

This issue of WHO EpiBrief provides an overview of selected epidemiological characteristics of measles and rubella in the WHO European Region based on monthly surveillance data. It also includes short reports on events of these diseases in selected countries: Austria, Greece, Italy, Romania and Ukraine. These short reports are based on additional information supplied by these countries. A brief report summarizing rotavirus surveillance data from Member States in the region participating in the WHO-coordinated Global Rotavirus Surveillance Network (GRSN) is also included.

The surveillance data presented in this issue were reported by Member States and are incorporated in the centralized information system for infectious diseases.¹ Tabulated surveillance data by country for 2017 (as of 16 April 2018) are annexed to this issue. Preliminary data for the first two months of 2018 (as of 16 April 2018) are also presented. Tabulated surveillance data by country for these two months are also published separately in WHO EpiData no. 3/2018.* The analyses of these data are performed on cases with disease onset dates during 2017 and during the first two months of 2018, respectively. Where these dates were unavailable, cases with the date of notification reported during this period were included. The numbers of cases in a specified time period may differ from reports produced by national or partner agencies if different dates are used. Percentages in this report were rounded to the nearest whole number.

Measles in the WHO European Region in 2017

Incidence – notifications and laboratory data

For 2017, 22 360 measles cases were reported in 43 countries of the WHO European Region among 52 (98%) countries that submitted measles data (including zero reporting) (Table 1 in annex). Turkmenistan did not submit reports.

Of the total, 71% of cases (n=15 787) were reported by three countries: Romania (n=5610; 25%), Italy (5410; 24%) and Ukraine (4767; 21%). The highest crude incidence per million population for 2017 was in Romania (292) followed by Ukraine (107).

Of the total, 12 371 (55%) cases were laboratory confirmed and 5145 (23%) were epidemiologically linked cases. The remaining 4844 (22%) were classified as clinically compatible cases. During 2017, 3077 measles virus sequences were reported to the Measles Nucleotide Surveillance database (MeaNS)² by reference laboratories of the WHO European Region (as of 11 April 2018). The genotypes identified in the Region comprised B3 (n=1967), D8 (1080), H1 (28) and D9 (2). The number of sequences of measles virus in the WHO European Region reported to MeaNS by genotype from 2015 up to week 11 of 2018 are shown in Fig. 1 (page 2).

The predominant measles virus genotypes reported for 2017 included several lineages of B3. These variants were reported by 28 countries, of which 23 countries reported the dominant named strain Dublin.IRL/8.16/ (70% of all B3 variants). Other B3 named strains (Saint Denis.FRA/36.17/, Niger.NGA/8.13/, Kansas.USA/1.12/ and Kabul.AFG/20.2014/3) as well as other B3 variants were less frequently reported.

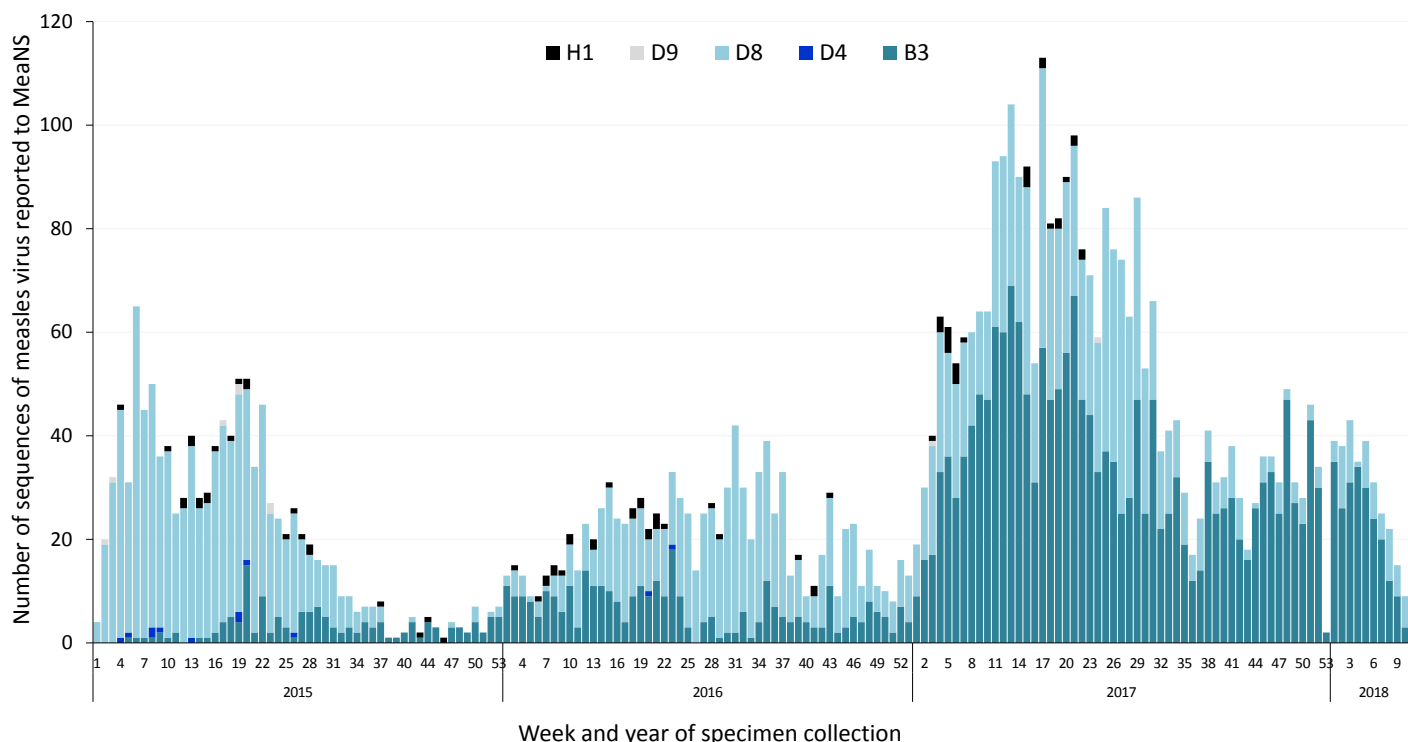
Variants of measles virus genotype D8 were reported by 26 countries, of which 12 countries reported the named strain Osaka.JPN/29.15/ accounting for 50% of D8 sequences. Other D8 named strains comprised Herborn.DEU/05.17/, Cambridge.GBR/5.16/, Frankfurt Main.DEU/17.11/ and Hulu Langat.MYS/26.11/. Genotype H1, which is usually found in Asia, was reported by five countries in the Region. Two sequences of D9 genotype were reported from two countries.

Age distribution

The age group was known in all but 9 cases (n=22 351), of which 11% (2516) were under 1 year of age, 25% (5509) were 1–4 years, 15% (3294) were 5–9 years of age, 14% (3181) were 10–19 years of age and 35% (7851) were 20 years and older (Fig. 2, page 2). Fig. 3 (page 3) shows the age distribution of reported measles cases in the top three countries reporting most cases: Romania, Italy and Ukraine by proportion and age-specific incidence.

*WHO EpiData no. 3/2018 is available at www.euro.who.int/en/health-topics/disease-prevention/vaccines-and-immunization/publications/surveillance-and-data/who-epibrief/who-epibrief,-no.-12018

Fig. 1. The number of sequences of measles virus in the WHO European Region reported to MeaNS by genotype, 2015 up to week 11, 2018



Vaccination status

Vaccination status and age was known in 18 419 cases (82%). Of these 15 018 cases were unvaccinated (82%): 2202 cases (15%) were <1 year old, 4150 cases (28%) were 1–4 years old, 2257 cases (15%) were 5–9 years old, 1867 cases (12%) were 10–19 years old and 4542 cases (30%) were ≥20 years old. Of the 18 419 cases with data on vaccination status and age, 2030 cases (11%) were reportedly vaccinated with at least one measles-containing vaccine dose.

Hospitalization

Data on hospitalization status was available for 63% (n=14 034) of all reported measles cases. Of these, 11 228 were hospitalized, amounting to 80% of all cases with known hospitalization status. Of all the hospitalized cases, most were reported from Romania (n=4806; 43%) and Ukraine (3057; 27%).

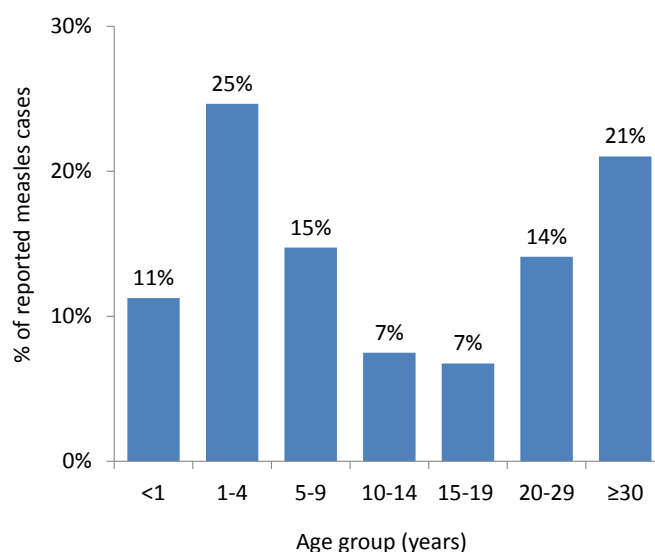
Measles-related deaths

Measles-related deaths were reported in 36 cases in 11 countries: Bulgaria (1 death), France (1), Germany (1), Greece (2), Italy (4), Portugal (1), Romania (18), Serbia (1), Spain (1), Switzerland (1) and Ukraine (5). Most deaths (61%, n=22) occurred in children under 10 years of age: 10 cases were <1 year old and 12 cases were 1–9 years old. Of the remaining deaths 6 cases were 10–19 years old and 8 cases were ≥25 years old. Of the fatal

cases in Romania, 8 cases were <1 year old and 7 cases were in children 1–3 years of age.

All 36 deaths were laboratory-confirmed cases of measles. 31 fatal cases were unvaccinated, 3 cases had received one measles-containing vaccine dose, 1 case had received two measles-containing vaccine doses and in 1 case the vaccination status was unknown.

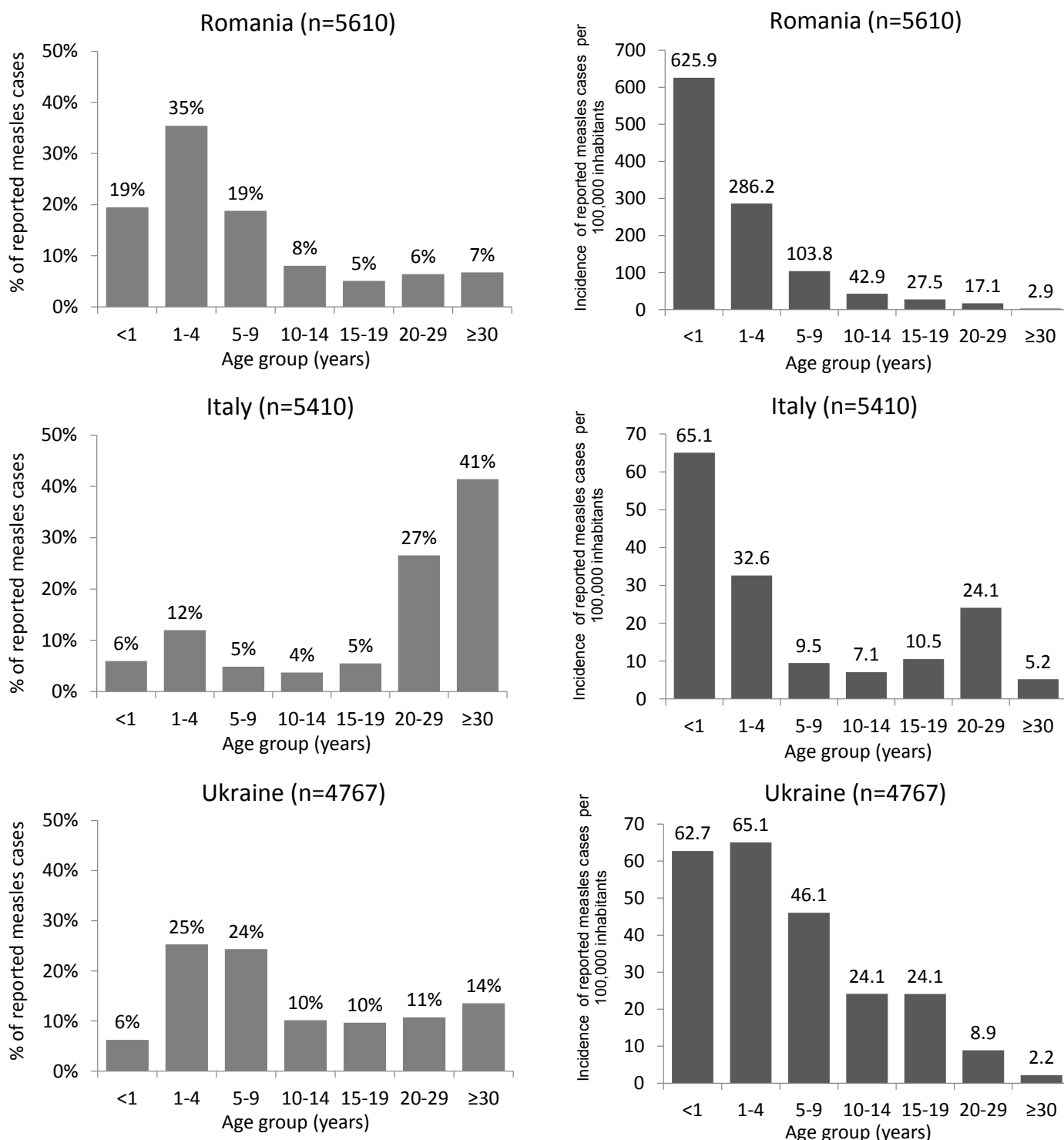
Fig. 2. Age distribution of measles cases by proportion in the WHO European Region, 2017 (n=22 360)*



N.B. Discarded cases are not included.

*For 9 cases the age group was not reported.

Fig. 3. Age distribution of measles cases by proportion (left) and incidence per 100 000 inhabitants (right) in the three countries that together reported 71% of cases with data on age in the WHO European Region, 2017 (n=15 787)



Imported cases

Importation status was known for 62% (n=13 779) of cases. Of these, 432 were reported as imported cases, amounting to 3.1% of cases with a known importation status. Of all the imported cases, most (337; 78%) were reported by United Kingdom (n=129), Germany (66), Italy (46), France (30), Russian Federation (25), Spain (21) and Romania (20).

Measles in the WHO European Region January—February 2018

Incidence – notifications and laboratory data

By 16 April 2018, 11 436 measles cases were reported in 32 countries of the WHO European Region among 50 (94%) countries that submitted measles data (including zero reporting) for the first two months of

2018. Three countries, namely Albania, Bosnia and Herzegovina and Turkmenistan, did not submit reports. During this period 14 measles-related deaths were reported: 4 in Serbia, 4 in Ukraine, 2 in Italy, 1 in France, 1 in Greece, 1 in Romania and 1 in the Russian Federation.

Of the total, 92% of cases (n=10 562) were reported by 6 countries: Ukraine (n=6129), Serbia (2131), Greece (787), France (745), Italy (411) and Russian Federation (359). The highest annualized incidence per million population for the period was reported in Serbia (40.5) followed by Ukraine(23) and Greece (12).

Rubella in the WHO European Region in 2017

Incidence – notifications and laboratory data

For 2017, 724 rubella cases were reported in 20 countries of the WHO European Region among 46 (87%) countries submitting rubella data (including zero reporting) (Table 2 in annex). Most cases were reported by Poland (n=496; 69%), followed by Germany (74; 10%), Italy (68; 9%) and Austria (42; 6%). Poland also had the highest crude incidence per million population (13).

Of the total, 118 (16%) cases were laboratory confirmed, most of which were reported by Austria (39 cases), Italy (31 cases) and Germany (12 cases). Most (98%, n=487) cases reported by Poland were clinically compatible cases.

During 2017, 4 rubella virus sequences were entered in the Rubella Nucleotide Surveillance database (RubeNS).³ The identified genotypes comprised 2B (n=2), 1H (1) and 1E (1).

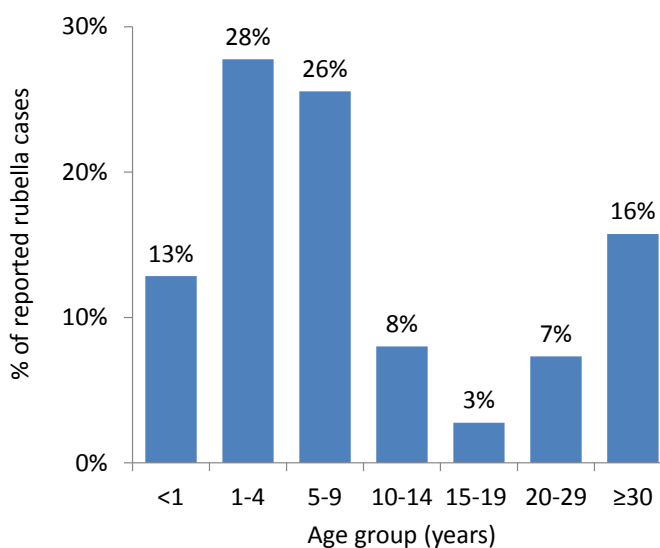
Age distribution

The age group was known in all cases: 93 cases (13%) were <1 year old, 201 cases (28%) were 1–4 years old, 243 cases (34%) were 5–14 years old, 20 cases (3%) were 15–19 years old and 167 cases (23%) were ≥20 years old (Fig. 4).

Vaccination status

Vaccination status was known in 86% of cases (n=624). Of the 314 (50%) unvaccinated cases, 87 cases (28%) were <1 year old, 71 cases (23%) were 1–4 years old, 36 cases (11%) were 5–9 years old, 21 cases (7%) were 10–14 years old and 99 cases (32%) were ≥15 years old. The remaining 310 cases (50%) were reportedly vaccinated with at least one rubella-containing vaccine dose.

Fig. 4. Age distribution of rubella cases in the WHO European Region, 2017 (n=724)



N.B. Discarded cases are not included.

Imported cases

Importation status was known in 23% (n=169) of rubella cases. Of these, 11 were reported as imported cases, amounting to 6.5% of cases with a known importation status. The imported cases were reported from Austria (n=3), Czech Republic (1), Germany (1), Italy (1), Russian Federation (1), Spain (1) and the United Kingdom (3).

Rubella in the WHO European Region January—February 2018

Incidence – notifications and laboratory data

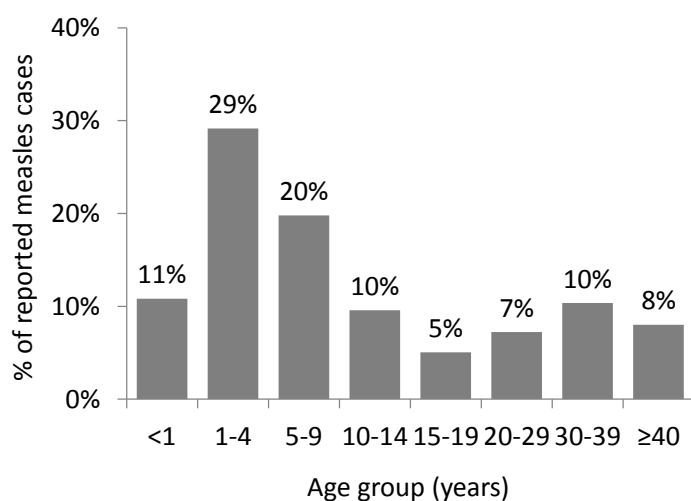
By 16 April 2018, 116 rubella cases were reported in 11 countries of the WHO European Region among 44 (83%) countries submitting rubella data (including zero reporting). Most cases were reported by Poland (n=84; 72%), which also had the highest annualized incidence per million population (0.4). All cases reported by Poland were clinically compatible cases. Of the total cases reported in the Region, 14 were laboratory confirmed.

Measles in Greece

A measles outbreak is currently ongoing in Greece. From May 2017 when the first cases were notified up to 18 February 2018, a total of 1784 measles cases were reported in all 13 regions of Greece. Most cases (n=1146; 64%) occurred among the Roma population.

Of the total, 193 (11%) were infants <1 year of age, 520 (29%) were young children 1–4 years of age and 353 (20%) were children 5–9 years of age (Fig.5, page 5). In Roma communities most cases were children <15 years

Fig. 5. Age distribution of reported measles cases Greece, 1 May 2017–18 February 2018 (n=1784)



of age (n=1025; 89%). Adults aged 20 years and older constituted 26% (n=457) of the total reported cases. Most of the adults were aged 25–44 years old. Among the measles cases were 79 health professionals.

Of the 1784 cases that were reported, 1067 cases were laboratory confirmed and 589 cases were epidemiologically linked to laboratory-confirmed cases. 128 cases were classified as clinically compatible. Molecular characterization of the circulating measles virus in Greece identified 87 cases of genotype B3.

The vast majority of the cases had information on vaccination status (n=1668; 94%), of whom 1486 were unvaccinated (83%). Pneumonia as a complication of measles was reported in 115 cases. 151 cases had other complications including, otitis media, and acute encephalitis.

Measles-related deaths in Greece

Since the beginning of the outbreak, there have been 3 deaths reported as a result of complications from measles. The first occurred in an 11-month old unvaccinated Roma infant who was malnourished and died of septicaemia. The second occurred in a 17-year-old unvaccinated Roma teenager who died of acute encephalitis. The third case concerned a 35-year-old female, from the general population, who was reported to be partially vaccinated, and who died of respiratory complications. All cases were laboratory confirmed. The infant was not yet eligible for vaccination as it had not reached 12 months of age – the recommended age to receive the first dose of a measles-containing vaccine according to the Greek childhood vaccination schedule.

Outbreak response and control measures in Greece

The Ministry of Health and the Hellenic Centre for

Diseases Control and Prevention (HCDCP) have implemented several public health measures in response to the outbreak.

A circular was issued by the Ministry of Health/General Directorate of Public Health, in which the National Immunization Committee recommended:

- A. immediate vaccination of children, adolescents and adults who had not been previously vaccinated with the appropriate doses of the measles-mumps-rubella vaccine (MMR). According to the National Immunization Programme, children, adolescents and adults born after 1970 with no evidence of immunity should receive two doses of measles-containing vaccine (MCV)
 - B. the first dose of MMR to be administered at the age of 12 months and the second dose three months later or, if that period has elapsed, as soon as possible. In high-risk communities the second dose was recommended at least four weeks after the first dose.

Furthermore, campaigns to check the vaccination status and vaccinate accordingly refugees/migrants and Roma are being implemented throughout the country. To ensure the earliest possible protection, vaccination starts at the age of 6 months for groups at high risk due to low coverage. Vaccines are free of charge and vaccinations are carried out by staff of HCDCP and the European Programme “PHILOS – Emergency health response to refugee crisis”, under the auspices of the Ministry of Health, in cooperation with the Healthcare Regional Units, the Office of the United Nations High Commissioner for Refugees (UNHCR), the Hellenic Association of Roma and the nongovernmental organizations operating at Points of Care for refugees/migrants.

Starting in April 2017, all regional and local public health authorities, physicians and other healthcare professionals in the public and private sectors were informed by HCDCP about the ongoing outbreak in several European countries along with the appropriate actions regarding laboratory investigation and management of suspected measles cases and their contacts (including management of affected cases, especially pregnant women and neonates, infection control measures, isolation of cases, contact tracing and vaccination of susceptible contacts, and vaccination of healthcare professionals). HCDCP raised disease awareness through information material

(available at www.keelpno.gr), emphasizing the importance of immunization and continues to publish on the HCDCP's website a weekly and monthly measles report to provide timely information about the current measles situation in the regions, both in Greek and in English.

Measles and rubella in Italy

Measles

In 2017, Italy reported 5404 cases of measles (data as of 13 April 2018). This represented a 6-fold increase compared with 2016, when 863 cases were reported. Most cases in 2017 occurred in March through July (n=3901; 72%). Cases were reported in all 21 regions of the country, however, predominantly (94%) in 10 regions: Lazio (1966; 39%), Lombardy (786; 16%), Piedmont (633; 13%), Sicily (466; 9%), Tuscany (370; 7%), Veneto (287; 6%), Abruzzo (252; 5%), Campania (110; 2%), Calabria (102; 2%) and Emilia-Romagna (92; 2%). Lazio region had the highest incidence at the first administrative subnational level (33 per 100 000 inhabitants), followed by Abruzzo (19) and Piedmont (14).

In 2017, the surveillance system received reports of 634 outbreaks that occurred in families, healthcare settings, schools and nomadic settlements. Measles cases were reported across the population, including over 300 cases among health workers.

The median age of cases reported in 2017 was 27 years (range: 2 days–84 years). 74% of the cases (n=3974) were 15 years and older. Of the total, 4347 cases (80%) were laboratory confirmed, 429 cases (8%) were epidemiologically linked to laboratory-confirmed cases and 628 cases (12%) were classified as clinically compatible.

Four deaths were reported due to respiratory insufficiency as a complication of measles. These were three children, 16 months, 6 years and 9 years of age and a 41-year-old adult. All had pre-existing medical conditions and were unvaccinated. In addition, there were 2 cases that developed encephalitis as a complication of measles: a 1-year-old child and a 36-year-old.

Of the total, 4867 cases were believed to have been infected in the country (including 37 import-related cases), 45 cases were imported and in 492 cases the origin of infection was unknown. Vaccination status was known for 4749 cases: 4158 cases (88%) were unvaccinated, 517 cases (11%) were vaccinated with one dose and 74 cases (2%) received two doses.

Rubella

In 2017, Italy reported a total of 68 cases of rubella (data as of 13 April 2018) identified in 12 of its regions. This is a marked increase in the number of reported cases compared with that in 2016 (30 cases), 2015 (26 cases) and 2014 (26 cases). In addition, a case of congenital rubella infection was reported. The congenital infection likely originated outside the country.

The median age was 27 years (range: 4 months–76 years). Most cases (72%; 49) were above 15 years of age. 31 cases (48%) were laboratory confirmed, 7 cases (8%) were epidemiologically linked to a laboratory-confirmed case and 30 cases (44%) were classified as clinically compatible.

Of the total, 56 cases were believed to have been infected in the country, 1 case was imported and in 11 cases the origin of infection was unknown. Vaccination status was known for 55 cases: 39 cases (71%) were unvaccinated and 16 cases (29%) were vaccinated with one dose.

Measles and rubella elimination activities in Italy

In March 2017, after identification of the epidemic, the Ministry of Health (Ministry) in coordination with the Istituto Superiore di Sanità (ISS) started to publish online weekly updates on the epidemiological situation of measles. The Ministry also published two circular letters (the first in April and the second in June) with recommendations to be put in place at local level, in the community and in health care facilities, to control the outbreak and prevent the further spread of the disease.

In April 2017, the Ministry activated a working group involving ISS, the regional health authorities, and scientific and civil societies to assist regions in implementing and monitoring the second National Measles and Rubella Elimination Plan (PNEMoRc) that was approved in 2010.

In parallel, an "Actions in support of the PNEMoRc" project, funded by the Ministry continued operating with wide participation of administrative regions, academia and ISS. The project's main actions included:

- the processing of measles and rubella reports summarizing the main indicators related to the elimination goals at regional level and their distribution to regional health authorities. This aims to support epidemiological analysis and identification of weaknesses and strengths of regional elimination plans;
- the launch of distance learning courses on measles and rubella for healthcare workers

In June 2017, the Ministry organized a workshop in collaboration with the “Actions in support of the PNEMoRc” project to identify the main challenges to stop the outbreak and possible solutions. The workshop was attended by the Ministry’s working group, regional health authorities, WHO and other stakeholders.

The network of reference laboratories for measles and rubella “MoRoNet” became operational in March 2017 in accordance with WHO standard requirements under coordination of the National Reference Lab, which is WHO accredited and located at ISS. In addition a national accreditation programme for decentralized laboratories in the network was set up for quality assurance.

To attain the target of 95% vaccination coverage set by WHO guidelines for the elimination of measles and rubella and to expand vaccination services to include new vaccines also for elderly people, a new National Immunization Plan (NIP) was approved in January 2017. The Plan confirms that elimination of measles and rubella is a priority, for the whole country and stresses the right to vaccination for all. Although national vaccination coverage rates were mostly above the 95% target around the year 2012, there has been a downward trend in the intervening years, with rates for specific vaccines (primary series of 3 doses of diphtheria, tetanus, pertussis and hepatitis B and first dose of measles-containing vaccine) down by 3 to 5 percentage points in 2015.

As a consequence of this decrease and the measles outbreak, and in the framework of the new NIP, on 31 July 2017 a new law was approved by the Italian Parliament, expanding the list of antigens against which vaccination is compulsory from 4 to 10: with vaccination against measles, rubella, mumps, pertussis, chickenpox, *Haemophilus influenzae* b (Hib) being added to vaccination against diphtheria, tetanus, hepatitis B and poliomyelitis. Following the decision, a toll-free number and two e-mail boxes were activated by the Ministry to respond to questions about the law from the general population and schools.

At the end of 2017, the Ministry reported that, in five regions for which preliminary data were available, 29.8% of unvaccinated children born from 2011 to 2015 had been vaccinated since the new law was enforced. Compared with 2016, this catch-up vaccination resulted in a national vaccine coverage increase from June to October 2017 of 1.0% for the hexavalent vaccine against diphtheria, tetanus, pertussis, poliomyelitis, Hib, and hepatitis B and of 2.9% for the measles, mumps and rubella vaccine (unpublished). Although the likelihood of

improved recording of vaccination and catch-up immunization should be considered when interpreting data, these results appear encouraging.

Measles cases continue to be reported in Italy, with 411 reported cases for January and February 2018, including 3 measles-related deaths in an infant and two adults above the age of 30 years (as of 16 April 2018).

Measles in Romania

A measles outbreak that started in 2016 is still ongoing in Romania (Fig. 6, page 8). By 9 February 2018, a total of 10 749 measles cases were reported since January 2016, in all 42 first-level administrative territories. The highest incidence of cases per 100 000 population occurred in 6 counties: Caras Severin (394), Satu Mare (256), Arad (239), Timis (176), Brasov (152) and Calarasi (134). The peak of the outbreak was in late winter and spring of 2017.

Of the total cases, 2065 (19%) were infants <1 year old, 4097 (38%) were young children 1–4 years of age and 1911 (18%) were children 5–9 years of age. Adults aged 20 years and older constituted 11% (n=1238) of the total reported cases (Fig.7, page 8).

Of the 8153 cases that were reported for 2017, 3041 cases were laboratory confirmed and 5014 cases were epidemiologically linked to laboratory-confirmed cases. 83 cases were classified as clinically compatible.

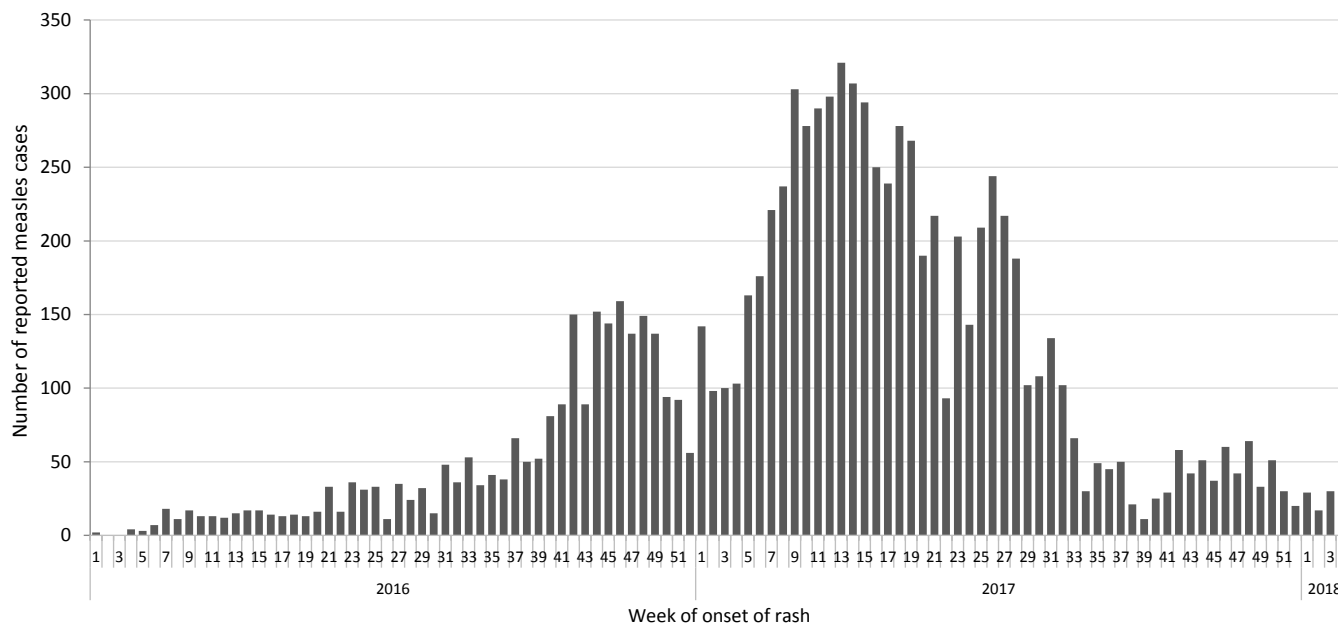
Molecular characterization of the circulating measles virus in Romania between January 2016 and February 2017 identified three different lineages of the B3 genotype. These lineages were not reported from Romania prior to 2016.

All cases had information on vaccination status: 10 274 were unvaccinated (95.6%), 360 had received one dose and 115 had received two doses. Pneumonia as a complication of measles was reported in 3280 cases and 4 cases had acute encephalitis. 485 cases had other complications including diarrhoea.

Measles-related deaths in Romania

Since the beginning of the outbreak, 38 deaths have been reported (as of 9 February 2018) as a result of complications from measles: 17 infants, 15 children 1–9 years old, 3 teenagers and 3 adults. The complications were pneumonia/bronchopneumonia in 12 cases, encephalitis in 2 cases and septicaemia in 3 cases. Thirteen cases had an underlying pre-existing medical condition and 2 cases were reported as being malnourished.

Fig. 6. Distribution of measles cases by week of onset of rash in Romania, 1 January 2016—9 February 2018 (based on 9872 cases with data on week of onset)



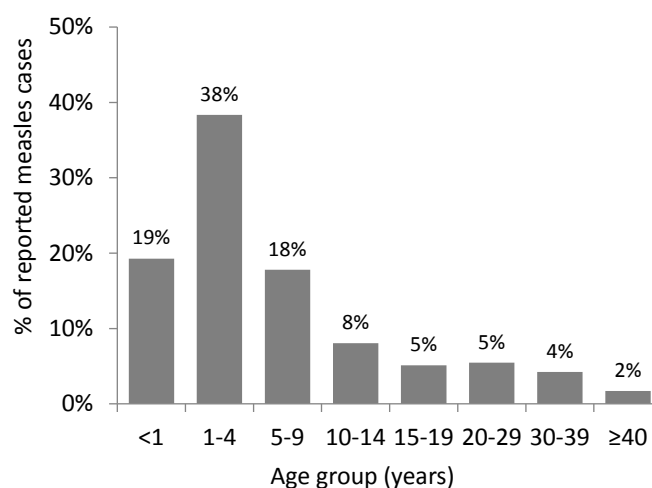
The diagnosis of measles in the fatal cases was confirmed with positive IgM test results or with the detection of the measles virus. For 1 case an epidemiologic link to another measles case was identified. 34 cases were unvaccinated, three cases were vaccinated during the incubation period and 1 case had received one MMR dose. The 17 infants were not eligible for vaccination as they had not reached 12 months of age – the recommended age to receive the first dose of a measles-containing vaccine according to the Romanian childhood vaccination schedule.

Outbreak response and control measures in Romania

In response to the outbreak, the recommended age to receive the first MMR vaccine dose was lowered from 12 months to 9 months. At the same time, a nationwide campaign of enhanced routine immunization activities was undertaken to identify unvaccinated and incompletely vaccinated children aged between 9 months and 9 years and to vaccinate them according to the national childhood immunization revised schedule. In 2017, 575 535 children were vaccinated with the MMR vaccine and included those vaccinated according to the national schedule and those vaccinated through the supplementary campaign. The health authorities requested all family doctors providing vaccination to ensure that unvaccinated children under 5 years of age received their first dose of MMR vaccine and that children 5 to 9 years of age were vaccinated with both vaccine doses.

Community nurses were deployed to identify unvaccinated children in vulnerable population groups and encourage their parents and caretakers to ensure that they are registered with health services for vaccination. To increase awareness of the outbreak and the importance of vaccination against measles the health authorities provided information in posters, leaflets and booklets for family doctors and the general population. The National Institute of Public Health in Romania has also been regularly updating its website with situation reports since 23 September 2016.

Fig. 7. Age distribution of measles cases in Romania, 1 January 2016—9 February 2018



Measles in Ukraine

Measles continues to spread in Ukraine. The country reported 4782 measles cases and 5 measles-related deaths for 2017. By 13 April 2018, over 10 682 cases and 8 measles-related deaths were reported since the beginning of 2018. This report analyses cases reported for 2017, registered in Kyiv City and in all 24 regions but mostly in Ivano-Frankivsk (1344 cases), Odessa (1256 cases) and Zakarpattia (637 cases).

Of the total 4782 cases reported in 2017, 1963 cases (41%) were laboratory confirmed. 926 cases (19%) were epidemiologically linked to laboratory-confirmed cases and 1872 cases (39%) were classified as clinically compatible.

Most cases ($n=2672$, 56%) were below 10 years of age. Of the 3987 cases with a known vaccination status, the majority of cases were unvaccinated ($n=2524$; 63%) while 701 (15%) had received one measles-containing vaccine dose. Of the total, 3795 cases (79%) were hospitalized.

The 5 measles-related deaths reported in 2017 were in 3 children and 2 adults, all from the Odessa region. The 8 measles-related deaths reported so far in 2018 occurred in 6 children (4 from Odessa, 1 from Lviv and 1 from Zakarpattia) and 2 adults (1 from Odessa and 1 from Ivano-Frankivsk).

Outbreak control measures

The first significant increase in the incidence of measles was noticed in May 2017. Since June 2017 the Ministry of Health of Ukraine has held regular monthly teleconferences with the regions of Ukraine to monitor the measles outbreak response. On 5 July 2017, the Ministry created a national Measles Task Force involving key stakeholders and partners, such as WHO and UNICEF. In the period July 2017–February 2018, 5 meetings of the Measles Task Force were conducted during which the issues discussed included a measles outbreak response action plan, supplementary immunization activities, access to vaccine for adults and high-risk groups.

WHO/Europe and UNICEF along with other partners have actively supported measles outbreak response activities. WHO/Europe provided technical support to the Ministry to develop a measles outbreak response plan, to identify strategies and target groups for supplementary immunization and to improve surveillance. UNICEF provided support on development of communication materials and in procuring the required vaccine supply.

Other partners, namely the non-government organizations Parents for Vaccination and Rotary International and national Rotary clubs also supported

measles outbreak response activities at regional level by conducting public awareness campaigns in social media and by working directly with parents and medical professionals. The measles outbreak response plan was endorsed by the ministry in September 2017, and supplementary immunization activities among 1–9 year-old children were launched. During the period November 2017–December 2017, integrated surveillance workshops on measles, rubella and congenital rubella syndrome were conducted in 8 oblasts of Ukraine by WHO/Europe in cooperation with the National Verification Committee for Measles and Rubella Elimination and the Ministry. Another 13 oblasts will be covered during March–June 2018. By the end of 2017, routine vaccination coverage with the first and second MMR doses reached 93% and 91%, respectively.

Rubella in Austria

For 2017, Austria reported 39 cases of rubella, 32 of which were related to two outbreaks (Fig. 8, page 10). The remaining 7 cases could not be epidemiologically linked to the outbreak cases. These included two imported cases: one from South Africa and one from Romania.

The first outbreak of 21 cases occurred in Vienna in an anthroposophic school between February and April 2017. The primary case was a school staff member, who had contact with students aged from 6 to 11 years (1st–5th grade). The index case was an 8-year-old boy in 3rd grade. The median age of the cases was 9 years (range 6–32 years). Most cases ($n=18$; 90%) were unvaccinated against rubella and in 3 cases the vaccination status was unknown. Of the 21 cases in this outbreak, 19 cases were laboratory confirmed and two cases were epidemiologically linked. Rubella virus genotype 2B was identified in 6 cases of this outbreak.

A second outbreak of 19 rubella cases occurred in the Upper Austria province between October 2017 and January 2018 (including 11 cases with diagnosis in 2017). The primary case was a 34-year old unvaccinated man, who acquired the infection during a stay in Bali, Indonesia. Upon his return to Austria, he infected his two unvaccinated children (aged 2 years and 11 years) who infected other children attending the same educational facility (day-care centre, school and kindergarten). The infection also spread to a high school in another village. The median age of this outbreak was 9 years (range 2–39 years). None of the cases had been vaccinated against rubella. Rubella virus genotype 1E was identified in 4 cases of this outbreak.

Outbreak measures taken

To prevent further spread of rubella in the two outbreaks, cases were excluded from attending their educational facility (day-care centre, kindergarten or school) until they passed the infectious period. Children and staff members of these facilities were allowed to attend them only if they had no symptoms suggesting rubella and could prove that they had received at least one rubella vaccine dose or been tested positive for rubella-IgG antibodies. Information letters on rubella and risk of transmission together with a strong recommendation to receive an MMR vaccine dose were also distributed to parents.

For the first outbreak, students in classrooms that were physically separated from classrooms for the 1st to 5th grades were allowed to attend school regardless of their vaccination and immunity status, except siblings of cases (unless they provided evidence of having received at least one rubella vaccine dose or been tested positive for rubella-IgG antibodies). A total of 27 teachers, who could not demonstrate having received MMR vaccination, were tested for rubella-IgG antibodies, 25 of whom were seropositive. Children were not tested for rubella-IgG antibodies, on the assumption that they were seronegative due to their young age, unless they had been vaccinated. Six children, who had not been fully vaccinated with MMR vaccine, accepted the offer to be vaccinated. In total, 39 contact persons of those affected had to refrain from attending classes for 21 days, including 37 children and 2 teachers.

The second outbreak occurred in a region where vaccine hesitancy is common. Authorities screened vaccination cards of all case contacts including children and teachers in the kindergarten and school attended by the rubella cases. All staff members of the kindergarten were vaccinated; 10 teachers of the affected school were tested for rubella-IgG antibodies,

among whom 8 were seropositive. All contacts who had not yet received two rubella vaccine doses were offered vaccination. Only one contact accepted vaccination. In total, 64 contacts had to refrain from attending school for 21 days, including 62 children and 2 teachers.

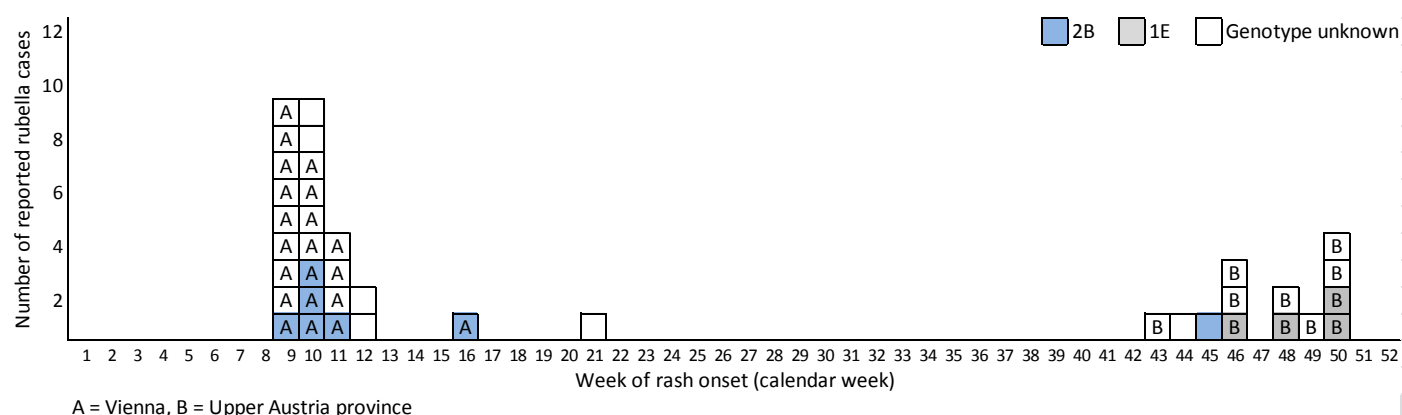
Comments

Measles and rubella in the WHO European Region

With 22 360 reported measles cases, 2017 saw an increase of just over 300% compared to the 5273 cases reported for 2016. This increase is mostly due to large numbers of cases reported from Italy, Romania and Ukraine. Large-scale outbreaks in these countries have previously occurred in the last decade.^{4,5,6} These countries have experienced a range of challenges in recent years, such as declines in overall routine immunization coverage, consistently low coverage among some marginalized groups and interruptions in vaccine supply. The resulting growing numbers of persons susceptible to measles forms the basis of large outbreaks. Several other countries have also reported surges in measles cases in 2017 but most experienced a decline by the close of 2017.

Rubella continues to be reported in fewer countries than measles. The number of reported cases in the Region for 2017 was 45% lower than that reported for 2016 (n=1322). This is attributed to the 55% decline in reported rubella cases in Poland, from 1105 cases for 2016 to 496 cases for 2017. All of the reported cases in Poland were clinically compatible. Laboratory testing would be needed to confirm cases as rubella. The rubella outbreaks in Austria resulting from importation of genotypes 2B and 1E clearly demonstrate the ease of transmission of rubella virus among susceptible individuals when in close contact as in educational settings. Imported cases of rubella virus genotypes 2B

Fig. 8. Number of rubella outbreak and non-outbreak cases* by week of rash onset by genotype in Austria, 2017



*First outbreak cases reported in Vienna (n=21), second outbreak cases reported in Upper Austria province (n=11) and non-outbreak cases (n=7)

and 1E have also been reported by the United Kingdom and Israel, and Belarus, respectively.

Measles and Rubella Laboratory Network

In 2017, the European Measles and Rubella Laboratory Network expanded to 73 WHO reference laboratories with two national measles and rubella laboratories newly nominated by Montenegro and Switzerland. All 73 laboratories were accredited. Countries continued to include laboratory data from public, private or commercial laboratories outside the WHO laboratory network in their surveillance and other relevant reports, including those of the national verification committees for measles and rubella. The lack of information on the proficiency of these laboratories in several countries still needs to be addressed.

In 2017, almost all countries in the Region notifying measles cases submitted genomic sequence information to the Measles Nucleotide Surveillance database (MeaNS) (although not always meeting the 80% target for viral detection). In contrast, few countries submitted genomic sequence information on rubella cases to the Rubella Nucleotide Surveillance database (RubeNS). It is important to note that these genotype reports are not fully representative of the regional distribution of measles and rubella viruses. This is primarily because Member States differ in the rate of collecting specimens for viral sequencing but also due to differences in the reporting of sequence data to MeaNS/RubeNS.

Elimination status

According to the assessment conducted in 2017 by the European Regional Verification Commission for Measles and Rubella Elimination on reports submitted by 51 countries for 2016, 33 countries have eliminated measles.⁷ A further 9 countries provided evidence for the interruption of measles transmission for a period of <36 months. However, 9 countries remain endemic for measles. For rubella, 33 countries have eliminated the disease and 4 have interrupted transmission. Yet, 14 were still considered endemic for rubella. 31 countries provided evidence for the elimination of both measles and rubella transmission.

Elimination of both measles and rubella is a priority goal that all European countries have firmly committed to. To attain this goal, immunization coverage of at least 95% needs to be reached and maintained at national level and in all districts through the routine immunization programme. In addition high-quality surveillance is necessary to monitor disease occurrence for public health action but also to adequately ascertain its absence in the elimination process.

Rotavirus surveillance

The WHO-coordinated Global Rotavirus Surveillance Network (GRSN) is a network of sentinel surveillance hospitals and laboratories that enrol eligible children <5 years of age who are hospitalized for diarrhoea to determine whether rotavirus is the cause of their diarrhoea.

Staff at the surveillance hospitals enrol and collect a stool specimen (within 2 days of hospital admission) from children hospitalized with acute diarrhoea (≥ 3 loose stools in a 24-hour period before hospital admission with onset ≤ 7 days at presentation). The stool specimen is tested for rotavirus using an enzyme immunoassay. Rotavirus surveillance data are important at the country, regional and global levels to facilitate decision-making on vaccine policy to introduce the rotavirus vaccine (RVV) in the national immunization schedule and to document the impact of RVV once introduced.

Seven Member States of the WHO European Region (Region) participated in GRSN in 2016: Armenia, Azerbaijan, Georgia, Republic of Moldova, Tajikistan, Ukraine and Uzbekistan. The countries joined the GRSN in different years (from 2008 to 2014) and all were eligible to receive financial support from Gavi, the Vaccine Alliance to introduce RVV.

Regional contribution to rotavirus surveillance thus far

Disease burden information gained through rotavirus surveillance led to the decision to add monovalent RVV to the national immunization schedule in 5 of the 7 GRSN-participating countries in the Region. With financial support from Gavi, the Vaccine Alliance, RVV was introduced in Armenia and the Republic of Moldova in 2012, Georgia in 2013, Uzbekistan in 2014 and Tajikistan in 2015. Azerbaijan and Ukraine have not introduced RVV.

Rotavirus surveillance data were also used to monitor the impact of RVV introduction on the disease burden and to estimate the effectiveness of the vaccine. Among the GRSN-participating countries in the Region, Armenia and Republic of Moldova were the earliest to introduce RVV. In Armenia, the percentage of rotavirus-associated hospitalizations among children <5 years of age fell from 38% to 20% in the first year and to 10% in the second year following RVV introduction. The vaccine effectiveness for a 2-dose schedule against severe rotavirus hospitalizations was 79% among children 6–23 months of age.⁸ Similarly, in Republic of Moldova, the percentage of rotavirus-associated hospitalizations among children <5 years of age fell from 45% to 25% in

the first year and to 14% in the second year following RVV introduction. The vaccine effectiveness for a 2-dose schedule against severe rotavirus hospitalizations was 84% among children 6–23 months of age.⁹

Regional rotavirus surveillance results for 2016

Eleven sentinel surveillance hospitals in 7 Member States reported data on children <5 years of age with acute diarrhoea in 2016. Children were enrolled at one sentinel surveillance hospital in Azerbaijan, Georgia and Tajikistan and at 2 sentinel hospitals in Armenia, Republic of Moldova, Ukraine and Uzbekistan. The number and rotavirus positivity of stool specimens tested varied by country (Fig. 9, page 13).

The number of specimens tested ranged from 719 in Azerbaijan to 5832 in Uzbekistan. Of the total 14 249 specimens tested, nearly 1 in 6 (16%; 2324) was found to be infected with rotavirus. The percentage of hospital admissions positive for rotavirus ranged from 6% in Armenia to 34% in Ukraine (Fig. 9).

In the two-year period before RVV introduction in Armenia, Georgia, Republic of Moldova and Tajikistan, the percentage of rotavirus-associated hospitalizations ranged from 18% in Georgia to 45% in Republic of Moldova. Uzbekistan did not conduct rotavirus surveillance two years before vaccine introduction; however, 2005–2006 data from a similar sentinel surveillance system indicated that 30% of hospitalizations for the treatment of acute diarrhoea among children <5 years of age tested positive for rotavirus. The percentage of rotavirus-associated hospitalizations among children <5 years of age decreased in all five countries after the introduction of RVV (Fig. 10, page 13).

Based on the 742 strains that were typed for 2016, the following 6 genotypes accounted for 91% of the strains circulating in the GSRN-participating countries: G4P[8], G1P[8], G2P[4], G9P[8], G3P[8] and G9P[4].

Rotavirus external quality assessment

Rotavirus laboratories participating in GSRN are invited to participate in an annual external quality assessment (EQA) exercise. Rotavirus proficiency panels used in the EQA exercise consist of lyophilized, non-infectious samples.

In 2016, all of the GSRN-participating rotavirus laboratories in the Region (n=9) passed the enzyme immunoassay (EIA) exercise to identify rotavirus and both of the laboratories with genotyping capacities passed the genotyping exercise. EQA is an important tool in the

Region to identify gaps and weaknesses in each participating laboratory and to strengthen laboratory data quality and reliability.

Expanded use of rotavirus surveillance platform

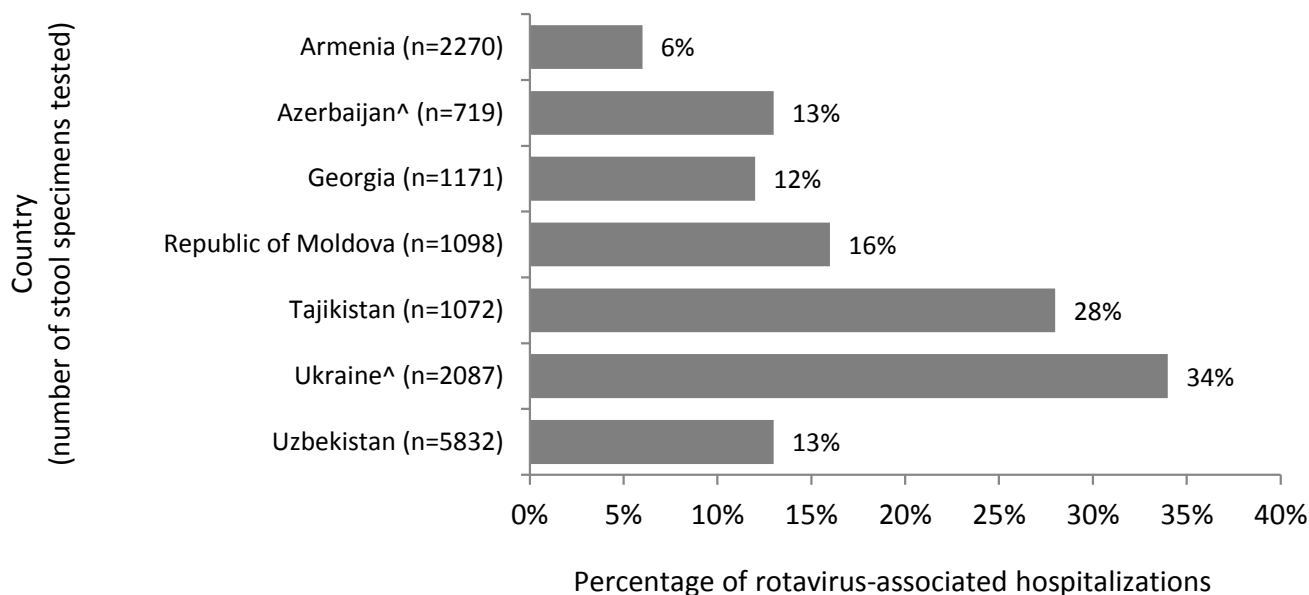
In 2017, the Global Paediatric Diarrhoeal Surveillance (GPDS) network was created, using a subset of GSRN-participating Member States, to monitor severe paediatric diarrhoea. One site in each of the following five Member States in the Region began participation in GPDS in January 2017: Armenia, Republic of Moldova, Tajikistan, Ukraine and Uzbekistan. The objectives of GPDS are to determine the hierarchy of the causes of paediatric diarrhoea requiring hospitalization in the post-RVV era while continuing to monitor the impact of rotavirus vaccine. GPDS data will contribute to global estimates of diarrhoeal disease burden and provide molecular information that will aid in enteric vaccine development.

For GPDS, the case definition was expanded from children <5 years of age hospitalized with acute watery diarrhoea, as recommended for rotavirus surveillance, to include all paediatric diarrhoea including chronic and bloody diarrhoea. In 2017, the existing WHO Regional Reference Laboratory (RRL) for rotavirus in Minsk, Belarus was equipped and staff was trained to perform qPCR using TAC. Quantitative polymerase chain reaction (qPCR) is performed using TaqMan array cards (TAC) on stool specimens from a randomly selected subset of children <5 years hospitalized for the treatment of diarrhoea. Each specimen is tested for more than 20 enteric pathogens at the RRL.

Preliminary results from stool specimens collected between January and June 2017 indicate that the prevalence of enteric pathogens varied by country. Combining results from the participating Member States, the most commonly detected pathogen was rotavirus followed by norovirus GII, enteroaggregative *Escherichia coli* (EAEC), atypical enteropathogenic *Escherichia coli* (aEPEC) and *Campylobacter jejuni/coli*.

These data are preliminary and do not include a full year, therefore results may be biased because the peak of each disease may be included or missing. Next steps include analysing a full year of qPCR data linked to the clinical and surveillance data from GPDS to estimate attributable fractions for each enteric pathogen by country. The monitoring of gastroenteritis pathogens will facilitate decision-making by Member States regarding future introduction of enteric vaccines currently in development for *Shigella*, enterotoxigenic *Escherichia coli* (ETEC) and norovirus.

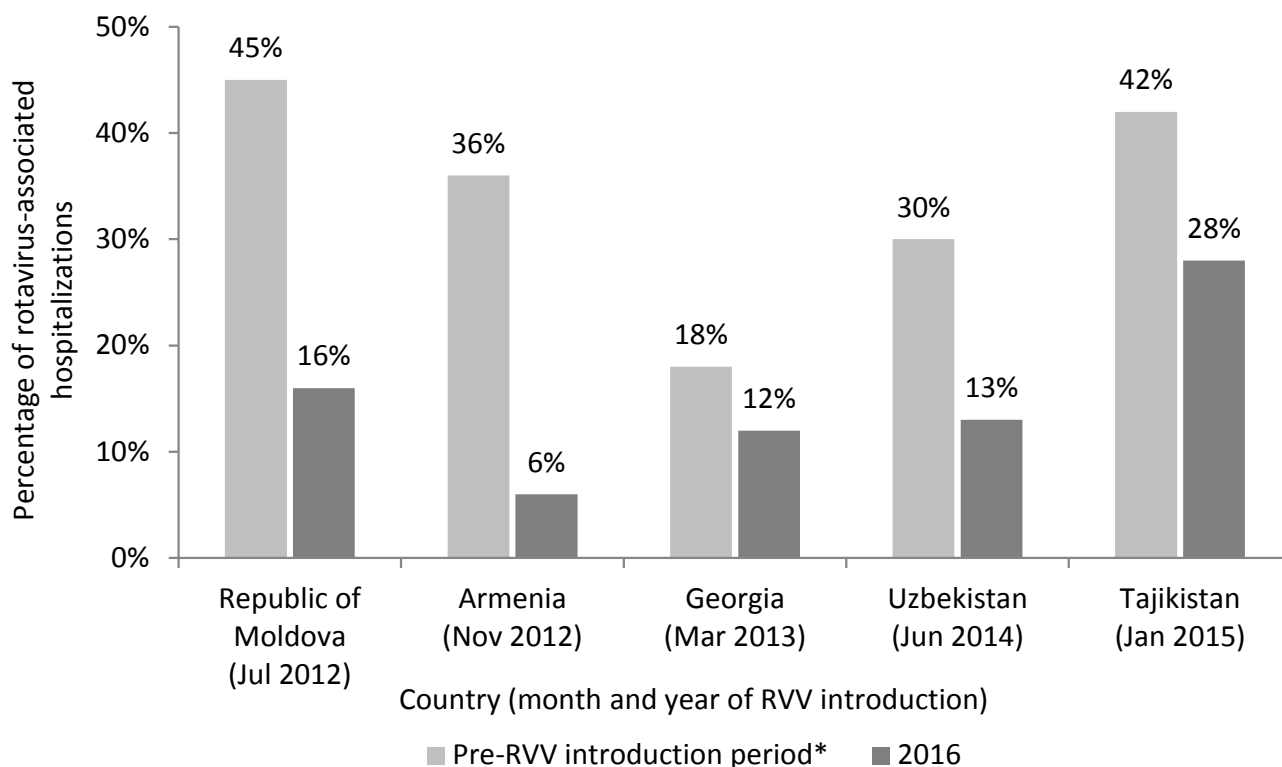
Fig. 9. Rotavirus positivity of hospitalization for treatment of acute diarrhoea among eligible* children <5 years of age — GRSN, WHO European Region, 2016



*Any child <5 years of age admitted to the hospital for the treatment of acute diarrhoea (≥ 3 loose stools in a 24-hour period before hospital admission with onset ≤ 7 days at presentation)

^ Azerbaijan and Ukraine have not introduced RVV.

Fig. 10. Rotavirus positivity of hospitalization for treatment of acute diarrhoea among eligible children <5 years of age by country and pre- and post-rotavirus vaccine (RVV) introduction periods — GRSN, WHO European Region, 2016



*This period includes the two years prior to RVV introduction for all countries except Uzbekistan, which is 2005—2006.

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Annex

Table 1. Measles cases: classification, reporting and surveillance performance 2017 (as of 16 April 2018)

Country	Total Population in 2017 ¹	2016 (as of 16 April 2018)					2017												
		Incidence Rate (per 1 million population) ²	Total measles cases ²	Total measles death	Annualized Incidence Rate (per 1 million population) ²	Total measles cases ²	Classification			Discarded Measles	Imported cases	Measles Death	Reporting			Surveillance Indicators			
							Lab confirmed	Epi-Link	Clinically compatible ⁴				Completeness ⁵	Timeliness ⁵	Month & year of last report	Laboratory investigation rate ³	Rate of discarded cases ⁶	Origin of infection ³	Timeliness of investigation ⁵
Albania	2 911 428	0.0	0	-	0.0	0	0	0	0	0	0	0	83%	67%	Oct-17	-	-	-	-
Andorra	68 727	0.0	0	-	0.0	0	0	0	0	0	0	0	100%	75%	Dec-17	-	-	-	-
Armenia	3 031 670	0.7	2	0	0.3	1	1	0	0	60	0	0	92%	75%	Dec-17	100%	1.98	1.6%	98%
Austria	8 592 400	1.6	28	0	9.7	94	82	11	1	52	11	0	100%	100%	Dec-17	70%	0.61	63.7%	6%
Azerbaijan	9 973 697	0.0	0	0	0.0	0	0	0	0	88	0	0	100%	100%	Dec-17	100%	0.88	0	83%
Belarus	9 458 535	1.6	29	0	0.0	1	1	0	0	331	1	0	100%	100%	Dec-17	100%	3.50	0.3%	0%
Belgium	11 443 830	6.6	78	0	32.1	367	243	84	40	0	0	0	100%	83%	Dec-17	-	-	-	-
Bosnia and Herzegovina	3 792 759	11.9	45	0	7.1	27	0	0	27	0	0	0	92%	58%	Dec-17	-	-	-	-
Bulgaria	7 045 259	0.1	1	0	23.6	167	87	67	13	3	1	1	92%	92%	Dec-17	95%	0.04	80.6%	100%
Croatia	4 209 815	0.0	4	0	1.7	7	7	0	0	3	0	0	100%	83%	Dec-17	100%	0.07	50.0%	0
Cyprus	1 187 575	0.0	0	-	0.8	4	4	0	0	0	3	0	100%	100%	Dec-17	100%	0.00	100.0%	0
Czech Republic	10 555 130	0.2	7	0	13.5	146	140	6	0	1	4	0	100%	100%	Dec-17	100%	0.01	93.2%	88%
Denmark	5 711 837	0.0	3	0	0.4	4	4	0	0	0	2	0	100%	100%	Dec-17	100%	0.00	100.0%	0
Estonia	1 305 755	0.0	2	0	0.0	1	1	0	0	39	1	0	100%	100%	Dec-17	100%	2.99	2.5%	100%
Finland	5 541 274	0.5	5	0	0.7	10	10	0	0	0	6	0	100%	83%	Dec-17	100%	0.00	80.0%	0
France	64 938 716	1.0	79	0	7.5	520	340	88	92	0	30	1	100%	100%	Dec-17	93%	0.00	90.0%	0%
Georgia	3 972 532	3.5	14	0	23.7	96	76	12	8	52	2	0	100%	83%	Dec-17	94%	1.31	64.2%	95%
Germany	80 636 124	3.4	328	0	10.8	936	650	257	29	0	66	1	100%	100%	Dec-17	94%	0.00	87.1%	0
Greece	10 892 931	0.0	0	-	97.4	1064	632	211	221	57	3	2	100%	100%	Dec-17	76%	0.52	0.3%	0
Hungary	9 787 905	0.0	0	0	3.2	36	36	0	0	42	5	0	100%	75%	Dec-17	100%	0.43	12.8%	91%
Iceland	334 303	0.0	1	0	3.0	3	3	0	0	0	2	0	92%	75%	Dec-17	100%	0.00	66.7%	100%
Ireland	4 749 153	8.4	43	0	5.5	26	23	0	3	0	0	0	100%	100%	Dec-17	100%	0.00	88.5%	88%
Israel	8 323 248	1.0	10	0	1.8	16	16	0	0	0	1	0	83%	33%	Dec-17	63%	0.00	6.3%	63%
Italy	59 797 978	13.7	861	0	89.7	5410	4353	430	627	411	46	4	92%	92%	Dec-17	89%	0.69	83.9%	0%
Kazakhstan	18 064 470	6.1	110	0	0.1	2	0	1	1	0	0	0	92%	75%	Dec-17	-	-	-	-
Kyrgyzstan	6 124 945	0.0	0	0	0.5	5	5	0	0	152	2	0	100%	83%	Dec-17	100%	2.48	3.2%	0
Latvia	1 944 565	0.0	0	-	2.1	5	5	0	0	0	1	0	100%	100%	Dec-17	100%	0.00	20.0%	100%
Lithuania	2 830 582	7.8	22	0	0.0	2	2	0	0	0	2	0	100%	92%	Dec-17	100%	0.00	100.0%	50%
Luxembourg	584 103	0.0	0	-	1.7	4	4	0	0	0	3	0	100%	100%	Dec-17	100%	0.00	75.0%	100%
Malta	420 521	0.0	0	-	0.0	0	0	0	0	0	0	0	100%	100%	Dec-17	-	-	-	-
Monaco	38 010	-	-	-	0.0	0	0	0	0	0	0	0	25%	25%	Nov-17	-	-	-	-
Montenegro	626 250	0.0	0	-	0.0	0	0	0	0	4	0	0	92%	58%	Dec-17	100%	0.64	0	25%
Netherlands	17 032 845	0.1	6	0	0.6	16	15	1	0	1	6	0	100%	92%	Dec-17	100%	0.01	76.5%	0
Norway	5 330 800	0.0	0	-	0.0	1	1	0	0	0	1	0	100%	100%	Dec-17	100%	0.00	100.0%	100%
Poland	38 563 573	2.4	138	0	1.4	63	40	14	9	0	10	0	100%	100%	Dec-17	96%	0.00	100.0%	100%
Portugal	10 264 797	0.0	0	0	3.1	34	29	0	5	221	2	1	100%	92%	Dec-17	92%	2.15	13.3%	66%
Republic of Moldova	4 054 640	0.0	0	-	0.0	0	0	0	0	0	0	0	100%	67%	Dec-17	-	-	-	-
Romania	19 237 513	126.2	2432	12	290.6	5610	2077	3502	31	0	20	18	100%	100%	Dec-17	99%	0.00	99.9%	100%
Russian Federation	143 375 006	1.1	180	0	5.9	868	836	30	2	2379	25	0	100%	50%	Dec-17	100%	1.66	26.7%	19%
San Marino	32 104	-	-	-	0.0	0	0	0	0	0	0	0	100%	25%	Dec-17	-	-	-	-
Serbia	8 776 940	1.6	14	0	80.0	702	275	0	427	0	0	1	100%	92%	Dec-17	-	-	-	-
Slovakia	5 432 157	0.0	0	0	1.5	11	11	0	0	5	3	0	100%	100%	Dec-17	44%	0.09	68.8%	69%
Slovenia	2 071 252	0.0	1	0	2.4	7	7	0	0	0	2	0	100%	100%	Dec-17	100%	0.00	100.0%	100%
Spain	46 070 146	0.6	38	0	2.9	155	147	6	2	142	21	1	100%	92%	Dec-17	98%	0.31	10.1%	79%
Sweden	9 920 624	0.0	3	0	3.5	46	46	0	0	9	11	0	100%	100%	Dec-17	100%	0.09	83.6%	0
Switzerland	8 454 083	6.3	66	0	11.6	105	78	20	7	119	7	1	100%	100%	Dec-17	95%	1.41	43.8%	48%
Tajikistan ⁷	8 858 115	5.9	52	0	-	650	248	401	1	161	-	0	100%	83%	Dec-17	100%	1.82	66.1%	99%
The former Yugoslav Republic of Macedonia	2 083 308	0.0	0	-	9.6	20	19	1	0	0	0	0	92%	75%	Dec-17	-	-	-	-
Turkey	80 417 526	0.1	9	0	0.8	69	48	3	18	1809	3	0	100%	17%	Dec-17	100%	2.25	1.1%	96%
Turkmenistan	5 502 586	-	-	-	-	-	-	-	-	-	-	-	-	-	No Report	-	-	-	-
Ukraine	44 405 055	2.0	90	0	107.4	4767	1487	0	3280	0	0	5	100%	92%	Dec-17	-	-	-	-
United Kingdom	65 511 098	8.1	571	1	2.3	282	282	0	0	1	129	0	100%	100%	Dec-17	100%	0.00	95.8%	2%
Uzbekistan	30 690 914	0.0	1	0	0.0	0	0	0	0	52	0	0	100%	50%	Dec-17	100%	0.17	0	25%
Total/Averages	914 981 109	5.4	5273	13	24.0	22360	12371	5145	4844	6194	432	36	94.8%	81.8%		70.9%	0.68	50.1%	35.7%

Data source: Monthly aggregated and case-based data reported by Member States to WHO/Europe or via ECDC/TESSy.

¹ Source: "World Population Prospects: The 2015 Revision", New York, United Nations.

² Incidence not meeting the target (<1) and countries not reporting monthly measles data are highlighted in red. The imported measles cases are excluded from the numerator while calculating the incidence rate.

³ All confirmed measles cases regardless of origin. ⁴ Unless specified as laboratory confirmed or epi-linked, cases are classified as clinically compatible.

⁵ Target (>=80%) not achieving are highlighted in Red. ⁶ Discard rate (>=2) not achieving are highlighted in Red. ⁷ Tajikistan: Importation status of cases pending

Member States submitting aggregate data: Belgium, Bosnia and Herzegovina, Kazakhstan, Republic of Moldova, Serbia, the former Yugoslav Republic of Macedonia, Ukraine. The Surveillance Indicators could not be calculated.

Table 2. Rubella cases: classification, reporting and surveillance performance 2017 (as of 16 April 2018)

Country	Total Population in 2017 ¹	2016 (as of 16 April 2018)		2017													
		Incidence Rate (per 1 million population) ²	Total rubella cases ³	Annualized Incidence Rate (per 1 million population) ²	Total rubella cases ³	Classification			Discarded Rubella cases	Imported cases	Reporting			Surveillance Indicators			
						Lab confirmed	Epi-Link	Clinically compatible ⁴			Completeness ⁵	Timeliness ⁵	Month & year of last report	Laboratory investigation rate ⁵	Rate of discarded cases ⁶	Origin of infection ⁶	Timeliness of investigation ⁵
Albania	2 911 428	0.0	0	0.0	0	0	0	0	0	0	83%	67%	Oct-17	-	-	-	-
Andorra	68 727	0.0	0	0.0	0	0	0	0	0	0	92%	75%	Dec-17	-	-	-	-
Armenia	3 031 670	0.0	0	0.0	0	0	0	0	14	0	92%	75%	Dec-17	100%	0.46	0%	100%
Austria	8 592 400	0.3	3	4.5	42	39	1	2	0	3	100%	92%	Dec-17	98%	0.00	100%	5%
Azerbaijan	9 973 697	0.0	0	0.0	0	0	0	0	53	0	100%	100%	Dec-17	100%	0.53	0%	96%
Belarus	9 458 535	-	-	0.1	1	1	0	0	331	0	100%	100%	Dec-17	0%	3.50	0%	0%
Belgium ⁷	11 443 830	-	-	-	-	-	-	-	-	-	-	-	See footnote	-	-	-	-
Bosnia and Herzegovina	3 792 759	0.0	0	0.3	1	0	0	1	0	0	83%	50%	Dec-17	-	-	-	-
Bulgaria	7 045 259	0.4	3	0.0	0	0	0	0	0	0	100%	100%	Dec-17	-	-	-	-
Croatia	4 209 815	0.0	2	0.0	0	0	0	0	0	0	100%	67%	Dec-17	-	-	-	-
Cyprus	1 187 575	0.0	0	0.0	0	0	0	0	0	0	100%	100%	Dec-17	-	-	-	-
Czech Republic	10 555 130	0.0	0	0.1	2	2	0	0	0	1	100%	100%	Dec-17	100%	0.00	50%	0%
Denmark ⁷	5 711 837	-	-	-	-	-	-	-	-	-	-	-	See footnote	-	-	-	-
Estonia	1 305 755	0.0	0	0.0	0	0	0	0	21	0	100%	100%	Dec-17	95%	1.61	0%	100%
Finland	5 541 274	0.0	0	0.2	1	1	0	0	0	0	100%	92%	Dec-17	100%	0.00	0%	0%
France ⁷	64 938 716	-	-	-	-	-	-	-	-	-	-	-	See footnote	-	-	-	-
Georgia	3 972 532	3.0	12	1.3	5	1	0	4	61	0	100%	83%	Dec-17	91%	1.54	8%	97%
Germany	80 636 124	1.2	96	0.9	74	12	7	55	0	1	100%	100%	Dec-17	18%	0.00	43%	0%
Greece	10 892 931	0.0	0	0.0	0	0	0	0	0	0	100%	100%	Dec-17	-	-	-	-
Hungary	9 787 905	0.0	0	0.0	0	0	0	0	9	0	83%	67%	Dec-17	100%	0.09	0%	89%
Iceland	334 303	0.0	0	0.0	0	0	0	0	0	0	100%	75%	Dec-17	-	-	-	-
Ireland	4 749 153	0.2	1	0.0	0	0	0	0	0	0	100%	100%	Dec-17	-	-	-	-
Israel	8 323 248	0.1	1	0.0	0	0	0	0	0	0	83%	33%	Dec-17	-	-	-	-
Italy	59 797 978	0.5	30	1.1	68	31	7	30	28	1	100%	92%	Dec-17	83%	0.05	59%	0%
Kazakhstan	18 064 470	0.2	4	0.0	0	0	0	0	0	0	92%	75%	Dec-17	-	-	-	-
Kyrgyzstan	6 124 945	0.3	2	0.7	4	4	0	0	0	0	100%	83%	Dec-17	100%	0.00	100%	0%
Latvia	1 944 565	0.0	0	0.0	0	0	0	0	0	0	100%	100%	Dec-17	-	-	-	-
Lithuania	2 830 582	0.0	0	0.0	0	0	0	0	0	0	100%	92%	Dec-17	-	-	-	-
Luxembourg	584 103	0.0	0	0.0	0	0	0	0	0	0	100%	100%	Dec-17	-	-	-	-
Malta	420 521	0.0	0	0.0	0	0	0	0	0	0	100%	100%	Dec-17	-	-	-	-
Monaco	38 010	-	-	-	-	-	-	-	-	-	-	-	No Report	-	-	-	-
Montenegro	626 250	0.0	0	0.0	0	0	0	0	0	0	92%	58%	Dec-17	-	-	-	-
Netherlands	17 032 845	0.0	0	0.0	0	0	0	0	0	0	100%	83%	Dec-17	-	-	-	-
Norway	5 330 800	0.0	0	0.0	0	0	0	0	0	0	100%	100%	Dec-17	-	-	-	-
Poland	38 563 573	28.7	1105	12.9	496	6	3	487	0	0	100%	100%	Dec-17	-	-	-	-
Portugal	10 264 797	0.8	8	0.4	4	0	0	4	10	0	100%	58%	Dec-17	64%	0.10	29%	50%
Republic of Moldova	4 054 640	0.0	0	0.0	0	0	0	0	0	0	92%	58%	Dec-17	-	-	-	-
Romania	19 237 513	0.7	13	0.5	9	6	0	3	0	0	83%	67%	Dec-17	78%	0.00	100%	100%
Russian Federation	143 375 006	0.2	37	0.0	7	7	0	0	0	1	100%	50%	Dec-17	100%	0.00	100%	29%
San Marino	32 104	-	-	0.0	0	0	0	0	0	0	25%	8%	Dec-17	-	-	-	-
Serbia	8 776 940	-	-	-	-	-	-	-	-	-	-	-	No Report	-	-	-	-
Slovakia	5 432 157	0.0	0	0.2	1	0	0	1	1	0	100%	100%	Dec-17	50%	0.02	50%	50%
Slovenia	2 071 252	0.0	0	0.0	0	0	0	0	0	0	100%	100%	Dec-17	-	-	-	-
Spain	46 070 146	0.0	2	0.0	1	1	0	0	15	1	100%	100%	Dec-17	100%	0.03	6%	94%
Sweden	9 920 624	0.0	0	0.0	0	0	0	0	0	0	100%	100%	Dec-17	-	-	-	-
Switzerland	8 454 083	0.0	0	0.1	1	1	0	0	22	0	100%	100%	Dec-17	96%	0.26	0%	22%
Tajikistan	8 858 115	0.1	1	0.1	1	1	0	0	21	0	83%	67%	Dec-17	100%	0.24	5%	86%
The former Yugoslav Republic of Macedonia	2 083 308	0.0	0	0.0	0	0	0	0	0	0	92%	75%	Dec-17	-	-	-	-
Turkey	80 417 526	-	-	0.0	2	1	0	1	1809	0	100%	17%	Dec-17	0%	2.25	0%	0%
Turkmenistan	5 502 586	-	-	-	-	-	-	-	-	-	-	-	No Report	-	-	-	-
Ukraine	44 405 055	-	-	-	-	-	-	-	-	-	-	-	No Report	-	-	-	-
United Kingdom	65 511 098	0.0	2	0.0	3	3	0	0	0	3	100%	100%	Dec-17	100%	0.00	100%	33%
Uzbekistan	30 690 914	0.0	0	0.0	1	1	0	0	2	0	100%	50%	Dec-17	100%	0.01	33%	33%
Total/Averages	914 981 109	1.4	1322	0.8	724	118	18	588	2397	11	84.1%	71.5%		12.3%	0.26	5.4%	7.1%

Data source: Monthly aggregated and case-based data reported by Member States to WHO/Europe or via ECDC/TESSy.

¹ Source: World Population Prospects: The 2015 Revision, New York, United Nations.

² Incidence not meeting the target (<1) and countries not reporting monthly rubella data are highlighted in red. The imported rubella cases are excluded from the numerator while calculating the incidence rate.

³ All confirmed rubella cases regardless of origin. ⁴ Unless specified as laboratory confirmed or epi-linked, cases are classified as clinically compatible.

⁵ Target (>=80%) not achieving are highlighted in Red. NA for countries submitting aggregated data. ⁶ Discard rate (>=2) not achieving are highlighted in Red.

⁷ Belgium, Denmark, and France do not have comprehensive rubella surveillance systems.

Member States submitting aggregate data: Bosnia and Herzegovina, Kazakhstan, Poland, Republic of Moldova, the former Yugoslav Republic of Macedonia. The Surveillance Indicators could not be calculated.