

EIGHTH MEETING OF THE EUROPEAN REGIONAL VERIFICATION COMMISSION FOR MEASLES AND RUBELLA ELIMINATION (RVC)

**12–14 June 2019
Warsaw, Poland**



Abstract

The European Regional Verification Commission for Measles and Rubella Elimination (RVC) met for the eighth time on 12-14 June 2019 in Warsaw, Poland. Eight members of the RVC evaluated national annual status updates (ASUs) and other relevant documents for 2018 from all 53 Member States. The RVC concluded that, as of the end of 2018, 37 Member States provided evidence to demonstrate that endemic transmission of measles was interrupted. Of these, 35 provided evidence to demonstrate the elimination of endemic measles (interrupted transmission for at least 36 months in the presence of a high-quality surveillance system). Endemic rubella transmission was interrupted in 42 Member States, of which 39 provided evidence to demonstrate the elimination of endemic rubella. Thirty-three Member States provided evidence for the elimination of both measles and rubella. The RVC also concluded that 12 Member States were measles endemic, 11 Member States were rubella endemic and nine Member States were endemic for both measles and rubella. Due to continuous transmission of measles in 2017 and 2018, the RVC concluded that measles transmission was re-established in four countries that had previously eliminated endemic measles transmission. The RVC and RVC Secretariat strongly encourage and support urgent strengthening of measles and rubella elimination activities in the WHO European Region.

Keywords

Immunization Programs

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Measles - prevention and control

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Abbreviations

ASU	annual status update
CDC	United States Centers for Disease Control and Prevention
CRI	congenital rubella infection
CRS	congenital rubella syndrome
ECDC	European Centre for Disease Prevention and Control
EQA	external quality assurance
HCW	health care worker
JRF	Joint Reporting Form
MCV	measles-containing vaccine
MCV1	first dose of measles-containing vaccine
MCV2	second dose of measles-containing vaccine
MeaNS	WHO Measles nucleotide surveillance database
MMR	measles-mumps-rubella vaccine
MRCV	measles- and rubella-containing vaccine
MRCV1	first dose of MRCV
MRCV2	second dose of MRCV
NVC	national verification committee for measles and rubella elimination
RT_PCR	negative reverse transcription polymerase chain reaction
RubeNS	WHO Rubella nucleotide surveillance database
RCV	rubella-containing vaccine
RVC	European Regional Verification Commission for Measles and Rubella Elimination
SIA	supplementary immunization activity
UNICEF	The United Nations Children's Fund
VPI	Vaccine-preventable Diseases and Immunization programme, WHO Regional Office for Europe

Executive summary

The European Regional Verification Commission for Measles and Rubella Elimination (RVC) is an independent panel of experts established by the WHO Regional Office for Europe (Regional Office) to evaluate the measles and rubella status of WHO Member States. The RVC met for the eighth time on 12–14 June 2019 in Warsaw, Poland to evaluate annual status updates (ASUs) and other documents received from each of the 53 Member States in the WHO European Region (the Region). The meeting included face-to-face discussions with members of the Polish National Verification Committee for Measles and Rubella Elimination (NVC) and representatives of the Ministry of Health of Poland and national public health system.

The RVC concluded that based on reports submitted for 2018:

- 37 (70%) Member States interrupted endemic measles transmission and 42 (79%) interrupted endemic rubella transmission for a period of at least 12 months;
- 35 (66%) provided evidence to demonstrate the elimination of endemic measles (interrupted transmission for at least 36 months), and 39 (73%) for the elimination of endemic rubella;
- 33 (63%) provided evidence for the elimination of both measles and rubella;
- 1 (2%) provided evidence for the interruption of measles transmission for a period of 24 months and 1 (2%) for interruption of transmission for 12 months;
- 3 (6%) provided evidence for interruption of rubella transmission for 24 months;
- 12 (23%) were considered endemic for measles;
- 4 (8%) countries were considered to have re-established measles transmission;
- 11 (21%) were considered endemic for rubella;
- 9 (17%) were considered endemic for both measles and rubella.

The RVC concluded that, in the majority of Member States, efforts towards measles and rubella elimination have been successful in achieving or sustaining interruption of endemic disease transmission. However, the RVC is concerned that some countries lost their measles-interruption or measles-eliminated status, as their measles epidemiology data indicated continuous transmission for a period longer than 12 months during 2017 and 2018. Similar to 2017, the RVC noted that, in several measles outbreaks in 2018, a significant proportion of cases were <1 year of age or >15 years of age, with >50% of confirmed cases among adolescents and adults in some outbreaks. In addition, many countries reported cases and outbreaks among health care workers (HCWs). Acknowledging existing immunity gaps and challenges associated with reaching unimmunized adolescents, adults and HCWs, the RVC urges countries to implement in full WHO recommendations to identify susceptible populations and implement effective strategies to reach them.

WHO recommends that Member States seek to achieve and sustain universal coverage with two doses of measles- and rubella-containing vaccine (MRCV) to close immunity gaps. Achievement of the

regional measles and rubella elimination goal is at risk of further delay, since measles transmission was re-established in four countries in 2018. Preliminary epidemiological surveillance data for 2019, available to date and presented by the Secretariat, suggest that chains of measles virus transmission which started in 2018 remain uninterrupted in 2019 in certain Member States.

In 2018, some progress was made towards the achievement of rubella elimination in the Region, and additional Member States committed to implementing adequate rubella surveillance systems.

However, the extent and quality of rubella and congenital rubella syndrome (CRS) surveillance remain suboptimal in many countries. It is possible that several countries that are currently considered endemic for rubella have interrupted transmission but are unable to demonstrate this primarily due to the lack of surveillance data. The RVC reminds Member States that WHO recommends nationwide mandatory, comprehensive rubella surveillance for reliable detection and reporting of cases. Rubella and CRS surveillance are critical for understanding rubella epidemiology and for documenting eventual elimination in the verification process of Member States.

Epidemiologic and genomic sequence analyses are crucial to the verification of measles and rubella elimination. Member States are reminded that specimens from all confirmed sporadic measles and rubella cases, and from a representative number ($\geq 80\%$) of outbreaks should be submitted for genomic sequencing in accredited laboratories. Most Member States now report their measles virus genomic sequence data to the measles nucleotide surveillance database (MeaNs), but reporting of sequence data to the rubella nucleotide surveillance database (RubeNs) remains low.

The RVC noted that timeliness of submission of ASUs and additional documentation is still a challenge for a few Member States. The quality of reports continues to improve, and supplementary tables, maps and epidemiological curves were highly appreciated. Data required to demonstrate the sensitivity of surveillance systems, however, were inadequate or lacking from several Member States, and this omission must be addressed urgently in future ASUs. The RVC and RVC Secretariat will continue supporting NVCs and Member States that need additional clarification and assistance.

Background

Since the beginning of the verification process in 2012, the RVC has acted as an independent expert body with the mission to verify the elimination of measles and rubella of Member States in the European Region. The Vaccine-preventable Diseases and Immunization programme (VPI) of the Regional Office serves as Secretariat to the RVC.

The RVC holds annual meetings to determine the status of measles and rubella elimination in Member States and consequently in the Region based on data and information provided in ASUs and additional documents, prepared and submitted by the NVCs. These should include information on measles and rubella epidemiology, molecular epidemiology, population immunity, immunization programme performance, surveillance quality, and changes that may have occurred since the last annual meeting.

The RVC has stressed that face-to-face meetings with country representatives are important to provide a broader understanding of Member State challenges, but also for Member States to better understand the verification requirements and process. This is particularly important for measles and rubella endemic countries. Following the satisfactory experience of conducting two previous RVC meetings in Member States with country representatives, the Secretariat approached the health authorities and the NVC of Poland, informing them about the intention to organize the 8th meeting of the RVC in Warsaw and inviting them for a bilateral meeting.

Scope and purpose of the meeting

The objectives of the 8th RVC meeting were:

- to inform the RVC about the current epidemiology of measles and rubella in the Region and VPI activities in support of measles and rubella elimination, as well as global developments in measles and rubella control and elimination;
- to review the NVCs' ASUs for 2018 and all other documentation that NVCs provide towards documenting the absence of endemic measles and rubella transmission in their countries;
- to define the status of transmission of measles and rubella in each Member State and in the Region in 2018;
- to declare the diseases' elimination where achieved and declare the status of measles and rubella epidemiology in the Region in light of the elimination targets;
- to initiate preparation of the RVC's measles and rubella elimination status report for 2018;
- to plan verification activities in 2019 and beyond, considering the role of the RVC in advocating for continued elimination efforts at national and Regional levels;
- to assess RVC working procedures and verification process requirements.

The RVC and RVC Secretariat met with the Poland's NVC members, relevant public health technical counterparts and senior officials from the Ministry of Health to discuss issues and challenges related to measles and rubella elimination in the country and plan further activities and support.

Introduction and opening remarks

The meeting was held on 12–14 June 2019 in Warsaw, Poland.

Dr Siddhartha Datta, VPI Programme Manager, welcomed participants on behalf of the WHO Regional Office and stressed the importance of the meeting, particularly in the light of the surge of measles outbreaks in the Region. He emphasized the importance of maintaining high immunization coverage to keep populations safe and that WHO works to provide Member States tailored technical assistance. Dr Datta also recognized that partnering with other organizations and national authorities is critical for achieving measles and rubella elimination goals.

Dr Günter Pfaff, RVC chair, greeted participants on behalf of the RVC and underlined his appreciation of the opportunity to better understand the health system and measles and rubella epidemiology in Poland. Both Drs Datta and Pfaff expressed appreciation for the opportunity to convene the meeting in Warsaw and for the RVC to meet with representatives of Poland.

Dr Paloma Cuchi, WHO Representative to Poland, praised the Poland's health authorities for their commitment to measles and rubella elimination goals, especially through strengthened activities in country and collaboration with the Regional Office.

Professor Zbigniew J. Król, Under-Secretary of Health of the Ministry of Health in Poland, thanked WHO for organizing the meeting in Poland, and emphasized the government's political commitment to achieving measles and rubella elimination and preventing the transmission of other communicable diseases. He also outlined activities to improve immunization coverage as part of a revised national disease prevention, including an extension of mandatory immunization from 3 to 11 vaccines (including measles and rubella), simplification of the immunization pathway for users, and mandatory notification of case-based data on rubella by the end of 2018.

The rapporteur for the meeting was Dr Morgane Donadel, with support from the RVC Secretariat.

Status of measles and rubella elimination: global and regional update

Global update

Dr Katrina Kretsinger, WHO headquarters, presented global measles and rubella epidemiology and WHO activities to support measles and rubella elimination.

Global immunization coverage with the first dose of measles-containing vaccine (MCV1) has plateaued at about 86%, with 118 countries (61%) in 2017 reporting MCV1 coverage of $\geq 90\%$.

Immunization coverage with the second dose of measles-containing vaccine (MCV2) increased to 68% in 2017. There was a significant 80% reduction in measles deaths between 2000 and 2017. Although impressive, this decrease does not meet the 2015 target of a 95% mortality reduction. Importantly, for both cases and deaths, progress has levelled off for the past 9 years and the World Health Assembly measles control targets set in 2010 have not been met.

In 2019, Member States reported 168 193 suspected measles cases to WHO (as of May 2019). There has been an increase in measles cases globally, and some countries from the European Region (Albania, Georgia, Israel, Kyrgyzstan, North Macedonia and Ukraine) are among the countries with the highest numbers of cases or the highest disease incidence globally. Reasons vary by country but frequently involve a long-term health system failure to vaccinate. Decreased access to immunization services, vaccine hesitancy, conflict situations and weak health systems often lead to pockets of low vaccination coverage, particularly among marginalized population groups.

Global coverage with rubella-containing vaccine (RCV) remains suboptimal (52% in 2017) and rubella continues to be under-reported in many countries.

All six WHO regions now have regional goals for measles elimination and all have active RVCs. Three regions also have a regional elimination goal for rubella (Americas, Europe and the Western Pacific). As of January 2019, the number of countries verified to have eliminated measles was 83 (43%), with 111 countries considered to be endemic. Two countries previously verified as having eliminated endemic measles, Brazil and Venezuela, have experienced outbreaks and were considered to have re-established transmission, however the Region of the Americas is still considered to be measles eliminated at this time. Seventy-six countries have been verified as having eliminated rubella, with 118 considered to be endemic.

Despite the resurgence in measles cases globally, continuous WHO Regional Offices leadership and the presence of RVCs in every region have been key to progress. As countries get closer to elimination, genotyping virus strains will be critical.

WHO has updated the verification framework for measles and rubella elimination¹, and CRS guidance is under development. Strengthening the verification process is continuing across the regions and within RVCs. The next joint meeting of RVC chairpersons was to be held in July 2019 to share experiences, reach agreement on standardized procedures, identify current gaps in global guidance for determining verification status for measles and rubella and discuss potential terms of reference for a global commission to support the work of the RVCs.

European regional update

¹ [Weekly epidemiological record](#), 12 Oct. 2018

Dr Patrick O'Connor, Accelerated Disease Control Team Lead, VPI, informed the meeting participants about the mid-term review of the European Vaccine Action Plan 2015-2020 (EVAP) and the planning process for new measles and rubella goals following 2020. Despite regional coverage with MCV1 being maintained above 90% for more than 15 years, there was a rise in the number of reported measles cases to over 84 000 in 2018, compared with 25 000 in 2017. This trend continued into the start of 2019. In 2018 more than 53 000 measles cases were reported by Ukraine, followed by Serbia, Israel, France and Italy (in order of number of cases). The majority of cases were unvaccinated or under-vaccinated. Measles-associated mortality also increased in 2018 with 22 deaths reported in Romania, 15 in Ukraine, 14 in Serbia, 7 in Italy, 3 in Georgia, France and Albania, 2 in Kyrgyzstan and Greece and 1 in the Russian Federation, for a regional total of 72 measles-associated deaths. A measles mortality case-control study is ongoing in Romania to understand causes of measles deaths, which may be helpful for other countries in the Region.

In 2018, 850 confirmed rubella cases were reported to the WHO Regional Office. As in recent years, the majority of cases were reported by Poland, where all cases were classified as clinically compatible, making interpretation of the true epidemiological situation difficult.

2018 was the first year in which all 53 Member States of the Region submitted an ASU report for review by the RVC. The RVC concluded at its 7th meeting, in June 2018, that 43 Member States had interrupted endemic measles transmission and 42 Member States had interrupted endemic rubella transmission by the end of 2017. Measles elimination was verified in 37 Member States in 2017, and rubella elimination verified in 37. Eight Member States remained endemic for both measles and rubella. Germany and Russian Federation lost their interrupted measles status in 2017 due to continuous measles transmission lasting 12 months or more.

Annual status update 2018 on measles and rubella elimination in Poland

Dr Adam Stępień, National Verification Committee for Measles and Rubella Elimination (NVC) Chair

NVC activities

Dr Adam Stępień, Poland NVC chair, provided an overview of the 2018 ASU on measles and rubella elimination in Poland. Dr Stępień explained that the number of measles cases has been relatively stable over the last 15 years. However, since 2017 the number has been steadily increasing, with more than a thousand cases reported in the first half of 2019. Measles incidence increased from 1.6 to 7.2 per 1 million population from 2017 to 2018. In 2013, there was a significant increase in the number of reported rubella cases among unvaccinated boys (13-18 years of age). The introduction of rubella-containing vaccine in 1988 only targeted girls. In 2004, the measles-mumps-rubella vaccine (MMR) was introduced for all children at 13 months of age with a second dose at 10 years of age. MMR vaccination in Poland is mandatory and free for those up to 19 years of age. In 2018, the age of

vaccination with MMR second dose was lowered from 10 years to 6 years. MMR first dose coverage has been stable since 2016 and reported as 92.3% in 2018. However, geographical disparities exist throughout the country with 3 districts reporting MMR coverage below 90%.

Surveillance

Measles surveillance in Poland is case-based and uses a passive reporting system that relies on suspected or clinically diagnosed measles cases and confirmation by laboratory testing. For 2018, there were 355 cases reported, of which 22% were imported, mostly from Ukraine. Among the 276 non-imported cases, 70% were laboratory confirmed. Most confirmed measles cases came from districts where vaccine coverage was below 90%. Out of the 19 outbreaks, seven were caused by D8 genotypes. B3 measles virus genotype was confirmed in one sporadic case.

Rubella surveillance is similarly based on a passive reporting system, relying on suspected or clinically diagnosed cases of rubella and laboratory confirmation. 438 rubella cases were reported in 2018 but only 3 were laboratory confirmed. None of the cases were genotyped.

CRS reporting follows a mandatory notification process to a congenital malformations registry. No cases were reported in 2018.

Discussion

Dr Pfaff thanked the Polish participants on behalf of the RVC.

Due to the threat of the ongoing measles outbreak in Ukraine, the Ministry of Foreign Affairs and the Office for Foreigners in Poland have collaborated with the Ministry of Health in providing data on border crossings to better understand the need for additional MMR vaccine requirements in Poland.

Children who are currently 6 to 10 years of age will receive the second dose of MMR in line with previously recommended schedule, at 10 years of age. In future years, two birth cohorts will be vaccinated annually with second dose of MMR.

Several factors have affected measles epidemiology in Poland in recent years, including increased parental vaccine refusal due to negative media attention, especially concerning MMR vaccination, and limited access to health service by migrant Ukrainian workers and Roma. Ongoing efforts to sensitize the general public about the importance of vaccination are occurring through various channels, including the national vaccination website.

Measles and rubella surveillance in Poland

1) Structure of measles and rubella surveillance

Dr Grzegorz Chudzik, Deputy Chief Sanitary Inspector, Chief Sanitary Inspectorate

Dr Chudzik informed meeting participants that the Chief Sanitary Inspectorate is responsible for collecting and processing data from provincial and national levels. Its main stakeholders are physicians for the reporting of cases based on clinical and laboratory data. Several reporting systems currently co-exist: aggregate reporting including that for rubella (case-based data only available at district level), desktop databases, and central web-based system. Poland will be moving to an electronic web-based and case-based surveillance system in 2020. The new system is currently being piloted in six districts. Currently, rubella cases are reported as aggregate data. The new system will introduce case-based reporting which is expected to greatly improve rubella data quality.

Measles and rubella surveillance faces technical challenges, including the time required to manage multiple database structures for data collection, entry and management, and funding gaps for specimen transport.

2) Measles and rubella laboratory surveillance

Dr Aleksander Masny, Head of the NIPH-NIH Virology Department, National Institute of Public Health – National Institute of Hygiene, Poland

The National Reference Laboratory of Poland passed the 2018 WHO molecular proficiency panel tests with the detection of measles virus RNA, the genotyping of measles virus and the detection of rubella virus RNA based on the WHO manual for measles and on the Robert Koch-Institute (RKI) protocol for rubella.

No genotyping was conducted on rubella cases in 2018 due to the lack of samples suitable for molecular testing, as physicians sent clinical specimens exclusively for serological testing. For measles, the dominant strain in 2018 was D8-Gir Somnath.IND. A single B3 genotype measles strain was identified in an imported case. Most measles cases were serologically and molecularly tested. Dr Masny provided details on the laboratory-specific surveillance indicators used.

Overall, physicians are well-trained at diagnosing measles (concordance of clinical diagnosis and laboratory confirmation results was 53%), however it is likely that rubella cases are over-reported because physicians lack experience in differential diagnoses between rubella and other diseases with similar symptomatology.

Discussion

All samples received at the national laboratory from measles-suspected cases are tested for both measles and rubella. It was noted that physicians do not always adhere to the rubella case definition, which includes rash and fever and at least one of the following: arthritis, arthralgia or lymphadenopathy. In addition, most physicians do not submit samples for rubella laboratory testing. Despite recent efforts to sensitize doctors on the importance of measles and rubella surveillance,

continued efforts are needed. There are funding gaps for specimen transport which need to be addressed to improve laboratory testing.

Dr Pfaff commended Poland for its commitment to attaining measles and rubella elimination goals. There are still challenges particularly with regards to rubella. Poland was encouraged to provide more details on the symptoms of the cases classified as rubella to understand the criteria being used for defining and classifying cases.

Status of the ASU submission and overview of the meeting programme

8th meeting: plan and procedures; outputs of the meeting and timeframe for finalization of report and letters

Dr Dragan Jankovic, Technical Officer, VPI, reported that the Regional Office received ASU reports or similar documents from all 53 Member States for the second consecutive year, and that the Secretariat will continue working with Member States to receive all signed reports on time. As observed in previous years, the quality of reporting varied between Member States. The Secretariat provided support to specific NVCs and their secretariats to improve their documentation against different lines of evidence. NVCs and their secretariats face diverse challenges: administrative and organizational issues, ongoing measles outbreaks, and insufficient capacity.

It was noted that some ASUs lack the necessary quality and completeness. Some deficiencies included missing NVC statements on status, misuse of endemic and re-established definitions, incomplete reports, misinterpreted questions, missing surveillance indicators and miscalculated outbreak analyses. The absence of outbreak reports and analysis, including descriptions of outbreak response measures, was particularly important and a missed opportunity, both by the national health systems and the NVCs. Information on outbreaks can improve knowledge of immunity gaps and current disease epidemiology and help plan activities and develop policies to prevent similar events in the future.

VPI developed Member State summary fact sheets, with data extracted from the ASUs. These data are publicly available on the Regional Office's website. The fact sheets include results from the 6th and 7th RVC meetings, and the fact sheets will be updated annually.

Systematized laboratory information for assessment of elimination status

Dr Myriam Ben Mamou, Scientist, VPI, presented the European measles and rubella laboratory network activities in 2018, followed by an overview of the serology and molecular accreditation performance data of the Regional Measles and Rubella Laboratory Network. Dr Ben Mamou informed the attendees of some of the key recommendations from the European measles and rubella

regional reference laboratory meeting held in March 2019: 1) the national reference laboratories are responsible for interpreting laboratory results and should be fully engaged by the NVCs in the preparation of ASUs; negative reverse transcription polymerase chain reaction (RT-PCR) results alone are not enough evidence to discard cases; 2) a commercial multiplex RT-PCR assay has been shown to miss specific measles strains and should not be used in the network until the issue is resolved; 3) full algorithm flowcharts used for measles and rubella laboratory testing should be attached to the ASU report; 4) a high-quality measles surveillance system is not indicative of good rubella surveillance. In the absence of national case-based rubella surveillance, only laboratory-based surveillance of rubella integrated with a high-quality fever/rash surveillance system is acceptable to verify rubella elimination.

Most countries in the Region are compliant with testing at least 80% of specimens in proficient labs. Of the 53 Member States, 35 use serology testing as the first line of measles and rubella laboratory confirmation, 4 use molecular testing and 13 use either both tests or another testing algorithm. Poland, Ukraine and Germany report the lowest rates of laboratory investigation for rubella although they together report most of the rubella cases in the Region.

Of the 48 Member States reporting measles cases in 2018, 43 reported genetic information in their ASUs and 44 submitted more than 4000 sequences to MeaNS. The dominant variant reported in the Region throughout 2018 was B3-Dublin. The accurate characterization of measles chains of transmission requires the epidemiologic and genomic data, including probability-based analyses of nucleotide substitutions to correctly identify viral lineages.

Of the 25 Member States reporting rubella cases, 10 reported genetic information in their ASUs and 9 reported information to RubeNS.

Assessment of ASU for 2018

The RVC members assessed ASUs and other documentation in accordance with the definition of elimination provided in the *Eliminating measles and rubella: framework for the verification process in the WHO European Region*². The reports were allocated among RVC members for preliminary review and presented at the meeting by major components: disease epidemiology, surveillance performance, population immunity and any supplemental information available. Conclusions for each Member State for 2018 are provided in Annex 1, together with a Regional summary of measles and

² [Eliminating measles and rubella: framework for the verification process in the WHO European Region, 2014](#)

rubella status for 2018. Specific comments on the conclusions for each country are provided in Annex 2.

As in previous years, the quality and completeness of data were suboptimal in some ASUs, and in some cases this problem has persisted even after multiple interventions and inputs from the Secretariat to their counterparts in countries. The Secretariat will provide further support to these countries in the coming year. Ensuring high-quality epidemiological surveillance is an ongoing challenge and a priority area in VPI's routine work.

Perspectives from partners

Dr Sabrina Bacci, Vaccine-preventable Diseases Surveillance and Response, European Centre for Disease Prevention and Control (ECDC), presented a risk assessment indicating that over 4.5 million individuals under 20 years of age are susceptible to measles in the European Union and the European Economic Area. Country activities are planned and conducted with ECDC to identify and close these immunity gaps.

Conclusions and recommendations

Conclusions

The RVC concluded that based on reports submitted for 2018:

- 37 (70%) Member States interrupted endemic measles transmission and 42 (79%) interrupted endemic rubella transmission for a period of at least 12 months;
- 35 (66%) provided evidence to demonstrate the elimination of endemic measles (interrupted transmission for at least 36 months), and 39 (73%) for the elimination of endemic rubella;
- 33 (63%) provided evidence for the elimination of both measles and rubella;
- 1 (2%) provided evidence for the interruption of measles transmission for a period of 24 months and 1 (2%) for interruption of transmission for 12 months;
- 3 (6%) provided evidence for interruption of rubella transmission for 24 months;
- 12 (23%) were considered endemic for measles;
- 4 (8%) countries were considered to have re-established measles transmission;
- 11 (21%) were considered endemic for rubella;
- 9 (17%) were considered endemic for both measles and rubella.

Upon reviewing ASUs, the RVC recognized that the number of countries with measles transmission increased in 2018. The RVC expressed concern that seven countries lost their measles-interruption or verified measles-eliminated status as their measles epidemiology data indicate continuous transmission for 12 or more months in 2017 and 2018. Pockets of susceptible populations, low-quality measles surveillance that cannot document the absence of endemic transmission and inadequate outbreak response activities are ongoing challenges.

In 2018, during outbreaks in several Member States most measles cases were among children too young to receive MRCV1 and adults, including among HCWs. As in previous years, the RVC reminds countries to follow the recommendations and guidelines made by WHO and the European Technical Advisory Group of Experts on Immunization (ETAGE), urging Member States to strengthen their routine immunization delivery services, detect immunity gaps in adolescents and adults, and develop strategies to reach unvaccinated individuals. The RVC again urges that Member States implement the recommendations in the measles vaccine position paper³. In particular, for HCWs who have contact with patients, documentation of immunity should be required before signing an employment contract or entering into a training programme. The RVC believes that HCWs and professionals who work in public environments, such as social workers, transport staff, prison officers, staff and teachers in child-care centres and schools need to understand the benefits of vaccination and be provided with the opportunity to be fully vaccinated.

³ [WHO position paper on measles](#)

The RVC acknowledges challenges that many countries face in verifying rubella elimination due to suboptimal rubella and CRS surveillance.

Some Member States that achieved interruption or elimination of endemic measles transmission have experienced widespread outbreaks following importation of measles virus in 2017 and 2018. Several Member States have been subjected to repeated importations and import-related outbreaks where individual chains of transmission have stopped within a few months. Member States providing detailed data analysis related to their measles cases and chains of transmission of less than 12 months were able to maintain their measles-interrupted or measles-eliminated status. In other Member States, the duration of import-related outbreaks exceeded 12 months. In the absence of evidence that sequentially occurring outbreaks were not linked, i.e. that they were not part of the same chain of transmission, these countries are considered to have reverted to endemic status or re-established measles transmission status. Complete epidemiological and laboratory investigation is needed to distinguish separate chains of transmission. Incomplete documentation did not allow for the distinguishing of individual cases and outbreaks, which is particularly important when a virus with similar genomic sequence is detected in many specimens.

To determine with confidence whether measles and/or rubella endemic transmission in a Member State has been interrupted, it is critical to fully characterize chains of transmission (outbreaks) and sporadic cases through the linkage of epidemiologic and genomic data. All Member States should submit specimens for genomic sequencing from all confirmed measles and rubella sporadic cases and from a representative number of cases from at least 80% of the chains of transmission. In addition, for continuous outbreaks, genotyping should be repeated periodically from specimens of the same chain if the transmission continues. In reviewing the ASUs, the RVC relied on the measles viral genetic information in conjunction with comprehensive epidemiological data as an essential line of evidence in documenting interruption of virus endemic transmission or, in the case of countries previously regarded as having interrupted transmission, its re-establishment.

Although some delays have been noted, most Member States continue to report their measles virus genomic sequence data to the measles nucleotide surveillance database (MeaNs). While the number of rubella viral sequences available in the rubella nucleotide surveillance database (RubeNS) increased in 2018, this information is again missing from Member States reporting the highest number of rubella cases but failing to provide laboratory confirmation of these cases.

The RVC calls on Member States to submit their ASUs on time to allow adequate time to review and verify received information. Overall, the ASU and associated documents were of good quality, and the RVC wishes to commend those NVCs and countries that submitted maps, spreadsheets and epidemiological curves illustrating the spatial and calendar distribution of confirmed cases, and the duration of transmission of specific virus strains. These additional analyses greatly facilitated the

RVC's ability to interpret the available data and accurately assign national verification status. A few reports, however, provided incomplete information or incorrectly calculated indicators. Of note, the information required to assess the sensitivity of surveillance systems was inadequate or lacking from several reports. Where challenges exist, national counterparts are asked to work more closely with the RVC Secretariat and RVC in preparation and finalization of the ASU for 2019.

The RVC greatly appreciates the continued support from the Regional Director and management team of the Regional Office. It commends the Secretariat for supporting the NVCs, and national authorities in collecting and collating the technical information required to complete the ASUs.

The RVC is grateful for the opportunity provided by the Regional Office and the Polish Ministry of Health to conduct face-to-face meetings with representatives from Poland, and for open and helpful discussions with the NVC and representatives of national health authorities on all issues of concern.

The RVC highly values the ongoing partnerships with WHO, ECDC, and the United States Centers for Disease Control and Prevention (CDC) in promoting and supporting activities to achieve the regional measles and rubella elimination goal.

Some RVC members participated in country missions with Secretariat staff in 2018. The missions were considered useful in providing insight and information that aided the RVC in reviewing specific ASUs and supporting the decision-making process. RVC requests that these missions continue in the future, especially to measles-endemic countries and those where measles transmission has been re-established.

The RVC is convinced that public advocacy is fundamental. Attention should be drawn to the current measles outbreaks to further increase awareness of the importance of strong national programmes that deliver measles and rubella vaccine to protect entire populations in all Member States. The RVC is willing to assist in public advocacy through capitalizing on technical conferences, professional association meetings and country visits, meeting with NVCs and government and health authorities, supporting press conferences and media releases and assistance with material for publications.

Recommendations

- To NVCs
 - NVCs, working together with national health authorities, should make every effort to provide comprehensive and signed ASUs in advance of the submission deadline provided by the Secretariat. The ASU should include all available data on surveillance performance, including:
 - the rate of discarded cases and genotype information;
 - detailed epidemiological data about cases (e.g. age, vaccination status) supported with outbreak reports, full laboratory algorithm flowcharts for

- measles and for rubella, maps and phylogenetic tree graphs, to facilitate understanding of the data;
- all available information on current vaccine coverage at national and subnational levels through routine and supplemental immunization, with information about the source of data and methodology used to estimate coverage;
 - an explanation, if necessary, for missing, incomplete or alternative information.
- NVCs should coordinate with the Secretariat and health authorities to ensure that the WHO-accredited National Reference Laboratory is adequately engaged in ASU preparation.
 - NVCs and their secretariats should utilize the support offered by the RVC Secretariat in preparing ASUs, which will contribute to their timely submission.
- To Member States
 - The RVC reiterates its reminder to national health authorities of their responsibility to ensure that adequate and complete information and documentation on all measles and rubella cases, especially those classified as imported or import-related, including available epidemiological information and details on the geographical source(s) of the imported virus(es), are provided in the ASU. These data should be consistent with the data provided through other reporting systems to the international health organizations.
 - The RVC urges Member States to implement WHO strategies and recommendations and ensure high measles and rubella immunity levels throughout the population, regardless of age, ethnicity or social status. HCWs and professionals who work in public environments, such as social workers, transport staff, prison officers and teachers, need to fully understand the benefits of vaccination and be provided with a full vaccination schedule. Countries with a high number of cases among adolescents and adults are urged to analyse disease epidemiology, investigate the reasons for immunity gaps, implement interventions to prevent transmission and share findings in upcoming ASUs.
 - The RVC urges Member States to implement WHO strategies and recommendations and ensure that high-quality measles and rubella surveillance, laboratory confirmation of at least 80% of suspected cases and genotyping of positive specimens are in place and adequately supported. Testing for measles and rubella of all clinical specimens should be conducted in WHO-accredited laboratories of the Regional Measles and Rubella Laboratory Network or in laboratories of known, documented proficiency

(either through oversight by WHO-accredited national laboratories or national accreditation by recognized bodies). WHO-accredited national laboratories should furthermore coordinate a national measles and rubella external quality assurance (EQA) programme or facilitate access of other laboratories to reputable measles and rubella EQA systems.

- To the Secretariat
 - The Secretariat should continue prioritizing Member States that require technical support and partner with the RVC in targeted advocacy to meet the regional measles and rubella elimination goals.
 - Resurgence of measles in the Region and the loss of measles elimination status of four Member States should be communicated broadly to promote awareness of the importance of strong national routine immunization programmes that provide easy and equitable access to vaccines and that rapidly identify and respond to suspected cases of measles and rubella.
 - Recognizing the significant proportion of adolescent and adult cases reported in recent measles outbreaks in 2018, the Secretariat is urged to provide any additional information to the RVC and ETAGE, for their information and discussion and eventual action as appropriate.
 - The Secretariat is encouraged to continue engaging with Member States and support them in implementing WHO strategies and recommendations for reducing measles and rubella immunity gaps, particularly for the immunization of specific risk groups (for example, HCWs).

Annex 1. Results of RVC review of reports and documents submitted by NVCs

Table 1. RVC conclusions on measles and rubella elimination status of Member State for 2018

Country	Measles elimination status, 2018	Rubella elimination status, 2018
Albania	Re-established	Eliminated
Andorra	Eliminated	Eliminated
Armenia	Eliminated	Eliminated
Austria	Eliminated	Eliminated
Azerbaijan	Eliminated	Eliminated
Belarus	Eliminated	Eliminated
Belgium	Interrupted 12 months	Endemic
Bosnia and Herzegovina	Endemic	Endemic
Bulgaria	Eliminated	Eliminated
Croatia	Eliminated	Eliminated
Cyprus	Eliminated	Eliminated
Czech Republic	Re-established	Eliminated
Denmark	Eliminated	Endemic
Estonia	Eliminated	Eliminated
Finland	Eliminated	Eliminated
France	Endemic	Endemic
Georgia	Endemic	Interrupted 24 months
Germany	Endemic	Endemic
Greece	Re-established	Eliminated
Hungary	Eliminated	Eliminated
Iceland	Eliminated	Eliminated
Ireland	Eliminated	Eliminated
Israel	Eliminated	Eliminated
Italy	Endemic	Endemic
Kazakhstan	Interrupted 24 months	Interrupted 24 months
Kyrgyzstan	Endemic	Eliminated
Latvia	Eliminated	Eliminated
Lithuania	Eliminated	Eliminated
Luxembourg	Eliminated	Eliminated
Malta	Eliminated	Eliminated
Monaco	Eliminated	Eliminated
Montenegro	Eliminated	Eliminated
Netherlands	Eliminated	Eliminated
North Macedonia	Eliminated	Eliminated
Norway	Eliminated	Eliminated
Poland	Endemic	Endemic
Portugal	Eliminated	Eliminated
Republic of Moldova	Eliminated	Eliminated
Romania	Endemic	Endemic
Russian Federation	Endemic	Eliminated
San Marino	Eliminated	Eliminated
Serbia	Endemic	Endemic
Slovakia	Eliminated	Eliminated
Slovenia	Eliminated	Eliminated
Spain	Eliminated	Eliminated
Sweden	Eliminated	Eliminated
Switzerland	Eliminated	Interrupted 24 months
Tajikistan	Eliminated	Eliminated
Turkey	Endemic	Endemic
Turkmenistan	Eliminated	Eliminated
Ukraine	Endemic	Endemic
United Kingdom of Great Britain and Northern Ireland	Re-established	Eliminated
Uzbekistan	Eliminated	Eliminated

Table 2: Summary of Member States of the WHO European Region by measles and rubella elimination status in 2018

Country status	Measles	Rubella
Eliminated	35 (66%)	39 (73%)
Interrupted ≥ 24 months	1 (2%)	3 (6%)
Interrupted ≥ 12 months	1 (2%)	0 (0%)
Endemic	12 (22%)	11 (21%)
Re-established	4 (8%)	0 (0%)
Total	53	53

Annex 2. RVC country-specific conclusions and comments

- a) Countries that sustained or achieved elimination of measles and rubella for at least 36 months (in alphabetical order)

Andorra Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Andorra in 2018 and confirmed that measles and rubella elimination have been sustained. RVC notes the continued increase in MRCV2 coverage. The RVC congratulates the NVC and its secretariat.	

Armenia Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Armenia in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC congratulates the NVC and its secretariat for documenting and presenting surveillance sensitivity data in the 2018 ASU report. The RVC strongly recommends the inclusion of genotype data in future ASUs to better document the elimination status.	

Austria Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of measles has been interrupted for three consequential years and rubella elimination has been sustained. The RVC congratulates the NVC, national health authorities and health system of Austria for achieving measles elimination. The RVC appreciates the high quality of the ASU with data that allowed the RVC to distinguish between different chains of transmission, exclude endemicity of measles transmission and genotype rubella chain of transmission. The RVC reiterates that immunization coverage, especially of MRCV2, is inadequate (<95%), which makes the country vulnerable to additional outbreaks when virus importation occurs. In addition, the age distribution of measles cases indicates measles immunity gaps in adults. The RVC calls for implementation of WHO strategies and recommendations to increase immunity among adults, especially those with professions entailing higher risk (e.g. HCWs, medical students), with supplemental immunization activities (SIAs) and provide them with a proof of immunization.	

Azerbaijan Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Azerbaijan in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC is aware that attempts have been made to genotype positive samples. If such data becomes available, the RVC urges the NVC and its secretariat to report genotyping data for better documentation of the elimination status in future ASUs.	

Belarus Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Belarus in 2018 and confirmed that measles- and rubella-elimination have been sustained based on high quality surveillance data including rubella virus genotyping. The RVC commends the NVC and national health system for this. The RVC is concerned about the increased number of measles cases in the local population in 2018 and the possibility that chains of transmission are continuing in 2019 and urges further implementation of adequate outbreaks control measures.	

Bulgaria Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
<p>The RVC concluded that endemic transmission of rubella has been interrupted for three consequential years and measles elimination was sustained in 2018.</p> <p>The RVC is concerned about the increased number of measles cases in 2019 and encourages implementation of WHO strategies and recommendations. This would allow the country to better identify and provide immunization services to susceptible populations, further increase and maintain high routine vaccination coverage at all administrative levels and strengthen the surveillance performance and sensitivity, which will lead to better data in the ASU. The RVC requests the NVC to improve collaboration with its secretariat to ensure more comprehensive data presentation in future ASUs.</p>	

Croatia Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
<p>The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Croatia in 2018 and confirmed that measles- and rubella-elimination have been sustained. Nevertheless, the suboptimal MRCV1 coverage is of concern as continued low vaccination coverage will result in the accumulation of susceptible children across the country, creating a high threat for re-establishment of measles transmission. The RVC calls for implementation of WHO strategies and recommendations to increase vaccination coverage across all susceptible ages, particularly the younger age groups. Surveillance performance and sensitivity need to be strengthened and better documented.</p>	

Cyprus Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
<p>The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Cyprus in 2018 and confirmed that measles- and rubella-elimination have been sustained. Nevertheless, the RVC has repeatedly expressed concerns about the methodologies used to assess MRCV1 and MRCV2 immunization coverage and urges the national authorities to initiate appropriate monitoring and greater efforts to document current vaccination coverage levels throughout the country. The RVC is eager to learn the results of a new survey methodology to assess immunization coverage that the country is implementing in 2019. Surveillance performance and sensitivity need to be strengthened and better documented. The RVC strongly recommends inclusion of measles genotyping data in future ASUs.</p>	

Estonia Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
<p>The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Estonia in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC would appreciate more information on additional tested specimens, which were reported in the laboratory segment of surveillance but were not considered as suspected cases in the ASU. The RVC requests the NVC and its secretariat to include genotyping data in future ASUs.</p>	

Finland Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
<p>The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Finland in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC notes the high political commitment to measles and rubella elimination.</p>	

Hungary Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Hungary in 2018 and confirmed that measles- and rubella-elimination have been sustained. Surveillance performance and sensitivity need to be strengthened and better documented in ASUs.	

Iceland Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Iceland in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC requests the NVC to sign the 2018 ASU report and all future ASUs.	

Ireland Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Ireland in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC reiterated its concerns over the low vaccination coverage reported for Dublin and considers this a potential threat to maintaining elimination status. In view of the risk of widespread measles transmission following an importation, the RVC urges the implementation of WHO recommended strategies to close immunity gaps in the population and requests that the NVC and its secretariat provide comprehensive coverage data and epidemiological analysis in future ASUs.	

Israel Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Israel in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC commends the NVC and its secretariat for strengthening and better documenting surveillance performance and sensitivity in the 2018 report. The RVC encourages the NVC to work with its secretariat and find a way to include immunization coverage data for all children in age cohorts targeted for routine immunization in the ASU. The RVC is concerned about the increased number of measles cases in 2018 and the possibility that transmission of some of the same measles virus strains is continuing in 2019. The RVC urges implementation of WHO strategies and recommendations to control outbreaks to prevent potential re-establishment of measles transmission. To better assess current measles epidemiology and review Israel's elimination status, the RVC requests that the NVC provide a comprehensive ASU for 2019 that will include detailed information about outbreak investigation and response.	

Latvia Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Latvia in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC encourages continued efforts in strengthening and documenting surveillance performance and sensitivity. The RVC commends the high immunization coverage in country.	

Lithuania Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
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The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Lithuania in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC commends the NVC for including measles genotyping data in this year's ASU. The RVC is concerned about the increased number of measles cases at the beginning of 2019. The RVC encourages implementation of WHO strategies and recommendations to control outbreaks, better identify immunity gaps in the population and provide immunization services to them, maintain high routine vaccination coverage at all administrative levels, strengthen the surveillance performance and sensitivity and provide better documentation in the next ASU. The RVC requests that the NVC work with its secretariat to ensure adequate surveillance sensitivity data and that a comprehensive presentation of outbreak data is included in future ASUs.

Luxembourg Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Luxembourg in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC also stressed that MRCV2 coverage is still suboptimal. This creates a risk for outbreaks when virus importation occurs.	

Malta Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Malta in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC is concerned over delayed immunization with both MRCV doses before school enrolment and urges more efforts to increase vaccination coverage in pre-school children. Further clarifications are needed from the NVC regarding the high rubella surveillance sensitivity reported in this year's ASU without adequate data on surveillance indicators.	

Monaco Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Monaco in 2018 and confirmed that measles- and rubella-elimination have been sustained. Appreciating submission of the second ASU, the RVC requests submission of a signed version if national procedures for verification includes that type of approving mechanism. Immunization coverage data reported through the WHO/United Nations Children's Fund (UNICEF) Joint Reporting Form (JRF) process should be included in the ASU. If this is not possible, the RVC requests that the NVC confirm that the JRF is the appropriate source of information about immunization coverage in Monaco. The RVC encourages continued activities to further increase and sustain high routine vaccination coverage. The RVC encourages the implementation of additional activities to increase and sustain high routine vaccination coverage.	

Montenegro Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Montenegro in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC is concerned about the continuing low vaccination coverage, which has resulted in a dangerous accumulation of susceptible children and created a high risk for re-establishing transmission. The RVC encourages implementation of WHO strategies and recommendations to increase vaccination coverage and close existing immunity gaps. The RVC requests that the NVC work with its secretariat to ensure inclusion of genotyping data in future ASUs.	

Netherlands Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in the Netherlands in 2018 and confirmed that measles- and rubella-elimination have been sustained. RVC encourages the implementation of innovative approaches to address vaccine hesitancy in certain communities and urges further strengthening of surveillance sensitivity. RVC looks forward to inclusion of the results of the 2017 serosurvey in the 2019 ASU.	

North Macedonia Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in North Macedonia in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC is concerned about the increasing number of measles cases and outbreak in 2019. The RVC urges implementation of WHO strategies and recommendations to increase routine immunization coverage with both doses of MRCV, implement outbreak response measures, catch-up immunization activities, identify susceptible populations, improve the documentation of immunization status among HCWs and implement infection control measures and procedures in health care settings. To facilitate the assessment of measles epidemiology and elimination status, the RVC requests that the NVC provide more detailed analysis of outbreaks in future ASUs.	

Norway Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Norway in 2018 and confirmed that measles- and rubella-elimination have been sustained.	

Portugal Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Portugal in 2018 and confirmed that measles- and rubella-elimination have been sustained. Surveillance performance and sensitivity need to be further strengthened and documented in future ASUs.	

Republic of Moldova Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Republic of Moldova in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC commends country efforts to strengthen the sensitivity of measles, rubella and CRS surveillance and recommends better epidemiological investigation and genotyping of sporadic measles cases. The RVC urges implementation of WHO strategies and recommendations to increase and sustain high routine MRCV immunization coverage, particularly ensuring timely immunization with first dose among children <24 months of age.	

San Marino Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in 2018 and confirmed that measles- and rubella- elimination have been sustained. The RVC encourages the implementation of additional activities to increase and sustain high routine vaccination coverage.	

Slovakia Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Slovakia in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC expressed concerns about the increased number of measles cases in 2018 and urges implementation of WHO strategies and recommendations for outbreak control and immunization of susceptible individuals. Additionally, surveillance performance and sensitivity and molecular epidemiology need to be strengthened and better documented in ASUs.	

Slovenia Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Slovenia in 2018 and confirmed that measles- and rubella-elimination have been sustained. Surveillance performance and sensitivity need to be further strengthened and better documented in ASUs.	

Spain Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Spain in 2018 and confirmed that measles- and rubella-elimination have been sustained. Surveillance performance and sensitivity need to be strengthened and better documented in ASUs. The RVC reminds national health authorities of the requirement to have specimens from suspected cases tested either in a WHO-accredited laboratory or in laboratories with documented high proficiency.	

Sweden Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Sweden in 2018 and confirmed that measles- and rubella-elimination have been sustained.	

Tajikistan Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Tajikistan in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC commends country efforts towards improving measles and rubella surveillance and strengthening the role of the NVC and urges health authorities to continue working in this direction.	

Turkmenistan Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Turkmenistan in 2018 and confirmed that measles- and rubella-elimination have been sustained. The RVC commends the NVC, national health authorities and health system of Turkmenistan on the efforts taken to achieve and maintain elimination of measles and rubella.	

Uzbekistan Status of measles and rubella elimination in 2018	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Uzbekistan in 2018 and confirmed that measles- and rubella-elimination have been sustained. While	

pleased with these results, the RVC is concerned about the increasing number of reported measles cases in 2019 and urges implementation of WHO strategies and recommendations to control eventual outbreaks. The RVC calls on authorities to maintain high routine immunization coverage, strengthen coverage monitoring at subnational levels and to consider additional activities to improve the quality of measles, rubella and CRS surveillance.

- b) Countries that have interrupted measles and rubella transmission as of 2018 for different periods of time, but have not yet sustained interruption of both diseases for 36 months (in alphabetical order)

Kazakhstan

Component	RVC comment
RVC conclusion for 2017	Measles interrupted 12 months. Rubella interrupted 12 months.
Epidemiology	576 measles cases were reported and incidence (excluding 5 imported cases) was 31.5/million. Most cases were reported from Astana City (74%) and Almaty City (12%); 84% of reported cases were among children <15 years of age, half of which were of age to receive routine immunization with MRCV1 (78% were children 0-4 years of age; 43% were <1 year of age). Four chains of transmission were detected starting with imported cases, genotyped as B3-Dublin, D8-Gir Somnath, B3-Kabul and D8-Osaka. There are indications that the latter three chains of transmission are continuing in 2019. One confirmed imported rubella case and zero CRS cases were reported.
Surveillance performance	All but one of the reported surveillance performance indicators met or surpassed targets. The rate of discarded cases was 3.1/100 000 for measles and 0.2/100 000 for rubella. Rate of genotyping was 100%. Genotyping detected 4 different B3 and D8 lineages in chains of transmission and one D8 in a sporadic case.
Population immunity	Coverage with MRCV1 was 99.5% and coverage with MRCV2 was 98.4%, based on administrative data. No immunity gaps were identified.
Supplementary information	Results of a seroepidemiological study, indicating 37% of seronegatives in sample size 3502 person, are not properly explained.
Specific comments to country	Based on data provided in the ASU for 2018, the RVC concluded that endemic transmission of both measles and rubella was interrupted for 24 months in Kazakhstan as of 2018. However, the RVC expressed concerns about the increased number of measles cases in 2018 and an even higher number of measles cases reported to date in 2019. To prevent the re-establishment of measles transmission, the RVC urges the health authorities to implement WHO strategies and recommendations on outbreak control, including outbreak response immunization followed by SIAs. Additionally, efforts should be put in place to strengthen routine immunization and ensure the sustainability of high-quality immunization monitoring and diseases surveillance, including increasing sensitivity, the geographical representativeness of discarded cases and genotyping, which is essential for tracing the chains of transmission. Training of HCWs in measles and rubella surveillance procedures should be considered as well.
RVC conclusion for 2018	Measles interrupted 24 months. Rubella interrupted 24 months.

Switzerland

Component	RVC comment
RVC conclusion for 2017	Measles interrupted 24 months. Rubella interrupted 12 months.
Epidemiology	<p>Measles incidence was 3.3/million with 48 measles cases reported, of which 28 were classified as endemic.</p> <p>7 outbreaks with a total of 32 cases were reported. Most cases were unimmunized (64%) and 31% were among adults ≥ 20 years of age. B3 and D8 measles genotypes were identified.</p> <p>Two rubella cases, both laboratory-confirmed and >15 years of age were reported.</p> <p>Zero CRS cases were reported.</p>
Surveillance performance	<p>Overall, surveillance performance indicators were suboptimal for both measles and rubella.</p> <p>Rubella genotyping was introduced by the National Laboratory.</p>
Population immunity	Coverage with MCV1 and MCV2 (the latter at 2 years of age) was 94.9% and 89.2%, respectively, during 2016-2018.
Supplementary information	The immunization calendar was modified in March 2019, with MCV1 moved from 12 to 9 months, and MCV2 from 15-24 months to 12 months.
Specific comments to country	The RVC commends the NVC, national health authorities and public health system on achieving elimination of endemic measles transmission and on sustaining interruption of endemic rubella transmission. Low MRCV2 coverage in many cantons is of concern and reported data suggest immunity gaps among adults. The RVC urges the health authorities to implement WHO strategies and recommendations on SIAs or other types of targeted vaccination activities.
RVC conclusion for 2018	Measles eliminated. Rubella interrupted 24 months.

- c) Countries with endemic transmission of measles, rubella or both diseases in 2018 (in alphabetical order)

Belgium

Component	RVC comment
RVC conclusion for 2017	Measles endemic. Rubella endemic.
Epidemiology	Reported measles incidence was 8.7/million with 117 cases, of which 18 were classified as imported. 21 outbreaks were reported. Forty-seven percent of cases were children <15 years of age, and 70% of cases were unvaccinated. Cases were reported nationwide in the period from February to December 2018, and different linages of genotypes B3-Dublin and D8 were detected. One confirmed rubella case (genotype 2B) and zero confirmed CRS cases were reported.
Surveillance performance	Surveillance quality indicators varied by sub-national region. The rate of discarded cases for measles was 1.7/100 000 nationally (1.1 in Flanders, 2.3 in Wallonia and 3.4 in Brussels). Rubella is a notifiable disease only in Brussels, and CRS is only notifiable in Brussels and Wallonia.
Population immunity	National coverage with MRCV1 was 96%. Coverage with MRCV2 varied between 75% (Brussels and Wallonia) and 87% (Flanders). High-risk groups include the orthodox religious Jewish community, anthroposophic community, adults born between 1970 and 1984 who only received one dose of measles- containing vaccines, the Roma community, asylum seekers and HCWs.
Supplementary information	Immunization calendar will be modified in 2019 and MRCV2 should be administered at 7–9 years of age, instead of at 10–12 years. With the surveillance system introduced, suspected measles cases negative for measles in laboratory should be tested for rubella.
Specific comments to country	The RVC sought and received additional information from the NVC, confirming that measles cases reported in 2017 and 2018 did not belong to the same chain of transmission according to epidemiological and laboratory genotyping data. The RVC commends Belgium for the interruption of endemic measles transmission over a period of 12 months and commends efforts made by health authorities to introduce testing of measles-negative specimens for rubella. The RVC remains concerned regarding low MRCV2 coverage, especially in Brussels and Wallonia, and continues to call for the implementation of WHO resolutions and guidelines recommending establishment of national rubella and CRS surveillance. The decision to maintain the non-notifiable status of rubella constitutes a major constraint to elimination, both nationally and throughout the Region.
RVC conclusion for 2018	Measles interrupted 12 months. Rubella endemic.

Bosnia and Herzegovina

Component	RVC comment
RVC conclusion for 2017	Measles endemic. Rubella endemic.
Epidemiology	Measles incidence in Bosnia and Herzegovina was 18.1/million with 62 measles cases reported. Fifty percent of cases were among individuals ≥ 20 years of age, and 71% were either unimmunized or had unknown immunization status. The majority of cases (55) were part of three outbreaks in Republika Srpska. One outbreak was reported by the Federation of Bosnia and Herzegovina. Genotyping revealed the B3 strain among cases from the Federation of Bosnia and Herzegovina, but it was not possible to confirm the genotype of the cases from Republika Srpska. Rubella incidence was 1.5/million with 5 rubella cases. Zero confirmed CRS cases were reported.
Surveillance performance	Surveillance performance indicators are calculated differently by two entities and one district. These indicators continue to be below the thresholds for both measles and rubella. Half of measles cases were clinically compatible, and one fifth were of unknown origin.
Population immunity	Population immunity remains low, as it has for several years. MRCV1 coverage in two entities and one district is between 68.4% and 86%, and MRCV2 coverage is between 68.4% and 92.7%. Routine immunization coverage is lower in the Federation of Bosnia and Herzegovina than in the other entity and the district.
Supplementary information	Each of the two entities provided comprehensive supplemental information about outbreak response, updated legal and technical documents, advocacy and communication activities, trainings to increase HCW capacity, and promotion of vaccination. Activities to immunize HCWs are being planned.
Specific comments to country	The RVC recognizes the complex circumstances in the country and commends the continued efforts to implement strategies to improve measles and rubella coverage and surveillance. The RVC remains concerned over the size of the susceptible population, both among children and adults, and urges implementation of WHO strategies and recommendations to increase measles and rubella immunization coverage in all population groups in the country. If considered, SIAs should be carefully planned and synchronized in both entities and the district to ensure that transmission between the entities and the district will not continue. Strengthened surveillance should increase detection of suspected cases and the rate of laboratory investigation, including genotyping of cases by WHO-accredited laboratories or in laboratories of known, documented proficiency. The RVC requests that the NVC coordinate with its secretariat to include genotyping data in ASUs.
RVC conclusion for 2018	Measles endemic. Rubella endemic.

Denmark

Component	RVC comment
RVC conclusion for 2017	Measles eliminated. Rubella endemic.
Epidemiology	Reported measles incidence was 0.7/million with 8 cases reported, 4 of which were classified as imported. One outbreak with 3 cases was reported. Genotypes D8 and B3 were detected. No rubella and CRS cases were reported.
Surveillance performance	Surveillance sensitivity was suboptimal, with the timeliness of investigation of 57%. Rubella and CRS surveillance are not population based.
Population immunity	Reported coverage with MCV1 was 94% and MCV2 coverage was 89%, according to the national immunization registry.
Supplementary information	In an attempt to develop laboratory-based rubella surveillance, all measles-negative lab specimens from suspected measles cases have been tested for rubella since 2017. From April 2018, all adults are offered measles vaccination free of charge.
Specific comments to country	The RVC is grateful to the Scandinavian Verification Committee for its comprehensive report and to the national health authorities and health system of Denmark for sustaining measles elimination and for their efforts to improve surveillance for rubella. The RVC recommends the implementation of WHO strategies and recommendations to increase coverage with both doses of MRCV and to establish operational and functional mandatory population-based rubella surveillance.
RVC conclusion for 2018	Measles eliminated. Rubella endemic.

France

Component	RVC comment
RVC conclusion for 2017	Measles endemic. Rubella endemic.
Epidemiology	Measles incidence was 43.5/million with 2921 reported cases, 122 of which were classified as imported; 47% of cases were ≥ 15 years of age, and 64% of cases were unvaccinated. Twelve outbreaks were reported, with 25–510 cases per outbreak. Different variants of measles genotypes B3 and D8 circulated nationwide in 2018. With specific surveillance for rubella and CRS, 5 confirmed rubella cases in pregnant women (4 imported) and one imported CRS case were reported.
Surveillance performance	Measles surveillance performance and sensitivity are suboptimal, with rate of discarded cases 0.4/100 000. Surveillance performance data were not provided in the ASU. Specific rubella surveillance exists throughout the country but does not cover the complete population. A new rubella surveillance system was initiated in September 2018.
Population immunity	Immunization coverage data for 2018 were not presented in the ASU because the data were not available. In 2017, a survey pertaining to 2-year-olds found that MRCV1 coverage was 90% and MRCV2 coverage was 80%. Five of the 14 sub-national administrative units reported coverage $\leq 90\%$ for both MRCV1 and MRCV2, and six additional units reported $\leq 90\%$ coverage for MRCV2 only.
Supplementary information	Rubella has been a fully notifiable disease since mid-2018. Mandatory school entry vaccination for 11 antigens was introduced in 2018.
Specific comments to country	The RVC commends action taken to improve immunization coverage and to initiate a new rubella surveillance system in the country. As at the previous meetings, the RVC urges the implementation of WHO strategies and recommendations for measles and rubella elimination. The RVC requests that the NVC work with its secretariat to include more measles outbreak investigation and response data. RVC also requests that the NVC provide full details on the implementation of case-based measles and rubella surveillance in the ASUs, to make it possible for the RVC to monitor standard surveillance indicators, especially sensitivity.
RVC conclusion for 2018	Measles endemic. Rubella endemic.

Georgia

Component	RVC comment
RVC conclusion for 2017	Measles endemic. Rubella interrupted 12 months.
Epidemiology	Measles incidence was 589.6/million with 2199 measles cases being considered as part of one outbreak, and 2185 cases of which classified as endemic. Cases were reported among all age groups, but the majority (55%) were ≥ 20 years of age. Most measles cases were unvaccinated or of unknown vaccination status. All endemic cases were considered as one outbreak, which started in August 2017 and continued in 2019. Only one case has been genotyped (D8-Zguridi). All 77 suspected rubella cases tested negative and were discarded. No CRS cases were reported.
Surveillance performance	The timeliness and completeness of reporting were 100%. Surveillance sensitivity has improved with rate of discarded cases 13.7/100 000 for measles and 2.1/100 000 for rubella. In addition, 458 suspected measles cases were also tested for rubella and found negative, thereby increasing rubella rate of discarded cases to 13.6/100 000.
Population immunity	Vaccination coverage with MRCV1 was 99% and coverage with MRCV2 was 96%. Four territories reported MRCV1 coverage <90%, and eight territories reported MRCV2 coverage <90%. Outbreak response immunization was conducted nationwide and targeted susceptible contacts of any age. The MMR vaccine is offered free of charge to those who are either unvaccinated or of unknown vaccination status and 6-41 years of age. Rolling SIAs have continued into 2019.
Supplementary information	A strategic plan for measles and rubella elimination for 2019–2022 has been developed and submitted for Ministry of Health approval.
Specific comments to country	The RVC commends the national health authorities on maintaining the interruption of endemic rubella transmission and for all efforts made towards measles and rubella elimination. The RVC urges further steps to achieve and maintain high vaccination coverage for both MRCV doses in eligible population groups of all ages at all administrative levels. Genotyping needs to be strengthened and used for better analysis of outbreaks.
RVC conclusion for 2018	Measles endemic. Rubella interrupted 24 months.

Germany

Component	RVC comment
RVC conclusion for 2017	Measles endemic. Rubella endemic.
Epidemiology	<p>Reported measles incidence was 5.8/million with 543 cases reported, 66 of which were classified as imported.</p> <p>A high portion of cases was among adults (45% were ≥ 20 years of age), and 71% of non-imported cases were unvaccinated. Cases were reported from almost all territories, and 330 cases were reported in 73 outbreaks. Various D8 and B3 linages were detected in 47 outbreaks and 213 sporadic measles cases.</p> <p>Rubella incidence was 0.7/million population with 58 cases reported, of which 3 were classified as imported. Sixteen rubella cases were laboratory confirmed. Eighty-one percent of cases were unvaccinated or of unknown vaccination status.</p> <p>No CRS cases were reported.</p>
Surveillance performance	<p>Standardized, case-based electronic surveillance for reporting measles and rubella cases and procedures for outbreak investigation and response are in place.</p> <p>The proportion of laboratory-confirmed measles cases (excluding epidemiologically linked cases) was 93% but viral detection decreased from 85% in 2017 to 64% in 2018; 47/73 outbreaks and 213 (39%) sporadic cases were genotyped (B3 and D8).</p> <p>Discarded cases are not notifiable; however, discarded cases are tracked by laboratories in 12 of 16 territories. The discard rate from these laboratories was 9/100 000.</p> <p>Assessment of the nationwide status of rubella elimination is limited due to incomplete data. No genotype data on rubella cases were available.</p>
Population immunity	Coverage with MCV1 among 24-month-olds was 95.6% and coverage with MCV2 was 73.9% with considerable heterogeneity at the district level. None of 16 territories had MCV2 >90%. Seroprevalence data suggest 70-95% measles immunity for asylum seekers and refugees.
Supplementary information	<p>Discussions are ongoing to improve tracking of cases and to enable documentation of discarded cases.</p> <p>Media campaigns have been undertaken to increase vaccine demand.</p> <p>Health authorities ensure that vaccinations are offered to asylum seekers and refugees early upon arrival.</p>
Specific comments to country	<p>The RVC commends Germany and the NVC on the high-quality report provided. The RVC also urges implementation of WHO strategies and recommendations in continued efforts to improve immunization coverage, especially by increasing routine coverage with MRCV2, assessing measles immunity in adults, and conducting targeted immunization activities to fill immunity gaps, especially among the at-risk adult population.</p> <p>The RVC remains concerned by the proportion of non-genotyped chains of transmission (26) and the high number of sporadic cases (140). The RVC believes that more efforts are required to improve case and outbreak investigations allowing a better understanding of chains of transmission. The rate of laboratory confirmation of rubella cases is low, indicating that more efforts to test suspected rubella cases and genotyping are needed.</p>
RVC conclusion for 2018	Measles endemic. Rubella endemic.

Italy

Component	RVC comment
RVC conclusion for 2017	Measles endemic. Rubella endemic.
Epidemiology	<p>Reported measles incidence was 43.3/million with 2682 cases, 61 of which were classified as imported.</p> <p>Incidence was highest in children under 1 year of age, but the majority of cases was among adults ≥ 20 years of age (68% of total cases). Most cases were unimmunized. Eight deaths were reported. Twenty out of 21 regions were affected, but 79% of cases were in 5 regions and most cases (48%) were in Sicilia. A total of 231 outbreaks was reported, and various lineages of D8 and B3 were detected in 166 outbreaks (72% of all), indicating different chains of transmission. Various D8 and B3 viruses were detected in 40% of sporadic cases. Rubella incidence was 0.3/million with 21 sporadic rubella cases reported and one classified as imported. No rubella genotyping was conducted.</p> <p>One imported CRS case was reported.</p>
Surveillance performance	<p>Timeliness and completeness of reporting were 100%. However, surveillance sensitivity was suboptimal, with rates of discarded measles and rubella cases being 0.4/100 000 and 0.04/100 000, respectively.</p> <p>All measles tests were performed in WHO-accredited and proficient labs of the Italian National Laboratory Network MoRoNet. However only 28% of rubella tests were performed in WHO-accredited and proficient labs.</p> <p>Genotyping was conducted in 72% of measles outbreaks. The main variants detected were B3-Dublin, B3-Saint Denis, B3-Ljubljana, B3-no named strain, D8-Gir Somnat, D8-Cambridge, D8-Herborn, D8-Samut Sakhon. Sporadic cases included D8-Victoria, and other D8 and B3 strains.</p>
Population immunity	<p>Reported coverage with MCV1/RCV1 was 93.22% and 93.21%, respectively; it was further increased with catch up activities. Coverage among children 36 months of age was 95.19% and 95.16%, respectively. MCV2/RCV2 coverage was 89.20% and 89.07%, respectively. Reported data coverage has increased since 2016. In 8 regions, coverage with the second dose of vaccines was $< 90\%$.</p>
Supplementary information	<p>There were modifications in the 2017 legal regulations concerning immunization, such that the requirement of 10 mandatory vaccinations for school entry was relaxed by the introduction of a “flexible obligation” in 2018.</p>
Specific comments to country	<p>The RVC thanks the NVC for a comprehensive ASU and commends the country on its continuous efforts made towards measles and rubella elimination. The RVC urges further steps in implementing WHO strategies and recommendations for achieving and maintaining high vaccination coverage with both MRCV doses at all administrative levels. The RVC also urges strengthening of the surveillance sensitivity of both measles and rubella, particularly by laboratory confirmation and genotyping of rubella cases.</p>
RVC conclusion for 2018	Measles endemic. Rubella endemic.

Kyrgyzstan

Component	RVC comment
RVC conclusion for 2017	Measles interrupted 24 months. Rubella interrupted 24 months.
Epidemiology	<p>Measles incidence was 157.6/million with 1007 cases, of which 6 cases were classified as imported. Transmission of measles B3-Dublin virus started in November 2017 and continued in 2018 and 2019 with 8 different chains of transmission in 2018. Five were genotyped and the same genotype lineage B3-Dublin was detected in samples collected in February, July and December 2018.</p> <p>Rubella incidence was 1.25/million with 8 sporadic lab-confirmed rubella cases reported. No genotype data were provided.</p> <p>Zero CRS cases were reported.</p>
Surveillance performance	Most of reported surveillance performance indicators met or exceeded targets. The rate of discarded measles cases was 12.7/100 000 and the rate of discarded rubella cases was 28.3/100 000. The timeliness of case investigation and measles rate of detection (genotyping) are low.
Population immunity	Reported MRCV1 coverage was 96.2% and MRCV2 was 96.0%. One province (Batken) reported below-average coverage (92.4% and 89.2%). Selective catch-up vaccination in Bishkek City and Chu Oblast was provided to 1463 children, 2-5 years of age.
Supplementary information	Measles transmission has continued in 2019. Nosocomial transmission was recognized as a major challenge during outbreaks in recent years. Unvaccinated infants were exposed in health institutions that were not implementing infection control measures (individuals hospitalized in Bishkek have spread measles to previously unaffected hospitals/territories of Jalal-Abad and Osh oblasts).
Specific comments to country	The RVC concluded that interruption of endemic measles transmission was not sustained in 2018 as a chain of transmission continued for a period longer than 12 months. The RVC is greatly concerned over the ongoing measles outbreak, particularly as it appears to be associated with hospital-acquired transmission. The RVC urges national health authorities to implement WHO strategies and recommendations for outbreak response and to identify susceptible individuals that could be reached by existing routine national immunization programme for MRCV in line with the existing calendar. The RVC also urges improved SIAs that will have a high coverage at all administrative levels and especially among high-risk groups; improved surveillance quality by increasing representative number of specimens sent for measles genotyping (from chains of transmission as well as from all sporadic cases); genotyping of rubella cases and activities that will decrease measles transmission in health care settings (e.g. fully vaccinated HCWs should be trained on measles and rubella diagnostics, surveillance and infection control).
RVC conclusion for 2018	Measles endemic. Rubella eliminated.

Poland

Component	RVC comment
RVC conclusion for 2017	Measles interrupted 24 months. Rubella endemic.
Epidemiology	<p>Measles incidence was 7.2/million with 355 cases reported, 79 of which were classified as imported.</p> <p>The majority of cases (52%) was adults ≥ 30 years of age who were either unvaccinated or of unknown vaccination status. There were 272 sporadic cases and 19 outbreaks, of which 12 resulted from importation of D8 measles strains.</p> <p>Rubella incidence was 11.4/million with 438 clinical rubella cases, but only three were laboratory confirmed. No rubella genotyping was conducted.</p> <p>Zero CRS cases were reported.</p>
Surveillance performance	Case-based measles surveillance with suspected cases reported by physicians and confirmed by laboratories is in place. A similar system is planned for rubella but is not yet operational. Surveillance indicators for measles were adequate. Rubella surveillance is based only on clinically confirmed cases.
Population immunity	Coverage with MRCV1 and MRCV2 among 3-year-old children was 92.9% and 92.4%, respectively. Coverage was lower in the Roma population, and was unknown for migrants.
Supplementary information	A new communicable disease electronic reporting system will be introduced in 2019 and is expected to be operational by autumn 2020. Work on a national plan of action for the verification of rubella elimination was initiated in early 2019.
Specific comments to country	<p>The RVC commends the country for sustaining the quality of measles surveillance in 2018. However, in view of the increased number of measles cases and incomplete information regarding measles chains of transmission and sporadic cases, the RVC cannot conclude that there was no measles transmission lasting 12 months or longer.</p> <p>As has been recommended by the RVC in previous years, elimination-standard rubella surveillance with laboratory confirmation and genotyping of cases, also needs to be established.</p> <p>More efforts should be made to identify immunity gaps among adults and high-risk groups and immunize them.</p>
RVC conclusion for 2018	Measles endemic. Rubella endemic.

Romania

Component	RVC comment
RVC conclusion for 2017	Measles endemic. Rubella endemic.
Epidemiology	<p>Measles incidence was 327/million with 6,407 confirmed measles cases. The majority (56%) of cases was among children 1-14 years of age, and 85% of all cases were not immunized</p> <p>Rubella incidence was 0.45/million with nine confirmed cases. The majority of cases were under five years of age, and six cases were not immunized</p> <p>Ten clinically compatible cases of CRS as per European Union case definition were reported.</p>
Surveillance performance	Surveillance indicators were high, with 86% of testing conducted in accredited laboratories. Genotype information showed different B3 lineages and D8-Herborn.
Population immunity	Coverage with MRCV1 was 89.6% and with MRCV2 was 80.9%.
Supplementary information	<p>Many activities were conducted in response to the measles outbreak, including the mobilization of health mediators (who identified and mobilized the vaccination of children not registered with a general practitioner), enhanced communications, HCW trainings, a mass media campaign, participating in European Immunization Week, conducting studies and publishing papers on rubella/CRS.</p> <p>Some legal and technical documents on immunization policy and practice are still pending official approval.</p>
Specific comments to country	<p>The RVC commends the national health authorities for their efforts to implement programmatic changes and introduce new regulations. The RVC also noted the support provided by WHO and partners (UNICEF, US CDC) to promote the immunization programme.</p> <p>The RVC commends the introduction of the “zero” dose measles policy (given to children age 9-12 months and followed with 2 doses MRCV in second year of life and at 5/7 years of age as per routine immunization calendar) as an outbreak response measure. The RVC also acknowledges the improvement in surveillance achieved through weekly and zero cases reporting from districts.</p> <p>The suboptimal MRCV coverage and immunity gaps remain of great concern. The RVC urges national health authorities to maintain technical cooperation with WHO and consider a more comprehensive response to the measles outbreak, followed with SIAs to close the population immunity gaps nationwide. Specimens from confirmed rubella cases should be collected and genotyped.</p>
RVC conclusion for 2018	Measles endemic. Rubella endemic.

Russian Federation

Component	RVC comment
RVC conclusion for 2017	Measles endemic. Rubella eliminated.
Epidemiology	<p>Measles incidence was 17.3/million with 2539 reported cases, 102 of which were classified as imported. Ninety-four percent of cases (n=2398) were laboratory confirmed. A total of 132 outbreaks were reported, involving 1289 cases. Thirty-five percent of cases were children <5 years of age, and 42% of cases were adults ≥20 years of age. Most cases were reported from Moscow city (926), Moscow region (400) and Republic of Dagestan (273). Seventy-six chains and 135 sporadic cases were linked to measles virus. The B3 and D8 variants were identified. Measles cases were reported during a period ≥12 months.</p> <p>Rubella incidence was 0.03/million with five laboratory-confirmed cases reported. The 2B genotype was identified in an outbreak of two cases.</p> <p>No CRS cases were reported.</p>
Surveillance performance	<p>All but one reported surveillance performance indicator met or exceeded targets. The rate of discarded cases was 3.5/100 000 for measles and 4.3/100 000 for rubella. High-quality laboratory data were provided. The rate of viral detection was 57.6% (76/132).</p> <p>There was continuous reporting from 2016 through 2019 of the D8-Frankfurt Main genotype. There was continuous reporting from June 2017 through 2019 of the B3-Dublin genotype.</p>
Population immunity	<p>Reported MCV1/RCV1 coverage was 97.1% and 97.0%, respectively, and MCV2/RCV2 coverage was 97.02% and 96.92%, respectively. Immunity gaps remain in Nenetski Autonomous Oblast with 438 000 population (MRCV1 - 85.7%), in Kurgan Oblast with 858 000 population (MRCV1 – 88.8%), among migrants (87.6%) and persons of other high-risk population groups (68.2-79.3%).</p> <p>SIAs were conducted for unvaccinated children (approximately 100 000 reached) and adults (approximately 199 000 reached). Highest coverage (93-96%) was in adults 18-55 years of age.</p>
Supplementary information	None provided.
Specific comments to country	The RVC commends the NVC for providing a high-quality ASU, which included comprehensive analysis and detailed laboratory information. The RVC commends the NVC and national health authorities on sustaining rubella elimination. The RVC urges national authorities to implement WHO strategies and recommendations to address measles immunity gaps and immunization programme challenges.
RVC conclusion for 2018	Measles endemic. Rubella eliminated.

Serbia

Component	RVC comment
RVC conclusion for 2017	Measles endemic. Rubella endemic.
Epidemiology	Reported measles incidence was 702.8/million with 5076 cases, two of which were classified as imported. The majority (53.8%) of cases were of unknown immunization status and 1472 were not immunized; 67.1% of cases were ≥ 20 years of age. There were five cases of rubella reported and no confirmed CRS cases.
Surveillance performance	Measles, rubella and CRS are notifiable in Serbia, but information about surveillance procedures was incomplete in the ASU. It is highly possible that not all available information from routine epidemiological and laboratory activities were systematically included in this report. Most cases were tested by proficient laboratories. The B3 genotype (different lineages) was linked to the outbreaks, and two different D8 importations were detected in July and December 2018.
Population immunity	Vaccination coverage improved following the outbreak which started in 2017. Coverage with MRCV1 was 93.4%. Coverage with MRCV2 was 91.6%. There were eight territories with coverage <90% for MRCV1 and seven with coverage <90% for MRCV2. Immunization services were provided to migrants.
Supplementary information	Outbreak response included conducting a catch-up campaign. Immunization is mandatory and implementation of the law was strengthened during the outbreak. Demand for immunization increased due to reported deaths caused by measles.
Specific comments to country	The RVC commends Serbia on its efforts to control measles outbreaks and expand genotyping of confirmed cases. As there is continuous measles and rubella transmission, the RVC reiterates the need to include line-lists of suspected, confirmed and discarded cases linked with the results of laboratory investigation. The RVC urges national authorities to implement WHO strategies and recommendations to strengthen surveillance, and to include analysis of measles chains of transmission and genotyping of rubella cases in reports. As per WHO guidelines, immunization coverage should reach and be maintained at >95% with both doses of MRCV among all age groups at national and sub-national levels and SIAs should be considered to reach all susceptibles, close immunity gaps and prevent outbreaks. The RVC requests that the NVC strengthen cooperation with its secretariat and improve the quality and completeness of data in future ASUs. Data presented in the report should be checked for consistency of calculations. The RVC and WHO Secretariat are ready to provide support for these activities.
RVC conclusion for 2018	Measles endemic. Rubella endemic.

Turkey

Component	RVC comment
RVC conclusion for 2017	Measles interrupted 24 months. Rubella endemic.
Epidemiology	Reported measles incidence was 7.7/million with 716 cases, of which 62 were classified as imported. Most (57.7%) of the cases were among Turkish residents and 34% of the cases were Syrian. Among the indigenous cases, 51% were children <5 years of age who were unvaccinated or with unknown vaccination status. Among the reported 28 outbreaks, 23 chains of transmission were genotyped (D8, B3). Rubella incidence was 0.3/million population with 22 sporadic cases of unknown origin. Molecular genotyping of rubella cases was not performed. No CRS cases were reported.
Surveillance performance	High-quality integrated surveillance for measles, rubella and rash and fever syndrome is confirmed by high rates of discarded cases (4.8/100 000 population for measles and 5.3/100 000 population for rubella), including 78% representativeness of discarded cases at sub-national level. Although measles genotyping data are consistently reported by the Measles Rubella National Laboratory to MeaNS, the ASU did not include sufficiently clear information about measles molecular epidemiology.
Population immunity	Reported MRCV1 coverage was 96% and MRCV2 coverage was 87%. Low coverage with the second dose was due to outbreak response activities (mop-up and speed-up) during 2013–2017, when 2 123 649 children 40-66 months of age were vaccinated. Those children were not vaccinated again at school entry. Nine sub-national territories reported coverage <90% for MRCV1 and one region reported MRCV1 <80%; 41 sub-national territories reported coverage <90% for MRCV2 and 16 regions reported coverage <80%. High-risk population groups include refugees and migrants from Syria, Iraq and Afghanistan. SIAs are ongoing as a catch-up for refugees and migrants nationwide.
Supplementary information	A well-functioning national network of accredited sub-national laboratories is in place. Re-scheduling of MCV2 (to be administered by family practitioners) is under discussion. Vaccines for refugees and migrants are provided free of charge.
Specific comments to country	The RVC commends Turkey on its immunization programme activities, especially in the provision of immunization services to refugees, and on the high-quality of measles laboratory surveillance. However, the RVC concludes that both measles and rubella are still endemic diseases in Turkey. Agreeing with the NVC statement on measles endemicity in 2018, the RVC stressed that inconsistent or missing data, related to mobile non-Turkish populations, could bias analysis of continuous measles transmission duration. In order to achieve measles and rubella elimination, the RVC urges full implementation of relevant WHO strategies and recommendations. WHO is ready to provide technical assistance and the RVC to support the NVC.
RVC conclusion for 2018	Measles endemic. Rubella endemic.

Ukraine

Component	RVC comment
RVC conclusion for 2017	Measles endemic. Rubella endemic.
Epidemiology	<p>There was a dramatic increase in measles incidence in 2018 (1254.3/million) compared to previous years due to a nationwide outbreak with 53 219 confirmed measles cases. The highest incidence was among infants <1 year of age, who constituted only 5% of all cases. Sixty-three percent of cases were among children <15 years of age. The majority of cases were unvaccinated. There were 16 deaths. A total of 929 outbreaks with 9958 cases were reported.</p> <p>Reported rubella incidence was 5.5/million, with 235 endemic cases in 19 regions. Fifty-nine percent of cases were among individuals ≤17 years of age. There were only 23 laboratory-confirmed cases. Most cases were clinically compatible.</p> <p>No CRS cases were reported.</p>
Surveillance performance	<p>Surveillance sensitivity for measles increased (rate of discarded cases: 9.38/100 000) but remained low for rubella (0.38/100 000). Laboratory testing was performed in proficient laboratories.</p> <p>Thirteen of the outbreaks were genotyped, resulting in a measles viral detection rate of 1.4%. Out of the total 43 261 sporadic cases, 70 were genotyped. D8-Cambridge, D8-Gir Somnath, B3-Kabul, B3-Dublin, as well as other B3 and D8 variants, were reported through MeaNS.</p> <p>There were no data on rubella genotyping. The number of suspected cases was inconsistent between the general part of the report and the laboratory testing table.</p>
Population immunity	<p>Reported MRCV1 was 91.0% and MRCV2 coverage was 89.5%, which is lower than what was reported in 2017. Coverage with MRCV1 was <90% in eight regions and MRCV2 coverage was <90% in nine regions. Serosurvey data indicate an average positivity rate of 82.8%.</p> <p>SIA with MMR vaccine included: targeting unvaccinated and partially vaccinated children, outbreak response vaccination targeting adult contacts of cases and high-risk groups, and organized groups of the population 6-18 years of age in Lvov Region.</p>
Supplementary information	<p>Ukraine accounted for over 64% of the 82 596 measles cases in the Region in 2018. The outbreak started in 2017 and continued into 2019. Western oblasts of Ukraine were most affected. The Ministry of Health issued orders to expand supplemental measles immunization, including expanding eligibility to include children of a wider age range and adults at high professional risk.</p>
Specific comments to country	<p>The RVC commends the country on its efforts to increase population immunity and control the measles outbreak but is concerned to see that the routine immunization coverage is still suboptimal, and that the measles outbreak is ongoing. The RVC urges implementation of WHO recommendations to stop the outbreak, improve surveillance and detection of contacts and susceptible individuals, and to expand outbreak response immunization and SIAs, as well as to achieve and maintain high routine vaccination coverage of both MRCV doses at all administrative levels. Rubella surveillance sensitivity and genotyping also need to be strengthened and better documented in future ASUs.</p>
RVC conclusion for 2018	Measles endemic. Rubella endemic.

- d) Countries with re-established endemic transmission of measles, rubella or both diseases in 2018 (in alphabetical order)

Albania

Component	RVC comment
RVC conclusion for 2017	Measles eliminated. Rubella eliminated.
Epidemiology	Measles incidence was 517.1/million with 1469 confirmed cases, of which 21 were classified as imported. Measles transmission took place after several importations. Most cases were in Tirana and Kukes. The highest number of cases were among infants <1 year of age and adults ≥ 20 years of age. The majority (71.5%) of cases were unvaccinated or of unknown vaccination status. Data analysis indicated that many measles cases were exposed to the virus in health care settings (hospitals). No confirmed rubella and CRS cases were reported.
Surveillance performance	High-quality surveillance with syndromic rash and fever surveillance and case-based measles and rubella surveillance are in place. Negative sera of suspected cases were tested for the other disease. Two chains of transmission of B3-Dublin MV (including one circulating for >12 months) and one B3-Ljubljana were detected.
Population immunity	Immunization coverage with MRCV1 was 94.1% and coverage with MRCV2 was 96.3%. The population born before 1990 only received one dose of MCV.
Supplementary information	There is a reported tendency among parents to postpone or refuse measles vaccination for their children, resulting in decreased MCRV1 coverage among the youngest cohorts. For example, MRCV1 coverage was 88.1% in Tirana. It is unknown how many people delay or refuse vaccination for religious or philosophical reasons. Conducted immunization activities included: outbreak response immunization of susceptible contacts (10 573 children and adults) and catch up MRCV immunization targeting children missed in previous years (12 816), people born between 1980 and 1990 (36 772 adults) and unvaccinated individuals in the Roma community (1501).
Specific comments to country	The RVC commends the country for its efforts in outbreak response and for maintaining high immunization coverage. However, as the NVC concluded, there is evidence of continuous measles transmission for a period longer than 12 months. Therefore, measles transmission has been re-established in Albania. The RVC urges the national health authorities to implement WHO strategies and recommendations to control the outbreak, close immunity gaps in the adult population, maintain routine immunization coverage with both MRCV doses >95% and strengthen measures for infection control in health care settings. Efforts should be made also to periodically collect specimens for genotyping, at least every 2 months.
RVC conclusion for 2018	Measles re-established. Rubella eliminated.

Czech Republic

Component	RVC comment
RVC conclusion for 2017	Measles eliminated. Rubella eliminated.
Epidemiology	Reported measles incidence was 19.49/million with 207 cases, of which 45 were classified as imported. Excluding imported cases, the majority (75%) of not imported cases occurred among adults ≥ 20 years of age and were unimmunized. A measles outbreak with 102 cases was reported in Prague, with the index case imported from Ukraine, with genotype D8-Cambridge virus. Some sporadic cases of the same lineage as in the outbreak were reported, as well as genotypes B3 and another D8 variant in 13 sporadic cases. Measles transmission is continuing in 2019. Two sporadic rubella cases were reported and no CRS cases.
Surveillance performance	The ASU contained incorrect calculations and presentation of surveillance indicators, including the rate of discarded cases. Surveillance sensitivity was in fact adequate. When calculations were corrected, the rate of discarded cases for measles and rubella was 2.3 and 1.7 per 100 000 population, respectively.
Population immunity	Coverage with MRCV1 was 97.0% and with MRCV2 was 83.6% and in Prague coverage with MRCV2 was only 71.3%. National coverage with MRCV2 declined compared with 2017. Starting in 2018 MRCV2 has been given at 5 years of age. Outbreak response immunization was conducted, but no details were provided in the ASU.
Supplementary information	None reported.
Specific comments to country	The RVC concurs with the NVC's conclusion of re-established measles transmission. The RVC urges national health authorities to implement WHO strategies and recommendations to increase and maintain high routine vaccination coverage, especially with MRCV2, at all administrative levels and to close immunity gaps in the adult population. Immunization monitoring and identification of pockets of suboptimal coverage for targeted SIAs may be considered as a useful strategy for urgently closing immunity gaps and improving routine immunization coverage. Surveillance performance and sensitivity need to be further strengthened and better documented in future ASUs, including the inclusion of MeaNS distinct sequence IDs of all reported variants.
RVC conclusion for 2018	Measles re-established. Rubella eliminated.

Greece

Component	RVC comment
RVC conclusion for 2017	Measles eliminated. Rubella eliminated.
Epidemiology	<p>Measles incidence was 213/million with 2291 confirmed cases, of which three cases were classified as imported. Among confirmed cases, 78.5% were unimmunized, and 48.4% were children 1-14 years of age. It is possible that there were multiple importations of measles. The main outbreak started in May 2017, and all 13 regions of Greece continued reporting cases in 2018. The index case was among Roma individuals of Romanian nationality who visited Greece. Two separate groups of susceptibles were recognized: the adult Greek population and the young ethnic minority population (Roma) of Greece and from other countries.</p> <p>Zero cases of rubella and CRS were reported.</p>
Surveillance performance	<p>High-quality measles surveillance was in place. The rate of laboratory investigations was adequate. Genotype B3 MVs/Ljubljana /27.17 and an unnamed B3 virus were detected.</p> <p>Data for rubella surveillance should be better presented to allow proper assessment</p>
Population immunity	According to data from an immunization coverage survey conducted in 2012 and 2013, coverage with MRCV1 was 93%, and coverage with MRCV2 was 83%.
Supplementary information	<p>Immunization of children is free of charge regardless of health insurance type. An MRVC catch-up campaign was conducted among migrants, refugees and Roma children and young adults in 2018.</p> <p>Surveillance reports and vaccine advocacy information are regularly updated on the public health institute web page, to sensitize medical staff and the public.</p>
Specific comments to country	The RVC concurs with the NVC's conclusion of re-established measles transmission, as the outbreak lasted longer than 12 months during 2017 and 2018. The RVC commends the current outbreak response activities and urges the national health authorities to implement WHO strategies and recommendations to increase routine immunization coverage and close immunity gaps among adults. The RVC also urges the creation of an immunization coverage monitoring system that will provide timely, reliable and representative data on immunization coverage and allow authorities to take adequate interventions among sub-optimally immunized communities. The RVC commends the country for providing data on immunization and surveillance among migrants and refugees.
RVC conclusion for 2018	Measles re-established. Rubella eliminated.

United Kingdom of Great Britain and Northern Ireland

Component	RVC comment
RVC conclusion for 2017	Measles eliminated. Rubella eliminated.
Epidemiology	<p>Reported measles incidence was 17.1/million with 1250 cases, of which 120 cases were classified as imported. Eighty-seven percent of not imported cases were either unvaccinated or of unknown vaccination status. All age groups were affected. One hundred and seven cases were classified as clinically compatible. Multiple importations of B3 and D8 measles strains were documented. Several chains of transmissions of distinguished genotype lineages were also detected. However, there were also outbreaks in which the index case lacked a history of travel or foreign visitors, and a further 91 sporadic cases were not genotyped. Nosocomial transmission among non-immune HCWs was reported.</p> <p>There were three reported cases of rubella (imported and import related, genotype 2B). There were no CRS cases, but one congenital rubella infection (CRI) case was reported.</p>
Surveillance performance	High-quality measles and rubella surveillance, including the laboratory segment, was in place. Quality of surveillance differed between territories and some indicators were suboptimal.
Population immunity	Immunization coverage among 5-years-olds was reported to be 95.2% for MRCV1 and 87.8% for MRCV2. MRCV2 coverage in London was <80%. Five other territories of significant population size had MRCV2 coverage <90%. The presence of vaccine hesitancy among the Orthodox Jewish community, migrants, Roma, Travellers and anthroposophic groups is recognized.
Supplementary information	Comprehensive maps and graphs illustrating the distribution of measles cases by genotype, time and place, with a full analysis of measles epidemiology were provided. The United Kingdom Measles and rubella elimination strategy 2019 was published in January 2019. Among other action points, the strategy document encourages general practitioners to focus on and advocate for raising vaccination coverage.
Specific comments to country	<p>The RVC concluded that rubella elimination was sustained in the United Kingdom of Great Britain and Northern Ireland in 2018. However, the RVC notes that measles transmission occurred throughout the country during 2017 and 2018. The RVC recognizes that while many chains of measles transmission were associated with importation, others were not and therefore must be considered endemic in origin. Also, a significant number of ungenotyped sporadic cases was reported, leaving the RVC unable to determine whether these cases were imported or related to outbreaks. As a result, the RVC considered that insufficient evidence was provided to exclude ongoing transmission for >12 months. The RVC believes that some of the cases currently classified as import related should be reclassified as endemic, in the absence of further epidemiological evidence.</p> <p>The RVC is greatly concerned about the low vaccination coverage reported for Greater London and that many of the reported measles cases occurred among unvaccinated young adults and HCWs. The RVC urges the full implementation of WHO strategies and recommendations to achieve adequate vaccination coverage among these and other susceptible populations.</p>
RVC conclusion for 2018	Measles re-established. Rubella eliminated.

Annex 3. List of participants

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The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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