

Review of progress and way forward on measles and rubella elimination activities in the WHO South-East Asia Region

1 October–30 November 2021 (Virtual)

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Review report

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The review would not have been successful without the extraordinary contribution of certain people. Sincere gratitude is expressed to the review coordinator Dr Keith Feldon, and Dr Jon Andrus and the entire review team whose contribution and willingness to facilitate discussions with country teams was critical to ensure a holistic review of the measles and rubella elimination effort in the Region.

The Immunizations and Vaccines Development (IVD) team at the WHO Regional Office, comprising Dr Sunil Bahl (coordinator, COVAX IVD), Dr Sudhir Khanal (Technical Officer for Measles) and Dr Lucky Sangal (Virologist), along with all other technical and administrative support personnel, deserves appreciation for the constant support, guidance and inputs provided throughout the review process.

All the participants of this review are offered special thanks for their contribution and availability, which helped in timely execution of the study. This review would not have been possible without the participants' reflections and endless patience and acumen in reinforcing the review team's understanding and come to reasonable conclusions.

List of abbreviations

ANM	auxiliary nurse midwife
BeSD	behaviour and social drivers
b-OPV	bivalent oral polio vaccine
cEPI	central Expanded Programme on Immunization
cMYPA	comprehensive multiyear plan of action
COVID-19	coronavirus disease 2019
CRS	congenital rubella syndrome
CSO	civil society organization
EAPRO	East-Asia & Pacific Regional Office (of UNICEF)
EHO	ethnic health organization
EPI	Expanded Programme on Immunization
GAVI	Gavi, the vaccine alliance
GP	general practitioner
INGO	international nongovernmental organization
IPV	inactivated polio virus
ITAG	Immunization Technical Advisory Group
IVD	Immunizations and Vaccines Development
MAP	micro array patches
MCV1	first dose of measles-containing vaccine
MoH	Ministry of Health
MoPH	Ministry of Public Health
MR	measles–rubella
MRCV1	first dose of measles and rubella-containing vaccine

MRCV2	second dose of measles and rubella-containing vaccine
MRE	measles and rubella elimination
NGO	nongovernmental organization
NIH	National Institute of Health
NITAG	National Immunization Technical Advisory Group
NVC	National Verification Commission for measles and rubella elimination
RI	routine immunization
ROSA	Regional Office for South-Asia (of UNICEF)
RRT	rapid response team
SEA	South-East Asia
SEA RVC	South-East Asia Regional Verification Commission for measles and rubella elimination
SEARO	South-East Asia Regional Office (of WHO)
SIA	supplementary immunization activities
SMS	short messaging service
UNICEF	United Nations Children's Fund
US CDC	United States Centers for Disease Control, Atlanta
VPD	vaccine-preventable disease
WHO	World Health Organization

Executive summary

The elimination of measles and rubella (MRE) in the South-East Asia Region by 2023 is a Regional Flagship Programme of the WHO South-East Asia (SEA) Region. Measles kills and rubella maims. Other reasons the Region has shouldered this extraordinary effort include: the opportunity to continue to build on the success of essential immunization programmes and polio eradication in the Region; and the recognition of the fact that measles antigen provides by far the highest return on investment among all the antigens offered in the national programmes. Certainly, this return on investment would be even higher if other factors were considered, such as the devastating immune amnesia that results from natural measles virus infection, as well as the added benefit of preventing rubella congenital syndrome with a combination vaccine.

To that end, extraordinary progress has been made to date in the SE Asia Region with five countries verified as having eliminated measles (Bhutan, Democratic People's Republic of Korea, Maldives, Sri Lanka and Timor-Leste), and two countries verified for eliminating rubella (Maldives and Sri Lanka). However, challenges in the form of immunity gaps; suboptimal sensitivity of surveillance; shortage of molecular epidemiology data; inadequate preparations for and implementation of outbreak response and preparedness; and the negative impact of the COVID-19 pandemic on immunization programmes threaten the achievement of the 2023 target.

About 22% of the children in the 2020 birth cohort in the Region are under-vaccinated. Accordingly, the WHO Regional Office for South-East Asia (SEARO) set up an independent 12-member review team of international experts to conduct a desk-top review, during the period 1–20 October 2021, of the progress towards MRE by 2023.

The specific objectives of the review were to: i) provide a candid estimation or review of the progress towards achieving the regional goal by 2023; ii) assess the quality of implementation of strategies laid out in the "Strategic Plan for Measles and Rubella Elimination in the WHO SE Asia Region 2020–2024" in the context of the COVID-19 pandemic, and provide recommendations on how the strategies and principles should be refined to accelerate progress towards the regional goal; iii) review subnational data on immunization coverage and surveillance indicators to plug the immunity gaps in countries of the Region; iv) identify risks and barriers for countries to progress and ways and means to address them with urgency; and v) recommend a set of political and programmatic priorities over the next three years (2022–2024) for implementers, measles endemic countries and donors in order to accelerate progress towards achieving the goal.

The review team concluded that four of the five strategic objectives in the Strategic Plan for MRE 2020–2024 are off track (namely surveillance, immunization coverage & immunity, outbreak preparedness and response & linkages). Clearly, the COVID-19 pandemic disrupted many national programmes, especially with regard to essential immunization services and surveillance. The review

team concluded that MRE will be achieved in the Region, but this achievement is highly unlikely by the 2023 target.

The review team, however, identified many opportunities going forward to revitalize focus and enhance regional MRE efforts. Accountability and advocacy for MRE, hampered by COVID-19, could actually be addressed as an incredible opportunity to further the agenda. To that end, the district-level “Task Force” or emergency operation centres should be re-assembled under the leadership of the district commissioners (or equivalent), to engage at the local level all sectors of civil society towards achieving the target, while greatly strengthening essential immunization services.

This was a key lesson learned from polio eradication. Countries such as India have also assembled MR-specific technical expert advisory groups to provide oversight into and guidance for national efforts. When appropriate, countries should embrace all operational and implementation research opportunities. These include opportunities to support new innovations (such as field trials to expedite development and regulatory clearance of rapid diagnostic tests and micro array patches (MAPs)), as well as operational research to identify missed opportunities for vaccination and zero-dose children.

Great progress has been made; nevertheless, the highest level of political commitment with WHO and partner support will be required in every country to rapidly reverse emerging immunity gaps through strengthened immunization services and SIAs; transition to “elimination quality” surveillance with adequate molecular epidemiology data; revitalize district level engagement and accountability; improve field guides and technical cooperation with standardized case definitions and laboratory procedures; enhance communication to promote immunization and address vaccine hesitancy; employ new innovative technologies for surveillance and vaccination; and strengthen the integration of MRE activities with the prevention and control of COVID-19.

The review team also strongly feels that all countries need to fast-track preparations in order to respond adequately to an inevitable global measles crisis in the near future as a result of immunity gaps created by COVID-19. Political commitment and excellence in technical and operational deployment remain critical.

Background

Studies indicate that the return on investment provided by essential immunization programmes in developing countries is one of the “best buys” in public health. The measles vaccine alone provides more than 50% of that return on investment. Given that measles kills, measles vaccination is the most important essential immunization service countries have to offer. The return on investment when vaccination for congenital rubella syndrome is also considered further substantiates the support provided to the measles rubella efforts.

The Seventy-second session of the WHO Regional Committee for South-East Asia in September 2019 endorsed resolution SEA/RC72/R3 calling for “measles and rubella elimination from the Region by 2023”. The elimination of measles and rubella by 2023 is one of the Flagship Priority Programmes of the WHO Regional Director for South-East Asia. To ensure adequate technical guidance to accelerate progress towards the measles and rubella elimination goal, a Strategic Plan for Measles and Rubella Elimination in the WHO South-East Asia Region 2020–2024 was also developed.

Since 2014, significant progress has been made in the Region towards measles and rubella elimination. Five countries have achieved, and sustained, measles elimination and two countries have achieved rubella elimination.

Unfortunately, the COVID-19 pandemic definitely has negatively impacted the implementation of the strategies for measles and rubella elimination. The estimated coverage with the first dose of measles-containing vaccine (MCV1) in the Region declined to 88% in 2020 compared with 94% in 2019. Similarly, coverage with the second dose of measles-containing vaccine declined to 78% in 2020 compared with 83% in 2019. Of the eight planned Measles Rubella Supplemental Immunization Activities (MR SIAs) in the Region, one was completed on time, two were reinstated, one was cancelled and four were postponed to the next year, i.e. 2021. Challenges in the form of subnational immunity gaps with imminent outbreaks, suboptimal sensitivity of surveillance and financial insufficiency pose a formidable risk to the achievement of the South-East Asia regional target of measles and rubella elimination by 2023.

Currently, countries in the WHO South-East Asia Region are in the process of developing and refining strategic, operational and policy guidelines for reviving immunization and surveillance activities following the COVID-19 pandemic. It is critical to identify gaps in performance at national and subnational levels following the COVID-19 pandemic and to develop tailored strategies to reach the target of zero endemic measles and rubella cases.

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Objectives

The objectives of the assessment are to:

- (1) provide a candid review of progress towards achieving the regional goal as of 2020;
- (2) assess the quality of implementation of the strategies laid out in the “Strategic Plan for Measles and Rubella Elimination in the WHO South-East Asia Region 2020–2024” in the context of COVID-19 pandemic, and provide recommendations on how the strategies and principles should be refined to accelerate progress towards the regional goal;
- (3) review the subnational data on immunization coverage and surveillance indicators and recommend tailored strategies to plug the immunity gaps in countries in the Region;
- (4) identify risks and barriers for countries to progress and ways and means to address them with urgency; and
- (5) recommend a set of political and programmatic priorities over the next three years (2022–2024) for implementers, measles-endemic countries and donors, in order to accelerate progress towards achieving the regional goal.

Measles Rubella elimination review methodology

A modified Delphi^{1,2} technique was used for the review.

A 13-member review team of subject matter experts was assembled. This consisted of public health experts in immunization, surveillance, vaccine preventable disease laboratory support, and communications who were independent consultants, as well as representatives from the United States Centers for Disease Control, Gavi, and UNICEF headquarters and regional offices (Annex-3). Staff of the WHO Regional Office for SE Asia served as the Secretariat to provide administrative and information technology support.

A Review Team Coordinator was responsible for overall coordination, development of the review and interview parameters, while the other team review members were grouped into three teams each being allocated three or four Member States of the SE Asia Region to review. Due to the COVID-19 pandemic, the review was conducted virtually, and no direct country visits could be made. The review was conducted between 1 and 20 October 2021.

Following two review team orientation sessions, the reviewers were tasked with reviewing documents and discussing with country teams. The reviewers then wrote country team reports and participated in a debrief with teams from SEARO and the country offices. The review team coordinator developed standard tools for the document review, in-depth country team interviews, team reports, and revised tools according to the inputs of the review team during orientation sessions. The reviewers were split into three teams so that each team could concentrate on 3–4 countries rather than try to review all countries. Considerations for the team composition were that no one should review their own country of origin, allowances be made for time zone differences, members should possess expertise in the different programme areas, and no member of the WHO Secretariat should play the role of a direct interviewer in the country discussions.

The members of Team A were Dr Shahina Tabassum (independent expert), Dr Ahmed Kassem from the US CDC (co-facilitator), Dr Gunter Boussey of UNICEF's Regional Office for South Asia (ROSA), Dr Sanjay Bhardwaj from UNICEF headquarters (co-facilitator) and Ms Kristine Brusletto from Gavi headquarters. Team A reviewed India, Nepal, Bhutan and Sri Lanka. The rationale for the choice was that three of the four countries shared land borders and one country had already achieved elimination of measles and rubella.

1 Bernice B. Brown (1968). "Delphi Process: A Methodology Used for the Elicitation of Opinions of Experts.": An earlier paper published by RAND (Document No: P-3925, 1968, 15 pages)

2 Harold A. Linstone, Murray Turoff (1975), *The Delphi Method: Techniques and Applications*, Reading, Mass.: Addison-Wesley, ISBN 978-0-201-04294-8, archived from the original on 2008-05-20

Members of Team B were Dr Kumnuang Ungchusak (co-facilitator), Dr Khin Devi Aung of UNICEF's East Asia & Pacific Regional Office (EAPRO), Ms Sara Sa Silva from Gavi headquarters, and Dr Susan Reef of the USCDC (co-facilitator). Team B reviewed Indonesia, Timor-Leste and the Democratic People's Republic (DPR) of Korea. The rationale for this grouping was also similar: two countries shared a land border and one country had already achieved elimination for measles.

Members of Team C were Mr Keith Feldon (facilitator), Dr Michelle Morales of the US CDC, and Dr Azar Abid Raja of UNICEF ROSA. Team C reviewed Bangladesh, Thailand, Myanmar and Maldives. In this group there were three countries that shared a land border, one populous country nearing elimination and one country having already achieved measles and rubella elimination.

Documents that were reviewed included:

- ◉ NVC report submitted to sixth SEA-RVC
- ◉ NITAG report submitted to the Twelfth ITAG Meeting
- ◉ National MR strategy/plan
- ◉ Surveillance field guide
- ◉ cMYPAs
- ◉ EPI factsheets for all countries
- ◉ Others (as required by reviewers)

These documents were available on sharepoint at the following link: <https://worldhealthorg.sharepoint.com/sites/SETTOOLS/MRReview/> (protected domain only and accessible to reviewers).

The programme areas in the documents reviewed were:

- ◉ Epidemiology and disease burden
- ◉ Immunization and population immunity
- ◉ Surveillance and laboratory network/collaboration
- ◉ Outbreak response plans and response
- ◉ Health system linkages
- ◉ Advocacy/social mobilization/communication
- ◉ Mitigation of impact of the COVID-19 pandemic on MR elimination
- ◉ Sustainability/commitment

The review teams conducted interviews with each country they were assigned to. Each country assembled a national team for this process that comprised Ministry of Health personnel from immunization, surveillance and laboratory departments along with WHO and UNICEF measles and rubella focal points. Each country team presented the key points on the same programme areas as the document review. Review teams could then request clarifications or ask additional questions that especially focused on what has been done and what will be done with regard to the five regional

measles rubella strategic objectives: closing immunity gaps; case-based surveillance for acute fever and maculopapular rash; laboratory support for surveillance; outbreak response preparedness and response and linkages. The country teams were also asked to present their critical next steps.

The country review team discussions/interviews were conducted over two weeks. Each review team interviewed a single country team on one day and asked for an additional session if needed to clarify points already made or to seek additional information. Country review teams prepared reports for each country reviewed following a mini-Delphi process to come to a conclusion and develop recommendations. A debriefing of their work was held with SEARO and the country teams on 17 November.

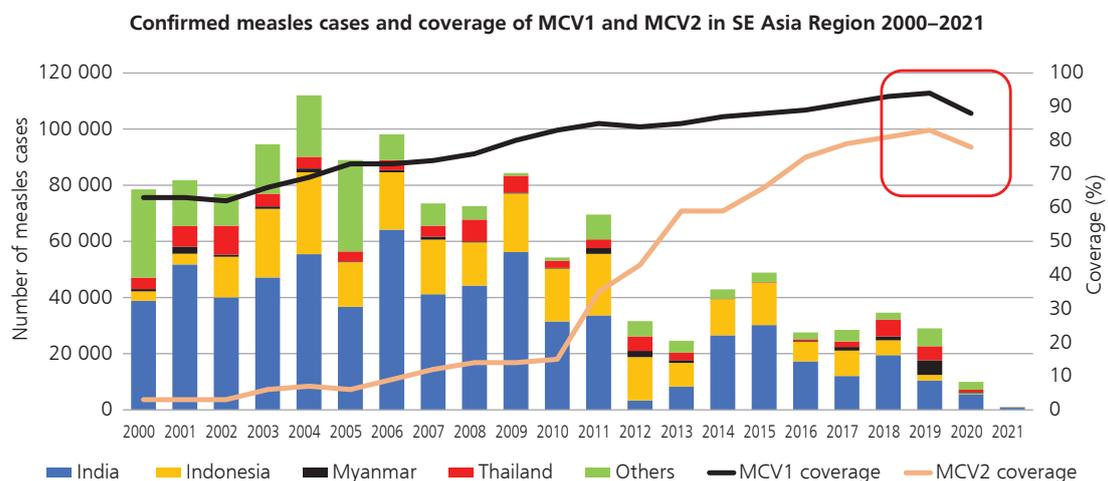
Findings from the review teams

NOTE: Overall findings are included within the body of this document, while the attached country reports in the annexes contain detailed findings, conclusions and recommendations for each country.

Immunization

Prior to the COVID-19 pandemic, the region was making remarkable progress with immunization coverage and towards closing immunity gaps. The pandemic brought immunization delivery services to a standstill in many parts of the Region, as sessions were postponed, and many vaccinators were repurposed for COVID-19 activities. In addition, while the pandemic raged the community avoided health facilities and outreach sessions, largely due to concerns about becoming infected while getting vaccinated or waiting in queue for vaccination. Many MR SIAs were postponed, while only a few countries managed to successfully conduct their national SIA despite the challenges of the pandemic. Two countries had their vaccine supplies disrupted and this impaired immunization delivery (DPR Korea due to the COVID-19 quarantines related to external supplies and Myanmar because of the internal political unrest).

Fig. 1. Coverage of first and second dose of measles-containing vaccine and number of measles cases by country by year in the SE Asia Region, 2000–2021



Source: WHO/UNICEF coverage estimates, July 2020 and WHO/UNICEF JRF and EPI/MoHFW; Measles cases from JRF 2000–2019 and 2020 and 2021 from SEA Region MR surveillance database as of 12 April 2021

Fig. 2. Number of unvaccinated and partially vaccinated children for measles in countries of the SE Asia Region based on WHO-UNICEF estimates, 2020

Country	Under-1-year population	MCV/RCV zero dose children		MCV partially vaccinated	
		Number	%	Number	%
Bangladesh	3 293 482	98 804	3%	131 739	4%
Bhutan	10 600	742	7%	106	1%
DPR Korea	306 153	3 062	1%	–	0%
India	26 451 880	2 909 707	11%	2 116 150	8%
Indonesia	4 650 109	1 116 026	24%	1 255 529	27%
Maldives	8 853	89	1%	266	3%
Myanmar	927 884	83 510	9%	9 279	1%
Nepal	620 739	80 696	13%	80 696	13%
Sri Lanka	352 554	14 102	4%	–	0%
Thailand	577 133	51 942	9%	–	0%
Timor-Leste	31 905	6 700	21%	319	1%
SE Asia Region	37 231 292	4 365 379	12%	3 594 085	10%

Source: Calculation done based on the population under 1 year of age from JRAF 2020 submitted by Member States and WHO/UNICEF joint estimate for 2020, July 2021

Several Member States of the Region, however, had not achieved the required uniform >95% MRCV1 and MRCV2 coverage rates. The reasons for this shortcoming include the fact that countries still have pockets of missed children from migrant populations, hard-to-reach areas, and some degree of vaccine hesitancy. Such challenges were most pronounced in urban and peri-urban settings. Outbreaks of measles and rubella among schoolaged children and young adults reveal that immunity gaps remain in older age groups. Unfortunately, health workers are not completely vaccinated in several of the countries. Unvaccinated health workers will amplify future outbreaks of measles and rubella and they remain a huge concern for the initiative.

Key findings from the review teams

Impact of COVID-19

- ◉ It is commendable that all countries continued immunization activities despite the COVID-19 pandemic, yet not without impact!
- ◉ *Of the 2020 SE Asia Region birth cohort, 22% of the children are under-vaccinated; 12% of the children have had zero doses! For national programmes, it is not a question of “if” huge measles and rubella outbreaks will occur, but “when”.*

- ◉ COVID-19 has led to repurposing of staff, vaccine supply interruptions, session delays, outreach cancellation and caregiver hesitancy about coming to vaccination sessions, as well as SIA postponement.
- ◉ At the same time, countries have used their COVID-19 mitigation and prevention efforts as a platform to also promote childhood immunization.
- ◉ Immunization services have been severely curtailed in the Democratic People's Republic of Korea due to the vaccine supply quarantines that had been imposed since December 2019.

Existing immunity issues

- ◉ High-risk groups have been identified in most countries. But countries still need to quantify and map their numbers more accurately. Such data must be incorporated into revised micro-plans. Migration to home areas or other places due to COVID-19 may have led ongoing immunization microplans to become outdated.
- ◉ Immunization services have been disrupted in Myanmar due to the civil and political unrest since February 2021.
- ◉ Urban immunization presents a substantial challenge to almost all countries, largely due to the influx of economic migration, both internal and external, difficulty in accessing working parents, reduced outreach/monitoring, and a greater degree of vaccine hesitancy.
- ◉ Data quality issues at the subnational level exist in most countries; target denominators have not always accounted for recent population movements.
- ◉ Vaccine hesitancy is definitely an increasing problem in some countries, especially in urban areas and among some identified high-risk groups.
- ◉ Selective SIAs have not achieved the high coverage necessary for reaching elimination status compared with non-selective SIAs. Indeed, the global literature lacks adequate documentation that non-selective SIAs achieve zero endemic cases in highly endemic developing countries.
- ◉ Health workers are not uniformly vaccinated for MR in several countries; this concern has been noted earlier.

Good practices

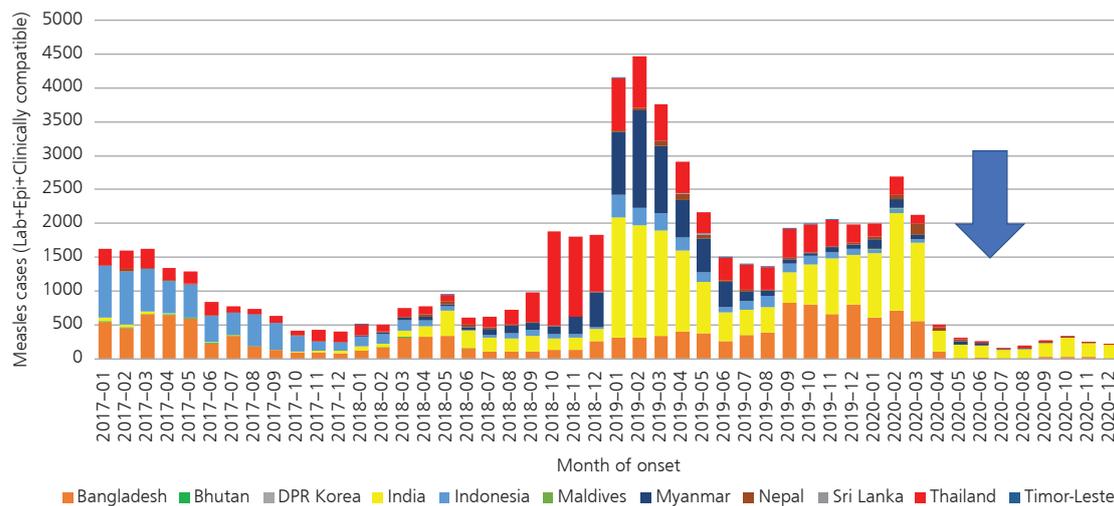
- ◉ Bangladesh and Nepal conducted successful national SIAs despite the challenges, achieving more than 95% reported vaccination coverage.
- ◉ Nepal increased the age for children who missed routine vaccination from the previous age cap of 2 years to a new age cap of 5 years. Other countries are considering adopting the same policy.
- ◉ Some countries (Bhutan, DPR Korea, Maldives and Thailand) are attempting to address immunity gaps among older-age high-risk groups while others need to explore opportunities such as in the workplace and other institutions.
- ◉ Regular MR vaccination in schools has been initiated in Indonesia; and in the recent past it remains at <90%.

- Bhutan, Maldives and Sri Lanka have effectively used school entry checks to identify children who have missed vaccination.
- Several countries have attempted assessments on declining coverage and seeking possible explanations to this.

Surveillance

In 2020 the reported number of confirmed measles and rubella cases and outbreaks have dramatically declined in the Region, probably the result of restrictive measures put in place by most countries followed by repurposing of surveillance staff to the COVID-19 response that prevented implementing surveillance activities. The physical and social distancing measures, and possibly the immunity developed from pre-2020 outbreaks, may have also contributed to this. Surveillance performance indicators have alarmingly declined, another possible reason why case counts have been low since the advent of the COVID-19 pandemic. Most countries are now challenged with a dramatic increase in the number of low-performing districts.

Fig. 3. Number of measles cases by month and country, SE Asia Region, 2017–2020



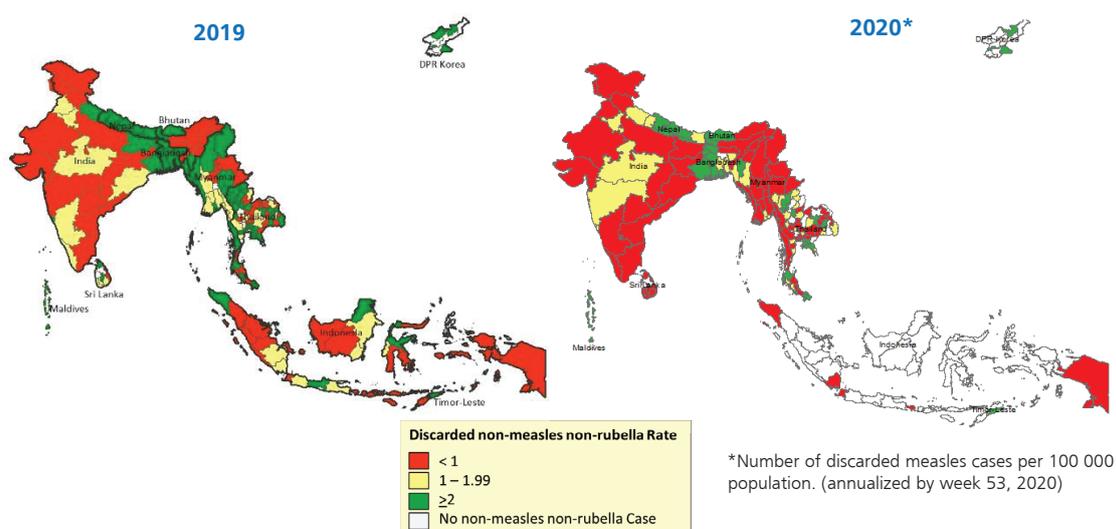
*Data Source: SEAR MR Surveillance database as of 13 January 2021

Fig. 4. Key measles and rubella surveillance performance indicators, 2019–2020, SE Asia Region

Countries	Reporting rate of discarded non-measles non-rubella cases per 100 000 population		% districts reporting at least 2 discarded non-measles non-rubella cases per 100 000 population	
	2019	2020	2019	2020
Bangladesh	3.35	1.91	91	50
Bhutan	39.72	15.98	85	50
DPR Korea	2.10	1.82	ND	ND
India	1.05	0.74	16	11
Indonesia	1.92	0.77	21	6
Maldives	18.40	41.36	ND	ND
Myanmar	2.43	0.42	37	6
Nepal	5.53	3.13	92	81
Sri Lanka	1.55	0.33	27	0
Thailand	5.99	1.61	ND	ND
Timor-Leste	31.63	6.77	38	46
SE Asia Region	1.68	0.92		

Data Source: SEAR MR Surveillance database as of 13 January 2021

Fig. 5. Non-measles non-rubella discarded case rate per 100 000 population by first subnational level, 2019–2020, SE Asia Region



*Data Source: SEAR MR Surveillance database as of 13 January 2021

Compared with immunization service delivery, surveillance activities were perhaps even more negatively affected by the pandemic due to vaccine preventable disease surveillance staff being generally repurposed for COVID-19 prevention and control activities. In addition, travel restrictions during the pandemic clearly impeded case and outbreak investigations, as well as restricting active search/supervision in health facilities and face-to-face trainings/orientations, critically needed for sustaining quality of surveillance. COVID-19 restrictions also affected the process for collection and transport of specimens to laboratories, especially from remote areas where lockdowns or cancellation of air services have been prevalent. Nevertheless, surveillance activities continued, though with less rigour, supervision and follow-up.

Key areas for improvement in many countries in the surveillance prior to the outbreak of COVID-19 included: incomplete reporting network, insufficient inclusion of key private facilities, gaps in specimen collection and transport particularly for throat swabs and urine specimens, in addition to late transport of specimens to laboratories. Inadequate cross-border cooperation and collaboration remain key issues for all countries in the Region. The pandemic clearly amplified the pre-existing challenges for countries to achieve effective, high-quality surveillance.

Key findings from the review teams

Impact of COVID-19

- ◉ As mentioned above, in summary, commendable MR surveillance continued during the pandemic but the results have declined as staff have been repurposed for COVID-19, limitations have been imposed on staff movement along with restrictions on transportation of samples, and the inability to visit hospitals by patients leading to lack of patient flow at OPDs.
- ◉ The non-measles, non-rubella discard rate in the Region in 2020 was only 0.92/100 000 population compared with the standard 2/100 000.
- ◉ Except Nepal, no country had >50% of districts with a 2/100 000 non-measles, non-rubella discard rate.
- ◉ Late reporting and delayed transportation of samples to the laboratory affected almost every country.

Existing surveillance-specific issues

- ◉ While the current UN rules of engagement are in place, and to avoid the impending disaster of future measles and rubella outbreaks, Myanmar should immediately train ethnic health organizations (EHO), NGOs and other CSOs to perform high-quality vaccine-preventable disease (VPD) surveillance in the country.
- ◉ Zero reporting was incomplete or not done in some of the countries.
- ◉ The reporting networks did not include all key health facilities, especially in the private sector.
- ◉ It emerged from the country review and discussions that the CRS surveillance system requires expansion or more attention in most countries (Bangladesh, Bhutan, Indonesia and Nepal need to strengthen their systems; India is in need of both strengthening and expansion; Maldives requires to expand the system and its functioning needs to be restored in Myanmar).

- ◉ Insufficient advocacy with physicians and community about surveillance needs urgent attention.
- ◉ Throat swabs and urine specimens required for molecular epidemiology are not routinely collected in most countries.
- ◉ International cross-border coordination requires urgent attention for several Member States (including countries of the Mekong Basin, as well as Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka) if MRE has to be achieved.

Good practices

- ◉ Sri Lanka left their VPD surveillance staff in place for COVID-19. In all other countries staff were also deployed for COVID-19 duties, but still managed to continue their MR activities. Such actions in the face of crisis are commendable.
- ◉ Several countries adopted telephone, WhatsApp and/or other virtual technology or mediums for active surveillance, training, supervision, monitoring and reviews.
- ◉ Several countries continued to do VPD surveillance training, while integrating these training activities with COVID-19-specific surveillance issues.
- ◉ Bangladesh and India conducted comprehensive internal surveillance reviews. Such actions are again commendable. These countries recognized the importance of implementing and sustaining integrated VPD and COVID-19 surveillance.

Laboratory

The SE Asia Region laboratory network consists of one regional reference laboratory, two national reference laboratories, 23 national laboratories and 23 subnational laboratories. This network continued to function reasonably well in several countries during the COVID-19 pandemic, partially due to a decrease in specimens provided for measles–rubella analysis, while simultaneously doubling of services for COVID-19 testing. All national laboratories and almost all subnational laboratories within the regional network were accredited and passed their MR quality assurance tests. Brief supply chain disruptions for laboratory reagents and kits were reported from most countries, with DPR Korea suffering a complete cut-off due to COVID-19 quarantine of supplies, and Indonesia having trouble with sustaining sufficient supplies due to internal procurement and transport restrictions. COVID-19 also affected the transport of laboratory panel tests for quality assurance.

Countries continue to be challenged with the dearth of genotyping and genetic sequencing data required for achieving elimination. As such, many countries are prevented from advancing into an elimination mode required for reaching zero endemic cases. Laboratories are not receiving sufficient throat swabs and urine specimens from the field. Additionally, countries without the current capacity to implement molecular testing need to urgently expand and build their capacity to conduct tests in their own country laboratories, and in some cases at the subnational level, as well. Better collection and transport of specimens in remote areas can be facilitated by the expansion of the laboratory network in the countries concerned.

Fig. 6. Measles and rubella laboratory network in the WHO South-East Asia Region, 2021

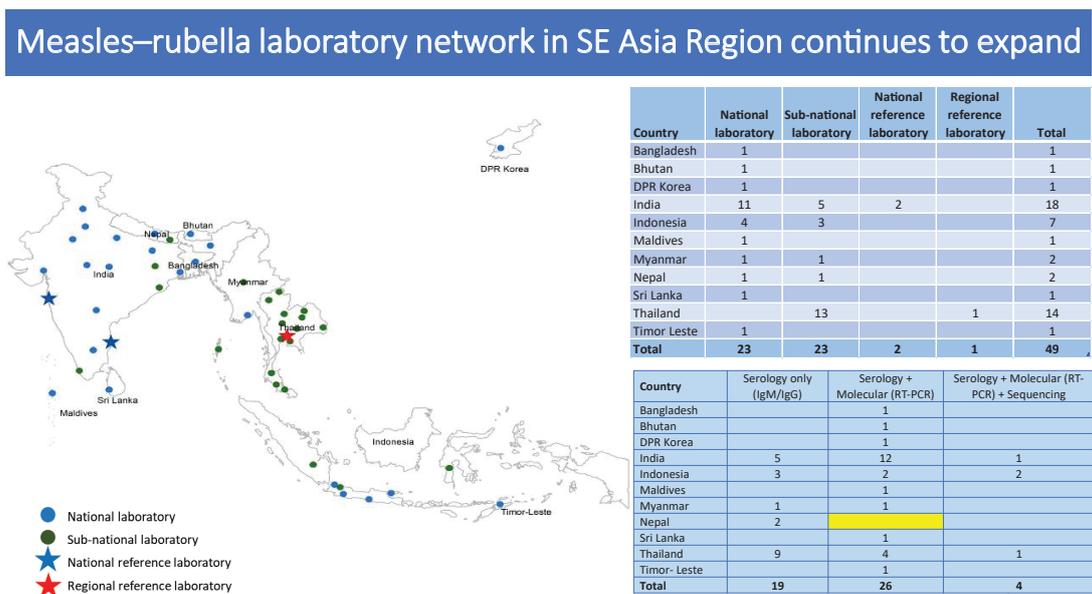


Fig. 7. Key laboratory performance indicators for measles and rubella, SE Asia Region, 2019–2020

Countries	Number of serum specimens received in laboratory		% serum specimens received at laboratory within 5 days of collection		% specimens tested for serology of specimens received in the laboratory		% serology results reported within 4 days of specimen received at laboratory	
	2019	2020	2019	2020	2019	2020	2019	2020
Bangladesh	9 848	4 470	100	99	100	100	86	53
Bhutan	280	109	65	69	98	99	90	99
DPR Korea	510	458	100	100	83	100	100	53
India	18 592	11 888	100	98	95	96	84	83
Indonesia	6 606	2 876	96	99	87	83	89	76
Maldives	56	244	88	98	100	100	85	100
Myanmar	4 807	442	96	95	100	100	84	100
Nepal	2 026	1 227	94	100	100	100	92	83
Sri Lanka	360	73	82	79	98	97	92	93
Thailand	7 866	1 532	57	65	98	98	100	100
Timor-Leste	444	100	100	97	98	93	100	100
SE Asia Region	51 395	23 419	92	96	96	96	91	85

*Data Source: SEAR MR Surveillance database as of 13 January 2021

Key findings from the review teams

Impact of COVID-19

- ◉ The designated measles–rubella laboratories continued to function reasonably well for MR surveillance, which is explained by the decrease in MR serum specimens received despite the increased workload from COVID-19 testing.
- ◉ There was disruption in the supply of reagents and test kits in some countries, with DPR Korea having their supplies completely blocked due to the COVID-19 quarantines and restrictions imposed beginning early 2020.
- ◉ Advocacy is required to galvanize political commitment in Indonesia to provide resources and support for procurement and distribution of non-locally made laboratory supplies and for transport of specimens, all of which became even more challenging during the COVID-19 pandemic.

Existing laboratory issues

- ◉ Functioning of the Myanmar national laboratory was disrupted for MR testing from February to September 2021.
- ◉ Laboratory network services need to be expanded in Bangladesh, Bhutan, Indonesia, Myanmar, Nepal and Sri Lanka.
- ◉ All countries except Thailand and India need to enhance their capacity to conduct molecular testing at either national or subnational levels (Bangladesh, Bhutan, Maldives, Nepal and Timor-Leste rely on the Regional Reference Laboratory (RRL) for measles–rubella sequencing).
- ◉ Harmonization of surveillance and laboratory data is still an issue in a few countries.
- ◉ There is little analysis of genetic sequencing results performed at country level to determine sources of infection.
- ◉ Problems with specimen collection and transport from remote areas in some countries still exist, particularly in those that need laboratory expansion.
- ◉ Most countries require more effective coordination with their private laboratories.

Good practices

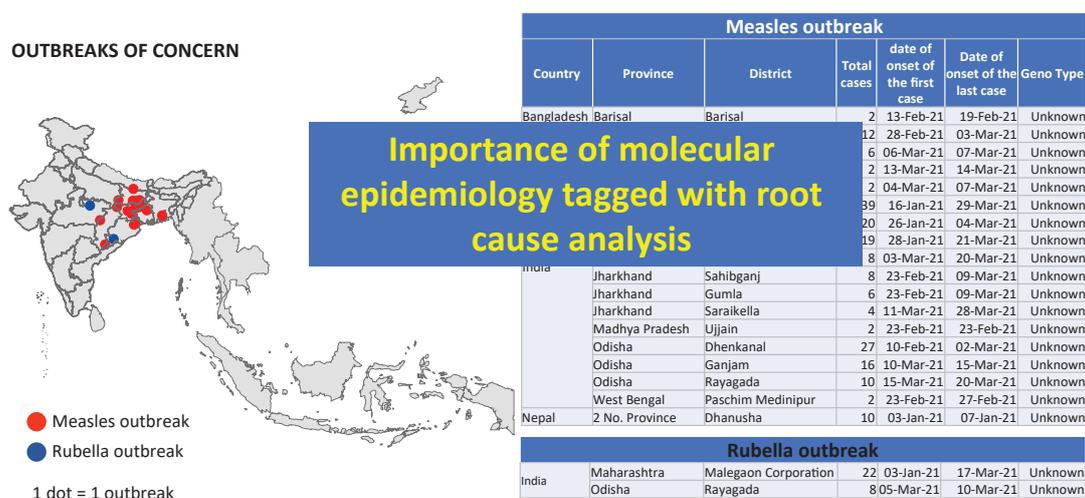
- ◉ Countries sustained laboratory-supported, case-based surveillance established in all 11 countries.
- ◉ The designated measles–rubella laboratories continued to function reasonably well for MR surveillance, despite the increased workload from COVID-19.
- ◉ All national laboratories have been WHO-accredited although DPR Korea is grappling with problems in recent times since the COVID-19 outbreak and will need to be reassessed.

Outbreak preparedness and response

Outbreak preparedness and response is facilitated by every country having a strategy, either in their measles–rubella elimination strategic plan, and/or in their surveillance plans. Several of the countries have designated rapid response teams (RRT) to investigate and respond to outbreaks. Also, there were some countries which preserved stockpiles of vaccines and other supplies for outbreak response. Countries that have not experienced recent outbreaks may be out of touch with outbreak response and will require refresher training and exercises.

Fig. 8. Reported measles and rubella outbreaks in the SE Asia Region, 2020

Capacity and preparedness for outbreak response in all countries



*Data Source: SEAR MR Surveillance database as of 12 April 2021

During 2020–2021, few outbreaks were reported in the Region (18 cases of measles and two of rubella). Some countries (Indonesia, Thailand and Timor-Leste) reported that outbreak investigation was affected by COVID-19 travel restrictions (especially for laboratory sample transport), lockdowns and repurposing of VPD surveillance staff. Some outbreaks initially reported with a few cases were not investigated further. Outbreak response varied among countries in terms of immunization approaches, vitamin A distribution and administration, contact-tracing and active case search.

In many outbreaks, response teams did not regularly collect throat swabs and urine specimens for genotyping and genetic sequencing. Such deficiencies in programme performance are lost opportunities to identify sources of infection and build the databank of genotypes for future outbreak genetic linkages.

Root cause analysis (RCA) was not routinely done for all outbreaks. In addition, the quality of country risk analysis varied substantially. Such risk analyses often lacked the desired rigour. Risk analyses were often only performed in larger administrative areas, such as provinces with a population of between 500 000 to 1 000 000 in medium-sized countries, and district-level (population between 500 000 and 6 million) in larger countries. This type of analysis can miss pockets within a province or district that overall may not otherwise qualify as “at risk”.

Key findings from the review teams

On existing outbreak response preparedness and response issues

- ◉ Outbreak response varies between countries, particularly the outbreak response immunization and treatment of suspect cases.
- ◉ The definition of “outbreak” to determine what will trigger a response is not standard among the countries depending on their endemic or elimination status. For purposes of achieving the elimination target, which is zero endemic cases, even one case should be considered an outbreak.
- ◉ Myanmar in the current situation will have to depend on external partners or the unmonitored de facto governments in ethnic communities for outbreak response.
- ◉ Some countries have not had any recent experience with responding to outbreaks and, therefore, may have lost the capacity to mount an appropriate, timely response.
- ◉ Not all outbreaks undergo investigation. Even single cases reported by a health facility should call for appropriate response and follow-up measures to be implemented.
- ◉ Not all countries have designated rapid response teams for outbreak response.
- ◉ Throat swabs and urine specimens are not regularly taken for genotyping.
- ◉ Root cause analysis is not often done for all outbreaks.
- ◉ Risk analysis is extended to an area too large such as provinces for medium-sized countries and districts for larger-sized countries. The opportunities to “unearth” hidden areas of risk, thereby mitigating unnecessary, adverse health outcomes, are missed.
- ◉ Cross-border coordination and cooperation for risk analysis and outbreak response is infrequent or not done at all.

Good practices

- ◉ All the countries have an outbreak response plan in place. Most plans guide the correct implementation of control and containment measures, although some are not funded and may depend on external agencies for support. As a result, delays occur, resulting in increasing viral spread and damage.
- ◉ Some countries such as Thailand have designated a vaccine stock for outbreak response.
- ◉ A few outbreak investigations were able to collect appropriate specimens from which genotypes were determined.

Linkages

All the countries have functioning national verification committees (NVC), immunization technical advisory groups (NITAGs) and an immunization coordination body. With the advent of the COVID-19 pandemic, all the measles–rubella activities must be coordinated and conducted within the context of COVID-19 in order to have the greatest health impact, especially with mortality reduction. Conversely,

the vaccination efforts for COVID-19 were also used to promote childhood immunization, which engendered a greater awareness about immunization in general among the population. The interaction with COVID-19 task forces that was necessitated was an opportunity for the MRE initiative to work with different government sectors and new partners.

However, the overall profile of measles–rubella elimination was lowered. Government funding for COVID-19 activities became the top priority. Several countries have good coordination with NGOs and CSOs for immunization, yet such coordination is less pronounced in the case of surveillance. The private sector still needs further inclusion into the measles–rubella elimination activities. Effective advocacy will lead to revitalization of the measles–rubella elimination activities.

Key findings from the review teams

Impact of COVID-19

- ◉ The COVID-19 vaccination initiative has been used as a platform to promote childhood immunization.
- ◉ COVID-19 activities and continuation of MR activities required considerable coordination between the programmes, which improved the efficiency of the pandemic response. But using the same health workers meant that some MR and immunization activities received inadequate attention.
- ◉ COVID-19 created some vaccine hesitancy due to the fear that the vaccination site may not have been safe, and/or administering other vaccines could lead to COVID-19 infection.
- ◉ Advocacy for MR activities suffered in some countries due to the prioritization of and emphasis on COVID-19 activities.
- ◉ Funding may become more of an issue for sustaining MR activities for several reasons, including the fact that governments have had to go into deficit spending to conduct the unexpected COVID-19 pandemic control measures, and that thousands of citizens lost their employment or endured reduced incomes during the pandemic.

Existing linkage issues

- ◉ Intersectoral and MoH interdepartmental cooperation/coordination is inconsistent in some countries.
- ◉ The strength and quality of coordination and cooperation with the private sector and medical associations varied among the countries; almost every country has room to improve on this score.
- ◉ Cross-border coordination happens infrequently (usually only at local levels). Information often has to go through official channels at national levels, and becomes even more complicated when the neighbouring belongs to a different WHO region.

- ◉ Lessons learnt from the polio programme to build accountability using multisectoral committees at the local level (such as the District Immunization Task Force or Immunization Coordination Committee at the lowest rung of the administration) are not optimally extended to cover MR elimination and other RI activities.
- ◉ RI drop-out rates are still calculated for the first year of life with a focus on DTP1 and DTP3 and not for DTP1 versus MCV2. There is a need for regional/global guidance and streamlining of indicators and the Immunization Agenda for 2030 (IA2030) provides this platform.

Good practices

- ◉ All Member States have functional institutions such as NVC, NITAG and Immunization Coordination Committees (ICC). In order to achieve progress towards elimination in Myanmar, partner agencies – including NGOs, EHOs, CSOs and the private sector – will need to form a technical working group and ICC.
- ◉ Innovative use of measles–rubella dashboards/websites in India and other countries is both a monitoring as well as an advocacy tool.
- ◉ All countries have working relationships with UN partner agencies and most with NGOs and CSOs as well. These partnerships can still be expanded.
- ◉ Transitioning of polio assets to work on MR elimination and routine immunization activities is ongoing but needs to accelerate.

5

Conclusions

Regional progress towards the Goal as of 2020

- Five countries verified as having eliminated measles and two countries for rubella, all have sustained their status in 2020
- Framework for *verification of measles and rubella elimination in the WHO South-East Asia Region 2020* is the guiding document for MR verification activities
- An estimated **80% reduction** in mortality due to measles has occurred in 2019 in the Region compared with 2000

Country	Year in which verified		Confirmed cases Quarter 1, 2021	
	Measles	Rubella	Measles	Rubella
Bhutan	2017	–	0	0
DPR Korea	2018	–	0	0
Maldives	2017	2020	0	0
Sri Lanka	2019	2020	0	0
Timor-Leste	2018	–	0	2

*Data Source: SEAR MR Surveillance database as of 12 April 2021

Conclusions

Immunization

All countries have witnessed decline in immunization coverage during the COVID-19 pandemic. As a result, the immunity gap has increased in all countries, both those that have achieved elimination and those that have not. Countries urgently need to identify and catch up with all missed children. This will require all planned SIAs that were postponed to be implemented. Some countries will need to conduct new SIAs that were hitherto not planned.

Although tremendous progress has been made in the SE Asia Region, it is the considered opinion of the review team that immunization levels necessary for elimination are likely not to be reached by all countries of the Region in 2023.

Conclusions

Surveillance

It is highly commendable that the measles–rubella–CRS surveillance continued throughout the COVID-19 pandemic. Unfortunately, surveillance quality unquestionably suffered because of the additional responsibilities that surveillance staff had to discharge due to COVID-19, as well as being confronted with all the difficulties of conducting field investigations, active case search and monitoring as described above due to the lockdowns and other restrictions.

The surveillance systems should pick up as COVID-19-related work decreases and a review conducted on how to make the systems more sensitive. As it stood in end-2021, the review team concludes that the surveillance systems of the endemic countries are likely not sensitive enough to verify measles–rubella elimination in 2023.

Conclusions

Laboratory

The measles–rubella laboratory system continues to function at a reasonable level except for the disruption of services encountered in DPR Korea and, for six months in the year, in Myanmar. To further reach the levels necessary for MR elimination, expansion of the laboratory network is essential for some countries and the capacity for molecular testing has to be enhanced at either the national or subnational level for most countries.

Following the disruptions from COVID-19 and other events, the review team concludes that the laboratory system has the capacity essential for elimination in 2023 if appropriate actions recommended in the other sections are taken and genetic sequencing efforts are substantially expanded.

Conclusions

Outbreak preparedness and response

Outbreak response was not sufficiently tested during the COVID-19 pandemic due to lower reporting of MR cases and outbreaks. Rapid response teams also had to cope with COVID-19 and may have neglected measles–rubella outbreak response.

As the elimination target nears, risk analysis needs to identify more rigorously the pockets where outbreaks could possibly occur. The outbreak response component has to be strengthened for and beyond the 2023 elimination date.

Conclusions

Linkages

COVID-19 has necessitated a “whole-of-society” approach that fosters essential cooperation and coordination at all levels in the community. Measles–rubella elimination had already established good linkages, but also should build on the enhanced platform developed for COVID-19. An integrated MR elimination approach should continue to work with all sectors, departments, partners and the community to achieve the 2023 goal.

Final conclusions and overall recommendations

Appreciable progress has been made, but the highest level of political commitment, and WHO and partner support in every country, will be required to: rapidly reverse emerging immunity gaps through strengthened immunization services and SIAs; make the transition to “elimination quality” surveillance with adequate molecular epidemiology data; revitalize district-level engagement and accountability; improve field guides and technical cooperation with standardized case definitions and laboratory procedures; enhance communication to promote immunization and address vaccine hesitancy; employ new and innovative technologies for surveillance and vaccination; and strengthen the integration of MRE activities with the prevention and control of COVID-19.

The review team strongly feels that all countries need to fast-track preparations in order to respond adequately to an inevitable global measles crisis in the near future as a result of immunity gaps consequent from the COVID-19 pandemic. Political commitment and excellence in technical and operational deployment remain critical.

Overall recommendations and critical next steps

The review team has made the following recommendations for each of the five strategic areas bearing in mind that implementation may be possibly delayed as some countries intensify their roll-out of COVID-19 vaccination in the coming months.

Immunization

- In all countries, conduct identification and catch-up of missed children, especially those “left behind” during the COVID-19 pandemic.

Using the “Reach every child” approach, identify the priority districts and areas at subnational levels based on access and utilization criteria. Ensure regular analysis of coverage and utilization data at the lowest administrative levels. Periodic intensified routine immunization activities (PIRI) must be conducted regularly to fill the immunity gaps created by suboptimal MRCV coverage at the subnational level.
- In Indonesia and Maldives, resume national MR SIA, while in India and Thailand resume their subnational/high-risk group SIA.
- Advocate with DPR Korea to resume its vaccine supply and immunization schedules.
- Support the “UN Revitalization of Routine Immunization and COVID-19 vaccination in Myanmar plans” and the expansion of vaccination services to the whole country as soon as possible.
- Close the immunity gaps among under-5 children in Timor-Leste immediately through MR SIA followed by strengthening of RI activities.
- Strongly consider with appropriate political commitment a non-selective national SIA for children aged between 9 months and 15 years in Thailand in 2023.
- Address vaccine hesitancy issues before and during SIA implementation; Indonesia and Thailand will specifically have to develop strategies to generate demand for vaccination.
- Countries should follow existing WHO guidelines for vaccinating children aged <9 months when the data support such interventions.
- Urban immunization strategies be reviewed and revised for all Member States following the example of Bangladesh’s new Urban Immunization Strategy 2019.
- Renew intensified efforts to identify high-risk groups and incorporate ways to reach them in immunization microplans. Such efforts should be considered for adults in Myanmar, as has been done in Thailand.
- Revise policy to extend MR vaccination to all missed children up to the age of 5 years.

- ◉ Consider streamlining existing vaccination guidelines to include dropout rates as a measure of the difference between DPT1 and MRCV2, given that MRCV2 is an ideal tracer for overall programme performance.
- ◉ Explore opportunities to address adult immunity gaps through workplace and other institutional vaccination schemes, including health facilities.
- ◉ Ensure that all health workers receive MR, especially those providing clinical services and immunization and conducting surveillance.
- ◉ Emerging technologies and time-honoured best practices provide excellent opportunities for research. Whenever possible countries should support field trials of new technologies such as rapid diagnostic tests (RDTs), and microarray patches (MAPs). In addition, operational research needs to be jump-started to identify missed opportunities for vaccination and “zero-dose children”, as well as provide a better understanding and approach to confronting vaccine hesitancy.

Surveillance

- ◉ Ensure that all countries continue case-based surveillance using acute fever and maculopapular rash as criteria established in the WHO SE Asia Region guidelines, including standardized case definitions and indicators of performance.
- ◉ Ensure guidelines and practices also make clear that one measles case is equivalent to an outbreak.
- ◉ Revitalize active surveillance and supervisory visits as COVID-19 caseloads decline and the degree of repurposing of health workers lessens.
- ◉ If physical visits are not possible then shift to telephonic/app-based monitoring and reporting, especially for low-performing reporting sites, on a frequent and regular basis.
- ◉ Conduct internal surveillance reviews in all countries and an external review in Indonesia to assess setbacks and ascertain the way forward within the COVID-19 context.
- ◉ Analyse current surveillance reporting networks and expand and reprioritize the inclusion of more reporting sites with a focus on private sites as necessary.
- ◉ Conduct refresher training on specimen collection and transport, particularly about the need for throat swabs and urine for genotyping.
- ◉ Provide renewed orientation and training of physicians, frontline workers and community about acute fever and rash surveillance as well as surveillance of other vaccine-preventable diseases.
- ◉ Led by WHO, conduct an emergency course on VPD surveillance for EHOs, NGOs and CSOs concerned in Myanmar.
- ◉ Re-establish or expand zero reporting to all key health facilities.
- ◉ Support, and when indicated expand, CRS surveillance in most countries.
- ◉ Advocate to ensure that senior functionaries in the MoH thoroughly understand the importance of high quality of surveillance in determining that their country has achieved elimination and verification.

- ◉ Encourage Member States to conduct more genotyping and report to the measles and rubella nucleotide surveillance database (MeaNS and RubNS).
- ◉ Build and strengthen capacity for molecular epidemiology to aid with the identification of the source of infection.

Laboratory

- ◉ Advocate for lifting of restrictions on transport of laboratory supplies to DPR Korea.
- ◉ Ensure continuous supply of reagents and test kits in all countries either through national procurement mechanisms or transient support through partners.
- ◉ To achieve elimination quality surveillance standards, countries must ensure specimen collection kits are available and used more extensively in all outbreak responses and surveillance activities. Currently, an insufficient number of cases are having either throat swabs or urine specimens collected for genetic sequencing of isolates. Without such data, it will be extremely difficult to verify the remaining countries as measles- and rubella-free.
- ◉ Establish molecular testing capacity for national and subnational laboratories as appropriate.
- ◉ Update laboratory surveillance guidelines.
- ◉ Accelerate expansion of the laboratory network in Bhutan, Bangladesh, Indonesia, Myanmar (when possible), Nepal and Sri Lanka to ensure that laboratory supported surveillance has better reach within the community.
- ◉ Conduct refresher training for surveillance staff on sample collection and transport, including the need for accurate throat swabs and urine specimens.
- ◉ Enhance coordination with private laboratories and establish mechanisms to ensure QA for local laboratories.
- ◉ Continue to improve the harmonization between epidemiology and laboratory data where necessary.
- ◉ Continue the work of the quality assurance and accreditation of laboratories.
- ◉ Encourage Member States to conduct more genotyping and report the results to the MeaNS and RubNS nucleotide surveillance database.
- ◉ Build and strengthen capacity to analyse molecular epidemiology results to identify the source of infection.
- ◉ Allow neighbouring countries to send specimens for genotyping/genetic sequencing to India and Indonesia to take some workload off the Thailand RRL.
- ◉ MRE will require that countries take every opportunity to enhance the mutual benefits of integration of activities related to COVID-19 and MR laboratories.

Outbreak preparedness and response

- ◉ Revise/develop preparedness plans for outbreak response.
- ◉ Ensure all countries have designated rapid response teams trained for outbreak investigation and response. Ensure sufficient investment in the capacity-building of the rapid response teams to implement outbreak response.
- ◉ Hold simulation exercises for countries that have not recently experienced measles–rubella outbreaks.
- ◉ Conduct risk analysis down to the lowest appropriate administrative level of the district in small-population countries and sub-districts for countries with large populations.
- ◉ Cross-border coordination and cooperation needs strengthening, especially in the light of migration as a consequence of conditions emanating from either economic or civil unrest.
- ◉ Increase the proportion of outbreaks that have follow-up investigation and response actions.
- ◉ Ensure that adequate supplies for outbreak response are prepositioned and available, including vaccines, vitamin A, specimen collection kits (for serum, throat swab and urine samples), reverse cold chain and transport.
- ◉ WHO initiate training of EHOs, NGOs and other CSO partners to respond to outbreaks in Myanmar.
- ◉ Ensure throat swabs and urine specimens are taken from suspect cases for genotyping.

Linkages

- ◉ Build MR elimination activities on the “whole-of-society” platform currently being used for the COVID-19 response.
- ◉ Advocate to ensure that sufficient budgetary provisions continue for MR elimination, both from governments and donors.
- ◉ Identify local, national and regional champions to ensure the agenda of MR elimination is accorded the highest priority.
- ◉ Revitalize and orient local immunization coordination committees or the equivalents that were created for polio eradication activities in a number of priority countries on their role on MR elimination at the local level.
- ◉ Capitalize on the increased health sector funding and human resources available for the COVID-19 response to also meet the MR elimination programme needs, such as immunization, surveillance, laboratory and outbreak response.
- ◉ Continue to enhance the coordination and involvement with NGOs, CSOs and the private sector. A key lesson learned from polio eradication was the advantage of implementation of district coordination mechanisms that included participation and ownership of efforts from beyond the health sector. District task forces and district-level emergency operation centres are ideal for spearheading such efforts at the local level.
- ◉ Expand advocacy with medical associations and frontline workers about the importance of measles–rubella elimination activities in the context of national and regional policy.

- ◉ Opportunities exist to include experts from medical associations and NGOs on scientific and technical advisory groups such as is the case in India. Such technical advisory groups greatly enhance the national programme with technical oversight and support.
- ◉ Explore use of innovative social media to target families with access to smartphones or even regular cellular phones.
- ◉ Urgently address the localized vaccine hesitancy issues anywhere, especially in Indonesia and southern Thailand.
- ◉ WHO and UNICEF can consider forging new partnerships in Myanmar with EHOs, NGOs, CSOs and the private Sector to carry out MR activities, while exploring how to renew the relationship with the government once the current crisis is resolved.
- ◉ Encourage and streamline cross-border coordination and cooperation between all relevant countries.
- ◉ Streamline all guidelines, recording and reporting formats to reflect MCV as a tracker of immunization in line with the IA2030 strategies. That includes including MCV2 within the purview of the definition of a fully immunization child and tracking them regularly (also in MICS and DHS surveys); and calculate drop-out rate using MCV2.
- ◉ Conduct regular risk assessment at the local level using the WHO risk assessment tool and use the tool as advocacy material to develop and implement corrective actions accordingly.

Country-specific critical next steps

The review team in collaboration with the country teams suggested select next critical steps for each country.

Countries that have achieved elimination for measles or both measles and rubella virus

Bhutan

Bhutan has maintained its elimination status for measles and should be evaluated soon for rubella elimination. In 2020, the country sustained its measles–rubella elimination activities without any significant decline with one exception: the proportion of low-reporting districts decreased from 85% before COVID-19 in 2019 to 50% in 2020. The review team concluded that the country should strengthen the follow areas to sustain its elimination status:

- ◉ The country programme will benefit from filling vacant posts and hiring additional human resources where necessary at the national and subnational levels. Additional staff will be critical for maintaining current operations with the added COVID-19 duties, and also for implementing the needed steps for rubella elimination efforts.
- ◉ The microplans must be updated to cover missed children, especially in the two high-risk districts of Paro and Thimphu.
- ◉ Data quality issues, such as reporting of administrative coverage of districts from 83% to 138%, should be assessed in order to identify action points that will improve accuracy.

- ◉ Sustaining elimination achievements will require the national programme to strengthen capacity for genotyping and sequencing of measles and rubella isolates in order to identify the source of future outbreaks.
- ◉ Support to improve rubella surveillance through laboratory detection and genotyping is also required.
- ◉ Cross-border strategies need to be devised and implemented, in consultation with the neighbouring countries.

Democratic People's Republic of Korea

Through 2020, the Democratic People's Republic of Korea maintained excellent immunization coverage and good surveillance reporting standards to achieve elimination status for measles and should soon be evaluated for rubella elimination as well. The country has covered seven years without a single measles case being detected. However, the recent disruptions in vaccine, laboratory, nutrition and other essential medicine supplies due to strict COVID-19 quarantine restrictions are cause for alarm. Continued disruption of these supplies places the whole health status of the country at risk, and not just the threat to measles–rubella elimination status. The following recommendations were made for DPR Korea:

- ◉ Advocate urgently for releasing quarantine restrictions so that supply of vaccines, laboratory supplies, essential medicines and nutritional support that is necessary ensure vaccination, laboratory testing and other health system functions can be resumed.
- ◉ Computer database of notifiable diseases will enhance surveillance analysis capacity.
- ◉ Uninterrupted power supply to laboratories in the country should also be ensured for optimum storage of kits and reagents and adequate functioning of laboratory equipment.
- ◉ Perform table-top or simulated outbreak response exercise for detection of any confirmed measles-rubella or CRS case. This can be done with WHO and UNICEF assistance as and where needed.

Maldives

Maldives has achieved and maintained both measles and rubella elimination. Continued excellent performance of the measles–rubella elimination activities will be required to mitigate the risk of importations from the constant influx of expatriate workers and other visitors into the country. Strong political commitment, supported by excellent cooperation among all partners, CSOs and NGOs, has made measles–rubella elimination a reality in the country. The following recommendations were made for Maldives:

- ◉ Resume the national MR SIA covering the ages between 6 months to 40 years as soon as it is feasible.
- ◉ Conduct nationwide training of health professionals, with particular attention to new case definitions and surveillance.
- ◉ Continue training on specimen collection and transport.

- ◉ Improve communications to address pockets of vaccine hesitancy and achieve outreach especially among the far-flung atolls.
- ◉ Update and strengthen CRS sentinel surveillance in association with the Indira Gandhi Memorial Hospital (IGMH).
- ◉ Strengthen coordination with the National Laboratory for laboratory surveillance.
- ◉ Request WHO to facilitate cross-border meetings with neighbouring countries to discuss and identify actions focused on common surveillance and migration issues.
- ◉ Establish an electronic immunization and surveillance recording and reporting system based on the success of the COVID-19 vaccination registration.
- ◉ Implement strategic MR vaccination of expatriate workers, while strengthening surveillance among expatriate populations.
- ◉ Ensure regular and active surveillance case sheet review at all hospitals.

Sri Lanka

Sri Lanka has maintained its elimination status for both measles and rubella, largely through continued high immunization coverage. As it happened in other countries, surveillance performance declined during the COVID-19 pandemic. The country sustained high political commitment, strong linkages and integrated service delivery through the frontline health workforce. Vaccine hesitancy in Sri Lanka is not as significant a challenge as with other countries. The country successfully supports its WHO accredited laboratory, the trained laboratory manpower, a well-managed supply chain of test kits and reagents, and genotype testing facilities within the country. The review team in collaboration with the country team made the following recommendations as next critical steps for Sri Lanka:

- ◉ Focus national efforts on the districts with less than 95% coverage.
- ◉ Update microplans to identify and include missed children so that they can be included in vaccination activities as soon as possible.
- ◉ Recognize that Sri Lanka has a unique MR surveillance system inasmuch that the discard rate is under-reported because discarded cases get assigned a specific diagnosis, indicating a strong overall system. Therefore, a periodic review of non-measles, non-rubella cases will have to be performed to ensure sensitivity of MR surveillance.
- ◉ Revisit and revise communication efforts, including the use of social media.
- ◉ Ensure robust plan and capacity for the laboratories to respond in case of outbreaks.
- ◉ Develop capacity at the RRL to perform sequencing studies.
- ◉ Upgrade and accredit the two subnational virology laboratories so they can act as supporting MR laboratories.
- ◉ Develop and implement cross-border strategies.

Timor-Leste

Timor-Leste has achieved measles elimination but not rubella elimination. Prior to 2020, the coverage of the second measles–rubella-containing vaccine was significantly less than 95%. Surveillance was also performed adequately before the outbreak of the COVID-19 pandemic. However, the low immunization coverage makes the country extremely vulnerable to large outbreaks if virus importations occur. The review team made the following recommendations as next critical steps for Timor-Leste:

- ◉ Conduct a non-selective national measles SIA for children aged 9–59 months as soon as it is feasible. As a transient measure conduct catch-up vaccination for all children up to 5 years of age (PIRI, or periodic intensification of routine immunization) in high-priority districts and reassess such needs every year.
- ◉ As soon as possible, re-establish routine immunization outreach to all remote areas.
- ◉ Develop a surveillance sustainability plan with support from partners.
- ◉ Consider the use of community reports of cases of acute fever and rash from remote areas to sound the alarm over suspected MR cases.
- ◉ Advocate to have a rapid response team to respond to potential MR outbreaks.

Countries that have not yet achieved elimination for measles and rubella virus

Bangladesh

Bangladesh has made significant progress towards achieving measles–rubella elimination. However, the country still has many challenges to overcome to reach the elimination goal. To that end, some immunity gaps need to be closed. In addition, surveillance, outbreak response, and expansion of the laboratory network need urgent support. The outbreak of COVID-19 may have slowed the progress in the necessary improvements that needed to be brought about to reach the elimination goal by 2023.

Of concern is the fact that a significant proportion of children reported with measles had received two doses of the measles vaccine in Bangladesh. In 2021, 25% (500) of confirmed measles cases were unvaccinated, 40% (802) cases had received two doses and 34% (672) had received only one dose. Even some children aged 9–11 months have received two doses of the vaccines. These data suggest Bangladesh may need to conduct additional investigations on whether the programme is encountering vaccine failure or data error. We can expect breakthrough infection in 5–10% cases under normal circumstances, but the situation in Bangladesh is unusual. The following are the recommendations for Bangladesh:

- ◉ Increase urban MRCV2 immunization coverage through the implementation of the Urban Immunization Strategy 2019.
- ◉ Conduct catch-up vaccination of those children who missed MRCV, particularly those from the identified high-risk groups.
- ◉ Consider expanding MR vaccination to all defaulter children up to the age of 5 years.
- ◉ Accredite more laboratories for testing measles samples.

- ◉ Increase throat swab collection to raise the frequency of molecular testing (genotyping) for measles and rubella specimens.
- ◉ Initiate molecular testing (genotyping) for measles and rubella specimens.
- ◉ Submit regularly and timely genotype reports to understand the trend of virus transmission (endemic or imported) and determine actions to be taken.
- ◉ Enhance advocacy, communication at all levels, including with professional bodies (associations of physicians, teachers and journalists, etc.).
- ◉ Arrange regular media briefings to help people understand the importance of measles surveillance, especially in the COVID-19 pandemic situation.
- ◉ Conduct high-level regular reviews with city corporations and district authorities, providing feedback on measles surveillance and routine immunization indicators.
- ◉ Ensure regular sharing of data bulletins (feedback).
- ◉ Implement MR second dose as the definition of “full vaccination coverage” (in keeping with the ITAG recommendation).
- ◉ Ensure that all health workers receive MR vaccination to prevent nosocomial infection at health facilities and in the community.
- ◉ Ensure that concurrent routine immunization monitoring of vaccination sessions and children in vulnerable settings through the government and partners is conducted effectively on a regular basis and evidence-based corrective actions are taken to close immunity gaps, and ensure surveillance optimization and quality of care.

India

During the last five years, India has made remarkable progress towards measles and rubella elimination. Strong commitment to MR elimination exists at national and state levels, as reflected in the increased financial support provided by the Government of India. The Strategic Plan is being implemented, leading to progress and data-driven optimism that the goal will be achieved. COVID-19 pandemic-related activities sparked a series of system strengthening efforts, including additional staffing. The COVID-19 experience has bolstered coordination among all sectors, built resilience within the programme, and contributed to expanded efforts in communication.

The next wave of COVID-19 could have a large negative impact on essential immunization services, including communication efforts; and the risk of adjusting the elimination timeline (from 2023 to 2030) could be demotivating and lose momentum. This is one the key risks and barriers towards reaching elimination. To overcome other risks the following actions are advocated:

- ◉ Identify missed children and implement concrete plans to cover these children.
- ◉ Conduct a rigorous analysis to identify the gaps in expanded immunization coverage for suitable action.
- ◉ Conduct more formal RCM activities after each outbreak.
- ◉ Maintain momentum for MR elimination 2023.
- ◉ Review needs to intensify efforts for social mobilization.

- ◉ Revise and implement the cross-border strategy in consultation with neighbouring countries.
- ◉ Root cause analysis needs to be done in the post-outbreak period to identify the underlying causes of the outbreak and of low vaccination coverage.
- ◉ Ensure continuity and sustainability in the supply of reagents and test kits.
- ◉ Upgrade the laboratories in the MR network to do genotyping and a few other strategic laboratories to do sequencing.
- ◉ Maintain efforts for timeliness of specimen collection and transportation to the laboratories.
- ◉ Continue to conduct internal surveillance reviews and rapid surveillance assessments.
- ◉ Identify low-performing sub-district areas for surveillance and immunization for corrective action.

Indonesia

Although the number of confirmed measles and rubella cases decreased in Indonesia, neither the immunization nor the surveillance systems are functioning at levels required to achieve measles and rubella elimination. The COVID-19 pandemic has dramatically increased the immunity gap in the country, while the surveillance system is not sufficiently sensitive to detect all measles cases and outbreaks. The country has a functional, quality-assured measles rubella laboratory network to serve the national surveillance programme. Linkages between laboratory and surveillance need strengthening to effectively achieve the goal of measles–rubella elimination in the country.

The coverage of the 2018 MR SIA was impaired by a tremendous increase in the prevalence of vaccine hesitancy in certain provinces due to a politically driven controversy over the religious validation of the measles–rubella vaccine (“halal” or “haram”), instigated by rival political factions. This posed a communication challenge, which must be addressed to ensure the success of future measles–rubella elimination immunization activities. The following are the recommendations for Indonesia:

- ◉ Prepare, implement and monitor the postponed National MR SIA planned for March and August 2022.
- ◉ Galvanize political will at the national and provincial levels to eliminate MR.
- ◉ Utilize village health volunteer corps (*Kader*), religious leaders and schoolteachers to help children with fever and rash access health services.
- ◉ Identify rubella susceptible cohorts for vaccination.
- ◉ Describe in more detail the descriptive epidemiology of measles, rubella and CRS cases so that appropriate actions can be taken.
- ◉ Ensure continuous supply of kits and reagents to the measles–rubella laboratory networks (MRLN) for uninterrupted functioning.
- ◉ Strengthen efforts to collect urine or throat swab specimens from acute measles–rubella suspect cases and ensure their proper shipment under the cold chain to MRLN.
- ◉ Expand the MRLN based on surveillance needs; and prioritize provinces from where shipping of infectious material is particularly challenging.

- ◉ Enhance the measles reporting system, while minimizing data discrepancies between laboratories and surveillance centres by developing the VPD information system.
- ◉ Formulate a strategy to strengthen molecular surveillance of measles and rubella.
- ◉ Strengthen and extend the number of CRS sentinel hospitals, especially in provinces with low routine immunization coverage and a high number of confirmed rubella cases.
- ◉ Develop a communication strategy on MR vaccination.
- ◉ Improve the strategy to cope with religious sentiments that impede vaccination, vaccine safety, and other issues that may impact vaccine acceptance. Enlist the aid of prominent religious bodies, both local and external, for this.
- ◉ Enhance collaboration with other organizations such as Komda PGPKT (Local Committee for the Prevention and Management of Hearing Loss and Deafness) to support community education.

Myanmar

The progress that Myanmar was making towards measles–rubella elimination was drastically impaired by the political events that occurred in the country since February 2021. In order to limit the potential outbreaks of measles–rubella and other vaccine-preventable diseases, including COVID-19, the country must collaborate with a UN-supported coalition of several non-State actors until a national health infrastructure is re-established and functional throughout Myanmar. The measles–rubella situation has to be closely monitored by WHO and UNICEF and other partners in this transition period to mitigate threats both to Myanmar as well as neighbouring countries. The following recommendations were made:

- ◉ Prepare for and implement the UN Revitalization of Routine Immunization and COVID-19 Vaccination Plan in Myanmar.
- ◉ Incorporate training on VPD surveillance and outbreak response into the plan.
- ◉ Ensure vaccines are available in the country for possible crash immunization and outbreak response.
- ◉ Urgently train rapid response teams to conduct surveillance and outbreak response.
- ◉ Re-establish data reporting, supervision and monitoring systems.
- ◉ Advocate at the highest levels to lift restrictions to restore full immunization, surveillance, and laboratory services to all parts of the country.
- ◉ Strengthen coordination between the Myanmar WHO Country Office and neighbouring countries in response to measles–rubella outbreaks in Myanmar.
- ◉ Strongly consider follow-up of MR SIA nationwide covering at least children aged 9–59 months as soon as feasible.
- ◉ Take cognizance of the fact that the immunity profile of Myanmar suggests that certain adult population groups have low immunity and may require measles–rubella vaccination.

Nepal

Nepal has made steady progress towards measles and rubella elimination and achieved a continually decreasing number of confirmed cases and instances of large outbreaks. However, the immunization programme has not yet reached the levels necessary to achieve elimination. The country conducted under extraordinary circumstances a successful national MR SIA in 2020 and achieved high coverage despite the challenges of COVID-19.

Essential immunization services were impacted by the COVID-19 pandemic. The two most populous provinces have the largest number of missed children. Microplanning includes the high-risk and migrant populations. The country has proactively increased the eligibility age for vaccination from 2 to 5 years. Effective cold chain, vaccine logistic management, and overall programme monitoring require more support from health authorities. While the MR surveillance system in Nepal has met the sensitivity indicators in the past years at the national level, more efforts are needed at the subnational level to enhance the quality of surveillance. The laboratory network needs expansion and support to improve performance. The following recommendations were made for Nepal:

- ◉ Strengthen focus on districts with more than 10% decrease in MCV1 coverage.
- ◉ Support increased EPI monitoring and actions in poor performing areas.
- ◉ Expand the involvement of the private sector.
- ◉ Strengthen VPD surveillance.
- ◉ Develop and implement a cross-border strategy.
- ◉ Conduct and document formal RCAs after each outbreak.
- ◉ Expand further the MR laboratory network to meet the 2023 elimination target. Another 2–3 MR laboratories are needed at the provincial level to conduct serological tests. In particular, a laboratory is also required to be set up in the western part of the country.
- ◉ Strengthen laboratory capacity for molecular testing (genotyping and sequencing).
- ◉ Upgrade NPHL to the status of a reference laboratory for conducting molecular testing.
- ◉ Devise innovative methods for timely collection and transport of specimens from hard-to-reach areas to the MR laboratory network.

Thailand

The country is still highly endemic for measles. The COVID-19 pandemic negatively impacted the immunization and surveillance programme performance that already was not functioning at elimination levels. However, the extensive laboratory network functions well. The laboratory network and the rest of the programme has the capacity for elimination, but the work will require more cohesion and monitoring. Achieving successful elimination will require significant upsurge in political commitment and operational support to close the immunity gap with a non-selective catch-up MR SIA.

Greater advocacy and commitment are required to improve and sustain the MR elimination efforts. Increased coordination is needed between the central (Ministry of Public Health) and implementation levels of the health system. Vaccination of unregistered migrant children and unprotected children resulting from vaccine hesitancy, and the remaining adult high-risk groups is imperative. Surveillance reporting network must be reprioritized to include key private providers. The following are the recommendations for Thailand:

- ◉ Implement lessons learned from successful vaccination initiatives, and model laboratory and surveillance coordination.
- ◉ Strengthen integration of activities implemented for COVID-19 with MR Elimination activities.
- ◉ Close immunity gaps through conducting outreach to unregistered migrant children. An increased vaccine supply may be needed for this effort.
- ◉ Conduct a non-selective national SIA for children aged 9 months to 15 years in 2023 that is well monitored (external funding may be needed, particularly for bundled vaccines and cold chain equipment). Such action is required to close the >10% immunity gap, as well as reach all unregistered migrants. Both these barriers need to be overcome to reach zero endemic cases.
- ◉ Continue efforts for adult high-risk groups, supported with essential monitoring.
- ◉ Re-establish zero AFR reporting for all reporting network sites both public and private.
- ◉ Establish more CRS surveillance sentinel sites.
- ◉ Train and advocate for increased involvement of physician and other health-care workers in MR elimination.
- ◉ Expand and accelerate culturally appropriate efforts to address vaccine hesitancy in the Southern Provinces.

SEARO next steps and initiatives

- ◉ Provide direct support to countries requesting technical guidance and assistance.
- ◉ Develop country immunity profiles at the subnational levels.
- ◉ Build capacity with a new Outbreak Preparedness Checklist.
- ◉ Develop an MR rapid diagnostic test kit in collaboration with university and US CDC.
- ◉ Design a guide for streamlining the molecular epidemiology process.
- ◉ Prepare a Cross-Border Surveillance Framework to guide local action.
- ◉ Update the SEARO Measles–rubella Surveillance Guidelines (with more emphasis for throat swab and urine specimen collection for genotyping and genetic sequencing).
- ◉ Plan and revise MRE tactics in the strategy, building on lessons learned from the COVID-19 platform and experience.
- ◉ Identify prominent people from local, national and regional levels to be “Champions for Measles–rubella Elimination”.

WHO headquarters next steps and initiatives

- ◉ Respond to regional requests for technical advice and assistance, strategic funding, review of documents/strategies.
 - Hold regular monthly calls with regions to discuss issues and plans.
- ◉ Help mobilize resources required to achieve MRE (for example, new CARES funding from CDC Atlanta for outbreak response and to mitigate negative COVID-19 impact).
- ◉ Provide nominative support such as inclusion of the Measles–rubella Strategic Framework within the Immunization Agenda 2030; new Outbreak Response Guidelines and new SIA Guidelines and a tailored approach to SIA Guidelines (limited areas, selective, etc.)
- ◉ Support innovation for rapid diagnostic test kits and micro-patch for vaccine development.
- ◉ Advocate more extensively using the new measles mortality publication.
- ◉ Allocate more time in supporting countries and regions.
- ◉ Increase capacity to help all countries requesting support, including middle-income countries without GAVI support.
- ◉ Advocate for greater research and innovations as state above.
- ◉ Explore the scope of improving integration between the various disease control initiatives at the global level to strengthen support downstream.

Annex 1

Country review reports

Bangladesh

Immunization service delivery (routine immunization/SIAs/school/adult vaccination, etc.)	
Key findings	<ul style="list-style-type: none">• Between 2015 and 2020, Bangladesh had MRCV1 coverage of >95% and MRCV2 coverage of >90%. The Coverage Evaluation Survey (CES) in 2019 had nationwide figures of 92.8% MRCV1 and 89% MRCV2.• The country had an impressive national MR SIA during the period December 2020 and February 2021 achieving uniform >95% coverage and vaccinating 35 million children aged between 9 months to 10 years. During the piloting of data triangulation guidelines in 2019, it was found that consistently high coverage (often well over 100%) was a systematic problem involving denominator issues, with little incentive at local levels to change denominators because of the resultant drop in coverage. An upcoming census will try to incorporate new questions to get more accurate birth cohort numbers.• Past coverage surveys in 2016 and 2019 plus the 2019 data triangulation exercise indicate there may be some underestimated denominators resulting in higher reported administrative coverage. This issue is due to be resolved by new census which was scheduled for 2021 but has been delayed due to COVID-19.• Immunity gap exists in very young children (<2 years) and possibly in young adults >19 years old.• There are still some gaps in immunity with identified areas of concern being urban immunization, floating/nomadic populations and ethnic minorities primarily in the Chittagong Hill Tracts.• Government policy currently does not require vaccination of defaulter children >2 years old.• The government conducts regular outreach even during the COVID-19 pandemic, but some parents are reluctant in the initial stages of the pandemic to attend health facility's fixed site sessions.• Urban vaccination is delegated to the Ministry of Local Governments and NGOs and does not have the same level of supervision as in rural areas which are under the jurisdiction of the Ministry of Health (MoH).• There is very good community demand for vaccination and almost exclusively through the public sector (urban NGOs are considered to be under the public sector).• Economic migration requires a focus on young mothers and other young adults who have young children and on addressing immunity gaps in this population.

	<ul style="list-style-type: none"> • A new Urban Immunization Strategy 2019 is being adopted. • Routine immunization microplans are updated at the lower levels every year it but may be difficult to have correct denominators in urban areas where substantial economic migration is taking place. • A new electronic childhood immunization tracking system has been piloted in a few districts and is planned to expand to 16 more districts after evaluation. • School entry check and recommendation for voluntary or mandatory vaccination of missed children is under consideration. • Health workers do not routinely receive MR vaccination. • There are 61 WHO Surveillance Immunization Officers (SIMO) covering all 64 districts. They assist with planning and monitoring of routine immunization, SIA and outbreak response immunization to take corrective actions and give indication of coverage in high-risk or hard-to-reach areas.
<p>Conclusions</p>	<p>Bangladesh’s immunization programme has made steady progress and is close to elimination levels. However, with the country’s large population, it has to close the remaining gaps in the programme with missed children. The numbers of such missed children are higher in urban areas, among nomadic economic migrants, ethnic hill tract minorities and tea garden workers. More attention is needed for young adults in urban areas who work in factories and vaccination at the workplace must be considered for both such young adults and their children. The new urban immunization strategy can help improve urban immunization coverage. A catch-up immunization activity for those children who were missed due to the COVID-19 pandemic is probably necessary.</p>
<p>Recommendations</p>	<ul style="list-style-type: none"> • Continue to address immunity gaps particularly in urban areas, economic nomadic children, ethnic hill tract minorities and tea garden workers. • Support implementation of the new Urban Immunization Strategy 2019. • Consider extending the current policy of vaccinating defaulter children up to the age of 5 years, especially for MR, bOPV and IPV vaccines. • Consider providing routine immunization outreach education at urban workplaces and vaccination of young adults at these work sites. • Concurrent routine immunization monitoring of vaccination sessions and children in vulnerable settings through the government and partners must be carried out. • Recommend or possibly mandate that all health workers receive MR vaccination to prevent possible nosocomial infection in health facilities and communities. • Ensure that concurrent routine immunization monitoring of vaccination sessions and of children in vulnerable settings through the government and partners is conducted and evidence-based corrective actions are taken to close immunity gaps, and ensure surveillance optimization and quality of care.

Bhutan

Immunization service delivery (routine immunization/SIAs/school/adult vaccination, etc.)	
Key findings	<ul style="list-style-type: none"> • Due to COVID-19, MCV1 coverage decreased from 97% to 93% in 2020, with 40% districts showing more than 10% decline. • No budgetary constraints for cold chain and vaccine logistics. • Cross-border importation remains a major challenge for sustenance of elimination status. • Data quality issues encountered at the subnational level. • High turnover of HR and delayed/lack of training during the peak COVID-19 period has adversely affected programme implementation and data quality.
Conclusions	Immunization services were impacted by the COVID-19 pandemic. Two districts (Paro and Thimphu) have been identified as high-risk districts and more than 20% of the country's population reside in these two districts alone.
Recommendations	<ul style="list-style-type: none"> • The microplans must be updated to cover missed children, especially in the two populous and high-risk districts of Paro and Thimphu. • There are significant data quality issues, e.g. administrative coverage of districts varies from 83% to 138%. Data quality assessment needs to be done urgently.
Surveillance activities	
Key findings	<ul style="list-style-type: none"> • There were no changes in active case-finding or in the reporting network because of the COVID-19 pandemic; staff conducted case-finding whenever lockdowns were lifted. • Because of the COVID-19-related disruptions, surveillance data validations and field visits were not completed. • Since the VPD surveillance officers were deployed for COVID-19 activities, surveillance performance was negatively affected. Additional staff were not assigned to support MR surveillance. • When health workers were being trained for COVID-19 vaccination, sessions on VPD surveillance were included. • Plans for expansion of the CRS surveillance network have been made but this is highly dependent on the ability to build capacity of hospital staff.
Conclusions	The MR surveillance system in Bhutan is sensitive and has the capacity to detect MR cases. Bhutan is ready for the next steps to build its molecular testing capacity and enhance its CRS surveillance system.
Recommendations	<ul style="list-style-type: none"> • The country programme should continue to maintain its MR surveillance operations and complete the surveillance activities that were halted due to the COVID-19 pandemic. • The country programme will benefit from additional human resources at the national and subnational levels. This will be critical for maintaining current operations with the added COVID-19 duties and also for undertaking the steps needed for rubella elimination efforts. • The country programme must prioritize activities to build its molecular testing capacity and enhance its CRS surveillance system.

Laboratory network

<p>Key findings</p>	<ul style="list-style-type: none"> • One WHO accredited National Measles Laboratory at the Royal Centre for Disease Control (RCDC) in Thimphu. • No private laboratories included in the MR laboratory network. • Type of tests done by the MR laboratory includes serology and virology. No genotyping or sequencing facilities available. • Continuous and sustainable supply of laboratory test kits and reagents available. No reports of disruption of supplies even during the pandemic. • The MR laboratory was used to test for COVID-19 during the pandemic; RT-PCR tests were done for COVID-19 in this laboratory. Different sets of technical staff were used for COVID-19 testing, so MR laboratory work was not affected by the pandemic. • Transportation of samples has resumed by air and/or land; although there were some restrictions in the south, trans-shipment has been restarted. • Cold boxes are used to transfer samples in reverse cold chain to the measles–rubella laboratory network from all parts of the country including hard-to-reach areas within 72 hours of collection. • Data harmonization between surveillance and laboratory teams is done manually by cross-checking between laboratory and surveillance data, as there are very few samples. • All laboratory results reported by the MR laboratory network can be linked to suspected measles cases in the national surveillance system in real-time manner by the web-based NEWARS. • Lack of facilities and technical capacity for genotyping is a major challenge, but capacity development for genotype testing is in process. • Most barriers to maintain the laboratory network have been addressed due to capacity development for the COVID-19 pandemic. At present, there are no barriers to achieve or maintain the laboratory network, except lack of genotyping facilities.
<p>Conclusions</p>	<p>The country is on track for developing and maintaining an accredited measles and rubella laboratory network throughout the nation by the 2023 elimination date as it has been verified for eliminating measles and has very few cases of rubella. The country has a WHO accredited laboratory and trained laboratory manpower and is working towards setting up advanced level of laboratory facilities for rubella elimination.</p>
<p>Recommendations</p>	<ul style="list-style-type: none"> • Capacity development for genotyping and sequencing for measles and rubella to identify the source of outbreaks in necessary at this stage when the country has been verified for eliminating measles and is close to eliminating rubella. • Strengthen efforts for rubella surveillance through laboratory detection and genotyping. • Consider changing the name of the National Measles Laboratory to ‘National Measles and Rubella Laboratory’ to place special emphasis on rubella elimination.

Outbreak planning, response and recovery	
Key findings	The total number of laboratory confirmed cases of measles and rubella in 2020 were two and four respectively.
Conclusions	In the past Bhutan had responded very well to outbreaks but because of the low number of cases it may need to conduct simulation or desk-top exercises to stay in readiness for a potential outbreak.
Recommendations	<ul style="list-style-type: none"> • Cross-border strategy needs to be devised and implemented, in consultation with the neighbouring countries. • Simulation exercises must be held periodically to stay in readiness for potential outbreaks.
Linkages (social mobilization, communications, advocacy; partnerships and other linkages)	
Key findings	<p>Communication efforts:</p> <ul style="list-style-type: none"> • Advocacy and awareness through respective health centres, outreach clinics (ORCs) and local government functionaries • Mass media and social media platforms of the Health Promotion Division, MoH. • World Immunization Week. • No vaccine hesitancy/no anti-vaccine groups reported in Bhutan (this is extremely rare); therefore, there is high uptake of any vaccine (incl. COVID-19 vaccine). • The National Task Force did a quick survey of vaccine hesitancy (<1%) and observed high levels of trust reposed on technical advisers, health workers and the government. • Given the presence of a nomadic population, the only issue is geographical access. <p>Partnerships:</p> <ul style="list-style-type: none"> • Rapid response teams in 20 districts (under the District Health Officer) • Concerted efforts are being made with strong support from multiple international organizations including the UN and NGOs • Bhutan Collaboration with Bhutan Health Trust Fund on the procurement of traditional vaccines • Good collaboration with the media with talks on national television raising the issues of reporting and surveillance from traditional practitioners. <p>Cross-border:</p> <ul style="list-style-type: none"> • The work of health workers in border areas is a priority activity • There is the intent to build networks and share reports in border areas
Conclusions	The country has a very good linkage of programmes and sectors with the only area for improvement being cross-border coordination.
Recommendations	Cross-border importation remains the major challenge in the way of sustenance of elimination status: it is important to revive these collaborative efforts in the Region

Most critical next steps for the country to achieve elimination by 2023

Conclusions	Bhutan has maintained its elimination status for measles and should be evaluated soon for rubella elimination. In 2020, the country sustained its measles–rubella elimination activities without significant decline with one exception: the proportion of low reporting districts pre-COVID-19 decreased from 85% in 2019 to 50% in 2020.
Recommendations	<ul style="list-style-type: none"> • The country programme will benefit from filling vacant posts and additional human resources where necessary at the national and subnational levels. Additional staff will be critical for maintaining current operations with the added COVID-19 duties, and also for implementing the steps needed for rubella elimination efforts. • The microplans must be updated to cover missed children, especially in the two high-risk districts of Paro and Thimphu. • Data quality issues, such as reporting of administrative coverage of districts from 83% to 138%, should be assessed in order to identify action points that will improve accuracy. • Sustaining elimination achievements will require the national programme to strengthen capacity for genotyping and sequencing of measles and rubella isolates in order to identify the source of future outbreaks. • Support to improve rubella surveillance through laboratory detection and genotyping is also required. • Cross-border strategies need to be devised and implemented, in consultation with the neighbouring countries.

Democratic People’s Republic of Korea

Immunization service delivery (routine immunization/SIAs/school/adult vaccination, etc.)

Key findings	<ul style="list-style-type: none"> • Vaccination has been conducted in health units. • DPR Korea has recorded high coverage since 2005 (>95%). • RI coverage surveys conducted in 2008 and 2017 found MCV1 & 2 coverage to be >95%. • SE Asia Region RVC verified measles to have been eliminated in 2018. • Rubella vaccine was introduced in October 2019 through wide-age SIA for children aged between 9 months to 15 years and females aged 16–18. • Post-SIA coverage survey documented to be >99.5%. • In June 2021, vaccine supply was interrupted due to the global COVID-19 pandemic. The 1st dose of measles–rubella vaccination coverage was 68.8%, and the 2nd dose was 68.1% in the second quarter of 2021. • A national plan is in place to vaccinate unvaccinated children once vaccines become available again.
Conclusions	Measles elimination has been verified and rubella documented as eliminated but not verified; however, due to the interruption in vaccines due to COVID-19 there remains the risk of measles and rubella outbreaks.
Recommendations	Work with the authorities to make vaccines available as soon as possible to close the immunity gaps.

Surveillance activities	
Key findings	<ul style="list-style-type: none"> • Measles and rubella cases have not been detected in the country in the past seven years. Rubella was eliminated but not verified because of the problem with vaccine stocks and supplies. • Case-based surveillance of fever and rash is functioning in the community hospital. • Measles and rubella and CRS discard rate at the national level met the standard criteria for high-sensitivity surveillance.
Conclusions	On track for high-quality surveillance performance.
Recommendations	Computer database of notifiable diseases will enhance surveillance analysis capacity.
Laboratory network	
Key findings	<ul style="list-style-type: none"> • The measles–rubella laboratory network (MRLN) comprises three laboratories, of which one is at the national level and two are subnational. • Procurement and installation of PCR machines is in the pipeline. • Continuous supply of electricity is a challenge for functioning of laboratories. • As country borders are sealed, no kits or reagents could be supplied to the laboratories since December 2019. • Inadequate insights available about ground-level reporting from laboratories.
Conclusions	The country seems to have a measles–rubella laboratory network. However, it is difficult to comment about the quality of its operations. The measles–rubella laboratory of DPR Korea has not participated in the global EQAS since 2016.
Recommendations	<ul style="list-style-type: none"> • The Ministry of Public Health should ensure the availability of human resources and necessary equipment, reagents and kits to the measles–rubella laboratory to test specimens received from measles or rubella suspected cases. • Uninterrupted power supply to the laboratory should also be ensured for optimum storage of kits and reagents and functioning of laboratory equipment.
Outbreak planning, response and recovery	
Key findings	<ul style="list-style-type: none"> • Strong primary health care with each family doctor team overseeing 130 household members. • Abnormal events or cases are likely to be picked up and investigated after being notified by the laboratory for response in a timely manner. • Retraining of health providers about clinical presentation of measles and rubella disease using computer-aided technology was a good practice initiated during COVID-19.
Conclusions	The rapid response systems and teams exist and are sustained.
Recommendations	Perform tabletop or drill-based exercises on scenarios of detection confirmed MR or CRS case. This can be done with WHO or UNICEF assistance if needed.

Linkages (social mobilization, communications, advocacy; partnerships and other linkages)	
Key findings	No issues of vaccine hesitancy reported, and coverage was consistently high before the COVID-19 pandemic.
Conclusions	Vaccine uptake is excellent in DPR Korea, and there are no issues of vaccine hesitancy.
Recommendations	<ul style="list-style-type: none"> • While vaccine hesitancy is not an issue, consider increasing the knowledge of the community/parents on vaccines and vaccination. • Continue efforts to advocate with the government to allow for the earliest entry of vaccines as lifesaving medicines, to catch up on children who had missed out on vaccines and are thereby risking measles and rubella outbreaks and losing the elimination status, as well as to continue providing the vaccines in a routine manner to maintain the elimination status. • Consider also to link the provision of other health services such as nutrition, together with vaccination services.
Most critical next steps for the country to achieve elimination by 2023	
Key findings	<ul style="list-style-type: none"> • The country is facing an MR vaccine shortage for routine immunization and other related supplies due to the closing of the borders after the COVID-19 pandemic outbreak. • The country demonstrates robust commitment to MR elimination goals and strategies. • International partner support has been limited during the COVID-19 pandemic as staff cannot resume normal functions.
Conclusions	Most likely to sustain measles elimination as verified until 2023. Rubella elimination is on track to be verified by 2023.
Recommendations	<ul style="list-style-type: none"> • Urgently solve the problem of MR vaccine stock and laboratory supplies that have been held at the border. This needs high-level intervention through diplomatic channels and the UN mechanism. • Vaccination for COVID-19 will ensure a smooth pathway to MR elimination as the country faces the continued risk of a COVID-19 outbreak similar to other countries. • Continue preparations to tackle new and imported cases.

India

Immunization service delivery (routine immunization/SIAs/school/adult vaccination, etc.)	
Key findings	<ul style="list-style-type: none"> • Due to COVID-19, the MCV1 coverage has decreased from 95% to 89% in 2020, with 16% of districts showing a decline of more than 10%. • Poor immunization coverage in urban and peri-urban areas. • Due to COVID-19, the country experienced largescale migration, especially in the agricultural and construction sectors. • Approximately 1 million children and 224 000 pregnant mothers were covered by an intensified immunization campaign in February–March 2020. • Vaccine stock-outs have been observed in some cold chain points (the country team explained that it is a distribution issue, and the problem was usually at the outreach level). Deep-dive analysis is required to understand any correlation with the areas having missed children. • Routine immunization monitoring shows high prevalence (30%) of lack of awareness/information gaps, and consequently of unvaccinated and partially vaccinated children.
Conclusions	<p>The immunization services were impacted by the COVID-19 pandemic and an additional 6% children were missed for MCV1 coverage. There are no major budgetary constraints. The country team is working well to identify the areas with missed children.</p>
Recommendations	<ul style="list-style-type: none"> • More focus on urban/periurban areas • In the wake of largescale migration, the HRA (High-Risk Area) Strategy needs to be reviewed (it as last revisited in 2013). • Deep-dive analysis is required to identify the reasons for vaccine stockouts at the outreach level to avoid missed opportunities. • The community awareness efforts need to be re-energized as it has been shown to be one of the prominent reasons for dropouts and “left-outs”.
Surveillance activities	
Key findings	<ul style="list-style-type: none"> • All the surveillance indicators have shown steady improvement over the last three years. • The MR surveillance system has been going through a transition period during the past few years. Changes include laboratory confirmation of non-outbreak cases (less than 5), expanding the outbreak case definition to be 5 cases within 28 days, and broadening the case definition (shifting to fever and rash surveillance). • During the COVID-19 pandemic, no additional human resources were recruited but the staff were repositioned to handle both RI activities and COVID-19 activities; all stakeholders were requested to provide plans on how to operationalize that. Guidance was sent from MoHFW to states about maintaining MR surveillance activities during the COVID-19 pandemic. • In response to COVID-19, active case search and sensitization of reporting sites have been conducted through the telephone. • Several workshops (n = 5957) were completed virtually (20%) and in-person to sensitize and build capacity of the surveillance staff.

	<ul style="list-style-type: none"> Over 2.6 million infokits on measles and rubella elimination were developed and disseminated in 15 different languages and more than 1.4 million frontline workers (FLW) have been trained using these kits. WhatsApp videos on VPD surveillance were developed for wider distribution. Review of VPD surveillance in 12 districts was completed to assess the impact of COVID-19 on routine activities. Several efforts were conducted to strengthen MR surveillance data, including monthly bulletins, dashboards, and national-level cascade training (July 2020).
Conclusions	The MR surveillance system in India has undergone several changes to improve its quality. While the MR surveillance system did not meet the sensitivity indicator in the past years, it is progressing in the right direction.
Recommendations	<ul style="list-style-type: none"> With all the recent changes made in the surveillance system (definitions, processes, etc.), the country programme should ensure that adequate monitoring and quality improvement processes are in place. Now that the structures and systems are set up, ensuring fidelity of implementation of MR surveillance activities will be critical. Similar to the rapid assessments that were conducted in 12 districts in 2020, the country programme should expand this effort and conduct VPD surveillance reviews in additional districts as well as nationally if possible. On account of the large size of the country, the country programme should further stratify risks and identify areas at the highest levels of risk for weak MR surveillance performance; this will be useful in deploying innovative and tailored strategies to improve MR surveillance in these areas.
Laboratory network	
Key findings	<ul style="list-style-type: none"> A total of 27 laboratories constitute the MR laboratory network. All laboratories are WHO accredited. The laboratories in the MR network are able to handle surveillance needs of the country and reduce sample shipment costs. All laboratory personnel are trained by WHO before starting work in the MR laboratories. The competence of technicians is evaluated during internal audits. The laboratories have continuous and sustainable supply of test kits and reagents; there were some shortages of reagents and kits in 2019, but in 2020 no shortage was encountered due to the low number of samples. The current MR laboratory network does not need further expansion to meet the 2023 elimination target as it can handle the present sample load. Some laboratories are not fully utilized to capacity yet. Current sample load is approximately 3000 samples per laboratory, or approximately 80 000 for the entire laboratory network. The MR laboratory network had no problem coping with the increased workload due to COVID-19. The MR laboratory network has adequate space, and HR support from WHO and the Indian Council of Medical Research (ICMR), and no shortage in this regard is expected; some shortage of reagents is anticipated and the procurement process for this has started accordingly.

	<ul style="list-style-type: none"> • Once samples are collected, tracking is performed at each district level to ensure that the samples reach the laboratory within five days of collection. • Different modes of transportation are used for sample shipment. Samples are transferred to the nearest laboratories by the easiest possible routes, either by road, train, or by air from the Northeast of the country (as from Guwahati). • Mechanisms used for data harmonization between surveillance and laboratory teams include close interaction between the Surveillance Information Management Software and MR dashboard, and similar platforms. There is slow but sure progress towards an integrated health information portal. • With regard to molecular testing, currently only one laboratory performs sequencing, 23 laboratories conduct virology, and four laboratories are in the process of being upgraded to conduct virology. Plans are in place to decentralize sequencing capacity in all laboratories in the future. • For molecular surveillance, there are SOPs in place for timeliness of testing and reporting of virology samples within 60 days of receipt of the samples. • Barriers to achieving or maintaining the laboratory network include upgrading of all laboratories to conduct molecular testing, ensuring continuous and sustainable supply of reagents, test kits and supplies, and timely sample collection and transport.
Conclusions	The country is on track for developing and maintaining an accredited measles and rubella laboratory network by the 2023 elimination date, as it has an adequate number of laboratories in its MR network, trained laboratory manpower, continuous and sustainable supplies of test kits and reagents, and molecular testing facilities within the country.
Recommendations	<ul style="list-style-type: none"> • Ensure continuity and sustainability of supply of reagents and test kits. • Upgrade the laboratories in the MR network to conduct genotyping and a few other strategic laboratories to perform sequencing. • Continue efforts to maintain timeliness of sample collection and transportation to the laboratory.
Outbreak planning, response and recovery	
Key findings	<ul style="list-style-type: none"> • The total laboratory confirmed cases of measles and rubella in 2020 were 2568 and 1296 respectively. • The majority of cases were reported from four states. • Approximately 20% cases were reported among children less than 1 year of age.
Conclusions	<ul style="list-style-type: none"> • Measles and rubella outbreaks have been reported in four states. • The country developed the <i>Measles–Rubella Surveillance Field Guide 2020</i>, which included a revised outbreak response protocol.
Recommendations	<ul style="list-style-type: none"> • Cross-border strategy needs to be devised and implemented, in consultation with neighbouring countries. • Root cause analysis needs to be done in the post-outbreak period to identify the underlying causes of the outbreak and of the low vaccination coverage.

Linkages (social mobilization, communications, advocacy; partnerships and other linkages)

Key findings

Social mobilization, communication and advocacy:

- The 2017 SE Asia Region MR Review Report recommended subnational communication strategies and allocation of budgets. The budget is not specified by activity and it is up to the state to ensure implementation under the budget for routine immunization. Under the National Health Mission (NHM) every state has a detailed programme implementation plan, which is flexible.
- Subnational communication plans: microplanning includes social mobilization and comprehensive capacity-building of frontline health workers on interpersonal communication.
- Social media: Robust efforts need to be made for clear messaging to combat vaccine hesitancy and misinformation related to COVID-19 vaccination and MR immunization.
- Vaccine hesitancy remains an issue and it is being addressed at all levels (frontline health workers are being trained on interpersonal communication, and mid-media and mass media, including capacity-building and media sensitization of spokespersons at various levels.
- Social media strategy developed and messages finetuned for use during the measles campaign: social media cells are activated, and templates and Government of India-approved messages circulated.

Advocacy for measles–rubella in the context of COVID-19:

- Leveraging professional associations, and eminent professionals and celebrities as spokespersons.

Partnerships and coordination:

- Setting up strong partnerships through expansion of laboratory networks (with private laboratories).
- Improved partner coordination, which is necessary also for surveillance.
- MR campaign: Leveraging partnerships with Lions International and medical and paediatric associations, and exploring partnering with dermatology associations.
- Coordination with the Integrated Disease Surveillance Programme (IDSP) platform is ongoing.
- Weekly district-level coordination meetings have been leveraged to improve linkages with multiple partners.

MR, RI and PHC:

- Strengthening routine immunization first is the foundation of the MR strategy. Opportunities and approaches to integrate will give sustainable results.
- Vitamin A campaign was leveraged for screening of malnourished children with possible measles infection in the past.
- MR surveillance and monitoring data is used to inform and strengthen routine immunization.
- Asha, ANM and anganwadi workers (all frontline health workers) are the fulcrum of the process of integration from the grassroots level and above to ensure correct linkages between MR, RI and PHC.

	<p>Polio network:</p> <ul style="list-style-type: none"> Using and piggybacking on the polio infrastructure, and applying lessons learnt from the polio programme (such as reporting using a separate structure) need to be enforced. The transitioning of surveillance medical officers of the polio network to the role of public health officers (with focus on RI and MR elimination) is needed. Continue to build on the lessons and successes of the polio programme. Despite the pandemic, India transitioned from outbreak surveillance to fever rash surveillance in the last five years. State-level differences are being considered and relevant strategies are being adapted to the context of the different states. <p>Efforts made for inter-state and cross-border collaboration for measles and rubella surveillance:</p> <ul style="list-style-type: none"> A draft document has been prepared. There was a plan to pilot it with selected neighbouring countries and across some Indian states and districts; however, this could not be operationalized due to the pandemic.
Conclusions	<ul style="list-style-type: none"> Strong commitment to MR elimination at national and state level is demonstrated; the Government of India has gradually taken on a larger share of the budget. A strategic plan is being implemented, and progress is discernible already. There is data-driven optimism that the goal will be achieved. The onset of COVID-19 led to the launch of a series of system strengthening efforts. Staff working in immunization (government and WHO) are now more committed. Coordination seems to be well established. The COVID-19 experience helped build resilience. Strong efforts on communication need to be advocated. <p>Key risks and barriers to reaching elimination:</p> <ul style="list-style-type: none"> The next wave of COVID-19 is likely to have a large impact on RI. There is the risk that adjusting the timeline (from 2023 to 2030) will lead to demotivation and loss of momentum. Barrier of different interpersonal communication: COVID-19 has affected the efforts for social mobilization and interpersonal communication.
Recommendations	<ul style="list-style-type: none"> Keep the momentum going for MR elimination in 2023. Review needs to intensify efforts for social mobilization.
Most critical next steps for the country to achieve elimination by 2023	
Key findings	<ul style="list-style-type: none"> Identification of missed children, and development and implementation of concrete plans to cover these children. Deep-dive analysis required to identify the decrease in immunization coverage as it will be an uphill task to cover the last mile. Formal RCA needs to be completed after each outbreak.

Conclusions	Although tremendous progress has been made in the past years, the COVID-19 pandemic has caused both immunization coverage and surveillance indicators to decline. It is imperative that India catches up on the children missed over the past few years as well as improves coverage in the coming years both by pushing forward routine immunization and completing the remaining state SIAs. On the matter of surveillance, increased monitoring and analysis is required to ensure all states and districts are performing at such a level that no chains of transmission of measles and rubella virus are missed.
Recommendations	Maintaining the MR elimination goal is a key factor in mobilizing resources, committing staff, and sustaining the MR programme in the country.

Indonesia

Immunization service delivery (routine immunization/SIAs/school/adult vaccination, etc.)	
Key findings	<ul style="list-style-type: none"> • MRC1 and MRC2 have not reached the =>95% level and have actually decreased during the COVID-19 pandemic. • Rubella-containing vaccine introduced in 2017 (Phase 1) and 2018 (Phase 2). Coverage for phase 1 and 2 were 100% and 73%, respectively. • Planning MR SIA for 2022 (previously planned for 2020–2021) is ongoing. First phase to be conducted outside of Java Island (2018 phase 2). Though the target is to conduct this in early 2022, the planning process was still ongoing in end-2021. • Due to COVID-19 RI staff have been repurposed, clinics were closed and vaccine stock-outs were reported. • School-based immunization coverage was >90% since 2011; however, in 2018, it dropped to 69% and has not crossed 90% since that year.
Conclusions	<ul style="list-style-type: none"> • Immunity gaps have increased due to COVID-19. • Planning for MR SIA for early 2022 will be conducted in the areas where phase 2 was conducted in 2019. • School immunization coverage has been decreasing even since before the onset of COVID-19.
Recommendations	<ul style="list-style-type: none"> • Immunity gaps for MR must be closed through well-planned SIAs and by strengthening RI. • For MR Phase II, there is the need to incorporate the lessons learned from the previous MR SIA. This will include microplanning, coordination with partners and community and religious leaders, and very strong communication and messaging outputs. • Strengthen the school-based immunization programme by understanding why the coverage dropped and implement suitable strategies to improve this coverage.

Surveillance activities	
Key findings	<ul style="list-style-type: none"> • Despite the endemic status of measles and rubella, the decreasing numbers during 2019 and 2020 may be due to the pandemic which overloaded the health workforce and reduced surveillance functions. • The majority of cases were in Region 1, particularly in Aceh, Sumatra and Jakarta. Fewer cases in Region 2, where cases were reported in Kalimantan. • MR discarded rate is around 1 per 100 000 population at the national level. Most provinces did not meet the MR discarded rate. • The private sector plays an important role in providing care and with the surveillance system. • The Ministry of Health has identified 367 very high-risk and high-risk districts where MR immunization and surveillance activities must be strengthened.
Conclusions	Surveillance for MR and CRS is not sensitive and qualified as indicated and required for MR elimination. This was complicated by the impact of the COVID-19 pandemic.
Recommendations	<ul style="list-style-type: none"> • Political will at the national and provincial level to eliminate MR can revitalize strategies that are currently offtrack, including surveillance. • Utilize village health volunteers or religious leaders and schoolteachers to help notify health centres about children who show up with fever and rashes to increase surveillance sensitivity.
Laboratory network	
Key findings	<ul style="list-style-type: none"> • The measles–rubella laboratory network (MRLN) comprises seven laboratories, of which five are functional. Four laboratories have attained WHO proficient status in 2021. • Timeliness of laboratory results reporting were adversely affected due to kit shortages in 2020. • The laboratory in Palembang could not report results to the national level due to software issues. • Surveillance system is not geared to collect throat swabs or urine specimens from acute measles suspected cases, hence genetic data about virus transmission chains is scarce in the country. • MRLN could not participate in global external quality control schemes as the national laboratory was not able to retrieve the panel samples and other reagents from Customs. • It was highlighted that it is difficult to ship infectious material from some provinces to others. • MoH is taking initiatives to expand the existing MRLN by adding another four laboratories into the network.
Conclusions	Overall, the country has a functional and quality assured measles–rubella laboratory network to serve the national surveillance programme. Linkages between laboratory and surveillance need strengthening to effectively achieve the goal of measles–rubella elimination in the country.

Recommendations	<ul style="list-style-type: none"> • MoH should ensure continuous supply of kits and reagents to MRLN for its uninterrupted functioning. • Efforts should be made to collect urine or throat swab specimens from acute measles or rubella suspected cases and ensure their shipment under cold chain to MRLN. • Expansion of MRLN should be based on surveillance needs and priority should be given to those provinces from where shipment of infectious material is a challenge. • MoH should develop mechanisms to fast-track Customs clearance of PT panel (proficiency testing panel) specimens, primer probes and positive controls, ordered through the IRR (International Reagent Resources) portal.
Outbreak planning, response and recovery	
Key findings	<ul style="list-style-type: none"> • The majority of MR cases were not investigated for source and epidemiological linkages. Nasopharyngeal swabs or urine collection were not done in all suspected cases. • The COVID-19 pandemic has had an impact on investigation. Improvement in the COVID-19 situation is an opportunity to resume MR investigation as soon as possible. • The country has an EWAR (early warning, alert and response) system in place that can help in outbreak response if revitalized.
Conclusions	<p>Outbreak investigation and response system is not at the level that will ensure successful elimination activities. Strengthening of the system is possible with political support at both the national and provincial levels.</p>
Recommendations	<p>Microplanning is necessary in all high-risk districts to have individual or clusters of MR cases investigated in a timely manner and adhering to quality standards.</p>
Linkages (social mobilization, communications, advocacy; partnerships and other linkages)	
Key findings	<ul style="list-style-type: none"> • Preliminary findings on behaviour and social drivers (BeSD) indicate that there is a high value for benefits and understanding of the importance of vaccines in Indonesia. However, in a few areas, there is a tendency to accept only select vaccines instead of all vaccines. Almost 20% of caregivers in Aceh indicated that they would not accept any vaccines at all. • The MCV1 coverage also decreased in 2019 in some parts of the country such as Kalimantan and Sulawesi and this may possibly be linked to the MR campaign in 2018. However, in-depth analysis is needed to understand why the coverage decreased. • The doubts expressed over the “halal/haram” aspect of vaccines emerged as a significant issue during the second phase of the vaccination campaign in 2018. • Studies have been undertaken and some are also in progress to measure the social and behavioural drivers in high-risk provinces, to advocate for and highlight the role of decision-makers in the family in supporting immunization, and to strengthen risk communication at the national and subnational level. Work is also ongoing to rollout the human-centred design (HCD) approach to increase immunization uptake and to engage religious leaders with the immunization programme.

Conclusions	While much work is being done to address demand and hesitancy issues, this needs to be further intensified and all possible avenues explored. Unless the “halal/haram” issue is addressed comprehensively, similar consequences can be expected in future MR campaigns and this may also potentially affect routine vaccination for MR. This will adversely affect the ability to achieve and maintain measles and/or rubella elimination.
Recommendations	<ul style="list-style-type: none"> • In preparation for future MR campaigns, the acceptance of community and religious authorities should be considered as an indicator or prerequisite. This must be included in the campaign readiness checklist. • Conduct active and real-time “social listening” before and during campaigns and address all issues under the SocMob (Social mobilization) working group. • Identify and address the underlying issues subnationally that led to decline in MCV1 coverage in 2019 before the COVID-19 outbreak. This is important to ensure that there is homogenous uptake and increase in MR vaccine coverage, and to facilitate achieving and maintaining MR elimination. • School vaccination for MR and other services as part of school health should be resumed as soon as possible.
Most critical next steps for the country to achieve elimination by 2023	
Key findings	<ul style="list-style-type: none"> • There are a high number of cases of measles and rubella in Region 1, especially Aceh, Jakarta and Sumatra. Elimination activities are severely impeded by COVID-19, especially routine immunization, surveillance and response. • MoH has showed determination to achieve MR elimination by 2023 in both regions or at least in Region 2. • Microplanning in high-risk and very high-risk districts (n = 367) is the key for implementation and monitoring. • MR elimination can be integrated into COVID-19 control activities once the pandemic situation in the country gets better or in early 2022. • Support from international organizations and partners is necessary for MR elimination in the country.
Conclusions	Unlikely to achieve MR elimination by 2023. There is, however, an opportunity to achieve elimination in Region 2 of the country.
Recommendations	<ul style="list-style-type: none"> • Secure commitment at the highest levels, including from H.E. the President and all Governors and religious leaders, towards elimination of MR by 2023. • Microplanning of MR elimination activities by district and close monitoring of the progress every six months to bring all activities on track should take place. • Ensure that the next MR SIA is conducted with high quality controls and that more than 90% of the districts achieve more than 95% evaluated coverage.

Maldives

Immunization service delivery (routine immunization/SIAs/school/adult vaccination, etc.)	
<p>Key findings</p>	<ul style="list-style-type: none"> • Maldives has achieved and been verified for measles and rubella elimination. • From 2016 to 2020, Maldives has had coverage of >95% for both MRCV1 and MRCV2. • Conducted a selective SIA for the 15–25-year age group target, achieving 76% coverage. However, young adults already vaccinated were also included in the denominator. • Immunity gap is primarily among children less than 1 year of age and the population above the age of 12 years. • Nationwide SIA targeting everyone between the ages of 6 months and 40 years began in February 2020 and had to be halted due to the COVID-19 pandemic. It is due to resume in November or December 2021 depending on the COVID-19 situation. • Outreach activities have been done well and have not faced many logistic challenges. • Migrant workers and their families are the highest-risk group and free vaccination is offered to them. • The Red Crescent Society assisted reaching out to undocumented migrants for vaccination. • Generally very good levels of vaccine acceptance have been observed. Some pockets of vaccine hesitancy have recently developed due to unproven social media reports on alleged association of autism with MMR vaccine (measles, mumps and rubella). • Efficient use of school entry checks has been made to vaccinate missed children. • Health workers are required to be vaccinated for MR. • Currently there is no electronic registration of immunization records and reports. However, positive use of electronic registration for COVID-19 vaccination could be adapted for routine immunization records. • A mandate for migrant workers to receive MR before entering the country is now under consideration.
<p>Conclusions</p>	<p>Maldives' immunization programme has performed and maintained elimination levels for several years and even during the challenge posed by the COVID-19 pandemic. The country is also making efforts to close all remaining gaps with an ambitious SIA covering all populations aged 6 months to 40 years. This had begun in February 2020 but was halted by COVID-19 and is planned to resume in November-December 2021. Free vaccination is provided to migrants whether properly documented or not. Health workers are also routinely vaccinated. The threats to the country are pockets of vaccine hesitancy caused by adverse social media posts, migrants and other foreign visitors who may be under-vaccinated.</p>

Recommendations	<ul style="list-style-type: none"> • Continue the excellent work on the routine immunization programme. • Resume the national MR SIA as soon as feasible. • Consider making an electronic registration system for routine immunization recording and reporting. • Continue to address vaccine hesitancy with the assistance of the medical societies, NGOs and UNICEF. • Ensure migrant workers and their families receive MR vaccination if not complete. • It may be necessary at some point to consider addressing vaccination status of foreign visitors as well as migrant workers.
Surveillance activities	
Key findings	<ul style="list-style-type: none"> • Maldives should be commended for maintaining a high-quality, elimination-standard surveillance system for measles and rubella, even during the COVID-19 pandemic. • In 2020, there were 15 confirmed cases of measles and 1 confirmed case of rubella. There were no CRS cases in 2020. • The MR surveillance system met or exceeded all indicators in 2020, in spite of surveillance staff being tasked to work on COVID-19. • The CRS surveillance system currently consists of a single sentinel site; however, expansion is beginning, with plans for 20 sentinel sites (1 in each atoll). • Two private hospitals are involved in surveillance, in addition to several private clinics.
Conclusions	<p>Maldives has a highly functional, elimination-quality surveillance system in place for measles and rubella. Expansion of the CRS surveillance system to additional sentinel sites throughout the country is underway and will strengthen reporting of CRS. There is private sector involvement in the surveillance system.</p>
Recommendations	<ul style="list-style-type: none"> • Continue the excellent work done in maintaining a high-functioning MR surveillance system. • Increase CRS surveillance system sensitivity through expansion of sentinel sites, which will require training/sensitization. • Consider sensitization of additional private clinics for reporting into the surveillance system.
Laboratory network	
Key findings	<ul style="list-style-type: none"> • Maldives has a single high-functioning accredited national laboratory for measles, rubella and CRS. • In 2020, the MR laboratory met all indicators, even with staffing constraints due to COVID-19. • Genotyping is done for all confirmed cases; however, it is currently sent to RRL. There are plans for implementing a sequencing mechanism within the country. Training was done in 2017; however, there has since been staff turnover.
Conclusions	<p>Maldives has a highly functioning, elimination-standard laboratory in place. The country plans to start performing genotyping in-country.</p>

Recommendations	<ul style="list-style-type: none"> • Continue the excellent MR laboratory performance. • Hold refresher trainings prior to initiating in-country genotyping. • Consider evaluating the role of private laboratories in the surveillance system.
Outbreak planning, response, recovery	
Key findings	<ul style="list-style-type: none"> • The country has a comprehensive and funded outbreak response plan. • The response to the last outbreak in 2020 was well done, including outbreak response immunization among those six months to 40 years old in the outbreak vicinity. • Risk analysis has been done by region because of the low population of some atolls. • Although migrant workers and their families are a well-known risk, it is becoming apparent that international tourists also pose a risk because some of them could possibly introduce measles or rubella when they visit Maldives. • There is no regular mechanism for the country to have direct interaction with neighbouring countries about common surveillance and risk issues.
Conclusions	<p>Maldives has a well-functioning outbreak response plan and response system. It needs to remain vigilant due to both influx of migrant workers and international tourists. It may be beneficial to have more contact with the ministries of health of neighbouring countries to discuss common surveillance issues.</p>
Recommendations	<ul style="list-style-type: none"> • Ensure continued outbreak response readiness. • Conduct risk analysis at the sub-district level to identify pockets within a district that may be susceptible to outbreaks. • WHO should facilitate cross-border meetings (can be virtual) to discuss common surveillance and migration issues. • Maldives should remain vigilant for possible importations of measles or rubella virus from the influx of travellers who enter the country for both economic and leisure reasons.
Linkages (social mobilization, communications, advocacy; partnerships and other linkages)	
Key findings	<ul style="list-style-type: none"> • Maldives has a well-functioning NVC, NITAG and other coordination bodies. • A whole-of-society approach is used for immunization. • Strong collaboration is in evidence with the Ministry of Education, the Red Crescent Society and NGOs as well as partner UN agencies. • The government has taken advocacy steps for both routine immunization and COVID-19 vaccination to counter vaccine hesitancy. • Good collaboration with medical associations to promote immunization and surveillance has been seen. • Private sector health facilities are involved in surveillance and advocacy. • COVID-19 has proved to be a suitable platform to promote good community acceptance for all forms of immunization.

Conclusions	Maldives has a good linkage between different departments of the government, UN agencies, NGOs, paediatric/medical societies and religious organizations. The private sector is involved in measles–rubella elimination activities. COVID-19 vaccination has become a platform for enhancing community acceptance of all immunization.
Recommendations	<ul style="list-style-type: none"> • Continue good cooperation between all government sectors, UN agencies, NGOs, CSOs, religious organizations, medical associations and the community. • Build on the positive experience from COVID-19 vaccination to continue robust support for the immunization programme. • Explore greater use of social media and telephone messaging services for immunization and surveillance community advocacy and education. • Increase attention on communications to address vaccine hesitancy.
Most critical next steps for the country to achieve elimination by 2023	
Recommendations	<ul style="list-style-type: none"> • Resume the national MR SIA for all aged 6 months to 40 years as soon as feasible. • Initiate nationwide training of health professionals in new case definitions and surveillance. • Continue training on sample collection and transportation. • Improve communications to address pockets of vaccine hesitancy. • Update and strengthen CRS sentinel surveillance with IGMH. • Strengthen coordination with the national laboratory for laboratory surveillance. • Approach WHO to facilitate cross-border meetings with neighbouring countries to discuss common surveillance and migration issues. • Consider establishing an electronic immunization and surveillance recording and reporting system based on the success of the COVID-19 vaccination registration. • Conduct MR vaccination of expatriate workers and further strengthen surveillance among expatriate populations. • Ensure regular active surveillance-case sheet review at all hospitals.
Conclusions	Maldives has achieved and maintained both measles and rubella elimination. Continued excellent performance of the measles–rubella elimination activities will be required due to the constant influx of expatriate workers and other visitors into the country.

Myanmar

Immunization service delivery (routine immunization/SIAs/school/adult vaccination, etc.)

Key findings

- During 2016–2020 Myanmar had achieved MRCV2 coverage >80%, reaching a high of 90% with 49% of districts having 90–95% coverage. Chin, Rakhine, Shan East and Shan North states and Yangon were had <80% coverage and Kachin and Kayin states reached <90%.
- Myanmar conducted successful MR SIA 2015 (nationwide for ages 9 months to 15 years = 94%); 2017 (in Yangon for ages 9 months to 15 years = 91%), and in 2019 (in Yangon for ages 9 months to 15 years = 92% and in the rest of the country for ages 9–66 months = 96%).
- SIA RCM data for 2015 was pegged at 95% and for 2019 it was 95% for Yangon and 98% for the rest of the country.
- Prior to 2021 the country had prioritized 96 townships (>25% of birth cohort) to receive GAVI HSS2 funding to promote routine immunization.
- About 66% of the confirmed measles cases in 2020 were under-vaccinated.

The progress that the country was making on immunization and other MR elimination activities received a setback following the change in political administration in early 2021. From 1 February 2021 it was observed that both routine immunization as well as the implementation of NCVDP (COVID-19 vaccination) have been largely suspended. This was partly due to political instability as well as on account of the civil disobedience movement of health-care professionals who adopted a non-cooperation strategy against the de facto political administration. This political situation may take some time to stabilize, while the threat from vaccine-preventable diseases continues to rise.

- Due to both the civil disobedience movement and the UN rules of engagement stipulating against direct interaction with the new political administration, UNICEF and WHO predict up to 90% decline in routine immunization and a slow COVID-19 vaccine roll-out in the months following the change of government.
- In response to this situation, the UN has drafted a plan titled “Revitalization of Routine Immunization and COVID-19 Vaccination in Myanmar”. This will be implemented in phases:
 - **Phase A:** In operating areas of 30 ethnic health organizations (EHO), Rakhine State with health workers and 15 townships with INGO support areas targeting 135 000 children (15% of the national target).
 - **Phase B:** Work with private providers in Yangon, Mandalay, Magway, Bago and Irrawaddy regions targeting 481 580 children (60% of the national target).
 - **Phase C:** Return to full national service coverage through the public health system.
- The plan faces challenges such as the low capacity of EHOs and other providers, unreliable or insufficient cold chain systems in these areas, and the need for negotiations with the Military for access to deliver supplies and conduct supervision.

Conclusions	Myanmar's immunization programme had still not achieved elimination levels in 2020 although it was making steady progress. The turn of political events in 2021 may set the programme back several years in addition to the potential deaths and disability that may occur until the immunization programme becomes fully functional again. The disruption of the immunization programme also poses a health security threat as well as a threat to MR elimination efforts in bordering countries and further beyond. Support for the UN revitalization plan seems to be the only course of action until the political situation stabilizes.
Recommendations	<ul style="list-style-type: none"> • Accelerate preparations to fully implement the revitalization of routine immunization and the COVID-19 vaccination plan. • Advocacy for complete immunization activities to be restored throughout the country. • Establish a data reporting, supervision and monitoring system by partner agencies with local implementing partners. • A follow-up MR SIA nationwide covering at least children aged 9–59 months should be conducted as soon as the political situation permits in either 2022 or 2023.
Surveillance activities	
Key findings	<ul style="list-style-type: none"> • In 2020, there were 206 laboratory-confirmed measles cases, 213 EPI-confirmed measles cases and 25 clinically confirmed measles cases in Myanmar, compared with corresponding figures of 3494, 1181 and 568, respectively, in 2019. In comparison, there have only been three laboratory-confirmed and five clinically confirmed measles cases in 2021. Laboratory-confirmed rubella cases were 28 in number in 2019, three in 2020 and one in 2021. • In 2020, the surveillance system was performing at a high level; however, sensitivity had dipped with NMNR discard rate dropping to 0.43 compared with 2.58 in 2019. The CRS surveillance system includes five sentinel sites but had no suspected cases from 2018 to 2020. • Following the military takeover in 2021, surveillance activities essentially came to a stop; DHIS2 is partially functional but receiving only zero reports. The few cases that have been detected in 2021 are generally from Yangon.
Conclusions	In 2020, Myanmar had a functioning MR and CRS surveillance system in place that had made great strides towards elimination-quality surveillance prior to the COVID-19 pandemic. There was progress on the surveillance system, including with the private sector. During COVID-19, the MR surveillance system suffered in terms of sensitivity of operations. Following the military takeover in February 2021, the MR and CRS surveillance systems have nearly collapsed. There is little available information on the current case counts for measles, rubella and CRS; however, the country is at great risk for outbreaks given interruptions in the immunization system. This will likely set back the goal of elimination by several years.

Recommendations	<ul style="list-style-type: none"> • Reestablish the MR and CRS surveillance systems as soon as it is safe and feasible. • Encourage NGOs to report cases of measles, rubella and CRS; at the very least, event-based surveillance should be conducted. • Train rapid response teams to conduct surveillance during the current situation. • Consider surveillance refresher trainings, once feasible. • Consider retrospective review of CRS to identify any possible missed cases during the period without surveillance.
Laboratory network	
Key findings	<ul style="list-style-type: none"> • Myanmar has two laboratories (accreditation not up to date): the National MR Laboratory in Yangon and the Public Health Laboratory in Mandalay • In 2020, the laboratory network was meeting all indicators, except those related to virology, as this was impeded due to COVID-19, the lockdowns and travel restrictions. • Following February 2021, the laboratories were closed until September 2021. When the measles–rubella laboratory reopened for measles–rubella testing in September, it mainly focused on COVID-19. It is unclear if NGO laboratory testing for MR was taking place.
Conclusions	<p>Prior to 2020, Myanmar had an MR laboratory network consisting of two accredited laboratories that were functioning well. The COVID-19 pandemic placed severe constraints on the laboratory network, but they were still meeting most indicators (except for virology not being performed). Since February 2021, the MR laboratory network has essentially been closed. Laboratory confirmation of measles, rubella and CRS is not occurring. This closure will likely set back the country on their goal of elimination by several years.</p>
Recommendations	<ul style="list-style-type: none"> • Re-establish the MR laboratory network once feasible; accreditation will be necessary, and special arrangements for supplies/kits will likely be needed prior to restarting the MR laboratories. • Determine whether any NGOs are providing testing for measles/rubella/CRS in the interim before the laboratory network can be re-established.

Outbreak planning, response and recovery

<p>Key findings</p>	<ul style="list-style-type: none"> • The country has a clear and comprehensive outbreak response plan although it was not fully funded or implemented prior to 2021. • Implementation of outbreak response was adequate with the ability to conduct outbreak response vaccination and collect samples for both case confirmation and genotyping. However, some outbreaks were missed due to the surveillance system sensitivity, especially in EHO-serviced and conflict-ridden areas. • Risk analysis and understanding of potential outbreak areas was done well and understood prior to 2021 but with the new disruptions to the health-care system a majority of the population of the country can be potentially at risk for outbreaks. • In the current political situation it is not clear if the rapid response teams that were the responsibility of the government will be deployed by EHOs, NGOs, private providers and health workers. • The new ad hoc health system actors may not be trained in outbreak investigation and response. • Access to outbreak response is compromised throughout a large part of the county due to limited functioning of the non-CDM health facility areas.
<p>Conclusions</p>	<p>Myanmar had the rudiments of a functioning outbreak response plan and response system. Unfortunately, the current political disruption of the entire health-care system and the eventuality of having to rely on a variety of organization outside the old public health structure means there are few health workers available who have sufficient understanding and training in outbreak response. With the disruption to immunization the country will be more at risk to outbreaks while having less people capable of adequately capacity to investigate and respond. This is an alarming situation to say the least, and has health security implications not only for Myanmar but also the neighbouring Member States.</p>
<p>Recommendations</p>	<ul style="list-style-type: none"> • WHO and UNICEF will have to guide and train the new health system partners on how to adequately investigate, respond to and report on measles–rubella outbreaks and reports of cases. • A system will need to be developed to reach sample collection supplies to the field, and ensure competent transportation of samples collected to a functioning designated laboratory. • New rapid response teams formed from EHOs, NGOs, private providers and health workers have to be trained and formed for the different regions of the country. • UNICEF and WHO, in collaboration with other partners, must secure essential vaccines and ancillary items, vitamin A supplies and other medications, etc. to handle an outbreak. • WHO must make arrangements for reporting outbreaks under the provisions of the International Health Regulations 2005 (IHR 2005) and to other countries as necessary until the national health system structure is restored.

Linkages (social mobilization, communications, advocacy; partnerships and other linkages)

<p>Key findings</p>	<ul style="list-style-type: none"> • Myanmar had a functioning NVC, NITAG and ICC prior February 2021 as per the reports received. • The existing ICC will be reformed into an interim ICC with the following members: Gavi, WHO, UNICEF, the Myanmar Health Sector Coordinating Committee (M-HSCC), Access to Health Fund, the US Centers for Disease Control, Rotary International, Myanmar Maternal and Child Welfare Association, Myanmar Red Cross Society, Myanmar Medical Association and relevant donor agencies such as USAID, DFAT, FCDO, etc. • The existing technical working group (TWG) has been reshaped into an interim TWG to include not only WHO and UNICEF but also other key partner organizations, but without the inclusion of the Ministry of Health team prior to February 2021. • Coordination nevertheless exists and is executed with the de facto administration, and influential stakeholders, at the state, region and community levels. This is necessary to ensure security and transport of essential vaccines and other medical supplies. • RI risk communication strategies and communication plans are updated with appropriate COVID-19-related messages. • Virtual media advocacy meetings/orientation trainings with and for all clinicians, physicians, paediatricians and general practitioners have been planned through the Myanmar Medical Association (MMA). • Increased levels of dissemination, promotion and advocacy of IEC materials through social media and EHOs have been observed. • cEPI-facilitated advocacy meetings have been held with the government, INGOs/NGOs, professional bodies, authorities of special administrative regions and other relevant stakeholders to increase support for immunization service delivery. • Facilitated meetings of schoolteachers have been held for identification of under-vaccinated children at school entry. • Capacity of basic health staff (BHS) on communication skills through IPC skills training related to dialogue with caregivers on the importance of immunization has been developed. • IPC training has been conducted with volunteers from the Myanmar Maternal and Child Welfare Association (MMCWA). • Some vaccine hesitancy exists, particularly within certain ethnic groups and in conflict areas.
<p>Conclusions</p>	<p>Many good linkages and coordination efforts had been put in place before February 2021. Now these linkages have to be re-thought and made more appropriate to be applied to the more complicated circumstances that involve both de facto State and non-State entities. Any progress on MR elimination and COVID-19 activities will depend on how well coordinated the varying implementation partners are and how they navigate the difficult terrain of coordinating the work between de facto State and non-State actors.</p>

Recommendations	<ul style="list-style-type: none"> • More attention than in the past is necessary for coordination between all organizations and individuals involved in MR elimination activities. • Monitor the implementation of the new interim ICC and TWG. • Advocacy is necessary at both higher and local levels to have a good working arrangement between EHOs, NGOs, private providers, non-CDM health workers and the military-appointed Administration as well as other local stakeholders. • Continue communication efforts on the importance of immunization and in reporting acute fever and rash illnesses.
Most critical next steps for the country to achieve elimination by 2023	
Recommendations	<ul style="list-style-type: none"> • Carry out preparations and implementation of the UN Revitalization of Routine Immunization and COVID-19 Vaccination in Myanmar Plan. • Incorporate training on VPD surveillance and outbreak response into the Plan. • Ensure vaccines are available in the country for possible “crash immunization” and outbreak response. • Urgently train rapid response teams to conduct surveillance and outbreak response. • Re-establish the data reporting, supervision and monitoring systems. • Conduct high level advocacy to ease restrictions to restore full immunization, surveillance and laboratory services to all parts of the country. • Ensure coordination between the Myanmar WHO Office and offices in neighbouring countries to promptly inform about measles–rubella outbreaks in Myanmar. • Consider a nationwide follow-up MR SIA covering at least all children aged 9–59 months as soon as the political situation permits during 2022 or 2023.
Conclusions	<p>The progress that Myanmar was making towards reaching measles–rubella elimination has been drastically impaired by the political events occurring since February 2021. In order to limit the potential outbreaks of measles–rubella and other vaccine-preventable diseases, including COVID-19, it is necessary to work with a UN-supported coalition of several non-State actors until a national health infrastructure is re-established and functional throughout the country. The measles–rubella situation has to be closely monitored by WHO and UNICEF and other partners in this transition period to mitigate threats both to Myanmar and surrounding countries.</p>

Nepal

Immunization service delivery (routine immunization/SIAs/school/adult vaccination, etc.)	
Key findings	<ul style="list-style-type: none"> • Due to COVID-19, the MCV1 coverage had decreased from 92% to 87% in 2020 in Nepal, with 33% of all districts showing more than 10% decline. • COVID-19 has caused disruption in the immunization programme nationwide. • About 41 of the 77 districts have MCV1 coverage of less than 80% and 12 of the 77 districts have a coverage of less than 70%. • Two worst performing provinces (Baghmati and Province-2) are incidentally the most populous provinces. • Stock-out of vaccines has been reported at the district level and the country has started monitoring vaccine supplies on a monthly basis. • Nationwide MR SIA was conducted in 2020 with an administrative coverage of 101%; post-campaign assessment has started in the third quarter of 2021 and the results will be available in 2022. • The age-eligibility for receiving routine vaccination has been increased from 2 years to 5 years. • Trainings for updating the microplans have been completed; the microplanning process has also been completed. • EPI monitoring has been affected adversely by COVID-19.
Conclusions	<p>The immunization services were impacted by the COVID-19 pandemic. The two most populous provinces have the greatest number of missed children. The microplanning process, to include high-risk and migrant population, has been completed. The country has proactively increased the eligibility age for vaccination from 2 to 5 years. The country needs to focus more on cold chain and vaccine logistic management and overall programme monitoring.</p>
Recommendations	<ul style="list-style-type: none"> • Compilation of outcomes of the microplanning process to understand the implications in terms of increased resources (HR, financial, cold chain and vaccine logistics) is necessary. • More emphasis has to be placed on EPI monitoring, especially in the districts with poor immunization coverage. • Systematic involvement of the private sector (in both EPI and outbreak management) is necessary as well as in the development of a national strategic document.

Surveillance activities

<p>Key findings</p>	<ul style="list-style-type: none"> • At the beginning of the COVID-19 pandemic, the VPD surveillance staff was shifted to focus on and prioritize COVID-19 surveillance, but recently the staff started to return to focus on MR surveillance as the COVID-19 situation is stabilizing. While this has affected the performance of the MR surveillance system, the local governments were able to recruit additional staff to support VPD surveillance. This also has resulted in steady improvements. • An alternate reporting mechanism (phones) was developed during lockdown for case detection and outbreak investigation. • About 50% of municipalities have case-based surveillance sites; 27 municipalities do not have surveillance sites (mostly in mountainous districts). • In 2020, surveillance units conducted 37 district-level workshops training 1695 participants from a total of 37 districts. Similarly, surveillance units also conducted sub-district-level VPD workshops in 165 case-based surveillance sites providing training to 3000 participants from 37 districts. Surveillance training of new informants is an ongoing process and is also included as part of training for vaccinators. • While the country exceeded the target rate for non-measles, non-rubella cases at the national level, there were several districts that did not meet the indicator (77% of districts in 2018; 93% of districts in 2019; and 85% of districts in 2020 have met the indicator). • The country did not meet the indicators for receiving the samples at the laboratory within five days and results reporting within four days. However, these two indicators are improving since 2018. • The target annual rate for suspected CRS cases at the national level has not been met for the years 2018–2020. The CRS surveillance network is limited.
<p>Conclusions</p>	<p>While the MR surveillance system in Nepal has met the sensitivity indicator in the past years at the national level, more efforts are needed at the subnational level to enhance the quality of surveillance.</p>
<p>Recommendations</p>	<ul style="list-style-type: none"> • The country programme should conduct a national VPD surveillance review. • Innovative and tailored approaches to enhance MR surveillance in the districts with suboptimal performance must be devised. • More efforts are needed to strengthen and expand the network for CRS surveillance.

Laboratory network

<p>Key findings</p>	<ul style="list-style-type: none"> • There are two laboratories in the MR laboratory network: (i) the National Public Health Laboratory (NPHL) in Kathmandu, and (ii) BP Koirala Institute of Health Sciences in Dharan. Private laboratories are not included in the MR laboratory network. • Both laboratories in the MR network were accredited recently in 2021. • All members of the human resources teams in the laboratories are adequately trained. • Continuous and sustainable supply of laboratory test kits and reagents are available in the laboratories and there were no issues during the pandemic. • The current MR laboratory network needs further expansion to meet the 2023 elimination target. There is the need for 2–3 more laboratories at the provincial level for serological tests. More laboratories also required in the western part of the country. NPHL to be used for molecular testing only. • The MR laboratory also acted as COVID-19 laboratory during the pandemic, but MR laboratory work was not affected as different groups of human resource teams were utilized in the two laboratories. • Transportation of samples has resumed by air and land post-lockdown. • It is difficult to ship samples to the MR laboratories from hard-to-reach areas within 72 hours of collection under reverse cold chain. Samples collected from remote sample collection sites take more than 72 hours to reach the field office. Once in the field office, they can be transported to NPHL within 72 hours. • Technical staff of the National Public Health Laboratory received training on M&R molecular testing from WHO-SEARO earlier this year. Currently the laboratory is conducting panel testing and is expected to start molecular testing in the first quarter of 2022. • Indicators for assessing quality of surveillance and monitoring regarding laboratory performance is off target since 2018. Development of a matrix system and monitoring is being done to improve the indicators. • No prominent risks or barriers are evident to maintaining the laboratory network.
<p>Conclusions</p>	<p>The country is behind schedule off-track for developing and maintaining an accredited measles & rubella laboratory network throughout the country by the 2023 elimination date as it still remains endemic for both measles and rubella. Besides, indicators for assessing the quality of surveillance and monitoring for laboratory performance has been off target since 2018.</p>
<p>Recommendations</p>	<ul style="list-style-type: none"> • MR laboratory network needs further expansion to meet the 2023 elimination target. Another 2–3 MR laboratories are needed at the provincial level for doing serological tests, and a laboratory is also required in the western part of the country. • Strengthen laboratory capacity for molecular testing (genotyping and sequencing). • Upgrade NPHL to the status of a reference laboratory for doing molecular testing. • Intensify efforts to enhance the quality of surveillance and monitoring indicators for laboratory performance. • Devise innovative methods for timely collection and transport of samples from hard-to-reach areas to the MR laboratory network.

Outbreak planning, response, recovery	
Key findings	<ul style="list-style-type: none"> • The total laboratory confirmed cases of measles and rubella in 2020 were 388 and 37 respectively. • More than 31 000 children aged between 6 months and 15 years were vaccinated during outbreak response immunization (97% coverage). • No root cause analysis was done.
Conclusions	
Recommendations	<ul style="list-style-type: none"> • Cross-border strategy needs to be devised and implemented, in consultation with India (states of Uttar Pradesh and Bihar on the border), and there are lessons to be learnt from collaborative work on polio by the two countries. <p>RCA needs to be done in the post-outbreak period to identify the underlying causes of the outbreak and of the low vaccination coverage.</p>
Linkages (social mobilization, communications, advocacy; partnerships and other linkages)	
Key findings	<p>On track to achieve strong linkages:</p> <ul style="list-style-type: none"> • 2020 SIA demonstrated strong engagement in relation to the campaign in 2020. Use of two vaccination cards and detection and tracking of missed children in routine immunization was observed. Information about children that missed immunization was shared with the municipalities. <p>Communication:</p> <ul style="list-style-type: none"> • Linkages with COVID-19: used COVID-19 vaccination card to also promote RI for children. • For the measles second dose, there is the need to focus on communication to make the community understand that the age for being fully immunized is 15 months instead of 9 months. • Vaccine hesitancy is not a concern in Nepal; only small pockets of ethnic marginalized communities lack awareness. • Innovations: there are plans to work with user groups and communities to finetune messages; there is also a plan to push messages using SMS (collaboration with mobile providers). There is a shift in policy to allow for delayed vaccination (more inclusive for missed children).
	<p>Financing:</p> <ul style="list-style-type: none"> • There is full budgetary support for procurement of vaccines and human resources for vaccine delivery. <p>The policy ceiling for the upper age limit for routine vaccination has been lifted from 2 years of age to 5 years.</p> <p>Strong political commitment: new CMYP/NIS is under development.</p>
Conclusions	Continue to build on the good work for linkages from both before and during the COVID-19 pandemic.
Recommendations	

Most critical next steps for the country to achieve elimination by 2023

<p>Conclusions</p>	<ul style="list-style-type: none"> • Nepal has made steady progress towards measles and rubella elimination with the number of confirmed cases and large outbreaks continuously diminishing. However, the immunization programme has not yet reached the levels necessary for elimination. Under extraordinary circumstances the country conducted a successful national MR SIA in 2020 and achieved high coverage despite the challenges of COVID-19. • The essential immunization services were impacted by the COVID-19 pandemic. The two most populous provinces have the largest number of missed children. Microplanning must include the high-risk and migrant populations. The country has proactively increased the eligibility age for vaccination from 2 years to 5 years. Effective cold chain, vaccine logistic management, and overall programme monitoring require more support from health authorities. While the MR surveillance system in Nepal has met the sensitivity indicator in the past years at the national level, more efforts are needed at the subnational level to enhance the quality of surveillance. The laboratory network needs expansion and support to improve performance.
<p>Recommendations</p>	<ul style="list-style-type: none"> • Strengthen focus on districts registering a more than 10% decrease in MCV1 coverage. • Support increased EPI monitoring and actions in poor performing areas. • Expand the involvement of the private sector. • Strengthen VPD surveillance. • Develop and implement cross-border strategy. • Conduct and document formal RCAs after each outbreak. • Expand further the MR laboratory network to meet the 2023 elimination target. Another 2–3 MR laboratories are needed at the provincial level for conducting serological tests. In particular, a laboratory is also required in the western part of the country. • Strengthen laboratory capacity for molecular testing (genotyping and sequencing). • Upgrade NPHL to the status of a reference laboratory for molecular testing. • Devise innovative methods for timely collection and transport of specimens from hard-to-reach areas to the MR laboratory network.

Sri Lanka

Immunization service delivery (routine immunization/SIAs/school/adult vaccination, etc.)	
Key findings	<ul style="list-style-type: none"> • There has been a decrease in MMR-1 coverage in the country from 98% in 2019 to 95.6% in 2020. • A total of 13 of the 26 districts have recorded MMR1 coverage of $\leq 95\%$. • No high-risk or difficult-to-reach area has been reported across the country.
Conclusions	The pandemic has adversely affected the immunization programme. In this context, it will need extra efforts for the country to identify the missed children in the high-performing areas.
Recommendations	<ul style="list-style-type: none"> • The country needs to strategically focus more on the districts with less than 95% coverage. • In the wake of migration, both inter- and intra-country, Sri Lanka needs to work on its border strategy for sustaining high immunization coverage.
Surveillance activities	
Key findings	<ul style="list-style-type: none"> • The disease notification system is set up in the country so that cases of fever and rash that are not measles and not rubella but diagnosed as other diseases are not counted as part of the numerator for the MR surveillance indicator non-measles non-rubella discard rate. This rate was reported as 1 in 2018, 1.55 in 2019 and 0.44 in 2020. • To maintain MR surveillance activities during COVID-19, additional staff, from hospitals mainly, were mobilized and trained to support COVID-19 activities so that public health staff could continue to focus on RI activities. • Completeness and timeliness of zero reporting by hospitals was negatively affected by the COVID-19 pandemic but remained relatively high.
Conclusions	The MR surveillance system in Sri Lanka is sensitive and has the capacity to detect MR and CRS cases. On account of the way the disease notification system is set up in the country, Sri Lanka is not able to meet the key surveillance indicator for sensitivity.
Recommendations	<ul style="list-style-type: none"> • The country programme should continue to maintain its MR surveillance operations and complete surveillance activities that were halted due to the COVID-19 pandemic. • The country programme should consider bioinformatics solutions to address the issue of not meeting surveillance indicators for the non-measles, non-rubella discard rate.

Laboratory network

Key findings

- One RRL in Colombo, and two subnational virology laboratories – one in the Central Province (Kandy) and one in Galle in the south.
- Private laboratories are not included in the MR laboratory network but can send samples of suspected MR cases to RRL.
- Only the RRL is WHO accredited; the last accreditation was issued in 2020.
- Tests done by RRL include serology, virology and genotyping. Sequencing is done from the Regional Reference Laboratory in Bangkok.
- All laboratory-related human resource staff receive annual training by the country authorities and by the WHO Regional Office.
- RRL is able to handle the laboratory surveillance needs of the country except sequencing.
- Continuous and sustainable supply of laboratory test kits and reagents are mostly available, but some gaps occurred during the early part of the pandemic.
- The current MR laboratory network does not need further expansion to meet the 2023 elimination target as the RRL is able to handle the low sample size. Upgradation and accreditation of the two subnational virology laboratories is needed.
- The laboratory work was not affected by the COVID-19 pandemic as the number of samples was low and all samples were tested in a timely manner.
- The RRL also acted as the COVID-19 testing laboratory but the increased workload due to COVID-19 was managed by pooling technical staff from other allied departments such as pathology, hematology, etc.
- It is feasible to ship samples in reverse cold chain to the RRL from all parts of the country including hard-to-reach areas within 72 hours of collection as Sri Lanka is a small country with good road network and transport facilities. Currently, sample transportation by air and land has resumed since July 2021.
- Data harmonization between surveillance and laboratory teams is done by a two-way notification between surveillance and the laboratory. All data are sent to the Central Epidemiology Unit, which harmonizes all related data.
- Results reported by the MR laboratory network can be linked to suspected measles cases in the national surveillance system in real time.
- Genotyping is being done since 2017. A request to establish capacity for sequencing has been made to the authorities.
- Barriers to achieve or maintain the laboratory network include gaps in reagent and kit supply, and sometimes the inability to confirm test results due to inadequate samples. Other barriers include transfer of trained staff every three years, lack of timely instrument calibration, and shipment cost to send samples to the RRL in Bangkok for sequencing. Requests for obtaining a sequencer have been made to the authorities.

Conclusions	The country is on track for developing and maintaining an accredited measles and rubella laboratory network throughout the country by the 2023 elimination date as Sri Lanka has already verified the elimination of both measles and rubella. Besides, it has a WHO accredited laboratory, trained laboratory manpower, continuous and sustainable supplies of test kits and reagents, and genotype testing facilities within the country.
Recommendations	<ul style="list-style-type: none"> • Ensure robust plan and capacity for the laboratory to respond in case of outbreaks. • Conduct capacity development at the RRL to perform sequencing studies. • Upgradation and accreditation of the two subnational virology laboratories is necessary so that they can act as supporting MR laboratories.
Outbreak planning, response, recovery	
Key findings	The total laboratory confirmed cases of measles and rubella in 2020 were two and zero respectively.
Conclusions	No measles and/or rubella outbreak in the country.
Recommendations	Cross-border strategy needs to be devised and implemented.
Linkages (social mobilization, communications, advocacy; partnerships and other linkages)	
Key findings	<ul style="list-style-type: none"> • Health services are essentially integrated at the service delivery level through the divisional MoH structure and the public health midwife providing a range of services in a continuum of care. • COVID-19 vaccinations: Close coordination with WHO and UNICEF, and support from UNICEF for cold chain, and to replace old equipment and support the provision of additional equipment. • UNICEF is providing support to conduct an EVM assessment scheduled for November 2021 (this has not been done for last four years due to lack of funds). • The Lions/Rotary organizations coordinate directly with MoH if they have resources to support any activities. • The national advisory committee on communicable diseases (which includes a NITAG but also goes beyond) is a technical body which includes key professional associations and organizations in Sri Lanka (medical, paediatric, the microbiology college, general practitioners, etc.) and exercises functional coordination for control and prevention. It also works in tandem with the polio expert committee for laboratory and case identification. • A separate social media strategy is not seen as needed, since there is very high demand for health services and vaccination. The public health midwife is strongly connected with the community and is a trusted source of information. • There is negligible vaccine hesitancy in the country. For COVID-19 vaccination the only issues are the preference of the 20–30-year age group for the Pfizer vaccine over Sinopharm, leading to a delay in vaccination until the preferred vaccine is available. • Traditional media is used for communication and messages around vaccination, and this includes the weekly newspapers and television. • Parents were allowed to take their children out for vaccination during the lockdown as this was considered an essential activity.

Conclusions	High political commitment, strong linkages, and integrated service delivery through the frontline health workforce is evidenced. There is no concern related to vaccine hesitancy.
Recommendations	<ul style="list-style-type: none"> • Continue the excellent work on linkages with all aspects and sectors for measles–rubella elimination. • Remain vigilant for any possible increase in vaccine hesitancy due to social media. • Increase efforts on cross-border cooperation with neighbouring countries.
Most critical next steps for the country to achieve elimination by 2023	
Conclusions	<ul style="list-style-type: none"> • Sri Lanka has maintained its elimination status for both measles and rubella, largely through continued high immunization coverage. As has been seen in other countries, surveillance performance declined during the COVID-19 pandemic. The country sustained high political commitment, strong linkages, and integrated service delivery through the frontline health workforce. • Vaccine hesitancy in Sri Lanka is not a challenge as with other countries. The country successfully supports its WHO accredited laboratory, the trained laboratory manpower, a well-managed supply chain of test kits and reagents, and genotype testing facilities within the country.
Recommendations	<ul style="list-style-type: none"> • National efforts must focus on districts with less than 95% coverage. • Microplans need to be updated to identify and include missed children so that they can be included in vaccination activities as soon as possible. • Sri Lanka has a unique MR surveillance system inasmuch that the discard rate is underreported because discarded cases get assigned a specific diagnosis, indicating a strong overall system. In recognition of this, therefore, a periodic review of non-measles, non-rubella cases will have to be performed to ensure sensitivity of MR surveillance. • Revisit and revise communication efforts, including the use of social media. • Ensure robust plan and capacity for the laboratory to respond in case of outbreaks. • Develop capacity at the RRL to perform sequencing studies. • Upgrade and accredit the two subnational virology laboratories so they can act as supporting MR laboratories. • Develop and implement cross-border strategies.

Thailand

Immunization service delivery (routine immunization/SIAs/school/adult vaccination, etc.)	
Key findings	<ul style="list-style-type: none"> • Thailand should be commended for continuing its essential immunization programme (EPI) during the COVID-19 pandemic with proper IPC measures taken. • National Measles Rubella Elimination Strategic Plan 2020–2024 has been revised in accordance with the SE Asia Region elimination plan. • MRCV2 vaccination schedule changed in 2021 from 30 months to 18 months. • 2020 MRCV1 and MRCV2 reported coverages of 91% and 89% respectively and MRCV2 has consistently been >80% during 2016–2020 but has not reached >95%. • Thailand conducted 2018 subnational MR SIA for ages of 1–12 years (1–<5 years at 81.7%); 5–12-year-olds outside school (92.1%) and schoolchildren (57.8%); and the 2019–2020 national selective MR SIA for 1–12-year age group (1–<7 years at 65.2%, and 7–12 years at 79%. • In 2020 high-risk adults in the 20–40-year age group in five high-risk provinces (military 38.5%, prisoners 56.2% and health personnel and factory workers 17.1%) were vaccinated with MR vaccines. • A proposed study on reasons for low SIA coverage could not be conducted due to the COVID-19 pandemic. • There is an electronic registration system for immunization and local health staff to track routine immunization defaulters. However, private provider vaccination reporting is through local health departments and not always captured completely in data reports. • The routine immunization coverage in Bangkok Municipality (the national capital region has 7–8% of the total national population) is not reported to the Ministry of Public Health. • Children of migrant families may not be recorded in the electronic registry depending on their level of contact with the health facilities. • The Programme is aware of the high-risk groups – namely, undocumented migrant children, vaccine hesitant families in southern provinces and young adults in high-risk provinces – but does not have numbers or mapping of these clusters. It may, however, be available at the local levels. • Technical guidance is provided by the Department of Disease Control, but implementation is the responsibility of regional, provincial and district levels, which provide direct supervision of the programme. • Some CSOs provide vaccination services in the vaccine-hesitant southern provinces and to migrants, especially along the provinces in the Thai-Myanmar border.

<p>Conclusions</p>	<ul style="list-style-type: none"> • The country programme has achieved good routine immunization coverage, though it is not high enough to achieve elimination levels. This is in part due to undocumented migrant children who remain outside the system and vaccine-hesitant families, primarily Muslim families, in security compromised areas that have not been vaccinated. Additionally, there is a significant pool of young adults susceptible to measles and rubella, many of them being migrants coming from countries where RI coverage has not been high over the last decade or two. There are also many young male adults susceptible to rubella as a result of introducing RCV in females only (RCV has been given to grade-6 female students in 1986–1998 before RCV was started among grade-1 male and female students in 1993). The actual immunization coverage figures may be higher if the electronic registration system is harmonized to include the private sector and the health facilities located in Bangkok. • Efforts have been made to address low immunity in high-risk groups through SIA but high enough coverage has not been achieved to meet elimination levels (>95%). This may be due in part to using selective SIA where it is difficult to determine SIA denominators, eligibility, and convenient implementation. Awareness communication and vaccination of children in high-risk areas by CSOs is a useful practice. • Renewed emphasis on plugging the remaining immunization gaps following the COVID-19 pandemic is essential for the country to reach elimination.
<p>Recommendations</p>	<ul style="list-style-type: none"> • Mapping of high-risk groups must be conducted by location and population estimates at the national and lower levels, and more detailed mapping must be included in immunization microplans. • Vaccination outreach must be provided to areas with significant numbers of unregistered migrant children. • Root cause analysis must be done to understand the reasons for not achieving more than 95% coverage in selected subnational areas in the recent SIA. A non-selective approach to future SIAs should be considered although that requires more vaccines and possibly more operational costs. • The duration of SIAs must be shortened so that it remains more of a campaign than an extension of routine services. • Resume outreach services for remote areas and urban slums that have been curtailed by the COVID-19 pandemic. • Continue engagement with CSOs and religious groups to mitigate vaccine hesitancy in the southern provinces. • Ensure a higher percentage of health workers receive MR vaccination to prevent nosocomial infections at health facilities.

Surveillance activities

<p>Key findings</p>	<ul style="list-style-type: none"> • The country should be commended for maintaining a high-quality surveillance system for measles and rubella during the COVID-19 pandemic notwithstanding the understandable dip in surveillance sensitivity (non-measles, non-rubella discard rate of 1.43 in 2020 compared with 5.58 in 2019). • CRS surveillance is case-based passive; discussions were underway to start sentinel CRS surveillance, but this was postponed due to COVID-19. • CRS was previously coded under rubella, making it somewhat difficult to separate CRS cases from rubella cases; CRS received its own code in 2020. • In 2020, there were 448 confirmed measles cases (down from 4411 in 2019) and 195 confirmed rubella cases (up from 142 in 2019). There were 0 CRS cases in 2020. • A review of CRS cases from 2014–2018 conducted in 2020 found nine laboratory-confirmed CRS cases, 238 clinically compatible CRS cases and 11 congenital rubella infections.
<p>Conclusions</p>	<ul style="list-style-type: none"> • Thailand has established a high-quality surveillance system for measles and rubella; however, improvements are needed to achieve elimination-standard surveillance. Zero reporting is not currently occurring. The country is not investigating all cases of fever/rash for measles or rubella as there is a concurrent burden of dengue. The increased number of cases needing testing is estimated at 30 000 for an estimated increased cost of US\$ 15 million annually. Improvements such as including the private sector in the surveillance system are needed. • The CRS surveillance system does not meet elimination standards. A review of CRS cases found 9 laboratory-confirmed and 238 clinically compatible CRS cases. Starting sentinel surveillance sites is critical. • There is a high turnover of surveillance staff with increased workload during COVID-19.
<p>Recommendations</p>	<ul style="list-style-type: none"> • Thailand can be provided with examples from the South-East Asia and Western Pacific Regional Offices of WHO of how other countries have handled testing all cases of acute fever/rash for measles/rubella in the context of a high domestic dengue burden. This information will be useful to start zero reporting. • Enact mitigation measures to counter the effects of COVID-19 on the surveillance system, especially decreased surveillance sensitivity. • Establish sentinel sites for CRS surveillance. • Conduct surveillance refresher training. • Consider reprioritization of private sector sites involved in the MR surveillance system to include additional sites.

Laboratory network

<p>Key findings</p>	<ul style="list-style-type: none"> • A high-quality laboratory network is in place meeting all laboratory indicators; this also serves as the regional reference laboratory. • Excellent historical genotype database in place for measles with genotyping dating back to 1993, allowing for accurate case classification. • Private/commercial laboratories are involved in the surveillance system; however, only about 3% of private laboratory data is available to the MR programme with plans to expand in the future.
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Conclusions	<ul style="list-style-type: none"> • High-quality laboratory network is in place throughout the country with 14 accredited laboratories meeting all laboratory indicators. The laboratory network's use of in-depth molecular epidemiology to reveal viral transmission patterns and the duration of circulation of viruses of specific lineages can serve as an example to the rest of the Region. • Private laboratories are involved in the surveillance system; however, those laboratories are not accredited, requiring additional sample testing/confirmation in an accredited laboratory. The country was scheduled to hold a workshop to explore the capacity of private laboratories in order to be part of the MR laboratory network. However, this plan has been put on hold due to the COVID-19 pandemic.
Recommendations	<ul style="list-style-type: none"> • Continue the currently excellent use of molecular epidemiology for both measles and rubella. • Consider expanding access of private laboratory data to the MR programme. • Consider including key private laboratories in the MR network.
Outbreak planning, response, recovery	
Key findings	<ul style="list-style-type: none"> • The country has a budgeted outbreak response and has robust data on outbreaks including genetic sequencing, but not all outbreaks have this data, and this includes for the large outbreak in Chiang Mai in 2020 that provided no data on genetic sequencing. • There is a vaccine stockpile of about 230 000 MR doses for outbreak response as of 2021. • Thailand has capable surveillance and rapid response teams (SRRT) at lower levels and these provide vaccination as necessary in addition to conducting investigation. • Vitamin A is only routinely provided in cases of childhood outbreak in the southern provinces because of evidence of underlying vitamin A deficiency in those areas. However, other migrant and underserved communities may also have subclinical or frank vitamin A deficiency. • The country risk analysis determined that there are no high-risk provinces for measles outbreaks. However, there may be districts or sub-districts that are considered high-risk. • Funding for SRRT did not allow for refresher training during the COVID-19 pandemic and it is not clear if the budget for actual outbreak response is also reduced.
Conclusions	<p>The outbreak planning and response to the actual reported outbreaks appears to be effective although it is better to provide vitamin A supplementation for all childhood cases according to WHO protocols in all areas of the country and have throat swabs and urine samples collected for as many outbreaks as possible. The subnational risk analysis as it stands should go down to a level lower than provinces to increase sensitivity and to ensure that all vulnerable areas receive adequate attention to prevent outbreaks.</p>

Recommendations	<ul style="list-style-type: none"> • Consider the subnational risk analysis for the country to be done for the district level instead of the provincial level to ensure greater sensitivity to predict outbreak risks. • Include provision of vitamin A capsule treatment dose for all childhood outbreak measles cases in all parts of the country according to WHO protocols. • Ensure throat swabs and urine samples are collected for as many possible if not for all outbreaks. • There is the need to keep funding in place for SRRT to possibly respond to all future outbreaks. • Increased vigilance for outbreaks on the Myanmar border and other areas due to the disruption of health services, including immunization, in many parts of Myanmar following the military-civilian conflict.
Linkages (social mobilization, communications, advocacy; partnerships and other linkages)	
Key findings	<ul style="list-style-type: none"> • The profile of measles–rubella elimination activities is not high enough, understandably, during the COVID-19 pandemic. • NVC and NITAGs are active and functional. • Regular coordination meetings between EPI, NIH and Surveillance authorities at the central level on polio eradication and MR elimination activities. • Regional offices for disease control are not routinely included in the coordination meetings but have their own meetings at the local level. • Partner agencies, Rotary and other CSOs are consulted on the development of the National Measles–Rubella Elimination Strategic Plan. • There is no regular involvement of the national paediatric and other medical societies for advocacy to the community and health workers. • CSOs are engaged with government consent to provide vaccination and communication/advocacy to the underserved southern provinces and migrant populations on the Myanmar border. • Coordination between the departments responsible for public health and health services at private facilities has not been fully harmonized resulting in loss of data and incomplete disease reporting. • EPI, NIH and Surveillance departments are fully coordinated and engaged with the COVID-19 task force.
Conclusions	<p>Coordination and possible linkages between different departments of MoPH, other government sectors, medical societies, partner agencies and CSOs are not being fully exploited. Of greater concern is the lack of advocacy and supportive supervision of the frontline workers. COVID-19 vaccination should be used as an opportunity to promote immunization and surveillance activities.</p>

Recommendations	<ul style="list-style-type: none"> • Use a whole-of-society approach as is done for COVID-19 to promote MR elimination activities. • Include regional offices of disease control in coordination meetings with central EPI, NIH and Surveillance departments for MR elimination activities. • Improve the supportive supervision mechanism from higher levels to lower levels for MR elimination activities. • Hold more frequent coordination/collaboration meetings with paediatric/medical societies, CSOs and the private sector. • Formalize and harmonize MR elimination activities with the private sector. • Revitalize social mobilization and communication efforts to enhance the interest of the community in MR vaccination and surveillance. Continue to address vaccine hesitancy, especially in the southern provinces. • Explore the possibility of renewing cross-border coordination meetings and cooperation with Cambodia, the Lao People's Democratic Republic, Malaysia and Myanmar.
Most critical next steps for the country to achieve elimination by 2023	
Recommendations	<ul style="list-style-type: none"> • Lessons learned from the positive vaccination, laboratory and surveillance activities implemented for COVID-19 can be applied suitably to MR elimination activities. • Close immunity gaps through conducting outreach to unregistered migrant children. May need increased vaccine supply for this. • Consider a non-selective national SIA for children aged 9 months to 15 years in 2023 that is well monitored (external funding may be needed, particularly for bundled vaccines and cold chain equipment). This is due to >10% immunity gap in the target age group not counting unregistered migrants who widen the gap even more. • Continue efforts on adult high-risk groups, but with greater monitoring. • Re-establish zero AFR reporting for all reporting network sites, both public and private. • Establish CRS surveillance sentinel sites. • Conduct training packages for advocacy on MR elimination among physicians. • Increase appropriate efforts to address vaccine hesitancy in the southern provinces.
Conclusions	<ul style="list-style-type: none"> • The country is still endemic for measles and the COVID-19 pandemic has impacted the performance of the immunization and surveillance programme that was already not functioning at elimination levels before the outbreak. All the pieces are there in place to achieve elimination; only more coordination and monitoring is needed along with a boost to efforts to close the immunity gap with a non-selective, catch-up SIA. • Greater advocacy and commitment are required to improve and sustain the MR elimination efforts. Increased coordination is needed between MoPH at the central level and implementation levels of the health system. Vaccination of unregistered migrant children, vaccine-hesitant children and the remaining adult high-risk groups is imperative. Surveillance reporting network must be re-prioritized to include key private providers.

Timor-Leste

Immunization service delivery (routine immunization/SIAs/school/adult vaccination, etc.)	
Key findings	<ul style="list-style-type: none"> • Measles has been verified for elimination in Timor-Leste by the Regional Office in 2018; this elimination has been sustained as of 2021. • Rubella vaccine introduced in 2015 by a wide-age SIA (9 months to 15 years). A post-campaign coverage evaluation survey estimated coverage to be at 96%. • Between 2015 till the present, MCV1 coverage has been >95% and also verified by two coverage surveys with the last one in 2019; however, the MCV2 coverage has been <90% over the same period. • About 30% of the population live in remote areas too far to access the regular health services, hence outreach activities are needed to support those areas. • In 2020 and 2021, mobile and outreach services were badly interrupted due to the COVID-19 pandemic and MRCV2 coverage in 2020 was low due to this reason. • In 2021–2022, with vaccination for COVID-19 available, health-care workers have and will be deployed to complete the COVID-19 vaccination schedules and plan.
Conclusions	Due to the COVID-19 situation, immunization has faced many challenges, particularly in remote areas.
Recommendations	<ul style="list-style-type: none"> • As soon as possible, re-institute immunization activities in the remote areas. • Children who are unvaccinated for COVID-19 should be vaccinated by a SIA.
Surveillance activities	
Key findings	<ul style="list-style-type: none"> • Elimination of measles in the country was verified in 2018. In 2020 rubella was classified as endemic. • Non-MR discarded rate is 2.9 at the national level but only 5% at the subnational level report 2 or more cases for every 100 000 population. The discarded rate is falling almost 10 times compared with 2019, the year before the COVID-19 pandemic struck. This was because villagers were not coming to the health centres and outreach activities were occasionally halted. • Six sentinel hospitals did not report any suspect CRS and did not meet the criteria of 1 case per 10 000 live births. • Health workers and surveillance staff are primarily engaging in COVID-19 surveillance and control activities. • COVID-19 vaccine roll-out is expected to cover the target population by the end of 2021 and health workers will be able to focus on MR elimination once again in 2022.
Conclusions	Sensitive case-based surveillance of measles is on track but needs to be monitored closely, especially at the subnational administrative level. Sensitive CRS surveillance is lower than standard levels.

Recommendations	<ul style="list-style-type: none"> • Post-elimination sustainable plans must be developed with the support from partners. • Consider using lay or village health volunteers in addition to outreach teams to detect and report fever and rash in remote areas to sound the alert for suspect MR cases.
Laboratory network	
Key findings	<ul style="list-style-type: none"> • The country has one measles rubella laboratory that is performing well as per WHO-recommended protocols and it has attained WHO proficient status in 2021. • The WHO Country Office is providing human resource support for all laboratory related activities, including JE, Rota and invasive bacterial diseases. • The laboratory faced shortages of kits and reagents due to restrictions on cargo flights in 2020. With this lesson learnt, the laboratory is now ordering supplies at least with a three-month lead time. • Efforts to collect throat swabs and urine specimens are made only after a suspected case gets laboratory confirmed based on serology results. There is the possibility that, as there is delay in collecting throat swabs and urine specimens in the acute phase of illness, results of all PCR tests are reported as negative. • There is a felt need of strengthening laboratory capacity for measles–rubella genotyping PCR.
Conclusions	Overall, the country has a functional and quality-assured measles–rubella laboratory network to serve the national surveillance programme. Specimen collection guidelines need to be modified to suit the country’s needs and to effectively achieve the goal of measles–rubella elimination in the country.
Recommendations	<ul style="list-style-type: none"> • MoH should ensure continuous supply of kits and reagents to MRLN for uninterrupted functioning. • Efforts should be made to collect urine or throat swab specimens from acute measles or rubella suspected cases at the time of first contact when the serum specimen is collected.
Outbreak planning, response, recovery	
Key findings	<ul style="list-style-type: none"> • An outbreak response system is in place. However, COVID-19 has diverted response teams to focus on pandemic-related activities. • COVID-19 vaccine roll-out will reach 80% of the target in 2021 and activities related to vaccine-preventable diseases including MR elimination are expected to resume as normal. • Any outbreak of vaccine-preventable diseases, in the meantime, will be a challenge and can be gamechanger.
Conclusions	Outbreak response system exists but is likely to face challenges due to COVID-19 until the middle of 2022.
Recommendations	Policy advocacy needs to be conducted to have a special dispatch team to respond to an MR outbreak before the pandemic subsides.

Linkages (social mobilization, communications, advocacy; partnerships and other linkages)

Key findings	<ul style="list-style-type: none"> • The priority in Timor-Leste has been the COVID-19 response and vaccination rollout. With all hands engaged on this, other services including routine immunization and outreach services have been affected. • Vaccine hesitancy is not an issue in of concern in Timor-Leste: people are aware that vaccines are important, and they are also aware that measles vaccination is given at 9 months and 18 months of age. However, there is no active demand for immunization. • Parents are also usually not aware of what vaccine has been given to the child. • While the Government of Timor-Leste purchases all vaccines and even fills the funding gaps during campaigns, operational costs for regular monthly outreach have been funded by donors till date.
Conclusions	<p>While Timor-Leste has achieved measles elimination, there is the emerging question of sustainability due to the lack of funding, active demand for immunization from the community, and challenges in reaching the hard-to-reach.</p>
Recommendations	<ul style="list-style-type: none"> • Incorporate the rights-based approach to immunization to enable active demand from the community for vaccines. • Advocate with parliamentarians/decision-makers for annual budget allocation for regular routine services, especially outreach. • Focus on overall health systems strengthening to be able to maintain measles and achieve rubella elimination systematically and affordably for the country, considering that it has transitioned out of Gavi support. • Enhance integration of services in conducting outreach services, and ensure that these are be funded by the government. • Consider increasing the frequency of outreach services.
Most critical next steps for the country to achieve elimination by 2023	
Key findings	<ul style="list-style-type: none"> • Most immunization activities, surveillance, laboratory and outbreak response to MR in Timor-Leste were severely affected by the COVID-19 pandemic. Optimistic estimates are that this will be temporary and are expected to resume by early or mid-2022, and that these activities will return to normal levels once the targets for immunization for COVID-19 are reached by the end of 2021. • Importation of cases is possible as the movement of people within the country as well as across the borders will be increase as COVID-19 subsides. • Sustainability is a big challenge as operational services for immunization still depend copiously on international funding.

Conclusions	It is likely that Timor-Leste will sustain verification of measles elimination and achieve rubella elimination by 2023 though without verification. Sustaining measles elimination will depend on the Government of Timor-Leste's commitment to funding to ensure high coverage and sensitive surveillance as well as on how rapidly the country can respond to measles outbreaks. Ideally the country should sustainably and systematically plan to reach all hard-to-reach populations with two doses of measles vaccine.
Recommendations	<ul style="list-style-type: none"> • Prepare government and international partners for imported cases or new outbreaks in high-risk areas and ensure swift response. Strengthen outreach for the hard-to-reach population. • Long-term health investment, especially on the human resources and workforce and service delivery funding, is essential for sustainability.

Annex 2

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A comprehensive review of progress on measles and rubella elimination activities in the WHO South-East Asia Region and estimation of the way forward was conducted in October–November 2021 by an independent group of experts. The objectives of the review were to provide a candid estimate of progress towards achieving the regional goal as of 2020 and assess the quality of implementation of the strategies laid out in the 'Strategic Plan for Measles and Rubella Elimination in the WHO SE Asia Region 2020–2024' in the context of the COVID-19 pandemic, and provide recommendations on how the strategies and principles should be refined to accelerate advancement towards the regional goal.

This publication provides the key observations, conclusions and recommendations made by the review team and charts the roadmap to accelerate progress towards measles and rubella elimination by 2023 in Member States of the WHO South-East Asia Region.

