

Eleventh meeting of the European Regional Verification Commission for Measles and Rubella Elimination

8–10 November 2022

Copenhagen, Denmark



Abstract

The eleventh meeting of the European Regional Verification Commission for Measles and Rubella Elimination (RVC) took place in Copenhagen, Denmark on 8–10 November 2022 to review the 2021 annual status updates (ASUs) from Member States of the WHO European Region. The RVC evaluated 50 national ASUs for 2021 submitted by each country's national verification committee. The RVC concluded that, by the end of 2021, 33 Member States had provided evidence to demonstrate that endemic transmission of measles was interrupted for at least 36 months and was thereby verified as eliminated. Similarly, endemic rubella transmission was interrupted in 48 Member States for at least 36 months and verified as eliminated.

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Contents

Abbreviations	iii
Executive summary	iv
Background	1
Scope and purpose of the meeting	1
Introduction and opening remarks	2
Status of measles and rubella elimination: global and regional update	2
Retrospective review of rubella data from Italy and plan for pending reviews	5
RVC discussion on eleventh meetings' priorities and procedures	6
Review of ASUs for 2021	8
Conclusions	8
Recommendations	9
Activities for 2023	11
References	12
Annex 1. Results of the RVC review of reports and documents submitted by NVCs	13
Annex 2. RVC conclusions on status of measles and rubella elimination per Member State in the WHO European Region in 2021	15
Annex 3. List of participants	26

Abbreviations

ASU	annual status update
COVID-19	Coronavirus disease 2019
CRS	congenital rubella syndrome
EIA2030	European Immunization Agenda 2030
GMLRN	Global Measles and Rubella Laboratory Network
MCV2	second dose of measles-containing vaccine
MMR	measles, mumps and rubella vaccine
MMR1	first dose of measles, mumps and rubella vaccine
MMR2	the second dose of measles, mumps and rubella vaccine
MRCV	measles- and rubella-containing vaccine
MRCV1	the first dose of measles-rubella-containing vaccine
MRCV2	the second dose of measles-rubella containing vaccine
NVC	national verification committee for measles and rubella elimination
RRL	Regional Reference Laboratory
RVC	European Regional Verification Commission for Measles and Rubella Elimination
SIAs	supplementary immunization activities
VPD	vaccine-preventable disease
VPI	Vaccine-preventable diseases and immunization programme, WHO Regional Office for Europe

Executive summary

The eleventh meeting of the European Regional Verification Commission for Measles and Rubella Elimination (RVC) took place in Copenhagen, Denmark on 8 –10 November 2022 to review the 2021 annual status updates (ASUs) from Member States of the WHO European Region. The RVC evaluated 50 national ASUs for 2021 submitted by each country’s national verification committee, which is an independent expert body in each country. The RVC concluded that, by the end of 2021, 33 Member States had provided evidence to demonstrate that endemic transmission of measles was interrupted for at least 36 months and was thereby verified as eliminated. Similarly, endemic rubella transmission was interrupted in 48 Member States for at least 36 months and verified as eliminated.

Background

The European Regional Verification Commission for Measles and Rubella Elimination (RVC) was established by the WHO Regional Office for Europe (Regional Office) in 2012 as an independent expert body with the mission to evaluate the documentation submitted by the national verification committee (NVC) in each of the 53 Member States in order to verify the elimination of measles and rubella when achieved in the Region. The Vaccine-preventable diseases and immunization programme (VPI) of the Regional Office serves as the Secretariat to the RVC and supports Member States throughout the process.

The RVC holds annual meetings to determine the status of measles and rubella elimination in the WHO European Region (Region) based on annual stock updates (ASUs) and additional documents prepared and submitted by the NVCs. Before the meeting, it is expected that the NVC secretariat in each country (generally representing the national immunization programme), will use the ASU form to provide data from existing reports (including on measles and rubella epidemiology, molecular epidemiology, the analysis of population immunity and immunization programme performance, the quality of surveillance and changes that may have occurred since the last report), together with any relevant additional information to the NVC. The NVC is expected to review and analyse the received information and complete the form with its statement on measles and rubella elimination status in the country for the particular year.

Scope and purpose of the meeting

The RVC reviewed the ASUs and other documentation (e.g., relevant technical reports, scientific articles) submitted by NVCs and their secretariats and assessed the status of measles and rubella transmission in 2021 in the Member States of the Region. Based on its conclusions for 2021 and previous years, the RVC determined the elimination status for each Member State that submitted a report.

The objectives of the eleventh meeting were for the RVC to:

- be informed about the current epidemiology of measles and rubella in the European Region and activities of the VPI programme of the WHO Regional Office for Europe towards measles and rubella elimination, as well as global developments in measles and rubella control and elimination;
- to review the NVCs' annual measles and rubella status updates for 2021, documents for previous years submitted after the corresponding review periods and all other documentation that NVCs provided to document the presence or absence of measles and rubella endemic transmission in their countries;
- to determine the status of transmission of measles and rubella in each Member State and in the Region in 2021, to declare whether elimination of either or both diseases was achieved and declare the status of measles and rubella epidemiology in the European Region in the context of the elimination targets;
- to initiate preparation of the RVC's measles and rubella elimination status report for 2022;
- to discuss the RVC's verification activities in the context of the ongoing Coronavirus disease 2019 (COVID-19) pandemic and considering its evident but not fully quantified impact on routine immunization, epidemiological and laboratory

surveillance and other aspects of health systems' performance; and to recommend verification activities in 2023 and beyond; and

- to review RVC working procedures and verification process requirements.

Introduction and opening remarks

Dr Siddhartha Datta and Dr Jose Hagan, VPI, opened the meeting and welcomed participants. The RVC Chair, Dr Günter Pfaff also welcomed the participants to the meeting and thanked the Regional Office for the incredible work they have conducted over the past year. The RVC had a quorum although two members were unable to attend, one of whom had submitted their analysis and recommendations in advance. Dr Pfaff noted the importance of the COVID-19 pandemic and pandemic response measures' impact on measles and rubella epidemiology, elimination and verification activities. A major concern for the RVC is the impact of the COVID-19 pandemic on measles and rubella surveillance sensitivity and performance of national immunization programmes. In such circumstances it is even more important that countries use molecular epidemiology in the assessment of sporadic cases or during ongoing measles and rubella transmission. The Chair was pleased that the group was able to come together in person for the meeting to permit a high-quality discussion.

Status of measles and rubella elimination: global and regional update

A WHO headquarters representative and the RVC Secretariat (VPI) provided updates on the current epidemiology of measles and rubella at the global level and in the Region.

Global update – presented by Dr Patrick O'Connor (WHO headquarters)

The number of global measles cases in 2019 was the highest reported since 1996. The number of cases dropped after 2019, which may be due to natural immunity from large outbreaks, COVID-19 non-pharmaceutical interventions, and disruptions of vaccine-preventable disease (VPD) surveillance due to the pandemic. Rubella cases followed a similar trend to that of measles. Despite the low number of reported measles cases over the past 24 months, an increasing number of countries have reported measles outbreaks characterized as large and disruptive – the number of countries increased from 19 to 29 in the past six months. WHO has developed the Measles outbreaks strategic response plan 2021–2023 (1) and is working to frame measles and rubella immunization activities as post-COVID-19 recovery activities. Between 2019 and 2022, the number of countries with low surveillance sensitivity increased from 76 to 88 and there are concerns that existing surveillance systems are not capturing all cases. The genotype distribution is stable but with the reduced number of measles cases, there have been a reduced number of genotypes identified. Regional and national verification commissions have continued activities throughout the pandemic. Progress has been made toward rubella elimination and there could be a pathway for achieving global measles elimination. Nineteen countries globally have not introduced rubella vaccine and 12 countries have not introduced the second dose of measles-containing vaccine (MCV2). First-dose measles coverage dropped to 81% in 2021, leaving five million more children unvaccinated compared to 2019. There were major global disruptions in immunizations, decreased coverage of measles and rubella immunization and an increase in the number of zero or 1-dose children in 2020 and 2021.

In the fourth quarter of 2021, health systems had to deploy 4.5 times more COVID-19 vaccine doses compared to routine immunization doses. Health systems and immunization programmes are stretched as they need to provide routine immunization, catch-up vaccination, continue with provision of COVID-19 vaccines to modified priority groups and with updated vaccines, and some will need to conduct mass supplementary immunization activities (SIAs).

The vision of the Measles and rubella strategic framework 2021–2030 (2) is a world free of measles and rubella, with eradication as the ultimate goal. The eradication timelines and milestones should be set when conditions for eradication are met. Elimination targets and milestones are set by the six WHO regions and vary based on conditions, with RVCs responsible for verifying elimination progress. We are currently at a crossroads to determine if immunity gaps can be closed in order to prevent large and disruptive outbreaks in 2023 and 2024.

European Region update – presented by Dr Jose Hagan (WHO Regional Office)

During the tenth RVC meeting, there were concerns about the overall low number of suspected, confirmed and discarded cases for both measles and rubella and about the decreased completeness and quality of country reports for 2020. The RVC stated that the waves of different variants of COVID-19 virus, ongoing COVID-19 pandemic and response measures had made an as yet undetermined impact on surveillance performance and vaccination coverage. Regional diversity of detected measles virus genotypes has been decreasing, consistent with progress toward elimination and the global situation. Based on existing data, the concerns remained in 2021.

At the tenth meeting, the RVC concluded that 29 countries (of 53 in the European Region) had eliminated measles, nine continued to have endemic transmission, and five had re-established endemic transmission. For ten countries, the RVC could not make a conclusion for various reasons (e.g., no or late ASU submission). For rubella, the RVC concluded that 41 countries had eliminated rubella, two were awaiting a retrospective review, and ten could not be reviewed.

Based on all information reported to the Regional Office, most countries recorded a small drop in routine immunization coverage with measles and rubella containing vaccine (MRCV) (for both doses) from 2019 to 2020 at national level. However, coverage in some countries dropped considerably to below 80% or even below 20%. Preliminary data and communication with countries indicate the presence of pockets with suboptimal immunization coverage in every country, as the result of missed or delayed immunization. In 2020 and 2021, there was a large drop in the number of reported suspected and confirmed measles cases for the Region as a whole. However, there was a modest increase in reported measles cases in 2022 compared to 2021 due to an outbreak in Tajikistan, which reported measles incidence of more than 20 cases per million.

The COVID-19 pandemic exacerbated immunization inequities within and across countries in the Region. Middle-income countries in the Balkan subregion reported a disproportionate decline in coverage with the first dose of measles-rubella-containing vaccine (MRCV1) compared to coverage with the third dose of diphtheria-tetanus-pertussis vaccine (DTP3) in

the period 2019–2021, with notably low coverage for MRCV1 in Montenegro. COVID-19 also exacerbated subnational immunization inequities with some subnational areas falling further behind compared to the national average. Recovery in the coverage level for MRCV1 has been reported in some areas but this has not been uniform across subnational areas within countries. There has been an accumulation of children under five years of age susceptible to measles with a projected number of susceptibles the size of one birth cohort by the end of 2022 in the Region; there is also a significant residual measles immunity gap among adults. At the same time, the risk of measles virus importation into the Region is higher than it was during the initial phases of the pandemic, as international travel has resumed.

The Regional Office has been involved in various activities and plans for advancing measles and rubella elimination, including measles outbreak responses, supporting catch-up campaigns, strengthening data use for action, providing guidance and technical support, strengthening outbreak preparedness, developing a rapid diagnostic testing pilot study, and accreditation and molecular laboratory training activities. The European Member States adopted the European Immunization Agenda 2030 (EIA 2030) (3) with the goals to reduce mortality and morbidity caused by VPDs, increase equitable access to new and existing vaccines, strengthen primary health care, and contribute towards universal health coverage. The Regional Office will develop a programme of work for measles and rubella elimination to support the strategic objectives of the EIA 2030 using measles “as a tracer”.

Discussion

The RVC expressed concern about the accumulation of susceptible children in the Region as a whole, and particularly about the extremely low MRCV1 coverage in Montenegro in 2019–2021. The RVC was encouraged to learn from the Secretariat that, based on missions and communication with priority countries, most children are caught up by the time they enter elementary school and the second dose of measles-rubella containing vaccine (MRCV2) coverage is much higher, but there is a need for additional interventions in the cohorts of susceptibles. In many countries, children receive their second dose of MRCV (MRCV2) at the time of school entry and that is an opportunity to detect unimmunized children. There are differing approaches to vaccination mandates in the Region; some countries do not have mandates, while others have monitoring and vaccination mandates for school entry. The Secretariat informed that conducting studies on the estimated cost of an outbreak and outbreak response in comparison to costs of high immunization coverage might be a good strategy to encourage countries to aim for a higher MRCV coverage. As all countries in the Region are using MRCV, the challenges to reach high vaccination coverage are the same or similar for both diseases, but the number of suspected and reported rubella cases is generally lower than the number of suspected and reported measles cases in the Region.

Regarding inequities in vaccination coverage, the RVC noted that there seems to be geographic clustering of low coverage. To address the measles immunity gap among adults, the RVC discussed mitigation activities; countries may consider analysis of historical data and eventually additional seroprevalence studies to determine the measles immunity status of adults. The existing analysis of susceptibility is based on routine immunization coverage data but may not include catch-up and supplemental immunization activities (SIAs). The RVC noted that it would be useful to know that countries are aware about gaps in adult immunity to measles and rubella and that they are implementing activities to address this.

The RVC discussed the extensive impact of the pandemic on measles and rubella elimination and verification activities in the Region and globally. The need for additional analysis of this impact was expressed, and the RVC suggested that the Secretariat collect and provide more information. The Secretariat stressed to the RVC that countries are currently dealing with many competing priorities, such as COVID-19, mpox vaccination, and the catch-up of routine vaccinations, and some countries are conducting polio and measles response activities or are extending vaccination to increased migrant and refugee groups. These programmatic realities must be taken into consideration when such relevant and comprehensive additional work is to be recommended to national health authorities. As the VPI programme is engaged in all VPD-related activities in countries and is addressing measles and rubella elimination systematically together with all other VPD issues, the feasibility and timing of such an intervention will be discussed on a country-by-country basis and with recognition of countries' ongoing work, capacities, priorities and specificities.

The issue of migration and possible importation and transmission risks, and challenges to providing health services to them, was also discussed. In 2020 and 2021, many of the ASUs included limited information on migrant populations. There are questions in the ASU on refugees (among other groups with recognized high risk in countries, including economic migrants, local ethnic communities, religious groups etc.) and most countries do respond to these questions. However, in the majority of countries migrants are not under the jurisdiction of the health authorities. It was reported in some ASUs that the majority of refugees in 2022 were from Ukraine, while the influx of populations from crisis-affected countries of the Middle East and Africa has remained at similar levels to those in previous years. Reporting on measles and rubella epidemiology and immunization status among refugees and migrants from Ukraine will need to be addressed by NVCs in future reporting years.

Retrospective review of rubella data from Italy and plan for pending reviews

A retrospective review of rubella data was conducted for Italy. Italy's current immunization schedule includes the first dose of measles, mumps and rubella vaccine (MMR1) given at 13–15 months and the second dose of measles, mumps and rubella vaccine (MMR2) given at 5–6 years. The first dose of rubella-containing vaccine was first introduced in 1972 in adolescent females, MMR1 was implemented in 1990, and MMR2 was implemented in 1999. MMR1 coverage in birth cohorts from 2012–2021 was above 85% (range of 85–94%) and rubella two-dose coverage was estimated at 86% over a 10-year period (herd immunity level for rubella is 83%). SIAs have been conducted to address immunity gaps. Some areas of the country experienced a small drop in MMR vaccination coverage in 2020 but recovered the previous level of coverage in 2021.

Regarding surveillance, rubella has been a notifiable disease since 1970; rubella in pregnancy, congenital rubella infection, and congenital rubella syndrome (CRS) are all notifiable conditions. Specimens from all suspected cases are tested, in parallel or in sequence, for measles and rubella. There is a measles-rubella laboratory network with one national laboratory and 15 subnational laboratories; states without a subnational laboratory are supported by the national laboratory. Several serosurveys were conducted in recent years and showed high sero-protection estimates ranging from 88.6%–95.8%.

Regarding rubella case reporting, 23 cases were reported in 2019, 15 were reported in 2020, and none were reported in 2021; no cases of CRS were reported for 2019–2021. Based on all available data (e.g., discarded cases), reported rubella cases do not represent ongoing chains of transmission greater than 12 months.

Discussion

The RVC considered whether these data demonstrate that endemic transmission of rubella has been stopped in Italy. The strengthened national and subnational surveillance system with stronger incorporation and coordination with laboratories began in 2017 following a WHO mission in 2015. The national reference laboratory has been proactive in collecting all needed case information. There was some variance in immunization coverage in the regions in 2020 with coverage at 40%–50% but latest data indicate that the coverage in these areas recovered by 2021 through SIAs. Italy's regions have autonomous health authorities that make decisions about immunizations but in recent years Italy has introduced mandatory measles and rubella immunization for particular age groups. The RVC concluded that rubella had been eliminated in Italy.

The RVC understands the delay in retrospective review of rubella epidemiology in Bosnia and Herzegovina, Poland and Ukraine, and appreciates the Secretariat's efforts to collect data and to conduct the review for these countries as the data become available.

RVC discussion on eleventh meetings' priorities and procedures

Considering the challenges that the COVID-19 pandemic and response create for measles and rubella elimination and verification processes in regard to surveillance, immunization activities and collecting and analysing data at national level and by NVCs, the RVC agreed that the most important thing is to ensure a systematic approach in reviewing submitted ASUs and additional data from NVCs, in triangulation with data routinely reported by countries to WHO.

The RVC recognized that assessment of all ASUs received for 2021 and those that had been delayed for 2020 and previous years was complicated by the absence of or sporadic appearance of confirmed measles and rubella cases. The majority of ASUs were also suboptimal in presenting surveillance activities. This may lead to the risk of incorrect assessment by the RVC. If a decision were made that transmission of measles or rubella had been interrupted, there is a risk that the status would be revoked later, potentially discrediting the entire regional verification process. In contrast, declaring that a disease is still endemic because surveillance data were inadequately detailed to exclude ongoing transmission, may not be understood by some NVCs.

The RVC agreed to define countries' elimination status based on

- information submitted in ASUs for 2021 (and in ASUs for any previous years that had been delayed and were received in 2022) as primary source;
- statements and opinions of the NVCs; and
- status of the measles and rubella elimination in the countries before the COVID-19 pandemic.

In addition, the RVC requested the Secretariat to provide during the meeting any additional information that countries submitted through routine reporting mechanisms or that WHO teams received in direct cooperation with and during missions to the countries.

The Chair suggested that the RVC note whether the NVC indicated in the ASU that COVID-19 had affected surveillance quality or surveillance and immunization coverage, or if such an indication was received from other sources and decide elimination status with the caveat that decisions are being made in the current context. If more and better information becomes available to the national health system and NVC, and it is provided in following ASUs, the RVC will review it at following meetings.

Regarding rubella elimination, it was noted that once all countries have achieved rubella elimination, the RVC will conduct a final review of the Region as a whole.

The RVC discussed how to deal with newly developed technologies in molecular epidemiology and whether this impacts the verification process. A recent WHO publication on measles virus genotypes and recommendations for use of sequence analysis to monitor viral transmission was mentioned for consideration of this topic (4).

Analysing the data submitted to MeaNS shows that in recent years N450 sequence analyses were often insufficient in demonstrating that multiple viruses were not part of the same chain of transmission. Sequencing of additional regions of the virus, or even whole genome sequencing does offer the prospect of greater elucidation of chains of transmission. However, whereas the Global Measles and Rubella Laboratory Network (GMRLN) has a well-developed programme of quality control and assurance for sequencing the measles N450 sequences, with inclusion of recent sequences in the MeaNS database limited to accredited laboratories. Currently, no such accreditation criteria or quality assessment is in place for other regions of the virus. The MF-non-coding region (MF-NCR) is notoriously difficult to sequence, often requiring a combination of primers to get reliable sequence. Hence, the GMRLN) has undertaken the development of guidance for the global measles and rubella programme on the use of extended window and whole genome sequencing for verification of elimination as well as quality control guidelines of the laboratory and bioinformatics for these extended sequencing methods. Until there is a mechanism within the measles network laboratories for accreditation, quality control and interpretation of the data (accepted substitution rates and probability model) for sequencing of alternative parts of the measles genome, any NVC wanting to submit extended sequencing data in support of their verification statement are expected to submit alongside their raw data (including sequence files) and phylogenetic analysis of their different sequences. And the most critical point is that all molecular epidemiological data must be analyzed and interpreted together with high-quality epidemiological and clinical data.

Review of ASUs for 2021

In line with the Eliminating measles and rubella: framework for the verification process in the WHO European Region (5), the ASUs from Member States' NVCs were distributed to all RVC members and groups of countries were allocated to specific RVC members. Each member preliminarily reviewed those ASUs allocated to them and prepared a presentation with proposed elimination status recommendations. The presentations focused on disease epidemiology, surveillance performance, population immunity and supplemental information if available. After reading ASUs and viewing the presentations the RVC discussed each country's situation and agreed on a final conclusion with respect to measles and rubella elimination status for each country for the particular time period.

The RVC was pleased to see that activities on verification of measles and rubella elimination are returning to pre-pandemic intensity and the majority of countries whose ASUs were missing in previous year(s) submitted missing information in adequate form or as a statement from the NVC. There were significant delays in submission of 2021 ASUs from some countries and a couple of submitted reports were not received by the Secretariat. As in previous years, the quality and completeness of data were still suboptimal in some ASUs, in some cases even after multiple interventions from the Secretariat. During the eleventh RVC meeting, three ASUs for 2021 – from Iceland, Israel and Ukraine – were still pending submission for evaluation by the RVC. At the time of finalization of this report, the NVCs of Iceland and Ukraine had submitted their missing ASUs and these will be reviewed at the 2023 annual RVC meeting. Israel's ASUs are still to be submitted.

Conclusions on measles and rubella status for each Member State for 2021 are provided in Annex 1, together with a regional summary of measles and rubella status for 2021 and the elimination status of each Member State. Evidence for the RVC's conclusions on each country's status are provided in Annex 2.

Conclusions

The RVC concluded that based on data submitted for 2021 and previous years:

- 33 (62%) Member States have eliminated measles (interruption for at least 36 months) and 48 (91%) have eliminated rubella;
- 33 (62%) eliminated both measles and rubella;
- 11 (19%) were considered endemic for measles;
- 5 (9%) countries were considered to have re-established measles transmission.
- 3 (6%) Member States are categorized as endemic for rubella and plan to submit data for a rubella retrospective review;
- 3 (6%) Member States did submit ASUs for the RVC's review before the end of its eleventh meeting.

The RVC acknowledged that the COVID-19 pandemic has taken a considerable amount of time and resources from immunization programme staff over the past three years. The pandemic and measures taken to combat it may affect measles and rubella epidemiology in

the years to come. The decisions taken by the RVC during this meeting may need to be revised later if new information becomes available.

The RVC has observed in literature and reports that the variants of measles genotypes detected during the last few years have declined considerably and is grateful for updates on this situation and new technologies provided by WHO staff and measles and rubella virologists during the meeting.

The RVC congratulated countries for maintaining vaccination activities during the COVID-19 pandemic. The European Region had the lowest drops in vaccination coverage at national level compared to other WHO regions in the world. Lessons learned about effective strategies for reaching entire populations with COVID-19 vaccines should be adapted to strengthen routine immunization programmes throughout the Region. It was also noted in many ASUs that NVCs reported increased vaccine hesitancy, and that further work on advocating for vaccine and vaccination, to bolster vaccine demand by increasing acceptance is needed. Inequitable access to immunizations is also a recognized problem, and countries need to tailor strategies to increase access to immunization services in order to make them as convenient and user-friendly as possible, especially in marginalized or hard to reach populations.

Recommendations

For NVCs and their secretariats:

- The RVC appreciated the commitment and efforts of the national public health systems and the NVCs in support of measles and rubella elimination despite the extraordinary burden of responding to the COVID-19 pandemic. It is promising that the majority of countries and NVCs submitted missing reports with their last ASU.
- The RVC requested that NVCs (and their secretariats) make every effort to provide comprehensive ASUs approved with NVC members' signatures in advance of the submission deadlines to the RVC secretariat. The ASUs should include all available and relevant data for the RVC to verify measles and rubella elimination, and it is critical not to miss:
 - rate of discarded cases, at subnational and national level;
 - detailed epidemiologic data about cases (e.g., location, age, vaccination status) supported by outbreak reports, laboratory algorithm flowcharts, maps and phylogenetic graphics and including genotyping information;
 - the latest immunization coverage data available at national and subnational levels achieved through routine and any supplemental activities; and
 - any supplementary or alternative information including serosurveys and unpublished data.
- The RVC stressed that all of its decisions about the status of measles and rubella elimination are based on information provided by NVCs and countries, and is the RVC recognizes that pandemic and pandemic response measures do have a

significant effect. Any additional information that the NVC and national public health system may consider important to mention as core evidence that may change the recognized status of disease endemicity or elimination is welcome and should be submitted to RVC as additional document(s) with the ASU for 2022.

- Considering WHO instructions to countries to address missed and postponed routine immunizations and close all immunity gaps developed during the pandemic and existing from years before it, the RVC encouraged the NVCs and their secretariats to report on how they have conducted their immunization activities. Description of the strategies that were used to address populations whose immunization was affected by the pandemic (e.g., children who missed or received delayed immunization) and any populations with recognized immunization gaps and immunization-related issues (adolescents, adults and particularly among migrants, vulnerable or hard-to-reach populations) will help in understanding the risk for continuous or re-established measles and rubella endemicity.
- Member States are reminded to follow WHO guidelines and recommendations and continue to collect specimens to confirm measles and rubella cases and outbreaks; to conduct genotyping of viruses by accredited laboratories; and to submit detected viral sequences to the global virus databases (MeaNS and RubeNS).
- The RVC encourages countries to follow recommendations and instructions from the WHO Regional Office/ VPI and ensure use of the capacities that were built to support COVID-19 vaccination rollout to address adult vaccination, provide catch up and other supplemental activities for populations targeted by the routine immunization programme and to strengthen routine immunization and response to measles and rubella outbreaks.

For the RVC Secretariat:

- As in previous years, the RVC secretariat should continue to provide remote and in-country technical support to Member States for achieving and documenting progress towards measles and rubella elimination goals, thereby prioritizing Member States that did not submit ASU reports due to disruption caused by the COVID-19 pandemic and are late in recovery of routine health services.
- The RVC secretariat should continue to support national technical counterparts for the retrospective rubella epidemiology reviews in Bosnia and Herzegovina, Poland, and Ukraine; prepare countries' reviews once feasible and prepare the process for regional rubella elimination.
- The RVC secretariat should consider supporting NVCs and secretariats on capacity building including providing additional training on verification requirements and reviewing surveillance performance; some countries may also need to reassess case definitions and the consistent use of decision-making algorithm for case classification. The secretariat should also continue its work with countries that have recognized challenges in their vaccine coverage monitoring.
- The RVC secretariat should consider creating an electronic ASU, which could provide countries with additional guidance and potentially improve communication, timeliness and data quality.
- The RVC secretariat should continue to work on publishing the rubella elimination retrospective reviews conducted in the Region in a peer-reviewed journal.

- The RVC secretariat should work with and encourage partner organizations to include information on the risk of measles and rubella and vaccine-preventable diseases in their upcoming meetings or conferences in 2023.

Activities for 2023

The RVC discussed the following potential activities for 2023:

- The RVC members can be more involved in pre-reviewing of the first versions of submitted ASUs for 2022 together with the secretariat and can help with follow-up with NVCs on any questions or concerns to reduce the burden on the secretariat.
- The RVC members can participate in site visits to countries that need additional support or from which RVC would like to receive more details about information provided in ASUs.
- The RVC noted that the global and regional diversity of measles virus genotypes has been decreasing, which demonstrates progress towards achieving the elimination goal. The RVC looks forward to efforts at the global level to validate and provide guidance for the use of extended sequencing techniques to distinguish different measles virus lineages in verification of disease elimination.

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Annex 1. Results of the RVC review of reports and documents submitted by NVCs**Table 1. RVC conclusions on measles and rubella elimination status per Member State for 2021**

Country	Measles elimination status, 2021	Rubella elimination status, 2021
Albania	Re-established	Eliminated
Andorra	Eliminated	Eliminated
Armenia	Eliminated	Eliminated
Austria	Eliminated	Eliminated
Azerbaijan	Eliminated	Eliminated
Belarus	Eliminated	Eliminated
Belgium	Eliminated	Eliminated
Bosnia and Herzegovina	Endemic	Pending rubella retrospective review
Bulgaria	Re-established	Eliminated
Croatia	Eliminated	Eliminated
Cyprus	Eliminated	Eliminated
Czechia	Eliminated	Eliminated
Denmark	Eliminated	Eliminated
Estonia	Eliminated	Eliminated
Finland	Eliminated	Eliminated
France	Endemic	Eliminated
Georgia	Endemic	Eliminated
Germany	Endemic	Eliminated
Greece	Eliminated	Eliminated
Hungary	Eliminated	Eliminated
Iceland	Delayed ASU submission	Delayed ASU submission
Ireland	Eliminated	Eliminated
Israel	Pending ASU	Pending ASU
Italy	Endemic	Eliminated
Kazakhstan	Endemic	Eliminated
Kyrgyzstan	Endemic	Eliminated
Latvia	Eliminated	Eliminated
Lithuania	Re-established	Eliminated
Luxembourg	Eliminated	Eliminated
Malta	Eliminated	Eliminated
Monaco	Eliminated	Eliminated
Montenegro	Eliminated	Eliminated
Netherlands (Kingdom of the)	Eliminated	Eliminated
North Macedonia	Eliminated	Eliminated

Norway	Eliminated	Eliminated
Poland	Endemic	Pending rubella retrospective review
Portugal	Eliminated	Eliminated
Republic of Moldova	Eliminated	Eliminated
Romania	Endemic	Eliminated
Russian Federation	Interrupted 12 months	Eliminated
San Marino	Eliminated	Eliminated
Serbia	Endemic	Eliminated
Slovakia	Re-established	Eliminated
Slovenia	Eliminated	Eliminated
Spain	Eliminated	Eliminated
Sweden	Eliminated	Eliminated
Switzerland	Eliminated	Eliminated
Tajikistan	Eliminated	Eliminated
Turkey	Endemic	Eliminated
Turkmenistan	Eliminated	Eliminated
Ukraine	Delayed ASU submission	Delayed ASU submission, pending rubella retrospective review
United Kingdom of Great Britain and Northern Ireland	Eliminated	Eliminated
Uzbekistan	Re-established	Eliminated

Table 2: Summary of measles and rubella elimination status for the European Region in 2021

Country status	Measles	Rubella
Pending or delayed submission – 2021 ASU	3	3
Eliminated	33	48
Interrupted 24 months	0	0
Interrupted 12 months	1	0
Re-established endemic	5	0
Endemic/Pending retrospective rubella review	11	2
Total	53	53

Annex 2. RVC conclusions on status of measles and rubella elimination per Member State in the WHO European Region in 2021 – (in alphabetical order)

Albania Status of measles and rubella elimination in 2021	Measles re-established Rubella eliminated
The RVC concludes that the transmission of measles remains re-established, as data in ASUs for 2020 and 2021 do not document the absence of transmission. Endemic transmission of rubella remained interrupted in 2020 and 2021 and consequently rubella elimination has been sustained. The RVC acknowledges that high routine immunization coverage has been maintained but insufficient surveillance information is provided in the ASU (e.g., periods with no suspected and confirmed cases). The RVC urges the country to implement WHO guidelines to increase immunization coverage in the regions with lowest coverage and where the previous outbreaks occurred.	
Andorra Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC confirms that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC urges the country to implement WHO guidelines to improve surveillance sensitivity and ensure high routine immunization coverage (of at least 95%).	
Armenia Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC confirms that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC urges the country to implement WHO guidelines to intensify surveillance and ensure high routine immunization coverage (of at least 95%).	
Austria Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. Based on the data provided, MRCV2 coverage is inadequate (<95%), placing the country at risk of outbreaks when importations occur. The RVC urges the country to follow WHO guidelines and ensure high routine immunization coverage (of at least 95%). As in previous years the RVC invites the NVC and its Secretariat to make national and sub-national coverage estimates timely available so that they are reported in the ASU and if feasible for the estimates to be based on children 24 months of age.	
Azerbaijan Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC confirms that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC commends Azerbaijan on improvements in vaccination coverage. The RVC urges the country to use WHO guidelines to improve surveillance sensitivity and ensure high routine immunization coverage (of at least 95%).	

Belarus Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC confirms that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC appreciates the high measles and rubella surveillance performance and the very well-organized immunization systems, as presented in a very comprehensive and technically sound ASU.	

Belgium Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. Since surveillance sensitivity was generally sustained in 2021 compared with 2020, the RVC concurs that low reported MR incidence in 2021 reflects the true epidemiological situation. However, the RVC recommends that efforts to increase surveillance sensitivity be accelerated. The RVC reiterates its concern that measles elimination status remains vulnerable while MRCV2 vaccination coverage remains low across all age-groups, especially in the capital city Brussels. The RVC notes that limited surveys were carried out in 2020 to estimate MRCV coverage and invites the NVC to include the results in the next ASU.	

Bosnia and Herzegovina Status of measles and rubella elimination in 2021	Measles endemic Rubella – pending retrospective review
Based on the review of ASUs for 2019–2021, the RVC concludes that measles is endemic, and the status of rubella elimination is pending retrospective review. The RVC encourages the NVC to work with the RVC Secretariat to finalize documentation for the rubella elimination status assessment. The RVC urges the country to follow WHO guidelines to intensify surveillance, ensure high routine immunization coverage (of at least 95%) at all levels, and improve the quality of information in future ASUs.	

Bulgaria Status of measles and rubella elimination in 2021	Measles re-established Rubella eliminated
The RVC concludes that the transmission of measles remains re-established due to ongoing measles transmission in 2020; and as data in the ASU for 2021 does not document absence of transmission in the presence of high-performing surveillance. The RVC confirms that endemic transmission of rubella remained interrupted and consequently that elimination has been sustained. The RVC urges the country to follow WHO guidelines to intensify surveillance and ensure high routine immunization coverage (of at least 95%). Also, the NVC is welcomed to present results of the noted 2021 survey, and any related comments, in the 2022 ASU.	

Croatia Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC concludes that endemic transmission of both measles and rubella remain interrupted in 2021 and consequently that measles and rubella elimination has been sustained. However, the RVC notes the systematic lack of sufficient information in ASUs for comprehensive assessment of the surveillance quality. The RVC urges the country to follow WHO guidelines to intensify surveillance, ensure high routine immunization coverage (of at least 95%), and improve the quality of information in future ASUs.	

Cyprus Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
<p>The RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC appreciates the efforts made by the country in active case finding and catch-up immunization activities in migrant populations. The RVC also urges the country to implement WHO guidelines to ensure collection of more comprehensive immunization coverage data and to provide complete information, including genotyping, in future ASUs. The RVC invites NVC and health authorities to consider establishing a nationwide immunization registry to monitor vaccination coverage in a timely manner, rather than relying on sample surveys.</p>	

Czechia Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
<p>The RVC acknowledges the NVC's concerns with respect to the status in 2020 and 2021 but concludes that endemic transmission of both measles and rubella remained interrupted in both years, and consequently that measles and rubella elimination has been sustained. The RVC notes that surveillance performance needs to be better documented and the NVC should present surveillance performance indicators according to the format of ASU as provided by WHO.</p>	

Denmark Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
<p>The RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC applauds the initiatives launched to improve the already high coverage with both doses of MRCV.</p>	

Estonia Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
<p>The RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC urges the country to use WHO guidelines to reverse the continued decline in MRCV coverage and to increase surveillance sensitivity, including by ensuring that adequate lab specimens are collected and tested from all suspected MR cases.</p>	

Finland Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
<p>The RVC concludes that endemic transmission of both measles and rubella remained interrupted in Finland in both 2020 and 2021 and consequently that measles and rubella elimination has been sustained. The RVC invites the country to follow WHO guidelines to ensure high routine immunization coverage (of at least 95%) with both doses.</p>	

France Status of measles and rubella elimination in 2021	Measles endemic Rubella eliminated
<p>The RVC confirms that endemic transmission of rubella remained interrupted in 2020 and 2021 and consequently that rubella elimination has been sustained. The RVC acknowledges the NVC's perspective with respect to the measles elimination status in 2021, however as data in the ASUs for 2020 and 2021 do not document absence of transmission in the presence of high-performing surveillance, the RVC concluded that measles remains endemic in France. Surveillance sensitivity remains unknown, and the RVC cannot confirm that the low reported MR incidence in 2020 and 2021 reflects the true epidemiological situation. The RVC reiterates the need to report complete case-based measles and rubella surveillance data in the ASUs, to make it possible for the RVC to assess surveillance performance through standard indicators. The RVC encourages active involvement of the national laboratory in the preparation and review of the ASU to provide expert interpretation of sequencing data and laboratory information.</p>	

Georgia Status of measles and rubella elimination in 2021	Measles endemic Rubella eliminated
<p>The RVC confirms that endemic transmission of rubella remained interrupted in 2021 and consequently that rubella elimination has been sustained. The RVC concludes that measles remains endemic. The RVC urges the country to follow WHO guidelines to intensify surveillance, ensure high routine immunization coverage (of at least 95%), and improve the quality of information in future ASUs. The country is encouraged to collect specimens for genotyping to detect chains of transmission and engage experts from the national measles-rubella laboratory to support interpretation of data and documentation for the ASU.</p>	

Germany Status of measles and rubella elimination in 2021	Measles endemic Rubella eliminated
<p>The RVC confirms that endemic transmission of rubella remained interrupted in 2021 and consequently that rubella elimination has been sustained. The RVC acknowledges the NVC's perspective with respect to the measles elimination status in 2020 and 2021, however data in the ASUs do not allow for a comprehensive assessment of disease epidemiology at the subnational level. The RVC considers that measles remains endemic. However, to enable a reassessment of the situation, the RVC would welcome more information and a discussion with the NVC to learn more about the noted laboratory surveillance system and challenges related to discarded cases. The RVC applauds the initiatives launched to improve the coverage with both doses of MRCV, however coverage among 24-month-old children and with the second dose in all federal states remains suboptimal, requiring further efforts. The RVC also notes the need to review and possibly modify the German case definition, and how the system is using existing definitions, to allow inclusion of all suspected cases and all laboratory-confirmed measles in the official statistics, and thereby ensure the necessary public health response.</p>	

Greece Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
<p>The RVC confirms that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC encourages the NVC to better present surveillance performance in the ASUs by including discarded cases with age and territorial distribution and laboratory results. If such data are not available, the RVC urges the country to follow WHO guidelines to collect these data. There is a critical need for more information about routine immunization coverage, and the NVC and country are therefore encouraged to consider conducting a survey or review to assess and confirm coverage. The RVC is interested to learn the latest developments in systematic assessment of routine immunization coverage. As in previous years, the RVC and Secretariat urge health authorities to follow WHO guidelines and recommendations for establishing a nationwide immunization registry to monitor vaccination coverage in a timely manner.</p>	

Hungary Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC urges the country to follow WHO guidelines to intensify surveillance and ensure high routine immunization coverage (of at least 95%).	

Iceland Status of measles and rubella elimination in 2021	Delayed ASU submission
The RVC acknowledges that disruptions and constraints on the health system caused by the COVID-19 pandemic resulted with delayed submission of the ASU for 2021. Submitted information will be reviewed together with the ASU for 2022 by the RVC during its next meeting.	

Ireland Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC confirms that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC reiterates its concerns about the threat to measles elimination due to low vaccination coverage across age groups, especially in Dublin. The RVC continues to urge implementation of WHO-recommended strategies to close immunity gaps in the population. Surveillance sensitivity was low in 2020 and declined significantly in 2021. The RVC urges efforts to restore surveillance sensitivity, and that more clarity be provided in future ASUs on the additional MR specimens tested but not included in surveillance data.	

Israel Status of measles and rubella elimination in 2021	Pending ASU submission
The RVC acknowledges the disruptions and constraints on the health system caused by the COVID-19 pandemic and encourages the NVC to submit an ASU for three years, with any supporting documents and any other missing documents as soon as possible.	

Italy Status of measles and rubella elimination in 2021	Measles endemic Rubella – eliminated
The RVC concludes that measles remains endemic. Based on retrospective review of rubella elimination activities in Italy, the RVC concluded that elimination of endemic rubella transmission has been achieved in 2021 and congratulates Italy on this achievement. The RVC urges the country to follow WHO guidelines to strengthen surveillance and ensure high routine immunization coverage (of at least 95%).	

Kazakhstan Status of measles and rubella elimination in 2021	Measles endemic Rubella eliminated
The RVC concludes that endemic transmission of rubella remained interrupted in 2021 and consequently that rubella elimination has been achieved. Due to a measles outbreak in 2020, and insufficient information to document measles elimination in 2021, it is still considered endemic. Immunization coverage is improving, and further actions are needed to reach >95% coverage in all oblasts. The RVC urges the country to implement the WHO guidelines and recommendations to strengthen surveillance at subnational level, and to systematically conduct and include in ASU genotyping data for measles and rubella cases, which would help in documenting chains of transmission. The NVC is invited to engage experts from the national measles-rubella laboratory to support interpretation of data and documentation for future ASUs.	

Kyrgyzstan Status of measles and rubella elimination in 2021	Measles endemic Rubella eliminated
<p>The RVC concludes that endemic transmission of rubella remained interrupted in 2021 and consequently that rubella elimination has been sustained. Due to ongoing chains of transmission, measles remains endemic. The RVC urges the country to continue to improve vaccination coverage to reach at least 95% for both MRCV doses at all levels. The RVC also encourages the country to implement the WHO guidelines and recommendations to strengthen surveillance, increase the rate of laboratory investigations, and collect specimens for genotyping at the Moscow Regional Reference Laboratory (RRL). It also recommends that the NVC engage experts from the national MR laboratory to support interpretation of data and documentation for future ASUs</p>	

Latvia Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
<p>The RVC confirms that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC notes that MRCV2 vaccination coverage has declined again in 2021 and urges the country to implement WHO guidelines to catch up children who missed doses as soon as possible and to improve surveillance sensitivity.</p>	

Lithuania Status of measles and rubella elimination in 2021	Measles re-established Rubella eliminated
<p>The RVC concludes that measles was re-established due to ongoing transmission >12 months in 2020 and 2021 and lack of comprehensive data in the ASUs to distinguish chains of transmission and to document eventual absence of endemicity. The RVC confirms that endemic transmission of rubella remained interrupted and consequently that elimination has been sustained. The RVC reiterates its concern that declining MRCV coverage will hinder progress toward measles elimination and could affect elimination of rubella. The RVC continues to urge implementation of WHO-recommended strategies to close immunity gaps in the population.</p>	

Luxembourg Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
<p>The RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. Data on national MRCV1 and MRCV2 coverage, based on a survey in 2018 and presented in the ASU 2021, are considered too old to reflect the current situation. The RVC invites health authorities to consider either conducting another survey or rather than relying on periodic surveys, to establish a nationwide immunization registry to monitor vaccination coverage in a timely manner.</p>	

Malta Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
<p>The RVC confirms that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC commends the country for improvements, but requests that the NVC include more information about rubella surveillance in future ASUs.</p>	

Monaco Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
<p>The RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC reiterates its concerns that steps should be taken to develop and implement a more accurate method for ascertaining vaccination coverage.</p>	

Montenegro Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
<p>The RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC urges the national health authorities and public health system to implement WHO guidelines and recommendations to further strengthen the measles and rubella immunization programme and disease surveillance quality, including for CRS, and to establish the national verification committee for verification of measles and rubella elimination. The RVC is concerned with extremely decreased routine immunization coverage with MRCV (<20% with MRCV1), but encouraged to learn about ongoing cooperation with WHO and partners to address this issue. The RVC further urges the country to immediately implement WHO guidelines and recommendations to prevent measles outbreaks.</p>	
Netherlands (Kingdom of the) Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
<p>The RVC confirms that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. High community protection was demonstrated by an MR serosurvey conducted five years ago, however MRCV coverage has declined in recent years. The RVC urges the country to implement WHO guidelines to strengthen surveillance and ensure high routine immunization coverage (of at least 95%).</p>	
North Macedonia Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
<p>Based on all ASUs from previous years received, the RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC notes to the NVC that surveillance performance indicators are suboptimal and the data presented in the ASU are insufficient. The RVC is concerned about decreased routine immunization coverage in 2020 and 2021 to levels under 80% and urges the country to implement WHO guidelines and recommendations to strengthen surveillance and ensure high routine immunization coverage (of at least 95%).</p>	
Norway Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
<p>The RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained.</p>	
Poland Status of measles and rubella elimination in 2021	Measles endemic Rubella – pending retrospective review
<p>The RVC concludes that measles remains endemic in Poland. The RVC notes that the Secretariat is working with colleagues in Poland to review data to conduct a retrospective assessment of rubella elimination status. Decreased MRCV1 and MRCV2 routine immunization coverage at the national level and in most provinces presents an additional risk of outbreaks in the event of importations. The RVC urges the country to implement WHO guidelines and recommendations to improve coverage in subnational territories reporting <95% coverage. The RVC also calls for continued efforts to ensure high coverage in high-risk groups. The RVC requests that the NVC and its secretariat include, if feasible, MRCV1 coverage estimates for 24-month-old children (rather than 36-month-old children), and urges the country to follow WHO guidelines to improve genotyping of measles chains of transmission and sporadic cases in collaboration with the Berlin RRL and to include this information in future ASUs.</p>	

Portugal Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC reiterates its concern regarding the continuing low sensitivity of MR surveillance and urges the country to implement WHO guidelines to strengthen surveillance.	

Republic of Moldova Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC confirms that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC urges the country to implement WHO guidelines to intensify surveillance and ensure high routine immunization coverage (of at least 95%), particularly for MRCV1 in children in the second year of life, in all administrative territories.	

Romania Status of measles and rubella elimination in 2021	Measles endemic Rubella eliminated
The RVC concludes that endemic transmission of rubella remained interrupted in 2021 and consequently that rubella elimination has been sustained. Considering the ongoing measles transmission in recent years and insufficient data in the ASU 2021 to document that the absence of cases is due to interruption of endemic transmission in the presence of high-quality surveillance, measles remained endemic in Romania. The RVC urges the country to implement WHO guidelines and recommendations to intensify surveillance, ensure high routine immunization coverage (of at least 95%). The RVC also encourages the country to consider conducting SIAs or similar activities to address recognized immunity gaps.	

Russian Federation Status of measles and rubella elimination in 2021	Measles interrupted for 12 months Rubella eliminated
The RVC concludes that endemic transmission of rubella remained interrupted in 2021 and consequently that rubella elimination has been sustained. Based on comprehensive subnational data including genotyping and analysis of discarded cases, the RVC concludes that endemic transmission of measles was interrupted in 2021. The RVC praised the country for its high-quality epidemiology and laboratory surveillance with excellently organized and performed molecular monitoring and a very comprehensive analysis of measles virus circulation. The data provided in the ASU was of high quality. The RVC encourages the country to ensure high-quality surveillance continues in all territories of the country.	

San Marino Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC confirms that endemic transmission of both measles and rubella remained interrupted in 2019 and 2020 and consequently that measles and rubella elimination was sustained in these years. In absence of an ASU or letter from colleagues in San Marino for 2021 but considering that the size of the population is incompatible with endemic transmission of both diseases, the RVC concluded that measles and rubella elimination has been sustained in 2021. The RVC acknowledges progress made with MRCV1 and MRCV2 coverage and invites the country to implement WHO guidelines to increase the coverage further.	

Serbia Status of measles and rubella elimination in 2021	Measles endemic Rubella eliminated
The RVC confirms that endemic transmission of rubella remained interrupted in Serbia and consequently that elimination has been sustained. Due to ongoing chains of transmission, measles remains endemic. Information in future ASUs should be elaborated with a statement from the NVC, and also should specifically stress contradicting information on rubella surveillance. The decreasing trend in immunization coverage is concerning and surveillance is suboptimal. The RVC urges the country to implement WHO guidelines and recommendations to increase uptake and improve the quality of surveillance.	
Slovakia Status of measles and rubella elimination in 2021	Measles re-established Rubella eliminated
The RVC concludes that measles remains re-established due to ongoing measles transmission in 2018–2019, and because the data in the ASUs for 2020 and 2021 do not document that the absence of reported cases reflects an absence of transmission. The RVC notes that the ASUs do not include indicators on the presence of high-performing surveillance. The RVC confirms that endemic transmission of rubella remained interrupted and consequently that elimination has been sustained. The RVC urges the country to follow WHO guidelines to strengthen surveillance and maintain high routine immunization coverage (of at least 95%). The RVC requests that the NVC, if feasible, provide more comprehensive analysis of 2020 to 2022 measles activities and elimination status in future ASUs.	
Slovenia Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
Based on NVC statement for 2020 and ASU for 2021, the RVC concludes that endemic transmission of both measles and rubella remains interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC urges NVC and its Secretariat to improve completeness and quality of data in the ASU and urges the country to follow WHO guidelines to strengthen surveillance and maintain high routine immunization coverage (of at least 95%) especially for MRCV2. Based on ASUs data on measles cases reported in 2018-2020, there appears to be pockets of susceptibility among adults, and the RVC is concerned that measles elimination status is vulnerable.	
Spain Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC congratulates the country for detecting sporadic cases of measles. The RVC reiterates the need to improve MR surveillance sensitivity – to complete the process of assessing and documenting the proficiency of the private and sub-national laboratories that test specimens from suspected cases, and to report progress in future ASUs.	
Sweden Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC calls for continued efforts to improve vaccination coverage in high-risk populations.	

Switzerland Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and consequently that measles and rubella elimination has been sustained. The RVC encourages the country to improve coverage in cantons reporting <90% coverage. The RVC urges the country to follow WHO guidelines to intensify surveillance for rubella, including reporting of suspected cases.	
Tajikistan Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC concludes that endemic transmission of both measles and rubella remained interrupted in 2021 and confirms that measles and rubella elimination has been sustained. The RVC urges the country to implement WHO guidance and recommendations to improve surveillance and ensure high immunization coverage at subnational level. The RVC is concerned to learn that a measles outbreak is ongoing in the country but expects that the conducted outbreak immunization response will prevent transmission for a period longer than 12 months. In line with WHO guidelines, any detected outbreak need follow-up including regular sending of specimens for genotyping (in the case of Tajikistan, to the Moscow RRL). More detailed information is expected in the ASU report for 2022.	
Türkiye Status of measles and rubella elimination in 2021	Measles endemic Rubella eliminated
The RVC concludes that measles remains endemic in Türkiye. The RVC confirms that endemic transmission of rubella remained interrupted and consequently that elimination has been sustained. The RVC commends the country's well-functioning surveillance system and national network of laboratories, and the NVC for a very comprehensive ASU report. The RVC recommends to the country that it implement WHO guidance to increase vaccination coverage.	
Turkmenistan Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
The RVC concludes that endemic transmission of both measles and rubella remained interrupted 2021 and consequently that measles and rubella elimination has been sustained. The RVC commends the country for its high-quality measles and rubella immunization programme and presented surveillance performance.	
Ukraine Status of measles and rubella elimination in 2021	Delayed ASU submission
The RVC acknowledges the disruptions and constraints on the health system in recent years in the country and greatly appreciates the efforts of the health system and NVC to nevertheless submit ASUs for 2020 and 2021. Submitted information will be reviewed together with the ASU for 2022 by the RVC during its next meeting.	

United Kingdom of Great Britain and Northern Ireland Status of measles and rubella elimination in 2021	Measles eliminated Rubella eliminated
Since surveillance sensitivity was generally sustained in 2021, RVC concurs with the NVC that the low reported MR incidence in 2021 reflects the true epidemiological situation. The RVC confirms that re-established endemic transmission of measles was stopped in 2021, and consequently that measles is considered eliminated. The RVC confirms that endemic transmission of rubella remained interrupted and consequently that elimination has been sustained. The RVC shares the concerns of the NVC about the threat to measles elimination caused by low MRCV vaccination coverage in the capital city of London and urges the country to implement WHO guidance to close immunity gaps throughout the population.	

Uzbekistan Status of measles and rubella elimination in 2021	Measles re-established Rubella eliminated
The RVC confirms that endemic transmission of measles was re-established due to ongoing chains of transmission, insufficient information to exclude endemicity in 2021, and the inability to distinguish chains of transmission. The RVC confirms that endemic transmission of rubella remained interrupted and consequently that elimination has been sustained. The ASU report provided by the NVC was of suboptimal quality. The RVC requests from the NVC to improve the quality of the ASU report for 2022 and provide more comprehensive data.	

Annex 3. List of participants

RVC members

Günter Pfaff, Chair

Retired, Ministry of Social Affairs and Integration, Germany

Robin Biellik

Retired epidemiologist, (WHO, UNICEF and PATH), Switzerland

Irja Davidkin

Retired Senior Researcher, Finnish institute for health and welfare, Finland

Mira Kojouharova

Professor of Epidemiology

Retired Deputy Director, National Center for Infectious and Parasitic Diseases, Bulgaria

Jose Ignacio Santos

Professor, Department of Experimental Medicine Universidad Nacional Autónoma de México, Mexico

John Simpson

Senior Medical Advisor, United Kingdom Health Security Agency, United Kingdom of Great Britain and Northern Ireland

WHO Regional Office for Europe

Vaccine-preventable Diseases and Immunization programme; Malika Abdusalyamova, Myriam Ben Mamou, Siddhartha Datta, Catharina de Kat, José Hagan, Shahin Huseynov, Dragan Jankovic, Mark Muscat, Dovile Videbaek, Bin Zhang

WHO Headquarters

Expanded Programme on Immunization, Department of Immunization, Vaccines and Biologicals; Patrick O'Connor, Anna Minta

European Centre for Disease Prevention and Control

Vaccine-preventable Diseases Surveillance and Response
Sabrina Bacci, Marlena Kaczmarek

Invited observers

Kevin Brown, Medical Virologist, retired from full-time work for UK Health Security Agency
Susan Reef, Infectiologist, Medical Officer – Rubella Team Lead, retired from US CDC

Rapporteur

Lisa Jacques-Carroll, WHO consultant

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