

ANNUAL
REPORT

2013



2013 AT A GLANCE



211 million

children were vaccinated against measles and rubella



242,000

measles and rubella samples were tested globally by our network of laboratories



84%

of children around the world under the age of five received measles vaccination



More than 250,000 volunteers were mobilized in 13 countries



80% of SIAs were integrated with other child health interventions



181 million

doses of measles & measles-rubella vaccine were procured



\$7,279,000

was used from the measles outbreak fund in 4 countries



4 more countries introduced MCV2 into their routine immunization schedule for a total of 145 countries

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EXECUTIVE SUMMARY

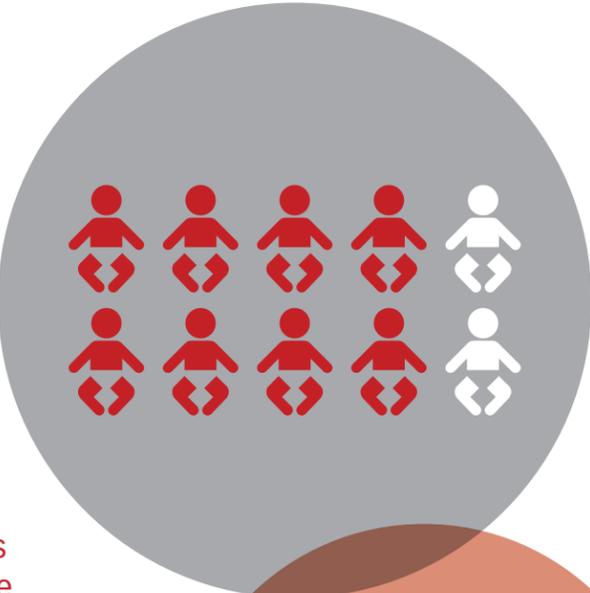
The Measles and Rubella Initiative (M&RI) is pleased to present our 2013 annual report on the global status of measles and rubella control and elimination. This year's report highlights progress and challenges under the five strategies set forth in the *Global Measles & Rubella Strategic Plan 2012 – 2020* and takes a deeper look at how countries are implementing these strategies.

The past year was a momentous one that marked the 50th anniversary of the introduction of the measles vaccine. The year 2013 also saw the World Health Organization (WHO) Region of South-East Asia (SEAR) become the final region to commit to measles elimination and rubella control by 2020.

The impact of the measles vaccine on global public health has been tremendous. Before 1963, most of the world's population caught measles by their 15th birthday, resulting in an estimated 100 million cases and over 2 million deaths annually.¹ By 2000, four decades of steadily increasing use of the vaccine saw a dramatic reduction of cases to just over half a million annually. In 2002, the Americas declared that measles was eliminated from the region.

Between 2000 and 2012, measles vaccine coverage increased to reach more than eight in ten children globally, and deaths decreased by another 78 per cent to just 122,000 in 2012. During this same time period, the number of countries providing a second dose of measles vaccine through routine immunization services increased from 96 (50 per cent) to 145 (75 per cent). Routine immunization is regularly supplemented with mass immunization campaigns, with approximately 145 million children in 33 countries vaccinated in 2012 and another 211 million children in 33 additional countries in 2013.

Measles elimination continues to leverage the polio eradication platform. In many countries, polio officers are extending their responsibilities to strengthen routine immunization activities through training of healthcare workers, providing logistics and cold chain expertise, ensuring the quality of measles campaigns and supporting district health departments in investigating and responding to measles outbreaks. Recognizing the value of these contributions, the M&RI set aside funds in 2012 to fund the salaries of surveillance networks in several countries.



Between 2000 and 2012, measles vaccine coverage increased to reach more than **eight in ten** children globally.

¹ Wolfson et al., 'Has the 2005 measles mortality reduction goal been achieved? A natural history modelling study', *Lancet* 2007; 369: 191-200



As many as
100,000
children are born with
Congenital Rubella
Syndrome (CRS) each year



Despite these positive trends, 2013 also saw significant setbacks. Outbreaks continue to threaten elimination goals in at least three regions. In Europe, outbreaks continued into late 2013, affecting primarily Georgia and Turkey but also the United Kingdom. With the disruption of health services in Syria due to ongoing conflict, reported measles cases rose from 13 in 2012 to over 700 by late 2013 spreading to Lebanon, Jordan, Iraq and Turkey. China is another country that experienced a resurgence in 2013 following a historic low in 2012, with over 27,000 cases reported through September 2013. These events illustrate the need for sustained efforts to raise and maintain high levels of immunization coverage even in areas where elimination level control has previously been attained.

In 2012, we launched a global strategic plan leveraging the success of measles control activities to deliver combined measles-rubella vaccine. WHO estimates that as many as 100,000 children are born with Congenital Rubella Syndrome (CRS) each year in developing countries. This life-altering disability develops from rubella infection during early pregnancy. The problem is also readily apparent in wealthier countries. A large rubella outbreak in Japan in 2012 resulted in more than 14,357 cases and at least 31 babies born with CRS. The urgency to address the threat of rubella is clear; eliminating acute rubella infections is the best way to prevent CRS. Last year, Cambodia, Ghana, Rwanda and Senegal introduced rubella-containing vaccine (RCV) in their programs with support from the GAVI Alliance, bringing the number of countries providing RCV to 136.

Regular M&RI funds supported supplementary immunization activities (SIAs) in 13 countries, reaching over 25 million children in the last twelve months. The year 2013 also saw the roll out of GAVI's support to SIAs for children under five in the high measles burden countries of the Democratic Republic of the Congo (DRC), Ethiopia and Nigeria. In this same year, the M&RI outbreak response fund (ORF) became operational, supporting national efforts to address outbreaks in DRC, Nigeria, Pakistan and Viet Nam.

Progress towards measles elimination is only made possible by the efforts of national programs supported by partners. These achievements would not

have been possible without the extraordinary efforts of grassroots volunteers including those from the Red Cross and Red Crescent societies, the Church of Jesus Christ of Latter-day Saints and the Lions Clubs International. In 2014, we plan to increase efforts to build even stronger links with grassroots networks and work closely with the International Paediatric Association to engage their powerful national paediatric associations.

Since 2001, over 1 billion dollars have been mobilised by the M&RI to reach 1.1 billion kids, averting more than 13.8 million deaths. To reach 2020 global measles and rubella elimination targets, it is estimated that the M&RI will require \$240 million dollars annually, over and above investment by governments and existing contributions from the polio platform.

As we celebrate the remarkable impact of 50 years of measles vaccine use, we must also highlight the enormity and importance of the work yet to be done. One in five child deaths prevented since 1990 can be attributed to the use of measles vaccination, leaving no doubt that extensive use of the measles vaccine has made a significant contribution towards Millennium Development Goal 4 (MDG 4). Yet, the disease continues to claim more than 300 children each day and based on current progress, elimination goals are unlikely to be met in the three WHO regions of Africa, Europe, and the Eastern Mediterranean.

More than ever before, realising a world without measles requires renewed commitment. Measles vaccine has the potential to save more lives between now and 2020 than all other vaccines combined.

THE MEASLES & RUBELLA INITIATIVE PARTNERS

- American Red Cross**
- United States Centers for Disease Control and Prevention**
- United Nations Foundation**
- UNICEF**
- World Health Organization**



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INTRODUCTION

More than
20 million
people are affected
by measles each year,
particularly in parts
of Africa and Asia.



ABOUT MEASLES AND RUBELLA

Measles is a leading cause of childhood mortality with serious complications including pneumonia, diarrhea and blindness, especially in infants and children under the age of five. More than 20 million people are affected by measles each year, particularly in parts of Africa and Asia. Measles outbreaks are notably devastating in emergency settings and populations emerging from natural disasters. The outbreaks associated with the ongoing Syrian crisis and following Typhoon Haiyan in the Philippines are ample evidence of rapid transmission of the disease under emergency circumstances. Acute rubella infection on the other hand is a mild disease in children and adults. For pregnant women however, particularly in the first trimester, there is a 90 per cent chance of having a foetus with congenital rubella syndrome (CRS) if she is infected with the rubella virus. The baby can be born with malformations including heart disorders, blindness, deafness or brain damage. A child born with CRS will require lifelong care and expensive treatment. Globally, an estimated 100,000 children were born with CRS in 2010.

MOVING FORWARD: THE MEASLES & RUBELLA INITIATIVE

Originally established as the Measles Initiative, the partnership is a collaborative effort of the American Red Cross (ARC), the United States Centers for Disease Control and Prevention (CDC), the United Nations Foundation (UNF), UNICEF and the World Health Organization (WHO). The Measles & Rubella Initiative mobilizes resources, provides technical expertise and assists with planning and implementation of quality supplementary campaigns. We also investigate outbreaks and provide technical and financial support for effective outbreak response. Highlighting the importance of surveillance as a cornerstone of achieving disease control and elimination, the M&RI also supports a global measles and rubella laboratory network.



194 member countries gathered at the World Health Assembly and resolved to reduce measles mortality by **95%**



THE COMMITMENTS

In 2010, the 194 member countries gathered at the World Health Assembly (WHA) and resolved to reduce measles mortality by 95 per cent from the 2000 estimate. The 2012 WHA took further action and adopted the Global Vaccine Action Plan (GVAP) committing to measles elimination in four WHO regions, rubella elimination in two WHO regions by the end of 2015 and the elimination of both measles and rubella in five WHO regions by the year 2020. The GVAP is the foundation for the M&RI *Global Strategic Plan 2012-2020* which articulates the following goals:

By the end of 2015

- To reduce global measles deaths by at least 95% compared with 2000 levels
- To achieve regional measles and rubella/congenital rubella syndrome elimination goals

By the end of 2020

- To achieve measles and rubella elimination in at least five WHO regions

The *Plan* provides clear strategies and targets for national immunization managers, working with various partners, to reach the 2015 and 2020 measles and rubella control and elimination goals.

The 2013 M&RI annual report highlights the strengths and vulnerabilities in the global effort to eliminate measles and rubella. The report is presented under each of the *Plan's* five strategies situating measles and rubella control within the broader immunization landscape. It also shines a spotlight on country and regional activities to reach every child to protect them against measles and rubella.

Measles and rubella move fast. We can and must, move faster.

LIST OF ACRONYMS

AFR	WHO African Region
AMR	WHO Region of the Americas
ARC	American Red Cross
CDC	US Centers for Disease Control and Prevention
CFR	Case fatality rate
CRS	Congenital rubella syndrome
EPI	Expanded programme on immunization
EMR	WHO Eastern Mediterranean Region
EUR	WHO European Region
GAVI	Global Alliance for Vaccines and Immunization
ICC	Inter-agency coordinating committee
IgM	Immunoglobulin M
LLIN	Long-lasting insecticide-treated bed net
M	Measles vaccine
MCV	Measles-containing vaccine
MCV1	First dose of measles-containing vaccine
MCV2	Second dose of measles-containing vaccine
MMR	Measles-mumps-rubella vaccine
MR	Measles-rubella vaccine
OPV	Oral polio vaccine
ORF	Outbreak response fund
ORI	Outbreak response immunization
RCV	Rubella-containing vaccine
RCV1	First dose of rubella-containing vaccine
RCV2	Second dose of rubella-containing vaccine
SEAR	WHO South-East Asia Region
SIA	Supplementary immunization activity
TT	Tetanus toxoid
UNF	United Nations Foundation
UNFIP	United Nations Fund for International Partnerships
UNICEF	United Nations Children's Fund
WHA	World Health Assembly
WHO	World Health Organization
WPR	WHO Western Pacific Region



REGIONAL SUMMARIES

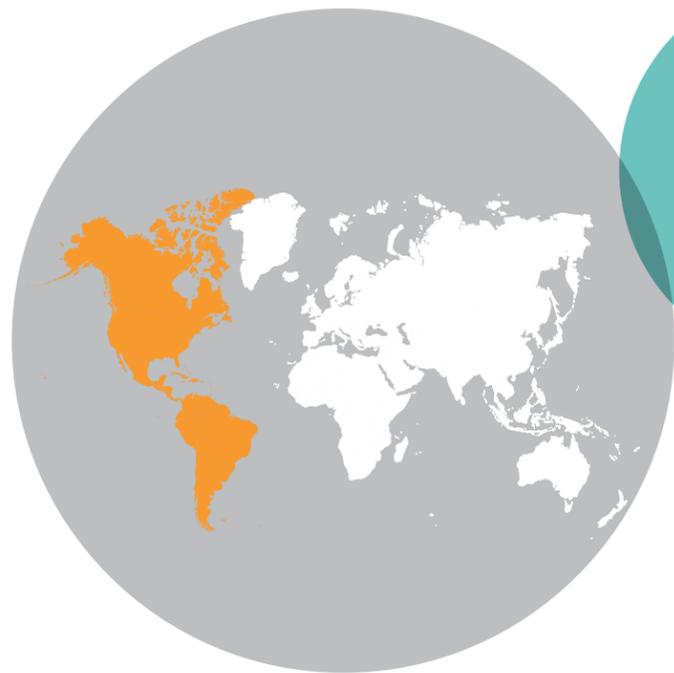


WHO AFRICAN REGION (AFR)

- Four countries (Burundi, Kenya, Sao Tome and Zambia) introduced the second dose of measles-containing vaccine (MCV2), with Kenya using their own resources; four more countries plan to introduce MCV2 in 2014
- Improved quality of SIAs, with expanded use of “best practices,” followed by post-campaign coverage surveys
- Cape Verde held a successful MR SIA targeting those aged 9 months to 24 years of age with over 95 per cent coverage in all districts documented by survey; the campaign had notably high level political support
- Ghana, Rwanda and Senegal introduced rubella-containing vaccine (RCV) into their routine immunization programs following well planned and high quality MR SIAs
- The Third Regional Measles Technical Advisory Group (TAG) met and addressed a wide range of challenges including how to improve routine measles coverage, SIA quality, and surveillance performance

CHALLENGES

- Stagnating coverage with first dose of measles vaccine (MCV1) in routine at a regional average of 74 per cent
- Perennial challenge of mobilizing funds for follow up SIAs by national governments - in 2013, six AFR countries mobilized the M&RI target of 50 per cent coverage for necessary operational costs
- Costs continue to increase for follow up SIAs given the need to target wider age groups
- Large outbreaks which are symptomatic of continuing difficulties reaching children in Democratic Republic of the Congo (DRC), Ethiopia and Nigeria



AMR
 Low measles, mumps, and rubella coverage in 2012 continued into 2013

WHO REGION OF THE AMERICAS (AMR)

- Maintained measles elimination since 2002 and rubella/CRS elimination since 2009
- Integrated epidemiological surveillance of measles/rubella met nearly all of the performance indicators for 2013 (more than 80 per cent)
- Achieved high quality surveillance to document the interruption of transmission of measles and rubella viruses (elimination) and to detect importations
- Developed and validated a protocol and instruments for external assessments of surveillance systems
- Developed standardized guidelines for post-elimination outbreak investigation and response. National surveillance officers from 29 countries trained in preparation for the 2014 World Cup in Brazil
- El Salvador, Haiti and Honduras implemented AMRO's protocol for rapid monitoring of vaccination to ensure all eligible children vaccinated in SIAs
- Guatemala implemented a national measles-rubella (MR) follow up campaign reaching 1,713,917 children aged 1-5 years with final coverage of 98 per cent

CHALLENGES

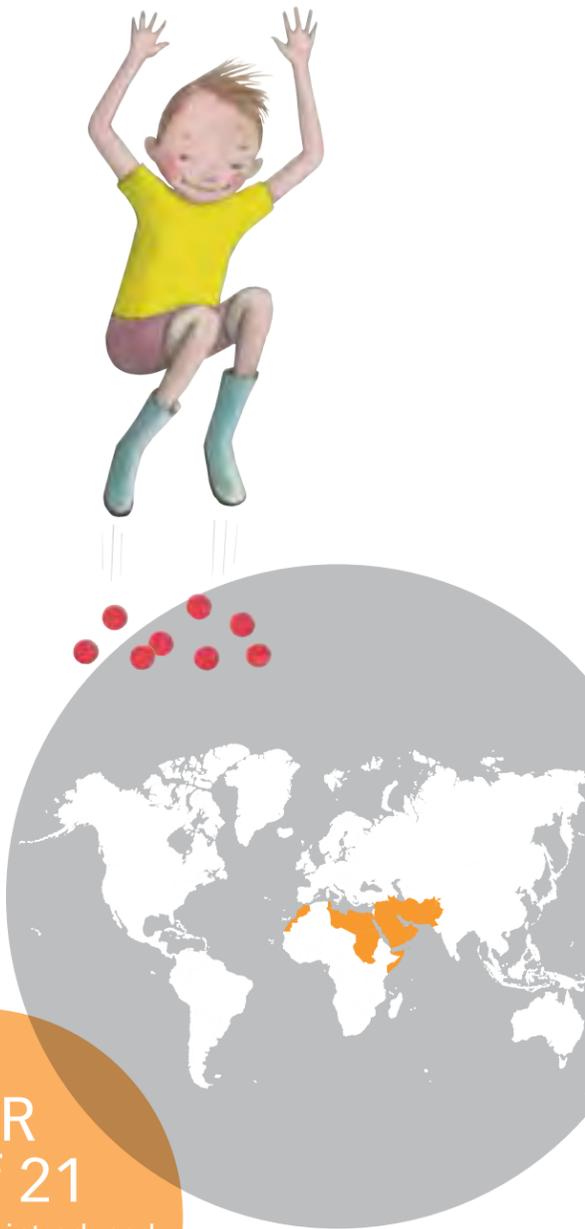
- Continuing gaps in CRS surveillance in some countries
- Sub-optimal AMR regional technical capacity to guide and coordinate country activities
- Low measles, mumps, and rubella (MMR) coverage in 2012 continued into 2013

WHO EASTERN MEDITERRANEAN REGION (EMR)

- 20 out of 21 countries in the region have introduced MCV2 in their routine immunization schedules since 2012
- In 2013 more than 62 million children were vaccinated through measles SIAs in Afghanistan, Djibouti, Pakistan, Somalia, Sudan and Yemen, in addition to measles outbreak response campaigns conducted in Jordan, Syria, Lebanon and Morocco
- 16 of 21 countries have introduced the rubella vaccine into their EPI schedule and 13 have developed a national target for rubella and CRS elimination
- 13 countries achieved coverage of more than 90 per cent with first dose of rubella-containing vaccine (RCV1) in 2012 as reported in 2013
- All countries have moved to case-based measles surveillance with laboratory confirmation; for 20 countries, surveillance is nationwide while in Somalia the surveillance is in selected sentinel sites

CHALLENGES

- Large measles outbreaks in Pakistan, Sudan and Lebanon
- Unprecedented events including conflicts and compromised security, massive population displacement, floods, and famine have negatively affected implementation of SIAs, field visits for supervision, monitoring and evaluation, supplies and logistics.
- The crisis in the Syrian Arab Republic and the influx of refugees to neighboring countries was associated with measles outbreaks in the Syrian Arab Republic, Iraq, Jordan and Lebanon which had all previously reported zero or very low measles incidence over the preceding three years
- Measles epidemiological and molecular surveillance did not meet the standard required to support validating measles elimination in most countries that have established nationwide surveillance



EMR
 16 of 21 countries have introduced the rubella vaccine into their EPI schedule

SEAR
Commitment established to eliminate measles and control rubella/CRS

WHO SOUTH-EAST ASIA REGION (SEAR)

- Regional commitment established to eliminate measles and control rubella/CRS by 2020
- Regional Surveillance Standards Workshop on measles and rubella/CRS was held to achieve consensus on the indicators to monitor progress towards the 2020 goal and agreement on the quality indicators for measles and rubella/CRS surveillance
- The polio Surveillance Medical Officer network in India, Nepal and Bangladesh supporting the improvements of routine immunization services and reinforcing surveillance for other vaccine preventable diseases

CHALLENGES

- A preliminary estimate projects the cost to be in excess of USD \$800 million for the region to achieve its measles and rubella goals
- Expansion of laboratory network will be needed in almost all countries to strengthen the quality of measles/rubella surveillance
- Several large population countries still need to introduce rubella vaccine and scale up MCV2
- Countries will need additional financial resources as well as technical support to move from outbreak surveillance to case-based surveillance with laboratory or epidemiologically linked confirmation of all cases

WPR
Only 6 measles cases per million in 2012 hit a historic low



WHO EUROPEAN REGION (EUR)

- Over two-thirds of countries reported less than five cases per million population and one-third reported less than one case per million population
- Released new Guidelines for measles and rubella outbreak investigation and response in the WHO European Region to reach the elimination goal
- Released Measles and Rubella Elimination 2015: Package for accelerated action 2013-2015 outlining necessary actions to be taken by countries and partners in order to reach the 2015 elimination goal
- Georgia rolled out two SIAs in response to a measles outbreak; the first reaching 90 per cent of the target group of more than 50,000 individuals and the second to reach another 100,000 people

CHALLENGES

- Not on track to achieve the 2015 target date for the elimination of measles and rubella based on reported 2013 outbreak numbers
- Despite the regional elimination goal, competing public health priorities have led to insufficient political commitment to close immunity gaps
- Many countries have significant subgroups that do not access vaccination services for philosophical, religious, or cultural reasons
- Large rubella outbreaks in older age groups in countries where immunization campaigns are politically and financially challenging

WHO WESTERN PACIFIC REGION (WPR)

- An incidence rate of only six measles cases per million in 2012 hit a historic low for the region
- SIAs were conducted in Cambodia, Federated States of Micronesia and Vanuatu
- Introduction of rubella vaccine into routine immunization in Laos and Solomon Islands
- Finalization of the Guidelines on Verification of Measles Elimination and submission of the first annual progress reports from 14 countries and areas
- Establishment and training of a Sub-Regional Verification Commission for the Pacific islands

CHALLENGES

- Outbreaks in China, Lao People's Democratic Republic (Laos), Philippines and Viet Nam
- MCV2 not yet included in Laos, Papua New Guinea (PNG), Solomon Islands and Vanuatu
- Rubella routine immunization not yet included in Cambodia, PNG, Vanuatu, and Viet Nam
- Surveillance quality not meeting standard performance indicators in the Pacific islands, PNG, and Viet Nam



OUR STRATEGIES IN ACTION

VACCINATE MORE

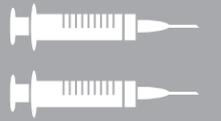
STRATEGY 1

Achieve and maintain high levels of population immunity by providing high vaccination coverage with two doses of measles, or measles-rubella-containing vaccines

Because measles is highly infectious and will easily find pockets of non-immune populations, the WHO recommends that measles vaccine coverage, or measles-rubella vaccine if introduced, must reach or exceed 95 per cent with each of the two doses nationally; and in every district to reach measles and rubella elimination goals.

While many countries have made tremendous progress towards increasing population immunity, global coverage has been stagnant since 2009 at approximately 84 per cent (MCV1). Increased effort is required to accelerate progress and achieve recommended coverage at national and district levels.

During 2013, approximately 211 million children received MCV during SIAs conducted in 33 countries. Among these SIAs were the first ones to benefit from the GAVI Alliance (GAVI) support. GAVI funded measles SIAs in DRC, Ethiopia and Nigeria which reached approximately 52 million children, while the measles-rubella SIAs in Cambodia, Ghana, Rwanda and Senegal reached approximately 26 million children. To ensure high quality SIAs, the M&RI supported these same seven countries with technical assistance for planning and preparations, monitoring and evaluations. Given the epidemiology in DRC, the M&RI topped up GAVI support to extend the target age to include children up to 9 years of age. In Nigeria, M&RI funds contributed to the outbreak response campaign and allowed planning and preparations for the nationwide preventive campaign to start in the period before GAVI funding was available. For the planned GAVI funded measles SIA in Pakistan anticipated in the second quarter of 2014, the M&RI will be joining the national and provincial governments to purchase vaccines and injection devices to extend the target age range to cover children up to 9 years of age.



WHO recommends that measles vaccine coverage must reach or exceed 95% with each of the **two doses** nationally

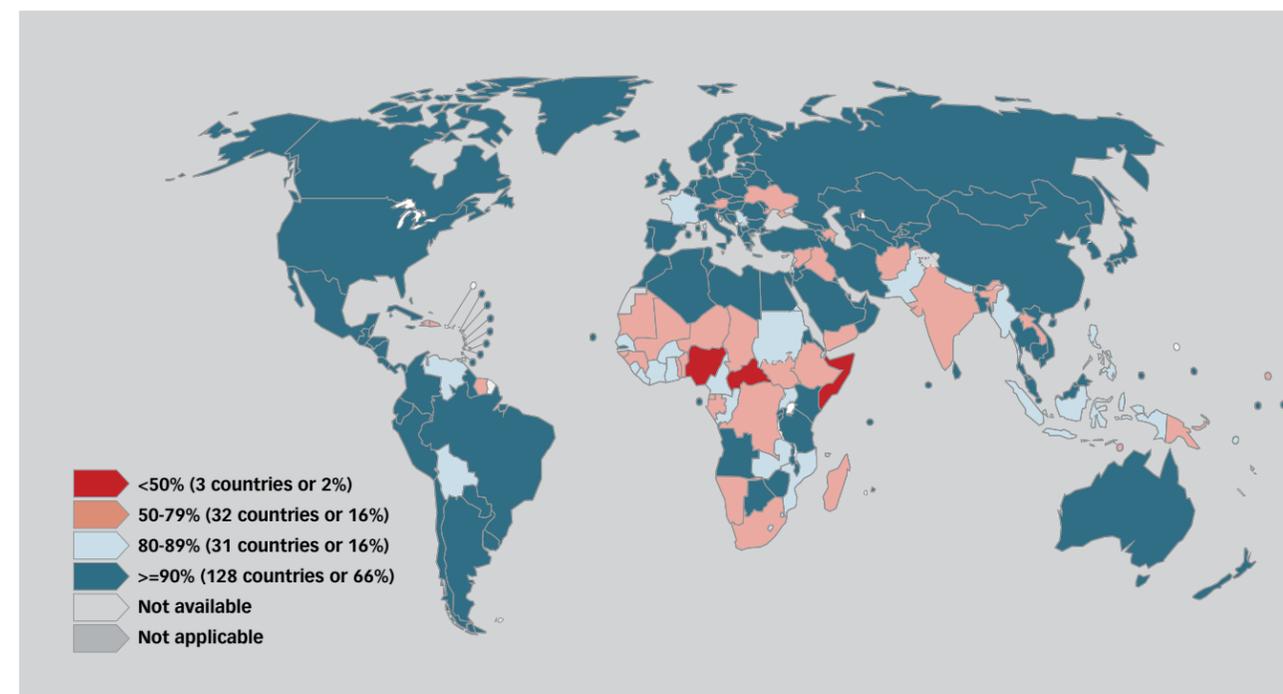
TABLE 1. ESTIMATES OF COVERAGE WITH THE FIRST DOSE OF MEASLES-CONTAINING VACCINE ADMINISTERED THROUGH ROUTINE IMMUNIZATION SERVICES AMONG CHILDREN AGED 1 YEAR, REPORTED MEASLES CASES AND INCIDENCE, AND ESTIMATED MEASLES MORTALITY, BY WORLD HEALTH ORGANIZATION REGION, 2000 AND 2012, WITH PRELIMINARY SURVEILLANCE DATA FROM 2013

WHO REGION	2000					2012/2013								
	% COVERAGE WITH THE FIRST DOSE OF MEASLES-CONTAINING VACCINE *	% MEMBER STATES WITH COVERAGE ≥90%	NUMBER OF REPORTED MEASLES CASES **	MEASLES INCIDENCE (CASES PER MILLION POPULATION) †,‡	ESTIMATED MEASLES DEATHS (95% CI)	% COVERAGE WITH THE FIRST DOSE OF MEASLES-CONTAINING VACCINE IN 2012 * 0	% MEMBER STATES WITH COVERAGE ≥90%	NUMBER OF REPORTED MEASLES CASES IN 2013 **	% DECLINE FROM 2000	MEASLES INCIDENCE (CASES PER MILLION POPULATION) †, ‡	% DECLINE FROM 2000	ESTIMATED MEASLES DEATHS IN 2012 (95% CI)	% MORTALITY REDUCTION 2000 TO 2012	% TOTAL MEASLES DEATHS IN 2012
African	53	9	520,102	841	354,900 (225,000-636,000)	73	32	160,324	69	174	79	41,400 (13,900-148,500)	88%	34%
Americas	93	63	1,755	2.1	<100	94	83	422	76	0.4	79	<100	-	0%
Eastern Mediterranean	72	60	38,592	90	53,900 (32,500-85,700)	83	57	16,194	58	26	71	25,800 (17,500-42,200)	52%	21%
European	91	60	37,421	50	300 (100-1,200)	94	87	26,397	29	29	41	100 (0-1,300)	64%	0%
South-East Asia	65	30	78,558	51	141,200 (105,800-186,400)	78	55	13,914	82	23	55	52,700 (34,400-79,100)	63%	43%
South-East Asia (excluding India)	77	-	39,723	80	84,300 (67,800-103,200)	88	-	13,914	65	23	71	36,200 (25,600-48,800)	57%	30%
India	59	-	38,835	37	56,900 (38,000-83,200)	74	-	0	100	-	-	16,500 (8,800-30,300)	71%	14%
Western Pacific	85	41	177,052	105	12,100 (6,800-48,500)	97	74	29,737	83	16	85	2,000 (100-37,400)	84%	2%
TOTAL	73	43	853,480	146	562,400 (370,200-957,900)	84	66	246,988	71	42	71	122,000 (65,900-308,500)	78%	100%

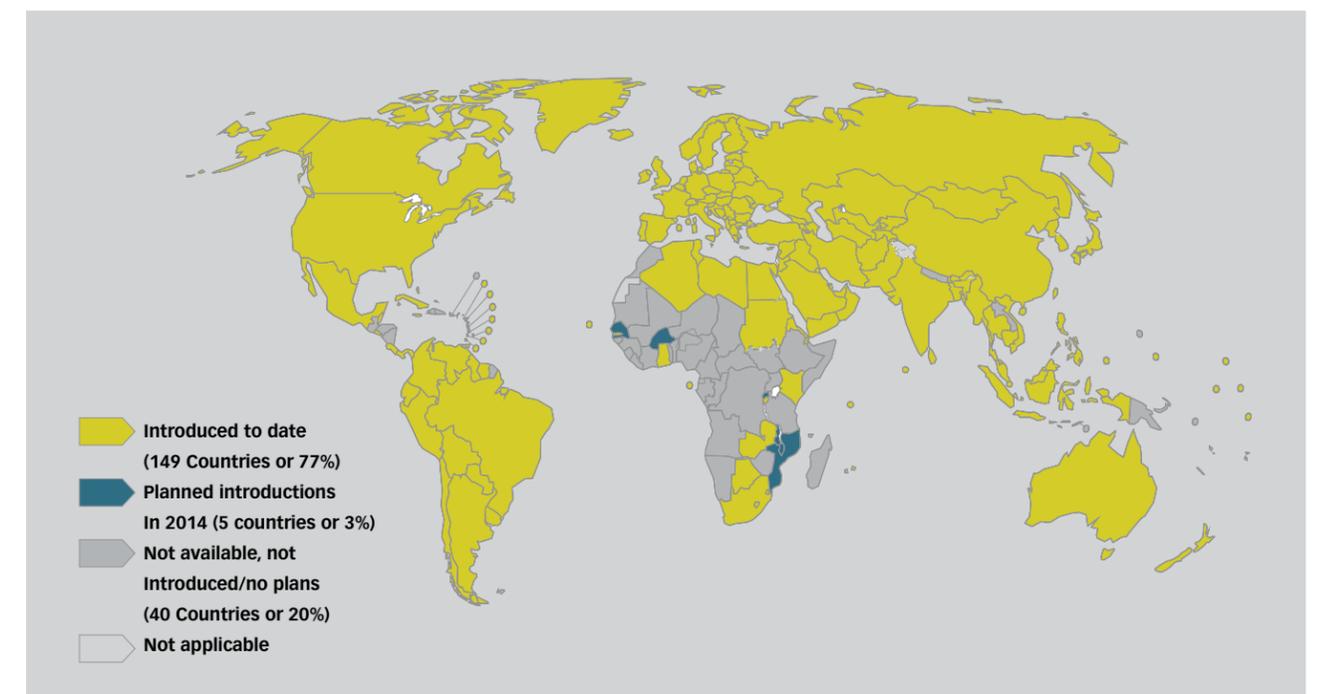
* Coverage data: WHO/UNICEF estimates of national immunization coverage. Geneva, World Health Organization, 2013 (update of 13 July 2013). (Available at http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tswucoveragecmv.html, accessed 9 December 2013)
 ** Reported case data: Measles reported cases. Geneva, World Health Organization, 2012 (update of 13 July 2013) (http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tsincidencemeasles.html, accessed 9 December 2013) Americas data for 2012 from Measles/rubella/congenital rubella syndrome surveillance data final classification, 2012. (update 25 September 2013) (http://ais.paho.org/hip/viz/im_vaccinepreventablediseases.asp, accessed 9 December 2013)

† Population data: United Nations, Department of Economic and Social Affairs, Population Division (2013). World Population Prospects: The 2012 Revision, CD-ROM Edition
 ‡ Any country not reporting data on measles cases for that year were removed from both the numerator and denominator

IMMUNIZATION COVERAGE WITH MEASLES CONTAINING VACCINES IN INFANTS, 2012



COUNTRIES USING MEASLES SECOND DOSE VACCINE TO DATE; AND PLANNED INTRODUCTIONS





INDIA

The measles catch up campaigns reached approximately **119 million** children

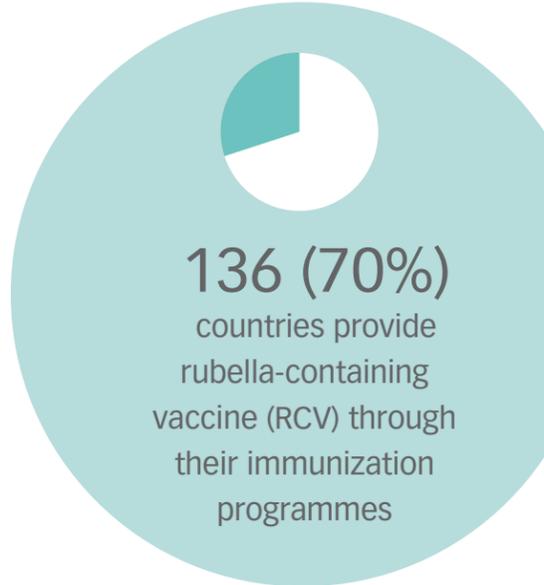
To accelerate measles control in India, a policy decision was made in 2010 to increase population immunity by reaching more children with a first dose of measles vaccine and a second dose of measles vaccine at 16 to 24 months of age. Laboratory supported surveillance was adopted to monitor progress and identify areas and populations with suboptimal immunity. 2013 saw the completion of the rolling catch up campaigns targeting all children 9 months to 10 years in the 14 States whose routine MCV1 was below 80%. The measles catch up campaigns reached approximately 119 million children. Subsequently,

these same States will introduce MCV2 in their routine programme. The surveillance data to date indicates that the measles catch up campaigns have reduced circulating measles virus and measles cases. Reported measles cases fell from 10,308 in 11 States reporting data in 2011 to 4,834 in 15 States reporting data in 2013. While laboratory supported measles surveillance from all States and Union Territories will not be available until the end of 2014, it's clear that the measles catch-up campaigns have reduced measles transmission.

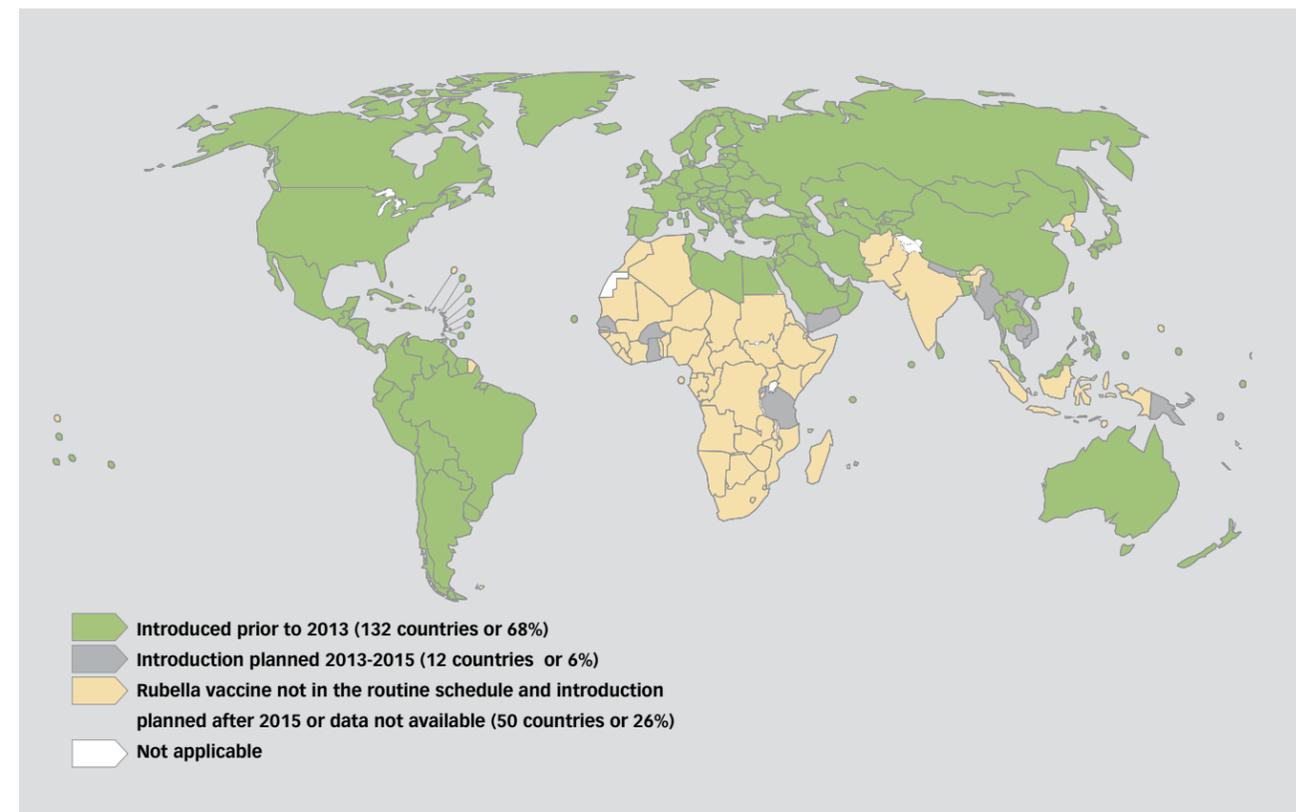
RUBELLA INTRODUCTION

As of December 2013, 136 (70 per cent) countries provide rubella-containing vaccine (RCV) through their immunization programmes; a 36 per cent increase from 99 countries in 2000. The M&RI continued to provide expert technical support to countries introducing RCV, and to monitor RCV progress in follow up campaigns in countries that have already introduced rubella vaccines. Cambodia, Nepal, Senegal, and Solomon Islands introduced RCV into their routine programmes in 2013; while Rwanda, with financial support from GAVI, became the first sub-Saharan Africa country to conduct a measles-rubella campaign. Ghana, Cambodia and Senegal followed thereafter.

Over the next four years, M&RI partners will support an increasing number of countries introducing RCV while GAVI has committed to finance 49 of the 59 countries that do not provide RCV in their national immunization programmes.



DISTRIBUTION OF COUNTRIES USING RUBELLA VACCINE IN THEIR ROUTINE IMMUNIZATION SCHEDULE IN 2012 AND COUNTRIES PLANNING INTRODUCTION DURING 2013-2015



CAMBODIA



"It was needed in order to have healthy babies."

The 2013 measles and rubella SIAs in Cambodia targeted all children from 9 months to 14 years of age. This was the largest single public health intervention ever held in the country.

Meet Pong Ro, a 12 year old student at Pearaing Secondary School, Prey Veng Province. She is one of the 4.5 million children in Cambodia vaccinated with the measles-rubella vaccine in 2013. For Pong Ro, the media and public awareness campaign helped her and others in the school appreciate

the benefits of the vaccine, particularly the rubella protection.

When the M&RI external monitors visited the site, Pong Ro was asked if she knew why this vaccine was important. She replied that, "It was needed in order to have healthy babies," referring to the rubella component of the vaccine, adding that she had learnt this through local television announcements.

PROCUREMENT OF VACCINES AND INJECTION DEVICES AND VACCINE SECURITY

In 2013, UNICEF Supply Division (SD) procured more than 330 million doses of measles monovalent (MV), measles and rubella (MR) and measles, mumps and rubella (MMR) vaccines for both routine immunization and SIAs for 72 countries. The number of doses of monovalent measles vaccines delivered was nearly twice the number forecasted at the beginning of the year with additional demands of 33 million doses for routine, 98 million doses for SIAs, and 16 million doses for outbreak response and emergency campaigns. Similarly, combined measles and rubella vaccine (MR) demand increased sharply from 9 million doses in 2012 to over 100 million doses in 2013 as a result of GAVI supported MR campaigns. See the Annex for more information on UNICEF Supply Division procurements.

SD also dealt with emergency requests from countries who have not traditionally procured through UNICEF, meeting these demands through close coordination with the M&RI, the GAVI Alliance, and industry. However, the high proportion of orders requiring shipment in the third and fourth quarter placed a heavy burden on the system. Currently, the MCV market landscape does not meet vaccine security requirements to ensure an uninterrupted and sustainable supply of affordable, quality vaccines. There is only a single manufacturer producing WHO prequalified MR vaccine. This same manufacturer is also the largest supplier of MV vaccine and new MCV manufacturers are not likely to be prequalified before 2016. Maintaining effective cooperation between UNICEF Supply Division and the current manufacturer is critical to safeguarding supply and availability. Demand for MCVs is anticipated to remain high for the next five years.

Injection devices and safety boxes experienced growth and turbulence in demand, similar to vaccine supply, and further complicated by the longer lead times associated with sea shipments. Variances in forecasts in terms of quantities and timing, multiple large campaigns scheduled in close succession, and late funding availability all increased the risk of delays. While industry responded positively to the surge in demand, providing all materials in a timely manner required partial consumption of emergency response buffers. Improved planning and forecasting, and early release of funds (as injection devices and safety boxes are a relatively low portion of the total cost) to compensate for the longer lead times associated with sea shipment can improve supply security.



Combined measles and rubella vaccine (MR) demand increased sharply from 9 million doses in 2012 to over **100 million** doses in 2013



MEASLES AND RUBELLA CONTROL AND ROUTINE IMMUNIZATION

The Global Vaccine Action Plan (GVAP) calls for measles elimination in five WHO regions by 2020, which can only be achieved with timely vaccination of 95 per cent of children with two doses of measles vaccine reaching every segment of society, including the poor, marginalized and the hard to reach.

The prevention of measles not only averts deaths directly associated with the disease, but also reduces socio-economic impact as well. Measles takes children out of school and parents or caregivers lose precious income when they stay home to care for sick children.

Many countries have included measles vaccination coverage as a marker for development. Given that measles is the last vaccine in the immunization schedule in most developing countries, achieving high rates of measles vaccination coverage can be a yardstick for national immunization programs. Measles outbreaks often serve as an early and visible signal of faltering program performance and addressing these can help guide overall improvements.

Just as measles and rubella control have leveraged the polio eradication platform, measles elimination activities have important synergies for other elements of child survival. Building a measles elimination program improves the capacity to collect and analyse surveillance data for program monitoring. The wider application of a second dose of measles vaccine during the second year of life offers opportunities for other interventions such as a fourth dose of DPT3 and polio vaccines, administration of vitamin A and deworming medicines, distribution of insecticide-treated bed nets and growth monitoring.

Supplementary immunization activities for measles have also been used in many countries to improve micro planning, logistics capacity and field supervision. Micro plans developed for measles SIAs have been used to plan outreach immunisation activities. In the preparatory phase, health workers undergo refresher training on immunization practices and supportive supervision. SIAs typically include cold chain capacity assessments and provide opportunities to procure and/or repair cold chain equipment. Campaign rapid convenience surveys have also been used to identify unreached, underserved, or other marginalized populations. As with the addition of a second dose of measles vaccine, SIAs provide opportunities for other child survival interventions particularly in areas with limited access to health services. In 2013, 80 per cent of SIAs included additional child health interventions (see table 2).



In 2013, **80%** of SIAs included additional child health interventions



GUATEMALA

In 2013, Guatemala implemented a national measles and rubella follow-up campaign reaching 1,713,917 children aged 1 to 5 years, reaching a final coverage rate of 98 per cent. Other health interventions were administered including 354,312 doses of Vitamin A, 332,937 doses of deworming medication and 574,013 doses of oral rehydration solution.

Guatemala has a large indigenous Maya population so tailored vaccination strategies were developed for this cultural context. Mayan healthcare workers were trained to administer vaccine and other child health services. Community leaders also played a key role to establish vaccination sites in areas where people congregate, such as churches, schools, community centres and even in homes. Mayan mothers were strongly committed to the campaign and helped guide vaccination teams during the door-to-door strategy to ensure that all children received the MMR vaccine.

TABLE 2: MEASLES SUPPLEMENTARY IMMUNIZATION ACTIVITIES (SIA) AND THE DELIVERY OF OTHER CHILD HEALTH INTERVENTIONS BY COUNTRY AND WORLD HEALTH ORGANIZATION (WHO) REGION, 2013

WHO REGION/ COUNTRY	AGE GROUP TARGETED	EXTENT OF SIA	CHILDREN REACHED IN TARGETED AGE GROUP		OTHER INTERVENTIONS DELIVERED					
			NO.	(%)	RUBELLA VACCINE	ORAL POLIO VACCINE	VITAMIN A	DEWORMING MEDICATION	TETANUS TOXOID VACCINATION	
AFRICA										
Botswana	9-59 M	National		198,341	(94)					
Cape Verde	9 M-24 Y	National		240,166	(95)	Yes				
Cent African Rep	9-59 M	National		665,469	(87)		Yes	Yes	Yes	
Comoros	9-59 M	National		85,516	(86)			Yes	Yes	Yes
Congo Rep	6-59 M	National		726,979	(92)				Yes	
Democratic Republic of the Congo	9 M-9 Y 9 M	Rollover-national		12,160,677	(101)		Yes	Yes	Yes	
Ethiopia	9-59 M	National		11,609,484	(98)		Yes			
Ghana	9 M-14 Y	National		11,062,605	(99)	Yes				
Lesotho	9-59 M	National		147,676	(72)		Yes	Yes	Yes	
Madagascar	9-59 M	National		3,316,542	(92)				Yes	Yes
Malawi	9-59 M	National		2,405,018	(105)		Yes	Yes	Yes	
Mozambique	6-59 M	National		4,074,389	(102)				Yes	
Nigeria	6-59 M	National		31,777,071	(94)		Yes		Yes	
Rwanda	9 M-14 Y	National		4,391,081	(103)	Yes	Yes	Yes	Yes	
Senegal	9 M-14 Y	National		6,097,123	(101)	Yes				
South Africa	6-59 M	National		4,186,192	(100)		Yes			
Swaziland	6-59 M	National		119,207	(97)		Yes	Yes	Yes	
Togo	9 M-9 Y	Rollover-national		1,641,635	(96)			Yes	Yes	
AMERICAS										
Guatemala	1-5 Y	National		1,713,917	(98)	Yes	Yes	Yes	Yes	
EASTERN MEDITERRANEAN										
Afghanistan	9-59 M	Sub-national		875,874	(85)		Yes			Yes
Jordan	9 M-14 Y 6 M	National		4,000,936	(102)	Yes	Yes	Yes		
Lebanon	9 M-18 Y 9 M	National		662,616	(88)	Yes				
Morocco	9 M-19 Y	National		10,191,571	(91)	Yes				
Pakistan	9 M-9 Y	Sindh and Punjab		32,024,096	(103)		Yes			
Somalia	9-59 M	Child Health Days and SIAs in newly accessible areas		744,077	(85)		Yes	Yes	Yes	Yes
Sudan	9 M-14 Y	National		14,976,050	(98)		Yes	Yes	Yes	
Syria	6-10 Y 12-15 Y	Sub-national		1,549,105	(80)	Yes				
Yemen	6-59 M	Sub-national		102,255	(62)					
EUROPEAN										
Georgia	9 M-10 Y	National		31,385	(49)	Yes				
SOUTH EAST ASIA										
India	9 M-10 Y	Rollover-national		33,640,721	(82)					
WESTERN PACIFIC										
Cambodia	3 - 14 Y	National		4,576,633	(105)	Yes		Yes	Yes	
Micronesia	6-35 M	National		3,435	(95)	Yes				
Vanuatu	12-59 M	National		33,604	(102)	Yes				
TOTAL				200,032,446						

STRENGTHENING ROUTINE IMMUNIZATION SERVICES IN CAMBODIA

The 2013 measles-rubella SIA in Cambodia served as an opportunity to assess the routine immunization status for children living in high risk communities. Before the SIA, yellow card checks occurred in more than 1,740 high risk villages identified by provincial and district health workers.

Checks were completed by vaccination teams going house to house identifying children between 12-23 months and asking caregivers to present a yellow card to verify if each child received three doses of pentavalent vaccine plus a measles dose at age 9 months.

Results were consolidated at the national level and villages were classified as "high," "medium" or "low risk" using the proportion of children fully vaccinated to the number of children found to be partially vaccinated.

The yellow card check exercise provided vital information for the national immunization program, provinces and immunization program managers to understand the issues behind underutilization of routine immunization services, to plan for corrective actions and develop specific strategies and micro plans for high risk communities.



WATCH CLOSELY

STRATEGY 2

Monitor disease using effective surveillance and evaluate programmatic efforts to ensure progress

Effective program monitoring requires case based surveillance with laboratory confirmation of suspected measles cases. During 2004-2012 the number of member states using case based surveillance increased from 120 (62 per cent) to 187 (96 per cent).

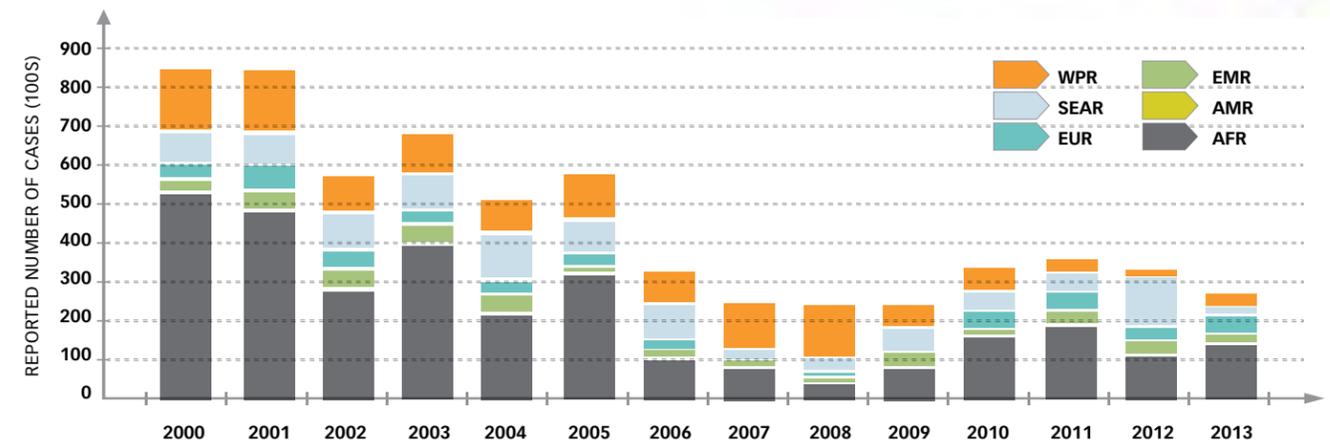
As a result of vaccination efforts, the global number of reported measles cases has fallen from 359,267 in 2011 to a historic low of 226,722 in 2012. The global incidence of measles cases decreased by 37 per cent, from 52 to 33 cases per million population per year. All WHO regions experienced a decrease in 2012, following three years of increasing numbers of cases (Table 1).

However, preliminary reports from 182 countries in 2013 suggest that cases are slightly up again from 2012 with 259,875 reported through October 2013, noting that India has not yet reported. The increase in 2013 is concentrated in just five countries. In Nigeria, reported cases sharply rose from 6,447 in 2012 to 55,335 by October 2013; China reported an increase from 6,183 reported cases in 2012 to 27,825 by October 2013; Democratic Republic of the Congo has seen numbers grow from 72,029 to 89,108 reported cases; Georgia from 31 to 7,830 reported cases and Turkey with 7,371 cases in 2013.

In these countries, the preliminary increases in reported case numbers for 2013 reflect coverage gaps within routine immunization systems, delays in implementing SIAs and suboptimal SIA quality due to complacency.



REPORTED MEASLES CASES BY WHO REGION, 2000-2013*



CHINA



The number of measles cases dropped from **130,000** in 2008 to **6,000** in 2012



China has made remarkable progress toward the elimination of endemic measles transmission. The number of measles cases dropped from 130,000 in 2008 to 6,000 in 2012. However, beginning in late 2012 and continuing through the first half of 2013, the country experienced persistent transmission, threatening elimination goals. In the first half of 2013, there were 16,000 cases of measles, exceeding the total number of cases for all of 2012.

In June 2013, an international team of consultants working with national counterparts visited eight provinces. The team observed that China's immunization program was sound but closer review of the data revealed gaps that likely contributed to the surge.

Most of the cases were in children and adults who had not received two doses of MCV and program implementation was not uniform in all provinces or at all levels. Reasons for this varied, reflecting China's significant diversity in people and health systems. Increasing population movement and urbanization have also posed challenges to healthcare systems trying to enroll children into vaccination programs. At the same time, health care providers often do not take advantage of opportunities to vaccinate children who present for acute care. Transmission of

measles also seemed to be occurring in healthcare settings in some outbreaks. These gaps result in significant immunization delays with many children never receiving their second dose of measles vaccine; over time, a sizable number of susceptible individuals accumulate in all age groups.

The team also felt that local immunization programs would benefit from data that could be gathered during measles outbreak investigations. The current outbreak response strategy involves vaccination of persons in the immediate vicinity of cases, regardless of their immunization status. However, a more effective strategy would be to conduct thorough case investigations to identify immunity gaps and programmatic weaknesses, and then intervene specifically to improve routine coverage.

China is very close to eliminating measles and the 2014-2015 period is critically important. The country faces unique challenges due to the diversity of measles epidemiology and health systems across the country. Success will depend on making further improvements in surveillance, decreasing delays in vaccination by taking every opportunity to vaccinate, and collecting data to inform further implementation refinement.

HOW POLIO SURVEILLANCE MEDICAL OFFICERS (SMO) STRENGTHEN MEASLES SURVEILLANCE AND ROUTINE IMMUNIZATION IN SEAR COUNTRIES

During its successful elimination of polio from SEAR, the Global Polio Eradication Initiative (GPEI) has built a large infrastructure for surveillance and reaching high levels of vaccine coverage. Many of the lessons learned from GPEI are now being applied to measles and rubella elimination.

In addition to India, other regional vaccination programs are already benefiting from the polio legacy. In Myanmar and Nepal, polio SMOs train healthcare workers on measles and rubella case based surveillance and support measles outbreak investigations. They also support routine immunization with logistics, micro planning, advocacy and social mobilization, data analysis, training of health staff on injection safety, service

delivery, and vaccine and cold chain management.

The polio SMO network in Bangladesh has been supporting measles surveillance since 2003. SMOs have also supported training, planning, and post introductory monitoring for introductions of new vaccines such as hepatitis B, pentavalent vaccine, MR vaccine and MCV2.

Repurposing and expanding the role of workers in the polio eradication program taps into the vast body of experience accumulated over the past 25 years. This expansion of the SMO role has enabled many countries to achieve important milestones with measles elimination and routine immunization more rapidly.

MEASLES AND RUBELLA LABORATORY NETWORK IN 2013

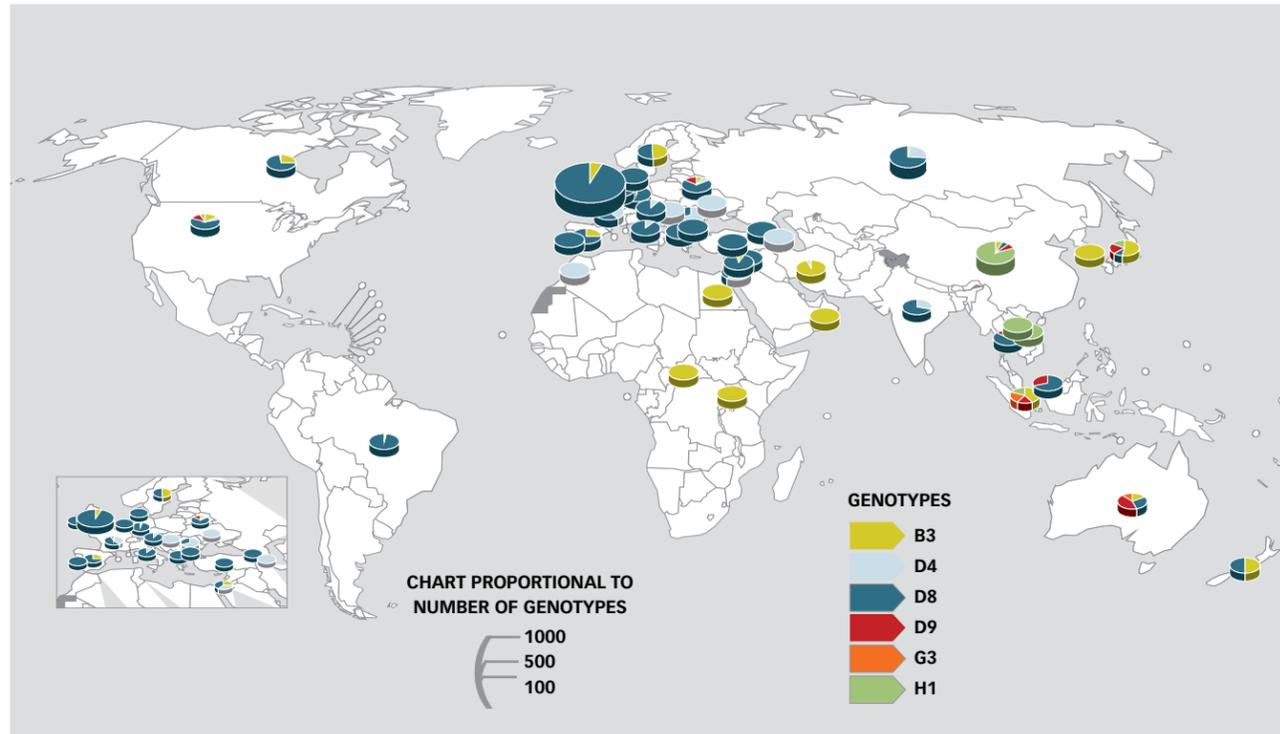
The impact of a vaccination program requires monitoring of both vaccination coverage and disease incidence. Because measles and rubella are both rash illnesses associated with fever, and laboratory testing includes rubella immunoglobulin (IgM), measles surveillance systems can provide data on rubella incidence.

In 2013, the global measles and rubella network of laboratories expanded to 694 labs in 160 countries, with an additional 31 countries served by a neighbouring country. Additionally, in order to cope with the heavy workload, larger countries have set up subnational laboratories (165), with more subnational labs expected as regions adopt goals to eliminate measles and/or eliminate or control rubella. Increasingly these laboratories are supporting testing of suspected CRS cases in parallel with introductions of MR vaccine.

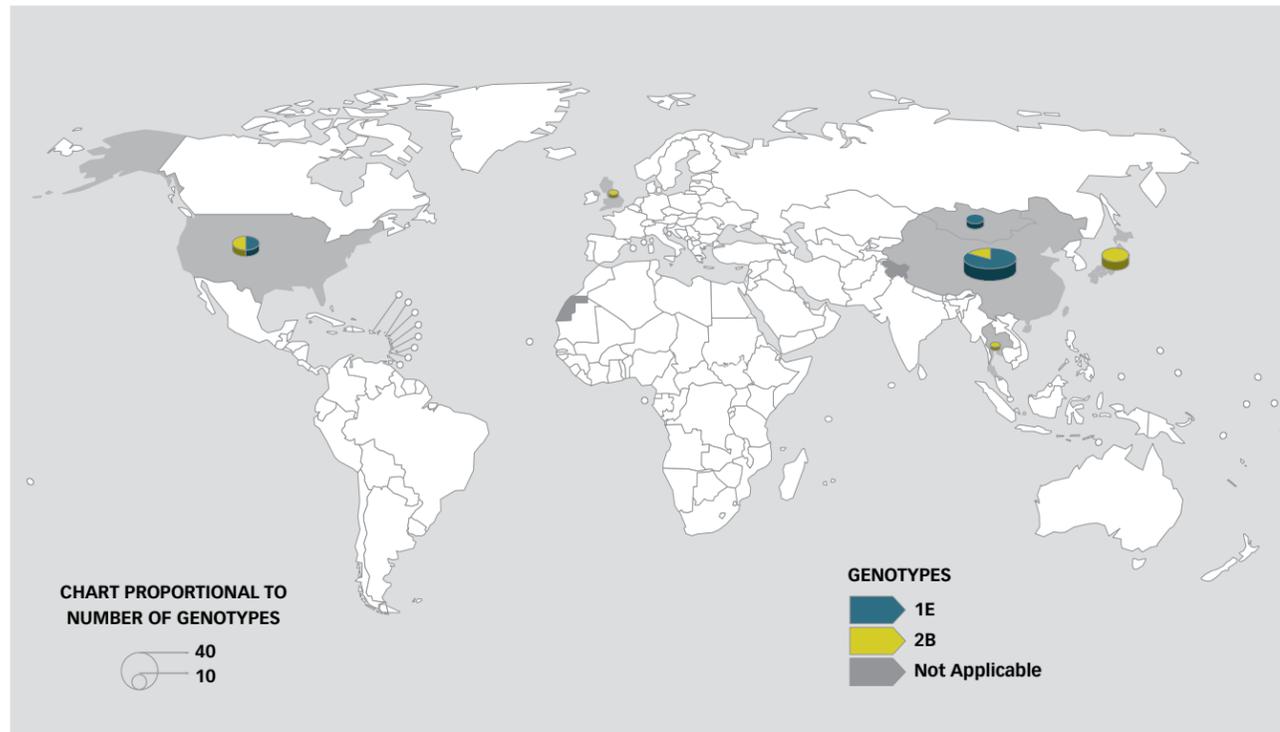
In 2013, the network laboratories conducted 144,000 tests for measles and 98,000 for rubella. About 20,000 more measles tests were conducted than in 2012. Rubella cases were reported by only 174 of 194 countries in 2013, with substantial under reporting in countries that have not yet introduced RCV.

Public Health England maintains a web-based virus genomic sequence database for measles (MeANS) and rubella viruses (RubeNS). In 2013, 111 countries reported laboratory-confirmed measles cases, but only 45 actually reported sequences. For rubella, 100 countries reported laboratory-confirmed cases but only six reported genotypes, highlighting the need to improve specimen collection rubella genotyping.

DISTRIBUTION OF MEASLES GENOTYPES FROM JAN TO DEC 2013



DISTRIBUTION OF RUBELLA GENOTYPES FROM JAN TO DEC 2013



BE READY

STRATEGY 3:

Develop and maintain outbreak preparedness, respond rapidly to outbreaks and manage cases

MEASLES OUTBREAKS

With progress came challenges. There were large measles outbreaks in at least three regions, placing elimination goals at risk. Through October 2013, large outbreaks were reported in DRC (89,108 cases), Nigeria (55,335 cases), China (27,825), Georgia (7,830 cases) and Turkey (7,371 cases).

Other European countries experiencing outbreaks included the Netherlands, Italy, the United Kingdom and Germany, which together reported over 7,500 cases. The 2012 outbreak in Ukraine carried over into 2013, though cases dropped to 3,308 from 12,746 in 2012. The outbreaks in Georgia, Germany, and the United Kingdom affected older children and young adults missed by routine immunization. Vaccine hesitancy has compounded the situation, affecting coverage in countries including France, the United Kingdom and Georgia. In Turkey, the outbreak hit pockets of low routine immunization coverage as well as young adults not fully immunized in their childhood. The Netherlands outbreak primarily occurred among conservative religious communities that traditionally avoid vaccination.

In Syria, the ongoing conflict has disrupted the entire health system including its immunization program. According to WHO, measles vaccination coverage is estimated to have fallen from over 90 per cent before the conflict began, to about 65 per cent towards the end of 2013. Consequently, measles cases have risen from 13 in 2012 to over 700 by November 2013, with spread to neighbouring countries receiving Syrian refugees: Turkey (7,371 cases by October 2013), Lebanon (1,740 cases), Iraq (520 cases), and Jordan (120 cases). These countries had all been reporting less than 15 cases annually since 2010. In response, Syria, Lebanon and Jordan held SIAs in 2013, while Iraq will conduct a campaign in 2014. In Pakistan, an outbreak originally reported in 2012 continued during 2013 with all provinces affected and more than 25,000 clinical cases reported. Outbreak response immunization activities were carried out in Sindh and Punjab Provinces. Nationwide SIAs scheduled in 2013 were postponed due to a combination of reasons including lack of counterpart financing, but are now planned for 2014.



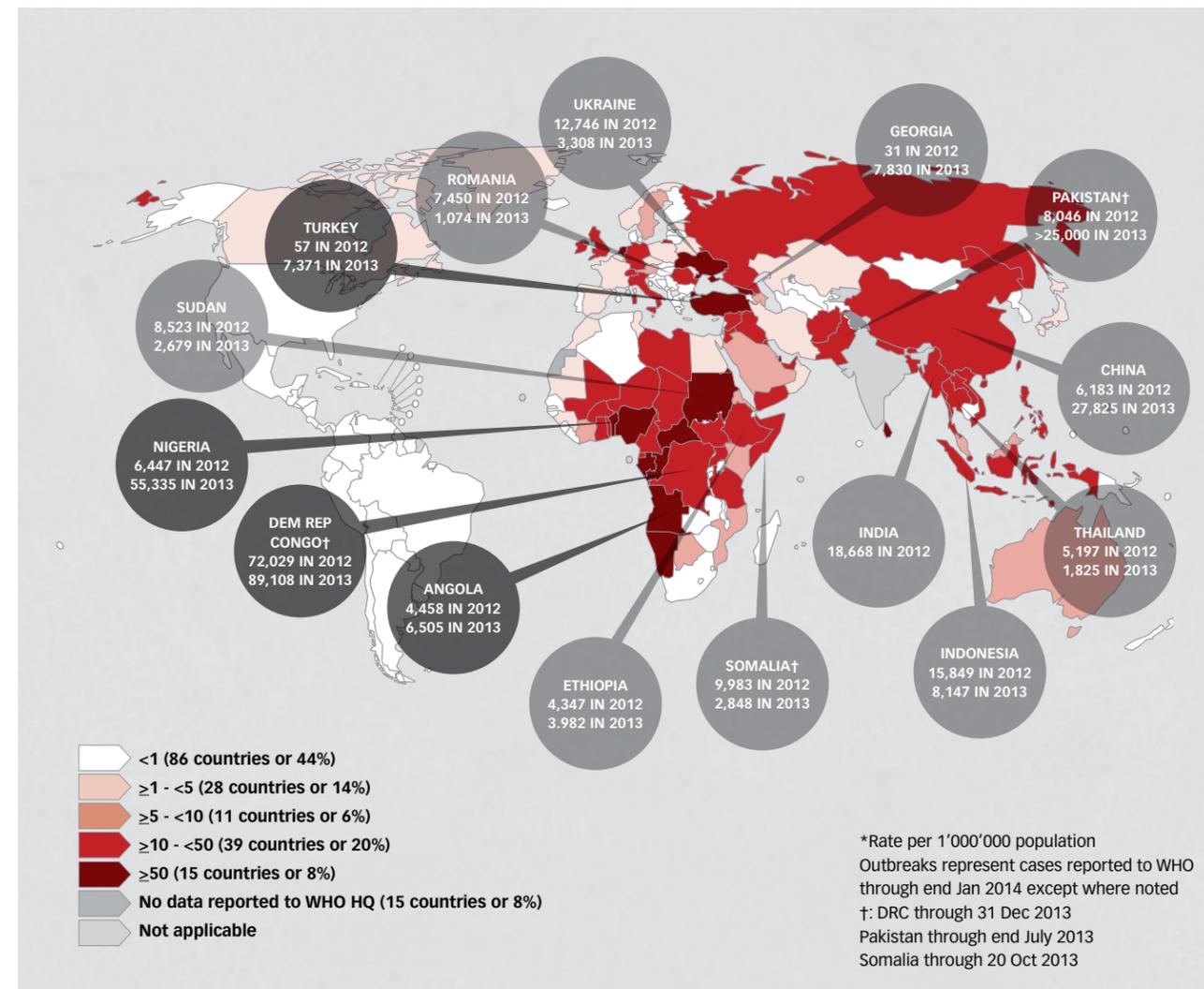
In the South East Asia region, Sri Lanka experienced a large outbreak with 3,440 cases through October 2013; mostly children under one year of age and young adults in age groups not included in the country's 2001 catch up campaign. In the Western Pacific Region, China's outbreaks primarily affected very young children born since the 2010 SIAs and young adults who missed routine immunization but were also too old for the campaign. The June 2013 review conducted in China concluded that many young children, particularly those from recent unregistered migrants, miss routine vaccination because they are not registered with the public health system. Another contributing factor is false contra-indications that delay or permanently prevent significant numbers of children from being vaccinated.

The African region also had its share of outbreaks. The ongoing epidemic in DRC is the result of challenges in logistics and infrastructure, security considerations in the eastern part of the country as well as suboptimal programme resources. Over 30 per cent of the cases were older than 5 years. In September 2013, DRC embarked on a nationwide SIA targeting children up to 9 years of age with the support of GAVI and the M&RI. Due to the size of the country, the campaign will be conducted in four phases stretching through July 2014. The large outbreak in Nigeria occurred primarily in the northern states where routine coverage remains suboptimal. By April 2013, over 9,000 measles cases were confirmed with 76 per cent among children aged 9 to 59 months indicating low routine coverage and that the previous under 5 years campaign had left many children unreached. One hundred and forty-one Local Government Areas (LGAs) were particularly affected in the States of Kano, Jigawa, Katsina, Zamfara, Kebbi, Kaduna, Sokoto, Yobe and Bauchi. With support from GAVI and M&RI, Nigeria held a nationwide SIA targeting children aged 6 to 59 months of age. Outbreaks also affected Angola (6,505 cases) and Ethiopia (3,982 cases). In Angola, the outbreaks reveal areas of low coverage both by routine and SIAs. In Ethiopia, cases are increasingly reported from age groups too old to have been targeted by the last two campaigns - children 9 to 47 months targeted in 2010-2011, and 9 to 59 months targeted in 2013; as well as younger infants in regions with persisting gaps in routine and SIA coverage.

Outbreak investigations repeatedly indicate that the overwhelming majority of cases occur amongst unvaccinated children, revealing that country programmes are not reaching persistent coverage gaps. The overwhelming measles disease burden remains among children less than 5 years of age in the M&RI priority countries. Nevertheless, even countries with relatively modest MCV1 coverage (under 80 per cent) are reporting up to 30 per cent of measles cases among older, susceptible children. The latter then serve as a "reservoir" and pass the disease to younger children who have higher case fatality rates. In 2013, eight countries conducted wide age range SIAs because epidemiological data showed that an under five years campaign would not significantly reduce ongoing measles transmission. This observation complicates measles control, greatly increases the costs and should be avoided by ensuring that at least 90 per cent of the children are reached with two doses of MCV in routine immunization programmes by their second birthday.

Outbreak investigations repeatedly indicate that the overwhelming majority of cases occur amongst unvaccinated children

REPORTED MEASLES INCIDENCE RATE (JAN TO DEC 2013)
REPORTED MEASLES CASES IN 15 LARGEST OUTBREAKS SINCE JANUARY 2012



MEASLES OUTBREAK RESPONSE FUND

Funded by GAVI, the measles outbreak response fund is intended to prevent measles deaths, limit spread of the virus and enable rapid responses during an outbreak. The fund is managed by the M&RI and began to receive applications in early 2013, initially from Pakistan, Nigeria, DRC and Viet Nam.

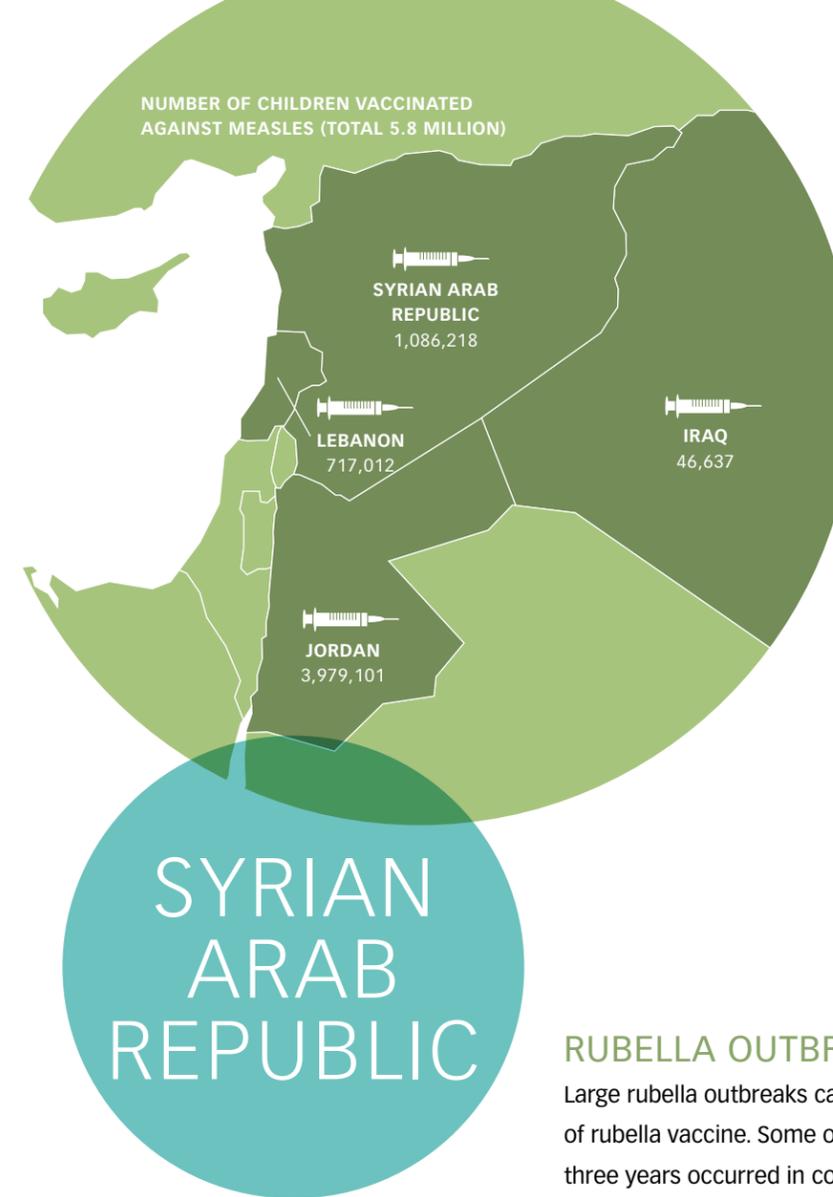
Countries experiencing a significant measles outbreak of national public health importance and cannot respond to the outbreak fast enough with local funding may request funding for outbreak response. To access this funding, countries must provide: (1) an outbreak investigation report including evidence of laboratory confirmed measles; (2) a plan of action that describes outbreak response activities; and (3) evidence of commitment from the Ministry of Health for sharing some of the costs.

In Pakistan, the nationwide outbreak called for an SIA targeting children 9 months to 10 years of age, with GAVI supporting the vaccination of children 9 to 59 months of age. The support has catalysed funding from national and provincial governments to support vaccination of children 5 to 10 years of age. The outbreak fund also provided USD \$2.64 million for the procurement of injection devices for phase one of the campaign. Pakistan's SIAs are planned over the period of April-June 2014.

In response to the large outbreak in 2013, Nigeria requested support for an immunization response in 164 heavily affected areas in six northern states. The outbreak response fund provided USD \$2.5 million for vaccine and operational costs of the response. The remaining funds were then used to jump start timely planning for the later, preventive SIAs. In Viet Nam, the outbreak response fund provided USD \$39,000 for operational costs to respond to two small localized outbreaks in the country.

In DRC, the normal cycle of follow up SIAs was interrupted in 2010 due to funding shortfalls and the need to respond to a polio outbreak, leading to the accumulation of susceptible individuals. This led to a large measles outbreak that began in Katanga and South Kivu, spreading north and west throughout the country over the course of the next two and a half years. Analyses of national data indicate that the prolonged outbreak in DRC was caused by failure to vaccinate with gaps in routine and supplementary immunization that allowed susceptibility to shift into older age groups.

In response to the large outbreak, primarily affecting children less than 10 years of age, DRC initially applied to GAVI and awarded support for a nationwide campaign targeting children 6 to 59 months of age. To fill the funding gap, money was mobilised from the government, UNICEF, OCHA and from the outbreak response fund (USD \$2.1 million) to address immunity gaps among children 5 to 9 years of age in the four provinces covered in 2013. A rolling campaign targeting children 6 months to 9 years of age started in September 2013 and will continue through July 2014.



The Syrian crisis entered its third year in 2013 with 4.3 million displaced children living in dire circumstances within the country. In the sub-region including Egypt, Iraq, Jordan, Lebanon, Turkey and other North African countries, another 1.26 million Syrian children live in refugee camps.

Syrian children within and beyond its borders live in cramped, unsanitary conditions and face malnutrition. These conditions are a perfect breeding ground for disease to spread, leaving children extremely vulnerable to measles, polio and other communicable diseases. Prior to the conflict, immunization coverage in Syria was approximately 95 per cent for two doses of measles vaccine and less than one case was reported annually per million population. Multiple, supplemental immunization campaigns against measles, polio and other vaccine-preventable diseases took place in Syria and the sub-region in 2013 with nearly six million children vaccinated against measles.

RUBELLA OUTBREAKS

Large rubella outbreaks can still occur in countries even after the introduction of rubella vaccine. Some of the largest documented outbreaks in the past three years occurred in countries that implemented an older strategy to control CRS that focused on vaccinating girls to prevent them from becoming infected during pregnancy. This strategy left a large number of males susceptible to rubella infection with outbreaks affecting not only adolescents and young adult males, but also susceptible pregnant women. However, it is important to note that all such countries have since changed to a universal (male and female) vaccination strategy.

Japan identified 14,357 cases in 2013 with 31 babies born with CRS; over 50 per cent of the cases were males 20-39 years of age and were not targeted during the older rubella vaccination strategy. In Poland, 38,100 cases were reported in 2013 and over 80 per cent were adolescent boys and young men; and in Romania 20,812 cases were reported in 2012, of which 59 per cent were among males. Romania is assessing implementation of a program to vaccinate those who were not vaccinated during the earlier years of the rubella program.

As countries adopt the 2011 WHO rubella position recommending vaccination of both males and females with rubella containing vaccine, fewer outbreaks such as these will occur in the future.

BE HEARD

STRATEGY 4: Communicate and engage to build public confidence and demand for immunization

Communications and social mobilization play a critical role in conducting measles or measles-rubella SIAs. Engaging with communities, parents and caregivers to stimulate demand for vaccination requires tremendous effort and coordination. Reaching targeted coverage results require plans and strategies to reach various segments of society from policy and decision makers, media, religious groups, community leaders, families and individuals.

Increasingly, social and epidemiological data and surveys influence the development of strategies to address awareness, motivation for vaccination and to target efforts to reduce the number of children missed in high-risk areas.

Mobilizing community resources, distribution of tailored information to different audiences and generating local support are an integral part of the process. The M&RI relies heavily on the efforts of partners like the Latter Day Saints, Lions Clubs and Red Cross to carry out communications and social mobilization efforts. Their combined resources and local networks saw 250,000 volunteers mobilize millions of families in 13 countries in 2013.



Madagascar's successful SIA reached 92 per cent of its targeted 3.4 million children aged 9 months to 5 years. A large part of the success was attributed to the immense support by local LDS chapters on this island nation. Their efforts were focused upon social mobilization and follow up for post-campaign evaluation.

LDS contributed funds to the production of more than 80,000 posters, air time for radio and television spots and organized much of the opening ceremony festivities in Taomosina. They performed extensive outreach and distributed tens of thousands of posters, flyers and other informational materials. There were more than 500 LDS volunteers on the ground spread throughout 332 mobilization zones and reached more than 44,000 families.

In November 2013, a national vaccination campaign was rolled out across all 28 districts in Malawi. In 2010, at least 134,000 people were infected during a measles outbreak with 300 people, mostly children, dying. Ethel Chisale, 26, was one of those who endured the 2010 outbreak, becoming extremely ill.

In Mchingi district, Ethel convinces Marita Positain to have her two children, five year old Letira and one year old Professor, vaccinated. "I have suffered," Ethel says, "I volunteer because I don't want others to have to go through the same thing. I am a living testimony to the importance of vaccines."

Ethel Chisale was one of more than 1,800 Malawi Red Cross Society volunteers that supported social mobilization efforts in six districts with house to house canvassing. Each volunteer was tasked with reaching 100 households to share information about the campaign and the importance of being vaccinated and providing details on the location of vaccination sites.



TABLE 3. VOLUNTEER AND HEALTHCARE WORKER NUMBERS FOR 2013 SIAS

COUNTRY	VOLUNTEERS	HEALTH WORKERS
Botswana	4000	549
Cape Verde	ND	452
Comoros	ND	306
Dem Rep Congo	27306	27303
Ethiopia	33624	29678
Madagascar	56449	19350
Malawi	24879	9885
Rwanda	45123	4807
Senegal	6479	5532
Swaziland	732	488
Jordan	303	ND
Togo	3337	2941
Somalia	6753	3467
Cambodia	41399	6054
Micronesia	7	50
Vanuatu	ND	150
Total	250391	111012

ND = no data

BOTSWANA



“We were getting the message out, but I think that the way the Lions helped us, we reached even more people, which means even more children vaccinated.”

In November 2013, Botswana Lions Club members worked on a five day campaign to reach children under five with measles vaccination, Vitamin A supplements and deworming pills.

Across the country, Lions formed motorcades and used public address systems to promote the immunization campaign. “There were horses ahead, then the cars, all their lights on, honking their horns,” said Lion Peter Mayondi, one of the organizers. “There was no way anyone who saw that motorcade could say they did not know about this campaign.”

In places like Selebi-Phikwe, Lions went door to door to remind families to take their children to be immunized. “We wanted to speak one-on-

one with mothers on their doorsteps to make sure they understood the importance of the vaccinations,” Leo Obakeng Kanthaga said.

In Maun, Lions invited community elders for lunch to ask them to urge their people to bring their children for immunizations. And in Tonota, Lions helped pay for a bus to bring families from remote areas to the village to be vaccinated. “The Lions really came in at the right time,” said Josephine Mosimanewakgosi, head of the Kanye district health team. “We were getting the message out, but I think that the way the Lions helped us, we reached even more people, which means even more children vaccinated.”

INNOVATE

STRATEGY 5:

Perform the research and development needed to support cost-effective operations and improve vaccination and diagnostic tools

In 2013, the measles and rubella working group of the Strategic Advisory Group of Experts (SAGE) completed a survey of partners to identify priority gaps in essential evidence and program barriers to achieving measles and rubella elimination targets. The SAGE subsequently endorsed the findings of the survey and encouraged the working group to disseminate them and to promote implementation of the research agenda previously published in *Vaccine* in 2012.^{1,2}

Innovative strategies and novel methods for vaccine delivery could significantly increase vaccination coverage, as well as reduce costs. Currently, most measles vaccine is given by hypodermic needle injection. This delivery method has several drawbacks including the pain of injection, the need for vaccine reconstitution and injection by skilled health professionals, and the need for refrigeration. To overcome these limitations, studies to develop a microneedle patch are underway. Microneedles are micron-scale (500-800 µm), solid, water-soluble needles on a Band-Aid® like patch that encapsulate a dry form of the vaccine that rapidly dissolves in the skin upon application. Microneedle patches cause little or no pain, are easily administered by minimally-trained personnel, and potentially may be self-administered. Because the microneedles dissolve in the skin, they cannot be re-used and do not generate hazardous waste.

Preliminary study results have shown that measles vaccine can be incorporated into microneedle patches at a dose equal to that used in standard immunizations, and that tests in animal models produced similar levels of protective antibodies. The microneedle patches can be stored at room temperature for up to one month with only minor loss of potency, and they are projected to cost the same or less than current measles vaccine. Analysis is ongoing to determine the cost-effectiveness of microneedle patches compared to sub-cutaneous injections in childhood measles vaccination programs. Additionally, studies are in progress to evaluate a microneedle patch containing both measles and rubella vaccine.



Microneedle patches cause little or no pain, are easily administered by minimally-trained personnel, and potentially may be self-administered

1 J Goodson, et al., 'Research priorities for global measles and rubella control and eradication', *Vaccine*, vol. 30, no. 32, 6 July 2012, pp.4709-4716.

2 WER 3 January 2014, No. 1, 2014, 89, 1-20 <http://www.who.int/wer>



OUR PARTNERS, FINANCIALS & MANAGEMENT TEAM

THE MEASLES & RUBELLA INITIATIVE PARTNERS

Key supporters of the Measles & Rubella Initiative include countries and governments affected by measles, rubella and CRS, and the following:

- American Academy of Pediatrics
- Anne Ray Charitable Trust
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- Church of Jesus Christ of Latter-day Saints
- GAVI Alliance
- Global Payments, Inc.
- Herman and Katherine Peters Foundation
- International Federation of Pharmaceutical Manufacturers Association
- International Federation of Red Cross and Red Crescent Societies
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- Izumi Foundation
- Japanese Agency for Development Cooperation (JICA)
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- Red Cross and chapters
- Sabin Vaccine Institute
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- Vodafone Foundation
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- WNBA

The Measles & Rubella Initiative is also grateful to its many individual private donors.

OUR FINANCIALS

MEASLES & RUBELLA INITIATIVE FUNDING MECHANISM

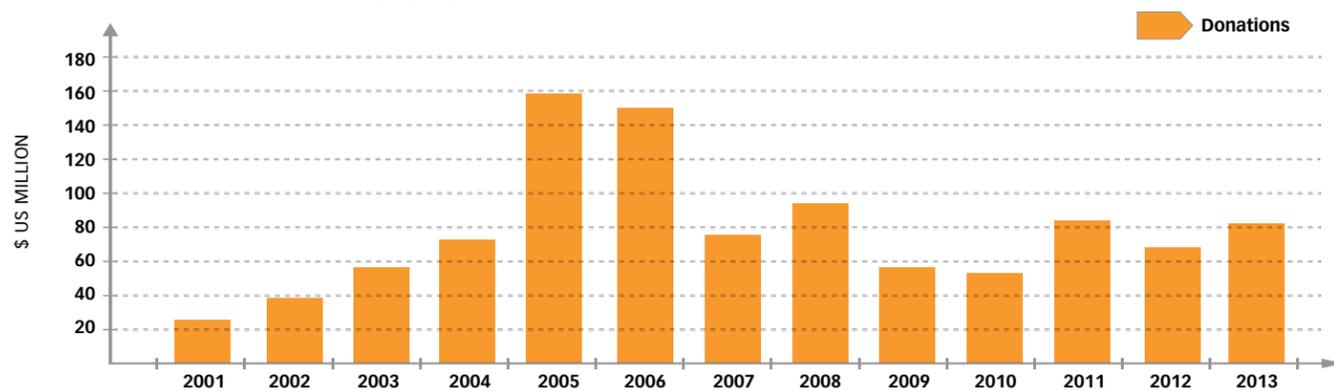
To increase coordination and transparency while minimizing transaction costs for UNICEF and WHO, a unique funding mechanism was created in 2001. Grants from various donors made to the UN Foundation specifically for the M&RI are pooled together with contributions from the UN Foundation. Initially, the UN Foundation matched donor funds and then moved to a straight contribution when donor contributions became too large to match.

A schedule of SIAs is projected over several years based on routine coverage and the quality and coverage of previous SIAs. Countries planning to conduct SIAs each year are requested to submit a Plan of Action (PoA) approved by the country's Interagency Coordinating Committee (ICC) that includes target populations and budgets, by the end of October of the prior year. Based upon these PoA from all countries, WHO and UNICEF develop an annual global budget for measles and rubella activities.

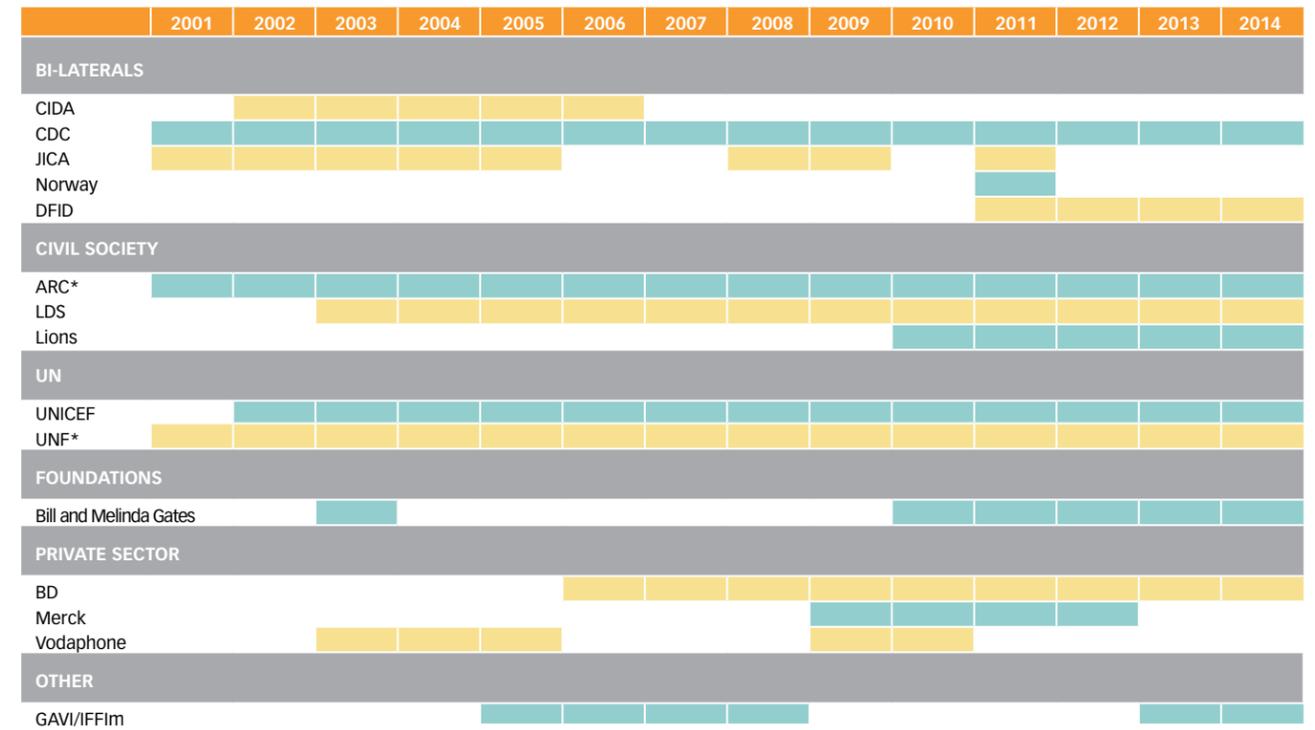
Each year, UNICEF and WHO submit one joint proposal to the UN Foundation for measles mortality reduction/elimination activities to be conducted in each of the six WHO regions. Based upon the budgets for these activities, the UN Foundation disburses funding to WHO and UNICEF according to the proposal request. Funds then flow from the UN Foundation to the UN Fund for International Partnerships (UNFIP) within the United Nations Secretary General's office and then to each of the two agency headquarters.

UNICEF HQ disburses funds directly to country offices to cover operational activities and technical assistance, and directly to UNICEF Supply Division for approved orders of bundled vaccines and devices. WHO HQ disburses funds to WHO Regional offices for disbursement to country offices where campaign activities are scheduled. UNICEF and WHO submit one joint progress report to the UN Foundation on a yearly basis which is made available to all Measles & Rubella Initiative donors and partners.

MEASLES & RUBELLA INITIATIVE ANNUAL EXPENDITURE, 2001-2013
TOTAL EXPENDITURE 2001-2013 = \$1,016,854,000

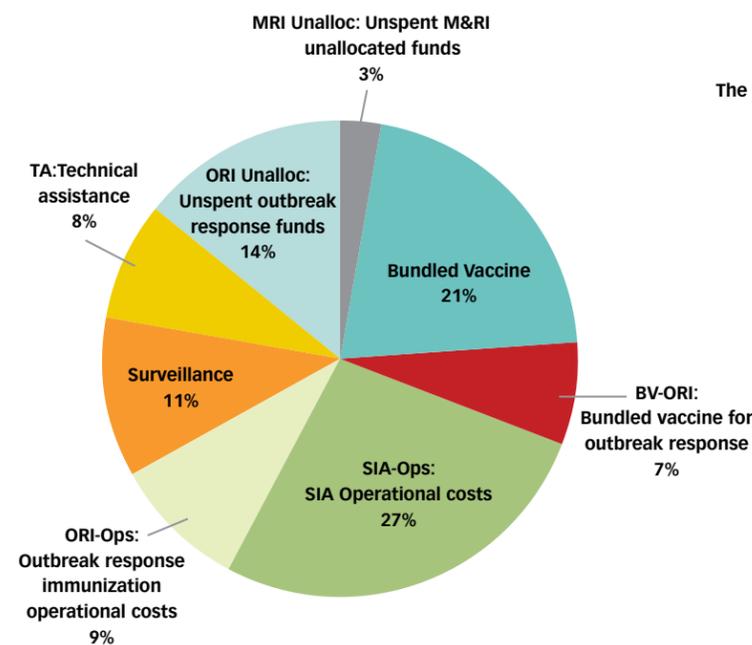


MEASLES & RUBELLA INITIATIVE DONORS, 2001-2014*

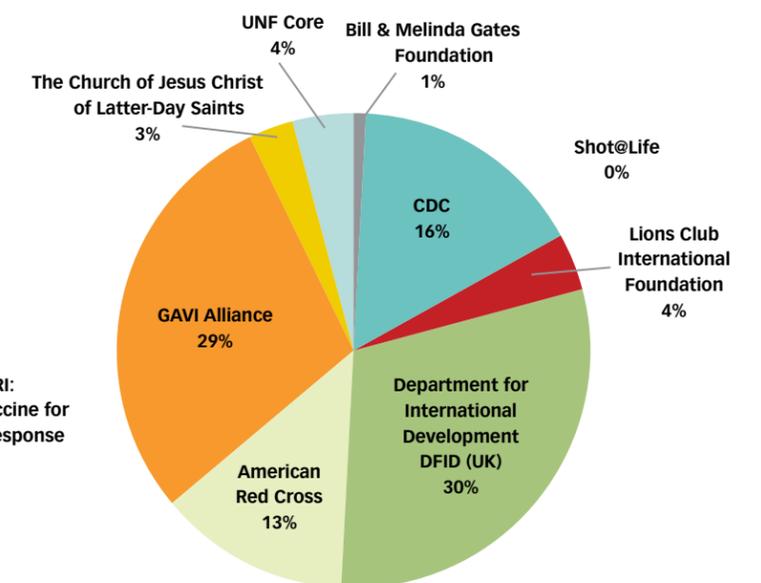


*Includes ARC/UNF and other partners

USE OF FUNDS 2013: USD \$52 MILLION TRANSMITTED THROUGH UNF/UNFIP



MEASLES & RUBELLA INITIATIVE DONORS 2013: USD \$52 MILLION TRANSMITTED THROUGH UNF/UNFIP



OUR MANAGEMENT TEAM

LISA CAIRNS is a medical epidemiologist in the Global Immunization Division of the Centers for Disease Control and Prevention (CDC). After completing medical training, she worked for CARE in Guatemala and as a clinician in the Marshall Islands for 3 years before pursuing a Master's in Public Health from Johns Hopkins University. She joined CDC as an Epidemic Intelligence Service (EIS) Officer in 1996. Since 2000 she has worked for the Global Immunization Division in a variety of roles, including being detailed to the World Health Organization in China as EPI team leader from 2007 – 2011.

MYRNA CHARLES is Senior Technical Advisor for the Measles & Rubella Initiative at the American Red Cross working within the international services division. From September 2007 until March 2013, she served as medical advisor and Chief of Epidemiology with Peace Corps. Dr. Charles received her medical degree from the New York College of Osteopathic Medicine and earned an MPH from Columbia University and an MBA from the University of Maryland, College Park. She trained with the CDC's Epidemic Intelligence Service (EIS '02) and also completed a Preventive Medicine Residency (PMR '05) working with the New York City Department of Health and Mental Hygiene.

STEPHEN L. COCHI is the Senior Advisor to the Director of the Centers for Disease Control and Prevention's (CDC) Global Immunization Division (GID). He holds a B.S. from MIT, an M.D. from Duke University, and an MPH from Emory University. Dr. Cochi completed residency training in pediatrics at the Massachusetts General Hospital and in preventive medicine at the CDC. In addition, he completed CDC's two-year Epidemic Intelligence Service (EIS) training program in 1984. Dr. Cochi has served for 32 years at CDC in various roles in the field of immunization including leading and managing the U.S. immunization program and its international activities. From 1993-2003, he led CDC's global immunization activities as Director of GID, which is a major partner in the Global Polio Eradication Initiative (GPEI), the Measles & Rubella Initiative (M&RI), the Global Alliance for Vaccines and Immunization (GAVI Alliance), and other priority global immunization activities. Dr. Cochi served as Deputy Director of the U.S. National Immunization Program in 2003 and as Acting Director for two years from January 2004-December 2005.

ANDREA GAY is the Executive Director of Children's Health at the United Nations Foundation. As Executive Director of Children's Health, Ms. Gay oversees the largest program at the United Nations Foundation, accounting for over 65% of the Foundation's grant-making. Prior to joining the Foundation in 1998, Ms. Gay worked with Managed Care Options, a professional health care firm established to advance principles, programs and practices of managed care. Ms. Gay was the founder and Executive Director of the China Education Fund, an advised fund under the Community Foundation of Greater Washington, founded to promote graduate faculty development for Chinese agriculture universities. Before living in China, Ms. Gay worked for the US Public Health Service with various community health care and financing programs. She holds both a masters in Biology and in City Planning from the University of Pennsylvania.

ROBERT KEZAALA is Senior Health Advisor – Immunisation, in the Programme Division at UNICEF headquarters. His academic qualifications include a medical degree (MBChB) from Makerere University Kampala and an MPH from the Royal Tropical Institute (KIT) in Amsterdam. He has worked for 15 years in immunization systems including 13 years with the World Health Organization – first as epidemiologist and Team Lead for WHO-EPI in Ethiopia, then heading the measles programme in WHO AFRO from 2001-2005 and with the Global Polio Eradication Initiative in Geneva until 2012. He currently heads the measles, rubella, epidemic meningitis and yellow fever control team at UNICEF in New York.

PETER STREBEL is the Priority Area Leader for Accelerated Disease Control in the Expanded Programme on Immunization at the World Health Organization. His academic qualifications include a BSc and medical degree from the University of Cape Town and an MPH from Johns Hopkins University. He was trained in the Centers for Disease Control and Prevention Epidemic Intelligence Service (EIS '89), and completed his residency in Preventive Medicine at the Georgia State Health Department. He worked for 16 years in the U.S. National Immunization Program where from 2000 to 2005 he was Chief of the Global Measles Branch.

ANNEX

Measles containing vaccine and supplies procured through UNICEF Supply Division for SIAs, Child health days conducted in 2013 including emergency response vaccination (outbreaks and humanitarian emergencies)

COUNTRY	VACCINE	DOSES VACCINE	VALUE VACCINE (US\$)	COST OF AD SYRINGES (US\$)	COST OF RECONSTITUTION SYRINGES (US\$)	COST OF RUP SYRINGES (US\$)	COST OF SAFETY BOXES (US\$)	TOTAL (US\$)
SUPPLEMENTARY IMMUNIZATION ACTIVITIES								
Afghanistan	Measles	1,200,000	274,800.00	54,000.00	4,260.00	n/a	7,656.00	1,540,716.00
Cambodia	MR	344,800	180,680.70	252,954.00	22,266.82	n/a	33,410.33	834,111.85
Cape Verde	MR	293,200	153,636.80	13,952.22	983.81	n/a	1,936.49	463,709.32
Central Africa Republic	Measles	106,650	248,460.00	38,923.50	3,468.82	n/a	1,184.66	292,036.98
Comoros	Measles	141,600	30,444.00	5,558.04	n/a	2,340.00	848.04	180,790.08
Congo Rep	Measles	830,000	199,200.00	35,908.40	2,831.71	n/a	4,889.73	1,072,829.84
DR Congo	Measles	12,509,300	3,002,232.00	1,408,274.00	73,061.69	62,263.64	225,789.25	17,280,920.58
Ethiopia	Measles	12,988,100	3,117,144.00	1,718,915.53	n/a	239,769.60	235,944.90	18,299,874.03
Ghana	MR	12,844,500	6,730,518.00	592,020.00	n/a	79,900.80	75,659.82	20,322,598.62
Jordan	MR	3,640,000	1,907,360.00	169,320.45	25,075.55	n/a	11,081.62	5,752,837.62
Lebanon	Measles	1,000,000	467,500.00	n/a	n/a	n/a	n/a	1,467,500.00
Lesotho	Measles	239,800	51,557.00	11,296.92	897.81	n/a	1,658.73	305,210.46
Madagascar	Measles	4,100,000	791,360.00	188,646.00	n/a	61,560.00	n/a	5,141,566.00
Malawi	Measles	3,074,200	660,953.00	138,112.40	n/a	19,152.00	19,792.50	3,912,209.90
Morocco	MR	11,444,500	5,749,555.50	n/a	n/a	n/a	n/a	17,194,055.50
Mozambique	Measles	4,800,000	1,152,000.00	237,072.00	16,323.84	n/a	n/a	6,205,395.84
Nigeria	Measles	37,977,600	9,114,624.00	1,484,985.42	n/a	153,909.18	198,093.22	48,929,211.82
Pakistan	Measles	34,057,500	6,953,235.00	3,478,419.55	232,847.67	n/a	435,605.05	45,157,607.27
Rwanda	MR	5,953,400	3,119,581.60	73,456.40	5,417.74	n/a	10,664.00	9,162,519.74
Senegal	MR	7,549,300	3,955,833.20	311,760.24	28,760.16	n/a	43,151.95	11,888,805.55
Sudan	Measles	16,724,030	4,013,767.20	769,350.00	49,837.52	n/a	89,708.73	21,646,693.45
Togo	Measles	1,893,500	454,440.00	85,040.60	n/a	8,032.68	12,078.50	2,453,091.78
Vanuatu	MR	44,000	59,880.00	n/a	n/a	n/a	n/a	103,880.00
CHILD HEALTH DAYS								
Somalia	Measles	890,573.00	227,922.00	39,791.00	3,980.00	n/a	2,420.00	274,113.00
EMERGENCY RESPONSE								
Nigeria	Measles	3,000,000.00	720,000.00	134,700.00	n/a	16,800.00	15,966.35	887,466.35
Chad	Measles	200,000.00	43,000.00	10,468.92	1,472.37	n/a	1,523.60	56,464.89
Jordan	Measles	1,000,000.00	240,000.00	47,586.00	3,346.30	n/a	5,876.64	296,808.94
Lebanon	Measles	809,600.00	194,304.00	33,320.50	2,607.29	n/a	5,247.95	235,479.74
Mali	Measles	3,120,000.00	748,800.00	101,000.00	10,591.00			3,630,391.23
Mauritania	Measles	40,000.00	6,020.00	3,047.98	n/a	466.69	655.24	10,189.91
Lebanon	Measles	9,600.00	2,304.00	n/a	n/a	n/a	n/a	2,304.00
Lebanon	MMR	4,800.00	4,684.80	n/a	n/a	n/a	n/a	4,684.80
Total		181,285,753	54,120,316.10	11,130,926.07	461,503.28	644,194.59	1,399,776.97	242,631,247.24

ARTWORK, DESIGN AND PHOTOGRAPHY
The illustrations were produced by acclaimed illustrator Sophie Blackall for the Measles & Rubella Initiative. This annual report was designed by Sara Gillingham Studio.

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Photograph page 39: Courtesy of ARC
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Measles
moves fast
We must
move faster