmission based on the following components: a) epidemiological information on measles, rubella, and CRS (vaccination impact); b) vaccination coverage and analy-

sis of protection; c) quality of the surveillance system; d) data on molecular epidemiology of measles and rubella virus; and e) data from available seroprevalence studies.

Reference:

¹ Pan American Health Organization. Special Rubella Issue. Immunization Newsletter 2007;29(3).

October 2007, Volume XXIX, Number 5

Haiti to Launch a Rubella and CRS Elimination Campaign on 5 November

In Haiti, rubella is a disease that is often not diagnosed or reported. The understanding of its burden in the country is limited. However, a study conducted by Golden et al. in 2002, estimated the number of congenital rubella syndrome (CRS) cases to be between 163 and 440 per year, based on rubella seroprevalence in pregnant women.¹ CRS is one of the adverse consequences of rubella infection during pregnancy. The three major birth defects associated with CRS are hearing impairment, congenital heart disease, and cataract.

In 2006, eleven rubella cases were reported between April and May in children aged 2-16 years (median age 7 years) from the Nord-Est and Sud Departments, suggesting widespread rubella virus circulation (Table 1). As part of the case investigation, samples were taken from the 18 pregnant women who had been in close contact with the rubella-infected children. Among these women, IgG results were positive for 17 (94%) and IgM results were negative for all 18. One woman aged 20 years, who was in her third month of pregnancy, tested IgG- and IgM-negative and remained negative two months later.

In 2006, CRS surveillance was established in a University Hospital (Hôpital Universitaire d'État d'Haïti/HUEH) in 2006. That year, HUEH reported 15 suspect CRS cases in children aged 6 days to 1 month. None of these cases were laboratory-confirmed.

In Brenda Hospital (Sud Department), on average 29 surgeries for congenital cataract are performed each year (Table 2). Unfortunately, most children consult late due to their parents' lack of resources. Of the 116 children operated between 2003 and 30 November 2006, 95% were examined after their first birthday, when it is more difficult to diagnose CRS with certainty (viral isolation or IgM-positive). In all children, the diagnostic at their first consultation was congenital cataract.

Based on the data reported, and Haiti's commitment to meet the Regional goal of rubella and

Table 1. Confirmed Rubella Cases by Selected Municipalities, Haiti, 2006

Epidemiological Week	Department	Municipality	Cases	Laboratory Testing
11	Nord-Est	Mombin Crochu	6	IgM+
17	Sud	Cayes	3	IgM+
22	Nord-Est	Ouanaminthe	2	IgM+

Table 2. Distribution of Non-traumatic Cataract Cases Operated on at Brenda Hospital, by Age Group, Haiti, 2003 - November 2006

Year	Age Group				
	<1 year	1 to 4 years	5 to 10 years	10 to 17 years	Age Unknown
2003	2	13	8	9	0
2004	1	6	11	11	7
2005	1	6	10	9	0
2006	2	2	11	7	0
TOTAL	6	27	40	36	7

CRS elimination by 2010, the country has decided to conduct a mass vaccination campaign using measles-rubella vaccine, targeting the population aged 1-19 years, estimated at 4.7 million and representing over half of the country's total population. This campaign will also serve as an opportunity to provide oral polio vaccine (OPV) to children aged <5 years, vitamin A supplementation to children aged 1-4 years, antiparasitics (albendazole) in schools, and Td vaccine to women of childbearing age in large cities. After the campaign, MMR (measles-mumps-rubella) vaccine will replace measles vaccine in the national immunization schedule, and will be given annually to all children aged 1 year.

In May 2007, a pilot campaign in five rural communes along a border area with the Dominican Republic and one urban commune in Port-au-Prince was conducted in preparation for the mass vaccination campaign. Over 99,000 persons were vaccinated. At the end of the pilot campaign, rapid coverage monitoring was conducted to verify campaign coverage at 99%. This pilot campaign generated important lessons to improve existing vaccination strategies and to better prepare the country for the upcoming national campaign.

Authors: Dr. Benoît Ntezayabo, Immunization Unit (IM)/PAHO, Haiti; Dr. François Lacapère, IM/PAHO, Haiti; Dr. Carlos Castillo-Solórzano, IM/PAHO, Washington, D.C.

Reference:

¹ Golden N, Kempker R, Khaton P, Summerlee R, Fournier A. Congenital rubella syndrome in Haiti (Short communication). Rev Panam Salud Pública. 2002;12(4):269-73.

2008

February 2008, Volume XXX, Number 1

27th Pan American Sanitary Conference Adopts Resolution for the Elimination of Rubella and CRS in the Americas

During the 27th Pan American Sanitary Conference held in October 2007 in Washington, D.C., Member States of the Pan American Health Organization (PAHO) expressed strong support for the rubella and congenital rubella syndrome (CRS) elimination initiative currently underway in the Region. As all countries of the Americas implement supplementary immu-

nization activities to complement routine vaccination programs, the combined strategy has resulted in a substantial decrease in rubella incidence. The number of confirmed rubella cases decreased by nearly 98% between 1998 and 2006 (from 135,947 to 2,998), and the number of confirmed CRS cases from 23 in 2002 to 14 in 2006. The impact on reducing rubella incidence has been greater in countries that vaccinated men and women in their campaigns.

In addition to interrupting rubella transmission, mass vaccination campaigns have greatly contributed to consolidating measles elimination. All 402 measles cases reported in the Americas since 2006 (2007 provisional data) have occurred in countries that had not yet implemented or completed a mass measles/rubella vaccination campaign among adolescents and adults.

By adopting Resolution CSP27.R2, PAHO Member States seek to build on the success achieved in the Region. Two previous resolutions calling for rubella and CRS elimination in the Americas by 2010 (2003) and reaffirming the elimination initiative as a Regional priority (2006) have been passed. Resolution CSP27.R2 also calls for national commissions to be formed to verify rubella and CRS elimination, under the guidance of an Expert Committee (see text box on page 42).

Below: Dr. Margarita Cedeño de Fernández (right), First Lady of the Dominican Republic, receiving a plaque from Dr. Mirta Roses Periago, PAHO Director, during the 27th Pan American Sanitary Conference. Dr. Cedeño was recognized as goodwill ambassador for her humanitarian work in favor of rubella elimination and her advocacy efforts to avoid disabilities caused by the rubella virus throughout the Americas. In her speech, Dr. Cedeño called for all governments of the Region to intensify their efforts in the fight against vaccine-preventable diseases.



Documenting the Interruption of Endemic Rubella and Measles Virus Transmission in the Americas

By the end of 2008, all countries and territories of the Region of the Americas will have implemented strategies to reduce populations susceptible to measles and rubella and reduce the incidence of the devastating birth defects associated with congenital rubella syndrome (CRS). The approval of Resolution CSP27.R2 by the 27th Pan American Sanitary Conference in October 2007 defined the final steps for reaching the goal of rubella elimination by 2010, calling for the formation of an Expert Committee responsible for the documentation and verification of the interruption of the endemic rubella and measles virus transmission in the Americas.

High quality and integrated measles/rubella surveillance, CRS surveillance, and vaccination coverage results, supported by sustained technical cooperation, are required to verify the interruption of virus transmission. PAHO staff, in collaboration with consultants from the US Centers for Disease Control and Prevention (CDC), considered several information components to be included in a Regional protocol for verifying the interruption of endemic transmission. It is essential that the data collected for each component be complete and consistent with other available data sources. The information components included were as follows:

- The development and evolution of national immunization programs;
- Measles, rubella, and CRS epidemiological data (impact of vaccination interventions);
- The analysis of protected cohorts, which includes vaccination coverage, routine immunization, follow-up campaigns, adolescent and adult mass campaigns, and post-partum vaccination (post-campaign);
- The quality of the surveillance system, including completion of indicators, active case searches, compatible cases (surveillance error), and excluded cases;
- Molecular epidemiology; and
- Available seroprevalence studies when needed.

The protocol will be tested in a pilot country. A panel of experts will convene to review the results from the pilot study and finalize the regional protocol for dissemination and implementation at country level.

In accordance with Resolution CSP27.R2, an international Expert Committee will independently verify that endemic rubella and measles virus transmission has been interrupted in the Western Hemisphere. Special national commissions in each country will assess country-specific situations and prepare the required documentation, as defined by the protocol. The international Expert Committee will be charged with completing the final analysis of all available data to determine definitive verification and report the findings to PAHO's Directing Council in 2010.

mended modifications based on the lessons learned during the initial collection of evidence on measles, rubella and CRS elimination in Costa Rica, and (2) determine the next steps to implement to achieve the goal of elimination certification in Costa Rica. Meeting participants included representatives from Costa Rica's Ministry of Health, Social Security Fund, and Birth Defects Registry Center; country experts in the field of neonatology, ophthalmology, and cardiology; international experts from the World Health Organization, the U.S. Centers for Disease Control and Prevention, PAHO, and the Oswaldo Cruz Foundation; and the former president of the American Academy of Pediatrics.

A key recommendation for improving the regional protocol was to develop a document providing countries with additional guidance on how to inter-relate all the pieces of evidence—including detailed information on the national immunization program, epidemiological analysis of measles, rubella, and CRS, surveillance quality, molecular epidemiology, and population immunity—to support the argument of elimination.

2009

February 2009, Volume XXXI, Number 3

A New Face for Rubella Watch

Thanks to *Rubella Watch*, readers of the Region of the Americas have been witnesses to the impressive progress achieved towards eliminating rubella and congenital rubella syndrome (CRS). Today, the Region is on the cusp of reaching the goal of elimination, while it still faces multiple challenges to protect the achievements of countries and maintain measles elimination.

In this context, *Rubella Watch* puts on a new face, with a clearer and more streamlined design that reflects the permanent watch countries of the Region and the world have led over measles and rubella. *Rubella Watch* will continue to publish reports on the efforts all countries of the Americas are making to quickly respond to constant importations. It will also report on the ongoing implementation of strategies to maintain the elimination of both the rubella and measles virus.

April 2009, Volume XXXI, Number 2

Brazilian National Vaccination Campaign to Eliminate Rubella and Congenital Rubella Syndrome

Introduction

In 2003, Member States of the Pan American Health Organization, including Brazil, set a goal of eliminating rubella and congenital rubella syndrome (CRS) from the Americas by 2010, using the strategies implemented in the Region of the Americas.

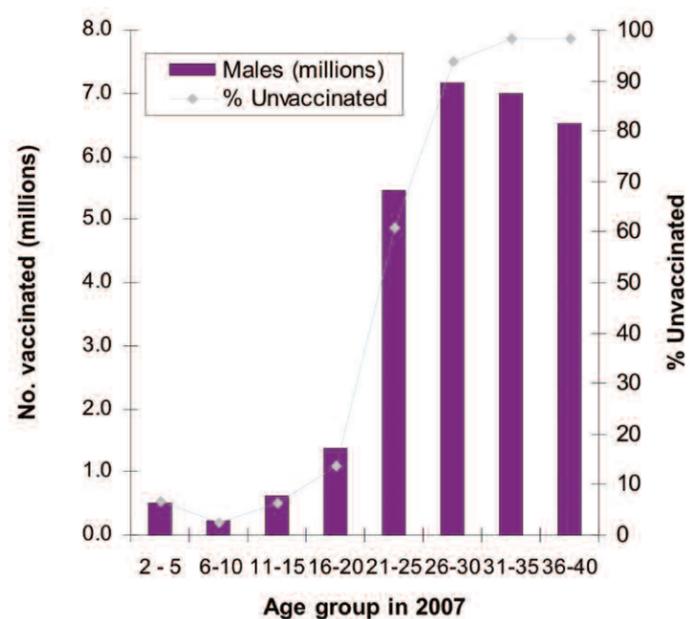
In Brazil, routine childhood immunization with MMR vaccine was introduced state by state from 1992 until 2000.

In order to reach the 2010 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 possibly susceptible adults against measles.

Target Population for the Campaigns

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 (Figure 1). This analysis indicated that groups missed by previous rubella vaccination strategies were

Figure 1. Estimates of the number and percentage of unvaccinated Brazilian males against rubella by age group. Brazil, 2007



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, and 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 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.

concentrated among adults aged 20 years and older: 60% of men between the ages of 21-25 years and 95% of those 26 years and older 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.

The analysis of prior vaccination opportunities defined the target population for rubella vaccination. In all 27 states, the campaign would target adult men and women aged 20-39 years, with an estimated 31.4 million men and 32.1 million women in this age group. 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

June 2008, Volume XXX, Number 3

Measles, Rubella, and CRS Elimination: Costa Rica Makes History

On 14 May 2008, Costa Rica became the first country of the Region to create a national commission for documenting the elimination of measles, rubella, and congenital rubella syndrome (CRS). The independent body will be comprised of national advisors and consultants who will collect and examine available country data as a step towards declaring Costa Rica

free from measles, rubella, and CRS. At the conclusion of this process, the commission will submit its final report to the Minister of Health who will officially present it to an international Expert committee (see *Immunization Newsletter*, February 2008).

From May 2007 to April 2008, Costa Rica also served as a pilot country to test the regional protocol on elimination that PAHO developed to assist countries with data collection and analysis. In May 2008, national and international participants convened in San José to (1) discuss the regional protocol and incorporate recom-



Left: Dr. Oscar Arias Sánchez, President of Costa Rica, signing the executive decree creating the national commission on 14 May 2008. To his left is Rodrigo Arias, Minister of the Presidency, and to his right Dr. María Luisa Ávila Agüero, Minister of Health.

national campaign. For the 20–39-year old age group, approximately 70 million doses (in 10-dose vials) of MR vaccine were imported and distributed to all state vaccination 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 Jeryl Lyn mumps strain. Vaccines were administered subcutaneously in the upper arm, with a 0.5 ml dose.

Vaccination Strategies

Prior to the launch of 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 under 5 years of age.

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, commercial and 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 the launch of 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.

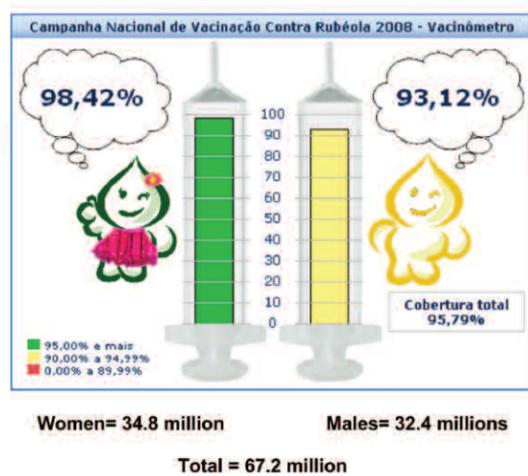
For the launch (together with the polio immunization day), the slogan was “*Vacinação virou programa família*” (Vaccination has become a family program). Television and radio spots reminded audiences that Brazil had eliminated polio and now the country was eliminating rubella. Parents were encouraged to take their children

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 (Figure 2).

Vaccination in Border Areas
Brazil shares borders with all

Figure 2. Rubella vaccination coverage by sex, Brazil 2008



Source: pni.datasus.gov.br

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 including 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*” (Now only you). 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

In order to focus media attention during a short period, the national rubella elimination campaign was scheduled to conclude on 12 September, five weeks after the official launch.

At the conclusion of five weeks, an estimated 84% of the target population had been

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 adverse events temporally associated with vaccination. Events 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; few data were available on the frequency of adverse events reported to surveillance systems during vaccination campaigns.

During the national rubella campaign, the adverse event surveillance system received

2,624 notifications of vaccine-associated adverse events, corresponding to a rate of 3.6 events per 100,000 doses administered, which is much lower than rates that have been reported in the literature. In relation to the type of events, 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%). Because a high proportion of the target population had previously been vaccinated or was immune, the incidence of adverse events following vaccination may have been much lower than expected in a non-immune population.

Information System

An online information system (available at <http://pni.datasus.gov.br>; accessed 13 April 2009) provided public access to vaccination coverage estimates in “real-time,” as soon

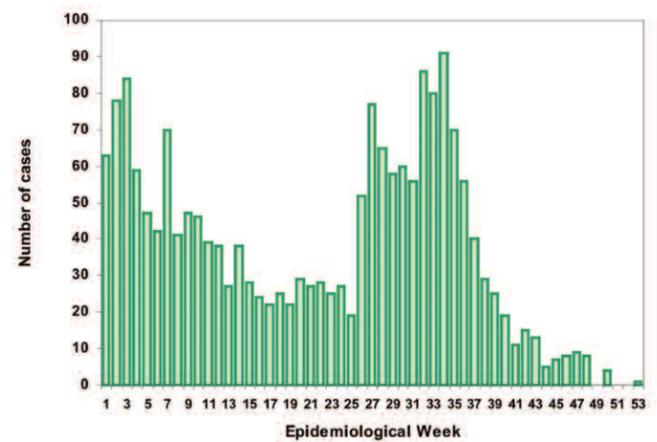
experiences and lessons learned in Brazil with countries in other regions beginning the process of rubella elimination.

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 assessments found slightly lower coverage than administrative estimates, except in cities where the

Figure 3. Rubella confirmed cases by epidemiological week, 2008



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.

Dissemination of Best Practices

Technical support to state and municipal immunization programs from the national immunization program helped to plan and evaluate vaccination activities.

During the campaign, PAHO/WHO 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 represented a new style of technical cooperation 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

population figures may have overestimated the resident population, as in the case of Palmas, the capital of the state of Tocantins. Monitoring surveys 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.

In this light, and having the presence of President Luiz Inácio Lula da Silva, the Minister of Health, Dr. José Gomes Temporao, presented the “Final



President Lula da Silva celebrates the success of the “mega” vaccination campaign. To his left, Dr. José Gomes Temporao, Minister of Health, and to his right, Mr. Diego Victoria, Representative of PAHO/WHO in Brazil.

Report of the National Vaccination Campaign for Rubella Elimination” to the representative of the Pan American Health Organization/World Health Organization (PAHO/WHO) in Brazil, Mr. Diego Victoria on March 3, 2009. In addition, Mr. Diego Victoria presented a certificate to Minister Temporao in recognition of Brazil’s sustained efforts and outstanding coverage achieved during the campaign, which was homogeneous throughout the country.

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 from Brazil.

During the elimination phase, 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.

International travelers entering Brazil should 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.

Source: Marlene Tavares Barros de Carvalho, Marília Mattos Bulhões and Cristina Maria Vieira da Rocha (NPI/Ministry of Health); Brendan Flannery (PAHO-Immunization/Brazil)

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National Campaign to Eliminate Rubella and Strengthen Measles Elimination in Haiti

In 1984, Haiti introduced the monovalent measles vaccine into its routine vaccination program with a single-dose schedule in children aged 9 months. Between 1990 and 2007, yearly immunization coverage with measles vaccine ranged from 24–54%, reaching the highest coverage of 85% in 1999.

Haiti was the only country of the Region without a vaccination program against rubella. The confirmation of a congenital rubella syndrome (CRS) case in 2004 brought attention to the underestimation of the problem, and incidence estimates indicated that new CRS cases in the country were between 1.63 and 4.40 per 100,000 live births per year. Furthermore, the improvement of surveillance and laboratory diagnosis led to the laboratory confirmation of 11 rubella cases in the country in 2006.

A seroprevalence study conducted among 503 pregnant women in 2002 demonstrated that 95% of women aged >20 years had acquired natural immunity to rubella infection.¹ In 2007, the Haitian Ministry of Public Health and Population (MSPP) decided to implement an immunization campaign using measles-rubella (MR) containing vaccine, and in accordance with the 2003 Directing Council Resolution, Haiti joined the rest of the Member States of the Pan American Health Organization (PAHO) in adopting a rubella and congenital rubella elimination (CRS) goal for 2010.

The campaign was integrated with a package of services to improve the health of its population. In addition, following campaign implementation, rubella-containing vaccine was gradually introduced into the routine program, as per the

PAHO recommended strategy.

The National Campaign to Eliminate Rubella utilized a “rolling campaign” strategy. Given the shortage of national supervisory staff and community health workers, MSPP selected the strategy to ensure the completion of high-quality vaccination interventions in one department prior to moving to the next. The campaign targeted the group aged 1–19 years, which included 1,041,384 children aged 1–4 years and 3,502,836 children and adolescents aged 5–19 years (total=4,544,420).

Furthermore, corresponding target populations for preventative, integrated interventions were as follows: oral polio vaccine, 1,325,397 children aged <4 years; diphtheria and tetanus Toxoid vaccine (dT), 705,819 women of childbearing age (WCBA) (aged 15–49 years); vitamin A supplementation, 1,041,384 children aged 1–4 years; and albendazole, 2,970,038 nursery and primary school students.

Campaign Objectives

Haiti undertook the most ambitious vaccination campaign in its history, targeting more than 4.5 million children, adolescents, and young adults aged 1–19 years as well as WCBA in urban areas, representing 50% of the country’s population.

The overarching objectives of the campaign were as follows:

- Strengthen measles elimination and reduce the risk of importations to the country;
- Take the first steps towards rubella and CRS elimination; and
- Strengthen measles elimination and reduce the risk of importations.

Secondary objectives as outlined by the national plan for the vaccination campaign included:

- Reinforce polio immunization to prevent the reintroduction of the disease or vaccine-derived poliovirus;
- Serve as a catalyst for the elimination of neonatal tetanus; and
- Fight vitamin A deficiencies in children <5 years as well as against intestinal parasites in schoolchildren.

Several factors were considered to justify the campaign. These included low measles vaccination coverage (57%–66% between 2004 and 2006*) and the accumulation of susceptibles, the continuous risk of importations due to the transient nature of the Haitian population and foreigner visitors to the country, and a weekly surveillance system for febrile rash illness.

Campaign Implementation

Collaborative efforts among high-ranking government officials, key stakeholders, community health workers, and non-governmental organiza-

tions proved instrumental in ensuring the success of the nationwide vaccination campaign. The main strategies for campaign implementation were:

- Obtaining the commitment of high-level authorities from campaign inception, including active participation in the campaign launching event, to highlight the campaign as a national priority.
- Mobilizing resources from a multitude of strategic partners to cover operational and input costs.
- Implementing a pilot campaign to prepare for the national integrated campaign and generate important lessons to improve existing vaccination strategies.
- Providing extensive training for health workers and

establishments), vaccination in fixed posts, and door-to-door vaccination.

Under the Creole slogan, *Ann Ai Vaksinen* (“Get Vaccinated”), the national campaign was launched on 5 November 2007 and initial vaccination activities were concentrated in the first strata (Artibonite, Nord-Est, and Ouest departments). Later that month, the population in the second strata (Metropolitan area) was targeted. In March 2008, activities continued in the third strata (Nord Ouest, Nord, and Centre departments). Campaign activities were carried out in the fourth strata (Grande Anse, Nippes, and Sud Est departments) and the fifth strata (Sud department) in May and November 2008, respectively (Figure 1).

Figure 1. National Campaign to Eliminate Rubella: “Rolling Campaign” Strategy



adapting training and instructional materials to provide consistency in campaign implementation methodology in a culturally appropriate and simplistic manner.

- Conducting microplanning activities at the local level to ensure that hard to access areas and vulnerable populations are reached with campaign activities in an organized manner.
- Ensuring periodic supervisory meetings to make necessary adjustments before and during the campaign to ensure attainment of the campaign goal.
- Providing an integrated package of services to capitalize on vaccination opportunities to reach more than half of the country’s population with preventative interventions.
- Recruiting volunteers from various organizations to overcome human resource shortages.

The pilot campaign was conducted in May–June 2007, and the launch of the program corresponded with Vaccination Week in the Americas. The “rolling” campaign strategy was implemented in different phases targeting blocks of departments (strata) in order to cover the entire country (Metropolitan area, 10 departments and 133 municipalities or communes). Strategies selected for service delivery included the vaccination of captive populations (in schools, institutions, businesses, and health

Several challenges were confronted and resolved over the course of the campaign planning, execution, and evaluation phases. These included initial concerns and insufficient prolonged commitment of the MSPP based on the assumption that campaign activities would detract from the routine EPI program; operational constraints that required continuous resource mobilization efforts; shortage of qualified national staff to conduct supervisory activities and lack of motivated local staff for the implementation of vaccination activities; nontraditional target population to be addressed through innovative social mobilization efforts; and unexpected sociopolitical and climatic emergencies occurring during the campaign period.

Campaign Results

The pilot successfully reached more than 99,000 children and adolescents in the target population with the MR-containing vaccine in five rural municipalities and one urban area. Coverage reached 94% as verified by rapid coverage monitoring (RCM). The success of the pilot clearly demonstrated the demand for vaccination and other health interventions by a target population not generally targeted with immunization activities, as well as allowed the country to advance in the organization and planning process for the nationwide campaign.

The “rolling” campaign, which concluded in November 2008,

one year after the campaign launching, did not advance as quickly as initially planned due to unforeseen events such as food shortages and the postponement of activities due to end of school year exams. Despite these setbacks, the campaign achieved 103% administrative coverage (80% coverage in population aged 1-4 years and 110% coverage in population aged 5-19 years) with MR-containing vaccine by vaccinating a total of 4,676,353 people in the target population. The coverage by department ranged from 85% (Quest) to 129% (Nord-Est); nine of the departments and the Metropolitan area achieved greater than 95% administrative coverage (Quest department reached 85% coverage). At the municipality level, 77% (n=102) attained >95% coverage and 92% (n=122) reached 80% coverage.

Rapid coverage monitoring was established during and following campaign implementation to provide health workers and supervisors with a quick impression of the completeness of vaccination and ensure that homogenous high coverage was attained, even in the poorest performing municipalities.

As verified by RCM, campaign coverage reached 94% at the national level: 91% in the group aged 1-4 years and 95% in the group aged 5-19 years (Figure 2). The discrepancies between administrative coverage and RCM assessments

interventions was 76% for oral polio vaccine, 78% for dT vaccine, and 53% for albendazole treatment.

The total cost of the national rubella vaccination campaign was US\$ 9.5 million, which included a package of interventions integrated with measles-rubella vaccination. This equals around US\$ 2.00 per person. More than US\$ 6 million of the budget was designated to procure MR-containing vaccine; the remainder was related to operational costs. Strategic partners, including PAHO/WHO, UNICEF, various agencies of the United Nations System, and non-governmental organizations, provided invaluable support to overcome budget shortfalls.

Final Considerations

The success of the national campaign to eliminate rubella and CRS in Haiti marks the final chapter of the implementation of interventions to achieve rubella elimination in the Region of the Americas. In order to verify this achievement and the attainment of high homogeneous coverage, a national coverage survey was implemented in June 2009.

As a result of the national campaign experience, routine immunization has been strengthened by ensuring that highly skilled personnel are trained on safe injection practices, waste management, cold chain, and the monitoring of events supposedly

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Health and Integration Processes in the Americas: South American TCC Project: Measles- and Rubella-free Borders

Introduction

The regional integration processes promoted by the Pan American Health Organization (PAHO/WHO) in the Americas have created a real opportunity for progress in social and health issues. In the Southern Cone, MERCOSUR is exploring the harmonization of health regulations, and the Andean Community of Nations (CAN) 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 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.

PAHO/WHO has approved over 200 TCC projects since 1998 in areas such as disease control, risk management, family and community health, environmental health, health services, and humanitarian assistance. In this article is described the first TCC to take place in South America, with an emphasis on vaccination in border areas for the elimination of rubella and congenital rubella syndrome (CRS) and the consolidation of measles elimination.

South American TCC: South American Borders Free from Measles and Rubella

Border areas are a priority for PAHO/WHO 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/WHO 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 the following: "As Argentina and Brazil are virtually the last countries in MERCOSUR to conduct mass vaccination activities to eliminate rubella and CRS, neighboring countries are requested to simultaneously conduct joint cross-border vaccination and surveillance activities in neighboring municipalities."¹

Brazil's border is 15,719 km 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 20 provinces 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."² Border migrants to Argentina exhibit varied behavioral patterns.

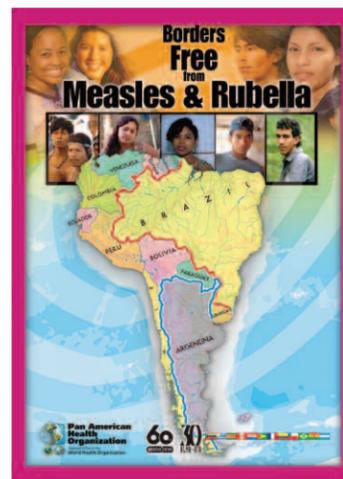
Progress

Convened in Asunción, Paraguay, from 1-2 April 2009, representatives of the National Immunization Program of the countries that share borders with Argentina and Brazil restated their commitment to maintain the borders of South America free from measles and rubella by intensifying vaccination and surveillance activities during 2009.

At the South American TCC meeting-co-organized by MERCOSUR and the Andean Health Organization (ORAS)--delegates from the Ministries of Health of Argentina, Bolivia, Brazil, Colombia, Chile, Paraguay, Peru, and Uruguay presented progress achieved through vaccination in border areas. Overall, nearly 20,000 people were vaccinated primarily in formal border crossings during August-December 2008.

Among the important outcomes from the meeting was the commitment to hold trans-border meetings to discuss the programming and evaluation of complementary activities. Each country will send a general directive to all the border municipalities to authorize these meetings. The expected results of the meetings will be outlined in the directive. Furthermore, the southern border of Brazil, the northern border of Uruguay, and the eastern border of Argentina were identified as the main risk areas. Bolivia, in turn, will support the vaccination of the Brazilian students of the universities of Benín, Santa Cruz, and La Paz, due to the high migration flow of this population at formal and informal border crossings shared by both countries.

Among the main recommendations agreed upon by the delegates was the suggestion that a permanent working group on immunization be formed within MERCOSUR and the An-



dean Community of Nations (CAN) to address subjects of mutual interest and jointly implement solutions. These subjects include an intercultural approach to vaccination in border areas, mechanisms to address vaccination in informal border crossings, and the process and flow of epidemiological surveillance data in border areas. In addition, discussion may involve establishing regional recommendations for international travelers arriving to the Americas with regard to their measles-rubella immunity, within the framework of the 2005 International Health Regulations (IHR).

Additional Activities at the Argentina-Brazil-Uruguay Border

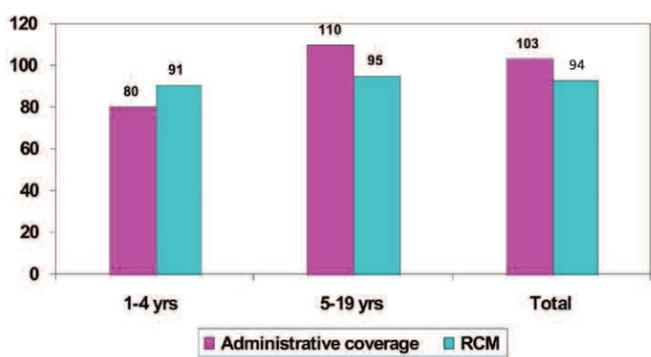
One of the areas where measles and rubella elimination is considered to be at risk is the border between eastern Argentina, southern Brazil, and northern Uruguay. Health authorities from Brazil and Uruguay recently met in the border city of Santana do Livramento to discuss specific activities to guarantee vaccination of the unvaccinated, how to handle the flow of people at borders, and coordinated 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).³ 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 homogeneous vaccination coverage in municipalities of Rio Grande do Sul, and that campaign coverage was low, resulting in a cohort of people, largely men, who would not be protected against measles and rubella.

The reasons for this low coverage include overestimation of the Brazilian population; problems with access to vaccination (hours of operation, mobile teams); little publicity about the campaign; limited human resources and logistical support; and the suspension of vaccination activities once the campaign was officially over (December 2008).

The following activities were discussed and will be conducted along the border with

Figure 2. Administrative Coverage* and Coverage Verified by Rapid Coverage Monitoring (RCM) by Age Group



*Denominator data from Haitian Ministry of Public Health and Population.

may be explained by incomplete tallying or reporting of the number of doses administered and outdated census data, as well as by the vaccination of individuals outside of the targeted age group.

The success of the campaign was obtained through the collaborative efforts of approximately 20,000 health workers (comprising over 4,400 vaccination teams; national, departmental, and local supervisors; institution heads; and campaign coordinators) and over 18,000 volunteers. Services were delivered in over 10,000 immunization posts, over 5,000 of which were located in areas difficult to access. Administrative coverage for the integrated preventative

attributed to vaccination and immunization (ESAVI); by exploring innovative social mobilization strategies to engage adolescent and young adult populations that will be useful as new vaccines are introduced; by utilizing microplanning activities to revitalize routine outreach to vulnerable populations; and by recognizing and overcoming threats to the cold chain that will ensure the quality and safety of future vaccines delivered through the routine program.

* Coverage 2eports for measles vaccine in children <1 year of age.

Reference:

¹Desinor, OY, Anselme RJP, Laender F, Saint-Louis C, Bien-Aime JE. Seroprevalence of antibodies against rubella virus in pregnant women in Haiti. Rev Panam Salud Publica. 2004;15(3):147-50.

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 mirror/border cities to discuss and coordinate joint vaccination and surveillance activities and to share data on coverage and suspected cases; and
- Increased epidemiological information sharing between Uruguay and Rio Grande do Sul (preferably electronically).

Conclusions:

The South American TCC project represented a mechanism for linking two important systems in South America: the Andean Community and MERCOSUR. It also reflected the desire of countries of the Region to integrate and was aligned with the PAHO/WHO 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/WHO because of the high vulnerability of the population living in these territories.

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

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- ² Sassone, S. M., 2002 "Problemática geodemográfica en las fronteras interiores del MERCOSUR: una mirada desde el territorio argentino", *Anales GAEA Sociedad Argentina de Estudios Geográficos - Homenaje al Dr. Raúl Rey* Balmaçada (Buenos Aires), Tomo 21-22, Vol. II (1997-2001), 213-246..
- ³ Secretaria de Vigilancia en Salud, Ministerio de Salud. Brote de Rubéola en Brasil, 2007-2008.

Several imported measles outbreaks have occurred in the Region of the Americas in recent years, with a small number of cases secondary to importation. In the period 2008-2009, there were 187 secondary cases from a total of 65 importations. In 23 cases, the source of the infection was unknown. 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 case was 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. 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 tourists or visitors to the Region.

Given the tremendous investment that countries 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.

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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 27th Pan American Sanitary Conference approved Resolution CSP27.R2 calling for the formation of an international committee responsible for documenting and verifying the interruption of endemic measles and rubella virus transmission in the Region of the Americas. The Resolution also urged Member States of the Pan American Health Organization/World Health Organization (PAHO/WHO) to establish national commissions to compile and analyze data to document and verify measles, rubella, and CRS elimination, for review by the international committee.

In this context PAHO/WHO's Comprehensive Family Immunization Project gathered a *Panel of Measles, Rubella, and CRS Experts* that met in Washington, D.C., from 27-29 August 2008. The main objective of the meeting was to discuss the essential elements, including indicators, to be incorporated into the Plan of Action for documenting and verifying measles, rubella, and CRS elimination in the Americas. Experts and health authorities from Argentina, Brazil, Canada, Colombia, Chile, the English-speaking Caribbean,



Guatemala, Mexico, Peru, and United States, PAHO/WHO immunization staff and consultants, and World Health Organization staff were in attendance.

Experts congratulated PAHO/WHO Member States for their progress towards eliminating rubella and CRS, bringing the Region closer to the process for documenting and verifying the elimination of these diseases. They highlighted the importance of taking into account the lessons learned from the global eradication of smallpox and the regional eradication of polio to gain an understanding of the main requirements of the elimination process. Among the lessons learned are the following:

1. Reliance on scientific evidence 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. Required sensitivity of surveillance.
3. Proficiency and diligence with which the national commission examines national data. In addition, provide concise roles of both national commissions and the international committee; and
4. Consider the regional elimination process in a global context.

The table on page 47 lists the experts' conclusions and recommendations.

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Measles Virus Importations: A Constant Fight for the Americas

Table 1. Imported Measles Cases, the Americas, 2008¹

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 and Switzerland
United States ²	24	102	Belgium, China, Germany, India, Israel, Italy, Philippines, Russia, Switzerland, United Kingdom, Vietnam

¹ Data as of EW 23/2009.
² In 2008, the United States reported 14 cases whose source of infection was unknown.

Table 2. Imported Measles Cases, the Americas, 2009¹

Country	Total Importations	Total Cases Associated With Importation	Source
Argentina	1 ²	2	United Kingdom
	1	0	United Kingdom
Canada	1	5	Belgium
	1	0	China
	1	0	United States
Chile	1	0	France
United States ³	22	23	Cape Verde, China, India, Italy, United Kingdom

¹ Data as of EW 23/2009.
² The case corresponds to EW 51/2008; however, the secondary cases appeared in EW 2/2009.
³ As of EW 22/2009, the United States reported 9 cases whose source of infection was unknown.



Participants from the Panel of Experts on the documentation and verification of measles, rubella, and CRS elimination. Washington, DC, August 2008.

Reasons for vaccination in borders areas

- In order to achieve rubella and congenital rubella syndrome elimination and maintain measles elimination in the Americas, the identification of groups that for socio-cultural reasons and access problems have a greater probability of being excluded from regular vaccination is crucial.
- Since border populations move from country to country, due to involvement in productive processes, agriculture, tourism, and other sectors, they have a greater probability of exclusion by remaining in neighboring countries during adolescent and adult vaccination campaigns (*speed-up* campaigns) conducted in their native countries. Furthermore, adult measles-rubella vaccination is not included in routine immunization programs.
- The exclusion of border populations can lead to pockets of measles and rubella susceptibles. Since these populations move from country to country, they have the potential to expose the Western hemisphere to a greater risk of importations and cases secondary to these importations, thus threatening the achievements gained 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 reach these vulnerable populations. This led to the development of a differentiated vaccination strategy that can be used in other regions with elimination goals.
- Finally, the health improvements among border populations through vaccination and other health services that are commonly integrated with these activities (for example, vitamin A supplementation) contributes to reducing health inequities in the Region.

Areas	Conclusions and Recommendations
Essential criteria	<ul style="list-style-type: none"> • Verification of the absence of endemic measles and rubella cases, and CRS cases resulting from endemic transmission, in all countries of the Americas for a period of at least 3 years, in the presence of high-quality surveillance. • High quality epidemiological surveillance sufficiently sensitive to catch any case, whether imported or import-related. • Analysis of protected cohorts <40 years of age demonstrate a coverage level $\geq 95\%$ • Verification of the absence of endemic measles and rubella virus strains (through viral detection) in all countries of the Americas.
Required documentation	<ol style="list-style-type: none"> 1. Sustainability of the National Immunization Program; 2. Epidemiological analysis of measles, rubella, and CRS; 3. Quality of measles, rubella, and CRS surveillance; 4. Analysis of the molecular epidemiology of detected/isolated measles and rubella viruses; 5. Analysis of vaccinated population cohorts; and 6. Linking the evidence for elimination.
Proposed indicators	<p>Measles/rubella:</p> <ol style="list-style-type: none"> 1. Annual rate of suspected measles/rubella cases: <ul style="list-style-type: none"> • $\geq 80\%$ of municipalities with >100,000 population reporting ≥ 2 cases • $\geq 80\%$ of municipalities with <100,000 population reporting ≥ 1 case 2. Percentage of suspected cases with adequate investigation: <ul style="list-style-type: none"> • $\geq 80\%$ of suspected cases were investigated within the first 48 hours after notification • $\geq 80\%$ of cases with the following 8 data points completed: sex, age or date of birth, notification date, investigation date, rash onset date, type of rash, presence of fever, and date of previous measles/rubella vaccinations* • $\geq 80\%$ of confirmed cases with follow-up of contacts for 30 days 3. $\geq 80\%$ of suspected cases with an adequate specimen 4. $\geq 80\%$ of outbreaks with adequate specimens and at least one specimen collected for virus detection/isolation. At least one detection/isolation should be carried out. <p>CRS:</p> <ol style="list-style-type: none"> 1. Annual rate for CRS suspected cases per 1,000 live births by municipality: ≥ 1 2. 100% of cases confirmed by laboratory 3. 100% of suspected cases with adequate investigation 4. 100% of confirmed cases with viral detection/isolation 5. 100% of confirmed cases with at least 2 negative tests for virus detection/isolation, after 3 months of age, with 1 month lapse between specimens <p>*When the number of doses is >0 and the information source can be verified.</p>
Surveillance aspects	<ol style="list-style-type: none"> 1. Measles and rubella active case search must be conducted on a periodic basis <ul style="list-style-type: none"> • in high-risk areas, • to detect recent circulation (within the last month), • to identify gaps in the surveillance system, and • to monitor timely and complete notification. 2. Retrospective CRS case search can be required to detect clinically compatible cases. 3. Information can be shared between countries in the following situations: <ul style="list-style-type: none"> • outbreaks occurring in several countries, • notification of importations to the country of origin, • notification of expected population movements (for example, during a sporting event).
Case classification and laboratory testing	<ul style="list-style-type: none"> • Cases must be classified by the case analysis committee after review of laboratory and epidemiology results. • Laboratory and epidemiology teams of each country must develop a specific algorithm for case classification. Components of the algorithm must include the following: (a) protocol for IgM result confirmation; (b) instructions for additional use of 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 etiologic agents.
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"> • Laboratories must maintain their participation in the global proficiency testing program for serologic testing. • Laboratories must send specimens for confirmation of testing twice a year, according to the schedule set by the PAHO/WHO Laboratory Coordinator. • All laboratories must be accredited according to the standards of the WHO Laboratory Network.
Information reporting and shipment to the strain bank	<ul style="list-style-type: none"> • Laboratories conducting virus sequencing must notify the PAHO/WHO Laboratory Coordinator as soon as information on the virus genotype is known. • Laboratories must send the genotype information to the WHO database and to the PAHO/WHO Laboratory Coordinator within two months after sequencing is complete.
Documentation process	<ul style="list-style-type: none"> • The area for documenting the interruption of endemic transmission is regional. • An international committee of experts will be formed and each country of the Region will establish national commissions. • Each country will prepare a plan of action for the documentation process and a timetable for the country evaluation for attaining the goal. • Documentation will be based on achieving and maintaining the following: <ul style="list-style-type: none"> – High measles and rubella vaccination coverage, and – Quality and efficient epidemiological and virological measles, rubella, and CRS surveillance. • 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 systematized to support the elimination process in other Regions of the world.

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Eliminating Rubella and Congenital Rubella Syndrome 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 congenital rubella syndrome (CRS) cases 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/World Health Organization (PAHO/WHO), around 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 speed-up (250 million) campaigns conducted by the countries of the Region from 1998 to 2008, while maintaining routine vaccination (Figure 1). 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, the country managed to immunize around 67 million people aged 20–39 years (95% coverage) and young people aged 12–19 years in five states: Maranhao, Minas Gerais, Mato Grosso, Rio de Janeiro, and Rio Grande do Norte. Despite many setbacks, Haiti completed its national

campaign against rubella, measles, and CRS in the age group 1–19 years, achieving 99% administrative coverage and 94% coverage verified through rapid coverage monitoring (RCM). Due to the differences in coverage results, the country has initiated a national survey in June to evaluate coverage homogeneity and identify potential areas and/or groups that have not been vaccinated. Argentina achieved 90% 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 $\geq 95\%$ coverage in all its provinces.

The Region of the Americas has made extraordinary progress towards eliminating rubella and CRS. It has limited endemic virus circulation to Argentina, a country that reported three rubella cases as of epidemiological week 4 of 2009, in Chaco Province, and two CRS cases (Figure 2). 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 to let their guard down. Maintaining measles, rubella, and CRS elimination implies many challenges for the Region, among them:

- the risk of virus importations from other

- regions of the world;
- the emergence of cases secondary to importation;
- outbreak prevention and rapid response;
- reach “the unreached” by providing a second opportunity to receive the MR vaccine through high-quality follow-up campaigns;
- strengthened the integrated surveillance system and active private-sector participation;
- monitor viral excretion in CRS cases; and
- false positive/negative results of sporadic cases and limited specimens for viral detection/isolation.

Overview of Challenges
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, say with 98.5 million, 21 million, and 20 million visitors, to North America, South America, and the Caribbean, respectively.

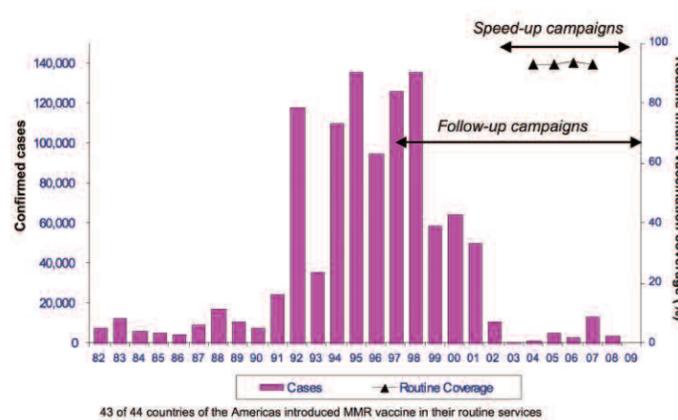
Imported cases are unavoidable. Therefore, countries must be adequately prepared and have a high-quality surveillance system in place to identify such cases. They must maintain high levels of population immunity and conduct adequate monitoring of susceptibles to limit the number of secondary cases. One way to achieve this high level of outbreak preparedness is by developing 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, with a potential risk of devastating rubella outbreaks.

Furthermore, despite country efforts to achieve high vaccination coverage in the routine program and follow-up campaigns, pockets of measles and rubella susceptibles still persist. It is therefore essential to guarantee high-quality follow-up campaigns every four or five years and achieve coverage >95%. Excluded populations, i.e., people who have never been vaccinated for various reasons, should be targeted, in an effort to promote equity. A thorough analysis of protected cohorts must be conducted to identify the population groups to vaccinate.

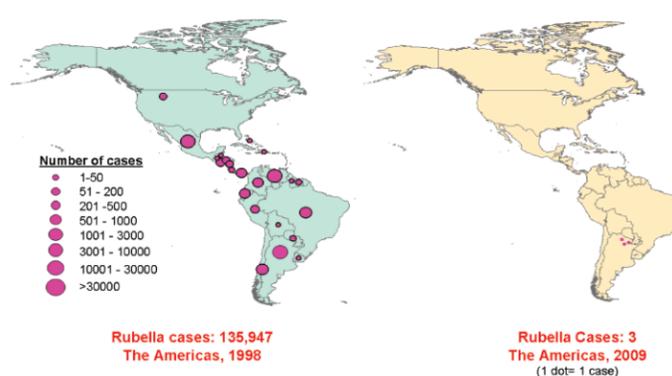
Rapid Coverage Monitoring (RCM) remains an integral element of supplemental vaccination activities and should be conducted at the end of follow up campaigns. RCM can confirm whether two doses of measles-mump-rubella

Figure 1. Rubella Elimination, The Americas, 1980-2009*



43 of 44 countries of the Americas introduced MMR vaccine in their routine services.
Source: Country reports, * Data as of EW 23/2009.

Figure 2. Impact of Rubella Elimination Strategies The Americas, 1998-2009*



* Includes rubella and measles cases reported to PAHO as of Epidemiological Week 23/2009.

Source: Country reports to PAHO.

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.

It is also imperative to monitor excretion of the virus in CRS cases. In 2008-2009,¹ 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 CRS and congenital infection cases, a specimen should be collected for viral detection after 3 months of age. 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 results, particularly suspected 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.

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 and viral genotypes, particularly for the rubella virus. 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

In October 2007, the 27th Pan American Sanitary Conference noted with great satisfaction the tremendous progress achieved towards the interruption of endemic rubella transmission and recognizing the invaluable efforts to strengthen and expand public-private partnerships, adopted 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.

To this end, PAHO/WHO developed a Plan of Action with the following six basic components:

- 1) epidemiological analysis of measles, rubella, and CRS; 2) quality of measles, rubella and CRS surveillance; 3) analysis of the molecular epidemiology of detected/isolated measles and rubella viruses; 4) analysis of vaccinated population cohorts, which includes routine vaccination coverage, follow-up campaigns, and adolescent and adult vaccination campaigns, and post-partum vaccination; 5) sustainability of the National Immunization Program; and 6) linking the

evidence for elimination. Consideration has been given to implementing the documentation and verification process over a three-year period in the presence of high-quality surveillance.

The plan will be submitted to the XVIII meeting of the Technical Advisory Group (TAG) on Vaccine-preventable diseases for recommendations. The plan will guide countries and their national commissions as they prepare and consolidate evidence that endemic measles and rubella transmission has been interrupted, using complete, consistent, valid, and representative data.

¹ Data as of EW 23/2009.

PAHO Member States

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- Argentina
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- Brazil
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- Chile
- Colombia
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- Dominican Republic
- Ecuador
- El Salvador
- Grenada
- Guatemala
- Guyana
- Haití
- Honduras
- Jamaica
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- Nicaragua
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PAHO seeks partnerships with member governments, private groups and other organization to address major public health issues. In addition to its core budget financed by quota contributions from Member States, PAHO also seeks outside funding to help implement programs and activities that advance key public health goals and respond to special needs. Voluntary tax deductible contributions for PAHO health and education projects in the Americas may be made to the Pan American Health and Education Foundation (PAHEF) PAHO's private philanthropic partner.