

GLOBAL MEASLES AND RUBELLA



STRATEGIC PLAN
2012- 2020

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ABBREVIATIONS AND ACRONYMS

AEFI	adverse event following immunization
ARC	American Red Cross
CDC	Centers for Disease Control and Prevention (USA)
CIDA	Canadian International Development Agency
cMYP	comprehensive multiyear plans for immunization
CRS	congenital rubella syndrome
DFID	Department for International Development, United Kingdom
DHS	Demographic and Health Survey
DTP	diphtheria-tetanus-pertussis [vaccine]
ELISA	enzyme-linked immunosorbent assay
EPI	Expanded Programme on Immunization
GIVS	Global Immunization Vision and Strategy
GPEI	Global Polio Eradication Initiative
HPV	human papillomavirus [vaccine]
IgM	immunoglobulin M
IPV	inactivated poliovirus vaccine
LabNet	Global Measles and Rubella Laboratory Network
LLIN	long-lasting insecticide treated bednet
M	measles [vaccine]
MCV	measles-containing vaccine
MCV1	first dose of MCV
MCV2	second dose of MCV
MDG	Millennium Development Goal
MR Initiative	Measles and Rubella Initiative
MICS	Multiple Indicator Cluster Survey
MMR	measles-mumps-rubella [vaccine]
MR	measles-rubella [vaccine]
RCV	rubella-containing vaccine
SAGE	Strategic Advisory Group of Experts on immunization
SIA	supplementary immunization activity
UNF	United Nations Foundation
UNICEF	United Nations Children's Fund
USA	United States of America
USAID	United States Agency for International Development
WHO	World Health Organization



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FOREWORD



Implementation of this Global Measles and Rubella Strategic Plan can protect and improve the lives of children and their mothers throughout the world, rapidly and sustainably.

Overwhelming evidence demonstrates the benefit of providing universal access to measles- and rubella-containing vaccines. Globally, an estimated 535 000 children died of measles in 2000. By 2010, the global push to improve vaccine coverage resulted in a 74% reduction in deaths. These efforts, supported by the Measles and Rubella Initiative, contributed 23% of the overall decline in under-five deaths between 1990 and 2008 and are driving progress towards meeting Millennium Development Goal 4 (MDG4).

However, as we have seen in several countries in the African, South-East Asian, European, Eastern Mediterranean and Western Pacific Regions, measles returns when we let down our guard. Rubella also remains a threat to pregnant women and their fetuses in particular, with more than 100 000 children born each year with congenital rubella syndrome (CRS), which includes heart defects, blindness and deafness.

We can completely prevent these illnesses, deaths and disabilities, and the global imperative to invest in vaccination has never been stronger. Measles- and rubella-containing vaccines are among the most cost-effective public health tools available. All 194 World Health Organization (WHO) Member States remain committed to reduce measles deaths by 95% by 2015, and four of six WHO regions have set rubella control or elimination targets. As 2015 approaches, increased access to measles, rubella and other vaccines will immediately produce improved child-mortality outcomes.

This Strategic Plan provides the blueprint. It builds on years of experience in implementing immunization programmes and incorporates lessons from accelerated measles control and polio eradication initiatives. The Plan stresses the importance of strong routine immunization systems supplemented by campaigns, laboratory-backed surveillance, outbreak preparedness and case management, as well as research and development. It also reminds us that public health is about people, above all, and that our work to build public trust and demand for vaccination is as important as the work to build and maintain measles and rubella vaccine supply and cold chains.

In this Decade of Vaccines, let us use the Strategic Plan to expand global equitable access to these measles and rubella vaccines that have saved millions of lives over several decades.

With strong partnerships, resources and political will, we can, and must work together to achieve and maintain the elimination of measles, rubella and CRS globally.

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EXECUTIVE SUMMARY



This Strategic Plan 2012–2020 explains how countries, working together with the MR Initiative and its partners, will achieve a world without measles, rubella and congenital rubella syndrome (CRS).

The Plan builds on the experience and successes of a decade of accelerated measles control efforts that resulted in a 74% reduction in measles deaths globally between 2000 and 2010 (1). It integrates the newest 2011 World Health Organization (WHO) policy on rubella vaccination which recommends combining measles and rubella control strategies and planning efforts, given the shared surveillance and widespread use of combined measles-rubella vaccine formulations, i.e. measles-rubella (MR) and measles-mumps-rubella (MMR). The Plan presents clear strategies that country immunization managers, working with domestic and international partners, can use as a blueprint to achieve the 2015 and 2020 measles and rubella control and elimination goals. The strategy focuses on the implementation of five core components.

1. Achieve and maintain high levels of population immunity by providing high vaccination coverage with two doses of measles- and rubella-containing vaccines.
2. Monitor disease using effective surveillance, and evaluate programmatic efforts to ensure progress.
3. Develop and maintain outbreak preparedness, respond rapidly to outbreaks and manage cases.
4. Communicate and engage to build public confidence and demand for immunization.
5. Perform the research and development needed to support cost-effective operations and improve vaccination and diagnostic tools.

The Plan provides the global context and an assessment of the current state of the world with respect to national, regional and global management of measles and rubella. It outlines guiding principles that provide a foundation for all measles and rubella control efforts, including country ownership, strengthening routine immunization and health systems, ensuring linkages with other health interventions and providing equity in immunization by reaching every child. Given the progress made to date, the plan includes a list of priority countries that require additional support to meet regional and global goals. It also examines key challenges to measles and rubella control and elimination, including: financial risks; high population density and highly mobile populations; weak immunization systems and inaccurate reporting of vaccination coverage; managing perceptions and misperceptions; and conflict and emergency settings. The Plan offers solutions to these challenges, discusses the roles and responsibilities of stakeholders, and provides indicators to monitor and evaluate national, regional and global progress towards the vision and goals.

Countries bear the largest responsibility for measles and rubella control and elimination, and they must support sustainable national planning, funding and advocacy to protect their citizens from devastating preventable diseases.



The MR Initiative and its five spearheading partners — the American Red Cross, United States Centers for Disease Control and Prevention, United Nations Children’s Fund, United Nations Foundation and World Health Organization — endorse this Strategic Plan and will work with countries and international donors on its implementation. As countries work towards attaining national, regional and global measles, rubella and CRS control and elimination goals, they can rely on technical and financial support from the MR Initiative and its partners, including the GAVI Alliance (formerly the Global Alliance for Vaccines and Immunization). To support this Plan, the MR Initiative developed and maintains a Financial Resource Requirements document that it reviews and updates regularly.

The MR Initiative recommends that all stakeholders use this Plan and the referenced technical guidance to secure the commitments and actions required for a world free of measles, rubella and CRS.

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INTRODUCTION



Measles is one of the most infectious human diseases and can cause serious illness, life-long complications and death. Prior to the availability of measles vaccine, measles infected over 90% of children before they reached 15 years of age. These infections were estimated to cause more than two million deaths and between 15 000 and 60 000 cases of blindness annually worldwide [2]. By contrast to measles, rubella infections cause a relatively mild disease for children. However, rubella infection in women during early pregnancy can severely affect the fetus, resulting in miscarriage, fetal death, or the combination of disabling conditions collectively called congenital rubella syndrome (CRS), which includes heart disease, blindness and deafness.

The highly effective, safe and relatively inexpensive measles- and rubella-containing vaccines protect individuals from infection, and their widespread use can completely stop the spread of the viruses in populations that achieve and maintain high levels of immunity. Countries began using measles vaccines in the 1960s, and immediately identified their use as highly cost-effective. The use of rubella vaccine began in 1969, and a combined formulation (MR or MMR) in the 1970s. Given the similar clinical presentations of measles and rubella, and the combined vaccine products, national and global health leaders have increasingly focused on simultaneous management of both diseases.

In the year 2000, the World Health Organization (WHO) estimated that 535 000 children died of measles, the majority in developing countries, and this burden accounted for 5% of all under-five mortality [3]. In some developing countries, case-fatality rates for measles among young children may still reach 5–6% [4]. In industrialized countries, approximately 10–30% of measles cases require hospitalization, and one in a thousand of these cases among children results in death from measles complications.

Improving measles vaccination coverage and reducing measles-related deaths is a global imperative, particularly as it relates to the United Nation's Millennium Development Goal 4 (MDG4), which aims to reduce the overall number of deaths among children by two-thirds between 1990 and 2015 [5]. The United Nations selected routine measles vaccination coverage as an indicator of progress towards MDG4, given the potential of measles vaccination to reduce child mortality, and because it serves as an indicator of access to child health services. The infectiousness of measles easily leads to global spread, and even countries that eliminated their indigenous transmission remain vulnerable to outbreaks from importations. This is exemplified in the WHO Region of the Americas, which successfully eliminated all indigenous transmission of measles viruses in 2002 and rubella viruses in 2009. The Region is currently seeking to verify the successful elimination of both diseases. However, since adoption and coverage of measles- and rubella-containing vaccines remain uneven around the world, measles and rubella continue to pose a significant threat to the lives of children and families everywhere.

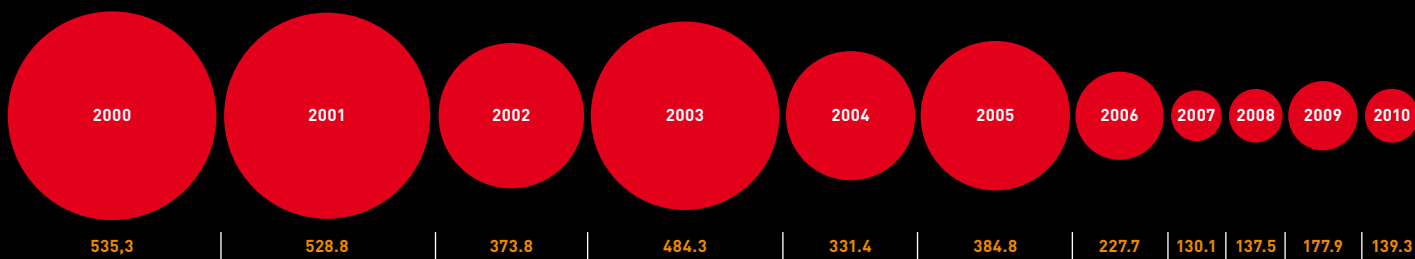
Global estimates of the burden of rubella suggest that the number of infants born with CRS in 2008 exceeded 110 000¹ which makes rubella a leading cause of preventable congenital defects. The 2008 estimates suggest that the highest CRS burden is in the South-East Asia (approximately 48%) and African (approximately 38%) Regions.

Recognizing that deaths and disabilities caused by measles and rubella are completely preventable with safe and inexpensive vaccines, and spurred by the success of countries in the Americas in stopping the spread of measles, the MR Initiative (formerly, the Measles Initiative) was launched in 2001 to support technically and financially accelerated measles control activities. As a result of its efforts, measles deaths dropped to approximately 139 000 per year in 2010, representing a

¹ Vynnycky E, Adams E. Report on the global burden of rubella and congenital rubella syndrome, 2000–2008 (unpublished data).



Figure 1: Number of estimated measles deaths (in thousands) globally 2000-2010



74% decrease compared with 2000 (Figure 1), and a 23% decline in under-five deaths worldwide between 1990 and 2008 (6).

The MR Initiative began supporting rubella control and CRS prevention activities in countries in central and eastern Europe in the early 2000s, and observed the increasing benefits of its efforts with respect to reducing the burden of rubella. As a result, the MR Initiative now includes rubella control goals as an integral part of its efforts, as demonstrated in this Strategic Plan.

In 2010, the World Health Assembly committed to reduce measles deaths by 95% of the 2000 levels by 2015. By 2010, estimated global measles mortality decreased 74% from 535 300 deaths in 2000 to 139 300 in 2010. Measles mortality was reduced by more than three-quarters in all WHO regions except the WHO southeast Asia Region. India accounted for 47% of estimated measles mortality in 2010, and the WHO African region accounted for 36%.



This Plan presents a five-pronged strategy to reach the measles, rubella and CRS national, regional and global targets and goals. The strategies include high vaccination coverage, laboratory-backed surveillance, monitoring and evaluation, outbreak preparedness and response, communication and community engagement, and research and development. The Plan builds on 30 years of experience in implementing immunization programmes and reflects the lessons learned to date by the MR Initiative and other globally coordinated disease-management efforts, including the Global Polio Eradication Initiative (GPEI). It particularly seeks to extend the experience gained by the WHO Region of the Americas in eliminating measles, rubella and CRS, to all other regions.

In addition to these strategies, the Plan outlines guiding principles that provide a foundation for all measles and rubella control efforts as well as a list of priority countries that require additional support to meet current goals. The Plan also identifies key challenges to measles and rubella control and elimination, and offers solutions to these challenges. It discusses the roles and responsibilities of stakeholders, and provides indicators to monitor and evaluate national, regional and global progress towards the vision and goals.

The five spearheading partners of the MR Initiative — the American Red Cross (ARC), United States Centers for Disease Control and Prevention (CDC), United Nations Children's Fund (UNICEF), United Nations Foundation (UNF) and World Health Organization (WHO) — endorse this Global Measles and Rubella Strategic Plan 2012–2020.

The MR Initiative has developed the Plan through an extensive consultation process, aligned it with the WHO/UNICEF Global Immunization Vision and Strategy (GIVS) (7), and expects to include it in the operational plans for the Decade of Vaccines (8). The Plan reflects national and regional experiences and changes in disease epidemiology, and incorporates insights from research findings, guidance and recommendations available since the last Measles Strategic Plan published in 2005 (9). It particularly incorporates the guidance and recommendations of the WHO Strategic Advisory Group of Experts on Immunization (SAGE) on measles (10–13) and on rubella and rubella vaccine use and the need to integrate rubella control activities with measles elimination activities. The Plan also reflects the recommendations of the WHO ad hoc Global Measles Advisory Group to assess the feasibility of measles eradication (14).

However, the MR Initiative remains concerned about the reduction in political and financial commitment since 2008 which is putting at risk the significant gains made and the global imperative to eliminate measles and rubella. Indeed, outbreaks of measles have been on the rise since 2009, particularly in the African, South-East Asia and European Regions and in North America (15).

It is unacceptable that every day 380 children still die from measles and 300 children still enter the world with the disabilities of CRS despite the availability of effective, safe and inexpensive vaccines. Achieving MDG4 and global measles-mortality reduction goals will require a further increase in measles vaccine coverage.

Through a combination of innovation, resources and political will, we can work together to achieve and maintain the global elimination of measles, rubella and CRS.

4

VISION, GOALS AND MILESTONES

VISION

Achieve and maintain a world without measles, rubella and congenital rubella syndrome (CRS).

GOALS

By end 2015

- Reduce global measles mortality by at least 95% compared with 2000 estimates.
- Achieve regional measles and rubella/CRS elimination goals.

By end 2020

- Achieve measles and rubella elimination in at least five WHO regions.

MILESTONES

By end 2015

- Reduce annual measles incidence to less than five cases per million and maintain that level.
- Achieve at least 90% coverage with the first routine dose of measles-containing vaccine (or measles- rubella-containing vaccine as appropriate) nationally, and exceed 80% vaccination coverage in every district or equivalent administrative unit.
- Achieve at least 95% coverage with M, MR or MMR during supplementary immunization activities (SIAs) in every district.
- Establish a rubella/CRS elimination goal in at least three additional WHO regions.
- Establish a target date for the global eradication of measles.

By end 2020

- Sustain the achievement of the 2015 goals.
- Achieve at least 95% coverage with both the first and second routine doses of measles vaccine (or measles- rubella-containing vaccine as appropriate) in each district and nationally.
- Establish a target date for the global eradication of rubella and CRS.

Strategic planning, coordination and cooperation at every level are essential to achieve a world without measles, rubella and congenital rubella syndrome.

We must work together.



5 GLOBAL CONTEXT

MEASLES VACCINATION

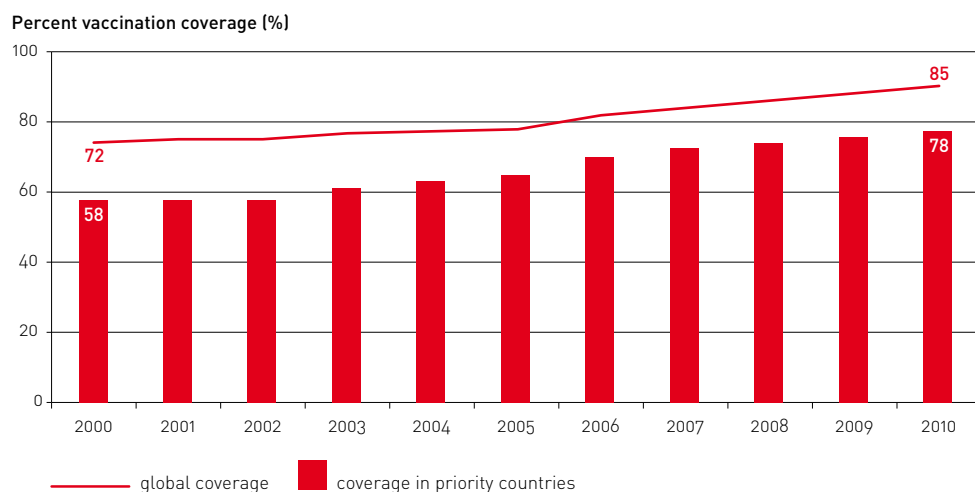
Despite the availability of a safe, heat-stable, effective and inexpensive measles vaccine, and the substantial progress towards measles control, measles remains one of the leading causes of preventable death globally among children. In 2000, the World Health Assembly adopted a resolution to reduce global measles deaths by half compared with 1999 levels, from 2000–2005. This goal was achieved globally following the implementation of a five-year strategic plan to increase coverage with measles vaccination through routine immunization and SIAs. Concurrently, the delivery of other safe, effective and affordable child-survival health interventions were scaled up (such as combining measles vaccine with vitamin A supplementation, deworming medicine, insecticide-treated bednets and polio vaccine) in the highest burden countries (16). The targeted countries supported the strategy with strong political commitment.

Following this achievement, the MR Initiative supported a five-year strategic plan in 2006 with a more ambitious goal to reduce estimated measles mortality by 90% by 2010 compared with 2000 levels. Considerable progress was achieved by 2010[1] : about 9.6 million deaths were averted by measles immunization during 2000-10 including routine and SIAs, and with the exception of the South-East Asia Region, all WHO regions have achieved at least 75% reduction in measles mortality in 2010 compared to 2000. The 90% measles mortality reduction goal was not achieved mainly due to delayed implementation of measles control activities in India and large-scale measles outbreaks in Africa.

By 2011, all 194 WHO Member States had introduced or begun the process of introducing a two-dose measles vaccination strategy delivered through routine immunization services and/or SIAs. According to WHO and UNICEF estimates, global routine coverage with a first dose of measles vaccine (MCV1) increased from 72% in 2000 to 85% in 2010 (Figure 2) (17). During this same period, coverage increased from 58% to 78% in the 47 countries with the highest burden of measles¹. By the end of 2010, the routine immunization schedules of 139 countries included two doses of measles-containing vaccine (MCV), and in 2011, GAVI supported 11 more countries to introduce a routine second dose of measles (MCV2). The timing of MCV2 serves as an important contact between the child and the Expanded Programme on Immunization (EPI) because it provides an opportunity to catch up on any missed vaccinations and deliver boosters, e.g. diphtheria-tetanus-pertussis (DTP) vaccine to older age groups.

¹ Afghanistan, Angola, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Ghana, Guinea, Guinea-Bissau, India, Indonesia, Kenya, Lao People's Democratic Republic, Liberia, Madagascar, Mali, Mozambique, Myanmar, Nepal, Niger, Nigeria, Pakistan, Papua New Guinea, Rwanda, Senegal, Sierra Leone, Somalia, Sudan, Timor-Leste, Togo, Uganda, United Republic of Tanzania, Viet Nam, Yemen and Zambia.

Figure 2: 1st Dose Measles Coverage Globally and in 47 Measles Priority Countries 2000-2010



Source: WHO / UNICEF coverage estimates, 1980-2010 as of August 2011



Between 2001 and 2011, the MR Initiative partners provided financial and technical support to more than 80 high-burden countries which enabled the vaccination of one billion children during SIAs over 10 years. In addition, the integration of other health interventions led to children receiving more than 41 million insecticide-treated bednets, 94 million deworming tablets, 127 million doses of polio vaccine and 213 million doses of vitamin A¹. The MR Initiative and its partners continue to work towards the goal of achieving and maintaining high levels of population immunity through routine immunization. In addition, SIAs conducted every two, three or four years, depending on the quality of routine immunization, currently play an important role in protecting children in countries unable to achieve high and homogenous vaccination coverage through routine immunization systems. These periodic, preventive SIAs reduce the number and size of outbreaks and consequently reduce the costs, disruption, and fear outbreaks cause both to the public and to the health-care system.

¹ MR Initiative (unpublished data).

RUBELLA VACCINATION

As for measles, a safe, heat-stable, effective and inexpensive rubella vaccine exists, and substantial progress has been made towards rubella control. However, rubella infections remain one of the leading causes globally of preventable congenital birth defects. As of December 2010, 131 of the 194 WHO Member States included rubella-containing vaccines (RCVs) in their routine immunization programmes, in the form of MR or MMR *(18)*².

² Africa: 2/46 states; Americas: all states; South-East Asia: 4/11 states; Europe: all states; Eastern Mediterranean: 15/21 states; Western Pacific: 21/27 states.

In the countries yet to introduce rubella vaccine, most children already receive two doses of measles vaccine through a combination of routine immunization and SIAs as part of accelerated measles-mortality reduction or regional elimination efforts. Switching from M to MR or MMR vaccine in these countries represents an opportunity that should not be missed to prevent rubella and CRS. In addition, in November 2011, GAVI opened a funding window to support the introduction of RCVs using the strategies recommended by SAGE in 2011 *(13)*. These strategies comprise conducting an initial wide age range catch-up vaccination campaign, combined with introducing MR vaccine in the routine childhood immunization programme, using MR vaccine in all subsequent follow-up campaigns, and introducing rubella and CRS monitoring activities.

LABORATORY NETWORK

Rapid and accurate diagnosis of measles and rubella remains essential for monitoring progress and detecting outbreaks. Based on the structure and practices of the successful polio laboratory network, the WHO Global Measles and Rubella Laboratory Network (LabNet) provides valuable global information about the circulation of measles and rubella infections *(19)*. As of October 2011, the LabNet included 690 national, sub-national and regional laboratories, serving 183 countries. All laboratories follow a standardized set of testing protocols and reporting procedures that are constantly reviewed and improved as technological innovations occur. The LabNet relies on a strong quality assurance programme that monitors the performance of all laboratories through annual proficiency testing and continuous assessment. In the five-year period between 2005 and 2009, the LabNet provided the results of over one million measles immunoglobulin M (IgM) tests and shared sequence information on over 10 000 measles and 1000 rubella viruses *(20)*. The LabNet is a vital resource for immunization programmes as it documents the successes of vaccination efforts to interrupt measles and rubella transmission nationally and internationally and is able to monitor virus transmission patterns and help document successful elimination strategies.



CURRENT WHO GLOBAL AND REGIONAL TARGETS

All six WHO regions have committed to measles elimination and five regions have set target dates. The WHO Region of the Americas achieved the goal in 2002; the Western Pacific Region aims to eliminate measles by end of 2012; and the European and Eastern Mediterranean Regions are accelerating their measles control activities in order to eliminate measles by 2015. In 2011, countries in the African Region took on the goal to eliminate measles by 2020, and in 2010 the South-East Asia Region adopted a resolution urging countries to mobilize resources to support the elimination of measles, the target date for which was under discussion.

In May 2010, the World Health Assembly endorsed a series of interim measles control targets for 2015 [21]. These targets, which include exceeding 90% coverage with MCV1 nationally, and exceeding 80% vaccination coverage in every district, highlighted the critical role of strong routine immunization systems as a cornerstone for sustainable measles control/elimination efforts. The targets also include reducing annual measles incidence to <5 cases per million, maintaining that level, and reducing measles mortality by more than 95% compared with 2000 estimates.

As of the publication of this plan, three of the six WHO regions had set control or elimination targets for rubella. The Americas and Europe targeted rubella and CRS elimination by 2010 and 2015, respectively. The Western Pacific Region aims to have significantly accelerated rubella and CRS prevention by 2015, and the Eastern Mediterranean Region is currently discussing the establishment of a target date for rubella elimination. The African and South-East Asia Regions have yet to establish rubella elimination, control or prevention goals (Figure 3).

POTENTIAL FUTURE WHO GLOBAL TARGETS

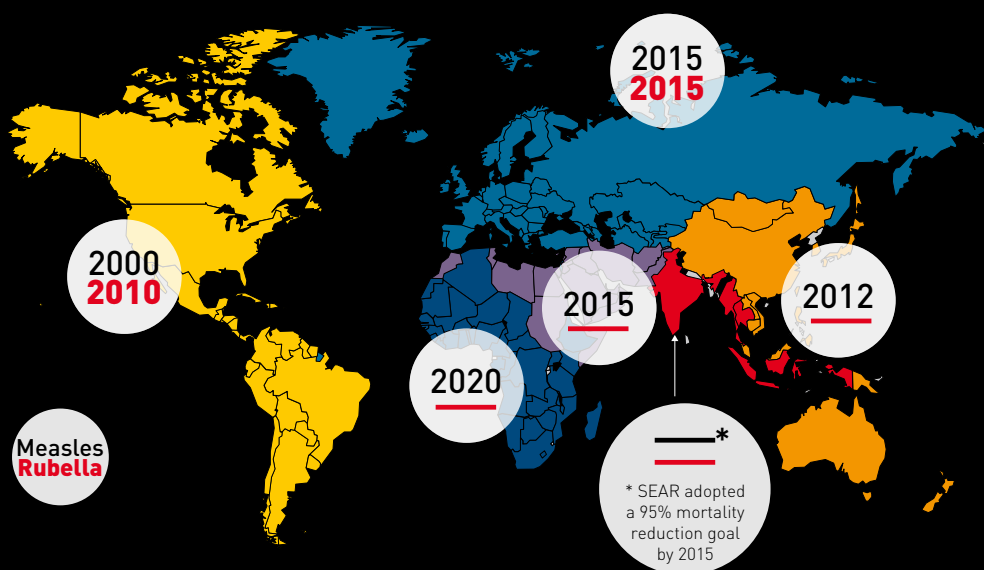
The MR Initiative recognizes the dynamic and iterative nature of the strategic planning and target-setting process, and seeks to maintain a management strategy that uses available resources optimally to achieve the largest possible health benefits associated with the reduction of measles, rubella and CRS.

In 2009, progress towards regional targets led the WHO Executive Board to request an assessment of the feasibility of measles eradication. The areas covered by the assessment included the biological, technical, socio-political and operational feasibility of measles eradication; the cost-effectiveness of measles eradication; the adequacy of global vaccine supply; and the impact of such an initiative on immunization services and health systems. In late 2010, the WHO ad hoc Global Measles Advisory Group and the SAGE concluded that measles can, and should, be eradicated, and that measles eradication activities should be used to accelerate rubella control and the prevention of CRS, conclusions endorsed in January 2011 by the WHO Executive Board..

The 63rd World Health Assembly recommended proceeding to the eventual global eradication of measles, conditional on achieving measurable progress towards reaching the 2015 global targets and the regional measles elimination goals [21]. The MR Initiative continues to explore the best timing and approach for launching a measles eradication initiative, particularly in the context of possible cost-sharing opportunities with the GPEI.



Figure 3:
Current WHO Regional Measles and Rubella Elimination/Control Goals



In 2009, SEAR Regional Committee endorsed a resolution to mobilize support toward measles elimination.

Note: EMRO is in the process of adopting a target for rubella elimination by 2020.



RECENT SETBACKS AND RISK OF RESURGENCE

Despite the successes in global measles control, progress towards a reduction in the numbers of measles cases and deaths stagnated between 2008 and 2010 [15], largely due to numerous prolonged measles outbreaks in Africa and Europe and the continued high measles disease burden in India (Figure 4).

Figure 4: Reported measles cases by WHO Region, 2005-2010. [Source: Cases from annual Joint Reporting Form 193 WHO Member States; Data as of August 2011].



The outbreaks in Europe contributed to a rise in the global number of reported cases from 7499 in 2009 to 30 625 in 2010, with most cases and outbreaks occurring in western European countries. The outbreaks in Africa over the same time period represent a widespread resurgence of measles that affected 28 countries in sub-Saharan Africa, with more than 250 000 reported measles cases and more than 1500 reported measles-associated deaths. Estimated underreporting of measles suggests that true numbers of cases and deaths may be as much as 10–50 times higher. The failure to vaccinate children and thus achieve and maintain high levels of population immunity uniformly throughout countries, either through routine immunization services or SIAs, is the underlying cause of the outbreaks. For example, 19 million infants (mostly in Africa and South-East Asia) did not receive MCV1 in 2010 and remain at risk of infection and death.

Furthermore, since 2008, major funding shortfalls have contributed to delays and the deterioration of the quality of SIAs. The outbreaks in Africa, together with continuing high numbers of measles cases and deaths in India, threaten to undermine the contribution of measles-mortality reduction to the achievement of MDG4. If financial and political commitments decrease from 2010 to 2013, WHO estimates an additional 200 000 measles deaths in 2011, rising to more than 500 000 worldwide by 2013 [22].

ECONOMIC ANALYSES OF MEASLES, RUBELLA AND CRS CONTROL AND ELIMINATION

Numerous studies document the cost-effectiveness and significant net economic benefits of measles and rubella vaccination efforts¹. In 1985, White and colleagues reported economic benefits that significantly exceeded the costs associated with using MMR vaccine for routine vaccination in the United States of America (USA) (23). An updated analysis published in 2004 confirmed continued cost-savings associated with the current USA 2-dose MMR routine vaccination schedule, and estimated annual net benefits exceeding US\$ 9.7 billion (US\$2011) (24). One study estimated a net saving for the WHO Region of the Americas of over US\$ 282 million (US\$2011) from investments made in regional measles elimination between 2000 and 2020, and suggested a positive impact on health systems (25). Developed countries continue to pay high costs associated with managing outbreaks associated with importations (26, 27).

Similar to the experience of developed countries, studies demonstrate the net value of vaccination in developing countries, although the lower levels of routine immunization coverage and single-dose schedules used in these countries make SIAs relatively much more cost-effective (28–30). For example, introducing a second measles dose in SIAs in Zambia appears cost- and life-saving compared to a single dose of measles vaccine through routine immunization (28). For India, SIAs also appear cost-effective (30). Estimates suggest that Measles and Rubella Initiative investments between 2000 and 2007 prevented 3.6 million child deaths at an average donor cost of approximately US\$ 220 (US\$2011) per death prevented (31), and in sub-Saharan Africa measles vaccination ranks as the third most cost-effective public health intervention available after vitamin A and zinc supplementation (32). Finally, a recent economic analysis demonstrated the cost-effectiveness of measles reduction goals and identified measles eradication as the most cost-effective strategy considered (33).

The economic analysis evidence for rubella and CRS control similarly suggested significant net savings. A 2002 review of the literature found evidence from 10 studies demonstrating that incorporation of RCV into national childhood immunization schedules appeared both cost-beneficial and cost-effective (34). Estimates suggest a wide range of the lifetime cost of treating a single CRS case, with some exceeding US\$ 75 000 (US\$2011) (34). Changing from measles vaccine to a combined MR vaccine increases the cost per dose by about US\$ 0.30 for MR vaccine and by US\$ 0.70–0.95 for MMR vaccine based on using 10-dose vials (35). Not surprisingly, using the combined form of vaccine represents a more cost-effective option than using both a measles vaccine and a rubella vaccine (36).

At approximately US\$ 1 per dose, measles vaccination is a highly cost-effective intervention. Adding rubella to measles vaccine increases the cost only slightly, and allows for shared delivery and administration costs.



¹ For purposes of comparison, all economic estimates are converted into 2011 US dollars (US\$2011).

6

STRATEGY TO ELIMINATE MEASLES, RUBELLA AND CRS



The strategy for 2012–2020 builds on the experiences in the Americas and in countries in other WHO regions that successfully eliminated indigenous transmission of measles, and in some cases rubella and CRS. High coverage with two doses of MCV serves as the foundation required to ensure high population immunity against measles. High coverage with one dose of RCV provides sufficient protection against rubella, although many countries choose the operational advantages of using a combined MR vaccine in their programmes, and deliver two MR doses. This Strategic Plan introduces several new components, including an emphasis on outbreak preparedness, timely detection and rapid response. The additional focus on communication and public engagement highlights the critical need to address these issues now. The Plan also recognizes and emphasizes the essential role of research and development to refine the tools for measles elimination and eradication.

The five components of the strategy are:

1. Achieve and maintain high levels of population immunity by providing high vaccination coverage with two doses of measles- and rubella-containing vaccines.
2. Monitor disease using effective surveillance and evaluate programmatic efforts to ensure progress.
3. Develop and maintain outbreak preparedness, respond rapidly to outbreaks and manage cases.
4. Communicate and engage to build public confidence and demand for immunization.
5. Perform the research and development needed to support cost-effective operations and improve vaccination and diagnostic tools.

1. ACHIEVE AND MAINTAIN HIGH LEVELS OF POPULATION IMMUNITY BY PROVIDING HIGH VACCINATION COVERAGE WITH TWO DOSES OF MEASLES- AND RUBELLA-CONTAINING VACCINES

Measles and rubella elimination require achieving and maintaining high levels of population immunity. For measles, vaccination coverage will need to reach and remain at or exceed 95% with each of the two doses of MCV (for countries yet to introduce RCV), MR or MMR vaccines at the district and national levels. All unvaccinated children old enough to receive MCV1 (combined with rubella vaccine where appropriate) should receive it through routine health services according to the national schedule, typically at 9 or 12 months of age. Strengthening routine immunization is a critical component of the strategy to control and eliminate measles, as it is the foundation to achieving and sustaining high levels of immunity to measles in the community.

Even high coverage with one dose of MCV will still leave people unprotected and will not prevent large outbreaks. A second dose, given through SIAs or routine services, is required. Various tactics have been employed in different settings. Countries with stronger and more stable immunization programmes have relied on routine services to deliver the second measles dose to children one month after the first dose, generally between 15–18 months of age or at school entry. Countries not able to achieve high and homogenous vaccination coverage with the first and second dose of MCV through their routine immunization systems will need to use SIAs [37]. These can be summarized as a one-time “catch-up” SIA targeting a broad age group (often

9 months to 14 years of age) to immunize the most susceptible children, followed by periodic “follow-up” SIAs targeting children born since the previous one regardless of vaccination status, with special efforts made to reach children who have never been vaccinated against measles. The interval between follow-up SIAs is determined by epidemiological analysis, including coverage rates, the age distribution of cases, and the estimated rate of accumulation of susceptible children. These non-selective SIAs not only give a second dose to children reached by the vaccination programme but also ensure that missed children are protected, especially those in poor or hard-to-reach communities. Focusing on the goal of achieving and maintaining high levels of population immunity offers the flexibility for countries and regions to adapt their approach as they improve their ability to deliver measles- and rubella-containing vaccines through their routine health services. As routine coverage with two doses increases, campaigns will need to occur less frequently, and can eventually cease altogether.

Countries that do not yet include immunization against rubella in their routine health services should consider adding it once they are able to achieve and maintain measles vaccination coverage of 80% or greater through routine and/or regular campaigns. This decision will need to consider the availability of appropriate infrastructure and resources for child and adult immunization programmes, competing disease priorities, and the ability to conduct high-quality campaigns to close the rubella immunity gap at the time of introduction.

Efforts are needed to record all doses (through routine programmes or SIAs) of measles and rubella vaccination on child health cards. Improved record keeping is a strategic prerequisite to improve monitoring of progress towards coverage targets, and can also potentially strengthen routine EPI. For example, a focus on recording doses can lead to an increased distribution and retention of child immunization cards and facilitate school enrolment vaccination screening policies. In addition, ensuring that a reliable supply of quality MCV and RCV at an affordable price (vaccine security) is critical to achieving the immunization coverage levels needed to reach these goals. Assuring vaccine security requires strong engagement with industry and partners, as well as accurate forecasting of vaccine supplies.

2. MONITOR DISEASE USING EFFECTIVE SURVEILLANCE AND EVALUATE PROGRAMMATIC EFFORTS TO ENSURE PROGRESS

Building and maintaining an effective measles and rubella surveillance system remains vital to provide essential information to set priorities, plan activities, allocate resources, implement prevention programmes, respond to outbreaks and evaluate control measures. WHO developed standards for epidemiological surveillance of measles and rubella for use in conjunction with the updated surveillance performance indicators and the measures for monitoring progress towards elimination (38,39). These standards are based on case-based surveillance with laboratory confirmation, in-depth outbreak investigations, and identification of viral genotypes from every outbreak. Outbreaks help to identify gaps in routine coverage and, where applicable, SIA coverage. National integrated measles and rubella surveillance systems must cover each nation completely, and perform with sufficient sensitivity to detect any ongoing transmission. Laboratory confirmation represents an increasingly critical component of effective surveillance, because it helps to exclude other diseases with fever and rash, and trace importations. For measles and rubella laboratory confirmation, the standard LabNet IgM test in serum samples is used. In some countries, oral fluid or dried blood spots



from suspected cases are also used for IgM testing. In addition, rapid diagnostic tests are being developed to support field investigations. As countries progress towards elimination, molecular surveillance becomes increasingly critical to identify importations, trace the transmission pathways of measles and rubella viruses and document the interruption of endemic disease transmission. To monitor better the impact of RCV introduction, countries will need to establish and expand CRS surveillance. Standard sentinel surveillance may need to be adapted in countries with limited health and curative infrastructure.

Planning requires accurate measurement of vaccination coverage. The quality of the data on the number of doses delivered improves through training and supervision. Countries should be supported to adopt new tools and technologies for reporting, tracking and supervising service delivery.

Countries should also conduct regular high-quality surveys to verify and benchmark vaccination coverage based on service-delivery data or provide coverage estimates if these data are unavailable. Surveys should also be used to assess the success of communications strategies and to identify reasons for non-vaccination. If possible, this information should come from already-planned large surveys, such as the Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), or post-SIA coverage surveys. Serological surveys may also serve as useful tool to assess gaps in population immunity and areas for potential outbreaks.

Finally, countries need to establish and maintain reliable systems for monitoring adverse events following immunization (AEFIs). These events should be rapidly and impartially investigated to provide accurate information that can allay the fear of vaccines, particularly combination vaccines containing measles, that exists in some communities. Paradoxically, as vaccine coverage improves and cases of the disease disappear, perceptions about the need for vaccine decrease and perceptions about the risk of AEFIs increase. In addition to prompt investigation, an AEFI surveillance system should include treatment guidelines for all AEFI and guidance on effective and transparent communication to maintain confidence in immunization programmes. Measles SIAs provide the opportunity to review current practice and to establish a surveillance system for AEFIs, or to strengthen an existing system and increase awareness about vaccine safety. Several countries that used SIAs to introduce AEFI surveillance activities subsequently extended them to their routine immunization system.

3. DEVELOP AND MAINTAIN OUTBREAK PREPAREDNESS AND RESPOND RAPIDLY TO OUTBREAKS AND MANAGE CASES

Measles is classically an outbreak disease. Although outbreaks will occur at all phases of measles control, they should become smaller and less frequent as countries and regions get closer to elimination. Outbreaks can be useful to identify gaps in immunization programme performance that may not be evident through monitoring vaccination coverage. Immunization programme weaknesses can include low coverage, heterogeneity of coverage with pockets of missed children, population movements, community resistance, cold-chain failure, inadequate human resources, poor data collection, and reporting errors. The community awareness and political attention resulting from outbreaks can help to mobilize effectively the resources needed to correct these programme weaknesses. Measles and rubella outbreak response efforts should seek to prevent further transmission and cases by urgently vaccinating the population.

Outbreak investigations, laboratory confirmation of suspected cases and detailed analysis of available measles/rubella surveillance data help to characterize the outbreak and ensure the

implementation of an effective response. WHO has developed a series of guidelines for measles outbreak investigation and response in elimination, mortality reduction and emergency settings. In elimination settings, a single measles case constitutes an outbreak requiring a rapid investigation and response (40). In countries with mortality reduction goals or higher disease incidence, each confirmed outbreak requires a thorough risk assessment to guide the decisions and planning of outbreak response immunization. Although the approach to outbreak response varies — depending on national measles control goals, the level of susceptibility in the population at different ages, the risk for spread and complications, and the existing health-service infrastructure — in general terms, responding faster is better. The response should target communities and age groups identified as the most affected and/or most at risk of more severe disease and death (41). In emergency settings, urgent coordinated SIAs that include vitamin A supplementation are often conducted to prevent outbreaks and reduce child mortality (42). Preparations for eventual outbreaks should include a plan for locally-funded outbreak response and provision of vaccine stocks for emergency use. At the global level, in order to reduce the disruption of routine preventative activities due to measles outbreaks, the MR Initiative will develop a funding mechanism for the rapid mobilization of vaccines for emergency outbreak response.

Measles and rubella outbreak response efforts should also seek to reduce morbidity and mortality by providing appropriate case management. Administration of vitamin A to people with measles decreases the severity of the disease, and the risk of death or xerophthalmia and its possible progression to blindness. All suspected measles cases should receive two doses of vitamin A (three doses if the child presents with ocular complications), following guidelines for the integrated management of childhood illness and supportive care at the first referral level, including additional fluids (such as oral rehydration solution), antipyretics and, when appropriate, antibiotics and referral to the next level of care (43,44). During and following rubella outbreaks, countries not yet using rubella vaccine should implement active CRS surveillance, with special attention paid to evaluating the rubella immunization status of pregnant women with suspected rash illness. In countries using rubella vaccine, additional measures should be undertaken such as investigation and vaccination of contacts to reduce the risk of exposure to pregnant women.

4. COMMUNICATE AND ENGAGE TO BUILD PUBLIC CONFIDENCE AND DEMAND FOR IMMUNIZATION

Communication and social mobilization efforts aim to foster community ownership and demand for immunization, to increase coverage and to help achieve measles, rubella, and CRS goals. Community awareness of immunization rights, benefits, safety and available services will promote public acceptance and participation. Experience with polio and measles programmes demonstrates the need for targeted and specific strategies to address resistance to immunization in communities, including health workers (45). Moreover, community and civil society demand for immunization will hold governments and programmes accountable to their commitments, thereby improving programme sustainability.

Vaccinating over 95% of the target population against measles and rubella requires well-conceived, professionally implemented communication strategies linked directly to programme goals. A renewed emphasis should be given to effective communication and public engagement with parents, health professionals, community leaders and the media, to gain their trust, understand and address vaccine concerns and support vaccine acceptance.



Communication strategies should address culture and belief systems and aim for dialogue and engagement with communities, rather than one-way communication. They should incorporate traditional media channels, lessons from commercial and public marketing campaigns, social media, and proven new techniques. Strategies must address the nature and threat of measles, rubella and CRS, the safety, efficacy and contraindications of the vaccines and strategies to manage AEFIs.

Planned communication and engagement activities include the following:

- Data collection and analysis and operations research to determine the challenges, evidence-based messages, strategies and channels for community engagement.
- Communication surveillance to understand any emerging community concerns about vaccination and to take appropriate measures to address them.
- Advocacy with decision-makers, including political leaders, health-care professionals, teachers and other educators, religious and traditional leaders, women's, youth, labour, business and professional associations and other influential groups — to explain the benefits of immunization, address community concerns and invite their active participation in the programme.
- Training of community leaders in basic health information, message development and dissemination, interpersonal communication, community engagement and mobilization.
- Information campaigns using clear evidence-based messages that address community needs communicated through interpersonal communication, community events, or mass and social media.

Strategies can also include population-based incentives for vaccine demand (e.g. bundled health interventions), provided that they respect the autonomy and informed consent of programme beneficiaries.

5. PERFORM THE RESEARCH AND DEVELOPMENT NEEDED TO SUPPORT COST-EFFECTIVE OPERATIONS AND IMPROVE VACCINATION AND DIAGNOSTIC TOOLS

Research supports the scientific underpinnings of the strategies and shapes evidence-based policy. An international meeting hosted by CDC in May 2011 highlighted the critical research areas necessary to achieve measles and rubella/CRS eradication¹. These areas comprise: measles, rubella and CRS epidemiology; assessing vaccine efficacy and effectiveness; needle-free vaccine-delivery methods (e.g. aerosolized or powdered vaccines inhaled through the respiratory tract); improved methods for laboratory testing for measles, rubella and CRS; new immunization strategies; improved methods to monitor and evaluate measles and rubella vaccination programmes; development of effective advocacy tools to use with decision-makers, and improved messages and strategies to communicate with potential beneficiaries and their families; economic analyses of different strategic options; and mathematical modelling.

¹ Report of the measles and rubella research meeting, 2011. [Submitted for publication].



7

GUIDING PRINCIPLES TO ELIMINATE MEASLES, RUBELLA AND CRS



Experience with targeted measles control activities and with polio eradication over the past decade led to the identification of key factors promoting success to guide the planning and implementation of measles, rubella and future infectious disease control efforts.

1. COUNTRY OWNERSHIP AND SUSTAINABILITY

National health leaders maintain responsibility for the well-being of their citizens, and building and attaining full country ownership is essential to achieve and sustain public health goals. Making the transition from the current situation to sustained high levels of population immunity will require national governments and civil society to work together, with the shared goal of achieving financial and technical self-reliance.

Achieving this ownership requires country political commitment and advocacy. Health-sector plans should fully integrate the national immunization programme plans and align with comprehensive multiyear plans for immunization (cMYPs). The cMYP planning process synthesizes estimates of programme needs and costs. In addition, performing the necessary analyses for costing and financing is a key step for national immunization programmes towards financial self-reliance. The cMYPs normally include financing for the first and second dose of MCV whether through routine immunization services or regular SIAs (for second dose only) held every two to four years, or both. They may also include the financing for the introduction of RCV into routine immunization and, if appropriate, SIAs.

Low-income countries reliant on external financial support for measles and rubella control and elimination activities should work to increase their contribution to the vaccination programme from their national budgets and to achieve self-reliance and financial sustainability. In addition to purchasing and delivering routine vaccinations, including MCV or combination measles- and rubella-containing vaccines, countries should finance at least 50% of the operational cost for follow-up SIAs supported by the MR Initiative. Achieving programme sustainability will require high-level advocacy and technical capacity-building at all levels within the country.

2. ROUTINE IMMUNIZATION AND HEALTH SYSTEMS STRENGTHENING

Achievement of regional and global measles and rubella goals requires robust and effective health and immunization systems, particularly a strong national EPI. Each country should take responsibility for providing the resources necessary to strengthen immunization systems, including high-quality routine immunization programmes and SIAs, disease surveillance, programme monitoring and an integrated laboratory network. Higher and more homogenous routine MCV1 coverage increases population immunity, thus eliminating the need for SIAs, or lengthening the interval between them. Better MCV1 coverage also allows introduction of a second dose in the routine system.

Providing measles and rubella vaccination through routine immunization systems offers an opportunity to strengthen health systems. Measles and rubella vaccination visits often represent the last routine contact between a child and the health system for preventive care, and serves as a key opportunity to monitor the vaccination and health status of the child, administer any missed or booster vaccine doses, distribute long-lasting insecticide treated bednets (LLINs) and provide vitamin A, as appropriate. SIAs can, and should, help strengthen routine immunization and health systems. Case studies have demonstrated that

properly planned measles SIAs can strengthen national health systems through renewed attention to effective and timely micro-planning, training and supervision of health workers, reinforcement of the cold chain, improvement of the waste-management system, increased injection-safety standards, strengthened disease surveillance and the use of surveillance data for fine-tuning programme management (46,47). To ensure that SIAs help strengthen immunization and surveillance systems, the MR Initiative invested additional resources in its SIA financial planning for health system strengthening activities. The MR Initiative continues to explore the best approaches to integrate measles and rubella activities to help build stronger routine immunization and health systems.

Underserved, migrant and poor children missed by routine services have the right to vaccination and should be specifically targeted by SIAs and/or other outreach efforts.



3. EQUITY

The WHO Constitution holds that “[t]he enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being...” By extension, all people, without distinction of gender, race, religion, age, political belief or economic or social condition, should benefit from disease-prevention programmes, and vaccination and protection against measles and rubella. Outreach activities and SIAs to deliver vaccines and other child-survival interventions specifically target children missed by routine services, including underserved, migrant and poor children. Studies in Ghana and Zambia (48) and Kenya (37) demonstrated that measles SIAs improve equity by reducing the gap in immunity between rich and poor households (see Figure 5). In addition, they provide an ideal platform for delivering other life-saving child-health interventions and health education. The goal of vaccinating all children ensures equity in health-service delivery, as countries develop their own routine and health systems.

4. LINKAGES

In public health, resources are rarely adequate for all needs, and interventions should thus be linked whenever possible. Combining measles and rubella control activities, and linking them to other health interventions while seeking synergies with all immunization efforts, follows the recommendations of the Global Immunization Vision and Strategy (GIVS). The following are examples of linkages that maximize the benefits and efficiency of investments:

With polio eradication: The strategies for measles and rubella elimination build on the principles and strategies developed for the GPEI. Both programmes work best in the presence of a strong routine immunization system to ensure sustained high levels of vaccine coverage, and both require SIAs to fill any gaps left by routine services to increase population immunity among wide age groups, regardless of previous vaccination or disease history. Providing polio vaccination during measles SIAs, strengthening routine immunization systems and combining efforts to strengthen surveillance for both diseases will facilitate both polio eradication and measles and rubella control and elimination targets. As the end-game strategy for polio eradication evolves, new opportunities for linkages between polio and measles may emerge — these may be related to the routine delivery of an inactivated polio vaccine (IPV) dose at nine months, and needle-free injection technologies (patch/jet injectors), among others. Polio surveillance officers also play key roles in planning, organizing and monitoring measles SIAs and in strengthening routine immunization.



With new vaccines: New vaccines, such as meningitis and human papillomavirus (HPV) vaccines, provide opportunities for measles and rubella in terms of overlapping target groups, synergies to promote school vaccination and school entry screening, and combined planning and implementation.



With other proven child survival interventions: The routine measles vaccination visit at nine months is widely used to provide vitamin A supplementation and an LLIN. This practice not only provides a high proportion of infants with these proven interventions but also provides additional incentives towards having a child fully vaccinated. The routine second dose contact can similarly be used as an “older healthy child visit” that combines vaccination with deworming, growth monitoring and semi-annual vitamin A supplementation. Through participation of the Lions Club in the MR Initiative the synergy between two proven interventions to reduce blindness, measles vaccination and vitamin A supplementation, will be further expanded, including the mobilization of national Lions Club volunteers. In addition, measles vaccination campaigns provide an equitable and effective platform to reach migrant, underserved and poor children with other proven interventions such as LLINs, vitamin A supplementation and deworming treatment. Such integration is now standard practice for SIAs supported by the MR Initiative in Africa and elsewhere. Studies from African countries concluded that integrated packages of high-impact interventions, including MCV delivered through campaigns, helped save lives, and that advance planning efforts successfully addressed formidable logistical challenges (48).



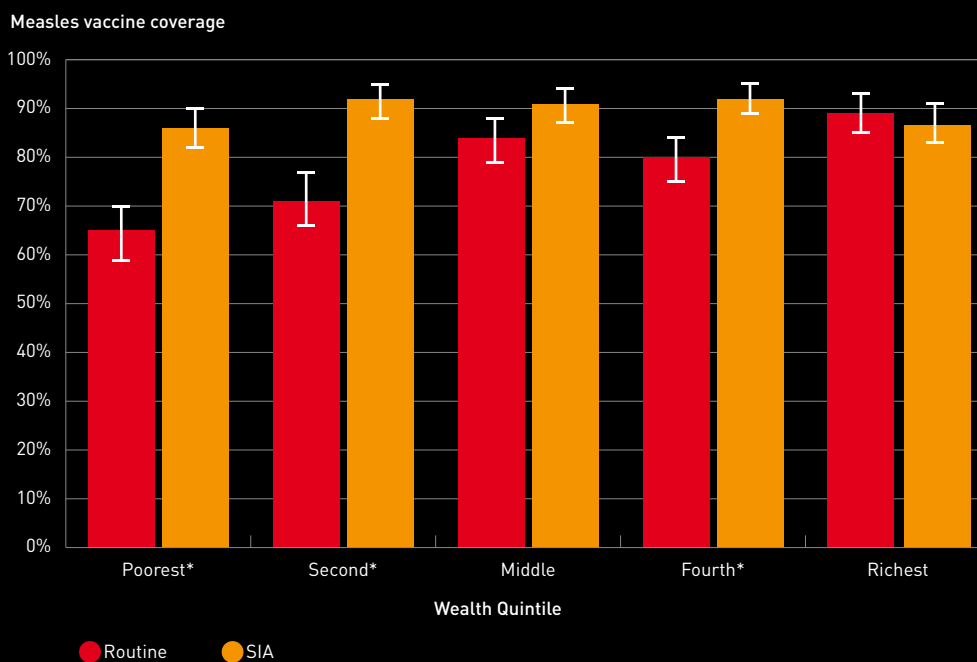
Surveillance activities: Measles and rubella surveillance is linked whenever possible to other disease-surveillance initiatives. In polio priority countries, the polio surveillance officers support measles outbreak investigations and surveillance activities. Many countries have integrated disease surveillance and response programmes that manage measles and rubella surveillance activities, and often a single institution contains both the national polio and measles laboratories. The equipment, training and quality assurance that support the confirmation of measles and rubella through an enzyme-linked immunosorbent assay (ELISA) provide an effective platform for confirmation of other vaccine-preventable diseases, such as yellow fever and Japanese encephalitis.

In summary, the measles and rubella strategy cuts across a broad range of other immunization and child-health programmes, and this Plan recognizes the importance of strengthening the control and elimination of measles and rubella while concomitantly improving health and health systems overall.



Figure 5:

Nationwide routine and SIA measles vaccine coverage by wealth quintile among children aged 9–23 months, Kenya, 2002. Lines above and below the point estimates of coverage represent 95% confidence intervals, and [*] indicates a statistically significant ($\alpha = 0.05$) difference between routine and SIA measles vaccine coverage [Source: reference 37].



8

CHALLENGES TO IMPLEMENTING THE STRATEGIC PLAN



Measles, rubella and CRS elimination strategies have been successful in the WHO Region of the Americas and in a number of countries in other WHO regions. However, these strategies may not perform the same way in all countries, and experiences of the GPEI reveal the importance of identifying, anticipating and addressing barriers to effective implementation of disease-control strategies. Resource limitations represent a major constraint. Comprehensive analyses of the feasibility of measles elimination by each WHO regional office and discussions about enabling factors, barriers and lessons learnt, led to the identification of the following five key challenges to implementing this Strategic Plan and potential solutions to address them.

1. FINANCIAL RISKS

Sufficient predictable and sustainable funds are a cornerstone to building a strong health system, delivering effective routine immunization and achieving the goals of control, elimination and eradication. Complacency following the initial success of accelerated control activities, and intense competition for human and financial resources between global health initiatives, including polio eradication and new vaccine introduction, caused delays in funding for preventive measles SIAs in priority countries. This resulted in a resurgence of measles cases and deaths. The MR Initiative will work with countries and all stakeholders to maintain and increase funding in this environment, to ensure optimal timing of measles SIAs based on technical and operational criteria.



The MR Initiative will continue to highlight the global benefits of implementing measles and rubella elimination strategies and the potential for synergies between different child-survival programmes. It will collaborate with other global health initiatives to strengthen routine immunization and surveillance, and increase access, when possible and as appropriate, to other child-survival health interventions. Strategically, the MR Initiative will seek to accelerate global and regional resource mobilization and advocacy efforts, communicate the measles-mortality reduction success story, and emphasize the potential risks of losing the gains achieved to date (including the MDG4 gains) due to the resurgence of measles in the African Region, widespread transmission in India, and prolonged outbreaks in western Europe.



The MR Initiative and its partners aim to support every country and region in the fight against measles, rubella and CRS through the development of a long-term and sustainable approach. Given resource limitations, the MR Initiative will prioritize countries in which the majority of measles deaths and CRS cases occur, and will focus on achieving the World Health Assembly 2015 targets of mortality reduction. Annex 1 provides a list of current measles and rubella priority countries, selected on their classification as low- or lower middle-income plus their relatively low routine measles immunization coverage [MCV1 <90%] or their lack of inclusion of RCV into routine immunization.

The MR Initiative will work closely with GAVI, which continues to support introduction of a second dose of measles vaccine into routine immunization systems, and to encourage and support GAVI-eligible countries to take advantage of the recently opened GAVI funding window to support the introduction of RCV. The MR Initiative will also pursue advocacy and communications efforts at all levels to sustain the political commitment and resources necessary to achieve the 2015 and 2020 targets of the Strategic Plan.



2. HIGH POPULATION DENSITY AND HIGHLY MOBILE POPULATIONS

In settings with high population density and along migration routes (including air travel and during mass gatherings), the highly infectious nature of measles makes control and elimination very challenging. For example, India currently has the largest estimated number of measles cases and deaths due to its relatively low routine immunization coverage, incomplete implementation of a two-dose strategy for measles control and high-density populations. In some Indian states, achieving measles control may prove as technically challenging as it has been for polio eradication, although successes in 2011 with polio in India provide clear demonstration of the ability of the Government of India to overcome large challenges. For measles and rubella, reaching a national-level technical consensus on the need for control and elimination represents a critical first step for India. Continued support and advocacy to every level of government can build on current efforts to implement a nationwide two-dose measles (or MR or MMR in some states) strategy, together with efforts to strengthen routine immunization programmes. The MR Initiative will support the research needed to address key questions, such as the level of vaccination coverage required to stop transmission in the densely populated states of Uttar Pradesh and Bihar, and the types of operational strategies required, based largely on the extensive GPEI block-by-block research.

The MR Initiative will support research activities that provide evidence-based strategies to address the challenges posed by high levels of population movement within and between countries, which exist in South Asia and West Africa. In addition, it will focus efforts on developing the communication tools and strategies required to reach migrants and isolated populations, including religious groups that typically do not interact with national health systems.



3. WEAK IMMUNIZATION SYSTEMS AND INACCURATE REPORTING OF VACCINATION COVERAGE

The resurgence of measles in Africa during 2009 and 2010 occurred largely due to underlying weaknesses in health systems, including difficulties in reaching and sustaining high vaccination coverage (15). These outbreaks suggest over-reporting of routine and SIA coverage in certain countries which can result in miscalculation of population immunity and the appropriate interval between follow-up SIAs.

The high infectiousness of measles and the high rate of clinical disease with infection make measles outbreaks one of the first indicators of programme weakness. Strengthening routine immunization systems is critical to attain measles control and elimination and to sustain any gains made.

The MR Initiative will increase support to countries to strengthen routine immunization systems by documenting and disseminating the experiences and outcomes of implementing “best practices” in conducting measles SIAs. In addition, the MR Initiative will support the inclusion of specific routine systems strengthening activities as part of M or MR SIAs. Other activities supported by the MR Initiative will be regular data validation (data quality assessments and surveys), greater accuracy of coverage data by taking full advantage of high-quality household surveys, and technical support for the planning, implementation and monitoring of SIAs, particularly in countries with relatively weak health systems. Furthermore, activities such as EPI programme reviews and Post Introduction Evaluations, or new vaccines (including routine measles second dose and RCV), represent key opportunities to review measles vaccination performance and the system components of the EPI programme. Typically, with the participation of external partners, these activities generate high-level national and international attention. Linking the outcomes and recommendations of the reviews to the multiyear planning process will lead to more systematic follow-up, which increases the chances of securing financial resources to implement actions.



4. MANAGING PERCEPTIONS AND MISPERCEPTIONS

In many wealthy and middle-income countries, improvements in living standards, nutrition, and quality of health care have reduced the measles mortality rate to such low levels that many citizens no longer perceive measles or rubella as a serious problem. When individuals no longer see cases of a previously common disease they begin to believe the vaccine no longer provides benefits. Thus, successful vaccination programmes can begin to suffer from public misperceptions that any risks associated with the vaccine might outweigh the invisible benefits. This misperception becomes an even greater problem if messages about AEFIs get amplified in the media while ignoring the benefits of vaccination.



Currently, pockets of resistance to immunization, especially to combination MCVs such as MMR, exist in some countries, most notably in North America and western Europe. This has resulted largely from the efforts of anti-vaccine groups and from highly publicized but completely discredited vaccine safety concerns (49). This resistance contributes significantly to the ongoing resurgence of transmission in western Europe, to the export of measles virus globally, and also to the large outbreak in 2010 in several countries in southern Africa. The spread of measles to the Americas required countries to divert resources for expensive outbreak investigations and vaccination responses.



To address vaccination perception challenges, the MR Initiative will work with partners to analyse the determinants of vaccine acceptance. It will support operational research on effective strategies to engage vulnerable and high-risk populations, addressing culture and belief systems and other factors that influence vaccine acceptance; on the effectiveness of immunization communication with parents and by health workers; and on determining the issues that need to be addressed to improve demand for measles and rubella immunization. The MR Initiative partners will actively work with national governments and professional associations to implement effective research-based communication strategies aimed at vulnerable and high-risk populations. These strategies will be carefully monitored and evaluated, and changed as necessary to ensure they are effective. Targeting health-care professionals during and after training to sensitize them to the value of immunization, and helping to track children to ensure they receive two doses of a measles- and rubella-containing vaccine on time, represents ongoing priorities.

5. CONFLICT AND EMERGENCY SETTINGS

Humanitarian crises resulting from armed conflicts or natural disasters adversely affect disease control and eradication efforts, and cause population displacement, crowding, interruption of health services, reduced access to health facilities and increased risk of outbreaks, including cross-border transmission. In the past, large measles outbreaks in refugee camps have led to extensive deaths, with case-fatality rates of up to 25%. With the widespread adoption of the SPHERE guidelines, all children affected by humanitarian emergencies should now receive a measles vaccination administered as soon as conditions allow access to affected communities (50). Lessons learnt from the polio eradication initiative provide appropriate insights into the importance of negotiating days of tranquillity and planning synchronized cross-border SIAs. The MR Initiative, in coordination with humanitarian emergency partners, will advocate for the establishment of a special emergency fund to support measles control efforts for countries, zones and populations in crisis.

9

ROLES AND RESPONSIBILITIES

The tremendous progress made towards reducing measles deaths is a direct result of the dedication of national governments and immunization partners, working together to achieve common goals. These partners range from volunteers, nongovernmental organizations, international bodies, vaccine manufacturers, foundations and researchers, among others. Countries bear the largest responsibility for measles and rubella control and elimination, and must engage in sustainable national planning, funding and advocacy to protect their citizens from devastating but preventable diseases. The Strategic Plan highlights below their roles and those of global and regional partners and the GAVI Alliance.

1. NATIONAL GOVERNMENTS

Realizing a world without measles, rubella or CRS will require political commitment at the top levels of national governments to mobilize the resources required to ensure the highest quality of immunization services. Immunization, whether through routine services or SIAs, should reach all children with two doses of measles- and rubella-containing vaccine, leaving no gaps due to geography, religion, ethnicity, or socioeconomic status. In most countries, effective delivery of MCVs, and eventually measles-rubella combination vaccines, through routine services and SIAs will require budgeting for an increased investment of financial, technical and human resources in immunization and health systems. Countries should also raise at least 50% of the operational costs for MR Initiative-supported SIAs, whether from government resources or local partners. GAVI-eligible countries are urged to apply for support from GAVI to fund the introduction of the second measles dose through routine systems, and to introduce MR vaccine through a catch-up campaign. These countries should then plan to include and fund a measles- and rubella-containing vaccine in the national immunization schedule after the SIA. Countries are also urged to pay special attention to human resources and ensure adequate numbers of trained staff are available at all levels.

Countries should use cMYPs as a tool to include all immunization programme activities in the health-sector plan. The cMYP can help to secure funding for immunization in national budgets in a timely manner and to identify well in advance gaps to be met by local partners or special budgetary measures. Reaching every child with two doses of a measles- and rubella-containing vaccine, as appropriate, will require effective micro-planning at peripheral level, especially to reach children in underserved communities and those not previously immunized. Countries planning SIAs should develop the SIA operational plan at least 12 months before the start of the activity.

Countries need to invest in national advocacy and communication efforts for measles, rubella and CRS control and elimination. Immunization must be promoted as a right and a social norm that will enhance social change and increase demand for vaccinations. Measles outbreaks highlight gaps in coverage and programme failures, and should therefore be used to draw attention to the importance of immunization in general.

2. GLOBAL AND REGIONAL PARTNERS

The elimination of measles, rubella and CRS cannot be achieved without the sustained commitment and support of the global and regional partners. Each partner should use its comparative advantage to support countries to achieve its goals. This support may take the form of helping to advocate for adequate resources, providing technical assistance and policy guidance, strengthening political and social commitments, sharing best practices and lessons learnt, and/or communicating to communities, governments, and partners the positive impact



and success of activities to reduce measles mortality and control or eliminate measles, rubella and CRS.

THE MEASLES AND RUBELLA INITIATIVE

In addition to financial support, the MR Initiative will provide the following types of support to the five components of the Strategy.

- Advocacy with countries and international partners to fully fund and implement the Strategic Plan, in close collaboration with child survival initiatives.
- Technical support to governments and communities in priority countries:
 - » to improve markedly coverage with the first and second doses of measles- and rubella-containing vaccines, delivered through either routine immunization or SIAs;
 - » to document and share best practices in conducting measles SIAs and in using SIAs to strengthen routine vaccination;
 - » to improve the quality of data used for monitoring and evaluating vaccine coverage and disease incidence;
 - » to expand and enhance the quality of measles and rubella surveillance and the LabNet; and
 - » to provide appropriate measles case treatment.
- Assistance to enable countries to respond rapidly to measles outbreaks, and advocacy for a special outbreak emergency fund.
- Support to operational research needed to address the challenges and achieve the goals of this Strategic Plan.
- Monitoring and evaluation of progress in implementing the Strategic Plan annually, and communication of progress and challenges to all stakeholders.
- Close collaboration with eligible countries and partners, including the GAVI Alliance:
 - » to facilitate applications for measles second dose and rubella vaccine support;
 - » to provide technical support to countries to plan for and introduce MR in campaigns and routine immunization;
 - » to monitor and evaluate progress in the introduction of measles second dose through routine services and RCV in eligible countries;
 - » to identify areas requiring partner support.

The MR Initiative works with several key supporters, including the Anne Ray Charitable Trust, BD, the Bill & Melinda Gates Foundation, the Canadian International Development Agency, the Church of Jesus Christ of Latter-day Saints, the United Kingdom Department for International Development, the GAVI Alliance, Herman and Katherine Peters Foundation, the International Federation of Red Cross and Red Crescent Societies, the International Financing Facility for Immunization, the Japan International Cooperation Agency, Lions Clubs International, Merck Co. Foundation, the Norwegian Ministry of Foreign Affairs, and Vodafone Foundation. To date, the partnership has successfully mobilized and invested US\$ 875 million in measles control activities, which supported the vaccination of more than one billion children in more than 80 countries.

THE GAVI ALLIANCE

The GAVI Alliance provides significant opportunities for improvements in funding to vaccination programmes in the developing world. GAVI supports strengthening immunization and health systems; introduction of the measles second dose through routine services; introduction of rubella vaccine through wide age-range campaigns using MR vaccine; as well as performance-based support to increase on-time vaccination with the first dose of MCV. In addition to national governments and public health and research institutions, the GAVI Alliance partners include the Bill & Melinda Gates Foundation, the International Federation of Pharmaceutical Manufacturers Associations, the Rockefeller Foundation, UNICEF, the World Bank and WHO. The MR Initiative will work closely with the GAVI Alliance to help countries introduce MCV2 and MR vaccines, monitor and evaluate progress and recommend areas for new investment.

10

TRACKING PROGRESS



Surveillance, monitoring and evaluation are essential tasks at all levels to improve performance and identify and address problems (51). The MR Initiative will continuously assess the quality of the data used to monitor progress, through evaluation of indicators of sensitivity and performance of the surveillance and reporting systems for each country, and through numerous other key process and impact indicators. These indicators will be followed on an annual basis:

1. Number and proportion of countries with measles incidence less than five cases per million population.
2. Number and proportion of countries with coverage levels of first dose MCV and RCV >90% nationally and >80% in all districts.
3. Number and proportion of countries providing MCV2 through routine services with coverage levels of second dose MCV and RCV >90% nationally and >80% in all districts.
4. Number and proportion of countries conducting SIAs that year that achieve at least 95% coverage with M, MR or MMR in every district.
5. Number of estimated measles deaths, the percentage reduction since 2000, and number of deaths averted through vaccination.
6. Number of estimated CRS cases, the percentage reduction since 2000, and number of cases averted through vaccination.
7. Number and proportion of measles-rubella priority countries providing funds to cover at least 50% of the operational cost of follow-up SIAs.
8. Number and proportion of MCV and RCV SIAs that include additional child health interventions.
9. Number of new countries introducing an RCV into their routine immunization programme.
10. Proportion of countries conducting both routine immunization and AEFI surveillance system strengthening training as part of SIA training activities.
11. Proportion of priority countries holding a measles-rubella surveillance review, ideally as part of a broader vaccine-preventable disease surveillance review.

Beyond these disease-specific targets, the MR Initiative will develop indicators to monitor the impact of this Plan, and its activities, on immunization systems to help track improvements in routine immunization services and to ensure accountability at the global level. The data for these indicators will come from country immunization programmes and the countries will assess the performance, both nationally and sub-nationally, with the technical assistance of the WHO country office. The WHO regional offices and headquarters will in turn collect the necessary data and calculate the indicators at regional and global levels for publication in a monthly bulletin. The MR Initiative will monitor and report on progress through the use of these indicators during regional conference calls, global LabNet meetings, global measles management meetings, MR Initiative partners meetings and meetings of the SAGE Working Group on Measles and Rubella. The Working Group will review the progress made towards the 2015 goals and targets, and prepare reports for presentation to SAGE. SAGE in turn will propose any necessary changes to the current WHO recommendations on vaccination and surveillance strategies for measles and rubella.

The MR Initiative will identify knowledge needed for overcoming barriers to achieving measles, rubella, and CRS elimination targets, and propose areas for operational or basic science research. Countries and WHO regions will document progress towards regional measles, rubella, and CRS elimination goals for review by regional verification committees. Based on progress towards the 2015 global and regional goals, the Working Group will advise SAGE on the appropriate timing to establish target dates for global eradication of measles, and global control or eradication targets for rubella and/or CRS.

11 CONCLUSION

The availability of inexpensive and effective vaccines makes measles and rubella immunization highly cost-effective across a range of development settings. The 194 WHO Member States have established clear measles control and elimination goals and, given the burden of CRS, increasingly recognize the need to ensure elimination of rubella and CRS. Measles and rubella control and elimination efforts over the past decade have demonstrated that not only can measles deaths be quickly reduced but, as the Americas have shown, that both diseases can be eliminated.

We can control and eliminate measles and rubella worldwide, and this Strategic Plan provides the blueprint. The imperative to achieve the child survival goals of MDG4 and reduce congenital abnormalities demands that we take this opportunity to ensure that every child is vaccinated and protected from measles and rubella.

We must work together to increase and sustain the socio-political and financial commitments required to end the devastation associated with preventable measles and rubella infections. Let us reverse the resurgence of measles, achieve the 2015 mortality-reduction target and look beyond, to reap the tremendous long-term humanitarian and economic benefits associated with a world free of measles, rubella and CRS.

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ANNEX 1

List of measles and rubella priority countries

Low- or lower middle-income countries that have either not attained 90% MCV1 coverage, or have not introduced RCV into routine immunization programmes, are included.

Country	MCV1 Coverage 2010	Rubella in schedule, 2010	Country	MCV1 Coverage 2010	Rubella in schedule, 2010
Afghanistan	62	No	Malawi	93	No
Angola	93	No	Mali	63	No
Bangladesh	94	No	Mauritania	67	No
Benin	69	No	Micronesia (Federated States of)	80	Yes
Bolivia (Plurinational State of)	79	Yes	Morocco	98	No
Burkina Faso	94	No	Mozambique	70	No
Burundi	92	No	Myanmar	88	No
Cambodia	93	No	Nepal	86	No
Cameroon	79	No	Niger (the)	71	No
Central African Republic (the)	62	No	Nigeria	71	No
Chad	46	No	Pakistan	86	No
Comoros (the)	72	No	Papua New Guinea	55	No
Congo (the)	76	No	Philippines (the)	88	Yes
Côte d'Ivoire	70	No	Rwanda	82	No
Democratic People's Republic of Korea (the)	99	No	Samoa	61	Yes
Democratic Republic of the Congo (the)	68	No	Sao Tome and Principe	92	No
Djibouti	85	No	Senegal	60	No
Eritrea	99	No	Sierra Leone	82	No
Ethiopia	81	No	Solomon Islands	68	No
Gambia (the)	97	No	Somalia	46	No
Ghana	93	No	South Sudan	NA	No
Guinea	51	No	Sudan (the)	90	No
Guinea-Bissau	61	No	Swaziland	94	No
Haiti	59	Yes	Syrian Arab Republic (the)	82	Yes
India	74	No	Tajikistan*	94	Yes
Indonesia	89	No	Timor-Leste	66	No
Iraq	73	Yes	Togo	84	No
Kenya	86	No	Tuvalu	85	Yes
Kiribati	89	Yes	Uganda	55	No
Lao People's Democratic Republic (the)	64	No	United Republic of Tanzania (the)	92	No
Lesotho	85	No	Vanuatu	52	No
Liberia	64	No	Viet Nam	98	No
Madagascar	67	No	Yemen	73	No
			Zambia	91	No
			Zimbabwe	84	No

NA: data not available for 2010.

* Tajikistan has been included as a priority country, as evidence suggests that there are gaps in coverage and that the coverage reported is not accurate.

Source: WHO/UNICEF Joint Reporting Form. WHO/UNICEF estimates of MCV1 coverage for 2010.



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