

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 for 2019. It also presents surveillance data on diphtheria for 2009–2018 with a focus on 2018, rotavirus for 2018 and paediatric diarrhoea for 2017–2018.

The measles and rubella surveillance data presented in this issue were reported by Member States of the WHO Regional Office for Europe and are incorporated in the Centralized information system for infectious diseases.¹ The analyses of these data are performed on cases with disease onset dates during 2019. Where these dates were unavailable, cases with the date of notification reported during this period were included. If different dates are used the numbers of cases in a specified time period may differ from reports produced by national or partner agencies. Tabulated surveillance data by country for 2018 and 2019 (as of 7 February 2020) are annexed to this issue. They are also published in WHO EpiData no. 1/2020.²

Surveillance data on diphtheria were obtained from Annual WHO/UNICEF Joint Reporting Forms (JRF) (as of 10 December 2019) submitted by the 53 Member States of the WHO European Region. Percentages in this report were rounded to the nearest whole number.

Measles in the WHO European Region

Notifications and laboratory data

For 2019, 104 248 measles cases were reported by 49 countries that submitted measles data (including zero reporting) (Table 1 in annex).

Of the total cases in the Region, 78 681 cases (75%) were reported by 4 countries: Ukraine (n=57 282; 55%), Kazakhstan (13 326; 13%), Russian Federation (4153; 4%) and Georgia (3920; 4%).

Of the total, 37 191 cases (36%) were laboratory confirmed and 8972 cases (9%) were epidemiologically linked. The remaining 58 085 cases (56%) were classified as clinically compatible. For 2019, 42 (89%) of the 47 countries notifying measles cases submitted 4016 genomic sequence information to the Measles Nucleotide Surveillance database (MeaNS)³ through WHO-accredited reference laboratories (as of 5 February

2020). The genotypes identified in the Region comprised D8 (n=3289), B3 (724) and H1 (163). The dominant measles virus variant was D8 Gir Somnath.IND/42.16/ representing 68% of all submissions and 83% of all D8 variants. Other D8 variants included Herborn.DEU/05.17/ (2.6%), MVs/Samut Sakhon.THA/8.18/ (1%) and MVs/Dagon Seikkan.MMR/5.18 (0.4%). The named strain Dublin.IRL/8.16/ although less frequently reported than in 2018, was again the dominant B3 variant in 2019 (24.4% of all B3 variants) followed by MVs/Kabul.AFG/20.2014/3 (11.9%) and MVs/Oslo.NOR/16.18 (9.5%). Only 3 sequences of genotype H1 were reported and none of D4 genotype. The number of sequences of measles virus in the WHO European Region reported to MeaNS by genotype from week 27, 2017 through week 52, 2019 is shown in Fig. 1.

Age distribution

Of the total cases, the age group was known in 103 508 cases: 11 563 (11%) were <1 year old, 18 894 (18%) were 1–4 years old, 31 197 (30%) were 5–19 years old and 41 854 (40%) were ≥20 years old (Fig. 2). The age distribution varied between countries. Fig. 3 shows the age distribution of measles cases in the 3 countries reporting the highest number of cases in the Region: Ukraine, Kazakhstan and Russian Federation. Among these 3 countries, the largest proportion of cases in adults aged ≥20 years was reported in Russian Federation (46%; n=1901). The largest proportion of cases in children 1–4 years old was reported in Kazakhstan (32%; 4263).

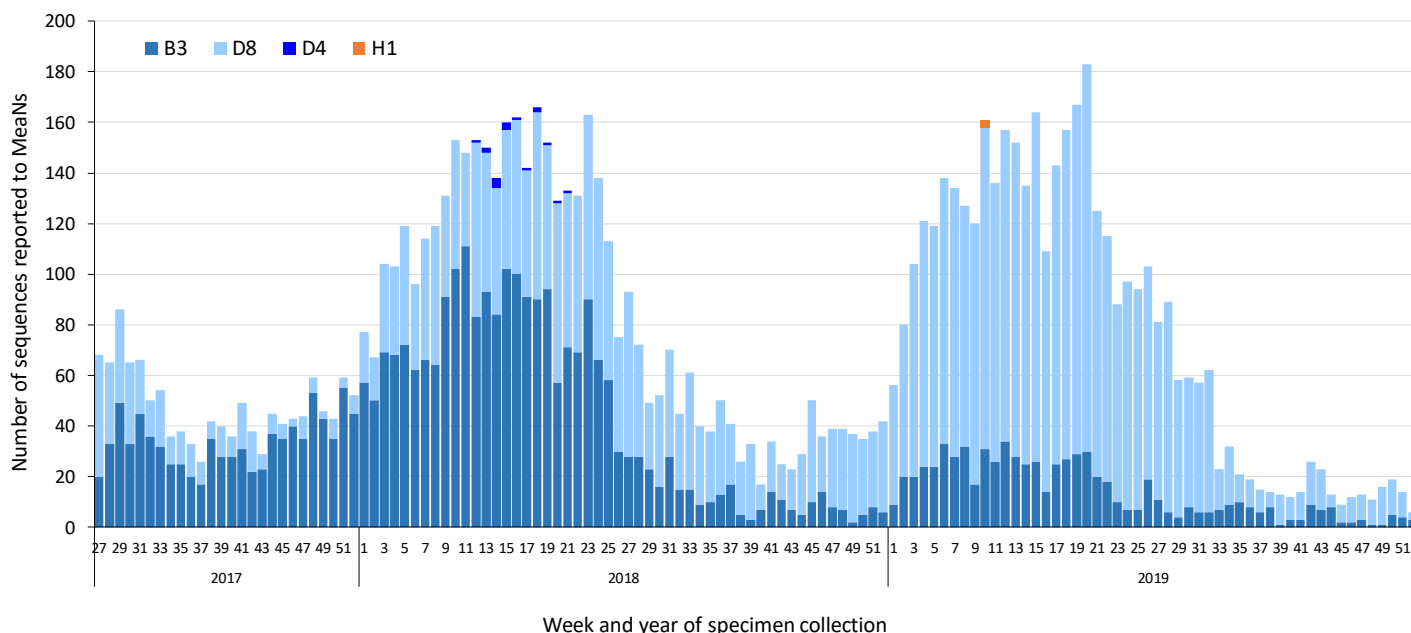
Vaccination status

Vaccination status was known for 73 503 cases (71%). Of the 46 004 cases (62%) that were unvaccinated: 10 317 (22%) were <1 year old, 12 995 (28%) were 1–4 years old, 7525 (16%) were 5–9 years old, 6155 (13%) were 10–19 years old and 9006 (20%) were ≥20 years old. Age was unknown for 6 unvaccinated cases (0.01%). The remaining 27 499 cases (37%) were reportedly vaccinated with at least one dose of measles-containing vaccine (MCV).

Hospitalization

Data on hospitalization status were available for 74 296 (71%) cases. Of these, 65 221 cases (88%) were hospitalized. 55% of the total hospitalized cases (n=35 738) were reported in Ukraine.

Fig. 1. The number of sequences of measles virus in the WHO European Region reported to MeaNS by genotype, week 27, 2017 through week 52, 2019 (as of 5 February 2020)



Measles-related deaths

In 2019, there were 64 reported measles-related deaths in 12 countries: Kazakhstan (21 deaths), Ukraine (20), North Macedonia (5), Romania (5), Turkey (3), Albania (2), France (2), Georgia (2), Hungary (1), Italy (1), Switzerland (1) and the United Kingdom (1). This corresponded to a death rate per 1000 measles cases of 0.61.

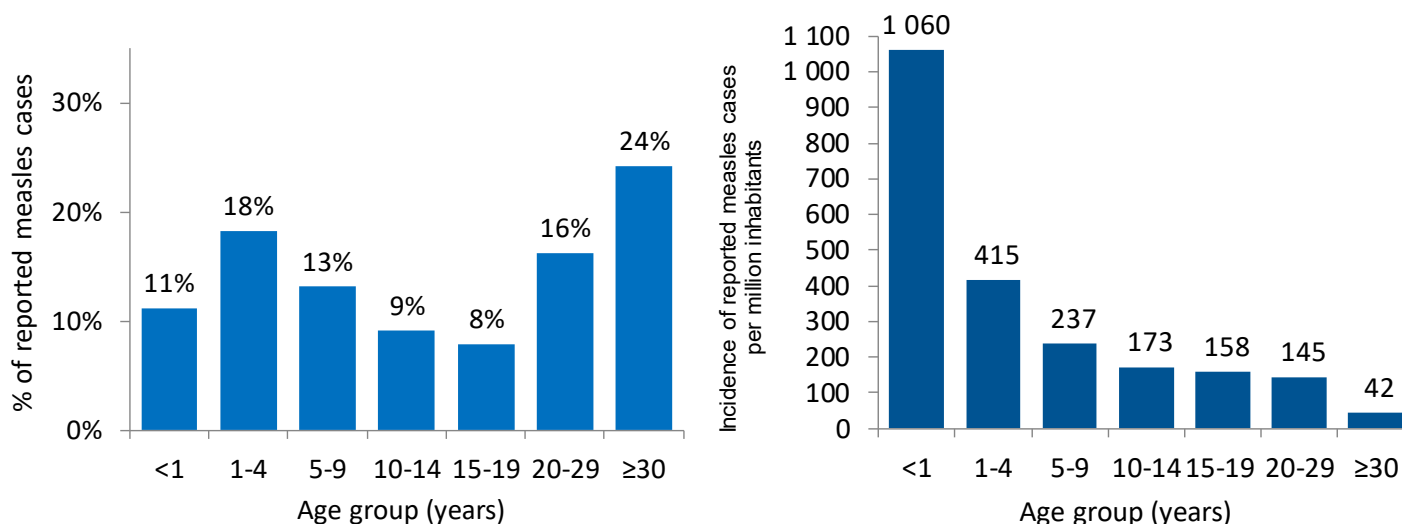
43 deaths (69%) occurred in children under 10 years of age: 20 cases were <1 year old and 23 cases were 1–9 years old. Of the remaining 17 deaths, 3 cases were 10–19 years old and 18 cases were ≥20 years old with the

oldest being 69 years of age. All but one of the 64 deaths were laboratory-confirmed cases of measles. 58 fatal cases were unvaccinated, 1 case had received one MCV dose and 2 cases received 2 doses. In the remaining 3 cases the vaccination status was unknown.

Imported cases

Importation status was known for 22 100 (21%) measles cases. Of these, 1035 (4.7%) cases were imported. Most imported cases (63%; n=654) were reported by Russian Federation (n=230), France (157), United Kingdom (110), Italy (82) and Germany (75) (Table 1 in annex).

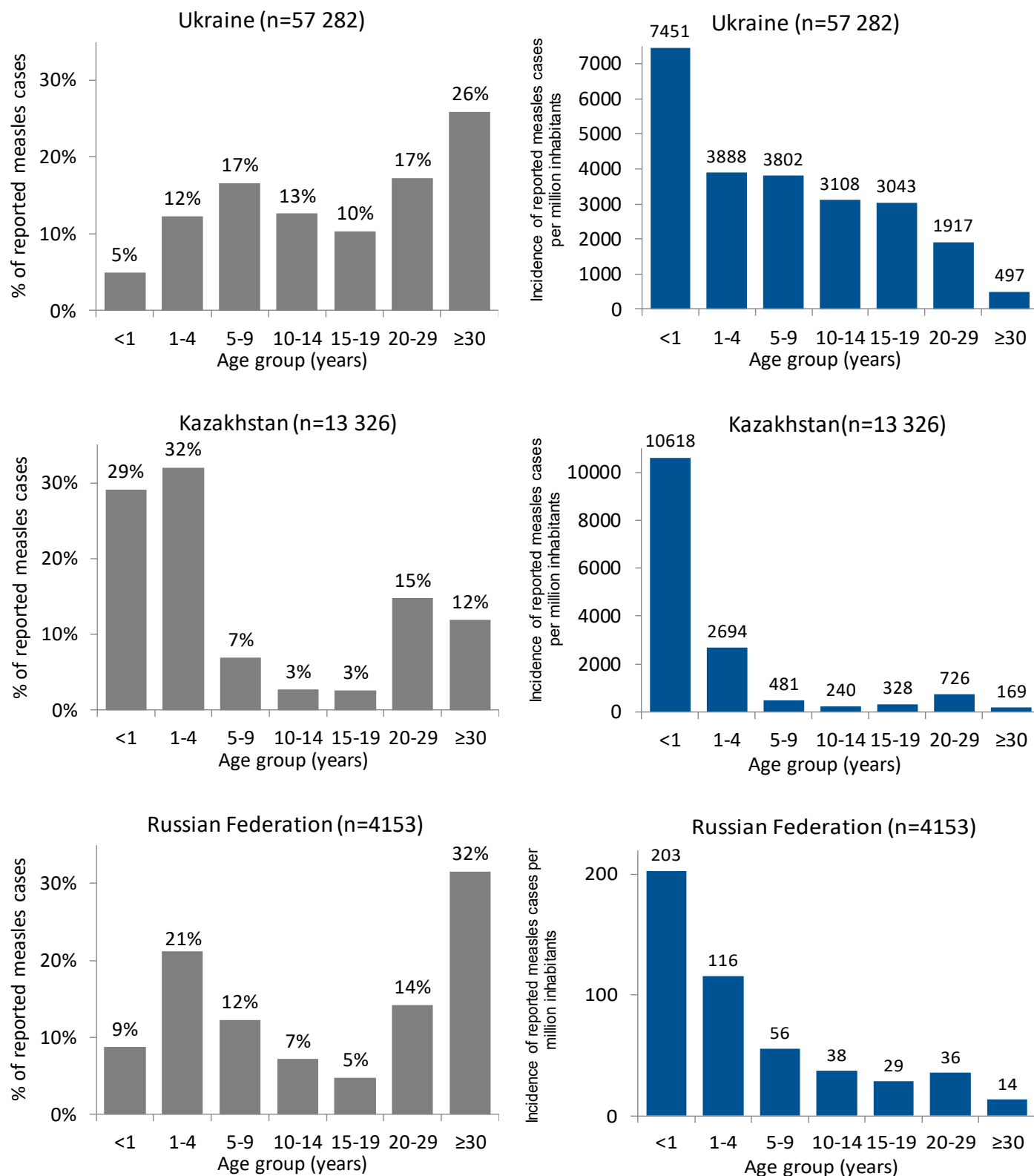
Fig. 2. Age distribution of measles cases by proportion (left) and incidence per million inhabitants (right) in the WHO European Region, 2019 (n=103 508)*



N.B. Discarded cases are not included.

*For 740 cases the age group was not reported.

Fig. 3. Age distribution of measles cases in the three countries with the largest numbers of cases in the WHO European Region, 2019



Rubella in the WHO European Region

Notifications and laboratory data

For 2019, 628 rubella cases were reported by 18 countries among 49 that submitted rubella data (including zero reporting) (Table 2 in annex). 90% of cases (n=367) were reported by Poland (46%; n=292), followed by Ukraine (22%; 138), Germany (9%; 56), Turkey (7%; 45) and Russian Federation (5%; 34).

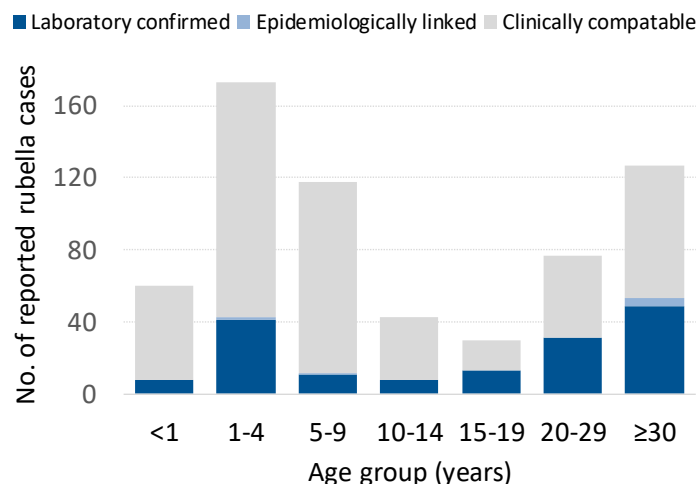
The majority of cases (73%; n=460) were classified as clinically compatible and were mostly (86%) reported by Poland (n=286) and Ukraine (109). 7 cases (1%) were classified as epidemiologically linked and 161 cases (26%) were laboratory confirmed, most of which were reported by Turkey (n=45), Russian Federation (34), Ukraine (29) and Germany (14).

During 2019, 11 rubella virus sequences were entered in the Rubella Nucleotide Surveillance database (RubeNS)⁴ (as of 5 February 2020). The identified genotypes comprised 2B (n=6) and 1E (5).

Age distribution

The age group was known in all 628 cases: 60 (10%) were <1 year old, 173 (28%) were 1–4 years old, 191 (30%) were 5–19 years old and 204 (32%) were ≥20 years old (Fig. 4). Of the 161 laboratory-confirmed cases, 8 were <1 year old, 41 were 1–4 years old, 19 were 5–14 years old, 13 were 15–19 years old, 54 were 20–39 years old and 26 were ≥40 years old (Fig.5). Of the 54 cases that were 20–39 years old, 24 were female.

Fig.5. Classification of reported rubella cases by age group in the WHO European Region, 2019 (n=628)



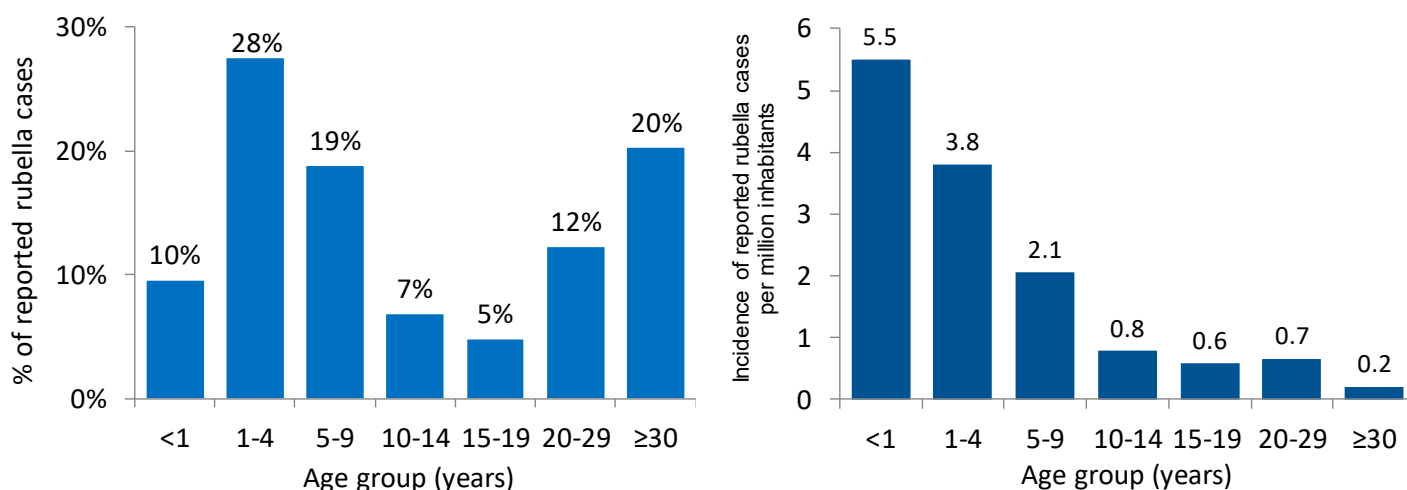
Vaccination status

Vaccination status was known in 78% of cases (n=489). Of the 213 (26%) unvaccinated cases: 56 (26%) were <1 year old, 56 (26%) were 1–4 years old, 28 (13%) were 5–19 years old and 73 (34%) were ≥20 years old. The remaining 276 cases (56%) were reportedly vaccinated with at least one dose of rubella-containing vaccine.

Imported cases

Importation status was known in 121 (19%) rubella cases. Of these, 14 cases (12%) were imported cases. Imported cases were reported by Russian Federation (n=4), Germany (3), Italy (3), Turkey (2), Latvia (1) and Switzerland (1).

Fig. 4. Age distribution of rubella cases by proportion (left) and incidence per million inhabitants (right) in the WHO European Region, 2019 (n=628)



N.B. Discarded cases are not included.

Comments

Measles and rubella in the WHO European Region

The number of reported measles cases in the Region for 2019 (n=104 248) increased by almost 20% over that for 2018 (88 695). This reflects persisting immunity gaps in the population. In some countries these immunity gaps are still large enough to sustain ongoing transmission of the measles virus for prolonged periods and give rise to widespread outbreaks. Countries with ongoing transmission need to implement adequate outbreak control measures without delay. An adequate outbreak response encompasses timely detection and investigation of cases and an appropriate immunization campaign to reduce the pool of susceptible individuals, alongside active case finding, contact tracing for targeted immunization if required, and enhanced laboratory surveillance.

Rubella continues to be reported in fewer countries than measles. The number of reported cases for 2019 (n=628) was lower than that reported for 2018 (838) largely due to a decline in cases reported by Poland and Ukraine. Only a small proportion of cases were laboratory confirmed. As in previous years most reported rubella cases were classified as clinically compatible. Considerable effort is required to increase the level of laboratory confirmation of suspected cases to confirm the occurrence or absence of rubella and exclude the possibility of over-reporting.

Vaccination

Attaining the optimal immunization coverage ($\geq 95\%$) with two MCV doses at all subnational levels (provinces, regions and districts) is crucial. At the same time immunity gaps need to be closed in all age groups, especially in adolescents and adults. Adults who are at an increased risk of measles infection should be immune to the disease. Health care workers should have either written documentation of receipt of 2 doses of MCV and at least 1 dose of rubella-containing vaccine or positive serologic (IgG) test results from a proficient laboratory.⁶ Susceptible persons (or anyone not sure of their immunization status) intending to travel to countries where measles is endemic and/or outbreaks are ongoing should be reminded of the importance of being vaccinated with MCV.⁶

Elimination status

According to the assessment conducted in 2019 by the European Regional Verification Commission for Measles and Rubella Elimination, 37 (70%) of the 53 Member States of the Region had interrupted endemic measles transmission for ≥ 12 months by the end of 2018.⁷ 35

(66%) of these had sustained interruption for ≥ 36 months and were therefore considered to have eliminated endemic disease.

For rubella, 42 countries (79%) had interrupted endemic transmission for ≥ 12 months by the end of 2018. 39 (73%) eliminated the disease. 33 (63%) countries provided evidence for the elimination of both measles and rubella transmission. Yet, 12 and 11 countries were still considered endemic for measles, and rubella, respectively, and 9 countries were endemic for both diseases. Due to continuous transmission of measles in 2017 and 2018, the RVC concluded that measles transmission was re-established in four countries that had previously eliminated endemic measles transmission.

Elimination of both measles and rubella is a priority goal that all countries of the WHO European Region have repeatedly firmly committed to. The cornerstones for eliminating these diseases remain high population immunity, including among adults, to stop disease transmission, and high-quality surveillance to monitor disease occurrence for public health action. The occurrence of measles cases and outbreaks is an indication of persisting challenges in making immunization services readily available to all the population and of under-utilization of the available immunization services by the population.

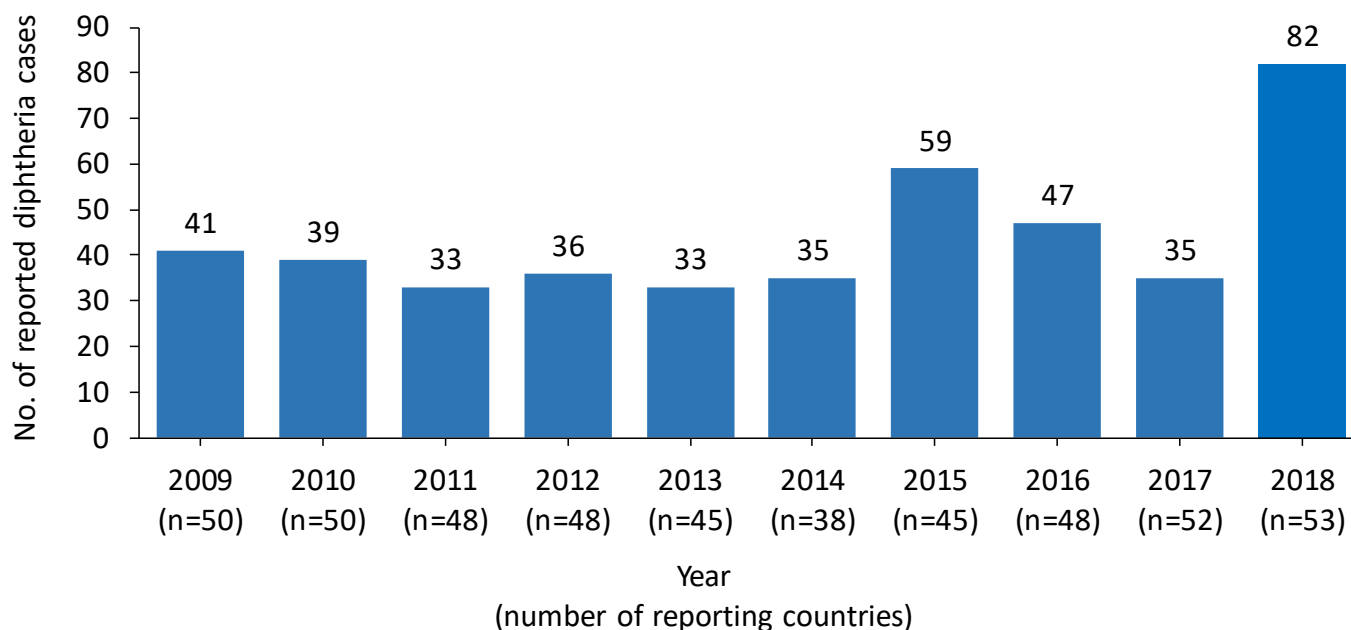
In May 2019 measles in the European Region was designated by WHO as a grade 2 regional emergency, thereby facilitating a scale up of action under the WHO Emergency Response Framework. Situation reports were published in July and August 2019 and in September 2019 the Regional Office for Europe launched its Strategic Response Plan.⁸ The plan covers September 2019 to December 2020 and highlights priority actions needed to ensure an effective response to interrupt transmission, save lives and reverse the regional trend in case numbers.

Diphtheria in the WHO European Region

Notifications and laboratory data

For 2009–2018, the number of countries that submitted reports (including zero reporting) ranged from 38 in 2014 to 53 in 2018. During 2009–2018 there were 440 cases of diphtheria reported in the Region (Fig. 6). For 2018, 13 countries reported 82 cases: Germany (n=26), United Kingdom (15), Ukraine (10), France (9), Switzerland (5), Russian Federation (4), Netherlands (4), Latvia (3), Belgium (2), Italy (1), Norway (1) Slovakia (1) and Spain (1).

Fig.6. Number of reported diphtheria cases in the WHO European Region, 2009–2018 (n=440)

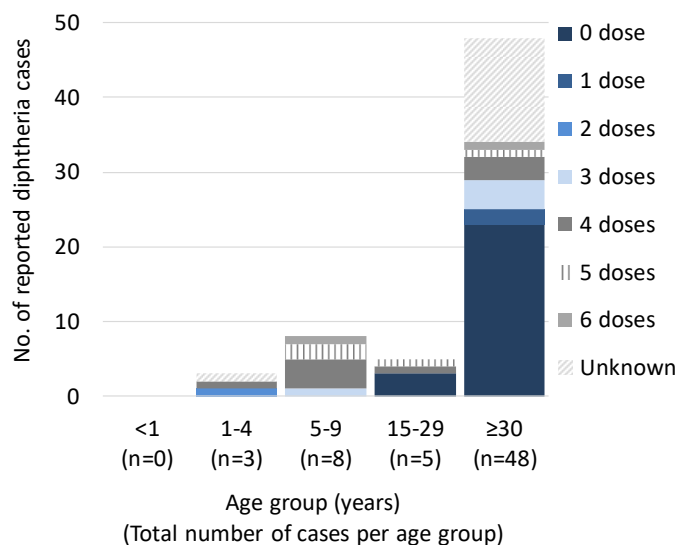


Of the 82 cases in 2018, 74 cases (90%) were laboratory confirmed, 4 cases were classified as clinically compatible and the remaining 4 cases did not have a final classification. The 74 laboratory-confirmed cases were reported by 12 countries: Germany (n=26), United Kingdom (14), France (9), Ukraine (7), Switzerland (5), Netherlands (4), Latvia (3), Belgium (2), Italy (1), Norway (1), Slovakia (1) and Spain (1).

Vaccination status

Of the 82 reported cases in 2018, 64 cases had data on age and vaccination status (Fig. 7). Most cases (75%, n=48) were ≥30 years old. Of these, 23 cases (48%) were unvaccinated.

Fig. 7. Diphtheria cases by age and vaccination status in the WHO European Region, 2018 (n=64)*



* For 18 cases the age group was not reported.

Diphtheria-related deaths

A total of 10 diphtheria-related deaths were reported through the JRF by 5 countries: Latvia (5 deaths) France (2), Spain (1), Turkey (1) and the United Kingdom (1). No deaths were reported in 2010 and 2018. Data on diphtheria-related deaths were not collected for 2016. That year one fatal case of diphtheria occurred in Belgium.⁵

Comments

Diphtheria in the WHO European Region

Prior to the widespread use of diphtheria immunization, the disease was a major cause of death among children.⁹ Diphtheria is now considered uncommon in the WHO European Region; of the 68 638 diphtheria cases reported globally in 2009–2018,¹⁰ only 440 cases were in the Region. Of these, 82 cases were reported in 2018 – the highest number of annual cases in 2009–2018. This is also of particular concern because unlike in previous years the total only included toxigenic cases, as was requested in the JRF for that year.

Not all countries are equipped with an adequate capacity to laboratory diagnose diphtheria. Indeed, significant gaps in this field of work have been reported in the Region.^{11,12} Surveillance systems including laboratory diagnostic capacity need to be adequate to ensure that cases are identified. Both clinicians and laboratory personnel should maintain a high index of suspicion in patients presenting with signs and symptoms of respiratory or cutaneous diphtheria

particularly after being in countries endemic for the disease.

All countries are urged to undertake national surveillance primarily to monitor disease burden and identify outbreaks. WHO has provided guidelines on surveillance for diphtheria.¹³ Since diphtheria has become uncommon, surveillance should be case based. All health care providers identifying cases should be required to report them and if possible, laboratory testing of all suspected cases should be conducted for case confirmation.

Rotavirus in the WHO European Region

Rotavirus surveillance

Rotavirus surveillance data are important at the country, regional and global levels to facilitate decision-making on policy related to introduction of the rotavirus vaccine (RVV) in a national immunization schedule and to document the impact of RVV once introduced.

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 hospitalized for acute 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 specimens are then tested for rotavirus using an enzyme immunoassay.

Regional rotavirus surveillance results

Seven Member States of the WHO European Region (Region) participated in GRSN in 2018: Armenia, Azerbaijan, Georgia, Republic of Moldova, Tajikistan, Ukraine and Uzbekistan. 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. The percentage of diarrhoea-associated hospitalizations caused by rotavirus among children <5 years of age fell after RVV introduction in Armenia (from 38% in the pre-RVV period to 10% in the second year following RVV introduction) and Republic of Moldova (from 45% in the pre-RVV period to 14% in the second year following RVV introduction).^{14,15} Rotavirus vaccine effectiveness for a 2-dose schedule against severe rotavirus hospitalizations was 79% and 84% among children 6–23 months of age in Armenia and Republic of Moldova, respectively.^{14,15} Similar impact and vaccine effectiveness evaluations are in progress in Tajikistan and Uzbekistan.

Ten sentinel surveillance hospitals in the 7 participating Member States in the Region reported data on children <5 years of age with acute diarrhoea in 2018. Children were enrolled at one sentinel surveillance hospital in Azerbaijan, Georgia, Tajikistan, and Ukraine and at 2 sentinel hospitals in Armenia, Republic of Moldova, and Uzbekistan. The number and rotavirus positivity of stool specimens tested varied by country (Fig. 8). The number of specimens tested ranged from 422 in Armenia to 1136 in Uzbekistan. In 2018, the percentage of hospital admissions positive for rotavirus ranged from 4% in Georgia (which has introduced RVV) to 37% in Ukraine (which has not yet introduced RVV).

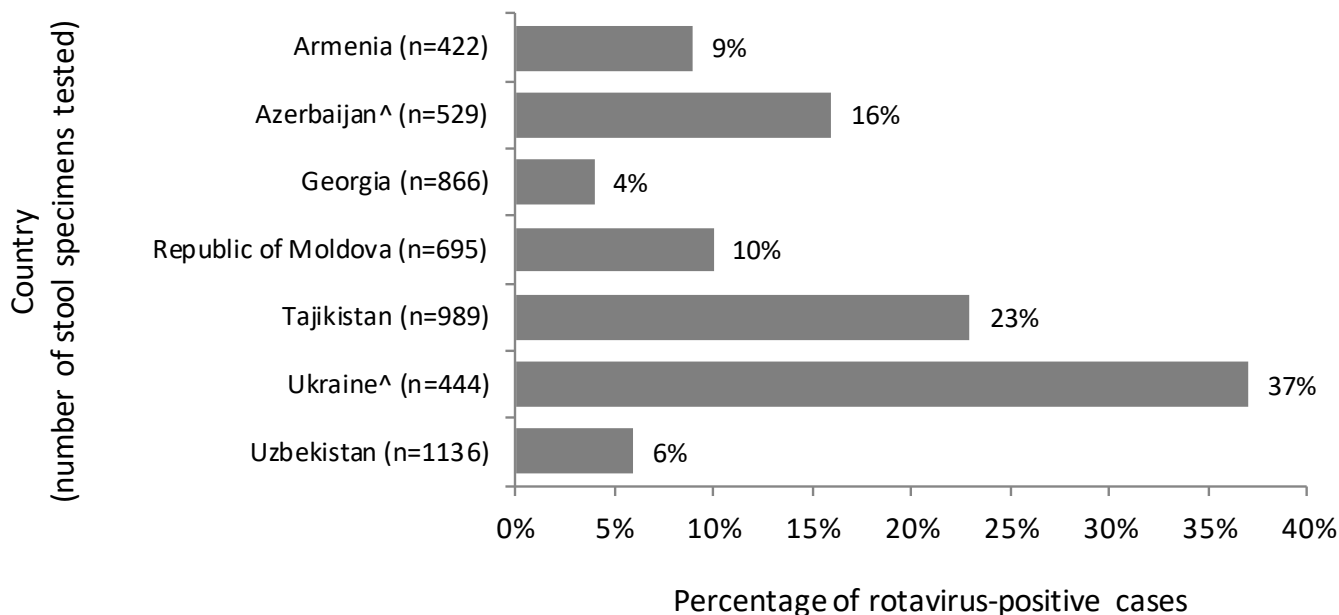
Based on the 313 strains that were typed for 2018, the following 6 genotypes accounted for 78% of the strains circulating in the GRSN-participating countries: G2P[4], G4P[8], G9P[8], G3P[4], G1P[8], and G3P[8].

Rotavirus laboratory external quality assessment

Rotavirus laboratories participating in GRSN 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. 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.

In 2018, all GRSN-participating rotavirus laboratories in the Region (n=9) passed the enzyme immunoassay (EIA) portion of the exercise to identify rotavirus. Two laboratories were assessed for the genotyping portion of the exercise and both passed.

Fig. 8. Percentage of diarrhoea-associated hospitalizations caused by rotavirus among eligible* children by country—GRSN, WHO European Region, 2018



*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 rotavirus vaccine.

Expanded use of rotavirus surveillance platform

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, the WHO-coordinated Global Paediatric Diarrhoea Surveillance (GPDS) network monitors severe paediatric diarrhoea in a subset of GRSN-participating Member States. The following five Member States in the Region began participation in GPDS in January 2017: Armenia, Republic of Moldova, Tajikistan, Ukraine and Uzbekistan. 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 GRSN case definition was expanded from children <5 years of age hospitalized with acute diarrhoea to include all paediatric diarrhoea including chronic and bloody diarrhoea. Quantitative polymerase chain reaction (qPCR) is performed at the existing WHO Regional Reference Laboratory (RRL) for rotavirus in Minsk, Belarus, 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.

Results from stool specimens collected in 2017–2018 indicate that the prevalence of enteric pathogens varied by country. Combining results from the five participating Member States in the Region, the most commonly detected pathogen was rotavirus followed by norovirus, *Shigella*, sapovirus, and adenovirus. Monitoring of gastroenteritis pathogens provides baseline data to facilitate decision making by Member States regarding future introduction of enteric vaccines currently in development for norovirus, *Shigella*, and enterotoxigenic *Escherichia coli* (ETEC).

Acknowledgements

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References

1. World Health Organization Regional Office for Europe. Centralized information system for infectious diseases (CISID). Copenhagen, WHO Regional Office for Europe. data.euro.who.int/cisid/
2. World Health Organization Regional Office for Europe. WHO EpiData no. 1/2020. www.euro.who.int/en/health-topics/disease-prevention/vaccines-and-immunization/publications/surveillance-and-data/who-epidata/epidata-12020
3. Measles Nucleotide Surveillance database (MeaNs) [online database]. London: Public Health England, and Geneva: World Health Organization. www.who-measles.org
4. Rubella Nucleotide Surveillance database (RubeNS). www.who-rubella.org [online database]. London: Public Health England, and Geneva: World Health Organization. www.who-rubella.org
5. European Centre for Disease Prevention and Control. Rapid risk assessment. A fatal case of diphtheria in Belgium, 24 March 2016. Stockholm: ECDC; 2016. <https://www.ecdc.europa.eu/sites/default/files/media/en/publications/Publications/RRA-Diphtheria-Belgium.pdf> (accessed 11 November 2019).
6. World Health Organization. Measles vaccines: WHO position paper—April 2017. *Wkly Epi Rec* 92:205-28 apps.who.int/iris/bitstream/handle/10665/255149/WER9217.pdf?sequence=1
7. World Health Organization Regional Office for Europe (2019). Eight meeting of the European regional verification commission for measles and rubella elimination. www.euro.who.int/en/health-topics/communicable-diseases/measles-and-rubella/publications/2019/8th-meeting-of-the-european-regional-verification-commission-for-measles-and-rubella-elimination-rvc-2019 (accessed 5 February 2020).
8. World Health Organization Regional Office for Europe (2019). Strategic Response Plan for the measles emergency in the WHO European Region (September 2019–December 2020) www.euro.who.int/en/health-topics/disease-prevention/vaccines-and-immunization/publications/2019/strategic-response-plan-for-the-measles-emergency-in-the-who-european-region-september-2019december-2020 (accessed 5 February 2020).
9. Tiwari T, Wharton M. Diphtheria Toxoid. In: Plotkin SA, Orenstein WA, Offit PA, (eds). *Vaccines*, 7th edn. Elsevier: Philadelphia, PA, 2018, pp 261-275.
10. World Health Organization. Diphtheria reported cases. (Online page) apps.who.int/immunization_monitoring/globalsummary/timeseries/tsincidediphtheria.html (accessed 23 October 2019).
11. Gaps found in the Region's capacity to diagnose diphtheria. Copenhagen: WHO Regional Office for Europe; 21 July 2017 www.euro.who.int/en/health-topics/disease-prevention/vaccines-and-immunization/news/news/2017/07/gaps-found-in-the-regions-capacity-to-diagnose-diphtheria (accessed 25 February 2020).
12. European Centre for Disease Prevention and Control. Gap analysis on securing diphtheria diagnostic capacity and diphtheria antitoxin availability in the EU/EEA. Stockholm: ECDC; 2017. Stockholm, July 2017 www.ecdc.europa.eu/en/publications-data/gap-analysis-securing-diphtheria-diagnostic-capacity-and-diphtheria-antitoxin (accessed 26 February 2020).
13. WHO Vaccine-Preventable Diseases Surveillance Standards. 2018. www.who.int/immunization/monitoring_surveillance/burden/vpd/WHO_SurveillanceVaccinePreventable_04_Diphtheria_R2.pdf?ua=1 (accessed 28 February 2020).
14. Sahakyan G., Griororyan S., Wasley A. et al. Impact and Effectiveness of Monovalent Rotavirus Vaccine in Armenian Children, *Clinical Infectious Diseases supplement*, 2016,62(S2), S.147-54
15. Gheorghita S., Bircal L., Donos A. et al. Impact of Rotavirus Vaccine Introduction and Vaccine Effectiveness in the Republic of Moldova, *Clinical Infectious Diseases supplement*, 2016,62(S2), S.140-6

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Annex

Table 1. Measles cases in the WHO European Region: classification, reporting and surveillance performance, 2019 (as of 7 February 2020)

Country	Total Population in 2019 ¹	2018 (as of 7 February 2020)			2019													
		Incidence Rate (per 1 million population)	Total measles cases ²	Total measles death	Total measles cases ²	Classification			Discarded Measles	Imported cases	Measles Death	Report			Surveillance Indicators ⁵			
						Lab confirmed	Epi-Link	Clinically compatible ³				Completeness ⁴	Timeliness ⁴	Month & year of last report	Laboratory investigation rate ⁴	Rate of discarded cases ⁵	Origin of infection ⁴	Timeliness of investigation ⁴
Albania ⁷	2 880 917	499.60	1466	3	482	379	0	103	350	22	2	100%	92%	Dec-19	87%	12.1	100%	100%
Andorra	77 142	0.00	0	-	0	0	0	0	0	-	-	100%	100%	Dec-19	-	0.0	-	-
Armenia	2 957 731	6.48	19	0	7	7	0	0	133	5	0	100%	100%	Dec-19	100%	4.5	86%	100%
Austria	8 955 102	8.80	77	0	151	140	11	0	74	18	0	100%	100%	Dec-19	79%	0.8	99%	9%
Azerbaijan	10 047 718	7.15	71	0	261	240	21	0	53	1	0	100%	92%	Dec-19	99%	0.5	99%	98%
Belarus ⁷	9 452 411	24.97	236	0	191	191	0	0	361	0	0	100%	100%	Dec-19	100%	3.8	0%	0%
Belgium	11 539 328	10.18	117	0	485	375	60	50	-	0	0	100%	100%	Dec-19	-	-	-	-
Bosnia and Herzegovina	3 301 000	25.40	89	0	1401	180	0	1221	-	0	0	100%	42%	Dec-19	-	-	-	-
Bulgaria	7 000 119	1.85	13	0	1235	1119	69	47	-	8	0	100%	100%	Dec-19	96%	-	2%	100%
Croatia	4 130 304	5.52	23	0	51	51	0	0	1	10	0	92%	83%	Nov-19	100%	0.0	92%	0%
Cyprus	1 198 575	11.77	14	0	6	5	1	0	-	1	0	100%	100%	Dec-19	100%	-	100%	0%
Czech Republic	10 689 209	20.42	217	0	577	498	40	39	-	17	0	100%	100%	Dec-19	95%	-	94%	0%
Denmark	5 771 876	1.39	8	0	15	15	0	0	-	4	0	100%	100%	Dec-19	100%	-	93%	0%
Estonia	1 325 648	7.65	10	0	27	26	0	1	130	13	0	100%	100%	Dec-19	99%	9.8	100%	100%
Finland	5 532 156	2.71	15	0	12	12	0	0	-	8	0	100%	92%	Dec-19	100%	-	92%	0%
France	65 129 728	44.75	2919	4	2637	1660	383	594	-	157	2	100%	100%	Dec-19	87%	-	86%	0%
Georgia	3 996 765	563.84	2203	3	3920	2559	124	1237	478	3	2	100%	92%	Dec-19	71%	12.0	99%	96%
Germany	83 517 045	6.60	543	0	505	398	79	28	-	75	0	100%	75%	Dec-19	93%	-	67%	0%
Greece	10 473 455	196.82	2193	2	45	28	1	16	2	17	0	100%	100%	Dec-19	65%	0.0	100%	0%
Hungary	9 684 679	1.44	14	0	23	23	0	0	0	10	1	100%	100%	Dec-19	100%	0.0	91%	100%
Iceland	339 031	0.00	0	-	9	9	0	0	-	3	0	100%	100%	Dec-19	100%	-	100%	100%
Ireland	4 882 495	16.24	78	0	73	42	7	24	-	11	0	100%	100%	Dec-19	82%	-	68%	67%
Israel	8 519 377	373.96	3161	0	1028	638	301	89	-	0	0	100%	83%	Dec-19	88%	-	0%	49%
Italy	60 550 075	45.30	2686	9	1626	1410	82	134	290	82	1	100%	92%	Dec-19	95%	0.5	84%	0%
Kazakhstan	18 551 427	31.30	576	0	13326	8018	4413	895	-	0	21	100%	100%	Dec-19	-	-	-	-
Kyrgyzstan ⁷	6 415 850	180.01	1104	2	2284	73	1251	960	683	5	0	100%	100%	Dec-19	7%	10.6	99%	99%
Latvia	1 906 743	10.88	21	0	2	2	0	0	-	2	0	83%	83%	Oct-19	100%	-	100%	100%
Lithuania	2 759 627	11.47	33	0	831	831	0	0	-	15	0	100%	92%	Dec-19	100%	-	100%	68%
Luxembourg	615 729	6.78	4	0	24	24	0	0	27	3	0	100%	100%	Dec-19	100%	4.4	96%	100%
Malta	440 372	11.57	5	0	32	32	0	0	-	0	0	100%	100%	Dec-19	100%	-	100%	0%
Monaco	38 964	0.00	0	-	0	0	0	0	0	-	-	100%	100%	Dec-19	-	0.0	-	-
Montenegro	627 987	322.62	203	0	0	0	0	0	39	-	-	100%	42%	Dec-19	100%	6.2	-	92%
Netherlands	17 097 130	1.40	24	0	82	68	14	0	-	20	0	100%	100%	Dec-19	100%	-	74%	0%
North Macedonia	2 083 459	30.69	64	0	1884	648	689	547	-	0	5	100%	58%	Dec-19	-	-	-	-
Norway	5 378 857	2.24	12	0	17	14	3	0	-	8	0	100%	83%	Dec-19	100%	-	88%	100%
Poland	37 887 768	10.26	391	0	1367	916	108	343	-	0	0	100%	100%	Dec-19	-	-	-	-
Portugal	10 226 187	16.62	171	0	10	10	0	0	79	6	0	100%	100%	Dec-19	94%	0.8	60%	88%
Republic of Moldova	4 043 263	84.14	340	0	89	66	23	0	32	23	0	100%	100%	Dec-19	100%	0.8	99%	98%
Romania	19 364 557	326.75	6398	22	1706	1270	399	37	-	3	5	100%	100%	Dec-19	98%	-	100%	99%
Russian Federation	145 872 256	15.91	2290	1	4153	3898	233	22	4583	230	0	100%	100%	Dec-19	100%	3.1	100%	41%
San Marino	33 860	0.00	0	-	11	11	0	0	0	1	0	100%	100%	Dec-19	100%	0.0	100%	100%
Serbia	8 772 235	579.32	5076	14	21	19	0	2	-	0	0	100%	92%	Dec-19	-	-	-	-
Slovakia	5 457 013	104.96	572	0	312	267	41	4	13	8	0	100%	100%	Dec-19	100%	0.2	100%	100%
Slovenia	2 078 654	4.32	9	0	48	48	0	0	-	13	0	100%	100%	Dec-19	100%	-	88%	100%
Spain	46 736 776	4.87	226	0	292	276	9	7	308	39	0	100%	100%	Dec-19	98%	0.7	99%	81%
Sweden	10 036 379	3.81	38	0	20	19	1	0	-	12	0	100%	100%	Dec-19	100%	-	95%	0%
Switzerland	8 591 365	5.97	51	0	217	169	44	4	302	40	1	100%	100%	Dec-19	99%	3.5	86%	41%
Tajikistan	9 321 018	0.00	0	-	7	7	0	0	96	0	0	100%	100%	Dec-19	100%	1.0	100%	97%
Turkey ⁷	83 429 615	8.74	716	0	2890	2401	489	0	5795	19	3	100%	75%	Dec-19	100%	6.9	7%	97%
Turkmenistan	5 942 089	0.00	0	-	0	0	0	0	48	-	-	100%	100%	Dec-19	100%	0.8	-	98%
Ukraine	43 993 638	1209.25	53218	15	57282	6531	35	50716	-	0	20	100%	100%	Dec-19	-	-	-	-
United Kingdom	67 530 172	14.32	953	0	882	881	1	0	-	110	1	100%	100%	Dec-19	100%	-	99%	2%
Uzbekistan	32 981 716	0.87	28	0	1692	687	40	965	467	13	0	100%	75%	Dec-19	50%	1.4	84%	99%
Region	930 166 592	96.15	88695	75	104248	37191	8972	58085	14344	1035	64	100%	93%	Dec-19	88%	3.0	78%	66%

Data source: Monthly aggregated and case-based data reported by Member States to WHO/Europe directly or via ECDC/TESSy. Member States submitting aggregate data: Belgium, Bosnia and Herzegovina, Kazakhstan, North Macedonia, Poland (since Feb 2019), Serbia and Ukraine.

¹ Population source: United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2019 Revision.

² All confirmed measles cases regardless of origin.

³ Unless specified as laboratory confirmed or epi-linked, cases are classified as clinically compatible.

⁴ Target (≥80%) not achieving are highlighted in red.

⁵ Rate of discarded cases not achieving the target (≥2 discarded cases per 100 000) are highlighted in red. Rate of discarded cases is not calculated for the countries submitting only confirmed measles cases.

⁶ Surveillance indicators can not be calculated for Member States submitting aggregate data.

⁷ Country classifies discard cases as "discarded, not measles, not rubella".

Table 2. Rubella cases in the WHO European Region: classification, reporting and surveillance performance, 2019 (as of 7 February 2020)

Country	Total Population in 2019 ¹	2018 (as of 7 February 2020)		2019												
		Incidence Rate (per 1 million population)	Total rubella cases ²	Total rubella cases ²	Classification					Report			Surveillance Indicators ⁶			
					Lab confirmed	Epi-Link	Clinically compatible ³	Discarded Rubella	Imported cases	Completeness ⁴	Timeliness ⁴	Month & year of last report	Laboratory investigation rate ⁴	Rate of discarded cases ⁵	Origin of infection ⁴	Timeliness of investigation ⁴
Albania ⁷	2 880 917	0.00	0	0	0	0	0	350	-	100%	100%	Dec-19	99%	12.1	-	100%
Andorra	77 142	0.00	0	0	0	0	0	0	-	100%	100%	Dec-19	-	0.0	-	-
Armenia	2 957 731	0.00	0	0	0	0	0	0	-	100%	100%	Dec-19	-	0.0	-	-
Austria	8 955 102	0.69	6	0	0	0	0	-	-	100%	100%	Dec-19	-	-	-	-
Azerbaijan	10 047 718	0.00	0	2	2	0	0	8	0	100%	92%	Dec-19	100%	0.1	0%	90%
Belarus ⁷	9 452 411	0.21	2	0	0	0	0	361	-	100%	100%	Dec-19	100%	3.8	-	0%
Belgium ⁸	11 539 328	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bosnia and Herzegovina	3 301 000	0.86	3	3	0	0	3	-	0	100%	42%	Dec-19	-	-	-	-
Bulgaria	7 000 119	0.14	1	0	0	0	0	-	-	100%	100%	Dec-19	-	-	-	-
Croatia	4 130 304	0.00	0	0	0	0	0	-	-	100%	58%	Dec-19	-	-	-	-
Cyprus	1 198 575	0.00	0	0	0	0	0	-	-	100%	100%	Dec-19	-	-	-	-
Czech Republic	10 689 209	0.19	2	0	0	0	0	-	-	100%	42%	Dec-19	-	-	-	-
Denmark ⁸	5 771 876	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estonia	1 325 648	0.00	0	0	0	0	0	12	-	100%	100%	Dec-19	100%	0.9	-	100%
Finland	5 532 156	0.00	0	0	0	0	0	-	-	100%	92%	Dec-19	-	-	-	-
France ⁸	65 129 728	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Georgia	3 996 765	0.00	0	9	4	0	5	36	0	100%	92%	Dec-19	80%	0.9	100%	96%
Germany	83 517 045	0.70	58	56	14	3	39	-	3	100%	75%	Dec-19	26%	-	63%	0%
Greece	10 473 455	0.00	0	0	0	0	0	-	-	100%	100%	Dec-19	-	-	-	-
Hungary	9 684 679	0.00	0	0	0	0	0	0	-	100%	92%	Dec-19	-	0.0	-	-
Iceland	339 031	0.00	0	0	0	0	0	-	-	100%	83%	Dec-19	-	-	-	-
Ireland	4 882 495	0.00	0	1	0	0	1	-	0	100%	100%	Dec-19	100%	-	100%	100%
Israel	8 519 377	0.24	2	0	0	0	0	-	-	100%	83%	Dec-19	-	-	-	-
Italy	60 550 075	0.34	20	22	9	1	12	19	3	100%	92%	Dec-19	93%	0.0	86%	0%
Kazakhstan	18 551 427	0.05	1	5	5	0	0	-	0	100%	100%	Dec-19	-	-	-	-
Kyrgyzstan ⁷	6 415 850	1.30	8	4	4	0	0	683	0	100%	100%	Dec-19	8%	10.6	100%	99%
Latvia	1 906 743	2.07	4	2	1	0	1	-	1	83%	83%	Oct-19	100%	-	100%	100%
Lithuania	2 759 627	0.35	1	0	0	0	0	-	-	100%	92%	Dec-19	-	-	-	-
Luxembourg	615 729	0.00	0	0	0	0	0	-	-	100%	100%	Dec-19	100%	-	-	100%
Malta	440 372	0.00	0	0	0	0	0	-	-	100%	100%	Dec-19	-	-	-	-
Monaco	38 964	0.00	0	0	0	0	0	0	-	100%	100%	Dec-19	-	0.0	-	-
Montenegro	627 987	0.00	0	0	0	0	0	0	-	100%	50%	Dec-19	-	0.0	-	-
Netherlands	17 097 130	0.00	0	0	0	0	0	-	-	100%	100%	Dec-19	-	-	-	-
North Macedonia	2 083 459	0.00	0	0	0	0	0	-	-	100%	75%	Dec-19	-	-	-	-
Norway	5 378 857	0.00	0	0	0	0	0	-	-	100%	75%	Dec-19	-	-	-	-
Poland	37 887 768	11.47	437	292	4	2	286	-	0	100%	100%	Dec-19	-	-	-	-
Portugal	10 226 187	0.49	5	3	0	0	3	9	0	100%	100%	Dec-19	75%	0.1	67%	75%
Republic of Moldova	4 043 263	0.00	0	0	0	0	0	1	-	100%	100%	Dec-19	100%	0.0	-	100%
Romania	19 364 557	0.46	9	4	4	0	0	-	0	100%	83%	Dec-19	100%	-	0%	100%
Russian Federation	145 872 256	0.04	6	34	34	0	0	4	4	100%	100%	Dec-19	100%	0.0	100%	53%
San Marino	33 860	0.00	0	0	0	0	0	0	-	100%	100%	Dec-19	-	0.0	-	-
Serbia	8 772 235	-	-	-	-	-	-	-	-	-	-	No report	-	-	-	-
Slovakia	5 457 013	0.00	0	0	0	0	0	0	-	100%	100%	Dec-19	-	0.0	-	-
Slovenia	2 078 654	0.00	0	0	0	0	0	-	-	100%	92%	Dec-19	-	-	-	-
Spain	46 736 776	0.26	12	4	2	1	1	13	0	100%	100%	Dec-19	100%	0.0	25%	100%
Sweden	10 036 379	0.00	0	0	0	0	0	0	-	100%	100%	Dec-19	-	0.0	-	-
Switzerland	8 591 365	0.23	2	1	1	0	0	31	1	100%	100%	Dec-19	97%	0.4	100%	9%
Tajikistan	9 321 018	0.00	0	0	0	0	0	36	-	100%	100%	Dec-19	100%	0.4	-	94%
Turkey ⁷	83 429 615	0.27	22	45	45	0	0	5795	2	100%	75%	Dec-19	100%	6.9	20%	97%
Turkmenistan	5 942 089	0.00	0	0	0	0	0	102	-	100%	100%	Dec-19	100%	1.7	-	100%
Ukraine	43 993 638	5.34	235	138	29	0	109	-	0	100%	100%	Dec-19	-	-	-	-
United Kingdom	67 530 172	0.03	2	3	3	0	0	-	0	100%	100%	Dec-19	100%	-	100%	0%
Uzbekistan	32 981 716	0.00	0	0	0	0	0	0	-	100%	75%	Dec-19	-	0.0	-	-
Region	930 166 592	0.91	838	628	161	7	460	7456	14	92%	84%		92%	1.6	63%	91%

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⁴ Target (≥80%) not achieving are highlighted in red.

⁵ Rate of discarded cases not achieving the target (≥2 discarded cases per 100 000) are highlighted in red. Rate of discarded cases is not calculated for the countries submitting only confirmed rubella cases.

⁶ Surveillance indicators can not be calculated for Member States submitting aggregate data.

⁷ Country classifies discarded cases as "discarded, not measles, not rubella".

⁸ Country does not have a comprehensive rubella surveillance system.