



World Health
Organization
REGIONAL OFFICE FOR South-East Asia

2014

2015

2016

2017

2018

2019

2020

**Midterm review of the
"Strategic plan for
measles elimination and
rubella and congenital rubella
syndrome control in the
South-East Asia Region: 2014–2020"**

2017

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2017



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South-East Asia

Midterm review of the “Strategic plan for measles elimination and rubella and congenital rubella syndrome control in the South-East Asia Region: 2014–2020”

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List of abbreviations

AEFI	adverse events following immunization
AFP	acute flaccid paralysis
AI	appreciative inquiry
CDC	United States Centres for Disease Control and Prevention
cMYP	comprehensive multi-year plan
CRS	congenital rubella syndrome
CTC	controlled temperature chain
EPI	Expanded Programme on Immunization
EPID Number	Epidemiological number (surveillance case identification number)
EQA	External Quality Assurance
EWARS	Early Warning, Alert and Response System
GAVI	Global Alliance for Vaccines and Immunization
GPEI	Global Polio Eradication Initiative
ICC	Inter-agency Coordinating Committee
IEC	Information, Education and Communication
IgM	Immunoglobulin M
ITAG	Immunization Technical Advisory Group
IVB	Immunization, Vaccines and Biologicals
JRF	Joint Reporting Form
MCV	measles-containing vaccine
MCV1	first dose of measles-containing vaccine
MCV2	second dose of measles-containing vaccine
MI	Mission Indradhanush
MMR	measles, mumps and rubella vaccine
MR	measles–rubella/measles and rubella
MRCV	measles–rubella-containing vaccine
MRI	Measles & Rubella Initiative
MSP	Measles Strategic Planning
MTR	midterm review

NITAG	National Immunization Technical Advisory Group
NML	national measles–rubella laboratory
NVC	National Verification Committee
NPSP	National Polio Surveillance Project
NRA	National Regulatory Authorities
NL	national laboratory
NM-NR	non-measles non-rubella
NTD	Neglected Tropical Diseases
ORI	outbreak response immunization
RC	Regional Committee
RCV	rubella-containing vaccine
REC	Reaching Every Community
RI	routine immunization
RRL	regional reference laboratory
RT-PCR	Reverse transcription polymerase chain reaction
RVC	Regional Verification Commission (for measles elimination)
SDG	sustainable development goal
SIA	supplementary immunization activity
SNL	subnational laboratories
TAG	Technical Advisory Group
UIP	Universal Immunization Programme
VDC	village development committee
VPD	vaccine-preventable diseases
UNICEF	United Nations Children Fund
WHA	World Health Assembly
WHO	World Health Organization

Executive summary

Key observations

Achievements: the basic strategies articulated in the strategic plan for measles elimination and rubella and congenital rubella syndrome control in the South-East Asia Region, 2014–2020 (henceforth Strategic Plan) are sound. Significant progress has been made towards measles elimination and rubella control since 2014, when the Regional Committee for South-East Asia adopted resolution SEA/RC66/R5 (Measles elimination and rubella/congenital rubella syndrome control). All Member States in the Region have introduced the second dose of measles-containing vaccine (MCV2) and ten countries have introduced the rubella-containing vaccine (RCV); the overall MCV2 coverage in the Region was 73% in 2016. There is a significant drop in the reported number of measles and rubella (MR) cases in the Region, with two countries – Bhutan and Maldives – being declared measles eliminated and two more countries – Sri Lanka and Timor-Leste – progressing well towards that goal.

Measles elimination and rubella/congenital rubella syndrome (CRS) control programme is off-track in the Region: robust and effective implementation of the specific strategies have been limited by country-level governance, national political will and global impetus, all of which are reflected in insufficient allocation of resources. The overall financial envelope for the MR elimination programme was much lower than proposed and is likely to be a major challenge in achieving the 2020 target. The programme has gathered momentum but the challenge is particularly substantial for two of the largest Member States – India and Indonesia. Measuring true disease incidence, in the presence of an effective surveillance system, is the most important indicator of progress (canary in the coal mine). The presence or absence of measles is also one of the best indicators of the overall performance of an immunization programme (accountability framework). In fact, the burden of MR in the largest countries is still not accurately known.

Other concerns: six countries for first dose of measles-containing vaccine (MCV1) and seven countries for MCV2 have national coverage levels <95% and RCV1 is around 14% for the whole Region. Supplementary immunization activities (SIAs) have regularly been conducted in the Region and some are under way. The transition from outbreak to case-based surveillance is not optimally implemented in all Member States. Several Member States programmatically have case-based measles surveillance, but due to expectation bias a syndromic approach is not often pursued truly in the field; hence, the clinical cases of measles are the ones captured most frequently. This appeared to be an important reason for the low non-measles non-rubella (NM-NR) discard rate (0.48/100,000 in 2016) in the Region. CRS surveillance required significant investment

to catch up with global standards. Genotype surveillance is also not uniform and limited information is available from some countries (the Democratic People's Republic of Korea, Maldives, Sri Lanka and Timor-Leste). Laboratory network performance is lower for some laboratories (in Sri Lanka) due to kit-related challenges. There is apprehension of overloading the laboratory system with reliable implementation of fever and rash syndromic approach for improvement in the sensitivity of the surveillance.

Communication: there is no structured communications strategy at regional and country levels and vaccine hesitancy observed recently in India and Indonesia during wide-age MR campaigns posed unique challenges.

Polio asset transition: MR surveillance has been built on the polio surveillance platform in almost all the Member States in the Region. Dwindling polio assets, therefore, pose a particularly serious threat in the Global Polio Eradication Initiative (GPEI)-supported five Member States, especially India and Indonesia, for losing the MR elimination momentum.

Opportunities: notwithstanding these observations, the Midterm Review (MTR) Team sensed **good political and administrative commitments** in most Member States, including India and Indonesia, and this in turn has laid a sound foundation on which elimination can be taken up in true earnest.

Immunization systems in Member States are reasonably robust with well-established supply and logistics systems and trained human resources and can incorporate systems strengthening processes to achieve elimination goals as well as to enable the introduction of new vaccines and other interventions through the newborn–children–adolescent and pregnancy life cycle approach. Surveillance systems have been strengthened over the years and have fairly good capacities that can be upgraded to eliminate standard surveillance over a short period.

Overarching recommendations

- (1) The foundation for achieving elimination/control goals is well-laid in the South-East Asia Region. The Region needs to build on the prevailing enthusiastic political and administrative commitments and adopt a different approach to achieving the measles elimination and rubella/CRS control goals of 2020. The Region should consider rubella elimination along with measles elimination concurrently.
- (2) The top priority in achieving the goals of the Strategic Plan is to enhance integrated case-based, laboratory-supported MR surveillance.
- (3) There is a need for multidimensional diagnostics of immunization systems within every Member State to assess the current state of health of the routine immunization services and undertake a tailored approach towards strengthening surveillance systems. This will accelerate MR-related work effectively and efficiently.

- (4) MCV2 should be adopted as a marker of mapping the progress of health-related sustainable development goals (SDGs), which in turn should also result in healthy competition that will be beneficial to achieving MR goals.
- (5) WHO continues to play an important role in monitoring the External Quality Assurance (EQA) of the regional reference laboratories (RRL) and national laboratories (NLs). The laboratory network needs support for uninterrupted supply of diagnostic kits. Any subnational laboratory network expansion needs a careful assessment of the impact of rash/fever only surveillance and cost-benefit analysis.
- (6) Advocacy and communication strategies remain serious concerns for the overall progress of measles elimination and rubella/CRS control activities, particularly in countries with significant disease burdens.
- (7) In view of its essential contribution, polio transition plans, particularly in the five GPEI-supported Member States, need to be put on hold and polio surveillance assets also need efficient re-engineering to optimize benefits for both the MR campaign and other vaccine-preventable diseases.
- (8) Consider putting forward a World Health Assembly resolution to activate the International Health Regulations, 2005 mechanism to escalate measles elimination and rubella control efforts with a recommendation to include vaccination to reduce their international spread.
- (9) Financing inadequacies need serious and urgent attention. Sustained budgetary support for regional activities as well as at the level of national governments is critical.

Specific recommendations

The current political and administrative environment in the South-East Asia Region is supportive of MR elimination. The Regional Office for South-East Asia should consider working with Member States to capitalize on this political keenness to enhance country ownership and shift the trajectory of progress to the next level of functioning. This will also translate into an annual review of the Measles & Rubella Initiative (MRI) during the meeting of the WHO Regional Committee for South-East Asia and create accountability.

The momentum gained for measles elimination and for introducing RCV in all Member States should be leveraged to integrate rubella elimination with measles elimination goals to optimize investments. Hence, Member States in the Region should consider declaring rubella elimination as a goal along with that of measles elimination.

The strategic area-specific recommendations

1. Ensuring optimal case-based surveillance

A top priority in achieving the goals of the Strategic Plan is to enhance integrated case-based, laboratory-supported MR surveillance.

- Member States in the Region should shift to broad fever and rash surveillance to increase the sensitivity of the surveillance system.
- Member States should continue monitoring the immunity gaps for both measles and rubella at national and subnational levels, including among the adult population.
- The Regional Office for South-East Asia should establish fortnightly or monthly country support meetings at the Regional Office to review surveillance data to identify weaknesses, silent areas and interventions. Also, there should be an in-depth analysis of surveillance data of three or four countries at every meeting.
- There should be a surveillance guide for vaccine-preventable diseases on integrated MR case-based surveillance, serum sample collection strategies to avoid overwhelming laboratories and prioritizing samples for genotypes.
- Coordination between field and laboratory, with assignment of an EPID number to each suspected case for tracking and final classification should be ensured.
- Case classification to determine cases attributable to programme failure versus vaccine failure should be improved.
- Weekly review meetings within the Ministry of Health along with implementing partners using surveillance data for action at national/subnational levels should be initiated.

2. Improving immunization coverage and reducing the immunity gap

Augmented efforts are needed in the Region and in individual Member States to improve and maintain population immunity against measles and rubella.

- There is a need to undertake multidimensional diagnostics of immunization systems within each Member State to assess the current state of health of the routine immunization (RI) services and implement a tailored approach towards strengthening immunization coverage and reducing the immunity gap. To assess the current state of health of the RI services:
 - the Regional Office works with Member States to develop a tailored approach towards systems strengthening;
 - high quality SIAs ensure readiness during planning, high-risk mapping, rapid coverage monitoring with special attention to high-risk regions, districts with poor coverage, and the urban poor.
- All Member States should be encouraged to introduce legislation with regard to school entry/school-level checks for immunization.

- The 2nd year of life platform for catch up immunization, including for those who have missed MCV, should be used. However, children who miss MCV2 must be immunized even beyond the expected time and age schedules.
- MCV2 should be adopted as a marker of progress in achieving SDG goals.
- Immunization status checks should be adopted for at-risk populations, health-care workers, and teachers.

3. Ensuring a strong laboratory network to support case-based surveillance and genotyping

Laboratory network activities need to be optimized to support MR surveillance and to monitor the eradication process.

- WHO continues to have an important role in monitoring the External Quality Assurance (EQA) of RRLs and NLS.
- The responsibility for coordination and maintenance of the quality of Subnational laboratories (SNLS) should be with the national (reference) laboratory in that particular country, with support and guidance from the WHO Regional Office.
- WHO headquarters should conduct an updated IgM assay assessment to provide evidence for countries to make decisions on procurement of appropriate kits.
- WHO should continue to provide kits for low-income countries.
- The capacity of the South-East Asia Region Laboratory Network (LabNet) is appropriate for the current/expected workload; however, the full impact of rash and fever only surveillance is still unknown. Any subnational LabNet expansion needs to be balanced with a careful analysis of all the factors and a cost-benefit analysis exercise.
- Member States should ensure data harmonization between laboratory and surveillance and WHO should supervise and support these efforts.
- Regular MR genetic sequence information from the Region should be analysed and reported in the vaccine-preventable disease (VPD) surveillance bulletin, along with evidence of transmission patterns, both within the Region and globally.

4. Strengthening advocacy and communication strategies

Appropriate advocacy and programme communication strategies and tools are critical to furthering MR efforts and prevent vaccine resistance and vaccine hesitancy issues.

- WHO should include a review of the measles eradication and rubella control programme in the annual agenda of the meetings of the Regional Committee for South-East Asia to bring about focus and accountability.
- WHO must advocate with Member States for greater ownership and investment in the MR immunization programme.
- WHO should incorporate rubella elimination into the regional measles elimination goals.
- The national verification committees (NVC) should continue to play advocacy roles with their respective governments to achieve the MR elimination goal.
- WHO and Member States should urgently develop a well-thought-out media strategy to achieve a quantum impact on ongoing elimination efforts.
- WHO and Member States should develop a country-specific (tailored to subnational needs) budgeted social mobilization and communications plan for both MR activities under RI and supplementary immunization activity (SIA) campaigns.
- WHO should support and facilitate the systematic mapping of vaccine hesitancy and vaccine resistance and Member States are encouraged to develop context-specific debunking strategies.

5. Polio transition and the potential impact on MR goal

Polio transition plans need to be put on hold in GPEI-supported countries and polio surveillance assets need re-engineering to sustain the progress made and achieve the 2020 goal.

- In view of the essential contribution of GPEI, polio transition plans (in the concerned Member States) need to be put on hold. The gains and assets accrued through the polio eradication programme are essential to sustain the progress made till global polio eradication takes place along with the critical contribution it is making to MR elimination/control targets.
- Polio surveillance assets also need efficient re-engineering to optimize benefits for both the MR campaign and other vaccine-preventable diseases.
- Till decisions to this effect are made, WHO should continue to support the development and implementation of the polio transition plans for GPEI-supported Member States while keeping in mind the imperatives of MRI.
- National governments must commit to ownership and greater investment in the translation of the polio transition plans on the ground.
- Development partners and multilateral agencies should continue to provide technical support to The Global Alliance for Vaccines and Immunization (GAVI)-eligible, GAVI-graduating and other countries.

6. Addressing emergency and conflict settings

Appropriate strategy and activities are needed to address MR efforts in emergency and conflict settings in the Region.

- WHO should consider putting forward a World Health Assembly resolution to activate the International Health Regulations (2005) mechanism to escalate measles elimination and rubella control efforts with the recommendation to include vaccination to reduce their international spread.
- WHO should develop MR-specific plans for emergency and conflict settings in the Region and also facilitate the development of country-specific plans, as applicable.
- WHO should develop a plan for the possible need for synchronized cross-border immunization activities in response to outbreaks.

7. Call for increasing investments in the Regional MR Strategic Plan

Financing inadequacies in the MR programme need serious and urgent attention. Sustained budgetary support for regional activities as well as at the level of national governments is critical.

- WHO should facilitate economic analyses at country and regional levels to document the actual cost analysis of programme implementation, cost-effectiveness analysis, and cost-benefit analysis/return on investment.
- WHO and Member States should allocate adequate resources and/or facilitate resource generation to meet the requirements of the Strategic Plan.
- WHO should establish institutions similar to an Inter-agency Coordinating Committee (ICC) in non-GAVI countries for better coordination between national governments and donors/partners.

8. Conducting operations and implementation research

WHO should help Member States formulate plans with regard to operations and implementation research to provide evidence of effective implementation of elimination strategies and address emerging programmatic challenges including but not limited to:

- Measles epidemiology: duration of protection after immunization, age when infants lose protection from maternal measles-specific antibodies in different epidemiological settings, susceptible population threshold to cause outbreak.
- Vaccine development, effectiveness and alternate better vaccine delivery methods: advantages of thermo-stable/controlled temperature chain (CTC) vaccines for delivery and coverage, advanced vaccine vial temperature monitors, self-reconstituting vials, alternative delivery methods (e.g. micro-needle patches, needle-free injection devices, aerosol, dry powder inhalation).

- Surveillance and laboratory methods: incidence of fever and maculopapular rashes in various epidemiological settings, impact of fever–rash surveillance on the national laboratory network, point-of-care testing devices to rapidly and accurately detect MR cases, molecular sequencing methods to distinguish between closely related genotypes to determine source of infection, more effective serology techniques with better specificity at and near elimination stage.
- Immunization strategies: effective strategies to maximize RI and SIA coverage in different epidemiological settings, improving data quality and use for action, efficient methods for monitoring routine first- and second-dose measles vaccination and SIA coverage, strategies to deal with vaccine hesitancy, effective and efficient strategy for outbreak immunization activities in near elimination settings.
- Mathematical modelling and economic analysis: most useful modelling approaches to estimate the threshold population size and susceptible density required to sustain MR virus transmission in various settings; cost–benefit analysis of measles elimination in countries. Adoption of novel methods to determine population immunity and level of herd immunity required in children and adults.

Conclusions

- The basic strategies articulated in the Strategic Plan are sound. The programme has gathered momentum in the South-East Asia Region with two countries verified as measles eliminated and two rapidly progressing towards elimination.
- However, the measles elimination and rubella/CRS control programme is NOT on track to achieve the ambitious goals by 2020.
- WHO and Member States will have to adopt an alternative strategy (across specific domains and activities) to achieve regional goals in time. This will require capitalizing on existing high degree of in-country political willingness and the enthusiasm of the programme managers.
- Major investments are necessary and much has to be done in a relatively short time, if regional goals are to be met according to the set timeline.
- The Regional Office for South-East Asia may consider convening a consultation of Member States, donors, partners and implementation agencies to develop a timeline for operationalizing MTR recommendations.

Section 1

Background and context for the midterm review

The 66th session of the WHO Regional Committee for South-East Asia met in September 2013 and recommended the adoption of the goal of measles elimination and rubella/congenital rubella syndrome (CRS) control by 2020. It took into account the regional consultation of technical and policy officials in Kathmandu (February 2013) on the feasibility of measles elimination and rubella/CRS control in the Region as well as the recommendations made by the South-East Asia Region Immunization Technical Advisory Group (ITAG). The Regional Committee noted with concern the inadequately addressed burden of rubella and CRS in the Region.¹ It recognized that measles elimination is also an opportunity for rubella/CRS elimination and recommended replacement of measles-containing vaccine (MCV) with combined measles–rubella (MR) vaccine.

The Regional Committee urged the Member States to:

- strengthen immunization and surveillance systems in the context of health systems, including laboratory capacity, to increase and sustain high levels of immunization coverage, high-quality case-based surveillance and well-functioning monitoring systems or adverse events following immunization (AEFI);

1 Resolution SEA/RC66/R5.

- conduct epidemiological assessments of population susceptibility to measles and rubella/CRS as a way of informing policy and planning preventive strategies to increase immunity levels uniformly;
- develop measles elimination and rubella/CRS control policy strategies using evidence-based data; and
- mobilize political, societal and financial support.

It also requested the Regional Director to:

- provide technical support to Member States in their efforts to develop an elimination policy and strategies, while strengthening their immunization and surveillance systems and improving programme performance;
- mobilize the required resources, build on existing partnerships and foster the development of new ones in support of measles elimination and rubella/CRS control efforts; and,
- report to the Regional Committee every two years on the status of global measles elimination and rubella/CRS control targets, milestones and progress of ongoing activities in Member States towards achieving the goal by 2020 in the Region.

The strategic plan for measles elimination and rubella and congenital rubella syndrome (CRS) control in the South-East Asia Region, 2014–2020 (henceforth Strategic Plan) identified four strategic objectives to enable the Region to achieve the measles elimination and rubella/CRS control goal:

- achieve and maintain at least 95% population immunity with two doses against MR within each district of every country in the Region through routine and/or supplementary immunization;
- develop and sustain a sensitive and timely integrated MR case-based surveillance system and CRS surveillance in each country in the Region that fulfil globally recommended surveillance performance indicators;
- develop and maintain an accredited MR laboratory network that supports every country or area in the Region; and
- strengthen support and linkages to achieve the above three strategic objectives.

The Regional Committee suggested the adoption of complementary strategies in line with existing global guidelines to achieve these strategic objectives. These included country ownership; strengthening routine immunization and health systems; and, equity and critical linkages with other health sectors. It was estimated that approximately US\$ 803.1 million will be needed to achieve regional measles elimination and rubella/

CRS control, of which US\$ 572.8 million (71%) would be required for supplementary immunization activities (SIAs), US\$ 199.5 million (25%) for MR surveillance, including laboratory support, and US\$ 26.0 million (3%) for outbreak response immunization. Costs for the other budget components were estimated to be US\$ 4.8 million (1%). These estimates excluded direct support to strengthen routine immunization (RI) services.

Recognizing that strategies to achieve rubella and CRS control may differ by country, depending on the history of use of the rubella-containing vaccine (RCV) in the national immunization programmes, the private sector and the age groups currently protected, additional elements that would be crucial for achieving rubella-related goals include:

- maintaining high vaccination coverage, particularly MCV, through the routine childhood immunization programme;
- assessing the susceptibility in women of childbearing age;
- monitoring outbreaks among adult males;
- considering SIAs to target appropriate age groups of both male and female birth cohorts to achieve rubella and CRS control;
- introducing RCV into the routine childhood immunization programme with first dose of measles-containing vaccine (MCV1);
- vaccinating women of childbearing age with RCV at convenient times (e.g. premarital vaccination, postpartum or when bringing newborn children for vaccination).

Certain cross-cutting strategies that were advised independent of the MR epidemiologic situation included:

- ensuring immunity in health workers and teachers to prevent nosocomial transmission;
- introducing school-entry checks for a completed immunization series, especially for measles and rubella;
- optimizing two-dose schedules of MCV and RCV;
- strengthening vaccine management systems including demand forecasting, injection equipment and supplies and cold chain at district, provincial and national levels, and avoiding preventable spoilage and wastage;
- increasing community demand through advocacy with decision-makers, social mobilization of relevant sectors and interest groups, and culturally appropriate communication strategies and activities;

- improving systems for vaccine procurement, promoting injection safety, ensuring safe disposal of injection wastes and institutionalizing systems to address adverse events following immunization (AEFI);
- implementing programme monitoring and evaluation at each level to identify problems in a timely manner and share feedback with staff and local partners to enable necessary adjustments;
- developing and sustaining a sensitive and timely case-based MR surveillance system;
- providing training in case identification and investigation, and data management and analysis;
- ensuring adequate operational resources for case investigation as well as collection and transport of specimens for case confirmation and virus detection;
- developing and maintaining an accredited MR laboratory network;
- envisaging a critical enabling role for WHO in supporting national authorities;
- maintaining adequate outbreak preparedness;
- promoting research and development.

The Strategic Plan was drawn up to address the goal set by the Regional Committee in a systematic and timely manner. It took into account significant improvements in immunization coverage, case-based MR surveillance, and establishment of a regional MR laboratory network over the past decade. It was of the understanding that the Region was adequately poised to move forward towards the declared goal of measles elimination and rubella/CRS control by 2020. Indeed, most countries in the Region had initiated programmatic intervention necessary for measles elimination and many were also addressing CRS control issues.

Considering that the Region arrived midway of the Strategic Plan and Bhutan and Maldives had achieved measles elimination status, there was a need to review the progress made till date and focus on the remaining period to accelerate progress towards achieving the goal of measles elimination and rubella/CRS control by 2020. Thus the IVD unit of the WHO Regional Office for South-East Asia took a decision to conduct a midterm review (hereinafter referred to as MTR) of the progress with the following objectives:

- To provide a candid **review of progress** towards achieving the regional goal by 2020.

- To assess the **quality of implementation of the strategies** laid out in the Strategic Plan and **provide recommendations** on how the strategies and principles should be refined **to accelerate progress** towards the regional goal.
- To assess the **current situation of the MR laboratory network** and to provide recommendations on additional laboratory needs, a laboratory structure and roles of laboratories at various levels in the structure in countries and the quality assurance mechanism for laboratories in each of these levels.
- To conduct an assessment of existing **resource availability and project resource requirements** till 2020, keeping in mind the polio assets transition plan in the Region, including cost analysis.
- To formulate a set of **lessons learned, risks, and financial, political and programmatic priorities** over the next three years (2018–2020) for implementers, measles endemic countries and donors in order to accelerate progress towards achieving the regional goal.

In operational terms, the team was tasked with:

- identifying programme activities and components that have worked well, in addition to barriers and bottlenecks that have adversely affected the elimination/control goals;
- taking stock of programming contexts that may have either impacted progress or are likely to impact progress;
- assessing gaps in quality or content that make it difficult to assess progress;
- identifying key decision points by reviewing the progress of the past three years (including actions taken and lessons learnt) and an overall assessment of the manner in which priorities and strategies have evolved;
- identifying the drivers of progress and assessing the availability of future funding from partners for the next five years.

Section 2

Methodology

A seven-member multidisciplinary team was constituted to undertake this review, representing a diverse range of specialties including communicable diseases epidemiology, health systems, vaccinology, paediatrics, laboratory sciences and health economics. All team members had prior experience in programme evaluation at regional and international levels. Secretariat support was provided by the Immunization and Vaccine Division, WHO Regional Office for South-East Asia and the respective country offices that were visited.

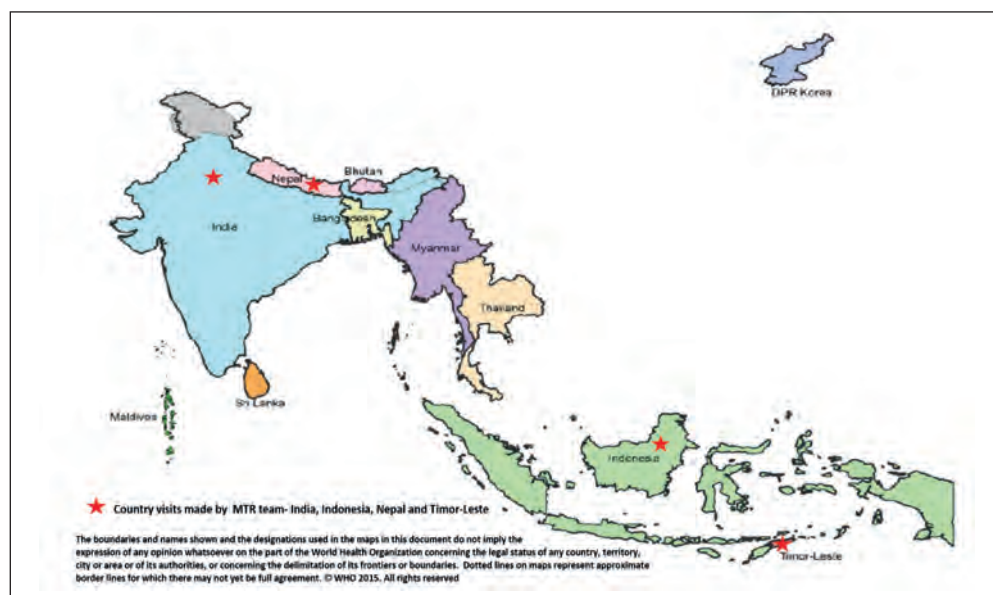
Activities time frame

4–8 July 2017	Orientation Desk review and discussions with the Regional Office staff
9–16 July 2017	Country visits (India, Nepal, and Timor-Leste) Teleconferences with country teams Continued review and discussions
17 July 2017	Preliminary debriefing with WHO SEAR Team
20–24 August 2017	Country visit (Indonesia)
25 August–30 September 2017	Report preparation
30 November 2017	Submission of report

2.1 Process of review

- (1) Desk review of the progress of all 11 Member States by reviewing documents such as the National Verification Committee (NVC) reports submitted to the Regional Verification Commission (RVC), reviews of NVC reports by the RVC, RVC reports, reports of Technical Advisory Groups (TAG), Expanded Programme on Immunization (EPI) fact sheets, comprehensive multi-year plans (cMYP) and GAVI documents.
- (2) Country visits were organized to four countries – India, Indonesia, Nepal and Timor-Leste – to gain an in-depth understanding of the progress made in the selected countries. Interactions were held with key programme officers at national, state and district levels as well as with other international agencies and non-governmental organizations (NGOs), and primary health-care institutions were also visited.
- (3) Additional teleconferences were organized through WHO country offices with programme officers and WHO country offices of all Member States.

Figure 1: Countries visited during the MTR process in the Region



2.2 Analytical framework

2.2.1a Desk review

The desk review included scrutinizing the available data sets at the Regional Office and interaction with Member States and members of the Immunization, Vaccines and Biologicals (IVB) secretariat at the Regional Office to assess country situations with regard to the following domains and sub-domains:

(1) **Epidemiology and disease burden**

- ◉ **Status of measles, rubella and CRS:** reported cases, outbreaks, incidence, endemic areas, age distribution and vaccination status of cases, case classification, reduction in estimated measles deaths, etc.

(2) **Immunization and population immunity**

- ◉ vaccination schedules, coverage, SIA activities, sero-epidemiological survey, immunity profile; and
- ◉ strategies for conflict and emergency settings.

(3) **Surveillance**

- ◉ **Surveillance system:** transition from outbreak surveillance, timeliness of reporting, non-measles non-rubella (NM-NR) discard rates, case investigations, timeliness of specimen transport, timeliness of laboratory reporting.
- ◉ **CRS surveillance:** suspected CRS cases investigation, timeliness of specimen transport, timeliness of laboratory reporting, viral detection.
- ◉ **Genotyping:** endemic, non-endemic, importations.

(4) **Laboratory network**

- ◉ accreditation of national MR laboratories (NML)/RRLs, operational support and technical support
- ◉ current load, and capacity to handle additional samples as the quality of surveillance improves.

(5) **Health systems**

- ◉ **Linkages with other child health interventions:** polio transition plans, introduction of other vaccines, promoting synergies with other child health programmes.
- ◉ data quality, human resources, high risk population groups.

- (6) **Advocacy, social mobilization, communication**
 - current media strategies, engagement with leaderships/opinion makers
 - communication for AEFI and vaccine hesitancy
 - budgetary support
- (7) **Sustainability**
 - political and administrative commitment to achieve 2020 goals
 - budgetary support, resource demands and financing strategies
 - inter-agency coordination and collaboration
 - monitoring and reviewing, vaccine management system
 - risk assessment, outbreak preparedness and response, AEFI surveillance and mitigation
 - support from WHO Country Office.
- (8) **Research and development to support programme activities**

2.2.1b Country visits

The *key questions* that country visits sought to address included the following:

Immunization

The immunization efforts included:

- efforts made by the programme to reach geographically challenging areas, inaccessible populations and minorities, and also address gender issues;
- catch up vaccination including missed opportunities, MCV2 and 2nd year of life platform, and gaps between policy and implementation;
- engagement with the private sector;
- issues relating to school entry checks for immunization;
- potential impact of measles elimination on RI and health systems; and
- the basis for the decision to conduct SIAs.

Surveillance

Surveillance efforts included:

- data use for action including an example of the last outbreak, silent districts, feedback mechanisms and sources from higher level to frontline staff;

- handling of confirmed cases of dengue and chikungunya in the surveillance;
- outbreak responses and strategies including the ability of the health system to handle augmented case load, preparation of the system and laboratories to handle extra case load as countries move towards the elimination stage;
- participation of the private sector;
- mechanisms for data harmonization between surveillance and laboratory teams;
- challenges of the urban and peri-urban areas.

Social mobilization and communication

- demand creation, social mobilization
- strategies to handle vaccine hesitancy particularly during MR campaigns and SIAs.

Linkages and partnerships

- linkages and political appetite
- inter-agency coordination and collaboration, and partnerships
- commitment of other stakeholders such as USAID, DFID, Lions Clubs/Rotary Clubs and professional associations
- resource gaps for achieving 2020 goals
- involvement of polio assets for the measles elimination programme
- transition plans for GAVI graduating countries
- possibility of a country committing to rubella elimination.

2.2.1c Teleconferences

During the teleconferences with country teams, the following issues were discussed further and clarified beyond what was available in the documents for better insight into the situation on the ground:

- measles elimination in conflict and emergency settings, which included plans, identification of areas. and operational strategies;
- impact of MR elimination on immunization programmes and primary health care; systems strengthening;
- injection safety measures and response mechanisms for AEFI;

- advocacy, social mobilization and communication strategies which included demand creation, media strategies, vaccine hesitancy, and engagement with political, administrative and professional leaderships;
- polio transition plan and relevance for measles elimination and rubella/CRS control;
- sustainability of the programme through political and administrative commitment;
- inter-agency coordination and collaboration;
- financing including a transition plan for GAVI graduating countries; and
- national appetite with regard to achieving the 2020 goal (political environment and response to recommendations made by ITAG /NVC/RVC).

Section 3

Observations

3.1 Data compilation and synthesis

All team members participated in data collection and analysis. Inputs and clarifications from WHO officials in the South-East Asia Region were sought through interactions during debriefing sessions. The observations are arranged into the following thematic sections.

- Immunization
- Surveillance and outbreak response
- Laboratory network
- Linkages
- Financing

3.2 Key progress made towards achieving 2020 goals

The WHO South-East Asia Region has made significant progress towards measles elimination and rubella/CRS control since 2014. The second dose of measles-containing vaccine (MCV2) has been introduced by all the 11 Member States and rubella-containing vaccine (RCV) has been introduced by 10 Member States till date. To close the population immunity gaps, several supplementary immunization activities (SIAs) have been conducted or are under way in several Member States. The Regional Verification Commission (RVC) and National Verification Committees (NVC) for measles elimination and rubella control are functional in all the Member States of the Region.

Two countries (Bhutan and Maldives) were declared measles eliminated states by the RVC in 2017; two more countries in the Region (Sri Lanka and Timor-Leste) are also progressing well towards the same goal. The high level of political and administrative commitment to achieve 2020 goals is evident across all Member States in the Region.

Strategic objective 1. Achieve and maintain 95% population immunity with first and second doses against measles and rubella within each district of each country in the Region through routine and/or supplementary immunization.

3.3 Thematic observations

3.3.1 Immunization

3.3.1a Population immunity against MR

As of 2016, the reported MCV1 coverage status in the Region reached 87%, a rise of only 2% since 2014. The MCV2 coverage in 2016 was 73%, an increase of 8% over 2014 coverage. However, there is wide disparity in the coverage status across and within the Member States in the Region. Five countries have MCV1 coverage >95% and two additional countries have >90% coverage. MCV2 coverage is >95% in four countries and one additional country has coverage of 90%. Only three countries (Bangladesh, the Democratic People's Republic of Korea and Maldives) have subnational MCV1 coverage >95%. In 2016, three countries (Indonesia, Nepal, Sri Lanka) had a drop in the subnational MCV1 coverage. In four countries (India, Indonesia, Nepal and Timor-Leste) more than 25% of districts had MCV1 coverage <80%.

Indonesian national MCV2 coverage declined in 2014 to approximately 30% due to a shift in the policy of immunizing at school entry to second year of life; this, however, later picked up to about 60% in 2016. There is, however, a policy disconnect between national (70%) and regional (>95%) MCV2 targets in Indonesia to achieve measles elimination.

In 2016, in 15 out of 36 Indian states/union territories, MCV1 coverage was <80% (subnational MCV2 data was not available). About one third of districts have MCV1 coverage <80% with wide variation in the levels. An immunity gap was present across all age groups including those >15 years. Half of the measles cases in India had received any MCV dose and in one fourth the vaccination status was unknown.

In Thailand, while the MCV1 coverage was >80% in almost all the provinces, only half of the provinces had MCV2 coverage >80%. In Myanmar, while the MCV1 coverage was >95% in half of the townships, only one fourth of townships had MCV2 coverage of 95% or more. All countries in the Region have already introduced MCV2,

with the first dose scheduled between 9 and 12 months and the second dose between 15 and 24 months in nine countries. In Thailand and Sri Lanka, MCV2 was scheduled at 30 months and 3 years of age, respectively. Maldives is introducing measles–rubella containing vaccine (MRCV1) in place of MCV in 2017. In 2014, Thailand changed the MRCV2 schedule to 30 months coupled with an MR campaign to close the immunity gap. The status of inclusion of MCV and RCV in the immunization schedule by Member States is summarized in Table 1.

RCV had been introduced in eight countries up to 2016. During 2017–2018, Indonesia and India are introducing RCV in a phased manner and are expected to cover the whole country by 2018. DPR Korea has not introduced RCV. Even though eight countries introduced RCV before 2017, less than 20% of infants in the Region currently have access to RCV in the routine immunization (RI) programme. Six countries introduced MR as MRCV for both doses, two countries have MMR for both doses and two countries have a mix of MR and MMR vaccines in the RI schedule. As many of the countries have introduced RCV recently, the coverage is expected to match MCV status in the near future. Based on inclusion of RCV in the immunization programme in the Member States, the expected pattern of protection against rubella is summarized in Table 2.

Table 1: Schedule of MR vaccination in the national immunization programmes of Member States in the Region

Countries	MRCV1	MRCV2
Bangladesh	MR: 9 months	MR: 15 months
Bhutan	MMR: 9 months	MMR: 24 months
DPR Korea	M: 9 months	M: 15 months
India	M: 9–12months (MR in 2017)	M: 16–24 months (MR in 2017)
Indonesia	M: 9 months (MR in 2017)	M: 24 months (MR in 2017)
Maldives	M: 9 months (MR in 2017)	MMR: 18 months
Myanmar	MR: 9 months	M: 18 months (MR in 2017)
Nepal	MR: 9 months	MR: 15 months
Sri Lanka	MMR: 9 months	MMR: 36 months
Thailand	MMR: 9 months	MMR: 30 months
Timor-Leste	MR: 9 months	MR: 18 months

Source: WHO/UNICEF Joint Reporting Form (JRF), 2017.

Table 2: Status of introduction of rubella vaccine as part of the national immunization programmes of Member States in the Region

Country	Year RCV introduced
Bangladesh	(2014) F+M: 9 months to 14 years
Bhutan	(2006) F: 9 months to 44 years; M: 9 months to 15 years
DPR Korea	NA
India	(2017–2018) F+M: 9 months to 15 years
Indonesia	(2017–2018) F+M: 9 months to 15 years
Maldives	(2005) F: 6–34 years; M: 6–25 years
Myanmar	(2015) F+M: 9 months to 15 years
Nepal	(2012) F+M: 9 months to 15 years
Sri Lanka	(1996) F: 11–44 years (2001) F+M ≥8 years
Thailand	(1986) F ≈12yr (grade 6) (1997) F+M: 9 months to 12 months + 6 years
Timor-Leste	(2015) F+M: 6 months to 14 years

Note: F = female, M = male, RCV = rubella-containing vaccine

Source: Country EPI Fact Sheet, WHO Regional Office for South-East Asia; 2016 (<http://www.searo.who.int/immunization/data/en/>)

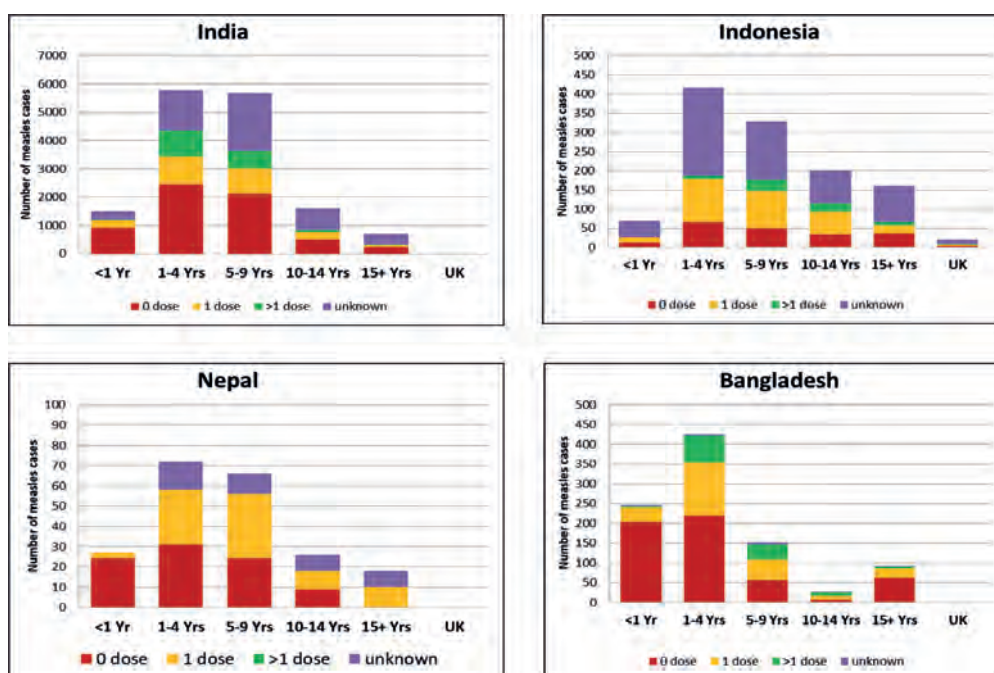
Serosurveys for measles were not available for most countries in the Region. However, for some countries (e.g. Nepal, Sri Lanka), rubella serosurveys have been conducted prior to the introduction of the rubella vaccine into the national programme. Some other countries have planned for serosurvey studies in the coming years. A serosurvey undertaken in Sri Lanka (2015) indicated that infants and those >15 years were susceptible to measles infection; this informed the reposition of MCV1 to 9 months. There are increasing reports of measles cases among older populations in several countries.

Patterns of immunity profiles of measles cases

Based on the available information on measles cases and their immunization status from Member States in the Region, the profile of immunity can be categorized into four broad patterns.

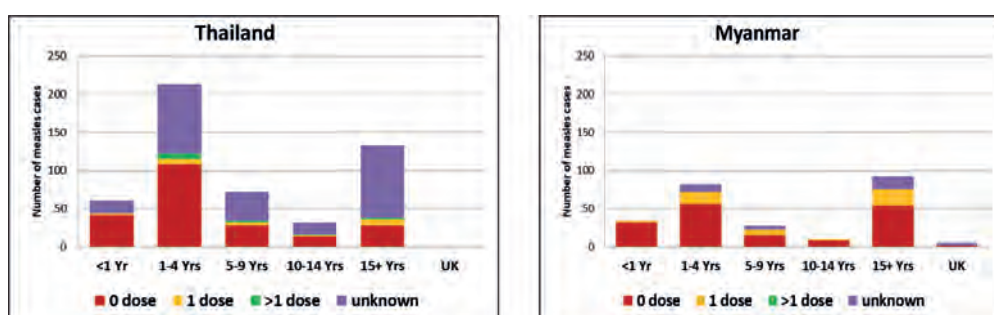
Pattern 1: High risk in younger age groups (under 10 years). This pattern was visible in four countries – Bangladesh, India, Indonesia and Nepal – where most of the measles cases included high proportions of unimmunized and partially immunized populations in the age group of 1–10 years (Fig. 2).

Figure 2: Pattern 1 of the immunity profile of measles cases



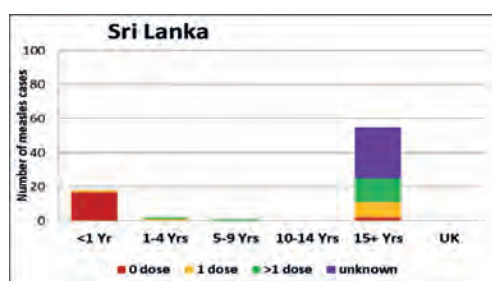
Pattern 2: Combined younger (under-5) and older (over 15 years) at-risk populations. The pattern in Thailand and Myanmar indicated at-risk population of both younger and older age groups, who were either partially immunized or unimmunized (Fig. 3).

Figure 3: Pattern 2 of the immunity profile of measles cases



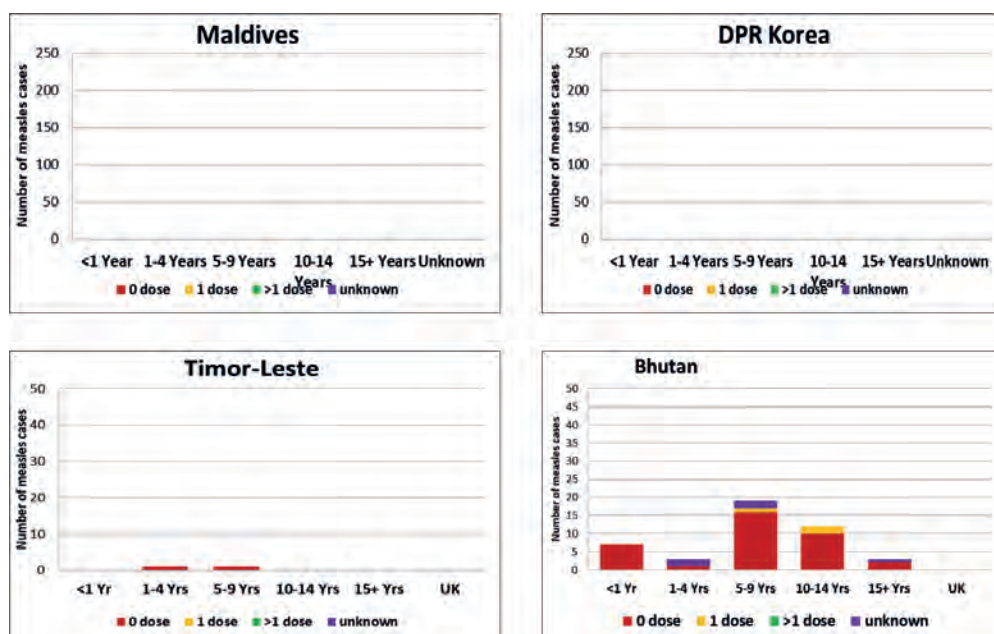
Pattern 3: bimodal at-risk populations. In Sri Lanka, a bimodal presentation of measles cases was observed in infants and those above 15 years of age (Fig. 4).

Figure 4: Pattern 3 of the immunity profile of measles cases



Pattern 4: Eliminated/near elimination. Four countries – Bhutan, the Democratic People’s Republic of Korea, Maldives and Timor-Leste – have near zero measles cases. Bhutan had all its cases imported from neighbouring India (Fig. 5).

Figure 5: Pattern 4 of the immunity profile of measles cases



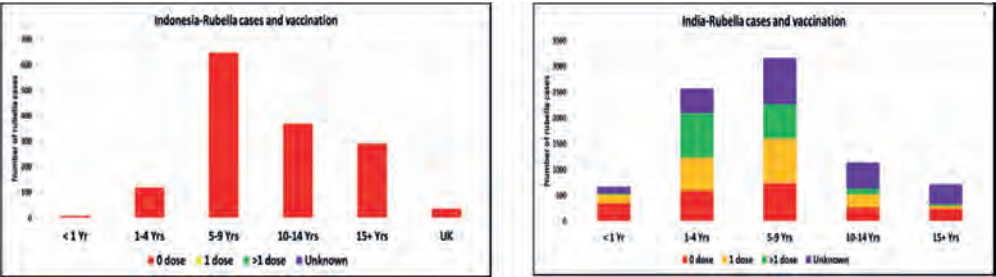
Source: MR case-based data for 2016 as shared by Member States with the WHO Regional Office for South-East Asia on a weekly basis.

3.3.1b Population immunity against rubella

Based on the available information on rubella cases and their immunization status from Member States in the Region, the profile of immunity can be categorized into four broad patterns. RCV was not part of the Universal Immunization Programme (UIP) in Indonesia during 2016.

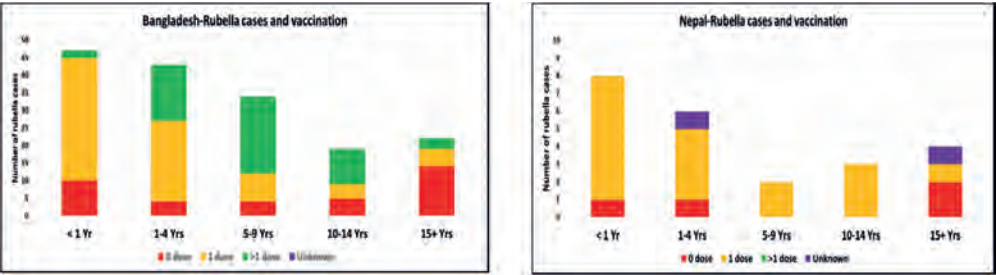
Pattern 1: High risk in younger (under 10 years) populations who were unimmunized/partially immunized. This pattern was visible in two countries including India and Indonesia where RCV was yet to be introduced in the national programme. In India, several rubella cases were partially immunized because the rubella vaccine is available in the private sector (Fig. 6).

Figure 6: Pattern 1 of the immunity profile of rubella cases



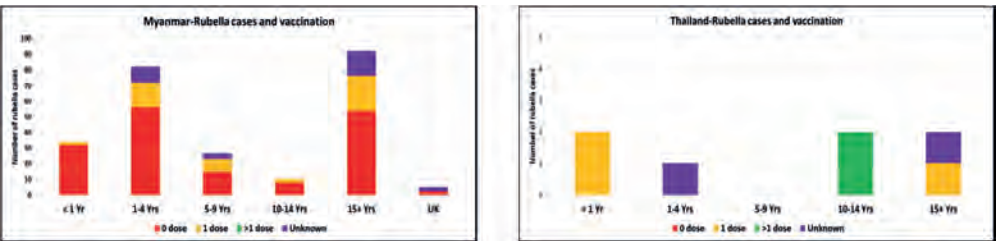
Pattern 2: Combined younger (under 5 years) and older (over 15 years) at-risk populations. The age distribution of rubella cases in Bangladesh and Nepal indicated such a pattern (Fig. 7).

Figure 7: Pattern 2 of the immunity profile of rubella cases



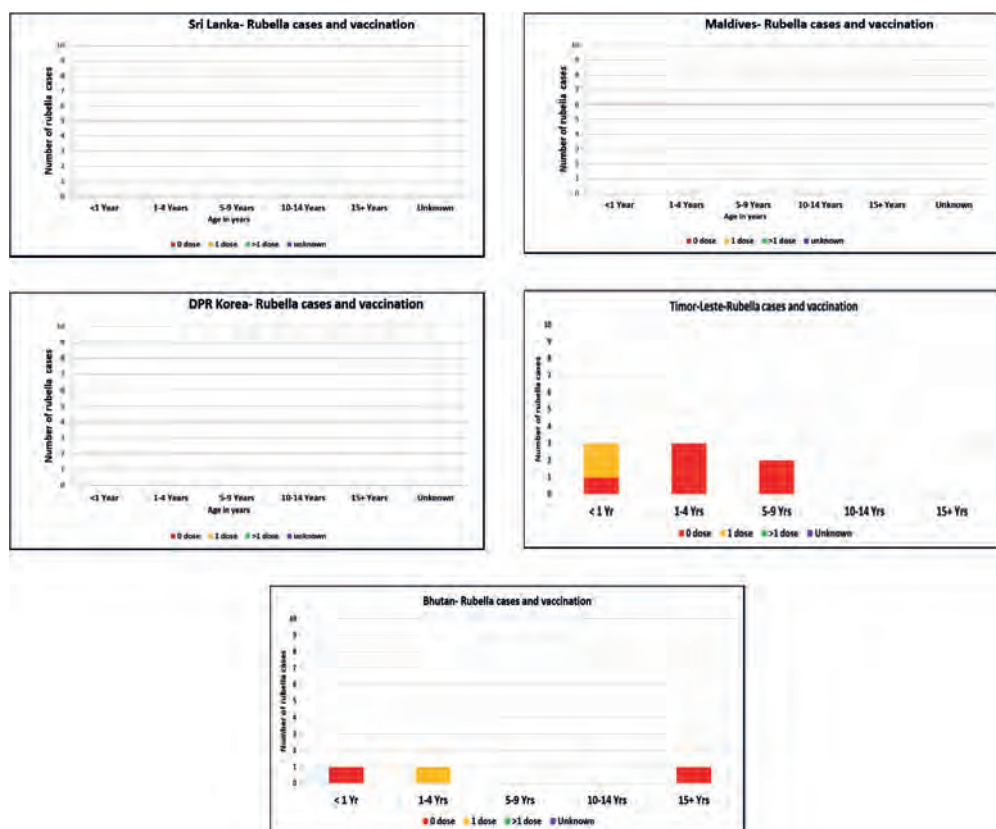
Pattern 3: Bimodal at-risk populations. In Myanmar and Thailand, a bimodal presentation of rubella cases, in infants and those above 15 years, is seen (Fig. 8).

Figure 8: Pattern 3 of the immunity profile of rubella cases



Pattern 4: Eliminated/near elimination status. Three countries – the Democratic People’s Republic of Korea, Maldives, Sri Lanka – reported no rubella cases in 2016. Two more countries – Bhutan and Timor-Leste – reported only a few rubella cases in 2016. All these countries could be categorized under pattern 4 (Fig. 9).

Figure 9: Pattern 4 of the immunity profile of rubella cases



Efforts to close the immunity gap

As reported by the NVCs, SIAs are being undertaken to improve coverage and close immunity gaps. Ten countries conducted either national and/or subnational SIAs to improve the MCV/MRCV coverage level and to close the immunity gap (Table 3). For all SIAs, MRCV has been used with the exception of one SIA in Indonesia that used only MCV.

A wide-age MRCV campaign (from 9 months to 15 years) is currently under way in India; during 2016–19, a target population of 420 million will be covered in three phases. Additional efforts like Mission Indradhanush, targeting the districts with low RI coverage and high-risk populations, are expected to increase MCV1 and MCV2 coverage. The first two phases of Mission Indradhanush led to a 5–7% rise in full immunization coverage.² Recently a subnational SIA targeting children (9–59 months) was undertaken in 183 high-risk districts of Indonesia. A nation-wide MR campaign is being planned in Indonesia in 2017–2018 in two phases targeting 67 million children aged 9 months to 15 years to reduce the immunity gap. Myanmar conducted a national wide-age (from 9 months to 15 years) MR campaign in 2015 with high coverage (94%). Bangladesh undertook an MR mop-up campaign in the areas near the Myanmar boarder and launched a special drive to identify and vaccinate “zero” MR dose children in high-risk areas. A national MR-SIA in Bangladesh was planned during 2017–2018. Maldives was also planning to undertake a wide-age catch up MR campaign in 2017. A wide-age (from 9 months to 40 years) SIA was conducted in Bhutan during the 2016 outbreaks. Nepal conducted a national MR-SIA campaign targeting children (from 9 months to 59 months) during 2015–2016. Timor-Leste conducted a wide-age MR campaign in 2015 with good coverage. In response to the measles outbreak in adults, Thailand conducted MR vaccination among those between 15 and 40 years to bridge the immunity gap. The Democratic People’s Republic of Korea conducted a subnational SIA targeting children aged 9 months to 16 years with MCV during 2014. Sri Lanka experienced measles outbreaks during 2013–2015. Community screening and vaccination of children and high-risk populations were undertaken, leading to a reduction of cases, in Sri Lanka in 2016. Overall, it was clear that Member States in the Region have actively been pursuing the national efforts to reduce population gaps and make effective progress towards measles elimination milestones.

School entry immunization status checks are operational in six countries: Bhutan, Indonesia, Maldives, Nepal, Sri Lanka, and Thailand. In some countries implementation appeared to be suboptimal. Myanmar has also recently adopted the school entry check and immunization strategy. In India, the Democratic People’s Republic of Korea and Timor-Leste, no formal school immunization check programme exists. For Bangladesh, the status was not known.

2 Integrated Child Health and Immunization Survey (INCHIS) Report, Rounds 1 & 2 (<http://www.itsu.org.in/integrated-child-health-immunization-survey-inchis-report-rounds-1-2>).

Table 3: SIAs conducted in Members States (2014–2017)

Country	Type of SIA	Vaccine	Target age	Target population	Admin coverage	Survey coverage
Bangladesh	Subnational (2014)	MR	9 months to 15 years	52 745 231	102%	>85%
	Subnational (outbreak) (2016)	MR	9–59 months	100 000	100%	-
	National (2017–2018) planned	MR	9–59 months	1 700 000	-	-
Bhutan	Subnational (outbreak) (2016)	MR	9 months to 40 years	416	100%	-
DPR Korea	Subnational (2014)	M	9 months to 16 years	NA	99.8%	-
India	Subnational (post flood) (2015)	M	1–15 years	890 070	-	-
	National (2017- Phase 1&2 (13 states)	MR	9 months to 15 years	67 493 359	97%	-
Indonesia	Subnational (2016)	M	9–59 months	4 222 172	86%	
	National (2017) Phase 1 (six provinces)	MR	9 months to 15 years	34 964 386	100%	-
Maldives	Nationwide (2017)	MR	8–25 years	67 228	NA	NA
Myanmar	National (2015)	MR	9 months to 15 years	13 958 965	94%	NA
	National (2018) Planned	MR	9–59 months	-	-	-
Nepal	National (2015–2016)	MR	9–59 months	3 002 263	99%	Ongoing
Sri Lanka	No recent SIA	-	-	-	-	-
Thailand	National (2015)	MR	2.5–7 years	2 541 544	88%	-
	Subnational (2016)	MR	15–40 years	869 810	-	NA
Timor-Leste	National (2015)	MR	9 months to 15 years	501 832	97%	96%

Source: Country EPI Fact Sheets, WHO Regional Office for South-East Asia; 2017 (<http://www.searo.who.int/immunization/data/en/>)

Covering high-risk and vulnerable populations

Most Member States in the Region follow some strategy to identify and increase coverage among high-risk and vulnerable populations according to their local context. Based on the polio eradication lessons learned, India tagged the polio high-risk areas to RI microplanning. Mission Indradhanush is also focusing on improving RI coverage along with MCV1 and MCV2 through system strengthening. Myanmar is implementing the Reaching Every Community (REC) programme, targeting hard to reach areas, to improve RI coverage. Indonesia conducted SIAs for vulnerable internally displaced populations due to natural disasters in 2016. Bangladesh is focusing on refugee areas and urban municipalities to improve coverage. Nepal has coordinated with local self-governments to adopt a “search and immunize” strategy to declare fully immunized districts. Timor-Leste is mapping high-risk areas and vulnerable populations for targeted RI interventions. Most countries in the Region were using the Measles Strategic Planning (MSP) tool to identify subnational levels of risk (very high, high and low). After systematic surveys, countries like Maldives and Sri Lanka reported limited marginalized or migrant populations. Maldives regularly vaccinates migrant workers from other countries to prevent importation of measles cases.

Good immunization practices in Member States

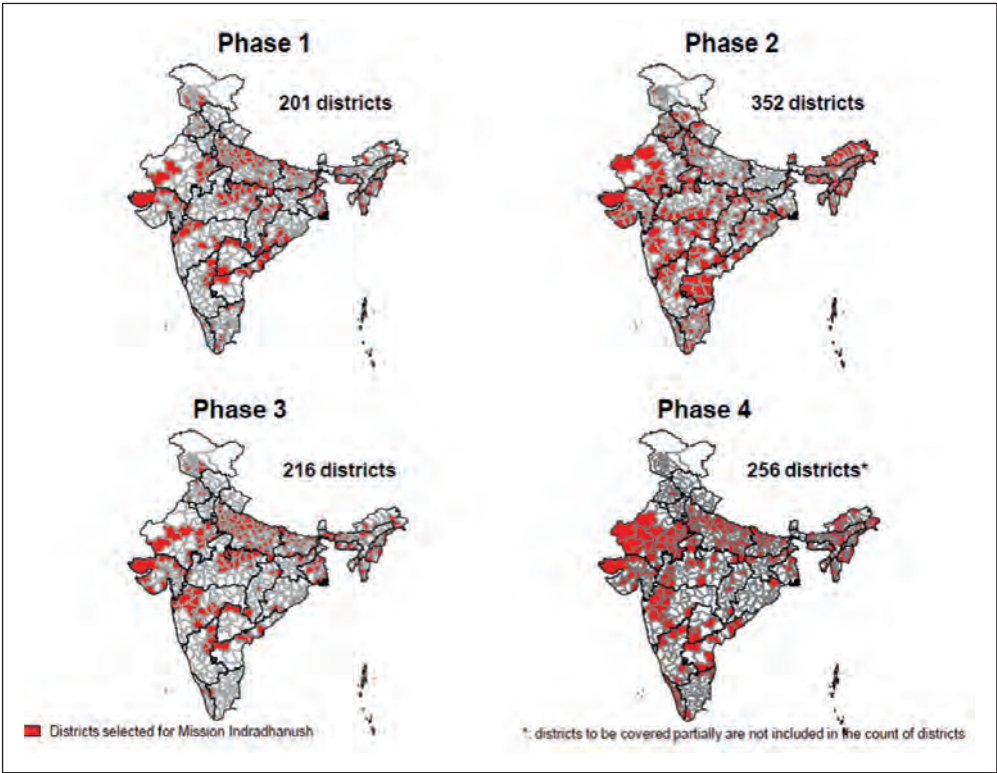
Mission Indradhanush in India

The Government of India launched Mission Indradhanush (MI) to accelerate, strengthen and support RI efforts and ensure that all children under the age of 2 years and pregnant women are fully immunized with all vaccines recommended under the national schedule. The MI districts were selected on the basis of several health- and immunization-related criteria but primarily with large numbers of unimmunized and partially immunized children. In three phases of MI, over 400 000 high-risk settlements were covered, more than 21 million children were immunized, with over 5.5 million children getting fully immunized. The fourth phase of MI was in progress at the time of the MTR (Fig. 10). The MI processes had been built within the broad operational framework of the RI programme; MI has contributed to health system strengthening.

Appreciative enquiry approach in Nepal

The Government of Nepal adopted the appreciative inquiry (AI) approach since 2012 to mobilize local communities and resources and build local ownership to ensure vaccination of every child (Fig. 11). The community stakeholders identify unimmunized children and ensure vaccination of all under-5 children. The vaccination status of the area is verified by the district coordination committee. On verification, the area is declared as fully immunized during a public declaration ceremony. More than 900 village development committees (VDCs), 35 municipalities and eight districts have been declared fully immunized. The strategy was an example of successful coordination and cooperation between various line ministries, viz. education, local development, and women and child welfare

Figure 10: Areas covered during different phases of Mission Indradhanush in India



Source: Ministry of Health and Family Welfare, Government of India.

Figure 11: Appreciative enquiry for full immunization coverage



Source: WHO Regional Office for South-East Asia; 2017 (<http://www.searo.who.int/mediacentre/events/appreciative-inquiry-story/en/>).

3.3.2 Surveillance and outbreak response

Strategic objective 2. Develop and sustain a sensitive and timely case-based MR surveillance system and CRS surveillance in each country in the Region that fulfils recommended surveillance performance indicators.

3.3.2a Surveillance

Status

When implementation of the Strategic Plan began in 2014, MR surveillance was already established in all 11 Member States. Case-based surveillance for measles was conducted in all countries, except India (which had only outbreak surveillance). In 2011, five countries exceeded the targeted non-measles non-rubella (NM-NR) discard rate of 2/100 000 population at the national level; however, some areas had lower levels of serologic specimen collection. As of 2014, CRS surveillance was established in Bangladesh, Indonesia, Nepal and Sri Lanka.

In 2015, a recommendation was made by the WHO Regional Office for South-East Asia to expand the case definition to a more sensitive rash *plus* fever, eliminating the need for screening cough, coryza or conjunctivitis. A regional workshop on surveillance standards for measles, rubella and priority vaccine-preventable diseases, held in September 2016, concluded that all countries require sensitive, high-quality surveillance for MR (including a move to the broadened case definition) and CRS.³

As of July 2017, all 11 Member States had laboratory-supported MR case-based surveillance systems; of these, eight Member States had implemented integrated MR case-based surveillance using the rash and fever case definition, with the exception of most parts of India. In India, the process of switching from outbreak-based surveillance to integrated MR case-based surveillance is ongoing. However, the overall sensitivity of MR surveillance was low, with a regional NM-NR discard rate of 0.48/100 000 total population in 2016. Currently, seven of the 11 countries did not meet the discarded NM-NR incidence goal of 2/100 000 population (reflected in Table 4). In addition, there was significant subnational variation. Ten of the 11 countries did not meet the goal of 80% of the subnational administrative units reporting an NM-NR discard rate of 2/100 000 population. There were additional surveillance systems in several countries, such as the Early Warning, Alert and Response System (EWARS) in Nepal, also detecting “measles-like illness”; however, data from these systems was not being used for cross-checking to ensure detection of all suspected measles cases are reported through the case-based system. Similarly, in India, there are two other surveillance systems for

3 Regional workshop on surveillance standards for measles, rubella and priority vaccine-preventable diseases; World Health Organization meeting report, Kathmandu, Nepal, 19–23 September 2016.

identifying measles cases in the field but the information was not integrated with the main MR surveillance.

Table 4: NM-NR discard rates and proportion of subnational administrative units reporting target NM-NR discard rates, WHO South-East Asia Region, 2016

Country	Discarded NM-NR incidence per 100 000 total population (Goal: 2/100 000 population)	Proportion of subnational administrative units reporting at least two discarded NM-NR cases per 100 000 total population (Goal: 80%)
Bangladesh	1.96	80 %
Bhutan	8.05	55 %
DPR Korea	0.27	ND
India	0.55	10%
Indonesia	0.95	ND
Maldives	3.22	30%
Myanmar	0.59	12%
Nepal	2.83	53%
Sri Lanka	1.09	27%
Thailand	0.64	ND
Timor-Leste	8.25	46%
SEA Region	0.77	-

Source: VPD Bulletin, WHO Regional Office for South-East Asia; December 2016 (updated December 2017) (http://www.searo.who.int/immunization/data/ivd_week52_2017.pdf?ua=1).

CRS surveillance has expanded in the Region; of the 11 Member States, eight have established CRS sentinel site surveillance. However, no countries currently report CRS surveillance indicators to the Regional Office, making it difficult to assess the performance of the system.

Challenges

Low sensitivity of MR surveillance system

The majority of Member States in the Region were not meeting targets for the integrated MR case-based surveillance performance indicators. There is heavy reliance on the existing network of reporting units for acute flaccid paralysis (AFP) surveillance, which may not detect all suspected cases, including those in the community. Close scrutiny of the data and close observations of some of the reporting sites during field visits suggested that there was major expectation bias during reporting and most of the cases reported were

either clinical or laboratory proven measles, leading to low NM-NR discard rates across most Member States. In addition, there is a lack of adequate training on the integrated MR case-based surveillance guidelines, including the rash and fever case definition, and complacency among clinicians and others involved in surveillance to complete case investigation forms and obtain serum samples on all suspected cases.

CRS surveillance

Three countries (Bhutan, Thailand, and the Democratic People's Republic of Korea) had not established sentinel sites for CRS surveillance. In addition, multiple countries had not adopted the use of updated CRS case definitions, global CRS indicators, and laboratory confirmation of cases. CRS epidemiological data was not regularly linked with rubella epidemiology data to look for patterns, such as an increase in CRS cases following large-scale rubella outbreaks. No countries were reporting CRS cases to the Regional Office.

Molecular surveillance

Despite having reported both laboratory-confirmed measles cases and rubella cases, three Member States did not report measles genotype information and eight Member States did not report rubella genotypes during 2012–2017. Genotype information is critical to document progress towards and achievement of elimination as well as to aid in determining transmission pathways and outbreak sources.

Discrepancies between laboratory and epidemiological case-based surveillance data

The assignment of a unique identifier is fundamental to a case-based surveillance system. For integrated MR case-based surveillance, it is necessary to assign an EPID number (epidemiological number/case identification number) to each suspected case to ensure linking of case-based surveillance data with the laboratory test results. In addition, case-based surveillance needs to be cross-checked with other surveillance systems (e.g. EWARS) that detect “measles-like illness” to ensure suspected cases are not missed by the integrated MR case-based surveillance system. Discrepancies between field and laboratory data was consistently observed in all countries where field visits were made.

Data for action

Measles/rubella/CRS cases are not regularly reviewed at national and regional levels to obtain a detailed analysis of descriptive epidemiology and to monitor case-based surveillance performance indicators. Most Member States did not have monthly national VPD surveillance bulletins to provide feedback to all districts.

Polio transition

Five polio priority Member States are at risk of reversal of surveillance progress and lack of predictable funding during the polio transition.

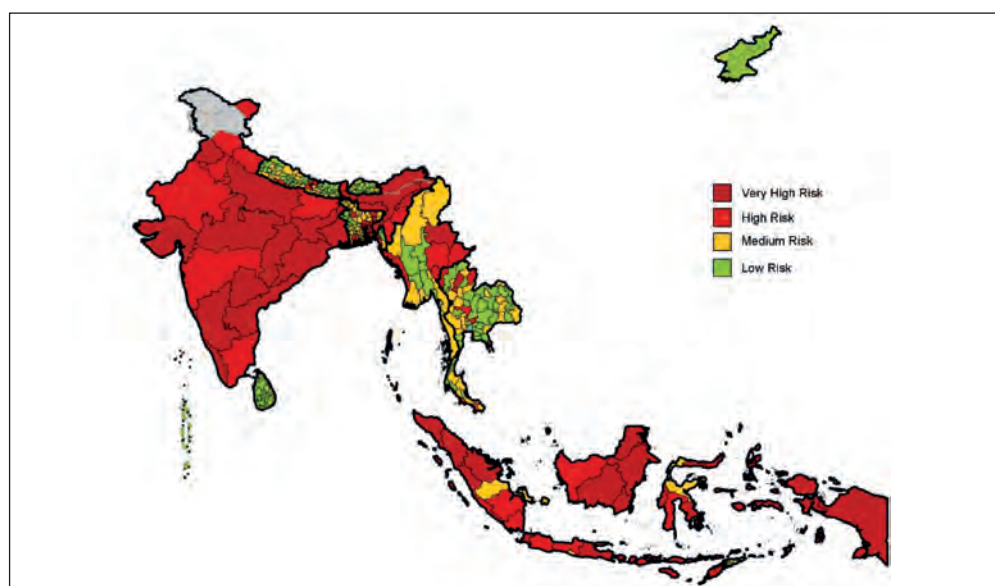
3.3.2b Outbreak preparedness and response

Status

More than 500 suspected measles or rubella outbreaks were reported and investigated in seven Member States during 2013. However, at that time, few specimens were collected for virus detection, and regional response guidelines did not include outbreak response immunization (ORI) activities. WHO has not established guidelines for measles outbreak investigation and response in elimination settings and there are currently no uniform regional response guidelines.

WHO United States Centers for Disease Control and Prevention (CDC) created a tool to identify districts at-risk for measles in 2014.⁴ The tool assigns a risk score to each administrative unit through the sum of risk points acquired for each of four categories of indicators: population immunity, quality of epidemiological surveillance, immunization programme performance and threats assessment. The process of conducting risk assessments strengthens linkages between the epidemiology and surveillance units. All 11 Member States have started using the WHO measles risk assessment tool since 2016 to conduct annual measles risk assessments to routinely assess measles risk, identify high-risk districts and guide elimination efforts to support efforts to prevent outbreaks.⁵

Figure 12: Risk assessment for MR transmission in the South-East Asia Region using the WHO risk assessment tool, 2016



4 Lam E, Schluter WW, Masresha BG, et al. Development of a district-level programmatic assessment tool for risk of measles virus transmission. *Risk Anal.* 2017; 37(6): 1052–62.

5 Measles programmatic risk assessment tool. World Health Organization; 22 August 2017 (http://www.who.int/immunization/monitoring_surveillance/routine/measles_assessment/en/).

Challenges

Field investigations

In some countries, it was unclear whether surveillance medical officers or rapid response teams should take the initiative to perform field investigations of confirmed cases. In addition, the detail needed from field outbreak investigations and the level of response needed based on the epidemiological data was unclear.

Infection prevention and control

In the majority of countries, infection prevention and control guidelines were not in place. For outbreak preparedness there is a need to establish guidance on appropriate case referral, effective triage and isolation facilities, and procedures to reduce risk of MR transmission and nosocomial exposures including ensuring immunity among health-care workers.

Cross-border activities

Immunization response to outbreaks may require synchronized cross-border activities, as was the case with polio, to interrupt virus transmission. Currently, there were no inter-country agreements for these activities.

3.3.3 Laboratory network

Strategic objective 3. Develop and maintain an accredited measles and rubella laboratory network that supports every country in the Region.

The South-East Asia Region laboratory network had a total of 37 laboratories with at least one national MR laboratory (NML) in each of the 11 Member States and with the capacity for case confirmation by IgM detection and with molecular capacity for identifying the source of transmission at the time of the development of the Strategic Plan. One RRL had been established in Bangkok, Thailand, and there were two national reference laboratories in India for serology (in Chennai) and for molecular sequencing and genotyping (in Pune). Most countries had established one NL except for India which had nine and Indonesia which had four. Thailand had recently established a subnational measles laboratory network of 13 laboratories that were classified as “WHO proficient laboratories”. In 2013, the South-East Asia Region network tested 15 235 specimens for measles and/or rubella, with 89% of results available within seven days of receipt (target $\geq 80\%$).⁶

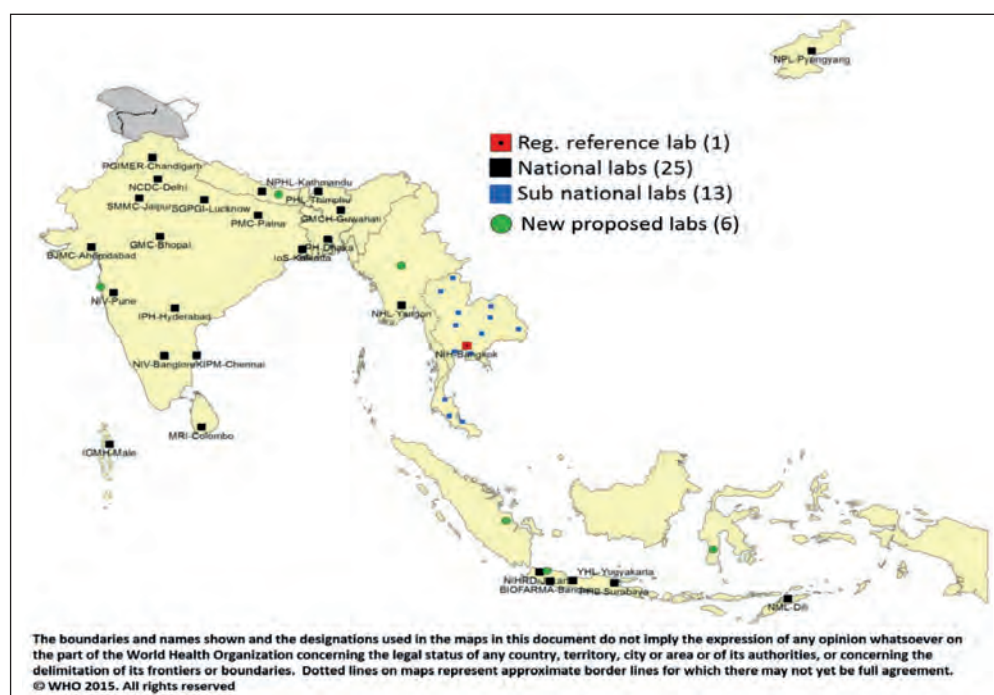
Strategies to improve sensitivity of MR surveillance and the timeliness of laboratory-based result reporting led to a change in the case definition and the laboratory turnaround

6 Strategic plan for measles elimination and rubella and congenital rubella syndrome control in the South-East Asia Region, 2014–2020. WHO; 2015 (<http://apps.who.int/iris/bitstream/handle/10665/205923/B5206.pdf?sequence=1&isAllowed=y>).

time in 2015. The case definition was changed to a simpler fever and maculopapular rash (one of the 3Cs was no longer required) or any case in which a physician suspected measles or rubella. From 2016 onwards, India also started modified case-based surveillance in select states. These strategies can potentially impact the workload of the laboratory network in the Region by generating increased sample collection. The turnaround time for testing and reporting IgM results was also reduced from seven days to four days, after receipt of sample in the laboratory (target $\geq 80\%$), for all samples requiring twice a week testing regimens in laboratories receiving samples regularly.

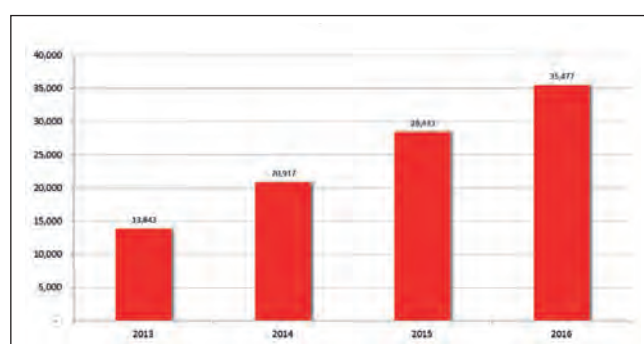
As of July 2017, the MR laboratory network in the Region had expanded to 45 laboratories, with 39 meeting all performance indicators and WHO accreditation (Fig. 13). A further six laboratories are proposed which currently meet WHO proficiency indicators but are awaiting final accreditation reviews from the Regional Office for South-East Asia. India, Indonesia, Myanmar, Nepal and Thailand have established subnational laboratories under the supervision of WHO. The Thailand subnational network has established a quality assurance programme with oversight by a WHO accredited laboratory (Thailand RRL); all SNLs underwent WHO accreditation with on-site reviews during 2015–2016. India was planning to establish additional laboratories under the Indian Council of Medical Research (ICMR) network; this was similar to the one implemented by Thailand and technical guidance is provided by WHO.

Figure 13: Measles and rubella laboratory network in the WHO South-East Asia Region



In 2016, 35 467 IgM assays were performed by the LabNet; an increase of 237% from 2013, (Fig. 14) with almost all laboratories using the WHO validated Siemens IgM assays for measles and rubella. Timeliness of reporting within four days was 65% overall, however 31/39 laboratories met the minimum criteria of 80%. Stock-out of kits negatively impacted reporting timeliness in a small number of laboratories.

Figure 14: Serum samples received for measles or rubella IgM in the Region's LabNet, 2013–2016



The capability of performing molecular tests in the Region increased from 2012 on account of specialized training workshops, one-on-one training, capacity building and the sharing of resources with other disease programmes including polio and influenza. Molecular capability, using conventional and real-time PCR, was available in 23 out of 39 laboratories in nine out of 11 Member States (except the Democratic People's Republic of Korea and Timor-Leste). Sequencing capacity is available in designated laboratories in India, Indonesia, Myanmar and Thailand. A total of 1 498 measles virus sequences from the Region were reported to the WHO MeaNS sequence database from 2014 to July 2017 with 18 laboratories in five countries reporting sequence information in 2017 compared with four laboratories in two countries reporting sequences in 2012. Fourteen laboratories from seven countries reported sequences in 2016. India and Thailand contribute more than 80% of sequencing information for the Region. India reported sequences from a broad geographical representation of the whole country since 2014 and Thailand reported sequences from recent outbreaks. Genotypes B3, D4, D8, D9 and H1 have been reported in the Region since 2015 with D8 predominating in India (2014–2017), Indonesia (2016) and Thailand (2016–2017). Genotype B3 was reported from outbreaks in Thailand during 2016–2017 and genotype H1 from Myanmar in 2017 (Table 5).

Rubella genotypes were submitted to the RubeNS sequence database from just three Member States in the Region since 2014: Bangladesh, India and Thailand (Table 6). While the Region has a rubella control goal, baseline evidence of endemic rubella sequence information will be critical for providing evidence of elimination if such a

goal is established in the future. The epidemiology of rubella virus circulation is likely to change dramatically once SIAs with RCV are completed and the challenges of collecting baseline sequence data post-campaigns shall be considerable.

Table 5: South-East Asia Region measles genotypes reported to MeaNS database, 2014–2017 (as of June 2017)

Country	2014	2015	2016	2017
Bangladesh	B3	B3	D8	
Bhutan		B3, D8	D8	D8
DPRK				
India	B3, D4, D8	B3, D4, D8	B3, D4, D8	D4, D8
Indonesia	G3	D8, D9	D8, D9	D8
Maldives				
Myanmar			D8, H1	H1
Nepal		D4, D8	D8, D9	
Sri Lanka	B3			
Thailand	B3	H1	B3, D8, H1	H1, B3, D8
Timor-Leste				

Table 6: South-East Asia Region rubella genotypes reported to RubeNS database, 2014–2017 (as of June 2017)

Country	2014	2015	2016	2017
Bangladesh	2B			
Bhutan				
DPRK				
India			2B	2B
Indonesia				
Maldives				
Myanmar				
Nepal				
Sri Lanka				
Thailand		2B		2B
Timor-Leste				

The final size of the Region's MR LabNet has not yet been determined; however, the current capacity appears to be sufficient for the estimated number of samples expected per country, if an NM-NR discard rate of 2/100,000 is achieved (Table 7). Factors such as geographical location of laboratories and heavy workload in high endemicity areas may require additional laboratories, especially in large geographical and/or population countries in the Region. The decision of whether new laboratories need to be established in a country needs to be factored with the extra costs of running small numbers of tests twice weekly, cost of sample transportation, cost of establishing, maintaining quality and coordination of laboratories and the benefits of capacity building of a quality LabNet for MR and other VPDs surveillance.

Table 7: South-East Asia Region's MR LabNet workload for IgM testing (2016)

Country	Current no. of labs (proposed additional labs)	No. of suspected measles cases (2016)	No. of specs received in lab (2016)	Average no. of specs received per lab (including proposed)	Minimum no. of samples per country per year Discard rate (2/10 ⁵ popn)	Minimum no. of samples per lab per year if measles eliminated Discard rate (2/10 ⁵)	Proportional difference Spec no. (current vs expected)
	(a)	(b)	(c)	(d)=c/a	(e)	(f)	(g)=d/f
Bangladesh	1	4 289	3 729	3,729	3,214	3,214	1.16
Bhutan	1	149	127	127	15	15	8.39
DPR Korea	1	73	73	73	486	486	0.15
India*	14 (13+1)	41 706	9 064	647	26 004	1 857	0.35
Indonesia	4 (3)	6 194	4 291	613	5 174	739	0.83
Maldives	1	8	8	8	7	7	1.18
Myanmar	1 (1)	592	502	251	1 042	521	0.48
Nepal	1 (1)	1 053	873	437	572	286	1.53
Sri Lanka	1	340	292 [#]	292	424	424	0.69
Thailand	14	1 430	1 096	78	1 314	94	0.83
Timor-Leste	1	122	111	111	24	24	4.63

* India is considering at least a further six laboratories under the VRDL network of ICMR.

[#] Some cases were EPI-linked cases, so no sample was collected.

3.3.3a Challenges

Molecular surveillance

Although molecular surveillance has improved dramatically for measles viruses since 2014, rubella sequences have only been reported from three Member States. Rubella

sequencing is more challenging than measles sequencing; enhanced procedures for collecting samples from suspected rubella cases, including CRS cases, needed to be introduced. More comprehensive analysis of measles sequence data, including use of “named strains”, could provide evidence of countries’ progress with elimination and enable spread patterns and likely outbreak sources to be determined, along with thorough epidemiological investigations of cases and outbreaks. Sequence information is able to provide vital evidence supporting verification of elimination.

Kit supply and procurement

There are considerable cost implications for the LabNet in the case of large countries such as India, Indonesia and Thailand if they are provided with WHO procured IgM kits. However, these countries implemented measures to support their own testing costs. India was in the process of developing an NIV IgM assay but needed WHO LabNet support to evaluate its sensitivity and specificity specifications. Indonesia was considering procuring its own IgM kits and requested that WHO provided a list of appropriate quality kits to select from. Thailand was procuring Siemens kits from national suppliers with the exception of kits provided to the RRL by the WHO for quality assurance purposes.

Subnational laboratory network (SNL)

The Regional Office for South-East Asia is responsible under the WHO Global Measles and Rubella Laboratory Network (GMRLN) to support the establishment of designated NL and RRLs in the Region, and to build capacity, provide quality assurance, and coordinate and monitor performance of these laboratories. However, it did not have the resources or capacity to provide more than limited support and guidance for establishing extensive subnational laboratory (SNL) networks in large countries. Thailand had provided a concept for establishing a subnational LabNet which could be a useful model for other countries in the Region to replicate. In essence, Thailand established MR testing laboratories in each of the 12 public health regions and two additional high-risk areas in existing public health laboratories. The SNLs were established using the same principles as the GMRLN under the tutelage and guidance of the WHO NML/RRL at the National Institute of Health (NIH) in Thailand. The Ministry of Health in Thailand supported the capacity building and procurement of all IgM kits and molecular testing while WHO provided support for quality assurance and accreditation. The SNLs will be supported almost entirely through the Ministry of Health and NIH after their establishment.

Accreditation process

The accreditation process for the GMRLN has been a critical process to ensure that each of the more than 700 laboratories is assessed under the same criteria and that their performance and results are comparable across the entire network. The responsibility for the accreditation of the LabNet falls largely on the laboratory coordinators, both

regional and global, and can be an arduous task if not managed carefully. Annual accreditation is important to identify performance issues before they become critical, but the strategy of annual self-reporting should be used for laboratories regularly meeting minimal performance criteria. On-site reviews can be carried out every three to four years and more frequently for laboratories with performance issues. Use of consultants with experience in the MR LabNet and the accreditation of SNLs carried out by appropriately trained NL staff can also be used to ease the laboratory coordinator's workload. The Regional Office for South-East Asia used a project to strengthen quality management skills of the Region's MR LabNet and developed a pilot project with Thailand's Reference Laboratory to provide capacity for their staff to conduct accreditation reviews of SNLs in that country. The model has worked well in Thailand and can be considered for India and Indonesia.

Polio transition

The CDC has been a long-term and substantial supporter of the MR LabNet through the annual CDC/WHO cooperative agreement as well as through technical and financial support from the MR laboratory team at CDC Atlanta. Seven of the 14 MR laboratories in India and three of four MR laboratories in Indonesia also function as polio laboratories. The impact of funding reduction during polio transition will adversely impact laboratory activities in these two countries. The Global Polio Eradication Initiative (GPEI) also provides considerable support for MR surveillance and coordination of the MR LabNet in the WHO South-East Asia Region. A reduction in funding for polio eradication will have a considerable impact on laboratory sample collection and coordination; it is critical that alternative funding sources are identified for these activities and support the affected laboratories.

Low incidence settings

The Siemens measles IgM assay commonly used in the MR LabNet has a relatively high specificity (96.7%), resulting in low percentage false positive cases under endemic virus circulation.⁷ As incidence diminishes, the positive predictive value of IgM assays also declines. When countries reach elimination, or are close to elimination, it is likely that most IgM positive results detected are not true cases and are either vaccine reactions or false positives. There are several strategies that countries can consider implementing to rule these cases "in" or "out" including accurate vaccine history and specimen collection data, thorough case investigation and contact tracing. Further laboratory tests such as avidity testing and real-time PCR may help resolve such cases but are unlikely to be available except in reference laboratories.

7 Ratnam S, Tipples G, Head C, Fauvel M, Fearon M, Ward BJ. Performance of indirect immunoglobulin M (IgM) serology tests and IgM capture assays for laboratory diagnosis of measles. *J Clin Microbiol.* 2000 Jan;38(1):99–104.

Data

Laboratory-supported case-based surveillance provides the opportunity to identify real-time epidemiology of MR virus transmission and monitor the progress with measles elimination and rubella and CRS control. Comprehensive analysis of information from the CIF and laboratory results can allow dot maps of cases, sequence information showing possible spread patterns, and age and vaccination status of cases; this can contribute to the immunization strategies to be implemented.

3.3.4 Linkages

Strategic objective 4. Strengthen support of and linkages with other child survival interventions to achieve the above strategic objectives.

Build public confidence and demand for immunization.

3.3.4a Social mobilization and communication

Social mobilization and creation of awareness about the immunization drives are essential components of the measles elimination and rubella/CRS control programme. This will require a comprehensive approach both at regional and national levels with availability of dedicated resources. There is an absence of any structured communications strategy at the regional level. Most Member States also lack any communications strategy. While communication is a part of the SIA guidelines, no overall budgeted communications strategy exists for the Measles & Rubella Initiative (MRI).

3.3.4b Vaccine hesitancy

Recent experiences from India and Indonesia during the wide-age MR campaign was reflective of the potential adverse impact on vaccine acceptability and coverage arising out of rapid spread of rumours and misinformation, particularly with the wide use of social media. The programmes in both countries adopted the usual Information, Education and Communication (IEC) strategies at the time of the roll-out of the MR campaign. Communication strategies were revised post hoc, including greater engagement with stakeholders and professional groups to debunk misinformation and emphasize vaccine safety.

3.3.4c Advocacy with political and administrative leadership

The current engagement with the political leadership of the Member States is through Regional Committee (RC) meetings. MR is an agenda item of the RC every 2 years. There is limited awareness among policy-makers and programme managers about the opportunities to strengthen RI and primary health-care systems with MRI. Advocacy at subnational levels is limited at best.

On a positive note, Member States included MRI activities as an annual budget line item and all countries except the Democratic People's Republic of Korea mention it in their cMYP as well. Efforts have been made to engage with donors and partners but there was lack of systematic effort at the regional level to keep them updated on MRI progress and challenges of programme implementation.

Inter-agency coordination and collaboration at national and subnational levels is an important requirement and reiterated by GAVI. There was good evidence of ICC in GAVI countries of the Region but somewhat weak among non-GAVI countries. Some Member States such as India, Indonesia and Timor-Leste had health partner forums related to the World Bank and these alliances have further helped to streamline technical and financial support. All countries now have National Immunization Technical Advisory Groups (NITAG), but this cannot be construed as an ICC mechanism because NITAGs do not participate in programme implementation.

3.3.4d Emergency and conflict settings

There are no MR-specific plans for emergency and conflict settings in Member States. Political and administrative reluctance was reported in acknowledging conflict areas. As a general rule, immunization and surveillance activities were being incorporated with (general) disaster management plans. Like the polio programme, the Member States have yet not established cross-border coordination mechanisms for SIAs and outbreak responses. In short, the current mechanisms in Member States do not allow for concerted and coordinated action.

3.3.4e Polio transition plan

Five Member States in the Region have GPEI-supported polio assets. The RI programme generally and the MR campaigns specifically are currently supported by GPEI-funded assets (including human resources). The five GPEI-supported countries have formulated polio transition plans following certification of the Region of its polio free status.

The National Polio Surveillance Project (NPSP) in India receives considerable support from its national government and has been assigned additional responsibilities for RI and Neglected Tropical Diseases (NTD). It closely supports the MRI in supporting both immunization and surveillance activities. Nepal has added US\$ 10 000 in its national budget line item and is expected to progressively increase this support. Bangladesh is using GAVI Alliance Health System Strengthening Funds (HSS) funds to support these assets until 2018. The regional polio laboratory network is also supported by GPEI funds and several of these laboratories are part of MR surveillance. This aspect will also have to be considered in transition planning. The Regional Office for South-East Asia is engaged with all Member States with regard to polio transition planning and is conducting risk and impact assessment for immunization and surveillance. Overall, the

polio asset transition is expected to have an impact on the performance and sustenance of MR activities and thereby achieve the objectives.

3.3.4f Sustainability

The MTR considered the following to be indicators of administrative and political commitment that could reflect the drive to achieve the 2020 elimination/control goal at the country level:

- MRI as a line item in national budgets;
- the development of a national plan or cMYPs with explicit mention of MRI activities;
- formation and functionality of NVCs, currently active in all Member States in the Region;
- AEFI committees and surveillance – 8 eight out of 11 Member States have AEFI committees and surveillance systems; Maldives and Timor-Leste are working through their NITAGs; the status of the Democratic People's Republic of Korea is unknown;
- MRI as an opportunity to link the immunization system with child health programmes and strengthening of primary care services in the community; administration of MCV2 bundled along with other child health interventions is also to be viewed with prospects of strengthening 2nd year of life platform;
- the availability and utilization of GAVI-HSS items;
- the VPD surveillance system to be organically linked with MR surveillance activities; most Member States are currently in the process of institutionalizing or strengthening their VPD surveillance systems;
- all Member States are striving to improve data quality;
- challenges of skilled human resources in Member States that may have serious implications for MRI.

3.4 Financing

The aim of the financing review was to assess resources available for the programme during the past three years and also to project resource requirements up to achieving elimination goals in 2020. The review was based on financial reports of the Regional Office and Member States. To assess existing resources available during 2014–2016, support to the Region and Member States via the United Nations Foundation and CDC Atlanta including shared cost of polio transition that is allocated to the MR elimination programme (30% of surveillance operating costs and technical assistance) were included.

There were some limitations identified explicitly; budget data of national governments for the immunization system could not be included due to non-availability. In addition, there might be some financial support directly allocated to the Member State by partners and donors that was also not accounted for. For determining the projected cost of the programme in the Region, data reviewed included: the UNF and CDC proposal, UNF and CDC budget allocations for 2014–2016, polio transition plans, and GAVI, JRF and SIA technical reports from 2014 till date. The UNF measles funds disbursed to the Member States were only 12–39% of the requested amount (Table 8) and the disbursed amount of the CDC measles funds were in the range of 36–60% of the requests (Table 9).

The forecasted budget for 2017–2020 included cost of campaigns, social mobilization and cost of surveillance. Surveillance costs included laboratory supply, transportation, personnel and staff training. It was assumed that 10% of the current expenditure on MR surveillance would be funded from GPEI funds till 2019. Technical support, research and verification activities in general were not included in this cost estimation and costs for a communications strategy needed to be developed for the Region. In the case of surveillance, three scenarios were considered:

- Base case: the number of samples to be collected and tested if the surveillance sensitivity remains 40% every year and cases decrease by 50% every year due to increased coverage.
- Scenario 1: the number of samples to be collected and tested if the surveillance sensitivity increased by 20% every year and cases decreased by 50% every year due to increased vaccine coverage.
- Scenario 2: the number of samples to be collected and tested if India and Indonesia rolled integrated case-based surveillance and case load increased threefold in 2017–2018 from the previous highest reported numbers.

In the financial forecasting, two parameters were included in the calculation, i.e. estimated number of activities or outputs and their unit cost. The number of campaign cases was derived from target groups indicated in SIA plans and population data from the WHO EPI Fact Sheet. Cost per unit of vaccine and vaccination (operational cost) was from the SIA technical report of each country. Estimated number of cases during surveillance was as per Regional Office estimations. The unit cost of surveillance cases was with reference to the 2014–2020 Strategic Plan. Based on these assumptions and data sources, the budget required for the whole Region during 2017–2020 would be around US\$ 599 million; it increased by 1% and 7% for scenarios 1 and 2, respectively (Table 10). The forecast costs were compared to those in the Strategic Plan. In summary, for the whole Region, a 200% increase in budget was estimated based on the Strategic Plan (Table 11). Comparing the three scenarios, assumptions under scenario 2 appeared to be the most appropriate. The current budget gap was estimated to be US\$ 149 million (Table 12).

Table 8: UNF measles funds: Year-wise distribution to the WHO South-East Asia Region

Country	2014 (\$)	2015 (\$)	2016 (\$)	2017 (\$)
Regional Office	454 285	373 000	290 000	183 000
Bangladesh	370 000	281 500	150 000	400 010
Bhutan	-	-	-	87 000
India	1 388 164		661 836	900 000
Indonesia	346 580	279 205	114 215	99 994
Maldives	-	-	-	180 000
Myanmar	300 000	73 000	237 000	-
Nepal	448 458	649 697	396 473	88 588
Timor-Leste		489 500	-	
Grand total, of funds received by WHO	3 307 487	2 145 902	1 849 524	1 938 592
Funds requested from UNF (for WHO)	8 408 539	10 778 517	9 300 069	16 681 200
Percentage received against request	39%	20%	20%	12%

Table 9: CDC measles funds: Year-wise distribution to the WHO South-East Asia Region

Country	2014	2015	2016	2017
Regional Office	625 403	592 100	615 751	381 500
Bangladesh	-	15 000	-	-
Bhutan	-	-	17 000	-
India	388 300	498 300	220 243	121 000
Indonesia	-		296 796	220 000
Maldives	-	-	46 000	-
Nepal	110 000	200 000	302 525	49 600
Timor-Leste	-	-	-	2,400
Grand total, of funds received by WHO	1 123 703	1 305 400	1 498 315	774 500
Funds asked for by WHO in CDC annual proposals	1 999 700	2 396 300	2 511 000	2 139 500
Percentage received against request	56%	54%	60%	36%

Table 10: Estimated budget projections for 2017–2020

Country	Total cost: 2017–2020 (US\$)						
	Base case			Scenario one		Scenario two	
	SIA	Surveillance	Total	Total	Difference (%)	Total	Difference (%)
Bangladesh	Vaccine + operations	Social mobilization					
	9 390 296	2 817 089	8 938 654	21 146 039	1%	21 291 152	1%
Bhutan	-	-	254 300	254 300	5%	265 810	5%
DPR Korea	3 991 047	1 197 314	256 680	5 445 041	54%	8 392 964	54%
India	286 160 000	85 848 000	99 479 999	471 487 999	-5%	465 368 829	-1%
Indonesia	49 000 000	14 700 000	12 821 873	76 521 873	35%	111 939 413	46%
Maldives	-	-	63 986	63 986	18%	75 642	18%
Myanmar	2 885 662	865 699	4 600 795	8 352 156	2%	12 834 146	54%
Nepal	1 819 127	545 738	7 829 182	10 194 048	1%	14 413 701	41%
Sri Lanka	-	-	75 099	75 099	72%	129 326	72%
Thailand	2 342 485	702 746	1 744 862	4 790 093	5%	5 629 049	18%
Timor-Leste	107 808	32 342	101 560	241 710	38%	333 601	38%
TOTAL	355 696 426	106 708 928	136 166 991	598 572 344	1%	640 673 633	7%

Note: These costs exclude all systems costs and are only core MR-related costs.

Table 11: Comparison between forecasted costs and costs in the Strategic Plan

Country	Total cost: 2017–2020 (US\$)		
	Forecasted cost; base case	Cost from the Strategic Plan	Difference (%)
Bangladesh	21 146 039	29 394 615	-28%
Bhutan	254 300	222 222	14%
DPR Korea	5 445 041	662 183	722%
India	471 487 999	138 945 238	239%
Indonesia	76 521 873	8 516 588	799%
Maldives	63 986	72 893	-12%
Myanmar	8 352 156	4 379 776	91%
Nepal	10 194 048	12 234 002	-17%
Sri Lanka	75 099	501 326	-85%
Thailand	4 790 093	2 421 331	98%
Timor-Leste	241 710	154 498	56%
TOTAL	598 572 344	197 504 671	203%

Resource constraints might become a major challenge to achieve the elimination goal in 2020 as envisaged. The forecasted budget during 2017–2020 is over 200% higher than the one planned in the Strategic Plan. This situation demands serious attention. Efficiency in programme implementation is pivotal to a successful outcome and necessitates close monitoring. Programme cost analysis is suggested as one of the basic tools for programme management. Cost-effectiveness and cost-benefit analyses are methods to provide value for money and return on social investments.

Table 12: Forecasted cost for scenario 2 for 2017–2020

Scenario 2 Country	Forecasted cost (\$)	TOTAL FUNDED (\$)	TOTAL GAP (\$)	Live births	Gap per live birth		Gap per population	Population
					UNIT cost (\$)	2017–20 (\$)		
Bangladesh	21 291 152	2 954 519	18 336 633	9 839 223	1.86	0.04		482 122 902
Bhutan	265 810	6458	259 352	38 607	6.72	0.11		2271 126
DPR Korea	8 392 964	8299	8 384 665	1 028 652	8.15	0.11		72 983 094
India	465 368 829	389 055 223	76 313 606	81 016 605	0.94	0.02		3 900 000 000
Indonesia	111 939 413	97 004 906	14 934 507	14 575 800	1.02	0.02		776 114 958
Maldives	75 642	1756	73 886	19 776	3.74	0.07		1 015 302
Myanmar	12 834 146	126 656	12 707 490	3 029 379	4.19	0.08		156 266 109
Nepal	14 413 701	2 541 106	11 872 596	1 911 789	6.21	0.14		85 872 897
Sri Lanka	129 326	31 300	98 026	993 219	0.10	0.00		63 493 374
Thailand	5 629 049	50 278	5 578 771	2 026 590	2.75	0.03		197 187 294
Timor Leste	333 601	117 184	216 418	106 278	2.04	0.06		3 693 786
TOTAL	640 673 633	491 897 685	148 775 948	114 585 918	1.30	0.03		5 741 020 842

Assumptions:

1. Polio funds are available to support 10% of the surveillance cost up to 2019
2. 30% of the operations cost is sufficient for social mobilization
3. Outbreak response not taken into account
4. Scenario 2 taken as the best case scenario
5. All SIAs for India and Indonesia are funded except the technical support component
6. Probable GAVI-funding for countries considered as gap unless already approved and committed as in India and Indonesia
7. Additional need for social mobilization not budgeted except for the campaigns.

Key observations

Achievements: the basic strategies articulated in the strategic plan for measles elimination and rubella and congenital rubella syndrome control in the South-East Asia Region (henceforth Strategic Plan) are sound. Significant progress has been made towards measles elimination and rubella control since 2014, when the Regional Committee for South-East Asia adopted resolution SEA/RC66/R5 (Measles elimination and rubella/congenital rubella syndrome control). All Member States in the Region have introduced the second dose of measles-containing vaccine (MCV2) and ten countries have inducted the rubella-containing vaccine (RCV); the overall MCV2 coverage in the Region was 73% in 2016. There is a significant drop in the reported number of measles and rubella (MR) cases in the Region, with two countries – Bhutan and Maldives – being declared measles eliminated and two more countries – Sri Lanka and Timor-Leste – progressing well towards that goal.

Measles elimination and rubella/congenital rubella syndrome (CRS) control programme is off-track in the Region: robust and effective implementation of the specific strategies have been limited by country-level governance, national political will and global impetus, all of which are reflected in insufficient allocation of resources. The overall financial envelope for the MR elimination programme was much lower than proposed and is likely to be a major challenge in achieving the 2020 target. The programme has gathered momentum but the challenge is particularly substantial for two of the largest member countries – India and Indonesia. Measuring true disease incidence, in the presence of an effective surveillance system, is the most important indicator of progress (canary in the coal mine). The presence or absence of measles is also one of the best indicators of the overall performance of an immunization programme (accountability framework). In fact, the burden of MR in the largest countries is still not accurately known.

Other concerns: six countries for first dose of measles-containing vaccine (MCV1) and seven countries for MCV2 have national coverage levels <95% and RCV1 is around 14% for the whole Region. Supplementary immunization activities (SIAs) have regularly been conducted in the Region and some are under way. The transition from outbreak to case-based surveillance is not optimally implemented in all Member States. Several Member States programmatically have case-based measles surveillance, but, due to *expectation bias*, a syndromic approach is not often pursued truly in the field; hence, the clinical cases of measles are the ones captured most frequently. This appeared to be an important reason for the low non-measles non-rubella (NM-NR) discard rate (0.48/100,000 in 2016) in the Region. CRS surveillance required significant investment to catch up with global standards. Genotype surveillance is also not uniform and limited information is available from some countries (the Democratic People's Republic of Korea, Maldives, Sri Lanka and Timor-Leste). Laboratory network performance is lower for some laboratories (in Sri Lanka) due to kit-related challenges. There is apprehension of overloading the laboratory system with reliable implementation of fever and rash syndromic approach for improvement in the sensitivity of the surveillance.

Communication: there is no structured communication strategy at regional and country levels and vaccine hesitancy observed recently in India and Indonesia during wide-age MR campaigns posed unique challenges.

Polio asset transition: MR surveillance has been built on the polio surveillance platform in almost all the Member States in the Region. Dwindling polio assets, therefore, pose a particularly serious threat in the Global Polio Eradication Initiative (GPEI)-supported five Member States, especially India and Indonesia, for losing the MR elimination momentum.

Opportunities: notwithstanding these observations, the Midterm Review (MTR) Team sensed **good political and administrative commitments** in most Member States, including India and Indonesia, and this in turn has laid a sound foundation on which elimination can be taken up in true earnest.

Immunization systems in Member States are reasonably robust with well-established supply and logistics systems and trained human resources and can incorporate systems strengthening processes to achieve elimination goals as well as to enable the introduction of new vaccines and other interventions through the newborn–children–adolescent and pregnancy life cycle approach. Surveillance systems have been strengthened over the years and have fairly good capacities that can be upgraded to eliminate standard surveillance over a short period.

Overarching recommendations

- (1) The foundation for achieving elimination/control goals is well-laid in the South-East Asia Region. The Region needs to build on the prevailing

enthusiastic political and administrative commitments and adopt a different approach to achieving the measles elimination and rubella/CRS control goals of 2020. The Region should consider rubella elimination along with measles elimination concurrently.

- (2) The top priority in achieving the goals of the Strategic Plan is to enhance integrated case-based, laboratory-supported MR surveillance.
- (3) There is a need for multidimensional diagnostics of immunization systems within every Member State to assess the current state of health of the routine immunization services and undertake a tailored approach towards strengthening surveillance systems. This will accelerate MR-related work effectively and efficiently.
 - (a) MCV2 should be adopted as a marker of mapping the progress of health-related sustainable development goals (SDGs), which in turn should also result in healthy competition that will be beneficial to achieving MR goals.
- (4) WHO continues to play an important role in monitoring the External Quality Assurance (EQA) of the regional reference laboratories (RRL) and national laboratories (NLs). The laboratory network needs support for uninterrupted supply of diagnostic kits. Any subnational laboratory network expansion needs a careful assessment of the impact of rash/fever only surveillance and cost-benefit analysis.
- (5) Advocacy and communication strategies remain serious concerns for the overall progress of measles elimination and rubella/CRS control activities, particularly in countries with significant disease burdens.
- (6) In view of its essential contribution, polio transition plans, particularly in the five GPEI-supported Member States, need to be put on hold and polio surveillance assets also need efficient re-engineering to optimize benefits for both the MR campaign and other vaccine-preventable diseases.
- (7) Consider putting forward a World Health Assembly resolution to activate the International Health Regulations, 2005 mechanism to escalate measles elimination and rubella control efforts with a recommendation to include vaccination to reduce their international spread.
- (8) Financing inadequacies need serious and urgent attention. Sustained budgetary support for regional activities as well as at the level of national governments is critical.

Specific recommendations

The current political and administrative environment in the South-East Asia Region is supportive of MR elimination. The Regional Office for South-East Asia should consider

working with Member States to capitalize on this political keenness to enhance country ownership and shift the trajectory of progress to the next level of functioning. This will also translate into an annual review of the Measles & Rubella Initiative (MRI) during the meeting of the WHO Regional Committee for South-East Asia and create accountability.

The momentum gained for measles eradication and for introducing RCV in all Member States (except the Democratic People's Republic of Korea) should be leveraged to integrate rubella elimination with measles elimination goals to optimize investments. Hence, Member States in the Region should consider declaring rubella elimination as a goal along with that of measles elimination.

The strategic area-specific recommendations

1. Ensuring optimal case-based surveillance

A top priority in achieving the goals of the Strategic Plan is to enhance integrated case-based, laboratory-supported MR surveillance.

- Member States in the Region should shift to broad fever and rash surveillance to increase the sensitivity of the surveillance system.
- Member States should continue monitoring the immunity gaps for both measles and rubella at national and subnational levels, including among the adult population.
- The Regional Office for South-East Asia should establish fortnightly or monthly country support meetings at the Regional Office to review surveillance data to identify weaknesses, silent areas and interventions. Also, there should be an in-depth analysis of surveillance data of three or four countries at every meeting.
- There should be a surveillance guide for vaccine-preventable diseases on integrated MR case-based surveillance, serum sample collection strategies to avoid overwhelming laboratories and prioritizing samples for genotypes.
- There must be coordination between field and laboratory, with assignment of an EPID number to each suspected case for tracking and final classification.
- Case classification to determine cases attributable to programme failure versus vaccine failure should be improved.
- Weekly review meetings within the Ministry of Health along with implementing partners using surveillance data for action at national/subnational levels should be initiated.

2. Improving immunization coverage and reducing the immunity gap

Augmented efforts are needed in the Region and in individual Member States to improve and maintain population immunity against measles and rubella.

- ◉ There is a need to undertake multidimensional diagnostics of immunization systems within each Member State to assess the current state of health of the routine immunization (RI) services and implement a tailored approach towards strengthening immunization coverage and reducing the immunity gap. To assess the current state of health of the RI services:
 - the Regional Office works with Member States to develop a tailored approach towards systems strengthening;
 - high quality SIAs ensure readiness planning, high-risk mapping, rapid coverage monitoring with special attention to high-risk regions, districts with poor coverage, and the urban poor.
- ◉ All Member States should be encouraged to introduce legislation with regard to school entry-/school-level checks for immunization.
- ◉ The 2nd year of life platform for catch up immunization, including for those who have missed MCV, should be used. However, children who miss MCV2 must be immunized even beyond the expected time and age schedules.
- ◉ MCV2 should be adopted as a marker of progress in achieving SDG goals.
- ◉ Immunization status checks should be adopted for at-risk populations, health-care workers, and teachers.

3. Ensuring a strong laboratory network to support case-based surveillance and genotyping

Laboratory network activities need to be optimized to support MR surveillance and to monitor the eradication process.

- ◉ WHO continues to have an important role in monitoring the External Quality Assurance (EQA) of RRLs and NLs.
- ◉ The responsibility for coordination and maintenance of the quality of Subnational laboratories (SNLs) should be with the national (reference) laboratory in that particular country, with support and guidance from the Regional Office.
- ◉ Regular MR genetic sequence information from the Region should be analysed and reported.
- ◉ WHO headquarters should conduct an updated IgM assay assessment to provide evidence for countries to make decisions on procurement of appropriate kits.
- ◉ WHO should continue to provide kits for low-income countries.

- The capacity of the South-East Asia Region Laboratory Network (LabNet) is appropriate for the current/expected workload; however, the full impact of rash and fever only surveillance is still unknown. Any subnational LabNet expansion needs to be balanced with a careful analysis of all the factors and a cost-benefit analysis exercise.
- Member States should ensure data harmonization between laboratory and surveillance and WHO should supervise and support these efforts.
- Regular MR genetic sequence information from the Region should be analysed and reported in the vaccine-preventable disease (VPD) surveillance bulletin, along with evidence of transmission patterns, both within the Region and globally.

4. Strengthening advocacy and communication strategies

Appropriate advocacy and programme communication strategies and tools are critical to furthering MR efforts and prevent vaccine resistance and vaccine hesitancy issues.

- WHO should include a review of the measles eradication and rubella control programme in the annual agenda of the meetings of the Regional Committee for South-East Asia to bring about focus and accountability.
- WHO must advocate with Member States for greater ownership and investment in the MR immunization programme.
- WHO should incorporate rubella elimination into the regional measles elimination goals.
- The national verification committees (NVC) should continue to play advocacy roles with their respective governments to achieve the MR elimination goal.
- WHO and Member States should urgently develop a well-thought-out media strategy to achieve a quantum impact on ongoing elimination efforts.
- WHO and Member States should develop a country-specific (tailored to subnational needs) budgeted social mobilization and communications plan for both MR activities under RI and supplementary immunization activity (SIA) campaigns.
- WHO should support and facilitate the systematic mapping of vaccine hesitancy and vaccine resistance and Member States are encouraged to develop context-specific debunking strategies.

5. Polio transition and the potential impact on MR goal

Polio transition plans need to be put on hold in GPEI-supported countries and polio surveillance assets need re-engineering to sustain the progress made and achieve the MR elimination goal.

- ◉ In view of the essential contribution of GPEI, polio transition plans (in the concerned Member States) need to be put on hold. The gains and assets accrued through the polio eradication programme are essential to sustain the progress made till global polio eradication takes place along with the critical contribution it is making to MR elimination/control targets.
- ◉ Polio surveillance assets also need efficient re-engineering to optimize benefits for both the MR campaign and other vaccine-preventable diseases.
- ◉ Till decisions to this effect are made, WHO should continue to support the development and implementation of the polio transition plans for GPEI-supported Member States while keeping in mind the imperatives of MRI.
- ◉ National governments must commit to ownership and greater investment in the translation of the polio transition plans on the ground.
- ◉ Development partners and multilateral agencies should continue to provide technical support to The Global Alliance for Vaccines and Immunization (GAVI)-eligible, GAVI-graduating and other countries.

6. Addressing emergency and conflict settings

Appropriate strategy and activities are needed to address MR efforts in emergency and conflict settings in the Region.

- ◉ WHO should consider putting forward a World Health Assembly resolution to activate the International Health Regulations (2005) mechanism to escalate measles elimination and rubella control efforts with the recommendation to include vaccination to reduce their international spread.
- ◉ WHO should develop MR-specific plans for emergency and conflict settings in the Region and also facilitate the development of country-specific plans, as applicable.
- ◉ WHO should develop a plan for the possible need for synchronized cross-border immunization activities in response to outbreaks.

7. Call for increasing investments in the Regional MR Strategic Plan

Financing inadequacies in the MR programme need serious and urgent attention. Sustained budgetary support for regional activities as well as at the level of national governments is critical.

- ◉ WHO should facilitate economic analyses at country and regional levels to document the actual cost analysis of programme implementation, cost-effectiveness analysis, and cost-benefit analysis/return on investment.

- WHO and Member States should allocate adequate resources and/or facilitate resource generation to meet the requirements of the Strategic Plan.
- WHO should establish institutions similar to an Inter-agency Coordinating Committee (ICC) in non-GAVI countries for better coordination between national governments and donors/partners.

8. Conducting operations and implementation research

WHO should help Member States formulate plans with regard to operations and implementation research to provide evidence of effective implementation of elimination strategies and address emerging programmatic challenges including but not limited to:

- Measles epidemiology: duration of protection after immunization, age when infants lose protection from maternal measles-specific antibodies in different epidemiological settings, susceptible population threshold to cause outbreak.
- Vaccine development, effectiveness and alternate better vaccine delivery methods: advantages of thermo-stable/controlled temperature chain (CTC) vaccines for delivery and coverage, advanced vaccine vial temperature monitors, self-reconstituting vials, alternative delivery methods (e.g. micro-needle patches, needle-free injection devices, aerosol, dry powder inhalation).
- Surveillance and laboratory methods: incidence of fever and maculopapular rashes in various epidemiological settings, impact of fever–rash surveillance on the national laboratory network, point-of-care testing devices to rapidly and accurately detect MR cases, molecular sequencing methods to distinguish between closely related genotypes to determine source of infection, more effective serology techniques with better specificity at and near elimination stage.
- Immunization strategies: effective strategies to maximize RI and SIA coverage in different epidemiological settings, improving data quality and use for action, efficient methods for monitoring routine first- and second-dose measles vaccination and SIA coverage, strategies to deal with vaccine hesitancy, effective and efficient strategy for outbreak immunization activities in near elimination settings.
- Mathematical modelling and economic analysis: most useful modelling approaches to estimate the threshold population size and susceptible density required to sustain MR virus transmission in various settings; cost–benefit analysis of measles elimination in countries. Adoption of novel methods to determine population immunity and level of herd immunity required in children and adults.

Conclusions

- The basic strategies articulated in the Strategic Plan are sound. The programme has gathered momentum in the South-East Asia Region with two countries verified as measles eliminated and two rapidly progressing towards elimination.
- However, the measles elimination and rubella/CRS control programme is NOT on track to achieve the ambitious goals by 2020.
- WHO and Member States will have to adopt an alternative strategy (across specific domains and activities) to achieve regional goals in time. This will require capitalizing on existing high degree of in-country political willingness and the enthusiasm of the programme managers.
- Major investments are necessary and much has to be done in a relatively short time, if regional goals are to be met according to the set timeline.
- The Regional Office for South-East Asia may consider convening a consultation of Member States, donors, partners and implementation agencies to develop a timeline for operationalizing MTR recommendations.

The mid-term review (MTR) of the Strategic Plan for Measles Elimination and Rubella and Congenital Rubella Syndrome Control in the South-East Asia Region, 2014–2020 was conducted between July and November 2017 by an independent group of experts.

The objectives of the MTR were to provide a candid review of progress towards achieving the regional goal by 2020 and assess the quality of implementation of the strategies laid out in the Strategic Plan. The MTR also aimed to provide recommendations on how the strategies and principles should be refined to accelerate progress towards the regional goal.

This publication provides the key observations, conclusions and recommendations made by the MTR team to accelerate progress towards elimination of measles and control of rubella/congenital rubella syndrome by 2020.

