

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 during 2015 in selected countries: Croatia, Germany, Israel and Italy. These short reports are based on information supplied separately by the countries. A short report on pertussis in Spain in 2015 is also included.

The surveillance data presented in this issue are based on datasets as reported by Member States as of 2 May 2016 and are incorporated in the centralized information system for infectious diseases.¹ Tabulated surveillance data by country for 2015 are published separately as EpiData no. 1/2016, and annexed to this issue.* The analyses of these data are performed on cases with disease onset dates during 2015. 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.

The surveillance data, and the virus sequence data entered in the Measles Nucleotide Surveillance database (MeaNS)² and the Rubella Nucleotide Surveillance database (RubeNS)³ may be updated following the publication of this report.

Measles in the WHO European Region in 2015

Incidence – notifications and laboratory data

For 2015, 30 762 measles cases were reported in 39 countries of the WHO European Region among 50 (94%) countries that submitted measles data (including zero reporting). Three countries, namely Monaco, San Marino and Turkmenistan, did not submit reports.

Of the total, 88% of cases (n=27 085) were reported by four countries: Kyrgyzstan (17 779; 58%), Bosnia and Herzegovina (4583; 15%), Germany (2383; 8%), Kazakhstan (2340; 8%). Another six countries reported 8% of cases: Russian Federation (640; 2%), Georgia (430; 2%), France (373; 1%), Serbia (368; 1%), Turkey (342; 1%) and Austria (306; 1%). With 3935 cases of

measles, the European Union as a whole reported 13% of all cases in the Region. The highest incidence per million population for 2015 was reported in Kyrgyzstan (2993.1) followed by Bosnia and Herzegovina (1202.8).

Of the total, 7193 (23%) cases were laboratory confirmed and 1068 (3%) were epidemiologically linked cases. The remaining 22 501 (73%) were classified as clinically compatible cases.

During 2015, 900 measles virus sequences were reported to MeaNS by reference laboratories of the WHO European Region (as of 31 May 2016). The genotypes identified in the Region comprised D8 (n=753), B3 (116), H1 (22), D4 (7) and D9 (2).

The predominant measles virus genotypes reported for 2015 included several lineages of D8. These variants were reported by 27 countries, of which 16 countries reported the dominant named strain Rostov-On-Don and six countries reported the newly named strain Chui. Other D8 “named strains” (Frankfurt-Main, Hulu Langat, Republic of Komi, Victoria and Villipuram) were less frequently reported. Variants of measles virus genotype B3 were reported by 16 countries and genotype H1 by six countries. The latter two genotypes were frequently associated with importation. Genotypes D4 and D9 were identified in just a few cases.

Age distribution

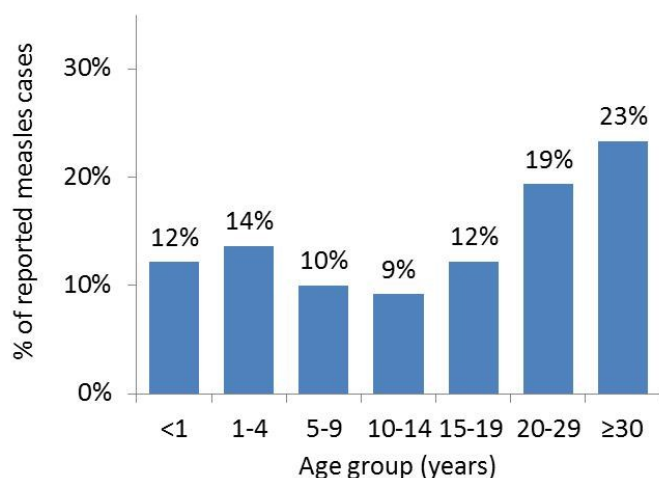
The age group was known in 35% of cases (n=10 630) of which 43% (n=4541) were 20 years and older (Fig. 1). Fig. 2 shows the age distribution of measles cases in the top four countries in the Region that together reported 71% of cases with data on age.

Vaccination status

Vaccination status was known in 35% of cases (n=10 638). Of the 5640 unvaccinated cases (53%), all but one case had data on age: 1197 cases (21%) were <1 year old, 1002 cases (18%) were 1–4 years, 695 cases (12%) were 5–9 years, 1223 cases (22%) were 10–19 years old and 1522 cases (27%) were ≥20 years old. The remaining 4998 cases (47%) were reportedly vaccinated with at least one measles-containing vaccine dose.

*WHO EpiData no. 1/2016, is annexed to this report and also available separately at www.euro.who.int/epidata-1-2016

Fig. 1. Age distribution of measles cases in the WHO European Region, 2015 (n=10 630)*



N.B. Discarded cases are not included.

*For 20 132 cases the age group was not reported. These cases are therefore not included in the graph.

Hospitalization

Data on hospitalization status was available for 19% (n=5782) of all reported measles cases. Of these, 3293 were hospitalized, amounting to 57% of all cases with known hospitalization status. Of all the hospitalized cases, most were reported from Kazakhstan (n=1966; 60%) and the Russian Federation (n=503; 15%). Hospitalisation status of cases was not submitted by Bosnia and Herzegovina and Kyrgyzstan.

Imported cases

Importation status was known for 15% (n=3869) of cases. Of these, 284 were reported as imported cases, amounting to 7% of cases with a known importation status. Of all the imported cases, most (79%; n=223) were reported from the United Kingdom (n=66), Germany (57), France (27), Uzbekistan (19), Austria (17), Italy (17), Croatia (10) and Poland (10). No data on importation status of cases were received from Bosnia and Herzegovina and Kyrgyzstan.

Fig. 2. Age distribution of measles cases in the four countries that together reported 71% of cases with data on age in the WHO European Region, 2015 (n=7598)



* For 2345 cases in Bosnia and Herzegovina, two cases in Germany and one case in the Russian Federation the age group was not reported. These cases are therefore not included in the graphs.

Rubella in the WHO European Region in 2015

Incidence – notifications and laboratory data

For 2015, 2368 rubella cases were reported in 23 countries of the WHO European Region among 44 (83%) countries submitting rubella data (including zero reporting). Most cases were reported by Poland (n=2029; 86%), which also had the highest incidence per million population (52.5), followed by Georgia (n=100; 4%), Germany (n=91; 4%) and Italy (n=39; 2%).

Of the total, 84 (4%) cases were laboratory-confirmed, most of which were reported from Germany (19 cases), Italy (16 cases), Russian Federation (14 cases), Finland (10 cases) and the United Kingdom (10 cases). None of the cases reported by Poland were laboratory confirmed.

During 2015, seven rubella virus sequences were entered in RubeNS. The identified genotypes comprised 2B (n=6) and 1a (1).

Age distribution

The age group was known in almost all cases (n=2364), of which 94 cases (4%) were 15–19 years old and 394 cases (17%) were ≥20 years old (Fig. 3).

Vaccination status

Vaccination status was known in 99.8% of cases (n=2364). Of the 780 (33%) unvaccinated cases, 258 cases (33%) were <1 year old, 180 cases (23%) were 1–4 years old, 78 cases (10%) were 5–9 years old, 18 cases (2%) were 10–14 years old and 246 cases (32%) were ≥15 years old. The remaining 1584 cases (67%) were reportedly vaccinated with at least one rubella-containing vaccine dose. Of these, 1401 cases were reported from Poland.

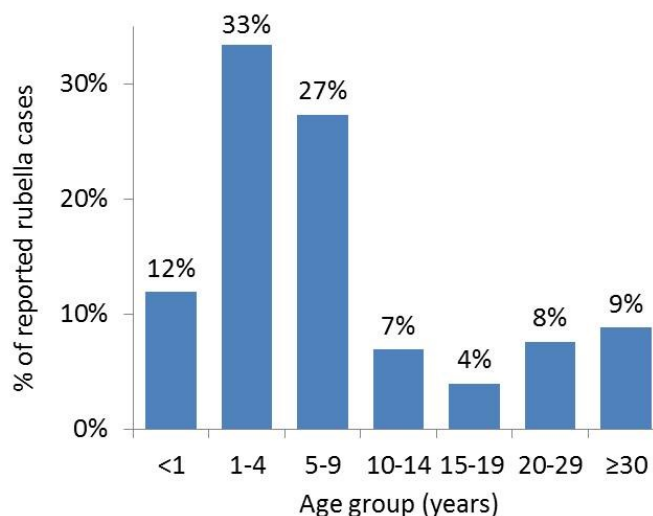
Imported cases

Importation status was known in 11% (n=249) of rubella cases. Of these, 18 were reported as imported cases, amounting to 7% of cases with a known importation status. The imported cases were reported from the United Kingdom (n=8), Italy (3), Finland (2), Germany (2), Belarus (1), Netherlands (1) and Portugal (1).

Measles outbreak in Croatia

Croatia reported an outbreak of measles that started in December 2014 and ended in summer 2015. A total of 220 measles cases were notified to the Croatian Institute of Public Health (CIPH). The first identified case was a 6-year-old child from the city of Zagreb. The child fell ill on 1 December 2014 upon returning from Berlin, Germany, and was diagnosed as a clinical case

Fig. 3. Age distribution of rubella cases in the WHO European Region, 2014 (n=2364)*



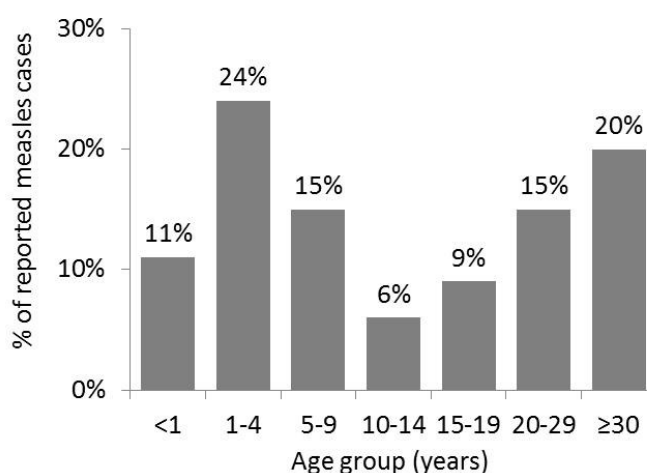
N.B. Discarded cases are not included.

*For four cases the age group was not reported. These cases are therefore not included in the graph.

of measles on 3 December 2014. The case was reported to the health authorities that same day. On 10 December 2014, the brother of the first case also fell ill. This second case was laboratory confirmed. These and two other family members formed the first cluster. In total, 14 cases had disease onset date in 2014 and 206 had disease onset date in 2015. The last case had onset of symptoms on 8 June 2015.

Most cases (58%; n=128) occurred in the city of Zagreb and Zagreb county, with the remaining cases occurring in 10 out of 21 counties of the country. The age group of the cases was known in all cases. Most were adults aged 20 years and older (Fig. 4). Vaccination status was known in 161 cases, of which 150 (93%) were

Fig. 4. Age distribution of measles cases in Croatia, 2015 (n=220)



unvaccinated. The majority of cases were members of large Roma families with extensive family contacts in Bosnia and Herzegovina (where measles was also circulating). Measles was also reported among health care workers: four physicians, three nurses and two auxiliary staff.

Of the total cases, 148 were laboratory confirmed (67%) and 72 were classified as possible cases (33%). Altogether, measles virus genotype D8 was identified in 31 laboratory-confirmed cases. In addition to the first identified case, which had a history of recent travel from Germany (measles virus genotype D8), several other cases also had a history of recent travel: seven cases from Bosnia and Herzegovina, two cases from Serbia (one case with measles virus genotype D8) and one case from Austria.

Hospitalization was reported for 41 cases (23%) with a known hospitalization status (n=180). Pneumonia as a complication of measles occurred in nine cases and otitis media in two cases. No measles-related deaths were reported.

Outbreak response measures

CIPH issued three press releases to raise awareness of the measles situation and support measures to contain the outbreak. The first press release was issued on 16 December 2014 soon after the first few cases of measles had been notified. Since then, CIPH has disseminated relevant information to the public on numerous occasions through the media and its website.

Together with the county public health authorities, CIPH was responsible for investigating the outbreak. This included active case finding and contact tracing for the identification of susceptible individuals and organizing catch-up immunizations for unvaccinated individuals. Susceptible individuals exposed to measles infection were encouraged to receive two doses of the combined measles, mumps and rubella (MMR) vaccine.

Letters were sent to parents of unvaccinated children and to all public health professionals to raise awareness about measles and strongly recommend that under-vaccinated children receive catch-up immunizations as soon as possible.

Guidance was also given on how to detect, investigate and report suspected cases and collect clinical specimens for laboratory investigation. Public health

professionals were reminded of the importance of checking the vaccination status of children and ensure that they are vaccinated according to the national vaccination schedule. By the end of May 2015, 605 children received their first measles-containing vaccine.

Measles in Germany

Measles became a notifiable disease in Germany in 2001. Since initiation of statutory notification, an overall declining trend in measles incidence has been observed, with peaks occurring every 2–3 years. In 2015, Germany experienced the highest annual incidence of measles since 2002. Several outbreaks were reported from different federal states, mostly from the eastern part of the country.

As of 1 March 2016, a total of 2464 measles cases were notified for 2015 to the Robert Koch Institute – the national public health authority in Germany. Fourteen of 16 federal states reported measles cases for 2015 (Table 1). Half of the cases (n=1243) occurred in the capital city, Berlin, followed by the federal states of Saxony and Thuringia (271 and 169 cases, respectively), all located in the eastern part of Germany. Cases in Saxony and Thuringia were mainly linked to outbreaks which started in schools.

Of the total, all but two cases had information on age: 199 (8%) were infants <1 year, 399 (16%) were young children 1–4 years old and 920 (37%) were adults aged 20 years and older.

The vast majority of the cases had information on vaccination status (n=2303; 94%), of whom 1970 were unvaccinated (86%). Hospitalization was reported for 576 cases (23%), of whom 318 (55%) were 20 years and older.

The 2014–2015 measles outbreak in Berlin

The largest outbreak in Germany in 2014–2015 occurred in the capital Berlin (see also WHO EpiBrief 1/2015⁴). It is believed to have started in early October 2014 when a child asylum-seeker from Bosnia and Herzegovina arrived in Berlin after a long-distance coach journey with the disease. The infection spread among residents of several asylum-seeker shelters and eventually to the city's general population. The last case of the outbreak was notified on 20 August 2015, by which time a total of 1358 cases had been reported from the federal state of Berlin.

Table 1. Number of measles cases in Germany by federal state, 2015

Federal state	Number of cases	Incidence (per million inhabitants)
Berlin	1243	361.1
Saxony	271	65.0
Thuringia	169	75.1
Bavaria	164	13.1
Baden-Württemberg	111	10.3
Brandenburg	101	40.2
Hamburg	87	49.0
Saxony-Anhalt	71	30.1
North Rhine-Westphalia	70	3.9
Hesse	64	10.6
Lower Saxony	50	6.3
Schleswig-Holstein	41	14.5
Mecklenburg-West Pomerania	16	9.7
Rhineland-Palatinate	6	1.5
Saarland	0	0
Bremen	0	0
TOTAL	2464	30.1

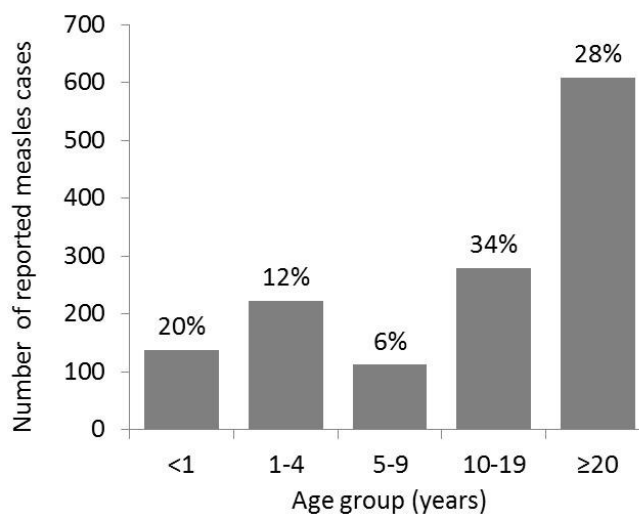
Of these, 955 cases (70%) were laboratory confirmed, 255 cases (19%) were epidemiologically linked to laboratory-confirmed cases and 148 cases (11%) were clinically compatible to measles. An identical measles virus genotype D8 (Rostov-on-Don RUS/47.13/2) was identified in almost all investigated cases from Berlin, including the index case.

The age distribution of cases is shown in Fig. 5. Hospitalization was reported for 351 cases (26%), of whom 207 (59%) were 20 years and older. One measles-related death was reported in an unvaccinated toddler. No cases with measles-related encephalitis were reported.

Outbreak response and control measures in Germany, 2015

In response to local outbreaks, local health authorities of the affected areas provided post-exposure vaccinations in outbreak-affected institutions (e.g. schools or asylum-seekers' shelters) and disseminated relevant information to health professionals and the public.

Fig. 5. Age distribution of measles cases in Berlin, Germany, 2014–2015 (n=1358)



Public health professionals were especially reminded of the need to detect, investigate and report suspected cases as soon as possible and to identify chains of transmission. The public was strongly encouraged to receive free catch-up immunizations, particularly adolescents and adults, as soon as possible according to official recommendations.

At national level, catch-up vaccination has been recommended since 2010 for all persons born after 1970 with no or only one previous measles-containing vaccine dose or with unknown vaccination status.⁵ Individual catch-up vaccinations are usually provided by private physicians. Due to the lack of an immunization register, there is no data on the effectiveness of the communication activities in respect to increasing vaccine uptake in the population. However, monthly sales of measles vaccines increased by as much as 50% (in March 2015) compared with the monthly average in 2014 (range: 105 000 to 173 000 doses per month).

Comments

The occurrence of measles mostly in the eastern part of the country is a new development in the epidemiology of measles in Germany. Since 2001 measles incidence and the number of outbreaks have been higher in the western part of the country due to historic differences in immunization systems and vaccine uptake before reunification of the country in 1990. Prior to 1990, in the eastern part of the country, measles vaccination was mandatory and vaccination coverage was higher than in the western part of Germany. Despite this, the eastern part of the

country has been experiencing an increasing trend in the incidence of measles in recent years. This may be the result of an influx of new residents from other parts of the country with lower coverage and a decline in vaccination coverage in the eastern part of the country after the reunification.⁶

Development of a “National Action Plan for the Elimination of Measles and Rubella in Germany 2015–2020” was initiated in 2014 by a working group consisting of representatives from federal health authorities, the federal states, and other relevant stakeholders (e.g. professional societies and health insurance companies).⁷ The Action Plan was discussed at a national conference on the elimination of measles and rubella with relevant stakeholders in December 2014 and endorsed in June 2015 by the health ministers of the federal states in Germany.

The Action Plan is expected to be an important stimulus for enhanced and better-coordinated activities with the goal of controlling and finally eliminating measles and rubella in Germany.

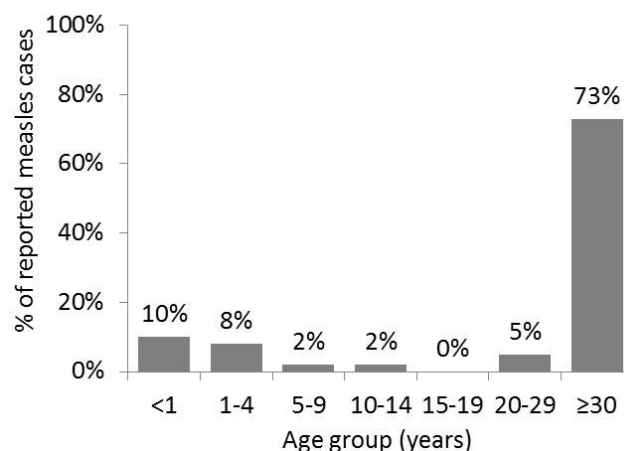
Measles outbreak in Israel

An outbreak of measles with 60 cases was reported in Israel in 2015. The first identified case had onset of rash on 25 January 2015. The last case had onset of rash on 28 July 2015. Imported and import-related cases that constituted small clusters of measles occurred simultaneously but were unrelated to this particular outbreak and are not reported here.

The outbreak began in the city of Holon (just south of the city of Tel Aviv) in a 53-year-old male who was later admitted to the hospital. The source of his infection was not determined. Most cases (93%; n=56) occurred in the Tel Aviv District, with the remaining cases occurring in Haifa District (1 case) and in three cities (Rishon Le Zion, Modiin and Kfar Saba) in the Central District (one case each).

The age of the cases ranged from 4 months to 66 years. Most cases (73%; n=44) were adults aged 30 years and older (Fig. 6). These included 33 cases aged 37 to 58, who were not targeted by the national measles vaccination programme when it was introduced, and had not developed natural immunity to the disease. None of the cases are known to have been immunized.

Fig. 6. Age distribution of measles cases in Tel Aviv outbreak, 2015, (n=60)



Of the total cases, 53 (88%) were laboratory confirmed using serological or PCR techniques. The remaining seven cases were classified as epidemiologically linked to laboratory-confirmed cases. Measles virus genotype B3 was identified in 32 laboratory-confirmed cases.

Hospitalization was reported for 33 cases (55%). Acute encephalitis developed in one patient, who later died. This was a 65-year-old-male, who on current policy would have been expected to be naturally immune. The patient had prior medical conditions including heart disease.

Outbreak response measures

District health authorities investigated the cases and offered immunization to unvaccinated contacts. Immunization was also offered to all residents of a residential building and all workers on the floor of an office building where several cases were reported. Susceptible individuals exposed to measles infection were encouraged to complete the two-dose schedule of MMR vaccination.

Outbreak control measures included investigation of the cases, immunization of unvaccinated contacts and active outreach to behind-schedule children in Mother and Child clinics and in schools. Outbreak response guidelines requiring validation of immunization status of health care workers and isolation of suspected cases were circulated to hospitals and health maintenance organizations.

Measles and rubella in Italy

Measles

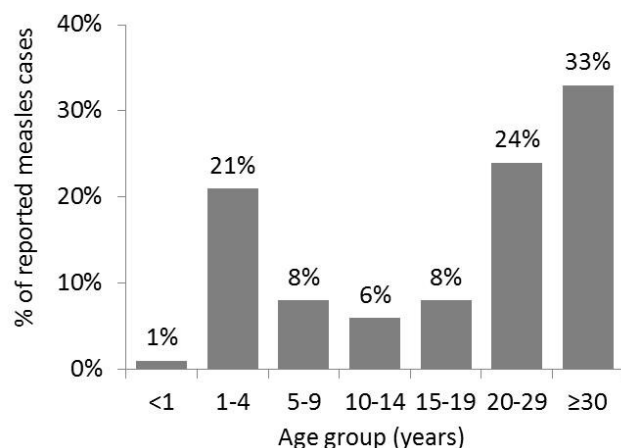
In 2015, Italy reported 253 cases of measles. This represents a decline of 85% of cases compared with 2014 when 1696 cases were reported. Cases in 2015 were reported in 18 of the 21 regions of the country, however most (76%) were reported in five regions: Lombardy (33%; n=83), Lazio (14%; n=35), Campania (10%; n=26) and Veneto (9%; n=23) and the autonomous province of Bolzano (10%; n=24). The latter also had the highest incidence at the first administrative sub-national level (4.6 per 100 000 inhabitants).

The median age of cases was 22 years (range: 4 months–84 years). More than half the cases (57%; n=143) occurred in those 20 years and older (Fig. 7). Two cases were infants <1 year old, who were too young to be vaccinated according to the national childhood vaccination schedule.

Of the total, 152 cases (61%) were laboratory confirmed. Vaccination status was known for 228 cases (90%), of which 193 cases (84%) were unvaccinated, 24 cases (11%) were vaccinated with one dose, six cases (3%) received two doses and five cases (2%) had a history of vaccination but the number of doses was unknown.

Of the total, 107 cases (43%) were hospitalized and 37 cases (15%) visited an accident and emergency department of a hospital. Complications were reported in 68 cases (27%). Diarrhoea was reported in 26 cases and acute pneumonia in 18 cases.

Fig. 7. Age distribution of measles cases in Italy, 2015 (n=253)



Rubella

In 2015, Italy reported 39 cases of rubella. This represents an increase of 50% compared with 2014, when 26 cases were reported. Cases in 2015 were reported in 10 of the 21 regions of the country, but mostly (77%; n=30) from Lombardy (9 cases), Campania (7 cases), Calabria (6 cases), and Emilia-Romagna and Lazio (4 cases each).

The median age of cases was 16 years (range: 9 months–81 years). Seventeen cases (44%) occurred in the age group 15–39 years. Children 1–4 years of age constituted 36% of cases (n=14) and 1 case was an infant <1 year old.

Sixteen cases (41%) were laboratory confirmed. Vaccination status is known for 34 cases (87%), of which 20 cases (59%) were unvaccinated and 14 cases (41%) were vaccinated. A pregnant, not immunized woman with confirmed rubella infection was reported in 2015. The patient interrupted the pregnancy at 11 weeks. No cases of congenital rubella syndrome were reported.

Measles and rubella elimination activities in Italy

A workshop on integrated surveillance for measles and rubella, and on congenital rubella and rubella in pregnancy, was organized in June 2015 to review the functioning of the system and identify critical issues. The overall objective was to improve data reporting, quality and availability. The workshop highlighted the need to assess the sensitivity of the surveillance system for congenital rubella and rubella in pregnancy. For this purpose a capture-recapture analysis of data was conducted in 2015. Cases of congenital rubella notified to the national surveillance system were compared to the hospital discharge records for the period 2010–2014. The underreporting was estimated to be 49%.

In 2015, the Italian National Public Health Institute (Istituto Superiore di Sanità) and Kessler Foundation (Trento, Italy) developed a stochastic agent-based model using all available data (incidence, sero-epidemiology and coverage data). Four scenarios were simulated for coverage levels with the first and second dose of measles- and rubella-containing vaccines in different Italian regions. According to the model predictions, none of the Italian regions will reach the elimination target in the short term without supplementary immunization activities (SIAs). The specific activities will be determined on a regional basis, depending on local vaccination coverage and population immunity profiles.

To sustain the National Measles and Rubella Elimination Plan, the Ministry of Health recently funded a two-year national project, involving the Istituto Superiore di Sanità and the regions. The project consists of coordinated interventions, such as training of health care workers, a communications plan and SIAs. In addition to these activities, a network of sub-national proficient laboratories fulfilling WHO criteria will be established by the WHO-accredited measles and rubella national reference laboratory.

Comments: measles and rubella in the WHO European Region in 2015

As in recent years, measles in the Region continues to be characterized by the occurrence of large-scale measles outbreaks in a few countries. In 2015, Kyrgyzstan reported the largest number of cases with over 17 779 cases and the highest incidence (2993.1 per million inhabitants) in the Region. Continuing transmission and outbreaks in the Region that started in 2014 have been reported in several countries.

The analysis of age distribution of cases did not include cases from Kyrgyzstan as no data on age was provided. Overall, for the rest of the Region 45% of measles cases were adults aged 20 years and older. The absence of policies and technical capacities to systematically address the vaccination needs of susceptible adults in many countries presents challenges to close immunity gaps in the adult population. Therefore, innovative ways need to be explored to effectively reach out to adults who are still susceptible to measles and rubella, and indeed, other vaccine-preventable diseases.

Rubella continues to be reported in fewer countries than measles. The number of reported cases in the Region for 2015 is 64% lower than that reported for 2014 (n=6607). This is attributed to the 66% decline in reported rubella cases in Poland, from 5899 for 2014 to 2029 for 2015. The lack of laboratory confirmation and further investigation of reported cases and absence of response measures to control rubella in Poland remain of concern in relation to the Region's goal for eliminating the disease.

Not all countries respond adequately to outbreaks, thereby allowing extension of transmission for periods longer than a year in some cases. Some countries are unwilling to undertake vaccination campaigns due to the poor acceptance of mass immunization by health authorities and the general public, and the lack of infrastructure to vaccinate specific susceptible

population groups, dedicated financial resources, political commitment and secure vaccine supply. Adequate outbreak responses are also required particularly in active case finding, contact tracing and in the laboratory component of surveillance, especially for rubella.

In 2015, 71 of the 72 WHO measles and rubella reference laboratories in the Region were accredited. Countries have included laboratory data from public, private or commercial laboratories outside of the WHO laboratory network in their surveillance and other relevant reports, including those of the national verification committees for measles and rubella. While there is evidence on the proficiency of many of these laboratories, the lack of information on these laboratories in several countries remains of concern.⁸

In 2015, almost all countries in the Region notifying measles cases submitted genomic sequence information on measles cases to the measles nucleotide surveillance database (MeaNS). In contrast, few countries submitted genomic sequence information on rubella cases to the rubella nucleotide surveillance database (RubeNS).⁹ It is important to note that these genotype reports do not accurately indicate the regional distribution of measles and rubella viruses as reporting is biased by differing capacities among Member States to conduct molecular epidemiological surveillance.¹⁰

As concluded by the European Regional Verification Commission for Measles and Rubella Elimination in its most recent meeting in October 2015, the regional goal of eliminating measles and rubella by 2015 has not been met and the epidemiological situation of these diseases in the Region during 2015 remains of concern. Nonetheless, overall, determination to eliminate these diseases has been indicated through actions to respond quickly to outbreaks, to strengthen country preparedness and to actively close gaps in population immunity.

Many countries in the Region still need to develop a national plan of action or equivalent for the elimination of measles and rubella. Such plans should include outbreak response guidance and stress the importance of high-quality surveillance and maintaining high vaccination coverage.

Although intensified efforts are being taken by many countries, political commitment to eliminate these diseases needs to be enhanced and maintained in each country of the Region.

Pertussis in Spain

Spain has experienced a dramatic decline in the number of pertussis cases after the introduction of routine vaccination against the disease in 1965. However, since 2010, an increase in pertussis notifications has been observed with peaks in 2011–2012 and 2015 despite high vaccination coverage (Fig. 8). In 2015, 8413 cases of pertussis were reported in Spain – an increase of 152% over the number of cases reported for the same period of 2014 (n=3333). Seven pertussis-related deaths were reported in 2014 and 10 deaths were reported for 2015 (until week 46). The age group mostly affected in terms of hospitalization and mortality is infants <1 year old, especially those <3 months of age.¹¹⁻¹³

Vaccination coverage

Spain has used acellular pertussis-containing vaccines since the end of the 1990s for the booster doses and for the whole programme since 2005. Immunization coverage with three doses (at 2, 4 and 6 months of age) has been ≥95% since 2000. Two booster doses are administered at 18 months and 6 years of age (the latter with the reduced dose of diphtheria, tetanus and pertussis (dTap) vaccine). In 2014, immunization coverage at national level was 96.6% for the first three doses, 94.6% for the first booster and 91.6% for the second booster dose.¹⁴

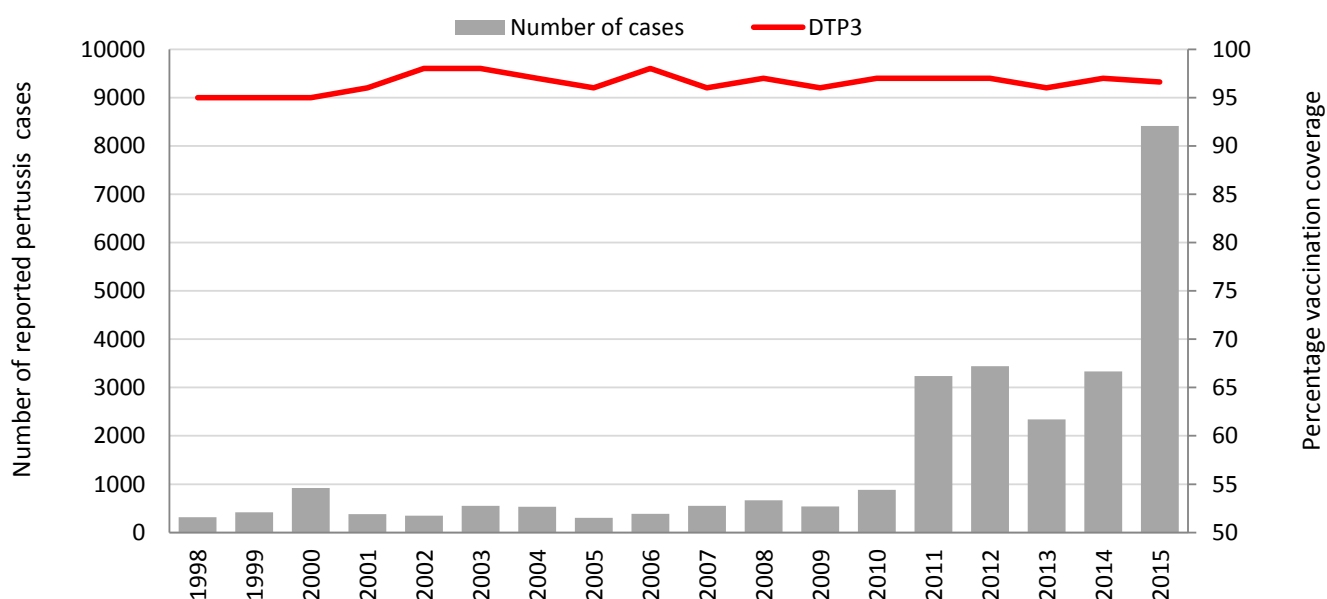
Preventive measures

In January 2013 and June 2015, Spain’s National Immunization Technical Advisory Group (NITAG)¹¹ reviewed the pertussis immunization programme. It continued to strongly recommend pertussis vaccination, and also encourage parents to vaccinate their children “on time” according to the current schedule. It also recommended strengthening surveillance of severe cases in infants, especially those hospitalized and with complications.

Maternal immunization is a cost-effective supplementary strategy to prevent severe pertussis in infants.¹⁵ In June 2015, Spain’s NITAG recommended the immunization of pregnant women based on available evidence supporting this strategy.¹⁶ By the end of 2015, the strategy was introduced in the whole country. The current global shortage of aP-containing vaccines has obliged the immunization programme to prioritize this strategy over the booster dose at 6 years of age and immunization of other specific groups.

The global demand for acellular pertussis-containing vaccines has increased, with more and more countries switching from whole-cell pertussis (wP) products to acellular pertussis-containing products. The shortage of acellular pertussis-containing vaccines encompasses pentavalent, hexavalent and

Fig. 8. Number of reported cases of pertussis in Spain 1998–2015 and coverage with the third dose of diphtheria, tetanus and pertussis (DTP3) vaccine by 24 months of age



Data sources: Number of cases - National Centre of Epidemiology. DTP3 vaccination coverage - Ministry of Health, official country reported coverage estimates time series. Available at: www.who.int/immunization/monitoring_surveillance/data/en/

dTap vaccines. Spain's Ministry of Health has been in contact with vaccine manufacturers to get as many vaccines as possible to cover the country's needs for 2016. The available doses of acellular pertussis-containing vaccines are equitably distributed to the regions. The public health authorities in Spain are committed to ensure that the immunization programme continues to be implemented in the best possible way.¹⁷

Comments

Pertussis continues to be of public health concern even in countries with long-existing vaccination programmes

and high vaccination coverage.¹⁸ The increase in the number of hospitalized cases and deaths in Spain since 2010 suggests a true resurgence of pertussis that deserves particular attention.

The cause of this resurgence is probably multifactorial and complex. An important factor in disease transmission is waning immunity among adults.¹⁹ The shorter duration of protection and probably lower impact on infection and transmission conferred by acellular pertussis-containing vaccine compared with the wP-containing vaccines are also likely to play a role.^{20, 21}

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A monthly summary of the epidemiological data on selected vaccine-preventable diseases in the European Region

Monthly summary table 1: Reported measles cases for the 12-month period January - December 2015 (data as of 2 May 2016)

Country	Total Population in 2015 ¹	Incidence Rate (per 1 million population) ²	Total measles cases	2015 (Year and month of rash onset)												Month & year of last report	
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Albania	2 896 679	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Dec-15
Andorra	70 473	0.0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	Oct-15
Armenia	3 017 712	10.6	32	0	0	0	0	6	6	9	10	1	0	0	0	0	Feb-16
Austria	8 544 586	35.8	306	35	31	50	66	69	40	9	2	0	0	3	1	0	Apr-16
Azerbaijan	9 753 968	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Feb-16
Belarus	9 495 826	0.3	3	0	1	0	0	1	1	0	0	0	0	0	0	0	Mar-16
Belgium	11 299 192	5.5	62	7	5	9	8	15	5	0	0	2	6	3	2	0	Apr-16
Bosnia and Herzegovina	3 810 416	1202.8	4583	963	839	962	925	581	210	64	9	7	1	16	6	0	Feb-16
Bulgaria	7 149 787	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Croatia	4 240 317	51.4	218	51	38	55	37	29	8	0	0	0	0	0	0	0	Mar-16
Cyprus	1 165 300	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Czech Republic	10 543 186	0.8	8	3	0	1	1	2	1	0	0	0	0	0	0	0	Apr-16
Denmark	5 669 081	1.6	9	0	2	1	0	5	1	0	0	0	0	0	0	0	Apr-16
Estonia	1 312 558	3.0	4	0	0	1	0	0	0	0	0	0	0	2	1	0	Apr-16
Finland	5 503 457	0.2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	Mar-16
France	64 395 345	5.8	373	8	5	13	94	150	53	17	10	2	6	4	11	0	Apr-16
Georgia	3 999 812	107.5	430	44	81	61	55	107	65	12	3	1	0	0	1	0	Dec-15
Germany	80 688 545	29.5	2383	432	443	608	442	234	109	64	18	15	12	2	4	0	Apr-16
Greece	10 954 617	0.1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	Apr-16
Hungary	9 855 023	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Iceland	329 425	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Ireland	4 688 465	3.8	18	2	1	1	3	1	3	2	0	0	2	1	2	0	Apr-16
Israel	8 064 036	9.9	80	5	4	12	11	27	11	7	1	2	-	-	-	0	Mar-16
Italy	59 797 685	4.3	259	12	17	14	30	32	14	19	16	15	15	30	45	0	Apr-16
Kazakhstan	17 625 226	132.8	2340	220	485	426	515	347	232	58	24	7	7	6	13	0	Apr-16
Kyrgyzstan ³	5 939 962	2993.1	17779	2070	4359	4188	4435	2154	526	47	0	0	0	0	0	0	Feb-16
Latvia	1 970 503	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Lithuania	2 878 405	17.7	51	0	0	6	2	5	24	14	0	0	0	0	0	0	Apr-16
Luxembourg	567 110	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Malta	418 670	2.4	1	0	0	0	0	1	0	0	0	0	0	0	0	0	Apr-16
Monaco	37 731	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No Report
Montenegro	625 781	24.0	15	4	8	2	0	1	0	0	0	0	0	0	-	0	Nov-15
Netherlands	16 924 929	0.4	7	0	0	1	2	0	2	2	0	0	0	0	0	0	Apr-16
Norway	5 210 967	2.7	14	0	0	2	3	4	0	1	4	0	0	0	0	0	Apr-16
Poland	38 611 794	1.2	48	2	10	15	5	0	7	3	2	1	0	2	1	0	Apr-16
Portugal	10 349 803	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Republic of Moldova	4 068 897	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Romania	19 511 324	0.4	8	2	2	0	0	0	3	0	0	0	0	1	0	0	Apr-16
Russian Federation	143 456 918	4.5	640	101	117	73	122	140	57	22	7	1	-	-	-	0	Feb-16
San Marino	31 781	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No Report
Serbia	8 850 975	41.6	368	84	57	29	62	61	11	41	11	8	3	-	1	0	Mar-16
Slovakia	5 426 258	0.2	1	0	0	0	0	0	0	0	0	0	1	0	0	0	Apr-16
Slovenia	2 067 526	9.2	19	7	8	2	2	0	0	0	0	0	0	0	0	0	Apr-16
Spain	46 121 699	1.0	45	9	8	7	4	5	7	3	1	1	0	0	0	0	Apr-16
Sweden	9 779 426	2.2	22	3	3	0	1	9	4	2	0	0	0	0	0	0	Apr-16
Switzerland	8 298 663	4.2	35	3	3	5	1	1	1	8	8	5	0	0	0	0	Feb-16
Tajikistan	8 481 855	0.4	3	3	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
The former Yugoslav Republic of Macedonia	2 078 453	0.5	1	0	1	0	0	0	0	0	0	0	0	0	0	0	Dec-15
Turkey	78 665 830	4.3	342	7	8	21	43	92	36	39	51	36	8	1	0	0	Dec-15
Turkmenistan	5 373 502	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No Report
Ukraine	44 823 765	3.1	141	25	22	7	14	14	7	6	38	2	3	2	1	0	Apr-16
United Kingdom	64 715 810	1.4	91	6	11	3	7	14	13	7	5	3	2	9	11	0	Apr-16
Uzbekistan	29 893 488	0.7	21	1	5	0	3	6	4	-	0	-	-	0	2	0	Apr-16
Total/Averages	910 052 542	33.80	30762	4109	6574	6575	6894	4113	1461	456	220	110	66	82	102		

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) is highlighted in red.

³ Kyrgyzstan: Total 17,779 measles cases reported in 2015 WHO/UNICEF Joint Reporting Form.

Member States submitting aggregate data: Bosnia and Herzegovina, Kazakhstan, Republic of Moldova, San Marino, Serbia, FYR Macedonia, Turkmenistan, Ukraine.

For tables 1-4, the reporting of these data by year and month are based on cases with disease onset date during the 12-month period and corresponding month. Where disease onset date was unavailable, cases with the date of notification reported during these respective time periods were included. These monthly reported numbers may differ from reports produced by national or partner agencies if other dates (e.g. date of case reporting) are used.

Monthly summary table 2: Reported rubella cases for the 12-month period January - December 2015 (data as of 2 May 2016)

Country	Total Population in 2015 ¹	Incidence Rate (per 1 million population) ²	Total rubella cases	2015 (Year and month of rash onset)												Month & year of last report	
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Albania	2 896 679	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Dec-15
Andorra	70 473	0.0	0	0	0	0	-	0	0	0	0	0	0	-	-	-	Oct-15
Armenia	3 017 712	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Feb-16
Austria	8 544 586	0.1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	Apr-16
Azerbaijan	9 753 968	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Feb-16
Belarus	9 495 826	0.1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	Mar-16
Belgium ³	11 299 192	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	See footnote
Bosnia and Herzegovina	3 810 416	3.1	12	1	2	1	6	1	0	0	0	0	0	0	1	1	Feb-16
Bulgaria	7 149 787	1.4	10	0	2	0	0	4	0	0	2	0	2	0	0	0	Apr-16
Croatia	4 240 317	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mar-16
Cyprus	1 165 300	1.7	2	0	0	0	2	0	0	0	0	0	0	0	0	0	Apr-16
Czech Republic	10 543 186	0.1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Denmark ³	5 669 081	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	See footnote
Estonia	1 312 558	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Finland	5 503 457	1.8	10	0	0	0	0	0	0	0	0	0	2	0	8	8	Mar-16
France ³	64 395 345	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	See footnote
Georgia	3 999 812	25.0	100	8	10	11	11	16	20	7	5	1	1	4	6	6	Dec-15
Germany	80 688 545	1.1	91	12	7	7	16	9	8	10	4	5	3	5	5	5	Apr-16
Greece	10 954 617	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Hungary	9 855 023	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Iceland	329 425	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Ireland	4 688 465	1.9	9	0	1	0	1	2	1	0	4	0	0	0	0	0	Apr-16
Israel	8 064 036	0.1	1	1	0	0	0	0	0	0	-	-	-	-	-	-	Mar-16
Italy	59 797 685	0.7	39	2	1	11	5	4	6	4	2	2	1	0	1	1	Apr-16
Kazakhstan	17 625 226	0.1	2	0	0	0	1	0	0	0	0	0	1	0	0	0	Apr-16
Kyrgyzstan	5 939 962	16.8	100	2	16	33	25	13	4	7	0	0	0	0	0	0	Feb-16
Latvia	1 970 503	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Lithuania	2 878 405	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Luxembourg	567 110	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Malta	418 670	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Monaco	37 731	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No Report
Montenegro	625 781	0.0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	Nov-15
Netherlands	16 924 929	0.1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	Apr-16
Norway	5 210 967	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Poland	38 611 794	52.5	2029	216	199	256	231	183	165	142	114	92	149	140	142	142	Apr-16
Portugal	10 349 803	0.8	8	0	0	1	0	0	1	1	1	1	0	3	0	0	Apr-16
Republic of Moldova	4 068 897	0.0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	Apr-16
Romania	19 511 324	0.9	18	3	3	0	2	2	4	0	0	0	2	2	0	0	Apr-16
Russian Federation	143 456 918	0.1	14	4	5	3	-	1	-	-	1	-	-	-	-	-	Feb-16
San Marino	31 781	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No Report
Serbia	8 850 975	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No Report
Slovakia	5 426 258	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Slovenia	2 067 526	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Spain	46 121 699	0.1	4	0	0	0	0	0	2	0	0	2	0	0	0	0	Apr-16
Sweden	9 779 426	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Apr-16
Switzerland	8 298 663	0.4	3	2	0	0	0	1	0	0	0	0	0	0	0	0	Feb-16
Tajikistan	8 481 855	0.1	1	-	0	-	0	-	0	0	0	0	0	0	1	1	Apr-16
The former Yugoslav Republic of Macedonia	2 078 453	0.5	1	0	0	0	0	0	0	0	1	0	0	0	0	0	Dec-15
Turkey	78 665 830	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No Report
Turkmenistan	5 373 502	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No Report
Ukraine	44 823 765	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No Report
United Kingdom	64 715 810	0.2	10	0	2	6	2	0	0	0	0	0	0	0	0	0	Apr-16
Uzbekistan	29 893 488	0.0	0	0	0	0	0	0	0	0	-	0	-	0	0	0	Apr-16
Total/Averages	910 052 542	2.71	2468	252	249	329	303	236	211	172	133	103	162	154	164		

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) is highlighted in red.

³ Belgium, Denmark, and France do not have comprehensive rubella surveillance systems.

Member States submitting aggregate data: Bosnia and Herzegovina, Kazakhstan, Republic of Moldova, San Marino, Serbia, FYR Macedonia, Turkmenistan, Ukraine.

Summary table 3: Classification, reporting and performance of measles, January - December 2015 (data as of 2 May 2016)

Country	Total Population in 2015 ¹	Incidence Rate (per 1 million population) ²	Total measles cases ³	Classification			Discarded MEA	Imported cases	Reporting			Surveillance Indicators		
				Lab confirmed	Epi-Link	Clinically compatible ⁴			Completeness	Timeliness	Month & year of last report	Laboratory investigation rate	Rate of discarded cases	Origin of infection
Albania	2 896 679	0	0	0	0	0	0	0	100%	75%	Dec-15	-	0	-
Andorra	70 473	0	0	0	0	0	0	0	83%	67%	Oct-15	-	0	-
Armenia	3 017 712	8.9	32	28	3	1	145	5	100%	92%	Feb-16	2.9%	4.80	2.8%
Austria	8 544 586	33.8	306	226	68	12	0	17	100%	100%	Apr-16	7.1%	0	5.6%
Azerbaijan	9 753 968	0	0	0	0	0	111	0	100%	100%	Feb-16	0.0%	1.14	0
Belarus	9 495 826	0.2	3	2	0	1	342	1	100%	67%	Mar-16	0.3%	3.60	0.3%
Belgium	11 299 192	5.5	62	43	6	13	102	0	100%	100%	Apr-16	0.0%	0.90	0
Bosnia and Herzegovina	3 810 416	1202.8	4583	113	0	4470	-	-	100%	0%	Feb-16	0.0%	-	0
Bulgaria	7 149 787	0	0	0	0	0	10	0	100%	100%	Apr-16	0.0%	0.14	0
Croatia	4 240 317	49.1	218	138	0	80	11	10	100%	100%	Mar-16	4.4%	0.26	4.4%
Cyprus	1 165 300	0	0	0	0	0	0	0	100%	100%	Apr-16	-	0	-
Czech Republic	10 543 186	0.6	8	8	0	0	0	2	100%	100%	Apr-16	25.0%	0	25.0%
Denmark	5 669 081	1.4	9	9	0	0	0	1	100%	100%	Apr-16	11.1%	0	11.1%
Estonia	1 312 558	0.8	4	4	0	0	41	3	100%	100%	Apr-16	6.7%	3.12	6.7%
Finland	5 503 457	0.2	1	1	0	0	0	0	100%	100%	Mar-16	0.0%	0	0
France	64 395 345	5.4	373	159	136	78	0	27	100%	100%	Apr-16	11.4%	0	7.2%
Georgia	3 999 812	107.5	430	42	11	377	68	0	100%	75%	Dec-15	0.0%	1.70	0
Germany	80 688 545	28.8	2383	1528	607	248	0	57	100%	100%	Apr-16	3.2%	0	2.4%
Greece	10 954 617	0.1	1	1	0	0	0	0	100%	100%	Apr-16	0.0%	0	0
Hungary	9 855 023	0	0	0	0	0	0	0	100%	100%	Apr-16	-	0	-
Iceland	329 425	0	0	0	0	0	0	0	100%	100%	Apr-16	-	0	-
Ireland	4 688 465	3.6	18	5	0	13	0	1	100%	100%	Apr-16	5.6%	0	5.6%
Israel	8 064 036	9.9	80	76	0	4	0	0	50%	50%	Mar-16	0.0%	0	0
Italy	59 797 685	4.0	259	162	49	48	108	17	100%	100%	Apr-16	5.3%	0.18	4.6%
Kazakhstan	17 625 226	132.8	2340	1808	148	384	0	0	100%	33%	Apr-16	0.0%	0	0
Kyrgyzstan ⁵	5 939 962	2993.1	17779	1300	0	16479	-	-	100%	8%	Feb-16	0.0%	-	0
Latvia	1 970 503	0	0	0	0	0	0	0	100%	100%	Apr-16	-	0	-
Lithuania	2 878 405	17.0	51	51	0	0	0	2	100%	100%	Apr-16	3.9%	0	3.9%
Luxembourg	567 110	4.0	0	0	0	0	0	0	100%	100%	Apr-16	-	0	-
Malta	418 670	2.4	1	1	0	0	0	0	100%	100%	Apr-16	0.0%	0	0
Monaco	37 731	-	-	-	-	-	-	-	-	-	No Report	-	-	-
Montenegro	625 781	16.0	15	13	2	0	4	5	92%	50%	Nov-15	29.4%	0.64	26.3%
Netherlands	16 924 929	0.3	7	6	1	0	0	2	100%	100%	Apr-16	33.3%	0	28.6%
Norway	5 210 967	1.3	14	14	0	0	0	7	100%	100%	Apr-16	50.0%	0	50.0%
Poland	38 611 794	1.0	48	31	2	15	0	10	100%	100%	Apr-16	21.7%	0	20.8%
Portugal	10 349 803	0	0	0	0	0	23	0	100%	100%	Apr-16	0.0%	0.22	0
Republic of Moldova	4 068 897	0	0	0	0	0	0	0	100%	92%	Apr-16	-	0	-
Romania	19 511 324	0.4	8	5	0	3	0	0	100%	100%	Apr-16	0.0%	0	0
Russian Federation	143 456 918	4.5	640	609	26	5	12	0	17%	17%	Feb-16	0.0%	0.01	0
San Marino	31 781	-	-	-	-	-	-	-	-	-	No Report	-	-	-
Serbia	8 850 975	41.6	368	226	0	142	0	0	92%	50%	Mar-16	0.0%	0	0
Slovakia	5 426 258	0.2	1	0	0	1	1	0	100%	100%	Apr-16	0.0%	0.02	0
Slovenia	2 067 526	4.8	19	19	0	0	0	9	100%	100%	Apr-16	47.4%	0	47.4%
Spain	46 121 699	0.8	45	38	3	4	70	7	100%	100%	Apr-16	6.3%	0.15	6.1%
Sweden	9 779 426	1.4	22	21	1	0	0	8	100%	100%	Apr-16	38.1%	0	36.4%
Switzerland	8 298 663	3.5	35	27	5	3	29	6	100%	100%	Feb-16	10.2%	0.35	9.4%
Tajikistan	8 481 855	0.1	3	3	0	0	43	2	100%	92%	Apr-16	4.3%	0.51	4.3%
The former Yugoslav Republic of Macedonia	2 078 453	0.5	1	1	0	0	0	0	100%	100%	Dec-15	0.0%	0	0
Turkey	78 665 830	4.3	342	342	0	0	0	0	42%	42%	Dec-15	0.0%	0	0
Turkmenistan	5 373 502	-	-	-	-	-	-	-	-	-	No Report	-	-	-
Ukraine	44 823 765	3.1	141	21	0	120	0	0	100%	100%	Apr-16	0.0%	0	0
United Kingdom	64 715 810	0.4	91	91	0	0	0	66	100%	100%	Apr-16	72.5%	0	72.5%
Uzbekistan	29 893 488	0.1	21	21	0	0	36	19	75%	50%	Apr-16	33.3%	0.12	33.3%
Total/Averages	910 052 542	33.5	30762	7193	1068	22501	1156	284	89.6%	80.3%		0.9%	0.13	0.9%

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.

³ All confirmed measles cases regardless of origin.

⁴ Unless specified as laboratory confirmed or epi-linked, cases are classified as clinically compatible.

⁵ Kyrgyzstan: Total 17,779 measles cases reported in 2015 WHO/UNICEF Joint Reporting Form.

Member States submitting aggregate data: Bosnia and Herzegovina, Kazakhstan, Republic of Moldova, San Marino, Serbia, FYR Macedonia, Turkmenistan, Ukraine.

Summary table 4: Classification, reporting and performance of rubella, January - December 2015 (data as of 2 May 2016)

Country	Total Population in 2015 ¹	Incidence Rate (per 1 million population) ²	Total rubella cases ³	Classification			Discarded Rubella	Imported cases	Reporting			Surveillance Indicators		
				Lab confirmed	Epi-Link	Clinically compatible ⁴			Completeness	Timeliness	Month of last report	Laboratory investigation rate	Rate of discarded cases	Origin of infection
Albania	2 896 679	0	0	0	0	0	0	0	100%	75%	Dec-15	-	0	-
Andorra	70 473	0	0	0	0	0	0	0	75%	58%	Oct-15	-	0	-
Armenia	3 017 712	0	0	0	0	0	18	0	100%	92%	Feb-16	100%	0.60	94.4%
Austria	8 544 586	0.1	1	1	0	0	0	0	100%	100%	Apr-16	0.0%	0	100%
Azerbaijan	9 753 968	0	0	0	0	0	43	0	100%	100%	Feb-16	58.1%	0.44	0
Belarus	9 495 826	0	1	1	0	0	342	1	8%	8%	Mar-16	100%	3.60	0.3%
Belgium ⁵	11 299 192	-	-	-	-	-	-	-	-	-	See footnote	-	-	-
Bosnia and Herzegovina	3 810 416	3.1	12	1	0	11	-	-	100%	0%	Feb-16	0.0%	-	0
Bulgaria	7 149 787	1.4	10	0	0	10	0	0	100%	100%	Apr-16	0.0%	0	100%
Croatia	4 240 317	0	0	0	0	0	0	0	100%	100%	Mar-16	-	0	-
Cyprus	1 165 300	1.7	2	2	0	0	0	0	100%	100%	Apr-16	100%	0	0
Czech Republic	10 543 186	0.1	1	1	0	0	0	0	100%	100%	Apr-16	100%	0	100%
Denmark ⁵	5 669 081	-	-	-	-	-	-	-	-	-	See footnote	-	-	-
Estonia	1 312 558	0	0	0	0	0	24	0	100%	100%	Apr-16	91.7%	1.83	50.0%
Finland	5 503 457	1.5	10	10	0	0	0	2	100%	100%	Mar-16	100%	0	60.0%
France ⁵	64 395 345	-	-	-	-	-	-	-	-	-	See footnote	-	-	-
Georgia	3 999 812	25.0	100	0	0	100	37	0	100%	75%	Dec-15	18.2%	0.93	100%
Germany	80 688 545	1.1	91	19	2	70	0	2	100%	100%	Apr-16	0.0%	0	50.5%
Greece	10 954 617	0	0	0	0	0	0	0	100%	100%	Apr-16	-	0	-
Hungary	9 855 023	0	0	0	0	0	6	0	100%	100%	Apr-16	100%	0.06	100%
Iceland	329 425	0	0	0	0	0	0	0	100%	100%	Apr-16	-	0	-
Ireland	4 688 465	1.9	9	0	0	9	0	0	100%	100%	Apr-16	0.0%	0	22.2%
Israel	8 064 036	0.1	1	1	0	0	0	0	50%	50%	Mar-16	0.0%	0	0
Italy	59 797 685	0.6	39	16	6	17	23	3	100%	100%	Apr-16	0.0%	0.04	67.7%
Kazakhstan	17 625 226	0.1	2	0	1	1	0	0	100%	33%	Apr-16	0.0%	0	0
Kyrgyzstan	5 939 962	16.8	100	31	0	69	-	-	100%	8%	Feb-16	0.0%	-	0
Latvia	1 970 503	0	0	0	0	0	0	0	100%	100%	Apr-16	-	0	-
Lithuania	2 878 405	0	0	0	0	0	0	0	100%	100%	Apr-16	-	0	-
Luxembourg	567 110	0	0	0	0	0	0	0	100%	100%	Apr-16	-	0	-
Malta	418 670	0	0	0	0	0	0	0	100%	100%	Apr-16	-	0	-
Monaco	37 731	-	-	-	-	-	-	-	-	-	No Report	-	-	-
Montenegro	625 781	0	0	0	0	0	8	0	92%	50%	Nov-15	0.0%	1.28	12.5%
Netherlands	16 924 929	0	1	1	0	0	0	1	100%	100%	Apr-16	0.0%	0	100%
Norway	5 210 967	0	0	0	0	0	0	0	100%	100%	Apr-16	-	0	-
Poland	38 611 794	52.5	2029	0	0	2029	0	0	100%	100%	Apr-16	0.0%	0	0
Portugal	10 349 803	0.7	8	1	0	7	25	1	100%	100%	Apr-16	60.6%	0.24	100%
Republic of Moldova	4 068 897	0	0	0	0	0	0	0	17%	17%	Apr-16	-	0	-
Romania	19 511 324	0.9	18	0	0	18	0	0	100%	100%	Apr-16	16.7%	0	100%
Russian Federation	143 456 918	0.1	14	14	0	0	0	0	17%	17%	Feb-16	100%	0	71.4%
San Marino	31 781	-	-	-	-	-	-	-	-	-	No Report	-	-	-
Serbia	8 850 975	-	-	-	-	-	-	-	-	-	No Report	-	-	-
Slovakia	5 426 258	0	0	0	0	0	0	0	100%	100%	Apr-16	-	0	-
Slovenia	2 067 526	0	0	0	0	0	0	0	100%	100%	Apr-16	-	0	-
Spain	46 121 699	0.1	4	2	0	2	28	0	100%	100%	Apr-16	87.5%	0.06	100%
Sweden	9 779 426	0	0	0	0	0	4	0	100%	100%	Apr-16	100%	0.04	50.0%
Switzerland	8 298 663	0.4	3	3	0	0	24	0	100%	100%	Feb-16	88.9%	0.29	7.4%
Tajikistan	8 481 855	0.1	1	0	0	1	38	0	75%	67%	Apr-16	100%	0.45	100%
The former Yugoslav Republic of Macedonia	2 078 453	0.5	1	1	0	0	0	0	100%	100%	Dec-15	0.0%	0	0
Turkey	78 665 830	-	-	-	-	-	-	-	-	-	No Report	-	-	-
Turkmenistan	5 373 502	-	-	-	-	-	-	-	-	-	No Report	-	-	-
Ukraine	44 823 765	-	-	-	-	-	-	-	-	-	No Report	-	-	-
United Kingdom	64 715 810	0.0	10	10	0	0	0	8	100%	100%	Apr-16	100%	0	80.0%
Uzbekistan	29 893 488	0	0	0	0	0	2	0	75%	50%	Apr-16	100%	0.01	0
Total/Averages	910 052 542	2.7	2468	115	9	2344	622	18	75.6%	68.2%		9.3%	0.07	13.8%

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.

³ All confirmed rubella cases regardless of origin.

⁴ Unless specified as laboratory confirmed or epi-linked, cases are classified as clinically compatible.

⁵ Belgium, Denmark, and France do not have comprehensive rubella surveillance systems.

Member States submitting aggregate data: Bosnia and Herzegovina, Kazakhstan, Republic of Moldova, San Marino, Serbia, FYR Macedonia, Turkmenistan, Ukraine.

Summary table 5: Measles and rubella laboratory test results, January - December 2015 (data as of 2 May 2016)

Country	Specimen* (Serum, Oral Fluid, Swab, Urine and other)								Reporting		
	Tested for measles	Positive for measles (%)	Measles Equivocal	Negative for measles	Tested for rubella	Positive for rubella (%)	Rubella Equivocal	Negative for rubella	% Completeness	% Timeliness	Month of last report
Albania	7	0 (0.0)	0	7	3	0 (0.0)	0	3	100%	75.0%	Dec-15
Andorra											No Lab
Armenia	254	29 (11.0)	0	225	254	0 (0.0)	0	254	100%	25.0%	Dec-15
Austria	1849	198 (11.0)	0	1651	5571	0 (0.0)	0	5571	100%	100%	Dec-15
Azerbaijan	154	0 (0.0)	0	154	154	0 (0.0)	0	154	100%	33.3%	Dec-15
Belarus	355	7 (2.0)	0	348	351	3 (1.0)	0	348	100%	75.0%	Dec-15
Belgium	170	35 (21.0)	7	125	87	19 (22.0)	12	56	100%	75.0%	Dec-15
Bosnia and Herzegovina	201	146 (73.0)	14	41	201	1 (0.0)	1	149	84.0%		Dec-15
Bulgaria	40	0 (0.0)	0	40	47	0 (0.0)	0	47	100%	100%	Dec-15
Croatia	0		0	0	0		0	0	0	0	No Report
Cyprus	204	0 (0.0)	0	204	661	2 (0.0)	0	659	100%	50.0%	Dec-15
Czech Republic	48	14 (29.0)	2	32	0	0	0	0	100%	91.7%	Dec-15
Denmark	818	26 (3.0)	5	787	536	0 (0.0)	10	526	100%	91.7%	Dec-15
Estonia	328	4 (1.0)	1	323	670	1 (0.0)	5	664	100%	91.7%	Dec-15
Finland	558	10 (2.0)	0	548	852	5 (1.0)	0	847	100%	58.3%	Dec-15
France	530	112 (21.0)	11	406	216	1 (0.0)	0	214	100%	41.7%	Dec-15
Georgia	90	13 (14.0)	2	75	87	0 (0.0)	1	86	100%	16.7%	Dec-15
Germany	321	255 (79.0)	3	62	11	0 (0.0)	0	11	25.0%	25.0%	Mar-16
Greece	17	0 (0.0)	0	17	146	45 (31.0)	9	92	100%	41.7%	Dec-15
Hungary	89	0 (0.0)	0	89	122	0 (0.0)	0	122	100%	91.7%	Dec-15
Iceland	0		0	0	0		0	0	0	0	No Report
Ireland	372	15 (4.0)	6	351	1639	4 (0.0)	1	1634	100%	83.3%	Dec-15
Israel	525	104 (20.0)	0	421	353	180 (51.0)	0	173	100%	75.0%	Dec-15
Italy	136	52 (38.0)	6	78	71	2 (3.0)	0	69	100%	58.3%	Dec-15
Kazakhstan	2312	1815 (79.0)	0	497	682	1 (0.0)	0	681	100%	91.7%	Dec-15
Kyrgyzstan	0		0	0	0		0	0	0	0	No Report
Latvia	231	2 (1.0)	3	226	251	7 (3.0)	8	236	100%	83.3%	Dec-15
Lithuania	324	59 (18.0)	3	177	236	0 (0.0)	0	151	100%	91.7%	Dec-15
Luxembourg	107	1 (1.0)	0	106	29	0 (0.0)	0	29	100%	91.7%	Dec-15
Malta	46	3 (7.0)	0	43	1607	0 (0.0)	0	1607	100%	75.0%	Dec-15
Monaco											No Lab
Montenegro											No Lab
Netherlands	0		0	0	0		0	0	0	0	No Report
Norway	33	7 (21.0)	0	26	17	0 (0.0)	0	17	33.3%	25.0%	Apr-16
Poland	5	1 (20.0)	1	3	4	0 (0.0)	0	4	16.7%	16.7%	Feb-16
Portugal	6	0 (0.0)	0	4	9	1 (11.0)	0	8	25.0%	25.0%	Mar-16
Republic of Moldova	43	0 (0.0)	0	43	43	0 (0.0)	0	43	100%	91.7%	Dec-15
Romania	152	4 (3.0)	1	147	162	1 (1.0)	4	157	100%	83.3%	Dec-15
Russian Federation	5122	1084 (21.0)	19	4019	4707	52 (1.0)	5	4650	100%	91.7%	Dec-15
San Marino											No Lab
Serbia	109	85 (78.0)	0	24	114	0 (0.0)	0	114	8.3%	8.3%	Jan-16
Slovakia	0	0	0	0	0	0	0	0	100%	91.7%	Dec-15
Slovenia	248	41 (17.0)	2	205	15	0 (0.0)	1	14	100%	83.3%	Dec-15
Spain	-		-	-	-		-	-	-	-	No Report
Sweden [#]	-		-	-	-		-	-	-	-	No Report
Switzerland	71	52 (73.0)	3	16	5	5 (100.0)	0	0	100%	91.7%	Dec-15
Tajikistan	-		-	-	-		-	-	-	-	No Report
The former Yugoslav Republic of Macedonia	9	2 (22.0)	0	7	2	0 (0.0)	0	2	58.3%	16.7%	Jul-15
Turkey	4531	483 (11.0)	53	3995	3052	53 (2.0)	18	2981	100%	91.7%	Dec-15
Turkmenistan [#]	-		-	-	-		-	-	-	-	No Report
Ukraine	273	30 (11.0)	0	243	265	12 (5.0)	1	252	100%	91.7%	Dec-15
United Kingdom	2441	120 (5.0)	0	2321	1496	51 (3.0)	0	1445	100%	41.7%	Dec-15
Uzbekistan	85	22 (26.0)	0	63	85	0 (0.0)	0	85	100%	83.3%	Dec-15
Total / Average	23214	4831 (21%)	142	18149	24813	446 (2%)	76	24155	67.3%	50.3%	

Data source: Aggregated monthly data provided by regional measles and rubella laboratory network (MR Labnet) to WHO/Europe. Bosnia and Herzegovina are only reporting to specimen-based MR lab data management system (MR LDMS).

[#]Sweden and Turkmenistan lab data not displayed as lab reporting does not match the required format and frequency.

*Specimen based data are not population based, and should not be interpreted as indicators for epidemiological surveillance. Laboratories may have received more than 1 clinical sample or may have conducted more than 1 test for a given case reported in Table 1.

Summary table 6: Classification of AFP cases, surveillance performance and weekly reporting by country to WHO European Regional Office, 2014-2015 (data as of 2 May 2016)

Member States do not report AFP cases to WHO: Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, Monaco, Netherlands, San Marino, Sweden and United Kingdom.

Countries	2015 (1-53 weeks)											2016 (1-17 weeks)													
	AFP Cases ¹	AFP cases under 15 year of age	Hot AFP Cases ²	Classification					Rates			AFP Cases ¹	AFP cases under 15 years of age	Hot AFP Cases ²	Classification					Rates			Reporting		
				Wild Polio cases	Discarded	VDPV/VAPP	Polio Compatible	Pending	Non-polio AFP rate ³	Adequate stool collection rate ⁴	Surv. Index ⁵				Wild Polio cases	Discarded	VDPV/VAPP	Polio Compatible	Pending	Non polio AFP rate ³	Adequate Stool collection rate ⁴	Surv. Index ⁵	% Completeness	% Timeliness	Week of last report
Albania	5	5	0	0	5	0	0	0	0.77	100.0	0.77	1	1	0	0	0	0	0	1	0.00	100.0	0.00	100.00	100.00	17
Andorra	0	0	0	0	0	0	0	0	0.00	0.0	0.00	0	0	0	0	0	0	0	0	0.00	0.0	0.00	0.00	0.00	0
Armenia	17	17	0	0	17	0	0	0	2.60	100.0	1.00	4	4	0	0	3	0	0	1	1.25	100.0	1.00	100.00	100.00	17
Austria	8	6	0	0	8	0	0	0	0.68	16.7	0.11	3	2	0	0	3	0	0	0	0.70	0.0	0.00	100.00	100.00	17
Azerbaijan	33	32	0	0	32	0	0	1	1.43	96.9	0.97	10	10	0	0	0	0	0	10	0.00	100.0	0.00	100.00	100.00	17
Belarus	57	57	3	0	57	0	0	0	3.82	87.7	0.88	22	22	0	0	6	0	0	16	1.09	81.8	0.82	100.00	100.00	17
Belgium	0	0	0	0	0	0	0	0	0.00	0.0	0.00	0	0	0	0	0	0	0	0	0.00	0.0	0.00	0.00	0.00	0
Bosnia and Herzegovina*	3	3	0	0	3	0	0	0	0.60	66.7	0.20	2	1	0	0	0	0	0	2	0.00	100.0	0.00	100.00	35.29	17
Bulgaria	12	12	0	0	11	0	0	1	1.04	100.0	1.00	5	5	0	0	0	0	0	5	0.00	100.0	0.00	88.24	64.71	15
Croatia	0	0	0	0	0	0	0	0	0.00	0.0	0.00	0	0	0	0	0	0	0	0	0.00	0.0	0.00	100.00	100.00	17
Cyprus	1	1	0	0	0	0	0	1	0.00	100.0	0.00	1	1	0	0	0	0	0	1	0.00	100.0	0.00	100.00	100.00	17
Czech Republic	10	10	0	0	10	0	0	0	0.63	80.0	0.50	0	0	0	0	0	0	0	0	0.00	0.0	0.00	100.00	100.00	17
Estonia	2	1	0	0	2	0	0	0	0.89	0.0	0.00	0	0	0	0	0	0	0	0	0.00	0.0	0.00	100.00	100.00	17
Georgia	11	11	0	0	11	0	0	0	1.55	100.0	1.00	5	5	0	0	2	0	0	3	0.77	100.0	0.77	100.00	100.00	17
Greece	18	18	1	0	18	0	0	0	1.05	88.9	0.94	7	7	0	0	0	0	0	7	0.00	71.4	0.00	100.00	94.12	17
Hungary	9	9	0	0	9	0	0	0	0.61	66.7	0.41	3	3	0	0	0	0	0	3	0.00	66.7	0.00	100.00	100.00	17
Israel	25	25	1	0	24	0	0	1	1.09	44.0	0.52	7	7	0	0	6	0	0	1	0.74	71.4	0.63	100.00	100.00	17
Italy	44	44	0	0	44	0	0	0	0.51	68.2	0.36	26	26	0	0	17	0	0	9	0.54	69.2	0.37	100.00	100.00	17
Kazakhstan	76	76	2	0	76	0	0	0	1.70	100.0	1.00	25	25	1	0	11	0	0	14	0.67	100.0	0.67	100.00	100.00	17
Kyrgyzstan	52	51	0	0	52	0	0	0	3.10	80.4	0.80	13	13	0	0	2	0	0	11	0.32	92.3	0.30	76.47	58.82	13
Latvia	0	0	0	0	0	0	0	0	0.00	0.0	0.00	0	0	0	0	0	0	0	0	0.00	0.0	0.00	100.00	100.00	17
Lithuania	12	10	0	0	11	0	0	1	2.26	80.0	0.80	0	0	0	0	0	0	0	0	0.00	0.0	0.00	100.00	100.00	17
Malta	0	0	0	0	0	0	0	0	0.00	0.0	0.00	0	0	0	0	0	0	0	0	0.00	0.0	0.00	100.00	23.53	17
Montenegro	1	1	0	0	1	0	0	0	0.86	100.0	0.86	0	0	0	0	0	0	0	0	0.00	0.0	0.00	100.00	58.82	17
Norway	10	10	0	0	0	0	0	10	0.00	20.0	0.00	4	2	0	0	0	0	0	4	0.00	0.0	0.00	82.35	70.59	14
Poland	41	41	0	0	36	0	0	5	0.63	78.0	0.49	21	21	0	0	5	0	0	16	0.24	23.8	0.06	100.00	76.47	17
Portugal	6	5	0	0	6	0	0	0	0.39	40.0	0.16	8	8	0	0	6	0	0	2	1.08	37.5	0.38	94.12	70.59	16
Republic of Moldova	5	5	0	0	5	0	0	0	0.86	100.0	0.86	1	1	0	0	0	0	0	1	0.00	100.0	0.00	100.00	100.00	17
Romania*	18	18	0	0	18	0	0	0	0.56	94.4	0.26	8	8	0	0	3	0	0	5	0.26	87.5	0.11	100.00	58.82	17
Russian Federation	340	340	44	0	340	0	0	0	1.45	93.5	0.96	121	121	19	0	23	0	0	98	0.27	92.6	0.25	100.00	100.00	17
Serbia	10	10	0	0	8	0	0	2	0.47	70.0	0.33	2	2	0	0	0	0	0	2	0.00	100.0	0.00	100.00	100.00	17
Slovakia	3	3	0	0	3	0	0	0	0.36	33.3	0.12	2	2	0	0	1	0	0	1	0.33	0.0	0.16	100.00	82.35	17
Slovenia	0	0	0	0	0	0	0	0	0.00	0.0	0.00	1	0	0	0	0	0	0	1	0.00	0.0	0.00	100.00	94.12	17
Spain	32	32	0	0	32	0	0	0	0.43	43.8	0.22	10	10	0	0	4	0	0	6	0.15	40.0	0.06	94.12	35.29	16
Switzerland	9	8	0	0	9	0	0	0	0.78	25.0	0.20	6	5	0	0	6	0	0	0	1.43	0.0	0.00	100.00	70.59	17
Tajikistan	124	120	0	0	118	0	0	6	4.54	95.8	0.97	18	18	0	0	16	0	0	2	1.67	100.0	1.00	100.00	88.24	17
The former Yugoslav Republic of Macedonia	2	2	0	0	2	0	0	0	0.59	100.0	0.59	0	0	0	0	0	0	0	0	0.00	0.0	0.00	100.00	88.24	17
Turkey	314	314	14	0	313	0	0	1	1.66	82.2	0.87	78	78	3	0	63	0	0	15	0.92	87.2	0.81	100.00	100.00	17
Turkmenistan	34	34	0	0	34	0	0	0	2.26	100.0	1.00	11	11	0	0	4	0	0	7	0.72	100.0	0.72	100.00	94.12	17
Ukraine**	156	153	44	0	138	3	0	15	2.04	97.4	0.97	75	75	13	0	0	0	0	75	0.00	97.3	0.00	100.00	100.00	17
Uzbekistan	175	170	0	0	175	0	0	0	2.19	99.4	0.99	31	31	0	0	12	0	0	19	0.41	100.0	0.41	94.12	94.12	16
Average/Total	1675	1654	109	0	1628	3	0	44	1.25	88.00	0.91	531	525	36	0	193	0	0	338	0.79	85.00	0.70	93.4	81.9	

¹ AFP cases of all ages.

² Hot cases = AFP case reported with a priority code (e.g. less than three doses of polio vaccine/Clinically polio/Recent travel to endemic country/high risk group).

³ Non-polio AFP cases per 100 000 children under the age of 15 years (annualized for current year). Number of non-polio (discarded) AFP cases X 100000 / total population under 15 years.

⁴ Two stool specimens collected 24-48 hours apart within 14 days of the onset of paralysis.

⁵ Surveillance index = Non-polio AFP rate up to 1.0 x (% AFP cases with 2 stool specimens collected 24-48 hours apart within 14 days of the onset of paralysis).

*Countries with a high risk for polio spread after importation, following the 28th RCC risk assessments in June 2013. Non-polio AFP Rate target for these member states has been revised to 2.0.

**Countries with a high risk for polio spread. Non-polio AFP Rate target for these member states has been revised to 3.0.