The Measles Rubella Initiative: Findings of an External Review

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List of Abbreviations

AEFI	Adverse events following immunization
AMR	American Region (WHO)
ARC	American Red Cross
BMGF	Bill and Melinda Gates Foundation
CDC	U.S. Centers for Disease Control and Prevention
CRS	Congenital Rubella Syndrome
EMR	Eastern Mediterranean Region (WHO)
EUR	European Region (WHO)
GAVI	Global Alliance for Vaccine and Immunizations
GPEI	Global Polio Eradication Initiative
GVAP	Global Vaccine Action Plan
IPV	Inactivated Polio Vaccine
M	Measles
MCV	Measles Containing Vaccine
MDG	Millennium Development Goals
MI	Measles Initiative
MR	Measles Rubella – containing vaccine
MRI	Measles Rubella Initiative
OPV	Oral Polio Vaccine
PAHO	Pan American Health Organization
RCV	Rubella Containing Vaccine
SAGE	Strategic Advisory Group of Experts (of WHO)\
SEARO	Southeast Asia Region (WHO)
SIA	Supplementary Immunization Activity
TAG	Technical Advisory Group
UNF	United Nations Foundations
UNICEF	United Nations Children's Fund
UNFIP	United Nations Fund for International Partnerships
WHA	World Health Assembly
WHO	World Health Organization
WPR	Western Pacific Region (WHO)

1 Summary

The founding partners of the Measles Initiative (MI)/Measles Rubella Initiative (MRI) (WHO, CDC, UNICEF, the American Red Cross, and the UN Foundation) requested in early 2013 that an independent, external Review Team examine the accomplishments to date of the MRI, as well as its structure, processes, resources, and staffing, and make recommendations concerning the direction it should take over the next three to five years. The Review Team reviewed relevant documents; interviewed a wide range of key informants; participated in selected MRI meetings and conference calls; and held a series of discussions and in person meetings to review its findings and develop its recommendations.

The Review Team concluded that the MRI has made substantial, albeit largely "behind the scenes" contributions to the very great reduction in measles-related mortality seen globally over the past decade, especially in Sub-Saharan Africa and several countries in Asia, and to the advancement of measles and rubella control/elimination goals in multiple regions and countries. In addition, the Review Team concluded that the MRI has, despite its minimal staffing and modest budget and overhead costs, played a highly useful role in helping coordinate measles and rubella control activities, especially supplemental immunization activities (SIAs), epidemiologic and laboratory surveillance, communications, and outbreak investigation. The Review Team noted that the intended scope of MRI activities is global, encompassing all member countries of WHO. The MRI has been focused on maximizing impact, believing that measurable success in mortality reduction will convince donors of the value of implementing in other countries the measles control strategy that has been successful in the PAHO region. In the Review Team's estimation, the priority placed by the world on measles and rubella eradication is low, and the MRI lacks sufficient influence to raise this priority to the level needed to achieve its stated goals with regard to measles and rubella. The Review Team also concluded that the MRI had little name recognition outside of Sub-Saharan Africa (and only limited name recognition there); is perceived by some in the global health community as having been largely reactive in terms of its approach; and has suffered from insufficient long term planning and budgeting. Furthermore, the Review Team concluded that the MRI's future effectiveness, indeed its very existence, is threatened by a variety of factors, including inadequate support by important funding organizations; a perception in some quarters that the MRI is not an essential component of future measles and rubella control/elimination activities; antipathy to "vertical" programs targeting specific vaccine-preventable diseases; complacency regarding measles and rubella in multiple regions, countries, and organizations; and the lack of a clear leadership succession plan

for the MRI at the founding partner organizations. The Review Team also noted that the current polio eradication efforts and "polio legacy" planning, among other factors, posed both opportunities and threats to the MRI, and that, to take advantage of the opportunities, the MRI, must move forward assertively and rapidly, working with countries and other global immunization partners.

After considering multiple possible future directions for the MRI, as well as the current and likely near term future state of global measles and rubella control/elimination efforts, the Review Team concluded that the MRI has an important role to play over the next three to five years, but that it needs to be strengthened and its weaknesses addressed in order for it to be well-positioned both to play a prominent role in helping the world meet the GVAP target of eliminating measles and rubella in at least five WHO regions by 2020, and to use these elimination goals [1] to strengthen routine immunization and surveillance systems. The Review Team believes that eradication of measles and rubella, while achievable, will ultimately require the evolution of the MRI into a more robust organization with a new charter; increased staffing; a secretariat; a globally recognized and respected leader; and an independent oversight or advisory board, but one that remains firmly linked to the broader childhood immunization systems structure and leadership. However, the Review Team also recognizes that the formation of such an organization would be difficult or impossible to achieve at present for a variety of reasons. As a result, the Review Team believes that the development of such a body should be delayed until more progress is made in reaching current region-specific measles and rubella goals, as well as toward the goal of eradicating polio.

In the meantime, the Review Team recommends that the MRI be strengthened from within through stronger commitment by each of its core partner agencies to the measles and rubella goals of the GVAP, and by the addition of a small number of additional staff, so as to increase the MRI's capacity for advocacy, promoting country ownership, fundraising, communications, and technical support of Regions and countries. (The Review Team notes that recent hiring decisions will address some of these needs.) The Review Team also strongly recommends that the MRI give more attention to regularly producing and implementing two year action plans and that the MRI partner organizations whose staff are responsible for most of its ongoing activities develop clear plans that address any known or likely departures of key staff anticipated in the next 18-24 months. In addition, the Review Team strongly recommends that the MRI continue and expand its discussions with GPEI staff involved in planning for the switch from OPV to IPV in countries still using OPV, as well as other aspects of the "polio legacy," to ensure that any

opportunities to retain staff, laboratory capacity, and other resources currently funded by GPEI and devote them to measles and rubella immunization activities and surveillance are not missed. The Review Team urges the MRI to develop closer ties and stronger working relationships with staff at GAVI, the Bill and Melinda Gates Foundation, and other key organizations in the global immunization arena to ensure maximal cooperation and coordination; joint commitment to ensuring that national and regional commitment to measles and rubella elimination be used to strengthen immunization systems; and minimal overlap and duplication of effort.

2 Origin and Scope of the Review of the MRI

In the Fall of 2012, the founding partners of the MRI decided that it would be highly desirable to have an independent outside group of experts conduct a comprehensive review of the past accomplishments and operations of the MRI and make recommendations concerning its future governance, role, responsibilities, structure, size, and operations. A four member review team comprised of individuals with extensive experience in the area of childhood immunization, especially in the developing country setting, was assembled and a formal proposal to conduct such a review was developed by the Review Team and submitted to the U.S. CDC, representing the MRI's founding partners. (See appendix 1.) After minor modifications were requested and made, the proposal was approved by the CDC, and arrangements were made for the review project to be administered by Avram Corporation in Miami, Florida, under the direction of Professor Arthur Reingold. The contract with Avram Corporation, which was signed May 7, 2013, called for a final written report to be prepared and submitted by December 31, 2013. The process for developing the report's findings and recommendations concerning a future direction for the MRI, as spelled out in the proposal and the subcontract agreement, was to include a review of relevant documents; meetings (in person or via telephone) with various stakeholders and key informants; participation (as observers) in selected meetings of the MRI partners; solicitation of input from other knowledgeable individuals; and meetings of the Review Team. The review was intended to be far-reaching, assessing the MRI's goals, strategies, governance, organizational structure, staffing, budget, resource mobilization, decision-making processes, and communications. As part of its report, the Review Team was asked to examine and make recommendations concerning how the MRI can best support achievement of the 2015 and 2020 measles and rubella/congenital rubella syndrome (CRS) goals and milestones, as described in the MRI's 2012-2020 Strategic Plan and GVAP; increase the efficiency and effectiveness of the MRI to lead measles and rubella control and elimination efforts and provide global leadership in activities related to measles and rubella; strengthen coordination with other important partners in

the global immunizations arena (e.g. the GAVI Alliance, the Bill and Melinda Gates Foundation, etc.); sustain and increase financial resource mobilization; and improve its coordination with priority countries and regions, to ensure adequate country "ownership" and "drive from within."

3 Measles and Rubella — Clinical Characteristics, Descriptive Epidemiologic Features, and Available Vaccines

Data in this section are from WHO's immunization programme statistical collection http://www.who.int/immunization_monitoring/data/data_subject/en/index.html, accessed July 2013.

3.1 Clinical Importance and Transmission

Measles and rubella are viral infections that, in the pre-vaccine era, were primarily diseases of children and were distributed across the globe.

3.1.1 Measles

Measles is caused by a paramyxovirus, and humans are the only natural host. In well-nourished and otherwise well children, measles is typically a self-limited acute infection producing cough, coryza, conjunctivitis, fever, Koplik's spots in the pharynx, and a maculopapular rash. However, in very young, malnourished or immunocompromised children, measles is associated with substantial mortality and morbidity. In the pre-vaccine era, there were at least two million deaths globally from the disease each year. Complications and sequelae are relatively common, and include otitis media, pneumonia, encephalitis, subacute sclerosing panencephalitis and immune suppression [1]

Measles is one of the most highly transmissible diseases affecting humans. In the pre-vaccine era, measles often occurred in epidemic waves lasting three to four months and coming every two to five years. About 98% of all people contracted measles at some stage during their lives, usually before the age of six. Recovery from infection results in lifelong immunity. There is a single, stable immunotype, but 23 different genotypes have been described. Measles is spread by the airborne route, and infectious aerosols can persist in closed spaces such as corridors or offices for several hours. [2, 3]. The basic reproduction number (R_0) is high, at about 15. This means that, in a non-immune population, each case on average causes 15 next generation cases. The very high transmissibility has important implications for measles control [4, 5].

3.1.2 Rubella

Rubella is caused by a togavirus and generally causes mild self-limited disease. The public health significance of rubella arises from the sequelae of in utero infection of the fetus. Infection of the fetus in the first 16 weeks may result in congenital rubella syndrome (CRS), which can cause myriad congenital syndromes, including deafness, cataracts, microphthalmia, glaucoma, chorioretinitis, congenital heart lesions, thrombocytopaenia, meningoencephalitis, hepatitis and mental retardation, with devastating often life-long effects on the newborn. [6]

Rubella is considerably less transmissible than measles. In the pre-vaccine era, about 80--90% of the population contracted the disease, usually at around the age of nine years. Recovery from infection results in lifelong immunity. The reproduction number is only about six, meaning that rubella is less transmissible and easier to control than measles. [4, 5] Like measles viruses, rubella viruses are antigenically stable, but 13 genotypes have been defined [7]

3.2 Measles and Rubella Vaccines

Measles and rubella vaccines are live attenuated virus vaccines. Measles vaccine first became available in March 1963, and it was introduced into the Expanded Programme on Immunization of WHO in 1974. Rubella vaccine was first available in 1969 and since 2011 has been recommended by WHO for use in all immunization programmes that can achieve 80% coverage through routine services and/or SIAs. Measles- and rubella-containing vaccines are currently available as monovalent preparations or as measles-rubella combination vaccines, often in combination with other live virus vaccines (e.g. mumps). The vaccines are administered by the subcutaneous route and immunity, once established, is long-lasting, perhaps life-long. Although antibody levels wane over time, clinical protection against disease appears to persist.

Under field conditions, a single dose of measles vaccine given at the age of nine months confers ~85% protection and given at the age of 9--11 months confers ~93% protection, although HIV-infected children respond less well. Of children who fail to seroconvert after a single dose, some 97% or more respond to a second dose.

Rubella vaccine is also highly effective; nearly 95% of children are protected by a single dose of rubella containing vaccine (RCV) given at or after the age of nine months.

For the first few months of life, newborn infants generally are protected against measles and

rubella by passively acquired maternal antibodies. However, this protection wanes exponentially from two – three months of age and antibodies against both measles and rubella are undetectable by 9--12 months of age. [1 – 8]

3.3 Measles

3.3.1 Measles Control Targets

Measles is an eradicable disease, and as of September, 2013, all six WHO Regions have set target dates for measles elimination and two Regions have set target dates for rubella elimination (Table 1)

Region	Disease	Target year	Year set	Comment	Reference
AFR	Measles	2020	2011		[9]
AMR	Measles, rubella	2000	1994	Measles achieved in 2002, rubella in 2009	[10]
EMR	Measles	2015	2010	Modification of earlier target date	[11]
EUR	Measles, rubella	2015	2010	Modification of earlier target date	[12]
SEAR	Measles	2020	2013		[13]
WPR	Measles	2015	2012		[14, 15]
Global	Measles Measles, rubella	2020 To be decided	2010 2012	5 of 6 Regions measles-free	[16,17]

Table 1 Measles elimination targets

The Region of the Americas succeeded in eliminating measles in 2002, thus demonstrating its practical feasibility. However, it should be noted that the USA set a measles elimination target in 1966, but did not achieve it until 2000, 34 years later [18]. Elimination of measles in the U.S. ultimately required the addition of a second dose of measles vaccine to the routine immunization schedule.

The World Health Assembly (WHA) resolved, in 2010, to establish three milestones toward

eventual measles eradication; the milestones to be reached by 2015 are: [15, 16]

1. to achieve routine MCV1 coverage of ≥90% in every country, and ≥80% in every district,
2. to reduce or maintain reported measles incidence to <5 /million/year, and
3. to reduce reported measles mortality by >95% from the estimated 2000 level.

At the WHA in 2012, all Member States endorsed the Global Vaccine Action Plan (GVAP). Elimination of measles and rubella in five of six WHO regions is one of the four high level goals in the GVAP. This situates global measles and rubella elimination as an integral part of the Decade of Vaccines global immunization agenda.

3.3.2 Epidemiologic Features of Measles

Measles epidemiology is exquisitely sensitive to immunization, and as a result the epidemiologic features of measles have changed dramatically over the last 40 years. Global measles incidence data are available by country from 1980. In that year, an estimated 3.8 million cases were reported globally, but by 2012 that number had fallen to 227,000 reported cases (Table 2↓). The global incidence of reported measles cases in 2011 was 5.2 cases/100,000/yr. [16]. Over the same time period, global coverage during the second year of life with a first dose of measles-containing vaccine rose from 13% in 1980 to 84% in 2011.

	1980	1990	2000	2010	2012
AFR	1,240,993	481,024	520,102	199,174	106,052
AMR	257,790	218,579	1,755	247	88
EMR	341,624	59,058	38,592	10,072	36,456
EUR	492,660	185,818	37,421	30,625	26,982
SEAR	199,535	224,925	78,558	52,529	46,945
WPR	1,319,640	155,490	177,052	49,460	10,722
Total	3,852,242	1,325,074	853,480	342,107	227,245

Table 2 Reported measles cases by WHO Region and in selected years

There is tremendous variability in the epidemiologic features of measles among the WHO Regions (Table 2↑, Figure 1).

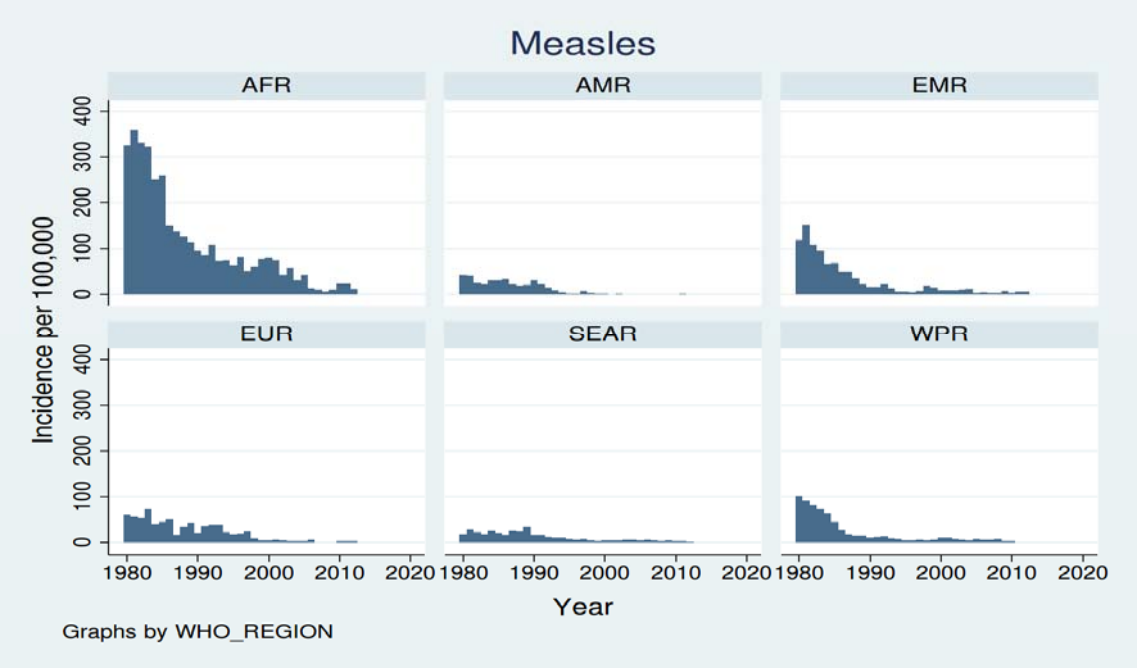


Figure 1 Reported measles incidence by year and WHO Region, 1980--2012

Many countries have reached the milestone of a reported measles incidence of ≤ 5/million/year i.e. have eliminated or nearly eliminated measles (Figure 2↓)

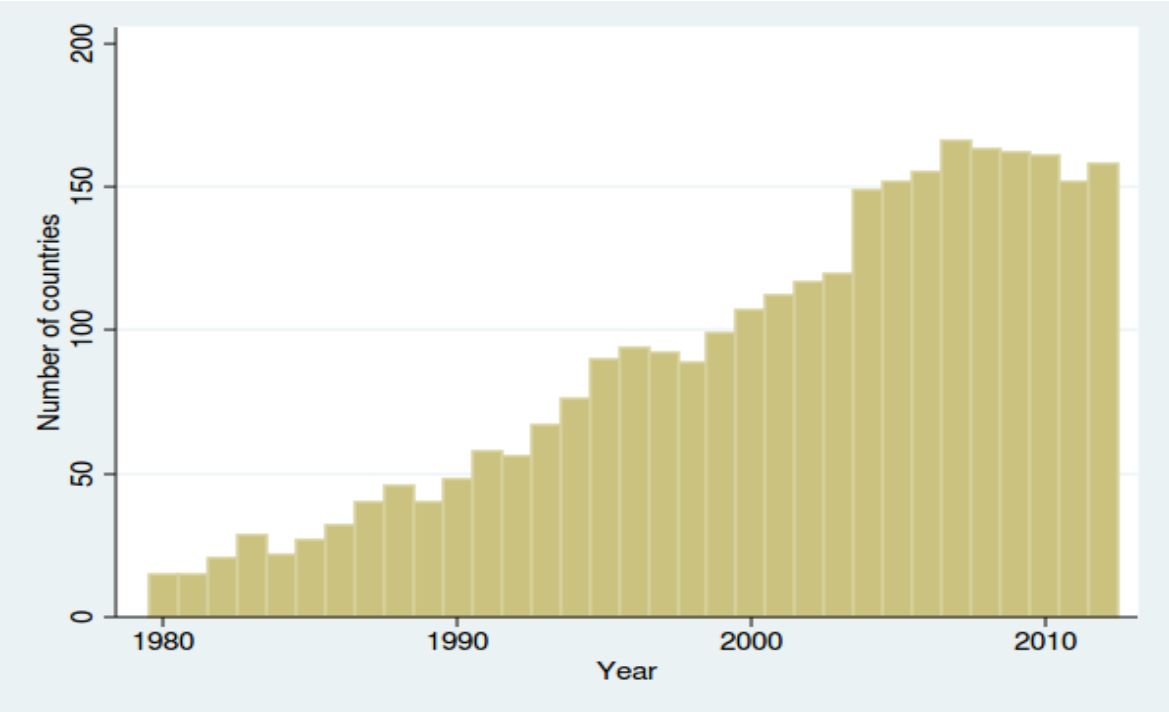


Figure 2 Number of countries reporting an annual incidence of measles ≤5/million/yr.

The reported incidence of measles in the African Region has always been, and remains, several-

fold higher than that in other WHO Regions, despite dramatic declines in incidence in the region (Figure 3↓).

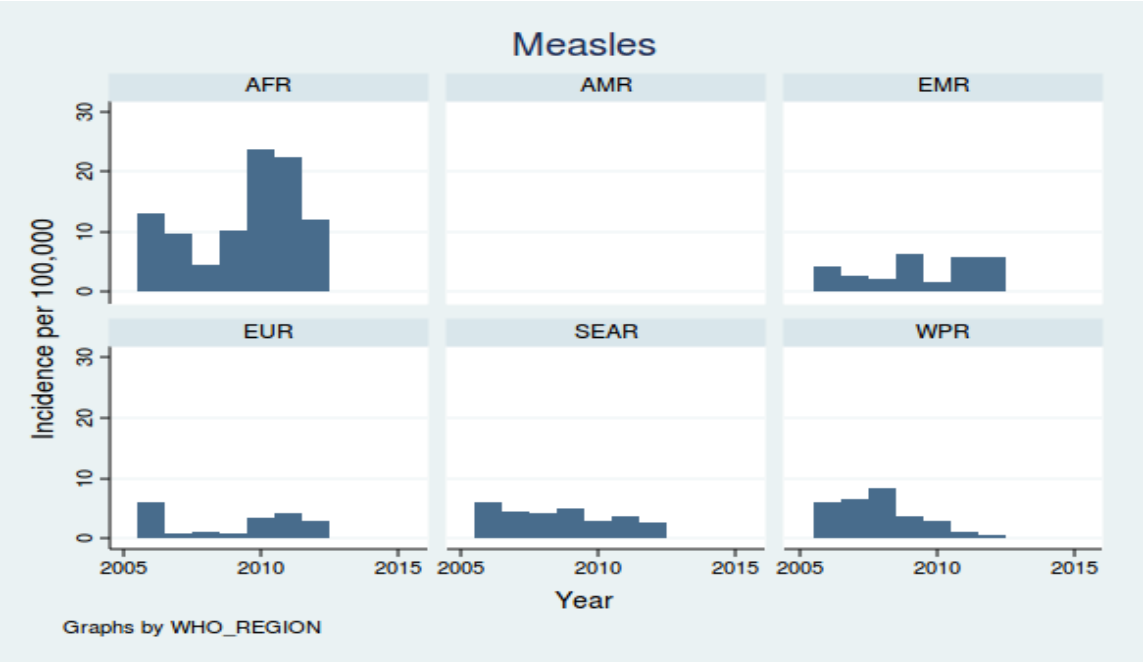


Figure 3 Reported measles incidence by year and WHO Region, 2005--2012

3.3.3 Geographic features of measles

Measles epidemiology varies, and has varied, markedly across the world. In 1980, only a few countries were using MCV in their immunization programmes, and the incidence of reported measles was relatively high in all countries (Figure 4↓).

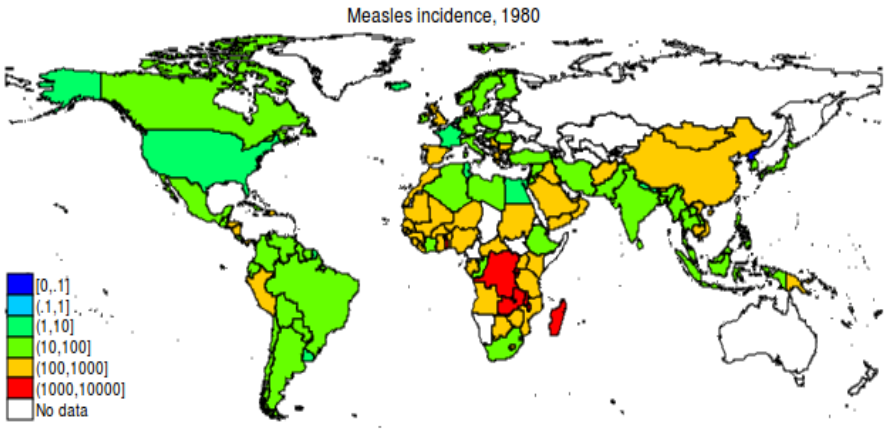


Figure 4 Global reported measles incidence per 100,000 per year in 1980

By 2012, all countries were offering opportunities for two doses of MCV, either in the routine

immunization programme or in supplemental immunization activities (SIAs). Consequently, the reported incidence of measles fell in most countries compared with the incidence in 1980, although the variation among countries has continued. In 2012, 61 countries reported zero cases, and the entire Region of the Americas had achieved measles elimination (Figure 5↓).

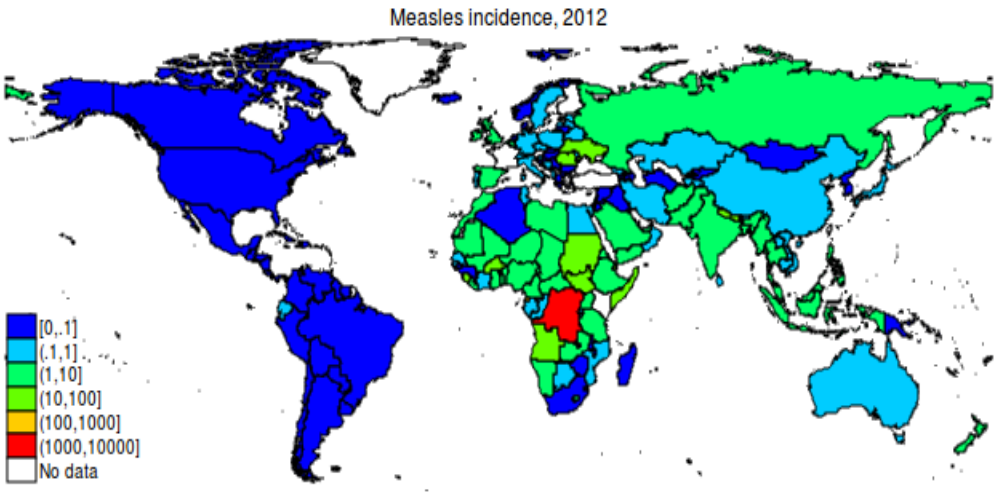


Figure 5 Global reported measles incidence per 100,000 per year in 2012

3.3.4 Measles vaccine coverage

In 1980, coverage with one dose of measles vaccine (MCV1) was low in nearly all those countries using the vaccine (Figure 6↓).

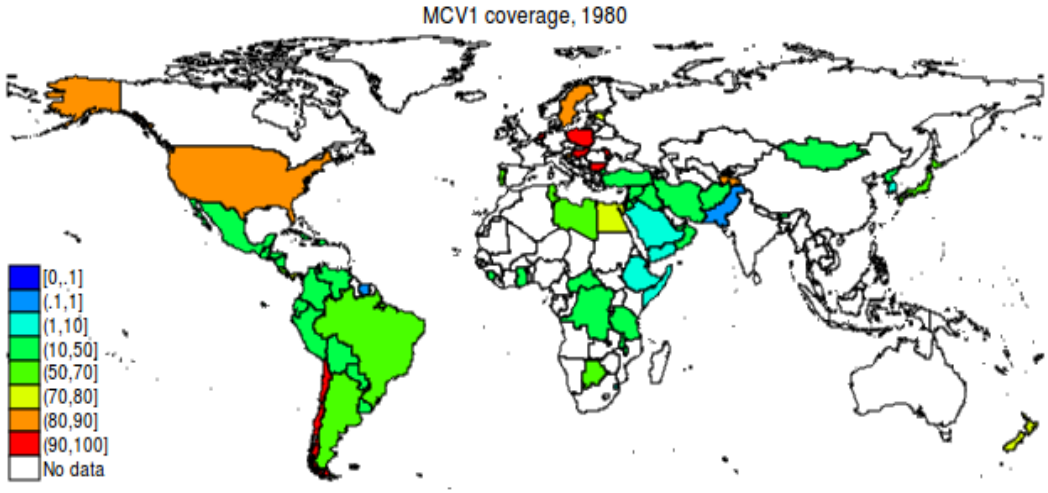


Figure 6 Reported MCV1 coverage, per cent, 1980

By 2011, the estimated global coverage for MCVI had increased to 84%, and 123 countries reported a coverage of >90% at the national level [16]. By 2012 reported coverage had

improved further (Figure 7↓), and many countries had achieved a coverage of ≥90%.

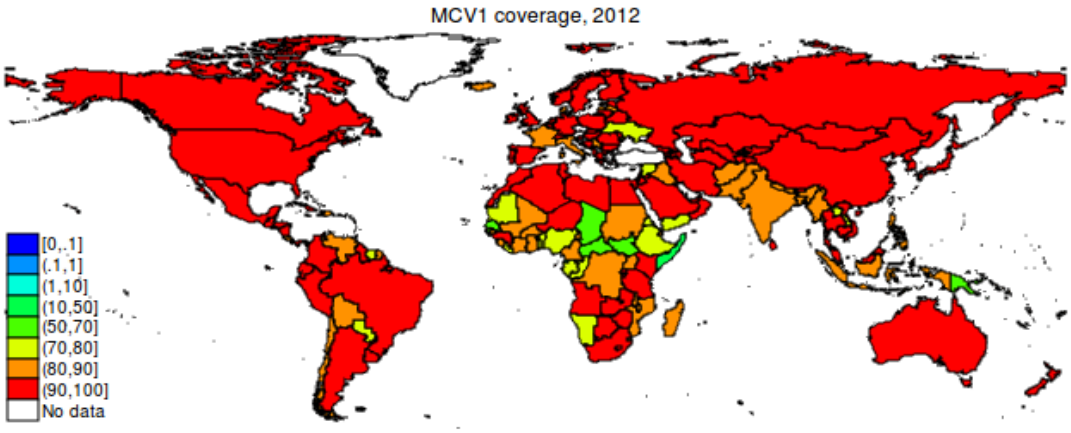


Figure 7 Reported MCV1 coverage, per cent, 2012

As noted above, the incidence of measles is exquisitely sensitive to measles vaccine coverage. High coverage with two doses has achieved elimination in many countries, including in all countries in the Region of the Americas. The second dose of measles vaccine may be delivered as part of a routine immunization programme or in SIAs. Both approaches to delivering the vaccine can be effective in achieving high levels of population level immunity. (Figures 8↓ and 9↓). For example, in Sri Lanka, the incidence of reported measles has been reduced to very low levels, and there have been periods of zero incidence, using a strategy of high coverage with two doses of MCV delivered in the routine immunization programme.

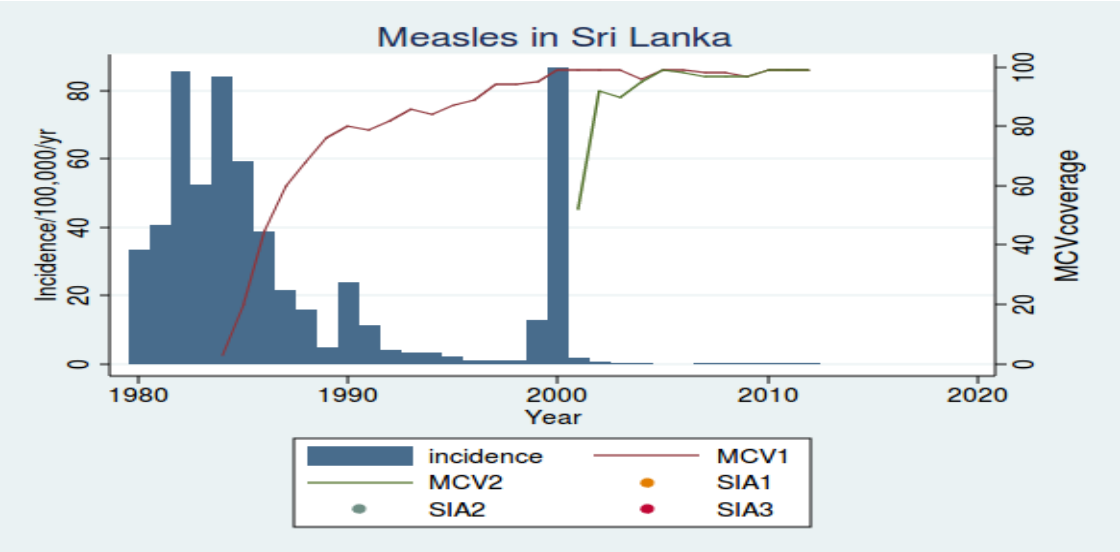


Figure 8 Reported measles in Sri Lanka (note that there are no SIAs reported)

Cameroon, has also achieved marked success in the elimination of measles, but has primarily relied on SIAs with high levels of coverage to achieve the necessary population immunity.

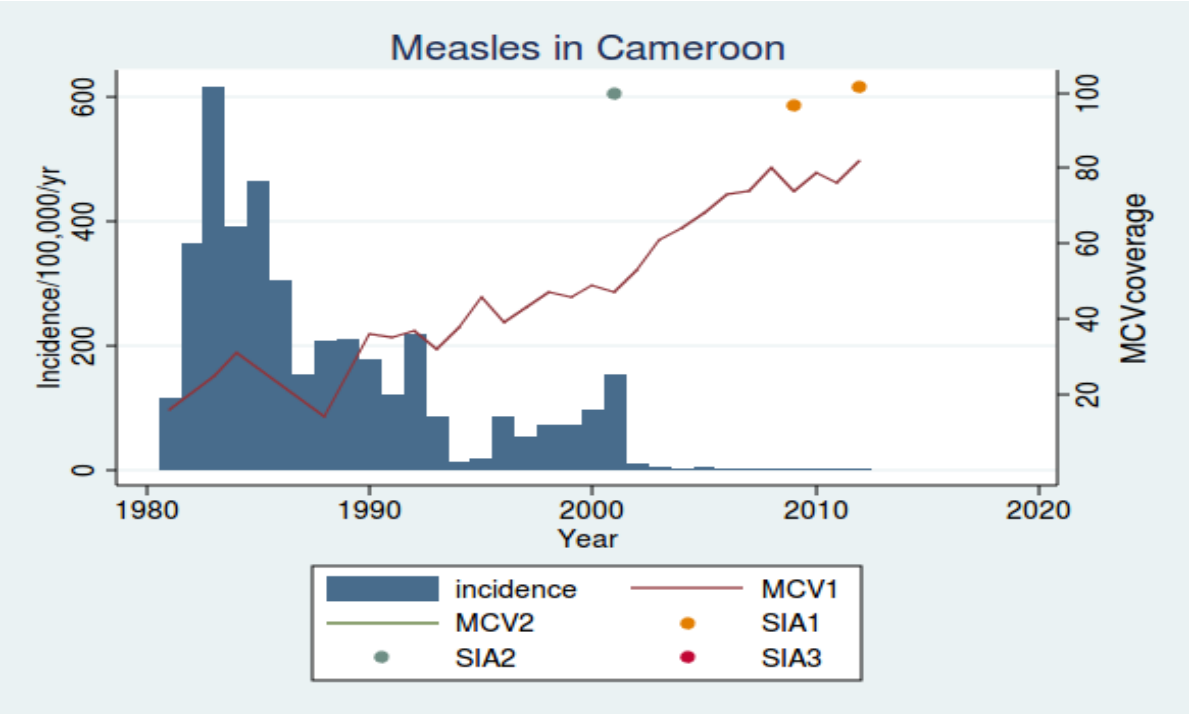


Figure 9 Reported measles in Cameroon

3.4 Rubella

3.4.1 Rubella Control Target

The primary aim of rubella immunization is to prevent congenital rubella syndrome (CRS), not rubella in children. Paradoxically, the prevalence of CRS may increase after the introduction of RCV for young children if uptake is low and larger numbers of girls susceptible to rubella reach reproductive age. This may happen if the immunization programme is weak or if the vaccine is used only selectively, for instance if RCV is available only on the private market. An alternative strategy to preventing CRS is to vaccinate only girls below the reproductive age, but this strategy cannot halt circulation of rubella virus.

In 2000, only 99 member states offered RCV, while in 2012, 132 (of 194) WHO member states offered RCV [22]

3.4.2 Epidemiologic Features of Rubella

WHO has collected data on the incidence of reported rubella cases since the late 1990s. In 1997, before the widespread use of RCV, there were 125,056 reported cases of rubella and 33 reported cases of CRS. By 2012, the number of reported cases of rubella had fallen to 93,899, with 295 reported cases of CRS [19]. These numbers are understood to represent only a fraction of the numbers of cases of rubella and CRS that are occurring globally. As with measles, there is tremendous variability in the epidemiologic features of reported rubella cases across the globe (Figure 10↓). However, it is likely that much, perhaps most of this variability is due to differences in the completeness of case ascertainment and reporting.

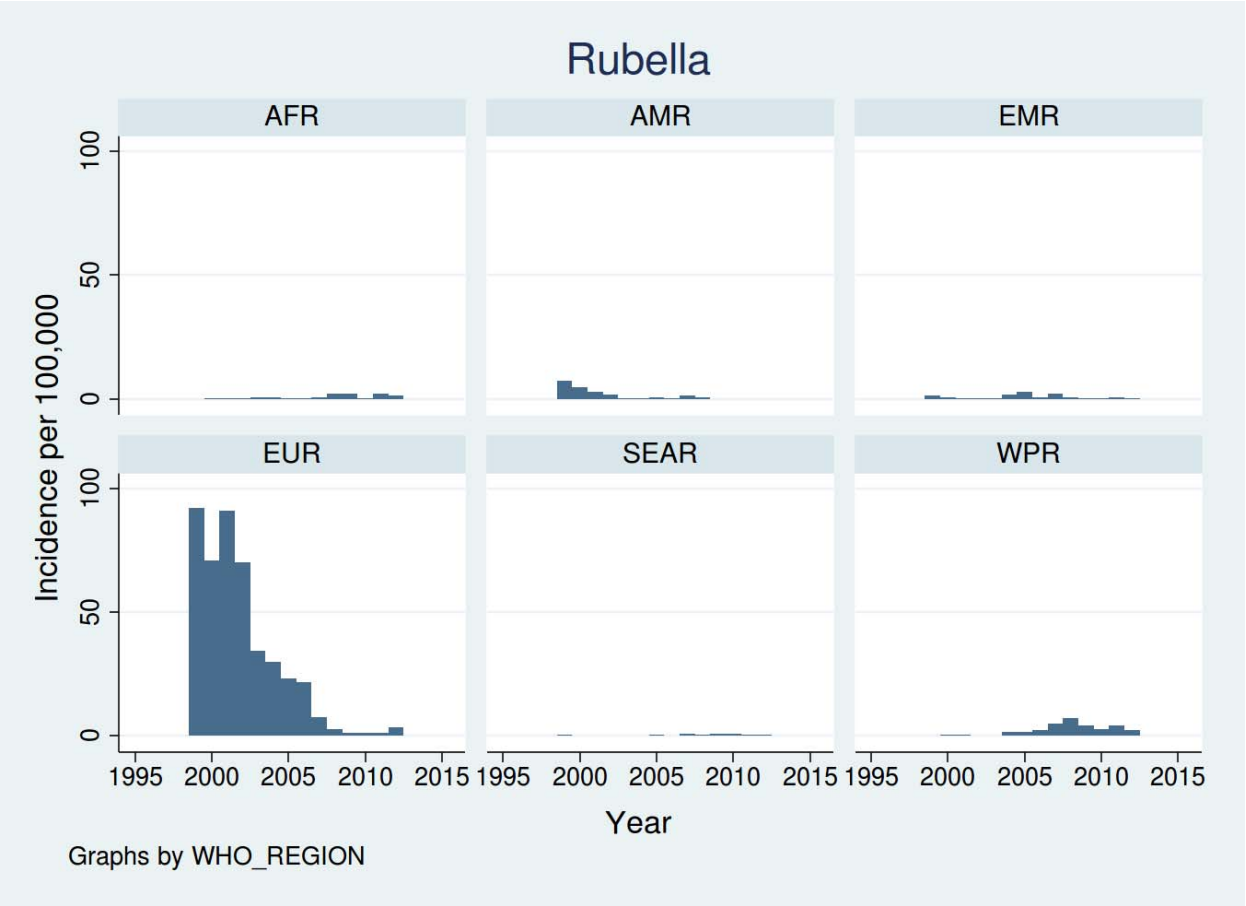


Figure 10 Rubella incidence by year and WHO Region

3.4.3 Geographic Distribution of Rubella

In 2000, few countries were using RCV, and rubella was at a high level of control only in North America, Scandinavia and a few other countries (Figure 11).

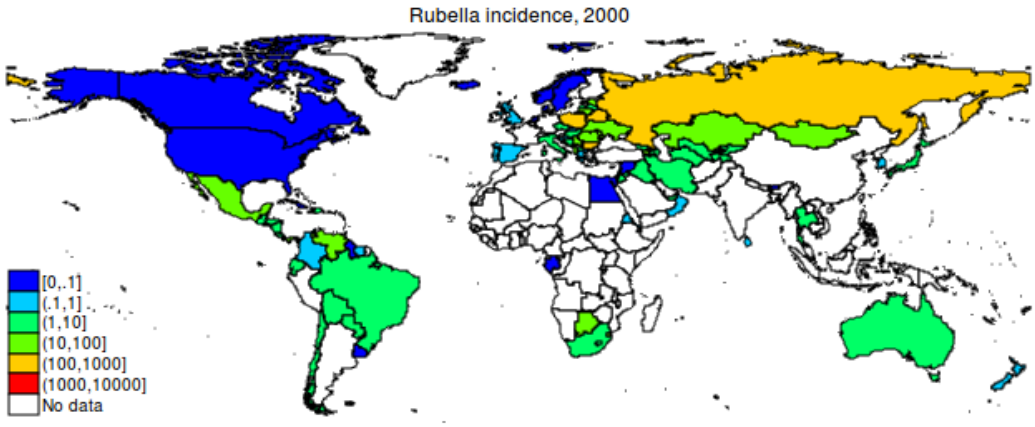


Figure 11 Global incidence of reported rubella cases in 2000

By 2009, the entire Region of the Americas had achieved elimination of rubella (Figure 12↓).

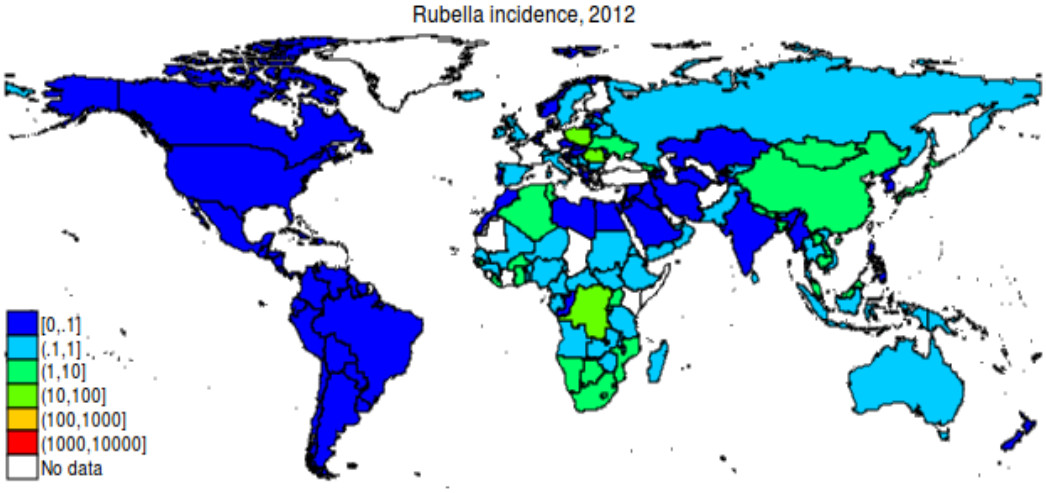


Figure 12 Global incidence of reported rubella cases in 2012

3.5 Current Epidemiologic Situation

3.5.1 Progress in the Control of Measles and Rubella

As noted above, the world has witnessed remarkable achievements over the past decade in the prevention and control of both measles and rubella, most notably an enormous decline in

measles-associated mortality, especially in Sub-Saharan Africa and other previously high burden countries in South Asia, East Asia, and the Eastern Mediterranean. Although many agencies, donors, and organizations have worked to achieve these impressive reductions in measles and rubella incidence and mortality, the MRI deserves substantial credit, for its contributions in the areas of advocacy, communications, fundraising, coordination and provision of technical expertise. (See below.)

3.5.2 Progress in Measles Vaccine Coverage

As documented above, coverage with MCV1 has substantially improved globally, from an estimated 72% in 2000 to 84% in 2011. The global improvement is partly attributable to a substantial increase in MCV1 coverage in the African Region, where coverage increased from 56% in 2000 to 75% in 2011.

As noted in the most recent Millennium Development Goals (MDG) report, measles vaccine coverage has increased in most regions of the world over the past decade, with notable increases in both Sub-Saharan Africa and South Asia. Nevertheless, measles outbreaks and 90% of all measles deaths continue to occur in these two regions. Major challenges to achieving and maintaining further reductions in measles morbidity and mortality in Sub-Saharan Africa and South Asia are posed by weak routine immunization systems and delayed implementation of accelerated disease control activities. If current immunization coverage trends continue, measles vaccine coverage targets for 2015 will not be met and countries in these regions will remain susceptible to measles outbreaks.

3.5.3 Progress Toward the Measles Mortality Goal

Measles mortality has declined globally by 78% since 2000. The Americas achieved the mortality reduction goal fully, and the Western Pacific and African regions are remarkably close to achieving the goal; by 2011, the mortality reduction achieved was 90% for the Western Pacific Region and 84% for the African region. A substantial push is needed in other regions to achieve the global goal for measles mortality reduction. According to the 2013 MDG report, overall an estimated 10.7 million deaths from measles were averted during 2000-2011 due to improved measles vaccine coverage. Further reductions in measles mortality are possible by achieving and sustaining high measles vaccine coverage. Nearly one fourth of all mortality reduction toward Millennium Development Goal 4 since 2000 has been due to expanded use of measles vaccine fostered by MRI .

3.5.3 Progress Toward the Measles Incidence Goal

A 64% reduction in the global incidence of measles was observed between 2000 and 2011, from 147 per million population in 2000 to 52 per million population in 2011. However, a resurgence of measles cases was observed in 2010-2011 in the Region of the Americas (related to importations from Europe), and in Africa and Europe; in the latter regions, a shift in the age distribution of cases to older children and adults was observed. These resurgences in measles were attributable, in part, to the variable quality of and delays in implementing follow-up SIAs, gaps in immunization service delivery, insufficient resource mobilization, conflicting social and health sector priorities, and vaccine hesitancy/resistance.

4 Establishment and Subsequent Evolution of the MRI

The MRI was initially founded in 2001 as the Measles Initiative (MI) by five partners: the World Health Organization (WHO), United Nations Children's Fund (UNICEF), the UN Foundation (UNF), the American Red Cross (ARC) and the U.S. Centers for Disease Control and Prevention (CDC). At the time of its founding, the goal of this partnership was to reduce measles mortality globally, with a focus on mortality reduction in Sub-Saharan Africa. Since 2001, new partners and supporters have joined the partnership (see below), although the founding partners continue to steer it, and the vision of the partnership has evolved from measles mortality reduction to a world without measles, rubella and CRS.

The early history of the MI/MRI is well-described in "Cases in Global Health Delivery," "The Measles Initiative," a case study authored in 2011 by Dhillon, Rhatijan, and colleagues at Harvard University [20]. As described in that case study, the MI was conceived at a time when the Global Polio Eradication Initiative (GPEI) was well-advanced, having shrunk the number of polio cases worldwide from an estimated 350,000 cases in over 125 countries to under 2,000 cases concentrated in just seven countries where it remained endemic. At the same time, the Pan American Health Organization (PAHO) had achieved a 99% reduction in cases and deaths due to measles between 1990 and 2001 through a combination of SIAs (e.g. mass campaigns) and the strengthening of routine immunization programs. In addition, in response to the continuing high burden of measles-related mortality in Sub-Saharan Africa, seven Southern African countries had conducted nationwide measles immunizations campaigns between 1998 and 2001. Nevertheless, at the time of the founding of the MI in 2001, it was estimated that globally there were 30 million measles cases and nearly 900,000 measles-related deaths each

year, despite the availability for over 30 years of a safe, effective, and inexpensive measles vaccine.

In this context, staff from CDC, UNF, and ARC met in July, 2000 and again, together with staff from WHO and UNICEF, in December, 2000, leading to the launch of the MI with the signing of a joint declaration (see Appendix 2) at a meeting in February, 2001. Initial funding for the MI came largely from UNF, with matching funds (1:1) from the CDC and ARC. For the first two years the budget was $20M, with half coming from UNF each year.

The MI was, at the outset, envisioned as a loose-knit collaboration that would, using well-established strategies and approaches, jump start accelerated measles control activities in highly affected countries; it was not embedded in or under any of the partner institutions, and as a result was intended to be less encumbered by their respective bureaucratic constraints. Each of the five original partners was envisioned as having one or more distinctive roles (see below). Since its inception, the partnership has raised just under USD 1.1 billion to support its activities and has supported the delivery of over 1.1 billion doses of measles vaccine. A clear commitment to the introduction and delivery of RCV vaccine was made by the Initiative as of 2012 through a name change from the Measles Initiative to the Measles and Rubella Initiative.

From mid 2011 through 2012, a number of important developments altered the global measles and rubella landscape. WHO published a position paper urging member states to take advantage of measles vaccination activities to introduce rubella vaccine; the MRI published a strategic plan for the period 2012 – 2020, envisioning reaching measles and rubella elimination in five of the six WHO regions by 2020; and GAVI made available more than USD 750 million for the period 2013-2018 to support the introduction of rubella vaccine through combined measles/rubella wide age range immunization campaign activities; strengthen measles control in six countries considered at high risk for measles outbreaks; and provide funding (USD 55 million) for outbreak response. While the majority of this funding was to be administered either bilaterally by GAVI directly to countries or through WHO and UNICEF, the outbreak response funding was to be administered through the MRI. (GAVI had previously made two measles grants totalling $176M to the MI.) Finally, the GVAP included on its list of goal-level indicators and targets specific targets for measles and rubella/CRS elimination by 2015 and 2020. GVAP also forecasted that the projected impact of all vaccinations administered between 2011-2020 would be 24.6-25.8 million deaths averted (compared with no vaccination), and measles vaccination

would account for 14.1 million of these deaths averted.

In order to ensure that it was adequately positioned to meet the challenges presented by these developments, the founding partners of the MRI met in 2012 to review the partnership's operating procedures and revise them as deemed appropriate. This meeting led to five major recommendations for change: 1) establishment of a Management Team, including a representative from each founding partner organization; 2) commitment to establishing three new posts to coordinate partner activities (an Epidemiologist responsible for measles and rubella surveillance, a Communications Specialist, and a Resource Mobilizer); 3) development of a more aggressive and visible communications strategy; 4) establishment of a Global Partners Group (including non-founding partners, national counterparts and other stakeholders) that would feed into the decision-making process of the Management Team; and 5) an external review of the partnership and these proposed changes.

The MRI strategic plan for 2012-2020 recognized the prior achievements globally related to reductions in measles and rubella morbidity and mortality, including the elimination in the Region of the Americas of indigenous transmission of measles virus in 2002 and of rubella virus in 2009. At the time the MRI strategic plan for 2012-2020 was being written, five of the six WHO regions had set target dates for measles elimination and two had set control or elimination targets for rubella (since the plan was written, the remaining WHO region, SEARO, has also set a goal for measles elimination). At the same time, however, the new MRI strategic plan took cognizance of the fact that every day almost 400 children still die from measles and that ~300 children enter the world with often severe disabilities caused by CRS. It also acknowledged that outbreaks of measles have been on the rise since 2009, not only in Africa, Southeast Asia, and Europe, but also in North America, and that, until recently, there continued to be a high measles disease burden in India. Underlying the problem of recurring measles outbreaks is the failure to vaccinate children and thus achieve and sustain high levels of population immunity uniformly throughout countries and regions, either through routine immunization services, SIAs or a combination of the two. In addition, the MRI strategic plan pointed to major funding shortfalls since 2008 that had contributed to delays and poor quality of some of the SIA's that have taken place. Thus, the strategic plan recognized that the risk of a resurgence of measles is real unless countries and regions achieve and maintain high levels of measles vaccine coverage in every birth cohort.

The strategy called for in the MRI strategic plan for 2012-2020 is comprised of five 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 MRI strategic plan identified four key factors that can promote success of the initiative: country ownership and sustainability; strengthening of routine immunization and health systems; equity; and linkages with other health interventions, including polio eradication efforts, new vaccine introduction, other proven child survival interventions, and surveillance. These guiding principles are closely aligned with the six Strategic Objectives of the GVAP, particularly the emphasis on building country ownership of immunization programmes. At the same time, the plan identified five challenges that may impede successful implementation: lack of sustained financial commitment; high population density and highly mobile populations; weak immunization systems and inaccurate reporting of vaccination coverage; misperceptions about the risks and benefits of vaccination; and conflict and emergency settings created by natural disasters.

The 2012 MRI strategic plan spelled out the respective roles and responsibilities of national governments, global and regional partners, the MRI itself, and the GAVI Alliance. In addition, it listed eleven indicators that should be tracked in order to monitor progress:

1. Number and proportion of countries with a 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 a second dose of measles-containing vaccine (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 each year that achieve at least 95% coverage with measles (M), measles-rubella (MR) or measles-mumps-rubella (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 adverse event following immunization (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.

In sum, the MRI's 2012 strategic plan included steps to align the MRI's operating procedures, human resources, and partner relations to achieve the new goals established by the Global Vaccine Action Plan (GVAP) and envisioned that measles and rubella elimination would be achieved in at least five WHO regions by 2020.

As noted above, the MRI has provided funds and technical assistance to support the purchase and administration to children of more than 1.1 billion doses of measles-containing vaccine in 80 countries between 2001 and 2012. This has helped raise global coverage of measles vaccination to 84%, with a consequent reduction of measles deaths by 78%. The MRI has, through these efforts, contributed substantially to the achievement of the Millennium Development Goal 4, the reduction of child mortality.

5 MRI Approach, Objectives, Organizational Structure, Function, and Management

5.1 Overall Approach of the MRI

The MRI has ambitious goals for worldwide measles and rubella control and ultimate eradication, and has worked to increase the priority of measles and rubella control of governments, donor agencies, the UN system and non-government organizations. It has advocated strongly for the

realization of the long-term goals of elimination of measles and rubella laid out in the GVAP, and provided political, financial and technical support to increasing coverage with measles- and rubella-containing vaccines. The MRI raises and disburses funds for routine immunization programmes, SIAs, surveillance (including the global and regional laboratory networks), outbreak response and routine immunization programmes. It also provides technical support for all of these activities. The MRI operates on the premise that high coverage with routinely administered vaccines is crucial to the success of measles and rubella elimination efforts and that enhanced measles and rubella control is integral to the effective operation of immunization programmes, strengthening the backbone of routine programmes and using supplementary immunization activities only where epidemiologically and programmatically necessary.

Rationale: The initial rationale for creating the MI/MRI was to decrease measles mortality in sub-Saharan Africa, which in 2001, accounted for 50% of global measles mortality. The plan was to employ the proven strategy developed by PAHO and already used successfully by seven southern African countries. The rationale was that by systematically implementing this strategy in all remaining 39 AFRO countries by 2006, global measles mortality would be reduced by 50% and the WHO/UNICEF 2005 goal would be achieved. Thereafter, the MRI expanded its support to other regions (EMR and SEAR). The MI/MRI's strategy was designed to strengthen various components of routine immunization and health systems by requiring all countries to use auto-destruct syringes (most for the first time), to re-train vaccinators in immunization safety; to institute case-based surveillance systems with laboratory confirmation for measles and rubella; to use the same systematic microplanning process that polio eradication was using; to train health staff on AEFIs; to train health staff on proper waste management; to refurbish the cold chain where needed; and to improve supervision. This approach was chosen in recognition of the fact that weakness in health and immunization systems, limited technical capacity, lack of coordination and shortages of resources for immunization in developing countries had led to stagnation in progress toward further reductions in measles incidence and mortality during the 1990s.

Policymaking The MI/MRI was intended to provide the technical competencies needed to guide immunization practices and outbreak response. The MI/MRI also intended to play a significant role in shaping immunization policies internationally and at national levels, working through SAGE at the global level; through regional TAGs at the regional level; and through ICCM at the national level.

Operations The major operations of the MI/MRI include advocacy for good immunization practices; social mobilization; coordination of outbreak responses; and fundraising.

Structure The MI/MRI has an informal organizational structure. Since its inception, the core members have been responsible for joint planning and implementation of MI/MRI activities. A yearly plan with one harmonized budget is developed by WHO/UNICEF HQ, based on information from countries and planned SIA schedules, MCV1 coverage, current epidemiological data and birth rates. Country data/requests are collated and confirmed by WHO/UNICEF HQ and shared with other members of the Management Team. This information forms the basis for developing the annual budget. Weekly telephone conference calls are conducted to follow up on the implementation of the plan. At the country level, MI/MRI has been represented by WHO and UNICEF, and as a result its visibility is diminished, even in countries where a substantial amount of MRI support is provided. This mode of operation has been successful in supporting regional measles goals by mobilizing effective political leadership, providing timely funding (both donor and national governments), allocating adequate time for planning and social mobilization, and maintaining well-performing surveillance, but has contributed to a lack of recognition of the MRI's contributions.

5.2 Objectives of the MRI

The MRI supports countries and regions in their efforts to reach the measles and rubella elimination goals of the GVAP by helping countries to raise immunization coverage with measles and rubella vaccines. The scope of MRI activities is intended to be global, encompassing all member countries of WHO and not limited in any way, (e.g. to only GAVI eligible countries). Among its activities, the MRI funds and helps plan, implement and monitor high quality SIAs. The MRI partners also help investigate outbreaks and provide technical and financial support for effective outbreak response. Recognizing that routine immunization is a foundation of vaccine delivery, the MRI also proposes and participates in the development of approaches to strengthening immunization delivery through activities that can be introduced in campaigns and then sustained. Given the critical importance of disease surveillance to achieving disease control and elimination goals, the MRI also helps support a global laboratory network for measles and rubella accessible by 191 countries.

5.3 Organizational Structure

As noted above, the MRI is an alliance of the five initial partners (ARC, CDC, UNICEF, UNF, and WHO) and a large number of additional partners. Each of these five core partners contributes to the MRI's functions (Table3↓).

Partner	Roles and responsibilities
American Red Cross (ARC)	Promote public awareness; mobilize Red Cross and Red Crescent societies in countries during mass campaigns and in support of routine immunization programs in select countries; and provide technical and financial resources
Centers for Disease Control and Prevention (CDC)	Provide technical and policy expertise and resources, including major support for surveillance and the global measles and rubella laboratory networks
United Nations Foundation (UNF)	Manage funds and donor agreements; coordinate MRI with ARC; provide resources; fundraising; advocate with UN agencies in countries; assist countries with implementation; handle contracts/agreements/letters to national governments/ partners on behalf of MRI
United Nations Children's Fund (UNICEF)	Support purchasing and delivery of vaccines to countries and assist countries with implementation, logistics (e.g. cold chain) and social mobilization
World Health Organization (WHO)	Provide technical leadership and develop global policy and strategies; assist countries with implementation, program planning, monitoring and evaluation; disease surveillance; and management of the global laboratory network

Table 3 Roles and responsibilities of the MRI's five core partners

In addition to the five core partners, many additional partners now contribute to the MRI, particularly in the areas of fundraising and advocacy.

Other MRI Partners

- Governments and Ministries of Health of countries
- American Academy of Pediatrics;
- Church of Jesus Christ of Latter Day Saints
- Walgreens
- American Red Cross Chapters
- Ann Ray Charitable Trust;
- Becton, Dickinson and Company;
- Bill and Melinda Gates Foundation;
- Canadian International Development Agency;
- GAVI Alliance;
- Global Payments Inc;
- Herman and Katherine Peters Foundation;
- International Federation of Pharmaceutical Manufacturers & Associations;
- International Federation of Red Cross and Red Crescent Societies;
- International Pediatrics Association;
- Izumi Foundation;
- Japan International Cooperation Agency;
- Vodafone Foundation;
- World Bank;
- Japan Ministry of Foreign Affairs
- Jeppesen;
- Shot@Life campaign
- IFFIm
- Kessler Family Foundation;
- Lions Clubs International Foundation;
- March of Dimes;
- Merck Company Foundation;
- Monte dei Paschi Foundation;
- Norwegian Ministry of Foreign Affairs;
- The ONE Campaign;
- Rockefeller Foundation;
- Sabin Vaccine Institute;
- Serum Institute of India;
- Task Force for Global Health;
- United Kingdom Department for International Development (DFID);
- Women's National Basketball Association.

5.4 Overall Approach

It is important to note that the MRI was launched and has operated in an environment where the global immunization community is focused on bringing the polio eradication effort to a successful conclusion before it commits to a similar effort targeting measles and rubella, and this environment has greatly influenced its overall approach. The MRI is an alliance, a collaboration between partners, and is a functional rather than an organizational entity. Participation in the alliance is intended to increase the commitment of the respective partner organizations and their collective effectiveness by working as a group and coordinating efforts. The MRI does not have

a juridical personality; its headquarters functions, such as legal and financial matters, are handled at the UNF. Legally, all funding and grant agreements of the MRI are executed by UNF, which is responsible for all donor reporting and for managing the pooled funds for MRI activities and, as a result, for much of the MRI's administrative work. The UNF has legal agreements with multiple partners, including, GAVI, BMGF, WHO and UNICEF, and formal cooperative agreements with CDC.

The MRI has neither a chief executive nor an identifiable secretariat. The management functions of the MRI are performed by the five core partners from within their respective organizations, and the staff of the MRI are not housed physically in a single agency. The lack of a juridical personality and of a recognizable administrative home allows the MRI to be more flexible and responsive, and less constrained by the bureaucratic limitations of any of the partner institutions. The work is done on behalf of the MRI and is considered to be a part of each member's contribution to the MRI's function.

The overall policy and direction of the MRI is set by the five core partners after consultation with countries and other partners. There is no board or clear administrative hierarchy. Decisions are reached by consensus, usually unanimously. The decision-making process is characterized by the dominance of technical and policy considerations, reflecting the orientations and values of the partner organizations and of the individual staff members involved. There is a strong convergence of values among the leadership of the MRI, based on a shared set of professional and technical values [20]

5.4.1 Operating Principles and Procedures

Operating principles

The following principles govern the actions of the MRI:

1. Countries take ownership of programmes and activities, which are conducted so as to promote sustainability;
2. Programmes and activities strengthen routine immunization and broader health systems;
3. Programmes and activities are conducted in a way that promotes equity and the goal of reaching all children with the benefits of measles and rubella vaccines; and
4. Linkages are made with other immunization and child survival interventions, such as routine immunization, polio eradication, introduction of new vaccines, and co-administration

of other child survival interventions, such as vitamin A, deworming medications, and insecticide-treated bed nets to prevent malaria.

5.5.2 Operating Procedures

The operating procedures of the MRI are intended to be country-led; efficient; timely; low-cost; flexible and responsive; and accountable and transparent.

The processes of the MRI are intended to be owned and led by countries, which set their own objectives and plan and implement their own programmes and activities. The MRI works in countries only at the request of governments, thereby assuring political commitment to the activities. Because measles is a very important cause of infant and child mortality in high-burden countries, there is often political pressure from parents and non-government organizations for immunization services. MRI processes are intended to be efficient, with a minimum of bureaucracy. There is a single pooled donor fund, which is disbursed after approval of a single annual global proposal. This means there is no need for individual review of multiple proposals from different countries, and there typically is no need for countries to develop multiple proposals targeted at individual donors. This process is intended to reduce costs, eliminate duplication of effort, improve planning and forecasting, and facilitate coordination. The funding mechanism is intended to be nimble and to keep overhead costs as low as possible. The UNF, UNICEF and WHO can disburse funds within a few weeks of donor funds becoming available. The UNF does not charge overhead costs, and all donor funds received by the MRI are channelled to WHO and UNICEF for disbursement. UNICEF and WHO charge 7% overhead costs.

While the constituency of the MRI is global and encompasses all countries, the MRI focuses its activities on 68 priority low- and low-middle income countries with a high burden of measles morbidity and mortality. Many of these countries also have a high burden of CRS or have not yet introduced RCV into their routine immunization programmes. The list of focus countries was developed by the MRI so as to channel assistance to countries with the greatest need, with the list being updated annually. The MRI currently funds:

- operational costs and the cost of vaccines and vaccination materials for measles SIAs;
- activities to strengthen the routine immunization system;
- surveillance; and
- technical support.

An objective of the MRI is a progressive transfer of responsibility for funding measles control

activities away from the MRI and towards the countries themselves. The MRI requires each government to assume responsibility for at least 50% of funding for operational costs of measles/rubella SIAs in that country, and this fraction is intended to increase with each subsequent SIA. It was intended that, by 2015, all countries would fully fund any needed additional SIAs (although this goal is unlikely to be achieved). It has been assumed that SIAs will need to continue for the foreseeable future, even in countries with a two-dose measles immunization schedule [19].

Each year, participating countries develop plans of action and budgets for measles and rubella, immunization and surveillance activities in conjunction with WHO and UNICEF. The MRI requires that annual plans be incorporated into comprehensive multi-year plans, and that the plans be epidemiologically justified, technically reasonable, and feasible within the operational constraints in the respective countries.

5.5.3 Coordination and Management

Because the MRI is a decentralized alliance, without a standing secretariat, coordination and management of MRI activities within and between the member organizations is a key concern. The MRI has adopted innovative approaches to resolving this potential problem. Long term policy direction is set at the annual meeting of the MRI, which is held in Washington in September, and at the annual management meeting of the core partners, which is held in Geneva in the first or second quarter of the year. In addition, issues are discussed and resolved as needed during weekly teleconferences.

Weekly and monthly teleconferences

Week-to-week coordination of the activities of the MRI partners is by teleconference. There is a weekly teleconference for the African WHO Region and monthly teleconferences for the South-East Asian and Eastern Mediterranean WHO Regions. The calls are co-chaired by the ARC and the UNF, with participation by WHO (both headquarters and Regional Offices), UNICEF (both headquarters and Supply Division), and CDC. Country representatives are invited to participate in the calls as needed, and additional MRI partners, such as the Task Force for Global Health, Lions International, International Federation of Red Cross and Red Crescent Societies, John Snow Inc, the Merck Foundation, the Church of Jesus Christ of Latter-Day Saints, the Sabin Vaccine Institute and Duke University Medical Center are also welcome to participate as are other donors.

During these teleconferences, there is discussion of the current epidemiological situation, any measles or rubella outbreaks that might require a response, and plans, budgets, and logistics related to various MRI activities. Updates on vaccine and equipment forecasts, supply and shipment are presented by UNICEF and discussed. WHO Regional offices present updates on the measles epidemiologic situation and on the results of immunization activities, including the outcomes and progress of SIAs. Progress reports are discussed, as are proposals to meet any shortfalls in funding. Minutes are taken and kept by the ARC and the UNF.

In addition to the regularly scheduled calls, other teleconferences are held as needed. Teleconferences are generally characterized by a technical approach and a willingness of the MRI partners to work together to resolve problems. Decisions are usually made by consensus, and various partner organizations volunteer to undertake any outstanding tasks. There is a clear concordance of shared values; many of the MRI partner representatives have, during the course of their careers worked in several of the partner organizations, and thus have a good understanding of how they work. In addition, there has been a remarkable degree of retention of the same key staff at the five core partners since the inception of the partnership. Frequent regular teleconferences and a high level of cooperation have enabled flexibility and rapid responses to emerging problems.

Annual Meetings

The MRI holds three meetings each year:

- A large meeting of all partners is hosted by the ARC; it is usually held in Washington each September. This is a multi-day conference at which results and progress are presented and discussed. This meeting is intended to communicate global progress, present and discuss plans and problems, and advocate for funds.
- A smaller meeting of the core MRI partners is hosted by WHO in Geneva early in the year. This meeting is intended to address ongoing management issues and discuss and approve the year's activities. It is technically focused and results in decisions on proposals to be funded. It also provides a setting for discussing the scientific basis of the MRI's work, and reviewing global, regional and country measles and rubella epidemiology and indicators.
- A global laboratory network meeting to review progress with measles and rubella laboratory surveillance is also held annually; it addresses and recommends laboratory techniques and innovations to support measles and rubella surveillance.

The MRI also holds at least one annual retreat of the core founding partners to scan the environment more broadly and to develop approaches for the future.

5.6 Planning, Budgeting and Funding Process

Each year in the third quarter, participating countries begin to formulate their country plans for the following year and beyond. WHO Regional Office, CDC and UNICEF staff work with the respective Ministries of Health and Interagency Coordinating Committees (ICCs) to develop the plans. The ICCs, being composed of representatives from the Ministry of Health, MRI partner organizations, and other cooperation agencies, play a major role in formulating plans at the country level. After finalization and approval, the plans are submitted by the Ministries of Health to the WHO Regional Office. Their respective WHO staff then consolidate these plans into regional and global plans. As noted above, there is substantial regional variation with regard to the level of MRI activities, with the MRI being most heavily involved in the African, Eastern Mediterranean and South-East Asian Regions. In the Americas, European, and Western Pacific Regions of WHO the MRI has relatively less involvement in measles and rubella control activities. Consolidation of country and regional plans usually takes place by the end of the fourth quarter of the year. These plans also include vaccine forecasts, which are forwarded to UNICEF's Supply Division, so as to ensure global vaccine and device availability, especially when large SIAs are proposed. An advantage of this approach has been the ability to schedule activities in ways that ensure continuity of vaccine supply, with SIAs in various countries being implemented at different times.

The core partners of the MRI review the consolidated and final proposals and allocate funding to countries, WHO Regional offices and WHO headquarters based on available funds. Generally, this work is complete by February and funds can be distributed soon thereafter. Funds are managed by the UNF, which, after approval by the MRI core partners, transfers the agreed upon funds via the UN Fund for International Partnerships (UNFIP) to WHO and UNICEF. WHO transfers funds from headquarters via regional and country offices to Ministries of Health in various countries. UNICEF uses the funds to purchase vaccines and vaccination equipment on behalf of the countries; to conduct social mobilization activities; and to cover operational costs. Funds are also reserved by WHO and UNICEF for their own operational costs in supporting the countries. Funds from the MRI are expected to be combined with funds from the countries themselves to support the immunization activities in the field.

MRI monitors the progress of proposed activities, changes in budgets and availability of funds on an ongoing basis. Adjustments are made by finding and filling gaps, with the funds to fill gaps coming from the MRI or other donors. The MRI partners continually work to increase the number of donors to measles and rubella programmes.

The MRI has worked to systematize its planning and procurement processes. It has developed tools for forecasting, staffing, logistics, cold chain management, training, and social mobilization. The MRI has also worked to improve micro-planning, developing guidance materials relating to many of the small details of large SIAs.

5.6.2 Criteria for Funding

The MRI has developed an informal set of criteria for funding immunization activities. As noted above, it allocates funds on the basis of plans of action prepared by Ministries of Health and approved by Interagency Coordinating Committees. These plans of action must be part of a comprehensive multi-year plan, so as to ensure a comprehensive approach without gaps, with countries funding at least 50% of the operational costs of SIA, so as to ensure commitment. The plans are evaluated for their epidemiological and technical quality; scientific evidence base; expected public health impacts; and operational feasibility. The plans must be approved by the countries' respective Interagency Coordinating Committees. Staff from the MRI core partner agencies work with countries to revise plans that do not meet these criteria.

If requests for funding in a given year exceed the funds available to the MRI, countries' proposals are prioritized. Based on the disease burden in each country; the measles immunization coverage achieved to date; countries' respective abilities to self fund their proposals; and the operational feasibility of the plans. If there is epidemiological evidence to indicate either vulnerability of age-groups not targeted in current plans or previously unrecognized outbreaks of measles, funding can be modified to increase support beyond that initially requested.

5.6.3 Fundraising

All MRI partners undertake fundraising activities. Most funds are disbursed at the start of the calendar year, but because donors have varying fiscal years, some funds are received later and disbursed immediately, as they are received. All funds raised by the MRI are directed to the UNF, which is able to use the UNFIP programme to distribute funds to UN system agencies, which then disburse the funds to governments. The MRI staff is largely technical, and the MRI

does not have a large pool of fundraising staff. The MRI has been moderately successful in attracting new donor partners, but has not been able to amass the level of support that would be needed to support an eradication programme. It is likely that the MRI's ability to raise funds has been constrained by the competing needs of the GPEI.

5.7 Communication

A major function of the MRI is advocacy, which requires a focus on communication. The MRI has not, until very recently, had a dedicated communications specialist who develops strategy and carries out day-to-day communication tasks, such as maintaining a media and web presence. Communication with existing and potential stakeholders is a priority, primarily done through the routine meetings of the MRI, but also via the web and media. As is the case with fundraising, the MRI's communications capacity is quite limited.

5.8 Technical Support

Technical support for planning, implementation and evaluation of SIAs, as well as surveillance and routine immunization strengthening activities, is a strength of the MRI, despite its modest staff size. Technical support comes from all five founding partners, but particularly from CDC and WHO. As noted above, the MRI also provides more limited support for advocacy, social mobilization and communication to help increase in-country political and financial commitment and community demand for immunization.

5.9 Evaluation and Reporting of MRI-Supported Activities

The MRI requires all countries with which it works to submit a technical implementation report within five weeks of completing an SIA. The report includes an estimate of administrative coverage achieved; strategies used to vaccinate hard to reach children and improve routine immunization; and challenges to measles and rubella elimination efforts. Full country reports are later consolidated by the WHO regional office into regional reports, which ultimately are consolidated into one annual report by WHO/UNICEF HQ. This consolidated global report is provided to the donors by the end of February each year. The MRI's activities are also reported on an annual basis to the Strategic Advisory Group of Experts (SAGE) of WHO at one of its twice a year meetings in Geneva and to the World Health Assembly, as appropriate. In addition, UNICEF (Supply Division) provides reporting on the number of vaccine doses and devices procured, along with a financial report on spending of funds transferred by UNICEF (Procurement Division) for bundled vaccine procurement.

The MRI partners have established programme performance, process and impact indicators that are monitored on a monthly (reported measles incidence) or annual (the remaining indicators) basis at the global level. (See above.)

The results of this monitoring and evaluation are published regularly in the CDC's Morbidity and Mortality Weekly Report and WHO's Weekly Epidemiological Record.

5.10 Staffing

Because the MRI is more properly seen as an alliance, rather than as a separate organization, and because the five core partners comprising the MRI have large numbers of staff working on childhood immunizations, it is difficult to define precisely how many staff can accurately be described as "MRI staff." At the UNF, for example, one staff member paid by UNF devotes 100% of her effort to the MRI, but other staff paid by UNF also devote/contribute "small percentages of their time" to ensuring that MRI funds are credited, disbursed, and accounted for correctly. At the ARC, a total of five staff contribute a total of 3.8 FTE of effort (one full time staff person in Washington, DC; two full time staff people in Nairobi, Kenya; and two additional staff who each work 40% time for MRI-one in Africa and one in Washington, DC), but one of those full time staff members is seconded/paid by CDC to work at ARC. At UNICEF, seven individuals contribute a total of 4.35 FTE of effort (none of them working full time for the MRI), in addition to three regional immunization focal points who each devote ~10% of their time and effort to MRI activities. At the two remaining core partner organizations that comprise the MRI, CDC, and WHO, there are much larger numbers of staff who spend some portion of their time working on MRI-related activities. At CDC, it is estimated that over 40 epidemiologists, laboratorians, support staff, and contractors devote anywhere from 5 to 100% of their time working on MRI activities. At WHO, including staff assigned to headquarters, regional offices, and countries, figures show that in 2013, there are 220 WHO immunization staff working on measles and rubella, of whom 106 are paid for out of measles funds (of whom 103 are paid by CDC). In addition, there are almost 4000 (i.e. 3,994) WHO staff funded by polio/GPEI, but who devote some part of their time and effort to measles- and rubella-related activities. Thus, it is difficult, if not impossible, to come up with an exact tally of how many staff MRI has working for it.

5.11 Roles and Responsibilities of Participating Organizations

National Health Authorities: have the overall responsibility for planning and implementing

measles and rubella activities, with the technical and financial support of the MRI. Each country is responsible for compiling a costed campaign plan; financing at least 50% of the operational costs; planning, executing and evaluating its measles and rubella control/elimination activities; and providing a report to the MRI.

The American Red Cross (ARC): The ARC provides technical and financial support to national Red Cross/Red Crescent societies to educate families and communities on the importance of vaccination and to increase participation in measles campaigns and routine immunization. It is a key funder of the MRI, raising millions of dollars annually through its professional fundraising channels. The ARC plays a leading role in communication and advocacy and helps countries to raise at least 50% of the needed operational costs in-country. It also plays a leading role in consensus building and partner coordination, as well as co-chairing and providing minutes for the weekly coordination calls.

The United Nations Foundation (UNF): The UNF manages the MRI's funds through an agreement with the United Nations and is responsible for reporting to donors. UNF is also a donor to the MRI. Under this agreement, the UNF manages and coordinates joint proposals for donors and implementing partners and disburses and accounts for MRI funds through the UN financial system. It also provides some matching funds to MRI collaborations. The UNF plays a leading role in advocacy and like the ARC helps countries raise at least 50% of the needed operational cost in-country. It also plays a leading role in consensus building and partner coordination, assists countries with implementation of SIAs, and co-chairs and provides minutes for the weekly coordination calls.

U.S. Centers for Disease Control and Prevention (CDC): CDC is a key funder of the MRI, supporting purchase of bundled vaccine, staff and operational costs. It provides technical expertise in support of epidemiological and laboratory surveillance and seconds technical and programmatic staff to WHO, UNICEF, and ARC. CDC also leads research to facilitate the design and implementation of the MRI's strategic plan and provides technical assistance to countries as needed.

United Nations Children's Fund (UNICEF): The Programme Division of UNICEF works with countries to prepare their measles and rubella plans of action and assists governments with cold-chain logistics and social mobilization. The Supply Division of UNICEF coordinates forecasting

of global measles-containing and rubella-containing vaccine requirements and manages contractual arrangements for supplies through its existing procurement mechanisms and processes. The Supply Division also reports on the funds spent on supplies and uses its logistical and procurement capacity to deliver vaccines, syringes and commodities directly to the countries where they are needed. It also assists governments with cold-chain logistics and social mobilization, works with countries to prepare their measles and rubella plans of action, and provides weekly bundled vaccine supply updates for the coordination calls.

World Health Organization (WHO): WHO provides technical leadership and strategic planning for measles and rubella control/elimination and is responsible for ensuring that all components are technically sound and well-implemented. It provides technical assistance to countries for the planning, implementation and evaluation of measles/rubella control strategies; monitors global and regional progress towards reductions in child mortality and measles/rubella control; generates annual vaccination coverage estimates, annual and monthly measles and rubella surveillance data and annual measles mortality estimates; manages the Global Labnet: provides a platform for epidemic alert and coordination of international technical support to countries facing outbreaks; and works with countries to prepare their measles and rubella plans of action, as well as consolidating the annual MRI proposal. It is also one of the leading agencies performing research to facilitate the design and implementation of MRI's strategic plan and provides weekly country reports for the coordination calls.

Civil Society Partners: Civil society partners with networks in countries on every continent anchor the measles and rubella elimination movement in communities across the globe. The Red Cross and Red Crescent Societies have leveraged their vast volunteer networks to maximize vaccination coverage by reaching the most vulnerable people in hard-to-reach and impoverished areas through community-level engagement, including house-to-house visits to promote vaccination. To date, more than 150,000 Red Cross and Red Crescent volunteers have participated in measles campaigns in every region of the world. The Church of Latter Day Saints (LDS), with more than 14 million members worldwide, supports the MRI through its humanitarian program. LDS has been involved with the MI/MRI since 2003. Financial contributions and help from 59,000 local LDS church volunteers have supported campaigns in more than 35 countries. Donations come from church members, with the LDS giving 100% of every dollar raised, absorbing its own overhead costs. The Lions Club International Foundation and Lions Clubs International have also supported the MRI, leading a successful pilot engagement of Lions Clubs

in four countries in 2010/2011. The Lions Clubs International have 1.35 million members in their volunteer organizations in 206 countries and geographic areas. Following a successful pilot program, Lions Clubs members are poised to bring their core belief "community is what we make it" to help ensure that communities and countries are measles free.

Achievements of the MRI in 2012

In 2012, the MRI:

- Released a new Global Measles and Rubella Strategic Plan 2012-2020
- Supported 32 countries to implement measles campaigns that reached more than 105 million children with bundled vaccines, operational costs or technical assistance.
- Contributed to social mobilization efforts involving ~165,000 volunteers who mobilized millions of families in 16 countries that mobilized millions of households for measles campaigns and routine immunizations.
- Added new partners, including the International Pediatric Association and the American Academy of Pediatrics
- Provided GAVI and countries the technical assistance required to apply for and use the newly pledged measles and rubella support of US $700 million.
- Published (in the Lancet) a new method to more accurately measure measles mortality and published (in Vaccine), the research priorities for global measles and rubella control and five WER/MMWR articles providing program and laboratory updates
- Supported studies that identified ways that measles activities strengthen routine immunization.
- Tested more than 205,000 serum samples globally for measles and rubella immunoglobulin M (IgM) antibodies for surveillance through the WHO Measles and Rubella Laboratory Network
- Finalized supply arrangements for 2013-2016 (through UNICEF Supply Division) for measles containing vaccines, including measles vaccines; measles and rubella vaccines; and measles, mumps and rubella vaccines in support of the global measles and rubella elimination goals
- Communicated the successes and challenges of measles and rubella control and elimination through a strengthened communication platform aimed at reaching a range of stakeholders.

6 MRI Financing

The MRI raised and disbursed over a billion dollars for measles and rubella control between 2001 and 2013. Over this period, funds raised each year have varied from USD 25 million in 2001 to USD 158 million in 2005; in 2013, the funds raised totalled USD 82 million (Fig 13). Fourteen major development and health agencies and non-government organizations contributed USD 1.038 billion between 2001 and 2013, and other organizations contributed smaller amounts. Major contributors over the period were the U.S. CDC, with 31% of the total; the ARC, providing 15%; the IFFIm, providing 13%; and UNICEF, providing 12%. Contributions from these 14 organizations over the period 2001 – 2013 are shown in Fig 14. Not only did the annual total vary markedly, but there was also significant variation in the contributions from each of the various funding organizations; in 2007, 67% of the funding (USD 100 million) was contributed by a single agency, the IFFIm.

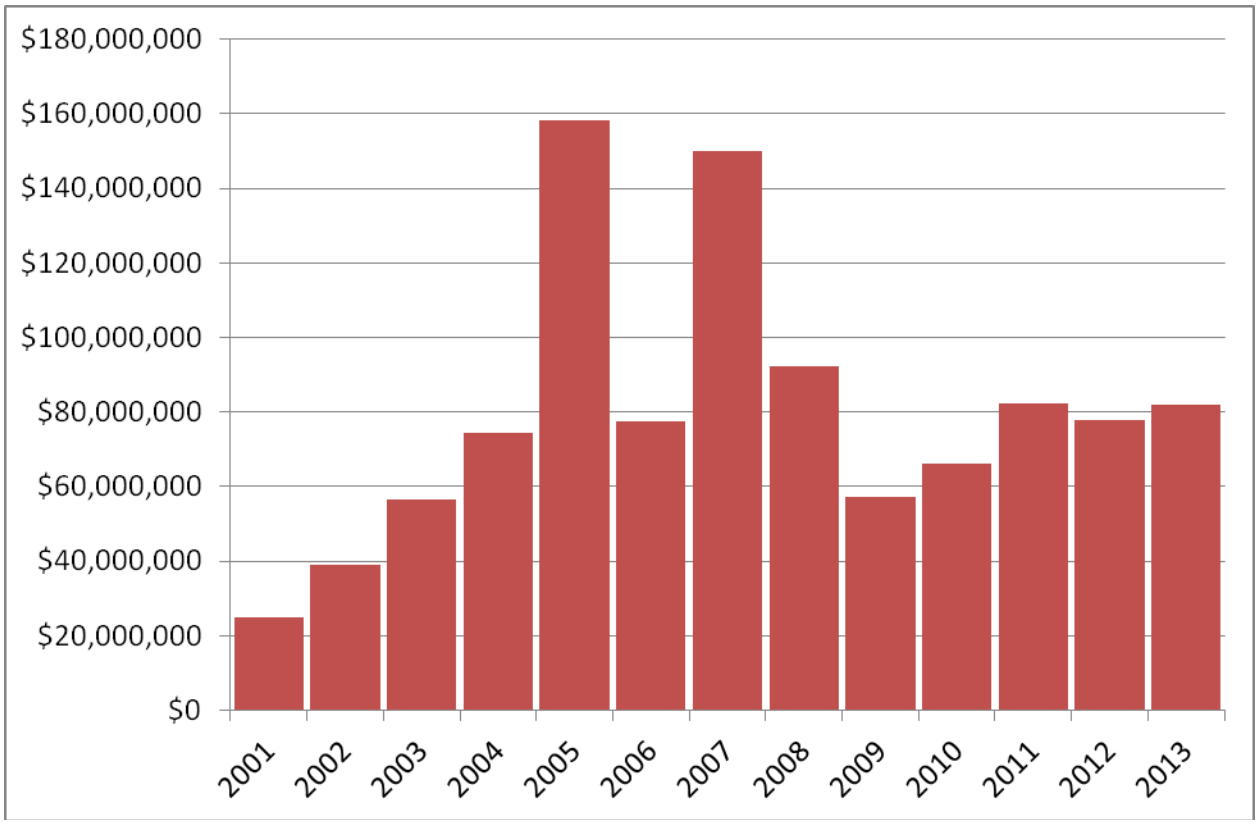


Figure 13 Funds raised by the MRI, 2001-2013

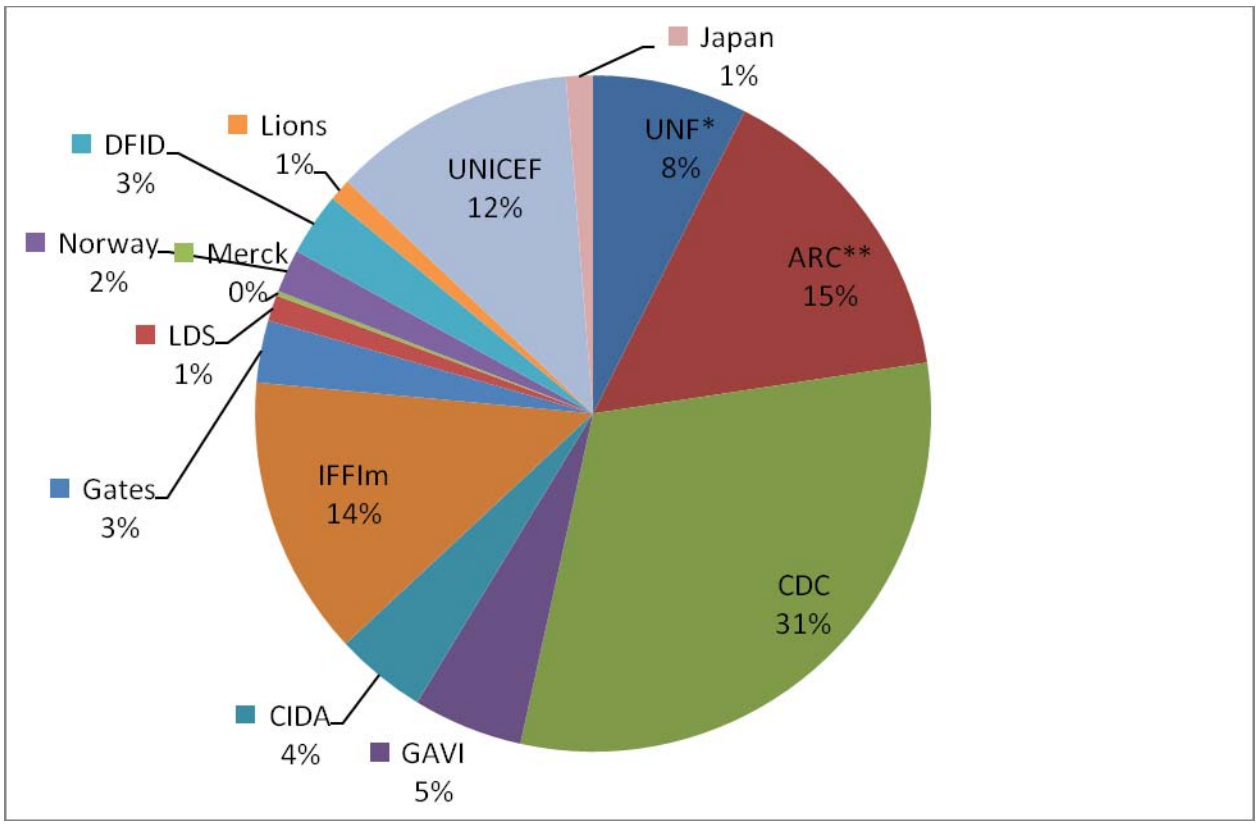


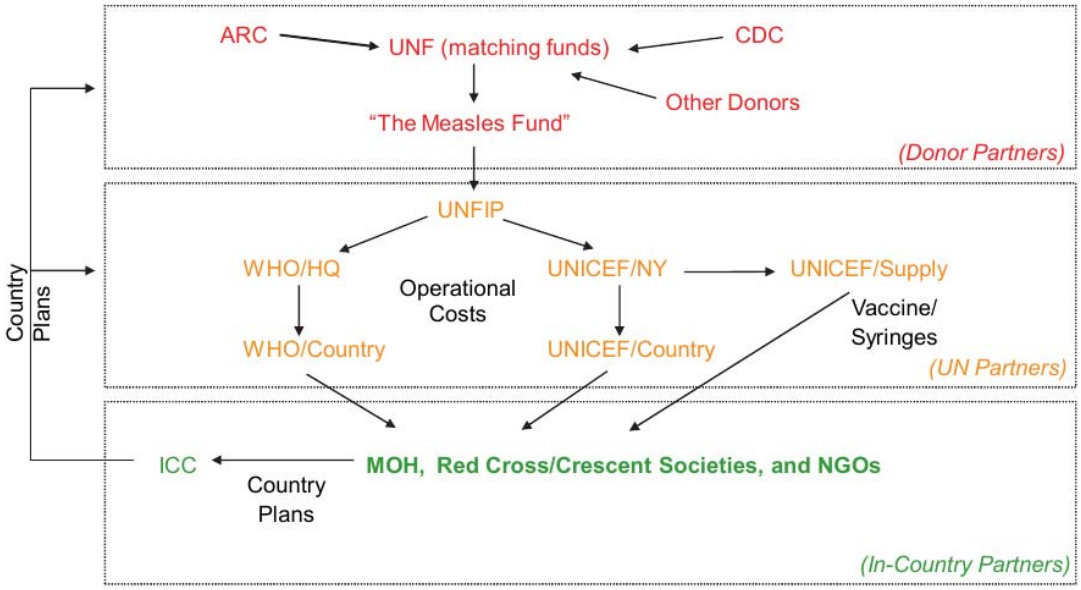
Figure 14 Distribution of funds contributed by 14 organizations to the MRI, 2001- 2013

In comparison with the USD 82 million contributed to the MRI in 2013, USD 596 million was contributed to the Global Polio Eradication Initiative in the same year. While the polio eradication effort is large and complex, this comparison illustrates that resources available currently for the MRI are quite limited.

6.1 Flow of funds

Funds disbursed by the MRI are raised by its partners and consolidated into a common pool, which is then used for country support and the MRI's activities. Fundraising is carried out by all of the MRI partners throughout the year. Funds are allocated through WHO and UNICEF HQ to Regional Offices and then to countries, after the planning process described above (see Section 5.6 and Figure 15). Progress against the plans and expenditures is reviewed continuously and adjusted, if necessary.

Exhibit 6 *Movement of Finances in the Measles Initiative*



Note: Funds are released when ICC-approved country plans are approved by donor partners.
Source: Measles Initiative.

Figure 15 Funding flows in the Measles Rubella Initiative

6.2 Disbursements

The total expenditures of the MRI during the period 2001–2013 were USD 1.038 billion, excluding country contributions and direct social mobilization funding from partners. The yearly funding level for the MRI has ranged between USD 25 million and 158 million. The financial resource projections for 2014–2015 show small gaps in projected funding, depending upon the final US government grant amount.

7. Views of Decision Makers, Donors, and Other Key Informants Regarding MRI and Its Role

A key task of the Review Team was to solicit input concerning the past accomplishments, current operations, and future possible paths for the MRI from a variety of stakeholders around the world, including decision-makers at high levels within the organizations comprising the MRI; various bilateral and multi-lateral donors; other non-government organizations; and experts in the field of global immunization. In addition, input was sought from individuals working at the regional and country levels to implement measles, rubella and other immunization and disease control programs. Input was sought and obtained through a variety of mechanisms, but primarily

through a series of in person and telephone interviews conducted between May and October, 2013. A number of key individuals were interviewed on more than one occasion. In order to ensure open and candid communication, it was decided by the Review Team (and explicitly told to those whose input was solicited) that the views expressed and summarized in this report would not be attributed to specific individuals. Thus, while the individuals interviewed are listed in Appendix 3, the views summarized here should not be ascribed to any individual, especially because a wide range of sometimes conflicting opinions and views emanated from these interviews. Among the individuals whose input was solicited by the Review Team were policy-makers, donors, independent experts, and individuals previously or currently involved in implementing childhood immunization programs, especially those working in poor and middle-income countries in Africa, Asia, and the Eastern Mediterranean. These individuals included those who support increasing the resources dedicated to focused, disease specific, "vertical" programs aimed at regional elimination and ultimately global eradication of measles and rubella, as well as individuals whose focus is on improving routine infant and childhood immunization through health system strengthening. Many of those in the latter group believe that disease specific "vertical" programs, while perhaps useful in the short term by quickly raising vaccine coverage levels and hence the proportion of the population that is immune to measles and rubella, often have a detrimental impact on routine immunization programs (e.g. by competing for scarce personnel and other limited resources) and on health systems.

In these interviews, we encountered a broad array of impressions concerning the past contributions of the MRI to the progress made against measles and rubella. Thus, while some respondents gave substantial credit to the MRI for the notable reductions in measles mortality seen over the past decade, especially in Sub-Saharan Africa (and to a lesser degree in South Asia, Western Pacific, and Eastern Mediterranean), others gave that credit to one or more of MRI's core partners, especially CDC, WHO, and UNICEF, which had provided either logistical support; vaccines and vaccination equipment; or technical support, rather than to the MRI. This latter view was captured by the respondent who said, "Countries don't see MRI – they see WHO, CDC, UNICEF, etc." A number of respondents recognized that the MRI's low profile and focus on results, rather than on receiving credit for its achievements, was intentional and reflected well on the organization, but nevertheless were dismayed that the result was a substantial under-recognition of the importance of the MRI's contributions.

Positive comments about the MRI and its mode of operation included:
"MRI's informality is a strength."
"The MRI is results-oriented, and holds our (i.e. region's and countries) feet to the fire."
"The MRI is very useful, doing things that other organizations don't."
"The MRI understands the issues and provides quick, sensible responses, with 'customer satisfaction' in mind."

Interestingly, several respondents pointed to the fact that various groups working on the prevention and control of both yellow fever and malaria in Sub-Saharan Africa have attempted to copy MRI's use of weekly phone calls including various partner organizations for coordination purposes, albeit with less success.

At the same time, a number of respondents had less flattering views of the MRI and the way it operates. More negative comments included:
"The MRI is fragmented and reactive, with no over-arching plan."
"The MRI needs more structure."
"The MRI needs to do a better job of forecasting future financial needs – it is amateurish in its forecasting."
"The quality of some of the SIAs supported by the MRI has been poor, missing the same kids again and again, although there have been recent improvements."
"It isn't clear to me that the MRI looks at and learns from its past experience."
"The MRI is not seen as gracious, welcoming, or collaborative."
"The MRI needs to shift from being reactive to proactive."
"The MRI needs stronger governance."
"The MRI is extremely good technically, but not well managed."
While the above comments, both positive and negative, should not be construed as representative, they do demonstrate that the MRI, like any organization, has supporters who value its contributions, as well as critics who perceive ways in which the MRI could improve its performance.

Respondents, not surprisingly, also had diverse views regarding the current and near term future (i.e. the next three to five years) need for and possible roles of the MRI in measles and rubella control/elimination efforts. Views expressed ranged from seeing no future need for the MRI to continue to exist ("MRI is not needed.") to seeing the MRI (or an organization performing the

same functions as the current MRI) as vital to sustaining reductions in measles- and rubella-related morbidity and mortality in GAVI-eligible, GAVI-graduating, and GAVI-ineligible countries ("If the MRI were to disappear, it would be an enormous loss – who would help us and provide support? It won't be GAVI or Gates"). The latter perspective, expressing substantial concern about the possible loss of the MRI, emanated primarily from those working at country and Regional levels.

Among the individuals we interviewed, there was a broad agreement that "the gains are fragile;" that the arrival every year of a new birth cohort in countries with weak routine immunization and health systems creates in the near term an ongoing need for an MRI-like organization; and that even with such an organization in place and other organizations supporting measles and rubella immunization activities, many of the regional measles and rubella elimination or control goals will not be met. Representative comments include:
"We will need many SIAs in the next few years."
"Our region (i.e. Africa) will need a lot of help to consolidate our gains in measles control."

At the same time, a number of respondents expressed the view that over the next three to five years, the focus of measles and rubella control/elimination efforts should be on strengthening routine immunization and improved delivery of vaccines through countries' health systems, rather than on separate, disease/vaccine-specific elimination or eradication efforts. Comments illustrating these views included:
"The world is not ready to set a measles or rubella eradication goal."
"Bilateral donors are really opposed to new disease or vaccine-specific initiatives."
"We need to think beyond the polio model."
"A separate measles/rubella initiative would be a disaster."
"The lesson from polio is, stay linked to routine immunization."
"Future efforts must find a way to be imbedded in the routine immunization/health system."
"Separating off measles and rubella would lead to fragmentation of immunization efforts."
"GAVI is supporting a mortality reduction goal, not disease elimination goals."

Thus, while there was substantial support for the view that measles and rubella control efforts in various countries and multiple regions over the next three to five years would benefit substantially from the type of support that the MRI has been providing, there was only modest support for, and indeed substantial opposition to the MRI becoming a demonstrably stronger,

more robust organization unless the resulting organization can both avoid being or becoming a stand-alone, disease(s) specific initiative along the lines of GPEI and can clearly support and help strengthen routine immunization programs. At the same time, there was clear recognition in many quarters that rather than remain the same, the MRI needs to evolve, given a number of important changes in the global situation regarding measles, rubella, and immunizations more broadly. This view was encapsulated by statements like the following:

> "The world has changed and the MRI must change – it can't remain the same."
> "The current MRI model is not sustainable."
> "The perception of MRI's value has declined – it needs to change."

In summary, the Review Team encountered a wide range of views concerning the MRI, its past accomplishments, its strengths and weaknesses, and the direction it should take in the future, given the changing global environment in which it finds itself.

8. Current and Near Term Future Context in which the MRI is working

In considering possible directions for the MRI to take regarding its structure, staffing, funding, and operating procedures, it is critical to take cognizance of the current and likely near term future circumstances regarding measles, rubella, and immunizations in general. While there are no new measles or rubella vaccines, diagnostic tests, or treatments on the horizon, it is theoretically (and practically) possible to eradicate both diseases with currently available tools, although the very high level of infectiousness of measles translates into a very high level of population level immunity needed to interrupt transmission.

Since the MRI was inaugurated as the Measles Initiative in 2001, the global immunization context has changed dramatically in a variety of ways. First and foremost, in recognition of the enormous impact and potentially achievable much greater impact of infant and childhood immunizations on infant and child mortality and morbidity rates, the world has made enormous new financial commitments to infant and child immunization programs. This unprecedented investment in immunization of the world's children is intended both to increase coverage with vaccines in widespread use for decades (e.g. DTP, measles, and polio), as well as to support the introduction of myriad new or previously under-utilized vaccines (e.g. rotavirus vaccine, HPV vaccine, pneumococcal conjugate vaccine, yellow fever vaccine, and rubella vaccine), utilizing innovative approaches to the financing of these vaccines and vaccination programs. These commitments have been most recently re-affirmed by the approval of the Global Vaccine Action

Plan, 2011-2020 by the World Health Assembly in May, 2012, providing a framework for achieving the Decade of Vaccine's vision of providing universal access to the benefits of immunization. These new funding opportunities, provided through the GAVI Alliance and other partners, support the introduction of a routine second dose of measles vaccine and the introduction of rubella-containing vaccines. Nevertheless, despite this enormous infusion of new resources and new vaccines, after years of steady, albeit slow improvements in vaccine coverage achieved through routine immunization programs, coverage with the third dose of DTP vaccine (as an indicator of routine vaccine coverage) remains disappointingly low in many poor countries, especially in rural areas, and in many countries further increases in coverage have been difficult to achieve through routine programs. While the GAVI Alliance and the resources it has made available for immunization have dramatically and permanently altered the global immunization landscape, the GAVI Alliance has, by design, supported immunization activities only in GAVI-eligible countries, which comprise the poorest countries in the world. Most GAVI-eligible countries are in Sub-Saharan Africa, with a few others in other regions. GAVI support is intended to be time-limited, and it is expected that 15-20 GAVI-eligible countries will "graduate" between 2015 and 2020. At the same time, there is growing recognition of the fact that a substantial proportion of the world's poor and under-immunized children live in GAVI-ineligible countries.

With regard to measles and rubella, as noted above, measles-related mortality and morbidity have dropped sharply over the past decade, and in some countries and regions, a substantial proportion of this decline can be attributed to the activities of the MI/MRI, especially its support of SIAs. In recognition of its importance as a cause of infant and child mortality, as well as the utility of using measles vaccine coverage to assess the reach of routine immunization and health services, measles and receipt of measles vaccine were chosen as a key indicator for monitoring country-level, regional, and global progress in meeting the Millennium Development Goals (MDG 4). Because of a similar focus on reductions in infant and child mortality as an indicator of success, the GAVI Alliance and the Bill and Melinda Gates Foundation, as well as other donors, see measles mortality as a highly useful indicator of impact. While most large funders of vaccines and of immunization programs in poor and middle income countries believe it is premature to consider eradication as a target for either measles or rubella, with the addition of SEARO in September, 2013, all WHO regions have now established target dates for measles elimination by 2020 or sooner, and two have established targets for the control or elimination of rubella. However, most experts believe that many of these regional goals will not be met by the

target dates, including the goal of eliminating measles in the European region, where substantial pockets of susceptibility to measles exist in a variety of countries for diverse reasons. The MRI's activity to date in the European Region has been indirect, through the support of staff and the funding of some SIAs, but it goes without saying that global eradication of measles cannot be achieved as long as these pockets of susceptibility remain.

As noted above, while all WHO regions have established measles elimination goals, most funders and multi-national organizations involved in infant and child immunization programs are currently emphasizing the further strengthening of routine immunization programs and health systems as the primary means of achieving these goals. There is a general recognition of the value of and need for SIAs in quickly raising population-level immunity in countries (or parts of countries) where the routine immunization program has not been able to achieve high levels of coverage with at least one dose of measles vaccine, as well as in the setting of an outbreak, but it is hoped that the need for SIAs will diminish over time because of improvements in routinely administered vaccine coverage achieved through strengthened routine immunization programmes. When SIAs are required, it is expected by donors that they will be well-planned and well-executed; that their quality and impact will be rigorously assessed and lessons learned incorporated in the planning of future SIAs; and that, whenever possible, their design, execution, and assessment will strengthen or in some way have a positive impact on the routine immunization system, rather than a negative impact.

Another important contextual factor certain to affect the MRI over the next three to five years is the progress made toward the eradication of polio. Since the world set a polio eradication goal over 25 years ago, the resulting investment in GPEI, the program tasked with bringing the eradication effort to a successful conclusion, as well as planning for a post-polio eradication world, has been enormous in terms of funding, staff, and research. The polio eradication effort has had profound impacts on the entire immunization (indeed the entire health) infrastructure in dozens of countries, especially those in Africa, South and West Asia, and the Eastern Mediterranean regions. Funding and staffing of the polio eradication effort is currently supporting virtually the entire immunization infrastructure in many of these countries, including not only the delivery of routine immunizations and SIAs, but also vaccine-preventable disease surveillance and the network of laboratories that makes it possible. If these resources were to disappear, or even be substantially reduced, the impact on measles and rubella (and other disease) control activities in many countries would be profound. Thus, the currently projected $1 billion shortfall in funding of GPEI represents a substantial threat to measles and rubella immunization activities.

Alternatively, if these resources can be maintained, as the need for polio- and polio-vaccination activities declines, these resources can be used increasingly to strengthen surveillance for and vaccination against other diseases, including measles and rubella. Similarly, current plans to switch from using oral polio vaccine to inactivated polio vaccine, which is given by injection, will undoubtedly have an impact on measles and rubella immunization activities in many countries. It should also be noted that however beneficial the ultimate eradication of polio proves to be, the enormity of the GPEI, together with the unexpectedly long time it is taking to achieve eradication, has tempered the enthusiasm of many public health officials and donors for embarking on another eradication program (e.g. measles or rubella), as well as made them leery of narrowly tailored immunization programs targeting a single disease. Whether related to this phenomenon or not, the current leadership of WHO has decided not to host any new partnerships, which limits the options available to the MRI.

9. Objectives of the MRI

An assessment of the MRI and recommendations concerning its structure, management, and staffing must take place within the context of its objectives regarding measles and rubella control. According to the *Global Measles and Rubella Strategic Plan,* the objectives of the MRI can be categorized as a vision, three goals and eight milestones to be achieved in conformity with four principles, using five strategies (Tables 4, 5 & 6).

Vision	**A world free of measles and rubella**	
	By end 2015	**By end 2020**
Goals	**Reduction of measles mortality ≥ 95% from the 2000 level**	**Measles elimination in five regions**
	Achievement of regional elimination goals	
Milestones	**Reduction of measles incidence to ≤ 5 per million/yr**	**Sustain 2015 goals**
	National routine MCV1 coverage ≥ 90%	**National routine MCV1 coverage ≥ 95%**
	District routine MCV1 coverage ≥ 80%	**District routine MCV1 coverage ≥ 95%**
	SIA MCV coverage ≥ 95%	**Target date set for global rubella CRS elimination**
	Rubella, CRS elimination goals in three additional regions	
	Target date set for measles eradication	

Table 4 Objectives of the MRI

An objective to eliminate measles in all six WHO Regions is equivalent to global eradication, and imposes a stringent set of conditions that need to be satisfied in order to succeed. Global eradication of measles and rubella is a universal, global objective and requires active collaboration by many different parties. Similarly, elimination in all Regions will require universal participation by all countries, unlike mortality reduction or reduction in incidence which can be achieved without requiring universal participation. High level control of measles and rubella has been agreed to by all parties to the MRI and endorsed by the World Health Assembly in its resolution of 2010 on the Global Vaccine Action Plan. This resolution established milestones "toward eventual measles eradication". This evolution of objectives from control to elimination in six Regions makes a very large difference to the organizational requirements for the MRI. Achievement of these ambitious, high-risk objectives in an environment where there is no clear management system is fraught with difficulty. If the timetable in the *Strategic Plan* is to be followed, there will need to be a major change in the MRI's organizational structure and modus operandi, in order to achieve the universal participation required for global eradication.

Country ownership and sustainability
Strengthening routine immunization and health systems
Equity
Linking with other public health activities

Table 5 Guiding principles of the MRI

AIM	STRATEGY
Achieve and maintain high levels of population immunity	**High coverage with two doses of MCV, and one dose of RCV**
Monitor disease transmission	**Effective disease surveillance and programme evaluation**
Respond to outbreaks	**Outbreak preparedness and case management**
Build public confidence and demand	**Effective communication**
Improve methods of operation	**Research and development**

Table 6 Strategy components of the MRI

Our assessment of the MRI's performance is based on the analysis given in the *Measles and Rubella Initiative 2012 Annual Report*. The report shows performance against the 11 indicators of progress in the *Strategic Plan 2012 – 2020*.

By 2015 the MRI intends to achieve two goals and six 'milestones' (Table 7).

Targets	By end 2015	2012 result	Comment
Goals	Reduction of measles mortality ≥ 95% from the 2000 level	78% reduction	Unlikely to achieve 2015 target
	Achievement of regional elimination goals	Achieved: 1/4 regions	Unlikely to achieve 2015 target
Milestones	Reduction of measles incidence to<5 million/yr	Achieved: 119 countries (world: 33/million/yr)	Unlikely to achieve 2015 target
	National routine MCV1 coverage ≥ 90%	Achieved: 128/194 countries 66% (world: 84%)	Unlikely to achieve 2015 target
	District routine MCV1 coverage ≥ 80%	Achieved 61/162 countries 38%	Unlikely to achieve 2015 target
	SIA MCV coverage ≥ 95%	Achieved: 18/33 countries 55%	Unlikely to achieve 2015 target
	Rubella: CRS elimination goals in three additional regions	Not set	Unlikely to achieve 2015 target
	Target date set for measles eradication	Not set	Unlikely to achieve 2015 target

Table 7 MRI Targets for 2015

It is our view that none of these targets is likely to be met by the end of 2015, with perhaps the

exception of achievement of elimination of measles in the Western Pacific Region.

The indicators of performance cover areas of measles incidence, measles and rubella immunization coverage, measles mortality, incidence of CRS, funding, synergies with other child health interventions, training and evaluation (Table 8) Progress in measles control has been excellent, with major reductions in incidence and mortality, high levels of measles immunization coverage, and many successful measles SIAs. For example, by 2012, the reduction in measles mortality from the level in 2000 had reached 78%. Nevertheless, achievement of the 2015 targets requires even higher levels of performance, and, at the current rate of progress, we consider it unlikely that these targets will be achieved.

Indicator		2012 result	Comment
1	Countries with measles incidence < 5 million/yr	119: 187 countries 64%	Unlikely to achieve 2015 target
2	National routine MCV1 and MCV coverage ≥ 90% and district coverage ≥ 80% in all districts	58/128 countries 45%	Unlikely to achieve 2015 target
3	National routine MCV2 coverage ≥ 90% and district coverage ≥ 80%		Insufficient data
4	SIA MCV coverage ≥ 95%	18/33 countries 55%	Unlikely to achieve 2015 target
5	Estimated measles deaths, proportional change from 2000, and deaths averted by immunization (2000-2012)	122,000, 78% 13.8 million	Unlikely to achieve 2015 target
6	Estimated CRS cases, proportional change from 2000, and cases averted by immunization		Insufficient data
7	Priority countries providing ≥ 50% of funds for SIAs	8/24 33%	Not required to achieve 2015 target
8	SIAs that include other child health interventions	20/33 61%	Not required to achieve 2015 target
9	Countries introducing RCV	2	Not required to achieve 2015 target
10	Countries training for strengthening surveillance of AEFI and coverage		Not required to achieve 2015 target
11	Countries undertaking MR surveillance review		Not required to achieve 2015 target

Table 8 MRI Indicators of Progress

10. Constraints to the Achievement of Measles and Rubella Elimination/Eradication

(In this section "control" refers to activities to reduce the incidence of measles or rubella and includes elimination and eradication, as control to an incidence of zero).

Based on the success of the program to eradicate smallpox, the countries of the world made a collective decision in 1988 to eradicate polio, with an initial target date of the year 2000. This decision was made despite a countervailing view that measles would, on epidemiologic and other grounds, be a more appropriate target for a second eradication effort. As noted above, as of September, 2013, each of the world's regions had established a target date for the elimination of measles, and two regions have established target dates for the elimination of rubella. Although elimination of measles (or any disease with similar epidemiologic features) in all six of the world's regions is equivalent to global eradication, the world's public health agencies and authorities (e.g. the World Health Assembly) and funders of childhood immunization programs have not enunciated a measles eradication goal.

Conventionally, disease elimination/eradication has been viewed as being constrained by technical, political, economic and social factors. The achievement of the Region of the Americas has clearly demonstrated that elimination of measles is technically and practically feasible, even under difficult circumstances. Furthermore, the Region of the Americas has demonstrated that elimination of measles can be sustained, even in the face of continuing importation of cases. In recognition of this achievement, SAGE has given its support to the elimination of measles and rubella in all regions. However, global eradication of measles and rubella requires that very large, high-risk projects be carried out in unstable environments over a prolonged time period. The risk of failure is high because elimination must be achieved even in the settings with the worst circumstances. The very long chain is only as strong as the weakest link.

Meeting the goals set for measles and rubella can be achieved only through the activities of a large and complex transorganizational system. The many different organizations that comprise such a system inevitably have different objectives, levels of commitment, organizational cultures, and resourcing levels. Transorganizational systems or alliances of this kind tend to be underorganized, with loose coupling of constituent organizations, and dispersed centres of power and authority, as is true of the system that is addressing measles and rubella control. There is no binding commitment to the project; donors can renege on funding pledges; countries can commit themselves partially; and so on. Because there is no unified command and control

system, it is very difficult to hold parties to such alliances to account for their performance [20]

While the organizational members of the MRI are powerful players in their own right, the staff who represent these organizations to the MRI are not senior enough to make major commitments on behalf of their respective organizations. Furthermore, while each of the five core partner organizations comprising the MRI plays one or more important roles, it can be difficult to ascribe functions or achievements to the MRI itself. The WHO contributes a diplomatic arena where global targets can be debated and decided, and technical expertise in the form of its staff. The CDC, while representing the interests of the US government, contributes substantial technical expertise and funding, mostly in the form of technical staff; the CDC is currently the technical powerhouse behind the MRI. Despite its very considerable influence, however, as a US government agency, the CDC is not able to provide a forum for setting global objectives or provide overall leadership to the MRI. UNICEF provides technical expertise, funding, and administrative support for purchasing and distributing vaccines and vaccination equipment. The UN Foundation is a non-government organization whose main roles are funds management and disbursement, and advocacy; it is not a major player in the health sector and its influence is consequently limited. The American Red Cross assists with advocacy and fundraising, but as a U.S.-based and identified organization, has limited reach globally. While the UN Foundation and the American Red Cross both raise funds, their efforts are small compared with the fundraising capacities of national aid cooperation programmes and major international organizations like GAVI and the Bill and Melinda Gates Foundation. GAVI has a specific remit to assist resource-poor countries, which are defined by a formula; there is a list of countries eligible for GAVI support. Countries that are not on the list must fund their participation in measles and rubella control in other ways, using independently mobilized donor funds or internal funds. This means that funding commitments to measles and rubella control vary substantially across countries and regions.

Furthermore, countries differ in their levels of commitment to measles and rubella control. Countries and individuals will participate in an immunization programme to the extent that it meets their perceived needs and priorities. Measles and rubella elimination (or global eradication) is not necessarily a high priority for all countries (e.g. a number of European countries). What might be in the best interests of the world may not be, or be perceived to be, in the best interests of a given country. If the objective is global measles and rubella eradication, harmonization of immunization activities must be universal, as no country is so small that it can

be ignored. At least for a period, and possibly for a prolonged period, nearly all countries will need to maintain very high levels of on-time immunization coverage. We see this situation currently with polio, where the population currently affected by the disease is a small proportion of the world's population, yet the entire globe is at risk, and every country will need to maintain high levels of polio immunization coverage, even many years after the elimination of circulating polio virus in that country. This may be even more true for measles because of its higher infectivity. The MRI currently does not possess the staffing, other resources, or authority to achieve the level of harmonization of immunization activities required to support a global measles and rubella eradication effort.

If global eradication of measles and rubella is the goal, the risks are high and the consequences of failing to reach this target are dire. The political costs of failure will be very high, with possible loss of legitimacy of organizations that currently stand at the centre of immunization policy. The economic costs will also be very high, as all investment to the time of acceptance of failure will be sunk costs that cannot be recovered. Global eradication is a very high-stakes game. Consequently, there is hesitancy in many quarters about global eradication of measles and rubella as a goal. If eradication is to be a goal, and the MRI is to play a leading role, then the MRI must be equipped with the capacities to address questions of commitment, risk management, leadership and influence.

Because the world has not yet formally committed itself to target dates for the eradication of measles or rubella, an organization similar to GPEI (or the prior smallpox eradication programme) charged with achieving measles or rubella eradication has not been established, and no existing organization either has the resources or is empowered to assume the necessary responsibility. In this setting, the MRI is providing advocacy, fundraising, communications, and technical support to countries and regions to help make progress towards regional elimination goals. However, the MRI currently lacks sufficient influence to raise the priority of measles and rubella eradication to the levels necessary for success.

11. Strengths and Weaknesses of the MRI and its Ability to Achieve Measles and Rubella Elimination Objectives

The MRI has served the world well to date, although it has not received commensurate recognition for its accomplishments. With regard to measles in particular, there have been notable reductions in the numbers of cases and deaths worldwide, and one WHO region, as well

as many countries, have demonstrated that measles elimination is possible using existing tools. Similar gains in the control of rubella, and CRS have been shown to be possible as well.

While the MRI deserves considerable credit for its contributions to these documented reductions in measles, rubella and CRS, the findings of the present review support the contention that the MRI's structure, staffing, and resources will need to be strengthened if it is to successfully lead the effort to meet the goal of eliminating measles in five WHO regions and the associated milestone of ≥ 95% routine MCV1 coverage in every country. Based on its review, the Review Team concluded that the MRI's strengths were its global perspective; exceptional internal coordination and communication; focus on results, rather than receipt of credit for its work; responsiveness to and focus on the needs of the countries with which it works; low indirect cost rate, and minimal, almost non-existent bureaucracy. At the same time, the Review Team noted a number of weaknesses, including insufficient long term planning and budgeting; substantial limitations to its geographic reach/scope; absence of an identifiable leader and a related lack of global leadership; being primarily reactive in its outlook and activities; insufficient resources to address important advocacy, communications, and technical needs; the absence of a succession plan with regard to key personnel; and uncertainty regarding the commitment of senior leaders of the MRI's component organizations to its long term future. Given the relatively poor recognition in many quarters of the MRI's contributions, the last two of these weaknesses raise concerns about the sustainability of the MRI.

To effectively lead the substantial global effort needed to meet the ambitious goals laid out in the Global Measles and Rubella Strategic Plan, the MRI needs to address the weaknesses described above. Achieving these goals would be substantially easier if relevant health organizations (e.g. the World Health Assembly) enunciated an unambiguous eradication goal; there were a high level of political commitment from countries, WHO and UNICEF headquarters, and WHO and UNICEF regional offices; there were a high degree of global coordination of activities; and there were a long term commitment of substantially more funds. However, in the absence of these changes, the MRI can, if its weaknesses are addressed, move the world substantially closer to meeting current goals and objectives and lay the groundwork for the ultimate eradication of both measles and rubella.

12. Options Considered by the Review Team

After reviewing the MRI and assessing its strengths and weaknesses, as well as the current and near term future context in which the MRI is or is likely to be working, the Review Team considered four options for the MRI:

1. Disband and cease to exist
2. Continue as is
3. Retain its current structure and basic approach, but address weaknesses within that framework
4. Develop a more formal structure, with a secretariat, an executive director, and other staff, as well as a headquarters, similar to disease-specific public-private partnerships working to eradicate polio and to reduce morbidity and mortality from malaria and tuberculosis

Below we discuss each of these options and its implications and feasibility.

Option 1: Disband and Cease to Exist

Under this scenario, the MRI would disband, discontinuing its various efforts to support countries and regions in their measles and rubella control efforts. Among key informants we interviewed, we encountered a small number of individuals who expressed the view that the MRI had accomplished much of what it originally planned, especially with regard to measles mortality in Africa, and that, at this point, it had outlived its usefulness, making it reasonable for the MRI to declare victory and close up shop. Under this scenario, the various organizations comprising or supporting the MRI would continue their individual efforts, cooperating and coordinating as needed, but without an MRI to assist in these efforts or in fundraising, communications, and advocacy. Individual organizations such as CDC, WHO, and UNICEF, together with GAVI and other funders, would support various countries and regions directly as they work to achieve various measles and rubella goals and objectives.

Option 2: Continue As Is

Under this scenario, the MRI would remain unchanged in terms of its approach, its structure, and its resources. Other than the currently planned or recently completed hiring of three new staff members to assist with advocacy and communications, financial management, and program support, the staffing of the MRI would also remain unchanged. Given that a number of key informants expressed the view that the MRI was, as currently structured and staffed, providing

highly useful, albeit limited support to various countries and regions a reasonable argument can be made that "if it ain't broke, don't fix it." On the other hand, however, if the weaknesses of the MRI can be addressed through selective and judicious changes in its approaches and achievable augmentation of its resources and staffing, then its impact can be increased. While we encountered influential individuals who were critical of the MRI and the way it currently operates, allowing the MRI to continue on its current path is, in all likelihood, the path of least resistance.

Option 3: Retain its Current Structure and Basic Approach, but Address Weaknesses within that Framework

Under this scenario, the MRI would retain its current structure and approach, as a confederation of organizations involved in supporting countries and regions as they work to achieve their respective goals and objectives relating to measles and rubella. At the same time, however, it would work to eliminate or minimize its weaknesses within that existing structure, thereby potentially increasing its impact over the next three to five years and simultaneously laying the groundwork for and assuring that it will be a central actor in future measles and rubella eradication efforts likely to gain momentum in the 2015-2020 timeframe. This approach will require that the MRI be strengthened within each of the core partner agencies; more resources be made available to the MRI from various quarters; and the MRI consider potentially difficult alterations to its current structure and staffing.

Option 4: Develop a more Formal Structure

Under this scenario, the MRI would be transformed from a relatively loose-knit confederation of organizations committed to coordinating their efforts and collaborating in their support of measles and rubella control efforts into a more formal public-private partnership, similar to the STOP TB Partnership, the Malaria Initiative, and the Global Polio Eradication Initiative. The MRI would have a designated leader, a secretariat, a headquarters, and an advisory or independent monitoring board overseeing its activities and to whom it was responsible. While other options are possible, its secretariat would most likely be located in Geneva, either within or near WHO headquarters. It would have a larger staff, albeit placed in regions and countries to the maximal extent possible, and a larger, more predictable annual budget. As important, it would be recognized as having the responsibility for leading global measles and rubella elimination efforts.

13. Discussion of the Options and Recommendations of the Review Team

Option 1, disbanding of the MRI, while feasible, was judged by the Review Team to be highly

undesirable. The greatest loss would be felt in many of those countries with the highest burdens of measles, rubella, and CRS, and presenting some of the most formidable challenges to achieving and maintaining measles and rubella elimination. Not only would the impact be acutely felt when needed SIAs are being planned, executed, and evaluated, but also as attempts are made to improve routine immunization and surveillance in theses countries. Neither GAVI nor any other organization could readily fill this need. In the Review Team's estimation, if the MRI were disbanded, many of its functions would still have to be carried out, necessitating the re-creation of mechanisms and systems to meet ongoing needs for coordination and technical support, and it is highly likely that any new mechanisms and systems would perform these functions less well and at no net savings, compared to the MRI continuing to perform them. The Review Team rejected this option.

Option 2, in which the MRI would continue to operate more or less unchanged (except for the currently planned addition of three staff members) is, as noted above, the "path of least resistance." It would present few, if any challenges, and would likely encounter little opposition. At the same time, however, in the Review Team's estimation, leaving the MRI unchanged would represent a substantial missed opportunity. As noted above in various sections, the world has ambitious goals and objectives with regard to the control and ultimate eradication of measles, rubella, and CRS, but is unlikely to meet many of its stated objectives by the agreed upon dates. While substantial changes to the MRI will not, in and of themselves, make it possible to meet these objectives, they can increase the impact of the MRI and thereby help countries and regions as they plan, execute, and evaluate SIAs; improve routine immunization services; and improve or initiate the case-based surveillance for measles, rubella, and CRS that will be required to guide and ultimately document the success of eradication efforts. As a result, the Review Team also rejected Option 2.

While the Review Team had no difficulty rejecting Options 1 and 2, it had substantial difficulty in deciding between Options 3 and 4. The Review Team believes that measles and rubella control is at a crossroads. Although the World Health Assembly has committed to the eventual eradication of measles, it has not set a target date for eradication. And while the six WHO regions have all committed to eliminating measles by 2020, it is difficult to be optimistic that agreed upon milestones will be reached in several regions, given current progress and trajectories. Thus, while experience in the Americas shows that elimination of measles and rubella is technically feasible using existing tools, achieving global eradication will require a clear

eradication objective, a high level of political commitment, a high degree of global coordination and substantially more resources than are currently available. In such a setting, the MRI would be the logical organization to lead global eradication efforts, but not with its current structure and resources. In that hypothetical setting, the Review Team believes that Option 4, in which the MRI would have a more formal structure and the other attributes described above, would be the most desirable option, and the option most likely to achieve the desired eradication goals.

However, as a result of our deliberations and based on our assessment of the current state of the global immunization landscape, including continuing challenges to achieving polio eradication, as well as discussions we have had with various key informants and decision-makers, the Review Team has concluded that it is premature for the MRI become a more formal organization similar to those spearheading efforts to control malaria and tuberculosis and to eradicate polio. Not only are a number of the prerequisites for a successful measles or rubella eradication effort not yet in place, but there are formidable obstacles to the MRI choosing Option 4 at this point in time. The global immunization community is focused on bringing the polio eradication effort to a successful conclusion before it commits to a similar effort targeting measles and rubella. In addition, many influential funders and other organizations view disease-specific, vaccination-based eradication efforts (i.e. vertical programs) as antithetical and damaging to efforts to strengthen routine immunization and other health services. As a result, any effort by the MRI to choose Option 4 would, at least at this juncture, face substantial opposition and fail to gain the support of critical partners. While this situation might change in the future, if the world moves closer to achieving elimination of measles and rubella in several other regions, the Review Team sees such a change as unlikely in the next several years. As a result, the Review Team recommends that the MRI choose Option 3 at this point in time.

Recommendation of the Review Team

The Review Team recommends that, for at least the next two to three years, the MRI retain its basic organizational structure as a loose confederation of partner organizations, relying on the collective efforts of staff designated to work on the MRI's behalf by the participating organizations. Stronger commitment and messaging by each of the core partner agencies on the role measles and rubella elimination can play in driving overall program performance and strengthening national immunization programs is urgently needed. Because WHO/EPI is the natural home for stronger coordination of Regional elimination efforts and ensuring integration of measles/rubella SIAs with routine immunization activities, WHO/EPI should be strengthened to take on these

functions. Because the current approach to internal communication within the MRI and coordination (e.g. regular telephone conference calls, periodic meetings, etc.) appears to be working well, we recommend that this aspect of the MRI's operational approach remain unchanged. At the same time, we believe the MRI must address the weaknesses we identified above. More specifically, we recommend that the MRI and the organizations supporting it make changes in the following areas:

1) Staffing

   Acknowledging that the current plan to hire three new individuals will address some of these needs, we recommend that the MRI increase the staff dedicated to communications and advocacy; financial planning and reporting; and technical support. Decisions concerning future augmentations in staffing should be made only after mapping out the human resources needed to staff the activities projected to be needed to meet 2020 elimination goals. To the maximum extent possible, additional staff providing technical support to countries and regions should be located in the countries and regions where the support is needed, rather than in Geneva, New York, Washington, or Atlanta. On the other hand, the additional staff working on communications and advocacy and on financial planning and reporting should be located at or in proximity to the UN Foundation, the American Red Cross, UNICEF headquarters, or WHO headquarters. In addition, the MRI should continue to strengthen links with GAVI, not only at the programmatic level, but also at management and leadership levels. At the same time, the organizations currently staffing the MRI (i.e. CDC, WHO, UNICEF, and the UNF) need to address the planned or likely departure of key individuals and have a clear succession plan in place that assures that key MRI functions and priorities are not interrupted or harmed by such departures.

2) Financial Planning and Reporting

   The Review Team strongly recommends that the MRI re-double its efforts to develop and update two year action plans and associated budgets, so as to facilitate planning and provide information that is critical to fundraising and advocacy activities. We also suggest that the MRI develop and disseminate a Five Year Financial Resources Requirements (FRR) document, based on a thorough and detailed assessment of the human resources and other needs to meet the 2020 elimination goals. The MRI partners should consider hiring a short term (e.g. six month) consultant to assist with or conduct this assessment. Acknowledging that the outbreaks will occur at unpredictable times in unpredictable locations and that the epidemiologic picture (e.g. age groups at highest risk of measles) in various countries may

change, such documents, plans, and budgets ideally should to take such uncertainty into account.

3) Interactions with Other Organizations

As referred to above, planning for the "polio legacy" and various aspects of the polio eradication effort (e.g. the switch from OPV to IPV in countries still using OPV), as well as possible changes in the direction and focus of GAVI (e.g. working to address the needs of poor children in non-GAVI-eligible countries) present both opportunities and threats to the MRI. The Review Team believes that it is vitally important that the MRI aggressively pursue collaborations and joint planning activities with GPEI, GAVI, the Bill and Melinda Gates Foundation and other powerful actors in the global immunizations community. By working side-by-side with these organizations, the MRI can increase the probability that these various changes turn out to be opportunities for it to expand and strengthen its efforts to eliminate measles and rubella in the context of strengthened routine immunization programmes. We suggest that the MRI consider holding quarterly meetings with relevant staff and leadership of these other organizations, to update them regarding MRI's activities, accomplishments, and plans and to conduct joint planning exercises, especially insofar as the polio "endgame" and the transition from OPV to IPV will both affect and create opportunities for the MRI.

4) Financial Resources and Fundraising

It goes without saying that the MRI would benefit from more robust fundraising that, if successful, would allow it to expand its reach and increase its impact. The addition of one or more staff members in this area, should help the MRI increase its advocacy and fundraising activities. Again, fundraising is one area in which the MRI might explore joint activities with GAVI.

5) Leadership and Visibility

As noted above in various sections of the report, there is compelling evidence that the MRI has not achieved the recognition for its accomplishments and the visibility that it deserves. Furthermore, because of its "distributed" structure and the corresponding lack of an identified leader (e.g. an Executive Director), it is often unclear who "speaks for" the MRI. The Review Team recommends that the MRI and it constituent partner organizations develop a "branding initiative" to increase its visibility and that it appoint or designate as Executive Director an individual with appropriate seniority, experience, and international recognition, who can represent the MRI in various meetings, negotiations, and deliberations.

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Appendix 1. Proposal for an External Review of the Measles and Rubella Initiative

Background

The Measles and Rubella Initiative (MRI) is a partnership initially founded in 2001 as the Measles Initiative (MI) by five partners: the World Health Organization (WHO), UNICEF, the UN Foundation (UNF), the American Red Cross (ARC) and the U.S. Centers for Disease Control and Prevention (CDC). At the time of its founding, the goal of this partnership was to reduce measles mortality globally. Since 2001, new partners have joined the partnership (although the founding partners continue to steer it) and the vision of the partnership has evolved from measles mortality reduction to a world without measles, rubella and congenital rubella syndrome (CRS).

The MRI has played a critical role in reducing measles deaths globally from an estimated 535,300 in 2000 to 139,300 in 2010. The partnership has raised just under USD one billion for activities, and has supported the delivery of over a billion doses of measles vaccine. Clear commitment to the introduction and delivery of rubella vaccine was made by the Initiative as of 2012 through a name change from the Measles Initiative to the Measles and Rubella Initiative.

From mid 2011 through 2012, a number of critical developments have altered the measles and rubella landscape. WHO published a position paper urging member states to take advantage of measles vaccination activities to introduce rubella vaccine; the MRI published a strategic plan for the period 2012 – 2020, envisioning reaching measles and rubella elimination in five of six WHO regions by 2020; and GAVI made available more than USD 750 million for the period 2013-2018 to support the introduction of rubella vaccine through combined measles/rubella wide age range immunization campaign activities; strengthen measles control in six countries considered at high risk for measles outbreaks; and provide funding (USD 55 million) for outbreak response. The majority of this funding will be administered either bilaterally by GAVI directly to countries or through WHO and UNICEF, while the outbreak response funding will be administered through the MRI.

In order to ensure that the MRI was adequately positioned to meet the challenges presented by these recent developments, the founding partners of the MRI recently met to review the partnership's operating procedures and revise these as deemed appropriate. This meeting led to six major recommendations for change: 1) development of standard operating procedures; 2)

establishment of a Management Team, including a representative from each founding partner organization; 3) commitment to establish three new posts to coordinate partner activities (Technical Officer, Communications Specialist, and Resource Mobilizer); 4) development of a communications strategy; 5) establishment of a Global Partners Group (including non-founding partners, national counterparts and other stakeholders) that would feed into the decision-making process of the Management Team; and 6) an external review of the partnership and these proposed changes.

The MRI strategic plan for 2012-20 recognizes the impressive achievements globally in recent years related to measles and rubella morbidity and mortality, including the elimination in the Americas of indigenous transmission of measles viruses in 2002 and of rubella viruses in 2009. As a result of the substantial progress made to date, five of the six WHO regions have now set target dates for measles elimination and three have set control or elimination targets for rubella. At the same time, however, the MRI strategic plan takes cognizance of the fact that, every day almost 400 children still die from measles and that ~300 children enter the world with often severe disabilities caused by congenital rubella syndrome. It also acknowledges that outbreaks of measles have been on the rise since 2009, especially in Africa, Southeast Asia, and Europe, but also in North America, and that, until recently, in response to supplemental immunization activities in some states, there continues to be a high measles disease burden in India. Underlying this problem is the failure to vaccinate children and thus achieve and sustain high levels of population immunity uniformly throughout countries and regions, either through routine immunization services, supplemental immunization activities (SIAs) or a combination of the two. In addition, the MRI strategic plan points to major funding shortfalls since 2008 that have contributed to delays and poor quality of some of the SIA's that have taken place. Thus, the risk of a resurgence of measles is real.

The strategy called for in the MRI strategic plan for 2012-20 is comprised of five 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 MRI strategic plan identifies four key factors that can promote success of the initiative: country ownership and sustainability; strengthening of routine immunization and health systems; equity; and linkages with other health interventions, including polio eradication efforts, new vaccine introduction, other proven child survival interventions, and surveillance. At the same time, the plan identifies five challenges that may impede successful implementation: lack of sustained financial commitment; high population density and highly mobile populations; weak immunization systems and inaccurate reporting of vaccination coverage; misperceptions about the risks and benefits of vaccination; and conflict and emergency settings created by natural disasters.

The MRI strategic plan also spells out the respective roles and responsibilities of national governments, global and regional partners, the MRI Initiative, and the GAVI Alliance. In addition, it lists eleven indicators that should be tracked in order to monitor progress:

1. Number and proportion of countries with measles incidence less than five cases permillion 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.

External Review of the Measles Rubella Initiative

As noted above, the MRI has developed a comprehensive strategic plan for the 2012-2020 time period. It is also taking steps to align its operating procedures, human resources, and partner relations to achieve the new goals established by the Global Vaccine Action Plan. For year 2020, the Strategic Action Plan's goal is to achieve measles and rubella elimination in at least five WHO regions. In order to inform these various processes and increase the probability that the MRI's worthy objectives are met, we propose to conduct an external review of the MRI partnership and the various steps it is taking to implement the strategic plan.

As part of the review process, the Review Team (see below) will collect and review all relevant documents; interview leadership and other key staff of the MRI core partner organizations, as well as GAVI and the Gates Foundation; interview the Chair of SAGE and members of the SAGE Working Group on Measles and Rubella, as well as staff in selected WHO and UNICEF regional offices and relevant government staff in selected high priority countries; and participate in key meetings and activities, including the Global Measles Management meeting in Geneva in February, 2013 and the annual meeting of the MRI partners in Washington in September, 2013. Among other issues to be addressed, the Review Team will examine and make recommendations concerning how the MRI can best support achievement of the 2015 and 2020 measles and rubella/CRS goals and milestones, as described in the 2012-2020 Strategic Plan; develop an efficient and effective global initiative to lead measles and rubella control and elimination efforts; maintain global leadership in activities related to measles and rubella; coordinate with other important partners in the global immunizations arena (e.g. GAVI Alliance, the Gates Foundation, etc.); sustain and increase financial resource mobilization; and coordinate its efforts with priority countries and regions, to ensure adequate country "ownership" and "drive from within." As a part of the review, the Review Team will assess and comment on various MRI strategies, including, but not limited to resource mobilization; coordination among partners; communications strategies; accounting and financial transparency; decision-making processes; positioning of the MRI in the global public health landscape; definitions of roles and responsibilities of various organizations; and relationships between founding and non-founding MRI partners, national governments, and other potential partners. In addition, the Review Team will provide advice and suggestions on the overall governance of the MRI, including the structure

and functions of existing and proposed governing bodies, committees, etc. At the conclusion of the review process, the Review Team will meet with the MRI's Management Team to review and discuss its findings and recommendations, after which it will prepare and submit a final report summarizing its findings and recommendations.

Review Team

The Review Team will be led by Professor Arthur Reingold, of the School of Public Health, University of California, Berkeley. Professor Reingold is an infectious disease epidemiologist who has devoted much of the past 30+ years to the study of vaccine preventable diseases, vaccine safety and effectiveness, and vaccination programs in the U.S. and in developing countries around the world. Between 2006 and 2012, Professor Reingold served as a member of WHO's Strategic Advisory Group of Experts (SAGE) on vaccines and immunizations, serving as the Vice-Chair for the last two years of his service on the Committee, as well as chairing or serving on numerous SAGE working groups. In addition to Professor Reingold, the Review Team will be comprised of three individuals with substantial experience and expertise related to childhood immunization programs and their implementation, management, and financing:

Palitha Abeykoon, MB BS, MS, MPH

Yemane Berhane, MD, MPH, PhD

Robert Hall, BSc (Med), MB BS, MPH, GCHE, DipRACOG, FRACMA, FAFPHM

These four individuals, whose resumes are attached, collectively have many decades of experience related to childhood immunizations in general and immunization against measles and rubella in particular, including extensive experience working in Sub-Saharan Africa and South Asia, two of the regions where the MRI will confront some of the greatest challenges to successful implementation of its strategy and its five components. Based on preliminary discussions, all of the proposed members of the Review Team have indicated that they are available and eager to undertake the work, travel, and participation in various activities and meetings required to complete the proposed review in the timeline outlined below.

Timeline

The review will be initiated in February, 2013 and be concluded by December, 2013, with a written report summarizing findings and recommendations to be completed and submitted by December 31, 2013. A few key milestones for the review include:

February, 2013: Convene the Review Team in Geneva the week of February 25,

	2013 to finalize a work plan. In addition, Dr. Reingold and the other available Review Team members meet with MRI's Executive Team (i.e. key leaders from the five partner organizations); identify important individuals in other organizations, WHO regions, etc. for possible interview; collect documents from MRI and other sources for review; and attend the Global Measles Management meeting in Geneva the week of February 25, 2013.
March-August, 2013:	Complete review of documents; develop, implement, and analyze the results of appropriate approaches (e.g. in person interviews, Skype/phone interviews, email surveys, etc.) to collecting data and other input from key informants and other sources; conduct visits to selected countries to meet with decision-makers and key informants.
September, 2013:	Review Group members meet to discuss and synthesize findings of the review; attend annual meeting of MRI partners in Washington, DC and meet with MRI's Management Team to review and discuss findings and recommendations
October-December, 2013:	Prepare and submit a report summarizing the Review Team's findings and recommendations.

Budget

1) The review will require that Dr. Reingold and other Review Team members travel to Geneva and other locations to participate in selected meetings and meet with key informants, including leadership of the five MRI partners, staff in selected high priority WHO regional offices and countries; and other key organizations.
2) One or more members of the Review Team may require compensation for their time, in the form of consulting fees or honoraria; it is assumed that Review Team members will each devote a total of 20 days of effort to the review process in 2013.

Appendix 2

January 31, 2001

MEETING OF PARTNERS FOR MEASLES ADVOCACY
AMERICAN RED CROSS, WASHINGTON, DC

JOINT DECLARATION

PREAMBLE:

Highly effective measles vaccines have been widely available for more than 30 years to prevent measles and its complications and deaths. Use of measles vaccine worldwide has resulted in an 85% reduction in measles mortality compared with pre-vaccine levels, and measles transmission has been interrupted in several countries. Despite this progress, 30 million measles cases and nearly 900,000 deaths due to measles still occur each year. African children account for half of these deaths. As we enter the 21st century, measles remains the leading vaccine-preventable cause of death among children. The primary reason for this ongoing disease burden is under-utilization of measles vaccine. The strategies for preventing measles have been well tested and proven effective. Now is the time for aggressive action to reduce the remaining disease burden.

The organizations present at the meeting of Partners for Measles Advocacy,

COGNIZANT of the burden of measles on the world's children,

AWARE that there is a safe and effective vaccine to prevent measles,

GRATEFUL to the American Red Cross for catalyzing the creation of a partnership,

PLEDGE TO:

Work together in partnership to further reduce measles mortality according to each partner organization's strengths;

Advocate for adequate human and financial resources to reduce measles mortality throughout the world;

Support the strategies outlined in the WHO/UNICEF Global Strategic Plan for Measles Mortality Reduction, 2001-*2005, including the recommendations on rubella vaccine use*;

Identify ways to support the goal of the Global Alliance for Vaccines and Immunizations of saving lives through the appropriate use of vaccines;

REQUEST:

The American Red Cross to chair and convene a U.S. based coalition of measles partners; and

The President of the American Red Cross to communicate the substance of this declaration widely.

American Academy of Pediatrics Centers for Disease Control and Prevention
Gates Children's Vaccine Program International Pediatric Association March of Dimes
Pan American Health Organization Task Force for Child Survival and Development UNICEF
United Nations' Foundation World Health Organization

Appendix 3

Persons Interviewed

Abeysinghe, Nihal
Abramson, Jon
Adams, Anthony
Andrus, Jon
Arora, N.K.
Aylward, Bruce
Berkley, Seth
Bhal, Sunil
Biellik, Robin
Bose, Anindya
Cairns, Lisa
Cochi, Stephen
Cooper, Louis
de Quadros, Ciro
Diorditsa, Sergey
Durrheim, David
Elias, Christopher
Endale, Aschalew
Espinal, Marcos
Figeroa, Peter
Foege, William
Freeman, Andrew
Gasasira, Alex
Gay, Andrea
Grant, Gavin
Grybowski, Mark
Gupta, Anuradha
Gupta, Satish
Hanson, Matthew
Hasan, Mainul
John, T. Jacob
Kapoor, Ambujam Nair
Kezaala, Robert
Khera, Ajay
Laforce, Mark
Levine, Orin
Malvoti, Stefano
Martin, Rebecca
Martinez, Susanna
Maresha, Balcha
McKinney, Susan
McNab, Christine
Meltzer, David
Mohamed, Ali Jaffer
Namgyal, Pem
Nshimirimana, Deo
O'Connor, Patrick
Okwo-Bele, Jean-Marie
O'Malley, Helena
Orenstein, Walter
Paul, Vinod
Petersen, Tim
Pfeifer, Dina
Rees, Helen
Routry, Satya
Sagar, Karan Singh
Schuchat, Anne
Shrestha, Murari Man
Strebel, Peter
Thapa, Arun
Vandelaer, Jos
Vandenent, Maya
Xiaojun, Wang
Zaffran, Michel

Appendix 4

Documents Reviewed

1. Global Vaccine Action Plan, 2011-2020
2. Global Measles and Rubella Strategic Plan, 2012-2020
3. Measles and Rubella Initiative Annual Report, 2012
4. United Nations Foundation Project Proposal Entitled “Strengthening Immunization Services through Measles Control, Phase XII, December, 2010
5. United Nations Foundation Project Proposal Entitled “Strengthening Immunization Services through Measles Control, Phase XIV,” December, 2012
6. The Measles and Rubella Initiative Operating Procedures, 03/27/12
7. The Measles Initiative; Cases in Global Health Delivery, Harvard Medical School, April, 2011