

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

**13–15 June 2018
Paris, France**



Abstract

The European Regional Verification Commission for Measles and Rubella Elimination (RVC) met for the seventh time on 13-15 June 2018 in Paris, France. Seven members of the RVC evaluated national annual status updates (ASUs) and other relevant documents for 2017 from all 53 countries. The RVC concluded that, by the end of 2017, 43 Member States provided evidence to demonstrate that endemic transmission of measles was interrupted. Of these, 37 have eliminated measles, documenting interrupted transmission for at least 36 months. Endemic rubella transmission was interrupted in 42 Member States, of which 37 have eliminated rubella. Thirty-five Member States provided evidence for the elimination of both measles and rubella.

Keywords

Immunization Programs

Disease Eradication

Measles - prevention and control

Rubella - prevention and control

Europe

Address requests about publications of the WHO Regional Office for Europe to:

Publications

WHO Regional Office for Europe

UN City, Marmorvej 51

DK-2100 Copenhagen Ø, Denmark

Alternatively, complete an online request form for documentation, health information, or for permission to quote or translate, on the Regional Office website (<http://www.euro.who.int/pubrequest>).

© World Health Organization 2018

All rights reserved. The Regional Office for Europe of the World Health Organization welcomes requests for permission to reproduce or translate its publications, in part or in full.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use. The views expressed by authors, editors, or expert groups do not necessarily represent the decisions or the stated policy of the World Health Organization.

Contents

Abbreviations.....	3
Executive summary.....	4
Background.....	6
Scope and purpose of the meeting.....	6
Introduction and opening remarks.....	7
Status of measles and rubella elimination: global and regional update.....	7
Measles and rubella elimination in France – summary of RVC discussion with the NVC Chair and representatives of the Ministry of Health and Public Health Institute.....	10
Measles and rubella elimination in Belgium – summary of RVC discussion with the NVC Chair, NVC members and Ministry of Health representatives.....	11
Review of submitted reports and updates.....	12
Conclusions and recommendations.....	13
Annex 1. Results of the RVC review of reports and documents submitted by NVCs.....	18
Annex 2. RVC conclusions on status of measles and rubella elimination in countries of the WHO European Region in 2017.....	20
Annex 3. List of participants.....	44

Abbreviations

ASU	annual status update
CRS	congenital rubella syndrome
EQA	external quality assurance
HCW	Health care worker
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
RubeNS	WHO Rubella nucleotide surveillance database
RCV	rubella-containing vaccine
RVC	European Regional Verification Commission for Measles and Rubella Elimination
SIA	supplementary immunization activity
VPI	WHO Regional Office for Europe, Vaccine-preventable Diseases and Immunization programme

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 seventh time on 13–15 June 2018 in Paris, France, 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 chairs of national verification committee for measles and rubella elimination (NVCs) and representatives of the ministries of health of France and Belgium.

The RVC concluded that, based on data for 2017:

- 43 (81%) Member States interrupted endemic measles transmission and 42 (79%) interrupted endemic rubella transmission for a period of at least 12 months;
- 37 (70%) provided evidence to demonstrate the elimination of endemic measles (interrupted transmission for at least 36 months), and 37 (70%) for the elimination of endemic rubella;
- 35 (66%) provided evidence for the elimination of both measles and rubella;
- 5 (9%) provided evidence for the interruption of measles transmission for a period of 24 months and 1 (2%) for interruption of transmission for 12 months;
- 2 (4%) provided evidence for interruption of rubella transmission for 24 months and 3 (5%) for interruption of transmission for 12 months;
- 10 (19%) were considered endemic for measles in 2017, including Germany and the Russian Federation, both of which had interrupted transmission in 2016;
- 11 (21%) were considered endemic for rubella in 2017;
- 8 (15%) were considered still endemic for both measles and rubella.

The RVC remains confident that regional progress towards measles and rubella elimination continues to be made, but noted with concern the marked increase in the incidence of measles in 2017 as compared to 2016. Based on 2018 surveillance information available to date, the RVC expressed concern about sustaining elimination achievements in several Member States where measles transmission began in the second half of 2017 and continues in 2018.

The RVC noted that in several measles outbreaks in 2017 significant proportions of cases were <1 year old or older than 15 years, 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 challenges associated with immunization of adolescents and adults, the RVC reminds countries to identify needs and develop approaches to immunize susceptible adolescents and adults and urges implementation of the WHO recommendations for the immunization of HCWs.

Despite some improvement, the extent and quality of rubella and congenital rubella syndrome (CRS) surveillance remains suboptimal in many countries. It is possible that several countries are considered endemic for rubella due to the lack of suitable surveillance. The RVC reminds Member States of requirements for nationwide mandatory comprehensive rubella surveillance and for reliable, representative CRS case surveillance as critical for documenting elimination.

Epidemiologic and genomic sequence analyses are crucial to the verification process and countries are reminded of the requirement that specimens from all confirmed sporadic measles and rubella cases, and from representative number of outbreaks should be submitted for genomic sequencing. It is encouraging that most Member States now report their measles virus genomic sequence data to the measles nucleotide surveillance database (MeaNs), but the amount of sequence data reported to the rubella nucleotide surveillance database (RubeNs) remains low.

The RVC was in position to review ASUs and similar documentation from all 53 Member States for the first time. Some ASUs were again received after the specified deadline, but the quality of reports continues to improve in general. Information required to assess the sensitivity of surveillance systems was inadequate or lacking from several reports. The RVC and Secretariat will continue supporting NVCs and Member States that need more clarification and assistance.

Background

The RVC was established by the Regional Office in 2012 as an independent expert body with the mission to verify the elimination of measles and rubella in the 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 the Region based on reports and additional documents prepared and submitted by the NVCs. These reports include information on measles and rubella epidemiology, molecular epidemiology, the analysis of population immunity and immunization programme performance, the quality of surveillance, and changes that may have occurred since the last report, together with additional information to support the NVC's conclusion on national measles and rubella elimination status.

The RVC has stressed that face-to-face meetings with country representatives are important to provide the RVC with a broader understanding of Member States' challenges, but also for Member States to gain a better understanding of the verification requirements and process. This is particularly important for measles and rubella endemic countries. Following the satisfactory experience of conducting 6th RVC meeting in Romania, the Secretariat approached health authorities and NVCs of France and Belgium, countries with endemic transmission of both diseases, suggesting that 7th RVC meeting should be organized in France with participation of health experts and NVC representatives from both countries. National health authorities in France agreed with WHO hosting the RVC meeting in Paris, France, and experts from Belgium and France met with the RVC and Secretariat at separate bilateral meetings.

Scope and purpose of the meeting

The objectives of the 7th 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 on measles and rubella control and elimination;
- to review the NVCs' ASUs for 2017 and all other documentation that NVCs provide towards documenting the absence of measles and rubella endemic transmission in their countries;
- to define the status of transmission of measles and rubella in each Member State and in the Region in 2017;
- to declare the diseases' elimination where achieved and declare the status of measles and rubella in the European Region;

- to initiate preparation of the RVC's measles and rubella elimination status report for 2017;
- to plan verification activities in 2018-2019 and beyond, considering the role of the RVC in advocating for continuation of elimination efforts at national and regional levels;
- to provide an opportunity to selected NVCs to meet with the RVC and participate in the meeting (Belgium and France);
- to assess RVC working procedures and verification process requirements.

Introduction and opening remarks

The meeting was held on 13–15 June 2018 in Paris, France. Participants were welcomed to Paris by Dr Jérôme Salomon, Director General for Health, Ministry of Health on behalf of the Health Minister Agnès Buzyn. Dr Salomon emphasized the high level of political commitment to achieving measles and rubella elimination in France and outlined activities to improve immunization coverage as part of a revised national disease prevention strategy and reorganization of the health system. These revisions include 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 rubella by the end of 2018.

Mr Robb Butler, VPI Programme Manager welcomed participants on behalf of the WHO Regional Director and RVC chair, Dr Günter Pfaff, officially opened the meeting on behalf of the RVC. Both expressed appreciation for the opportunity to convene the meeting in Paris and thereby for the RVC to meet with representatives of France; they also thanked Belgium's health authorities and NVC for their willingness to meet with the RVC. Close dialogue between the RVC and national representatives is considered important to gain better understanding of the circumstances and challenges faced by these countries.

Rapporteur for the meeting was Dr Ray Sanders.

Status of measles and rubella elimination: global and regional update

Global update

Dr Minal Patel, WHO headquarters, informed the meeting that immunization coverage with the first dose of measles-containing vaccine (MCV1) has plateaued at 84 to 85% with 123 countries (63%) reporting MCV1 coverage of $\geq 90\%$ in 2016. Immunization coverage with the second dose of measles-containing vaccine (MCV2) has increased steadily reaching 64% in 2016. While there has been only a modest reduction in the global measles case load since 2009, there has been a dramatic 84% reduction in measles deaths since 2000. Despite this impressive reduction, it is still short of the 2015 target of a

95% reduction. Importantly, for both cases and deaths, progress has levelled off for the past 8 years. The World Health Assembly 2010 measles control targets were not met.

In 2018, 179 countries reported measles cases to WHO (as of 1 June 2018). Of 128 170 suspected cases 81 635 (64%) were classified as measles, of which 68% were clinically compatible cases. Last year at this time, 174 countries had reported 97 943 suspected cases and 59 069 cases classified as measles (58% were clinically compatible). This amounts to a 38% increase in cases in 2018 compared to 2017. Ukraine, Serbia and Italy (in order of number of cases) are among the top ten countries globally.

While global coverage with rubella-containing vaccine (RCV) remains suboptimal, the number of countries introducing RCV has continued to increase. Rubella continues to be under-reported in many countries. Globally only 67 countries (34%) have adequate surveillance sensitivity for measles and rubella as assessed by the suspected case discard rate.

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 June 2018, the number of countries verified to have eliminated or interrupted endemic transmission of measles was 85, with 108 countries considered to be endemic. One country previously verified as having eliminated endemic measles, Venezuela, has experienced an ongoing outbreak for >50 weeks and will soon be considered to have re-established transmission, which will affect measles elimination status of Americas. Seventy-four countries have been verified as having eliminated or interrupted endemic transmission of rubella, with 120 considered to remain endemic.

Development of the verification process is continuing across the regions and within the RVCs. A joint meeting of chairpersons of all RVCs was held in June 2017 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

Dr Patrick O'Connor, Accelerated Disease Control Team Lead, VPI, informed the meeting that despite regional coverage with MCV1 being maintained above 90% for more than 15 years, 2017 saw a substantial rise in the number of measles cases reported to over 21 000. More than 15 000 of these were reported by Italy, Romania and Ukraine. In 2017, 10 countries accounted for more than 93% of all measles cases reported in the Region. Of the measles cases with adequate data reported for 2017, approximately 12% were < 1 year of age and approximately 36% were 20 years of age or above. Vaccination status was known in 84% of cases and the majority of these (70%) were unvaccinated. Measles-associated mortality also increased in 2017 with 18 deaths reported in Romania, 4 in Italy, 3

in Ukraine, 2 in Greece and 1 death reported in each of 7 other countries, bringing the regional total to 34.

Reported rubella cases declined from 1326 in 2016 to 713 in 2017. As in past years, the majority of cases were reported from Poland, where all cases were classified as clinically compatible making interpretation of the true epidemiological situation difficult. There were 15 cases of CRS reported in 2017, but the different case definitions and differential diagnoses used in different countries make it difficult to comparisons between countries.

The RVC concluded at its 6th meeting, in June 2017, that 42 Member States had interrupted endemic measles transmission and 37 Member States had interrupted endemic rubella transmission by the end of 2016. Measles elimination was verified in 33 Member States in 2016, and rubella elimination verified in 33. Nine Member States remained endemic for both measles and rubella.

Discussion

Concerns were raised over the large proportion of measles cases aged <1 year, and thus ineligible to receive the first routine dose of measles vaccine in most countries in the European Region. Cases aged 20 years and above, many of whom have no history of measles vaccination, are also concerning as MRCVs are not systematically provided to susceptible adults through immunization services in most countries. WHO has recommended that during an outbreak the vaccine be given to infants from 6 months of age, but this should be counted as a zero dose, rather than the first dose. Some Member States have also temporarily decreased the age of receipt of the first dose to 9 months, in line with the measles vaccine position paper. The problem of declining maternal antibody levels and increased susceptibility of young infants to measles is currently under review by WHO. The challenges of vaccinating adolescents and young adults were also discussed, and the limited success of past attempts in some countries acknowledged. In 2012 the European Technical Advisory Group on immunization (ETAGE) reviewed the situation and concluded there was insufficient evidence of the extent to which adults contribute to sustain measles or rubella transmission. ETAGE recommended that efforts be focussed on raising and maintaining high childhood MRCV1 and MRCV2 coverage rates and that more information on the relative contribution of transmission by adults was needed before targeting them for SIAs. In light of recent experience in many Member States in the Region, the RVC encouraged the Secretariat and ETAGE to stress the importance of identifying and targeting susceptible adults.

Measles and rubella elimination in France – summary of RVC discussion with the NVC Chair and representatives of the Ministry of Health and Public Health Institute

Dr Daniel Floret, NVC Chair; Dr Denise Antona, Public Health France; Dr Odile Kremp, Ministry for Solidarity and Health

NVC activities

The NVC held two meetings in 2017 at which it was decided to press for mandatory reporting of rubella as a notifiable disease. At a meeting in February 2018 it was proposed that an update and revision be made to official documentation on the prevention of measles transmission.

Outbreak response and prevention

Detailed information of the 2017-2018 measles outbreak and approaches taken to prevent further transmission of the virus was presented, including the development of multi-sectoral coordination among different government departments and regions, and the Ministry's targeted communications strategy.

More than 2400 measles cases have been reported in the past year, from almost all parts of mainland France but with highest incidence in the west and south of the country. The main problem has been a lack of vaccination, with the highest incidence in infants <1 year of age.

All children in France born after January 2018 will have to provide a valid document confirming MMR vaccination before they can enter the education system. This requirement is still in the process of communication to all relevant bodies, and its implementation will require collaboration with local level administrations, but it is hoped that collection of documentation of vaccine coverage can begin by the end of 2018.

Surveillance

The sentinel surveillance of clinical cases of measles established in 1985 was replaced in 2005 by mandatory notification of all cases. This surveillance is supplemented by follow-up of emergency ward records. Surveillance for rubella has relied on laboratory-based screening of pregnant women for IgG completed in some cases with IgM and PCR, with quarterly reporting of laboratory results and clinical outcomes. CRS surveillance follows the same pattern. The low incidence of rubella leads to a high proportion of IgM-positive reports that are not considered as maternal infections after investigation, and the system does not provide enough information for certification of rubella elimination.

A system for the mandatory notification of rubella in the general population as well as in pregnant women was approved on 7 May 2018. Several steps are still required before the system can be fully implemented, and it is expected that there will be a period of at least two years during which the two systems will run concurrently.

Discussion

Dr Pfaff thanked the French participants on behalf of the RVC and congratulated them on the activities now in place and due to be implemented over the course of this year. While the new system for mandatory reporting of rubella represents a significant advance, the RVC expressed concerns that only laboratory-confirmed cases would be reported. This would not permit evaluation of surveillance sensitivity. It was recommended that consideration be given to collection and reporting the number of suspected rubella cases, together with the number of confirmed cases.

Measles and rubella elimination in Belgium – summary of RVC discussion with the NVC Chair, NVC members and Ministry of Health representatives

Dr Elizaveta Padalko, NVC Chair; Dr Veronik Hutse, National Reference Laboratory; Mrs (Dr) Tine Grammens, Sciensano (National Institute for Health)

Outbreak response and prevention

The national measles incidence in 2017 was 31.5 cases per million population, with 358 reported cases, but cases were not distributed evenly across the country. . Fifty-two percent of cases were ≥ 15 years of age, with a peak in the 25-29 years age group.

Coverage with a first dose of MMR is approximately 95% and coverage with the second dose (two doses) is reported to be approximately 75% in Wallonia and Brussels and 87% in Flanders. However, data from a survey among adults indicate that the second dose coverage is approximately 93.4% in Flanders and 78.0% in Brussels and Wallonia.

Vaccination is offered at registration and asylum centres, and over 10 000 doses of MMR were administered to children and adults in 2017 after verification of their vaccination status. No measles cases were reported among asylum seekers in 2017.

Measles cases have continued to be detected into 2018, with a small outbreak occurring among school children in Flanders. Genotype D8 clusters have been associated with this outbreak, while sporadic cases of genotype B3 have also been identified in Brussels and Wallonia.

Although 28 suspected rubella cases and 19 suspected CRS cases were identified in 2017, no rubella or CRS were confirmed. Samples from all suspected cases were laboratory tested and found to be negative.

Aware of the gap of 10 years between receipt of MRCV1 and MRCV2 there will be a review of the MRCV2 schedule to improve population immunity. A letter has been sent to the NITAG proposing the review and a NITAG working group for vaccination has already had its first meeting.

Surveillance

A considerable amount of work was done in documenting chains of measles transmission in 2017. However, capacity of the laboratory to conduct full testing, particularly investigation of chains of transmission, was compromised by the high workload from the outbreak. For 2018 use is being made of the WHO ASU toolkit to differentiate between sporadic and outbreak strains.

The surveillance system for rubella is a laboratory-based sentinel surveillance system. In 2018 a proactive screening scheme will be introduced to test samples from all measles cases for rubella. This scheme will exclude the testing of samples from pregnant women.

Discussion

Dr Pfaff thanked and commended the Belgian participants for their detailed and open presentation and discussion and acknowledged the challenges the NVC and the country are facing. Belgium is one of the few remaining Member States without mandatory notification of rubella cases and will need to consider future requirements to monitor for imported cases. It will be necessary to distinguish between endemic and imported cases, which would be difficult to achieve without a mandatory reporting system.

Review of submitted reports and updates

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*. 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 2017 are provided in Annex 1, together with a Regional summary of measles and rubella status for 2017. Specific comments on the conclusions for each country are provided in Annex 2. The list of participants is provided in Annex 3.

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

Conclusions and recommendations

Conclusions

The RVC concluded that based on reports submitted for 2017:

- 43 (81%) Member States interrupted endemic measles transmission and 42 (79%) interrupted endemic rubella transmission for a period of at least 12 months;
- 37 (70%) provided evidence to demonstrate the elimination of endemic measles (interrupted transmission for at least 36 months), and 37 (70%) for the elimination of endemic rubella;
- 35 (66%) provided evidence for the elimination of both measles and rubella;
- 5 (9%) provided evidence for the interruption of measles transmission for a period of 24 months and 1 (2%) for interruption of transmission for 12 months;
- 2 (4%) provided evidence for interruption of rubella transmission for 24 months and 3 (5%) for interruption of transmission for 12 months;
- 10 (19%) were considered endemic for measles in 2017, including Germany and the Russian Federation, both of which had interrupted transmission in 2016;
- 11 (21%) were considered endemic for rubella in 2017;
- 8 (15%) were considered still endemic for both measles and rubella.

The RVC remains confident that regional progress towards measles and rubella elimination continues to be made and greatly appreciates the continued support and advocacy from the Regional Director and senior staff of the Regional Office. The RVC commends the Secretariat for its efforts in supporting the NVCs and national authorities in collecting and collating the technical information provided to the RVC and for ensuring that, for the first time, ASUs or, in case of Monaco and San Marino, comprehensive equivalent documentation, were received from all 53 Member States.

The RVC greatly appreciates the opportunity provided by the Regional Office and the French Ministry of Health to conduct face-to-face meetings with representatives from France and is grateful for open and helpful responses in discussing the issues of concern. The RVC is equally grateful to health authorities and the NVC of Belgium for the bilateral meeting and for fruitful discussions on their main challenges in measles and rubella elimination.

The RVC greatly appreciates the ongoing partnerships with the European Centre for Disease Prevention and Control and the United States Centers for Disease Control and Prevention and values their participation in promoting and supporting the regional measles and rubella elimination goal.

Several ASUs were received after the deadline. Although there has been a further general improvement in the quality of reports, with some reports being of exceptionally high quality, reports from several Member States either failed to provide the requested information on the quality of surveillance indicators, or the information provided was incomplete or incorrectly calculated. In

particular, information required to assess the sensitivity of surveillance systems was inadequate or lacking from several reports.

The RVC noted that in several measles outbreaks in 2017 significant proportions of cases were less than 1 year old (not covered with national routine immunization programme schedule) or older than 15 years (mostly missed by and now overaged for the national routine immunization programme schedule). In some outbreaks >50% of confirmed cases were adolescents and adults. Many countries reported cases and outbreaks affecting HCWs. The RVC acknowledged the major challenges associated with vaccinating adolescents and adults, and noted that the European Technical Advisory Group of Experts on Immunization (ETAGE) recommended in 2014 that immunization services should focus primarily on vaccination of infants and children, but also called on countries in 2012 to identify the need for and develop approaches to immunize susceptible adolescents and adults. The RVC urged implementation of WHO recommendations regarding immunization of HCW; the WHO vaccine position paper on measles stresses that all HCWs should be immune to measles and proof/documentation of immunity or immunization should be required as a condition of enrolment into medical training and employment.

Again, the RVC stressed the need to ensure that all HCW and other relevant professionals (such as social workers and teachers) fully understand the benefits of vaccination, are offered vaccination as a matter of course and are strongly encouraged to protect themselves and consequently others against infection.

The RVC noted that in several reported measles outbreaks, between 5 and 10% of cases were recorded as having received two doses of measles-containing vaccine. Since the vaccine is not 100% effective, it would be expected that in a country with high vaccination coverage, high proportion of cases would have been vaccinated. From the data provided it is not possible to determine the extent of either primary or secondary vaccine failure, or if these cases represent reporting or recording errors. Countries with these circumstances should consider further investigations and analysis.

Despite noted improvement, the extent and quality of rubella and congenital rubella syndrome (CRS) surveillance remains suboptimal in many countries. It is possible that several countries considered endemic for rubella have, in fact, interrupted transmission but the lack of suitable surveillance capacities to provide evidence makes it impossible to assess their rubella status. While efforts to provide retrospective analysis of potential rubella cases as supplementary evidence for the absence of disease are applauded, the RVC reminds Member States that these studies are not currently acceptable as alternatives to mandatory reporting of rubella cases and nationwide rubella and CRS case surveillance.

The ability to distinguish between endemic and import-related cases and outbreaks is crucial to the verification process, and monitoring chains of virus transmission through epidemiologic and genomic

sequence analysis is essential. All Member States are reminded of the requirement that specimens from all confirmed measles and rubella sporadic cases, and from representative number of outbreak cases should be submitted for genomic sequencing. In reviewing the 2017 ASUs, the RVC relied on the measles genotyping data to determine if the evidence provided supported a conclusion that endemic transmission had been interrupted or, in the case of countries previously regarded as having interrupted transmission, that endemic transmission has not been re-established. It is encouraging that most Member States now report their measles virus genomic sequence data to the measles nucleotide surveillance database (MeaNs), but the amount of sequence data reported to the rubella nucleotide surveillance database (RubeNs) remains low.

A small number of Member States that achieved interruption or elimination of endemic measles transmission have experienced widespread outbreaks following importation of the virus in 2017. In some cases, these import-related outbreaks have lasted for many months. It has also become apparent that some Member States have been subjected to repeated importations and import-related outbreaks where individual chains of transmission may be halted within a few months, but because of repeated reintroduction of virus there is always at least one local outbreak occurring somewhere in the country. Complete epidemiological and laboratory investigation to distinguish separate chains of transmission may give inconclusive results in the context of repeated importations of viruses with same genomic sequence.

The RVC expressed concern that the existing global definition of *elimination* should be reviewed in light of these repeated import-related outbreaks. Repeated outbreaks are suggestive of sizable populations with low population immunity and suboptimal vaccination coverage. While the current definition refers to cessation of transmission of *endemic* measles, continued susceptibility to wide-scale import-related outbreaks raises questions over the relevance of such a definition. This situation stresses the importance of population immunity and the relevance of sensitivity and specificity of surveillance (integration of epidemiological and laboratory data, high-level laboratory capacities and use of global reference laboratory network for genotyping).

The RVC noted that involvement of RVC members in missions to selected countries in 2017 had been very productive in providing a significant amount of insight and additional information that aided the RVC in assessing the ASUs and supporting the decision-making process. The value of these visits to the NVCs, national authorities and the RVC should not be underestimated. It would be helpful for the RVC if a priority listing of countries to be visited could be established.

Recommendations

- To NVCs
 - NVCs, working together with national health authorities, should make every effort to provide comprehensive ASUs in advance of the submission deadline provided by the WHO Secretariat.
 - Submitted ASUs should include all requested data on surveillance performance, including the rate of discarded cases and genotype information. Where data is not available an explanation for the missing, incomplete or alternative information should be provided together with supporting documentation.
 - Information on the age distribution of measles cases together with the vaccination status of reported cases provides valuable insight into potential population immunity gaps and this data should be included in the ASU. Maps and graphs should also be included, as these facilitate the understanding of data.
 - NVCs are again urged to ensure that all available information on current vaccine coverage at national and subnational levels is provided in the ASUs. This information should include the source of data and methodology used to estimate coverage.
- To Member States
 - The RVC reiterates its reminder to national health authorities of their responsibility to ensure that adequate information and documentation on all, but especially on imported and import-related measles and rubella cases, including available epidemiological information and details on the geographical source of the importation, are provided in the ASU.
 - The RVC urges Member States to ensure high measles and rubella immunity among adolescent and adults and to implement WHO recommendations on immunization of HCWs. Countries with high number of cases among adolescents and adults are invited to analyse disease epidemiology, look for causes and interventions to prevent cases in the future and share their findings in their next ASUs.
 - The RVC urges Member States to ensure that high-quality measles and rubella surveillance, laboratory confirmation of at least 80% of suspected cases and genotyping of positive specimens is in place and is 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 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 requiring technical support from the Secretariat and targeted advocacy from the RVC to meet the regional measles and rubella elimination goals, and to share the prioritization with the RVC.
 - Recognizing the significant proportion of adolescent and adult cases reported in recent measles outbreaks, the Secretariat is urged to provide this information and RVC comments and concerns to ETAGE, for their information and discussion on the need to underline the importance of identifying and targeting susceptible adults.
 - Acknowledging the challenges associated with adult immunization programmes, the RVC requests the Secretariat to research, review and document examples of any successful strategies used to vaccinate adolescents and adults, especially of particular occupations, to close population immunity gaps. The RVC encourages the Secretariat to engage with Member States to explore and implement appropriate measures for reducing measles and rubella population susceptibility, including implementation of WHO recommendations for immunization of HCWs

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

Table 1. RVC conclusions on measles and rubella elimination status in Member States for 2017

Country	Measles elimination status, 2017	Rubella elimination status, 2017
Albania	Eliminated	Eliminated
Andorra	Eliminated	Eliminated
Armenia	Eliminated	Eliminated
Austria	Interrupted 24 months	Eliminated
Azerbaijan	Eliminated	Eliminated
Belarus	Eliminated	Eliminated
Belgium	Endemic	Endemic
Bosnia and Herzegovina	Endemic	Endemic
Bulgaria	Eliminated	Interrupted 24 months
Croatia	Eliminated	Eliminated
Cyprus	Eliminated	Eliminated
Czech Republic	Eliminated	Eliminated
Denmark	Eliminated	Endemic
Estonia	Eliminated	Eliminated
Finland	Eliminated	Eliminated
France	Endemic	Endemic
Georgia	Endemic	Interrupted 12 months
Germany	Endemic	Endemic
Greece	Eliminated	Eliminated
Hungary	Eliminated	Eliminated
Iceland	Eliminated	Eliminated
Ireland	Eliminated	Eliminated
Israel	Eliminated	Eliminated
Italy	Endemic	Endemic
Kazakhstan	Interrupted 12 months	Interrupted 12 months
Kyrgyzstan	Interrupted 24 months	Interrupted 24 months
Latvia	Eliminated	Eliminated
Lithuania	Eliminated	Eliminated
Luxembourg	Eliminated	Eliminated
Malta	Eliminated	Eliminated
Monaco	Eliminated	Eliminated
Montenegro	Eliminated	Eliminated

Netherlands	Eliminated	Eliminated
Norway	Eliminated	Eliminated
Poland	Interrupted 24 months	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	Interrupted 24 months	Interrupted 12 months
Tajikistan	Eliminated	Eliminated
The former Yugoslav Republic of Macedonia	Eliminated	Eliminated
Turkey	Interrupted 24 months	Endemic
Turkmenistan	Eliminated	Eliminated
Ukraine	Endemic	Endemic
United Kingdom of Great Britain and Northern Ireland	Eliminated	Eliminated
Uzbekistan	Eliminated	Eliminated

Table 2: Summary of Member States of the WHO European Region by measles and rubella elimination status in 2017

Country status	Measles	Rubella
Eliminated	37 (70%)	37 (70%)
Interrupted ≥ 24 months	5 (9%)	2 (4%)
Interrupted ≥ 12 months	1 (2%)	3 (5%)
Endemic	10 (19%)	11 (21%)
Total	53	53

Annex 2. RVC conclusions on status of measles and rubella elimination in countries of the WHO European Region in 2017

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

Albania Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Albania in 2017 and confirmed that measles and rubella elimination has been sustained. The RVC commends the sustained efforts by Albania in maintaining high vaccination coverage but surveillance performance and sensitivity need to be strengthened and better documented.	

Andorra Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Andorra in 2017 and confirmed that measles and rubella elimination has been sustained. RVC notes the continued increase in MRCV2 coverage and would appreciate additional activities keeping that trend.	

Armenia Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Armenia in 2017 and confirmed that measles and rubella elimination has been sustained. Greater care should be taken in the calculation and presentation of surveillance sensitivity data. The RVC strongly recommends genotyping of detected viruses and inclusion of data in future ASUs.	

Azerbaijan Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Azerbaijan in 2017 and confirmed that measles and rubella elimination has been sustained. Surveillance performance and sensitivity need to be strengthened and better documented.	

Belarus Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Belarus in 2017 and confirmed that measles and rubella elimination has been sustained.	

Croatia Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Croatia in 2017 and confirmed that measles and rubella elimination has been sustained. Nevertheless, the suboptimal MRCV1 coverage is of concern. Greater efforts are needed to increase vaccine coverage in younger age groups. Surveillance performance and sensitivity, especially for rubella, need to be strengthened and better documented, including the information on proficiency of laboratories testing for measles and rubella.	

Cyprus Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Cyprus in 2017 and confirmed that measles and rubella elimination has been sustained. Nevertheless, greater efforts are required to document current vaccination coverage levels throughout the country. Surveillance performance and sensitivity need to be strengthened and better documented. The RVC strongly recommends inclusion of measles genotyping data in future ASUs.	

Czech Republic Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Czech Republic in 2017 and confirmed that measles and rubella elimination has been sustained. Surveillance performance and sensitivity need to be strengthened and better documented. The RVC also requests that information on MRCV immunization coverage in 2017 be submitted in the following ASU.	

Estonia Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Estonia in 2017 and confirmed that measles and rubella elimination has been sustained. The RVC would appreciate more information on additional tested specimens that were not considered as suspected cases in the ASU. The RVC strongly recommends genotyping of detected viruses and inclusion of data in future ASUs.	

Finland Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Finland in 2017 and confirmed that measles and rubella elimination has been sustained. The RVC notes the high political commitment to measles elimination and the new Communicable Disease Act requiring employers to protect their health care workers.	

Greece Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Greece in 2017 and confirmed that measles and rubella elimination has been sustained. The RVC notes the NVC conclusion that measles transmission has been re-established but refers to the current definition of re-establishment as 12 months of uninterrupted transmission. Based on this definition the RVC concluded that for 2017 measles in Greece remained eliminated but, as the measles outbreak has spread throughout the country and continued into 2018, the RVC is concerned that evidence for ongoing transmission for >12 months will be forthcoming and that Greece will have re-established measles transmission in 2018. The RVC urges for activities in response to the outbreak, and is anticipating a detailed ASU for 2018.	

Hungary Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Hungary in 2017 and confirmed that measles and rubella elimination has been sustained. Surveillance performance and sensitivity need to be strengthened and better documented.	

Iceland Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Iceland in 2017 and confirmed that measles and rubella elimination has been sustained. Recognizing low incidence of imported cases, the RVC nevertheless recommends genotyping of cases and inclusion of measles genotyping data in future ASUs.	

Ireland Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of measles remained interrupted in 2017 and verified that measles has been eliminated. The RVC commends the NVC, national health authorities and public health system on this achievement. It also concluded that endemic transmission of rubella remained interrupted in 2017 and confirmed that rubella elimination has been sustained. The RVC is greatly concerned over the low vaccination coverage reported for Dublin and considers this a potential threat to maintaining elimination status. Further clarification is requested from the NVC on the status of confirmed measles cases as per currently available data on surveillance quality RVC cannot clearly determine decisions are these imported or endemic cases. The RVC would appreciate better consistency between number of suspected cases and number of reported tests.	

Israel Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Israel in 2017 and confirmed that measles and rubella elimination has been sustained. Surveillance performance and sensitivity need to be strengthened and better documented.	

Latvia Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Latvia in 2017 and confirmed that measles and rubella elimination has been sustained. Surveillance performance and sensitivity need to be strengthened and better documented.	

Lithuania Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Lithuania in 2017 and confirmed that measles and rubella elimination has been sustained. Surveillance performance and sensitivity need to be strengthened and better documented. The RVC strongly recommends inclusion of measles genotyping data in future ASUs together with all other requested information.	

Luxembourg Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Luxembourg in 2017 and confirmed that measles and rubella elimination has been sustained. The RVC notes that a large dataset of rubella and measles IgG tests between 2005 and 2015 is currently being analysed and would appreciate being informed of the final results, particularly with regard to possible immunity gaps. The RVC would appreciate additional information, clarifying why MRCV2 coverage is nearly 15% lower than MRCV1 coverage.	

Malta Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Malta in 2017 and confirmed that measles and rubella elimination has been sustained. The RVC is concerned over delayed immunization with both MRCV doses, until school age, and urges that steps be taken to increase vaccine coverage in younger children.	

Monaco Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC congratulates Monaco on providing an ASU for the first time and greatly appreciates the efforts taken. Based on received data and considering population size, the RVC concluded that endemic transmission of both measles and rubella has been interrupted in San Marino for a period of 3 years, and verified that measles and rubella have been eliminated. The RVC commends the national health authorities and public health system on this achievement.	

Montenegro Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Montenegro in 2017 and confirmed that measles and rubella elimination has been sustained. The RVC commends the recent nomination and accreditation of a National Measles and Rubella Reference Laboratory in Montenegro. However, the RVC is extremely concerned over the continuing low vaccination coverage, resulting in a dangerous accumulation of susceptible children across the country and creating a high risk for re-establishing endemic transmission. The RVC urges efforts to increase vaccination coverage and close existing immunity gaps.	

Netherlands Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Netherlands in 2017 and confirmed that measles and rubella elimination has been sustained. Surveillance performance and sensitivity need to be strengthened and better documented.	

Norway Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Norway in 2017 and confirmed that measles and rubella elimination has been sustained.	

Portugal Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Portugal in 2017 and confirmed that measles and rubella elimination has been sustained. Surveillance performance and sensitivity need to be strengthened and better documented, especially regarding laboratory investigation of suspected rubella cases.	

Republic of Moldova Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Republic of Moldova in 2017 and confirmed that measles and rubella elimination has been sustained. The RVC urges continued activities to increase and sustain high MRCV immunization	

coverage, particularly for children <24 months of age. Sensitivity of measles, rubella and CRS surveillance needs to be increased.

San Marino Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC congratulates San Marino on providing an ASU for the first time and greatly appreciates the efforts taken. Based on received data and considering population size, the RVC concluded that endemic transmission of both measles and rubella has been interrupted in San Marino for a period of 3 years, and verified that measles and rubella have been eliminated. The RVC commends the national health authorities and public health system on this achievement.	

Slovakia Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Slovakia in 2017 and confirmed that measles and rubella elimination has been sustained. Surveillance performance and sensitivity need to be strengthened and better documented.	

Slovenia Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Slovenia in 2017 and confirmed that measles and rubella elimination has been sustained. Surveillance performance and sensitivity need to be strengthened and better documented.	

Spain Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Spain in 2017 and confirmed that measles and rubella elimination has been sustained. Surveillance performance and sensitivity need to be strengthened and better documented. The RVC reminds national health authorities of the requirement to have specimens from suspected cases tested either in WHO-accredited laboratory or in laboratories with documented high proficiency.	

Sweden Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Sweden in 2017 and confirmed that measles and rubella elimination has been sustained.	

Tajikistan Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Tajikistan in 2017 and confirmed that measles and rubella elimination has been sustained. The RVC notes the large nationwide outbreak of measles from November 2016 to August 2017 and considers that effective actions were taken to halt transmission. The RVC urges health authorities for additional activities to improve the quality of routine immunization and surveillance, particularly at the sub-national level. Molecular genotyping of measles and rubella viruses from positive cases should be ensured, with collection of appropriate specimens and their shipment to the Regional Reference Laboratory for sequencing.	

The former Yugoslav Republic of Macedonia Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of measles remained interrupted in 2017 and verified that measles has been eliminated. The RVC commends the NVC, national health authorities and public health system on this achievement. It also concluded that endemic transmission of rubella remained interrupted in 2017 and confirmed that rubella elimination has been sustained. Surveillance performance and sensitivity need to be strengthened and better documented.	

Turkmenistan Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Turkmenistan in 2017 and confirmed that measles and rubella elimination has been sustained.	

United Kingdom of Great Britain and Northern Ireland Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in the United Kingdom of Great Britain and Northern Ireland in 2017 and confirmed that measles and rubella elimination has been sustained. However, the RVC notes that measles transmission has occurred throughout the country in 2017 and continued into 2018, and is concerned that evidence for ongoing transmission for >12 months will be forthcoming and that the United Kingdom will have re-established measles transmission in 2018. The RVC is greatly concerned over the low vaccination coverage reported for Greater London and the many reported measles cases are among young adults, and encourages efforts to vaccinate this and other susceptible populations.	

Uzbekistan Status of measles and rubella elimination in 2017	Measles eliminated Rubella eliminated
The RVC concluded that endemic transmission of both measles and rubella remained interrupted in Uzbekistan in 2017 and confirmed that measles and rubella elimination has been sustained. The RVC nevertheless urges consideration of additional activities to improve the quality of reporting and surveillance of measles, rubella and CRS. The RVC reiterates that molecular genotyping of measles and rubella viruses are crucial in the elimination period and should be performed if confirmed cases appear. The RVC anticipates that the national public health system will maintain high routine immunization coverage with coverage monitoring at subnational levels.	

- b) Countries that have interrupted measles and rubella transmission as of 2017 for different periods of time, but have not yet sustained interruption of both diseases for 36 months (in alphabetical order)

Austria

Component	RVC comment
RVC conclusion for 2016	Measles interrupted 12 months. Rubella interrupted 24 months.
Epidemiology	There were 95 measles cases. There were 11 outbreaks. There were 39 rubella cases, with 31 cases reported as part of two outbreaks. Zero CRS reported.
Surveillance performance	Surveillance indicators appear adequate except for suboptimal discarded case rates. Measles virus genotypes were identified in 10 of 11 outbreaks and 17 sporadic cases.
Population immunity	No sub-national coverage data available. Sub-national campaign administered 1000 MRCV doses, across all age groups.
Supplementary information	New requirements put in place at hospitals/associations for pre-employment screening for complete MRCV immunization.
Specific comments to country	The RVC commends the NVC, national health authorities and public health system on achieving rubella elimination. The RVC would appreciate to learn more about hospitals, associations, and medical schools that require pre-employment screening. The RVC also looks forward to receiving data next year using the updated model for coverage estimation and, if any serosurveys and particularly for immunity at sub-national level have been conducted, the RVC would appreciate receiving results. Health authorities may consider whether would be feasible and beneficial to conduct serosurveys to identify population immunity gaps, followed by immunization of susceptible individuals through SIAs.
RVC conclusion for 2017	Measles interrupted 24 months. Rubella eliminated.

Bulgaria

Component	RVC comment
RVC conclusion for 2016	Measles eliminated. Rubella interrupted 12 months.
Epidemiology	Measles incidence increased to 22.8/million population with 165 confirmed cases that occurred in two outbreaks between March and July. Zero rubella and CRS confirmed cases reported.
Surveillance performance	Surveillance sensitivity was suboptimal. Timeliness and completeness of reporting was incorrectly presented. Genotyping data from two measles chains of transmission were provided (100%, B3- Dublin and B3-5270 genotypes).
Population immunity	National MRCV1 coverage was 95%, and MRCV2 was 92%. However, coverage of <90% for MRCV1 or MRCV2 have been reported from 9 out of 28 administrative territories.
Supplementary information	A National Coordination Council for the management and response to the measles outbreak has been established and GPs were coordinated in outbreak control measures. As outbreak response, 9315 doses of MMR vaccine were administered to the population from 13 months to 18 years of age.
Specific comments to country	The RVC welcomes recent steps taken to improve vaccination coverage and encourages continued activities to further increase and sustain high routine vaccination coverage at all administrative levels. Surveillance performance and sensitivity need to be strengthened and better documented.
RVC conclusion for 2017	Measles eliminated. Rubella interrupted 24 months.

Kazakhstan

Component	RVC comment
RVC conclusion for 2016	Measles endemic. Rubella endemic.
Epidemiology	Incidence of reported measles was 0.1/million population with 2 imported, confirmed cases. No rubella or CRS cases were reported.
Surveillance performance	From a total of 73 measles/rubella suspected cases, 71 were discarded. Surveillance sensitivity is suboptimal with 0.3/100 000 population for both measles and rubella. Timeliness and completeness of reporting, timeliness of investigation and rates of laboratory investigations are adequate. Representativeness of reporting discarded cases is suboptimal. All sporadic measles cases were genotyped (H1-4870 and D8-2750).
Population immunity	MRCV1 coverage was 95% and MRCV2 coverage was 99%. No immunity gaps are identified.
Supplementary information	None provided.
Specific comments to country	The RVC agrees with the NVC conclusion that measles and rubella endemic transmission was interrupted in 2017, and commends the NVC, national health authorities and public health system on achieving interruption of endemic measles and rubella transmission. Surveillance quality should be improved by increasing surveillance sensitivity and the representativeness of reporting discarded cases.
RVC conclusion for 2017	Measles interrupted 12 months. Rubella interrupted 12 months.

Kyrgyzstan

Component	RVC comment
RVC conclusion for 2016	Measles interrupted 12 months. Rubella interrupted 12 months.
Epidemiology	Reported measles incidence was 0.8/million population, with 5 confirmed measles cases. Four cases in Bishkek in Nov 2017 (2 imported and 2 import-related) were genotyped. Rubella incidence was 0.6/million population with 4 sporadic laboratory-confirmed cases. No information was provided about the origin of infection. Zero CRS cases were reported.
Surveillance performance	Timeliness and completeness of reporting was 84% and the rate of laboratory investigations was 100%. The rate of discarded measles and rubella cases was 2.4 /100 000 population. Representativeness of reporting of discarded cases was 100%. B3-Dublin measles virus was identified in unique chain of measles transmission (continuing in 2018). No rubella genotyping information was provided.
Population immunity	MRCV1 coverage was 95% and MRCV2 coverage was 96%. There were sub-national administrative units with coverage <90%. The main population at risk was 400,000 internal migrants. Catch-up vaccinations given during the European Immunization Week reached 33,565 individuals.
Supplementary information	None provided
Specific comments to country	The RVC concluded that interruption of endemic measles and rubella transmission is sustained but 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 consider and implement activities to end transmission. While the RVC concludes that for 2017 endemic measles in Kyrgyzstan had remained interrupted, it is concerned that evidence for ongoing transmission for >12 months will be forthcoming and that Kyrgyzstan will have re-established measles transmission in 2018. The RVC also notes that the quality of the ASU is sub-optimal and the report was submitted very late. The RVC looks forward to receiving a more timely and higher quality report for 2018.
RVC conclusion for 2017	Measles interrupted 24 months. Rubella interrupted 24 months.

Switzerland

Component	RVC comment
RVC conclusion for 2016	Measles interrupted 12 months. Rubella endemic.
Epidemiology	244 suspected and 105 confirmed measles cases have been reported. 85 of confirmed cases were reported in 13 outbreaks, and 91 of them (87%) were classified as endemic or of unknown origin. No chain of transmission lasted for more than 1 year. One rubella case was reported.
Surveillance performance	Rate of discarded cases for measles was 1.7/100 000, but suspected cases with negative laboratory results tend not to be reported. There is no mandatory reporting of suspected clinical rubella by physicians, though all positive laboratory tests are notifiable. Rubella PCR and genotyping will be introduced in 2018. Many performance indicators are not calculated due to the surveillance system characteristics and limitations.
Population immunity	MRCV2 coverage was 88.5% in 2-year olds and 92% in 8-year olds (2014-2016 data). Almost 80% of measles cases were unvaccinated or had unknown vaccine status. There is a plan to change the two dose routine MRCV schedule from 12 and 16-24 months to 9 and 12 months.
Supplementary information	A National Vaccination Strategy and implementation action plan has been developed. Laboratories participating in surveillance have an established quality assurance programme and are accredited by a national body. In 2017 a National Measles and Rubella Reference Laboratory was appointed and has been accredited by WHO. No information was provided on NVC activities.
Specific comments to country	The RVC commends the NVC, national health authorities and public health system on achieving interruption of endemic rubella transmission and sustaining interruption of endemic measles transmission, and welcomes accreditation of the National Measles and Rubella Reference Laboratory. A low MRCV2 coverage in many cantons is of concern. The RVC would appreciate if more comprehensive data on routine immunization coverage are included in the next ASU and commented on by the NVC. The wide age range of measles cases suggests immunity gaps across all age groups. Health authorities may consider whether would be feasible and beneficial to conduct serosurveys to identify population immunity gaps, followed by immunization of susceptible individuals through SIAs.
RVC conclusion for 2017	Measles interrupted 24 months. Rubella interrupted 12 months.

- c) Countries with endemic transmission of measles, rubella or both diseases in 2017 (in alphabetical order)

Belgium

Component	RVC comment
RVC conclusion for 2016	Measles endemic. Rubella endemic.
Epidemiology	National measles incidence was 31.6/million population (Brussels 20.1; Flanders 6.3; Wallonia 81.1). A total of 367 measles cases were reported in 8 outbreaks, the largest of which was in Wallonia with 283 reported cases. 56% of measles cases were >15 years old, with mostly unvaccinated or unknown status. Zero confirmed rubella or CRS cases reported.
Surveillance performance	Reported surveillance sensitivity for measles was 4.1/100 000. Measles genotypes B3 and D8 were identified. Two of 8 outbreaks do not have genotype information (for one of which due to low viral load); 14 of 44 sporadic cases were without genotype information. There is no comprehensive national surveillance for rubella. Some laboratory data on rubella and congenital rubella are collected by the National Reference Center.
Population immunity	MRCV1 coverage at 18-24 months of age was 96% and has remained consistent since 2014. MRCV2 coverage at 11 to 14 years, estimated from sample survey was 75% in Brussels and Wallonia (unchanged since 2012) and 87% in Flanders. Identified high-risk groups include orthodox religious and anthroposophical groups, Roma, immigrants, asylum seekers and health care workers.
Supplementary information	The results of a serosurvey conducted among adults in 2015 indicate MRCV2 coverage of 93.4% in Flanders and 78.0% in Wallonia and Brussels.
Specific comments to country	The RVC commends efforts being made by health authorities and the NVC, 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 regional elimination. The low MRCV2 coverage remains of great concern. To document interruption of endemic measles transmission, the RVC strongly recommends inclusion of genotyping data on sporadic measles cases in future ASUs.
RVC conclusion for 2017	Measles endemic. Rubella endemic.

Bosnia and Herzegovina

Component	RVC comment
RVC conclusion for 2016	Measles endemic. Rubella endemic.
Epidemiology	18 measles cases were reported including 1 laboratory-confirmed case. Cases occurred in all age groups with 6 cases >30 years of age. 4 rubella cases were reported.
Surveillance performance	Surveillance performance indicators continue to be below requirements with low discard rates for both measles and rubella. No transmission chains were identified and no genotyping data were available.
Population immunity	Population immunity remains low, as it has been for several years.
Supplementary information	None provided.
Specific comments to country	The RVC recognizes the complex circumstances in the country and commends the continued efforts to put in place strategies to improve measles and rubella coverage and surveillance. The RVC remains concerned over the size of the susceptible population in the country and urges actions to be taken to increase measles and rubella immunization coverage in all population groups in the country. If SIAs are considered they should be carefully planned and synchronized in all entities and administrative territories. Strengthened surveillance should increase detection of suspected cases and rate of laboratory investigation, including genotyping, conducted by WHO-accredited laboratories or in laboratories of known, documented proficiency.
RVC conclusion for 2017	Measles endemic. Rubella endemic.

Denmark

Component	RVC comment
RVC conclusion for 2016	Measles eliminated. Rubella endemic.
Epidemiology	Four laboratory-confirmed measles cases were reported, 2 classified as imported and 2 as import-related based on genotyping. All 4 cases occurred in adults, 3 of whom had no history of vaccination. Zero rubella cases reported (pending retrospective search and report).
Surveillance performance	The measles case discard rate (0.99/100 000) is low. Rubella surveillance is under development. The report presented retrospective studies of 3 inventories. A study of 2014-2017 data identified 7 suspected rubella cases that were considered to be sporadic, but health authorities are not legally allowed to follow up and confirm suspected rubella cases. Timeliness at 74% approaches but does not reach the 80% target.
Population immunity	MRCV1 coverage was 94% and MRCV2 was 88%. There are 4 subnational administrative areas with MRCV1 coverage <90% and 5 territories for suboptimal MRCV2 coverage.
Supplementary information	The notification system for suspected measles cases is being revised by the Danish Health Authority to establish legal requirements to include obligatory notification by phone, planned for 2018. A vaccination reminder system appears to have had a positive impact. Effective from April 2018, the government has funded a campaign to vaccinate non-immune adults. Denmark now does PCR rubella tests on all specimens from measles suspected cases. There is no national rubella surveillance covering total population of all ages, but the topic will be open for Parliamentary discussion later in 2018.
Specific comments to country	The RVC continues to call for the implementation of WHO resolutions and guidelines recommending establishment of national rubella and CRS surveillance. The RVC would also appreciate if information on samples submitted for measles PCR testing would include specific information on clinical suspicion. In the absence of this information such cases should not be discarded.
RVC conclusion for 2017	Measles eliminated. Rubella endemic.

France

Component	RVC comment
RVC conclusion for 2016	Measles endemic. Rubella endemic.
Epidemiology	The reported measles incidence was 7.3/million population, with 519 confirmed cases and nationwide transmission affecting mostly unvaccinated individuals of all ages. Surveillance for rubella in pregnant women reported 7 confirmed cases, and 4 were classified as imported. Two confirmed imported CRS cases were reported
Surveillance performance	Information on surveillance sensitivity was not provided. Measles genotypes B3 and D8 were identified; 100% of chains of transmission were with genotype data but many sporadic cases don't have this information. There is no rubella surveillance, with only serology results available from antenatal attenders.
Population immunity	Immunization coverage data for 2017 were not available. In 2016, coverage was estimated by survey to be 90% for MRCV1 and 80% for MRCV2 among 2-year-olds. Three of 18 subnational administrative units reported both MRCV1 and MRCV2 coverage of <90%. Eight of 18 subnational administrative units reported MRCV2 coverage <90% but no high-risk groups were identified.
Supplementary information	Rubella is not a notifiable disease in France but will become so from 2019.
Specific comments to country	RVC commends introduction of mandatory school vaccination for 11 antigens from 2018 and the decision to initiate mandatory notification of rubella from 2019. RVC requests details on the implementation of case-based measles and rubella surveillance, to make it possible for the RVC to monitor standard surveillance indicators, especially sensitivity.
RVC conclusion for 2017	Measles endemic. Rubella endemic.

Georgia

Component	RVC comment
RVC conclusion for 2016	Measles endemic. Rubella endemic.
Epidemiology	Measles incidence was 25.3/million population with 94 confirmed cases. Forty percent of reported cases had no history of vaccination against measles. Cases were evenly spread across age groups. 92% of cases are reported in 6 outbreaks. Rubella incidence was 1.3/million population, with 5 cases reported, and only 1 was laboratory-confirmed. Zero CRS cases were reported.
Surveillance performance	Surveillance sensitivity was suboptimal with a rate of discarded cases 1.39/100 000 for measles and 1.64/100 000 for rubella. Only 20% of rubella cases were lab-confirmed. Measles genotype D8-5165 was identified, a strain closely related to strains that circulated in Georgia in 2013-2014. No rubella genotyping reported.
Population immunity	MRCV1 coverage was 93% and MRCV2 coverage was 85%. Twenty-eight territories reported coverage of <90%. Mopping-up SIA was conducted throughout the year with low coverage.
Supplementary information	Rubella surveillance data are indicating lack of endemic rubella transmission in Georgia during 2017 due to small number of cases, no geographic or temporal clustering of clinically compatible cases and long intervals between laboratory-confirmed cases over the last three years. Rubella surveillance improved, with an increase in laboratory testing of suspected rubella cases over the past 2 years what is suggesting that most clinically compatible cases are not rubella.
Specific comments to country	The RVC commends the NVC, national health authorities and public health system on achieving interruption of endemic rubella transmission, and all efforts made towards measles and rubella elimination. The RVC urges further steps be taken to achieve and maintain high vaccination coverage with 2 doses of MRCV at all administrative levels and among all susceptibles. Surveillance sensitivity and measles genotyping need to be strengthened and rubella genotyping initiated.
RVC conclusion for 2017	Measles endemic. Rubella interrupted 12 months.

Germany

Component	RVC comment
RVC conclusion for 2016	Measles interrupted 12 months. Rubella endemic.
Epidemiology	<p>There were 929 reported measles cases in 2017. 74% of cases had no history of vaccination. A total of 57 outbreaks occurred, and the largest (n=321) occurred in Duisburg.</p> <p>There were 74 reported rubella cases; 55 of which were clinically compatible. 87.5% of cases were under-vaccinated (<2 doses) or had unknown vaccine status.</p> <p>Zero confirmed CRS was reported.</p>
Surveillance performance	Viral detection of measles in outbreaks (61.4%) and rate of laboratory investigations of measles cases (96%) are satisfactory. Genotype B3-4299 is accounted for 83% of all sequenced cases. A lab-based sentinel system for detecting discarded cases indicates 9/100 000. Assessment of the nationwide status of rubella elimination is limited due to incomplete data. No genotype information on rubella cases.
Population immunity	<p>In 2016, coverage with MCV1 was 97% and with MCV2 was 93%. There is large variability in district-level coverage. 2008-2011 seroprevalence data suggest 90% and 94% measles and rubella immunity respectively, among 18 to 79-year olds.</p> <p>No SIAs with MRCV were conducted in Germany at national level in 2017 but some subnational SIA were conducted. Low vaccination rates are observed in children of immigrant families from other EU-countries who do not have insurance coverage.</p>
Supplementary information	The number of asylum seekers declined in 2017 to 223 000 (from 746 000 in 2016). As in previous years, SIA have been conducted at local level targeting asylum seekers and resident adults. No evaluation data on these local activities were provided.
Specific comments to country	<p>The RVC commends Germany and the NVC on the high-quality report provided.</p> <p>The RVC urges further improvement in the epidemiological surveillance of measles and rubella with better contact tracing. More efforts to identify chains of transmission using epidemiological and laboratory data are needed as well as continued efforts to improve rubella surveillance, including laboratory confirmation of suspected cases and genotyping.</p> <p>Greater efforts are also needed to monitor and improve the immunization status of health care workers.</p>
RVC conclusion for 2017	Measles endemic. Rubella endemic.

Italy

Component	RVC comment
RVC conclusion for 2016	Measles endemic. Rubella endemic.
Epidemiology	<p>The reported measles incidence was 88.4/million population with 5404 confirmed cases (4347 laboratory confirmed). Four measles-related deaths were reported. A total of 634 outbreaks were reported with all regions involved, but 92% of cases occurred in 9 regions. Seventy-four percent of cases were <15 years of age and 78% had no history of vaccination against measles.</p> <p>Rubella incidence was 1.1/million population with 68 confirmed cases (31 laboratory confirmed). All cases were sporadic and identified in 12 of the regions.</p> <p>One CRS case was reported.</p>
Surveillance performance	<p>Surveillance sensitivity remained low in 2017 with rates of discarded measles and rubella cases being 0.68 and 0.04. While most measles testing was performed in WHO-accredited and proficient laboratories only 20% of rubella tests were performed by these laboratories. This severely limits the epidemiological assessment. Comprehensive measles genotyping data were provided. Genotypes B3-Dublin (646 outbreak cases and 526 sporadic cases) and D8-Osaka (361 outbreak cases and 270 sporadic cases) were dominant. B3-Niger, D8-Cambridge, D8-Rostov, D8-Herborn, D8-Hulu Langat and H1 were also detected. No information was provided on rubella genotyping.</p>
Population immunity	<p>Reported vaccination coverage for MCV1/RCV1 was 92% and for MCV2/RCV2 86%, which is an increase compared to 2015 and 2016 coverage. SIAs (mop-ups and catch-ups) were conducted in 3 regions.</p>
Supplementary information	<p>Italy introduced a law in 2017, making 10 vaccinations, including measles and rubella, mandatory for children up to 16 years of age. The National Plan of Vaccine Prevention was adopted. Funds for vaccine supply have been established. A Technical Group has been established for monitoring and coordination of the Measles and Rubella Elimination Plan. The MoRoNET laboratory network has been extended (11 subnational laboratories in 10 regions recruited) and intensified its activities.</p>
Specific comments to country	<p>The RVC commends Italy on the efforts made towards measles and rubella elimination, and comprehensive measles genotyping information provided in the ASU. The RVC urges further steps to be taken to achieve and maintain high vaccination coverage with 2 doses of MRCV at all administrative levels. Surveillance sensitivity and laboratory testing and genotyping of rubella need to be strengthened.</p>
RVC conclusion for 2017	Measles endemic. Rubella endemic.

Poland

Component	RVC comment
RVC conclusion for 2016	Measles interrupted 12 months. Rubella endemic.
Epidemiology	<p>There were 63 reported measles cases (8 imported, 39 import-related, and 16 endemic) from 10/16 territories. Of the 55 non-imported cases, the majority was immunized with one dose of MRCV. Six measles outbreaks were reported.</p> <p>There were 476 rubella cases reported but 98% of these are classified as clinically compatible. All ages and all 16 territories were affected. Zero CRS cases reported.</p>
Surveillance performance	<p>Case-based measles surveillance with suspected cases reported by physicians, and laboratory confirmation of cases in place. Rubella surveillance based on clinical diagnosis.</p> <p>Reporting timeliness and completeness are 100%. The rate of discarded cases (0.52/100 000) and timeliness of investigation (8.8%) are low. Low virus detection rate (33.3% of measles outbreaks are with investigated genotype and no rubella genotyping reported).</p>
Population immunity	MRCV1 coverage is 94% and MRCV2 coverage is 95% (at 10 years of age). Unregistered persons (estimated at 5%) are not included in the denominators. Coverage is unknown in Roma, asylum seekers and migrants (estimated <0.01% population per group).
Supplementary information	None provided
Specific comments to country	<p>The RVC is impressed with measles prevention efforts, noting timeliness and completeness of reporting and high vaccine coverage. As stressed at previous meeting, there is a need for further improvements in rubella surveillance, lab-confirmation and genotyping.</p> <p>The national health authorities are invited to consider revisions of MRCV immunization schedule, in particular the rationale for providing MRCV2 at 10 years of age in light of fact that 60% of measles cases occurred in population which is less than 10 years old.</p> <p>The RVC is concerned that once again the report is very light on details and the RVC request the NVC to provide more detailed ASU.</p>
RVC conclusion for 2017	Measles interrupted 24 months. Rubella endemic.

Romania

Component	RVC comment
RVC conclusion for 2016	Measles endemic. Rubella endemic.
Epidemiology	The measles incidence was 459/million population with 2435 confirmed cases, all reported as the nation-wide outbreak. However different B3 genotype strains identified indicates different chains of transmission. Rubella incidence was 0.45/million population with 13 confirmed cases. No rubella genotype data was provided. Nineteen suspected cases of CRS were reported, all IgM negative; 5 were classified as negative, 14 as probable; it is possible that CRS is over-reported.
Surveillance performance	National surveillance sensitivity for measles 6.1/100 000 but lower in some sub-national administrative territories. The rate of laboratory confirmed cases was 82% for measles and 99.6% for rubella. Rate of viral detection was 100% for measles.
Population immunity	Reported MRCV1 coverage at 18-24 months of age was 91%. MRCV2 coverage in selected 5-year-olds was 81%. Romania has a complex healthcare system with few incentives to immunize in a timely manner.
Supplementary information	Results of a 2015 serosurvey include a measure of MRCV2 uptake in adults that appears to indicate slightly higher MRCV2 coverage.
Specific comments to country	The suboptimal MRCV coverage and immunity remains of great concern. The RVC urges national health authorities to consider comprehensive response to the measles outbreak, followed with SIA to close the population immunity gaps nationwide. The RVC commends the commitment to initiate laboratory-based rubella surveillance from 2018.
RVC conclusion for 2017	Measles endemic. Rubella endemic.

Russian Federation

Component	RVC comment
RVC conclusion for 2016	Measles interrupted for 12 months. Rubella interrupted for 24 months.
Epidemiology	Measles incidence was 4.9/million population with 721 confirmed cases, 689 of them confirmed by laboratory. 175 cases were classified as endemic and 43 were with unknown origin. The age distribution of cases included 48% < 5 years and 32% ≥20 yrs. Most cases reported from Moscow city (330) and Republic of Dagestan (99). A total of 21 outbreaks were reported, with 631 cases (2 to 304 cases per outbreak). Some of outbreaks that started in 2017 are continuing in 2018. Rubella incidence was 0.03/million population (5 cases, all laboratory confirmed, 1 case imported and 4 import-related). Zero CRS cases were reported.
Surveillance performance	All reported surveillance performance indicators meet or exceed targets. The rate of discarded cases is 2.5/100 000 for measles and 2.9/100 000 for rubella. High-quality laboratory information was provided. Several chains and sporadic cases due to measles virus H1, B3 variants and D8 variants were identified. B3-Dublin was detected in several outbreaks. D8-FrankfurtMain has been continuously reported since 2016. Based on confirmation in cases reported from Republic of Dagestan, Moscow Oblast, Chechen Republic, Stavropol Kray and 12 other administrative territories in 2017, its transmission is considered to be re-established. The imported 1H rubella genotype was identified.
Population immunity	Reported MCV1/RCV1 coverage was 97.11/ 97.08% and MCV2/RCV2 coverage was 97.05/96.96%. Immunity gaps were reported for Nenetski AO with 438 000 population (MRVC1 - 86.1%), among migrants (181 024) and 139 374 persons belonging to high-risk population groups. Measles immunization of adults, targeting 36-55-year-olds has been conducted. SIAs coverage reached 42-99% of targeted population.
Supplementary information	None provided.
Specific comments to country	The RVC commends the NVC, national health authorities and public health system on achieving rubella elimination. The RVC repeatedly commends a high quality of ASU, including comprehensive analysis and detailed laboratory information provided. The RVC agrees with the NVC conclusion that measles endemic transmission was re-established in 2017, and is looking forward to learn about activities and steps taken to address measles immunity challenges.
RVC conclusion for 2017	Measles endemic. Rubella eliminated.

Serbia

Component	RVC comment
RVC conclusion for 2016	Measles endemic. Rubella endemic.
Epidemiology	Measles incidence in 2017 was 2.1/million population, with 73 suspected and 15 confirmed measles cases reported. All cases were in adults, ≥ 30 years of age. There was 60 cases reported to be compatible with rubella for an incidence of 0.72/million population, but no data on age or immunization status was provided. Zero confirmed CRS cases were reported.
Surveillance performance	Representativeness of reporting discarded measles cases is insufficient, suggesting an inadequate surveillance sensitivity, despite a rate of 0.67/100 000 discarded cases during an outbreak year. It is not clear how many measles cases were genotyped, but genotype B3 was identified as in previous years. Nationwide comprehensive rubella surveillance is not yet established and the quality of surveillance cannot be assessed because no information was provided on rubella or CRS surveillance indicators. No rubella genotypes data were provided.
Population immunity	There is a reported further decline in coverage with MRCV1 at 84% and MRCV2 at 87.5%. The number of administrative territories with MRCV1 and MRCV2 < 90% has increased to 15 of 25 administrative territories (from 11 in 2014) exposing significant population immunity gaps.
Supplementary information	None provided with the ASU. Discrepancies were observed in numbers of measles case in 2017 in different parts of the ASU.
Specific comments to country	RVC commends Serbia on the expansion of genotyping of confirmed cases and reiterates the request to include line-lists of discarded suspected cases with results of laboratory investigations for first-level administrative units. Measles and rubella surveillance should be strengthened and its quality improved. It is necessary to reach and maintain >95% coverage with both doses of MRCV at national and sub-national levels within routine immunization programme, but the RVC also urges Serbia to consider conducting SIAs to reach all susceptibles, boost population immunity and prevent outbreaks.
RVC conclusion for 2017	Measles endemic. Rubella endemic.

Turkey

Component	RVC comment
RVC conclusion for 2016	Measles interrupted 12 months. Rubella endemic.
Epidemiology	<p>Reported measles incidence was 0.9/million population. Of the 84 confirmed cases 11 were imported, 3 import-related, 41 endemic and 29 (34.5%) of unknown origin. 57.1% of the cases occurred among the Turkish resident population. Most cases were non-vaccinated children <5 years of age (55% of all cases). Most, 93% of cases were reported from only 6 regions. 77 cases were reported in 6 outbreaks, which have had between 4 and 32 cases per outbreak. Genotype information is available for 5 outbreaks.</p> <p>Two rubella cases were reported, both sporadic cases of unknown origin. Zero CRS cases were reported.</p>
Surveillance performance	<p>High-quality surveillance for measles and rubella is ascertained by the rate of discarded cases (3.3/100 000 population), including 66.7% representativeness of reported discarded cases at subnational level. Through an integrated syndromic surveillance of rash and fever, cases are tested for both measles and rubella. Measles viruses D8-4824, B3 and D4 variants were identified. Molecular genotyping of rubella cases was not performed.</p>
Population immunity	<p>Reported MRCV1 coverage was 95% and MRCV2 coverage was 86%. 13 subnational territories had coverage <90% for MRCV1 with one region with less than 80%; 25 subnational territories had coverage <90% for MRCV2 with 11 regions <80%.</p> <p>Syrian children below 5 years of age were identified as a high-risk population group. There is an ongoing catch-up campaign for Syrian refugees nationwide.</p> <p>More than 180,000 children, military persons and health care workers were vaccinated in SIA in 2017.</p>
Supplementary information	The efficacy and extent of reach of the SIAs could not be assessed from data in the ASUs and there have been no systematic evaluations of the SIAs conducted. Vaccines to the Syrian refugees are provided free of charge.
Specific comments to country	The RVC commends Turkey on the improved quality of surveillance compare to previous years and on the high quality of the ASU. However, the RVC would appreciate if more data on the temporal and spatial (subnational) development of immunization coverage in Turkey would be included in next annual status update, to allow better understanding of population immunity. The RVC is concerned regarding the possible size of the susceptible population in some parts of country, and the risk of future outbreaks. In the same time, the RVC highly commend the efforts and achievements of Turkey in the provision of immunization services to refugees.
RVC conclusion for 2017	Measles interrupted 24 months. Rubella endemic.

Ukraine

Component	RVC comment
RVC conclusion for 2016	Measles endemic. Rubella endemic.
Epidemiology	There has been a dramatic increase in measles in all regions of Ukraine compared to 2015 and 2016, with 4782 cases and incidence 112.3/million population. 1983 cases were laboratory confirmed, and 83% of all cases have no history of measles vaccination. Five measles-related deaths were reported. Eighty-two percent of cases were reported from outbreaks. The reported rubella incidence was 3.8/million population with 160 confirmed cases. Only 7 cases were laboratory confirmed and most were clinically compatible.
Surveillance performance	Surveillance indicators failed to meet requirements and/or were incorrectly calculated. Surveillance sensitivity for both diseases remained suboptimal. Only 24% of chains of transmission were genotyped. All tests were performed in WHO accredited and proficient laboratories. Genotypes identified included D8-Hulu Langat, D8-Cambridge, D8-other strains, B3-Dublin, B3-Kabul, B3-other strains and D9-5108. No rubella genotyping information was available. There is no CRS surveillance.
Population immunity	There has been a notable increase in vaccination coverage, with reported MRCV1 at 93% and MRCV2 at 90%. Supplementary immunization activities in form of accelerated routine immunization reached 77.3% among documented unvaccinated and 81.7% among incompletely vaccinated.
Supplementary information	The public health system is in process of restructuring with establishment of a National Center on Public Health in charge of surveillance and immunization. The response to the ongoing outbreak is coordinated by an Operations Center under the Ministry of Health with focal points nominated in all regions. Vaccine procurement through international partners (UNICEF) is continued. A Cabinet of Ministers decided on 03 April 2017 to increase routine vaccination coverage to 95%. Multiple training courses and conferences on measles and rubella elimination have been conducted at national and subnational levels, targeting various audiences.
Specific comments to country	The RVC commends Ukraine on efforts to increase immunization coverage, but with ongoing measles outbreak still urges further steps to achieve and maintain universal high vaccination coverage with 2 doses of MRCV. Surveillance sensitivity, laboratory testing and genotyping needs to be strengthened and better documented in ASU.
RVC conclusion for 2017	Measles endemic. Rubella endemic.

Annex 3. List of participants

RVC members

Robin Biellik
Formerly of UNICEF, WHO and PATH
La Rippe, Switzerland

Irja Davidkin
Senior Researcher, Virology Unit
National Institute for Health and Welfare
Finland

Mira Kojouharova
Head, National Center for Infectious and Parasitic Diseases
Ministry of Health
Bulgaria

Robert Linkins
Chief, Accelerated Disease Control and Vaccine Preventable Disease Surveillance
United States Centers for Disease Control and Prevention
United States of America

Andrey Lobanov
Formerly of the WHO Regional Office for Europe
Russian Federation

Günter Pfaff
Epidemiology and Health Reporting
Baden-Württemberg State Health Office
Germany

Jose Ignacio Santos
Professor of Medicine
Universidad Nacional Autónoma de México
Mexico

John Simpson
Deputy Director, Emergency Response Department
Public Health England
United Kingdom

Belgium

Tine Grammens
Scientist, Epidemiology of infectious diseases, Sciensano

Elizaveta Padalko
NVC Chair
Medical Microbiology, Infectious Serology and Molecular Microbiology
University Hospital Ghent

Veronik Hutse
Scientist, Viral Diseases, Sciensano
National Reference Center for Measles, Mumps, Rubella, Viral Hepatitis and Human Papillomavirus

France

Ministry for Solidarity and Health

Jérôme Salomon
Director General for Health
Directorate General of Health

Sylvie Floreani
Population Health and Vaccine Policy Office
Directorate General of Health

Odile Kremp
Head, Population Health and Vaccine Policy Office
Directorate General of Health

Julie Soma
Crisis Communications Manager
Directorate General of Health

Manuel Zurbaran
National Focal Point, Public Health Emergency Operations Center
Division of Surveillance and Health Security
Directorate General of Health

Public Health France

Denise Antona
Infectious Disease Division
Respiratory Infections and Immunization Unit
Public Health France

National Verification Committee

Daniel Floret
NVC Chair
Professor of Pediatrics, University Claude Bernard, Lyon

Jean Beytout
Professor, Centre hospitalier universitaire de Clermont

Joel Gaudelus
Pediatrician, Hopitaux Universitaires Paris Seine Saint Denis

Dominique Salmon
Infectious Diseases Department, Paris University Hospitals

National Reference Laboratory for Measles and Rubella

Julia Dina
Virology Department, Hospital Center of Caen

CDC

Morgane Donadel
Global Immunization Division
Center for Global Health

Laura Zimmerman
Global Immunization Division
Center for Global Health

ECDC

Tarik Derrough
Expert, Vaccine-preventable Diseases Surveillance and Response

Observer

Paata Imnadze
Scientific Director, NCDC Georgia

WHO headquarters

Alya Dabbagh
Expanded Programme on Immunization, Department of Immunization, Vaccines and Biologicals

Minal Patel
Expanded Programme on Immunization, Department of Immunization, Vaccines and Biologicals

WHO Regional Office for Europe

Myriam Ben Mamou
Scientist, VPI

Zhanara Bekenova
Consultant, VPI

Florencia Biviano
Programme Assistant, VPI

Robb Butler
Programme Manager, VPI

Danni Daniels
Technical Officer, VPI

Sergei Deshevoi
Technical Officer, VPI

Shahin Huseynov
Technical Officer, VPI

Mark Muscat
Technical Officer, VPI

Patrick O'Connor
Team lead, Accelerated Disease Control, VPI

Dovile Videbaek
Consultant, VPI

Rapporteur

Ray Sanders

The WHO Regional Office for Europe

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.

Member States

Albania
Andorra
Armenia
Austria
Azerbaijan
Belarus
Belgium
Bosnia and Herzegovina
Bulgaria
Croatia
Cyprus
Czechia
Denmark
Estonia
Finland
France
Georgia
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Kazakhstan
Kyrgyzstan
Latvia
Lithuania
Luxembourg
Malta
Monaco
Montenegro
Netherlands
Norway
Poland
Portugal
Republic of Moldova
Romania
Russian Federation
San Marino
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Tajikistan
The former Yugoslav
Republic of Macedonia
Turkey
Turkmenistan
Ukraine
United Kingdom
Uzbekistan

World Health Organization Regional Office for Europe

UN City, Marmorvej 51, DK-2100 Copenhagen Ø, Denmark

Tel: +45 45 33 70 00 Fax: +45 45 33 70 01

Email: eurocontact@who.int

Website: www.euro.who.int