Introduction

The following preliminary measles surveillance report aims to describe basic epidemiological features of measles in EUVAC.NET-participating countries for 2009.

Methods

Measles surveillance data were submitted by all 32 EUVAC.NET-participating countries for the whole year. Thirty-one countries provided case-based data obtained through national mandatory notification systems. Belgium provided case-based data gathered through both a national voluntary notification system and a mandatory system applied to schools. Cases meeting the requirements for national surveillance, including clinical, laboratory-confirmed, and epidemiologically linked cases, were analysed.

Data analysis was based on cases with disease onset in 2009. Case-based reports provided data for disease onset dates, age, diagnosis confirmation, vaccination, importation, hospitalisation, the presence of acute encephalitis as a complication of measles, and measles-related deaths. Variables for which no data were available in the case-based reports were converted to unknown status.

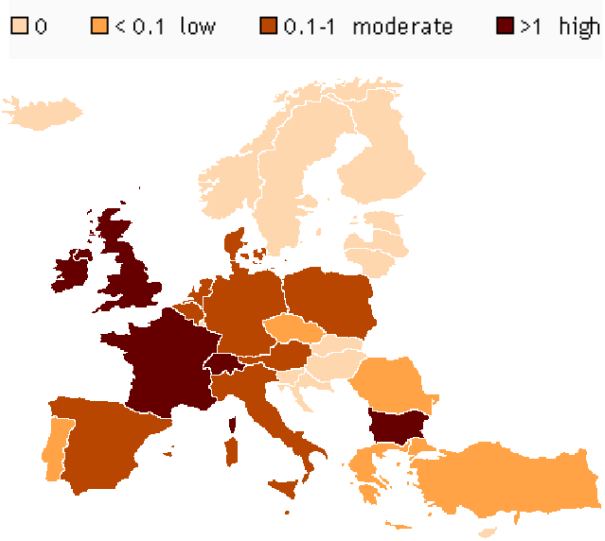
We defined indigenous cases as those that were not recorded as imported from another country. Those with unknown importation status were also regarded as indigenous cases. Data for imported cases indicated the most probable country to have been the source of infection. Countries were grouped into categories of zero, low, moderate, and high incidence for the corresponding indigenous measles incidence per 100,000 inhabitants per year of 0, less than 0·1, 0·1–1, and more than 1, respectively.

Case-based reports with absent or unknown disease onset dates were included in the analyses because the date of notification or the date of collection of the laboratory sample was during the corresponding years. Incidence was calculated with the number of cases of reported measles as the numerator and the country population obtained from the WHO Computerized Information System for Infectious Diseases (CISID)[1] as the denominator. We expressed incidence of disease as measles cases per 100,000 inhabitants per year, and that of death as the total per 1000 measles cases per year. We included all reported cases (i.e., including indigenous cases, imported cases, and those with unknown importation status) when calculating crude incidences.

Incidence – notifications and laboratory data

During 2009, a total of 7,175 measles cases was reported and included 52 (0.7%) case-based reports with absent or unknown disease onset dates. Most cases (n=6,523; 91%) were from five countries: Bulgaria, France, Switzerland, the UK and Germany (table 1).

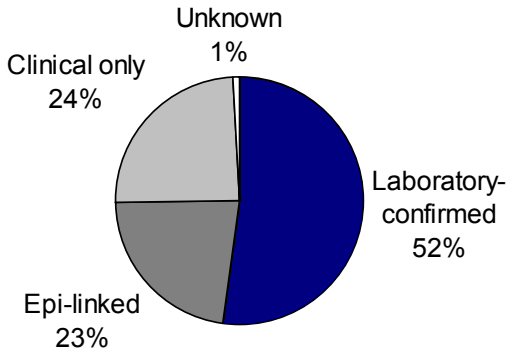
Figure 1. Geographical indigenous incidence of measles, 2009



In some countries minor discrepancies with nationally reported data may arise if these include cases reported in 2009 but with disease onset in 2008.

The distribution of reported measles cases varied considerably among the participating countries (table 1). The largest numbers of cases in 2009 were reported from Bulgaria (31%) and France (22%), and the highest crude incidence rates were in Bulgaria and Switzerland with 29.88 and 13.16 per 100,000 inhabitants, respectively (figure 1). Figure 2 overleaf shows the proportions of cases by diagnosis classification.

Figure 2. Diagnosis classification of measles cases, 2009 (n=7,175)



In panel 1, countries have been grouped into low, moderate and high incidence categories based on reported indigenous measles cases. No indigenous cases were reported from 13 countries: Croatia, Cyprus, Estonia, Finland, Hungary, Iceland, Latvia, Lithuania, Luxembourg, Norway, Slovakia, Slovenia and Sweden.

Panel 1: Reported incidence of indigenous measles per 100,000 inhabitants by country, 2009

High incidence (>1) Bulgaria (29.9), Switzerland (13.0), Ireland (4.3), France (2.5) and United Kingdom (1.9).

Moderate incidence (0.1-1) Germany (0.7), Austria (0.5), Belgium (0.3), Italy (0.3), Poland (0.3), Malta (0.2), Denmark (0.1), the Netherlands (0.1) and Spain (0.1).

Low incidence (<0.1) Czech Republic (0.04), Greece (0.02), Portugal (0.01), Romania (0.01) and Turkey (0.001).

Outbreak-related and imported cases

Information on outbreak status was known in 5,528 (77%) cases. Of these, 4,301 cases reported as being outbreak-related (table 2), making up to 78% of those with a known outbreak status. Most outbreak cases were reported from the Bulgaria (52%), United Kingdom (16%), France (14%) and Germany (11%). Measles outbreaks in 2009 were documented from Austria,[2] Bulgaria,[3,4] Denmark,[5] France,[6-8] Ireland[9] and Poland.[10] They involved the general population as well as particular groups such as Roma communities and anthroposophic communities. Measles transmission was reported in schools and hospitals.

The importation status was known in 5,163 (72%) of cases (table 2). Of these, there were 101 imported cases amounting to 2% of cases with known importation status. 60 (59%) were imported from another European country. The rest were reported as imported from other continents including, 22 from Asia, five from the Middle East, 11 from Africa, three from North America region. The number of reported measles cases by country identified as sources of importation is seen in panel 2.

Panel 2: Top 10 countries identified as sources of importation, 2009

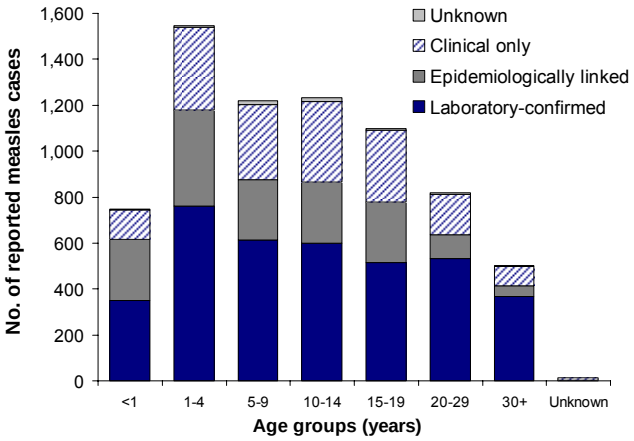
France (17), India (10), UK (10), Ireland (7), Italy (7), Switzerland (7), Thailand (5), Ethiopia (4), Spain (4) and Germany (3)

This panel needs to be interpreted with caution as the definition of an imported case may differ from country to country.

Age distribution

The age-group was known in 99.8% of cases. Measles was reported in both children and adults. Overall, 10% of cases were infants, 22% 1-4 years, 50% 5-19 years and 18% were ≥20 years. Figure 3 shows the number of reported measles cases by age-group and diagnosis confirmation status.

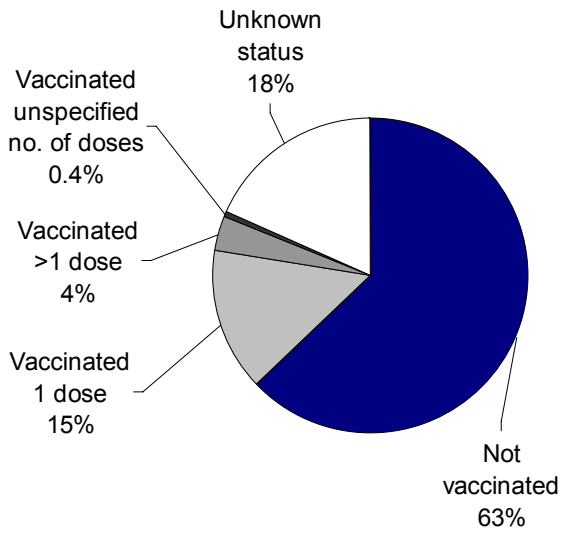
Figure 3. Reported measles cases by age-group and diagnosis confirmation status, 2009 (n=7,175)



Vaccination status

Information on known vaccination status was provided in 5,860 (82%) of all reported measles cases (table 3). Overall, 77% of those with a known vaccination status were unvaccinated. Figure 4 overleaf shows the proportions of cases by vaccination status.

Figure 4. Vaccination status of measles cases, 2009 (n=7,175)



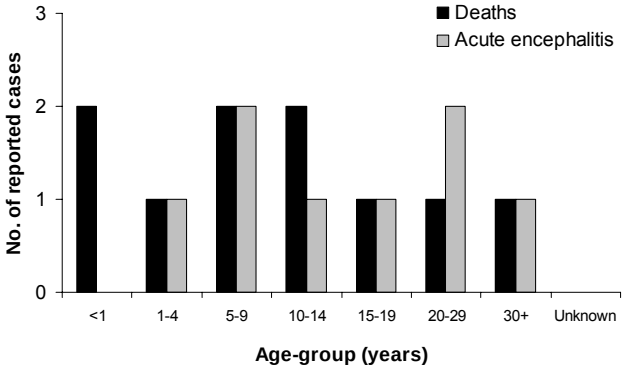
Morbidity and mortality

Data on known hospitalisation status was available in 98% of all reported measles cases. There were 2,819 reported hospitalised cases in connection with measles (table 2) amounting to 40% of all cases with known hospitalisation status.

A total of 10 measles-related deaths were reported. These were reported from Bulgaria (seven deaths), France (two deaths) and the Netherlands (one death). This corresponds to an overall case fatality rate of 1.39 per 1000 measles cases. Six died of pulmonary complications and four died of acute encephalitis. Seven cases were unvaccinated, four cases had received one measles-containing vaccine (MCV) and in two cases the vaccination status was unknown. The cases of the measles-related death cases ranged from 3 months to 39 years (figure 5). With the exception of one case, all were laboratory confirmed for measles.

Eight cases were complicated with acute encephalitis corresponding to an overall incidence of 1.11 per 100,000 measles cases. The cases were reported from Bulgaria (three cases), France (two cases), the UK (two cases) and Switzerland (one case). The cases of acute encephalitis ranged from one year and 10 months to 30 years (figure 5). Three had not been vaccinated against measles while two had been vaccinated with one MCV dose. In the other two cases the vaccination status was unknown. Acute encephalitis contributed to four measles-related deaths.

Figure 5. Number of reported measles-related deaths (n=10) and acute encephalitis (n=8), 2009



Comments

The number of reported measles cases in EUVAC.NET-participating remained almost the same in 2009 compared with the previous year. The decline in the number of cases from many countries have been counterbalanced by increases in the number if cases from a few countries, namely Bulgaria, France and Ireland.

Comparisons between countries should, however, be made with caution because while some countries reported both clinical cases and laboratory-confirmed cases others only reported the latter. More countries reported zero indigenous cases with 13 countries in 2009 compared with 10 in 2008. As expected, the majority of measles cases occurred in unvaccinated cases.

Most imported cases were reported to occur following travel to countries with documented outbreaks or where endemic measles transmission still occurs. It is to be noted that the list of countries reported as sources of importation of measles (panel 2) has to be interpreted with caution since different countries may use different definitions of imported cases.

The sharp increase in number of measles cases in some EUVAC.NET-participating countries remains of great concern in relation to the measles elimination goal by 2010. The commitment to eliminate measles in Europe needs to be strengthened by increasing vaccination coverage with two doses of measles vaccines to a WHO recommended minimum of 95%.

Additionally, enhanced surveillance from clinical to laboratory level needs to be undertaken for early identification and laboratory confirmation of cases. An increased level of suspicion in cases

with rash, particularly in those >15 years old and in travellers returning from endemic countries is important. Laboratory investigations including molecular characterization of measles virus help to better define outbreaks and identify imported measles thereby demonstrating the absence or presence of endemic measles.

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Reporters

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Issued: 28 April 2010 *Updated: 03 December 2010*

Table 1. Reported measles cases and laboratory-confirmed cases by country, 2009 (n=7,175)

Country	Number of cases (Crude incidence per 100,000 inhabitants)		*Laboratory-confirmed cases*	*Epidemiologically linked cases*
	2008	2009	2009	2009
Austria	427 *(5.09)*	47 *(0.56)*	13 28%	0 0%
Belgium	98 *(0.94)*	33 *(0.31)*	24 73%	2 6%
Bulgaria	1 *(0.01)*	2249 *(29.88)*	696 31%	1,226 55%
Croatia	50 *(1.10)*	2 *(0.04)*	1 50%	0 0%
Cyprus	1 *(0.12)*	0 *(0)*	0 ..	0 ..
Czech Republic	2 *(0.02)*	5 *(0.05)*	5 100%	0 0%
Denmark	12 *(0.22)*	8 *(0.15)*	8 100%	0 0%
Estonia	0 *(0)*	0 *(0)*	0 ..	0 ..
Finland	5 *(0.09)*	2 *(0.04)*	2 100%	0 0%
France	604 *(0.98)*	1544 *(2.48)*	832 54%	96 6%
Germany	915 *(1.11)*	572 *(0.69)*	387 68%	146 26%
Greece	1 *(0.01)*	2 *(0.02)*	1 50%	0 0%
Hungary	0 *(0)*	1 *(0.01)*	1 100%	0 0%
Iceland	0 *(0)*	0 *(0)*	0 ..	0 ..
Ireland	56 *(1.28)*	193 *(4.33)*	100 52%	30 16%
Italy	1619 *(2.75)*	173 *(0.29)*	0 0%	0 0%
Latvia	3 (0.13)	0 (0)	0 ..	0 ..
Lithuania	1 (0.03)	0 (0)	0 ..	0 ..
Luxembourg	0 (0)	0 (0)	0 ..	0 ..
Malta	1 *(0.24)*	1 *(0.24)*	1 100%	0 0%
Netherlands	109 *(0.66)*	15 *(0.09)*	13 87%	1 7%
Norway	4 *(0.08)*	2 *(0.04)*	2 100%	0 0%
Poland	100 (0.26)	109 (0.29)	56 51%	41 38%
Portugal	1 *(0.01)*	3 *(0.03)*	3 100%	0 0%
Romania	14 (0.07)	8 (0.04)	7 88%	0 0%
Slovakia	0 (0)	0 (0)	0 ..	0 ..
Slovenia	0 (0)	0 (0)	0 ..	0 ..
Spain	296 (0.66)	41 (0.09)	31 76%	3 7%
Sweden	25 (0.27)	3 (0.03)	3 100%	0 0%
Switzerland	2062 *(27.45)*	992 *(13.16)*	409 41%	84 8%
Turkey	4 *(0.01)*	4 *(0.01)*	2 50%	0 0%
United Kingdom	1406 *(2.30)*	1166 *(1.90)*	1148 98%	2 0%
Total	7817 *(1.33)*	7175 *(1.22)*	3745 52%	1631 23%

Table 2. Reported measles cases: hospitalised, outbreak related and imported, by country, 2009

Country	Hospitalised cases[1]		Outbreak-related cases[1]		Imported cases[1]	
	No. of cases (% of known hospitalisation status)	*% Unknown status or no data*	*No. of cases (% of known outbreak status)*	*% Unknown status or no data*	*No. of cases (% of known importation status)*	*% Unknown of total or no data*
Austria	11 26%	11%	27 71%	19%	2 5%	9%
Belgium	8 29%	15%	13 41%	3%	6 20%	9%
Bulgaria	1760 78%	0%	2249 100%	0%	1 0.04%	0%
Croatia	1 50%	0%	0 0%	0%	2 100%	0%
Cyprus	0 ..	..	0 ..	..	0 ..	..
Czech Republic	4 80%	0%	0 0%	0%	1 25%	20%
Denmark	5 63%	0%	5 71%	13%	1 13%	0%
Estonia	0 ..	..	0 ..	..	0 ..	..
Finland	1 100%	50%	0 0%	0%	2 100%	0%
France	422 28%	2%	590 53%	28%	4 0.3%	22%
Germany	149 27%	2%	453 79%	0%	26 5%	5%
Greece	1 50%	0%	0 0%	0%	0 0%	0%
Hungary	1 100%	0%	0 0%	0%	1 100%	0%
Iceland	0 ..	..	0 ..	..	0 ..	..
Ireland	79 46%	11%	105 75%	27%	3 3%	45%
Italy	41 24%	2%	21 100%	88%	0 ..	98%
Latvia	0 ..	..	0 ..	..	0 ..	..
Lithuania	0 ..	..	0 ..	..	0 ..	..
Luxembourg	0 ..	..	0 ..	..	0 ..	..
Malta	0 0%	0%	1 100%	0%	0 0%	0%
Netherlands	5 33%	0%	10 71%	7%	3 25%	20%
Norway	1 50%	0%	0 0%	0%	2 100%	0%
Poland	74 68%	0%	86 79%	0%	1 1%	0%
Portugal	3 100%	0%	2 67%	0%	2 67%	0%
Romania	6 86%	13%	6 75%	0%	6 75%	0%
Slovakia	0 ..	..	0 ..	..	0 ..	..
Slovenia	0 ..	..	0 ..	..	0 ..	..
Spain	7 17%	0%	32 82%	5%	7 17%	0%
Sweden	1 100%	67%	0 0%	33%	3 100%	0%
Switzerland	81 9%	4%	0 ..	100%	13 2%	22%
Turkey	4 100%	0%	3 75%	0%	3 100%	25%
United Kingdom	154 13%	0%	698 60%	0%	12 100%	99%
Total	**2819 40%**	**2%**	**4301 78%**	**23%**	**101 2%**	**28%**

[1]Denominator n=7,175

Table 3. Vaccination status of reported measles cases by country, 2009 (n=7,175)

Country	*No. of unvaccinated cases (% of unvaccinated of known vaccination status)*	*No. of vaccinated cases (% vaccinated of known vaccination status)*	*No. with unknown vaccination status/no data (% unknown status /no data of total)*
Austria	27 93%	2 7%	18 38%
Belgium	23 77%	7 23%	3 9%
Bulgaria	558 39%	855 61%	836 37%
Croatia	1 100%	0 0%	1 50%
Cyprus	0 ..	0 ..	0 ..
Czech Republic	3 75%	1 25%	1 20%
Denmark	8 100%	0 0%	0 0%
Estonia	0 ..	0 ..	0 ..
Finland	2 100%	0 0%	0 0%
France	1108 84%	217 16%	219 14%
Germany	489 95%	26 5%	57 10%
Greece	0 0%	2 100%	0 0%
Hungary	0 0%	1 100%	0 0%
Iceland	0 ..	0 ..	0 ..
Ireland	116 74%	41 26%	36 19%
Italy	146 87%	22 13%	5 3%
Latvia	0 ..	0 ..	0 ..
Lithuania	0 ..	0 ..	0 ..
Luxembourg	0 ..	0 ..	0 ..
Malta	1 100%	0 0%	0 0%
Netherlands	13 93%	1 7%	1 7%
Norway	1 100%	0 0%	1 50%
Poland	84 77%	25 23%	0 0%
Portugal	1 50%	1 50%	1 33%
Romania	3 38%	5 63%	0 0%
Slovakia	0 ..	0 ..	0 ..
Slovenia	0 ..	0 ..	0 ..
Spain	33 87%	5 13%	3 7%
Sweden	1 33%	2 67%	0 0%
Switzerland	795 92%	68 8%	129 13%
Turkey	1 50%	2 67%	1 33%
United Kingdom	1097 94%	69 6%	0 0%
Total	**4511 77%**	**1352 23%**	**1312 18%**

Contributors

We would like to thank all those who have contributed data for this report: Gabriela El Belazi (Federal Ministry for Health, Austria); Martine Sabbe (Scientific Institute of Public Health, Belgium); Lili Marinova and Mira Kojouharova (National Centre of Infectious and Parasitic Diseases, Bulgaria); Bernard Kaic (National Institute of Public Health, Croatia); Soteroulla Soteriou, Chryso Gregoriadou Eracleous and Chrystalla Hadjianastassiou (Medical and Public Health Services, Cyprus); Pavla Lexová and Jitka Castkova (National Institute of Public Health, Czech Republic); Annette Hartvig Christiansen (Statens Serum Institut, Denmark); Natalia Kerbo (Health Protection Inspectorate, Estonia); Irja Davidkin (National Institute for Health and Welfare, Finland); Isabelle Parent du Châtelet (Institut de Veille Sanitaire, France); Anette Siedler (Robert Koch-Institut, Germany); Magdalini Vova-Chatzi (Hellenic Centre for Infectious Diseases Control, Greece); Zsuzsanna Molnár (National Centre for Epidemiology, Hungary); Thorolfur Gudnason (Directorate of Health, Iceland); Sarah Gee (Health Protection Surveillance Centre, Ireland); Corrado Cenci, (Communicable Disease Unit, Ministry of Welfare, Italy); Larisa Savrasova (Public Health Agency, Latvia); Eglė Valikonienė (Centre for Communicable Diseases

Prevention and Control, Lithuania); Pierre Weicherding and Norbert Charle (Direction de la Santé, Luxembourg); Jackie Maistre Melillo (Health Division, Malta); Susan Hahne (National Institute of Public Health and the Environment, The Netherlands); Øistein Løvoll (National Institute of Public Health, Norway); Justyna Rogalska (National Institute of Hygiene, Poland); Teresa Fernandes (Directorate General of Health, Portugal); Aurora Stanescu and Adriana Pistol (Institute of Public Health, Romania); Alexandra Zampachova (Public Health Authority, Slovak Republic); Maya Sevljak Jurjevec, Tanja Metličar and Alenka Kraigher (Institute of Public Health, Slovenia); Isabel Peña-Rey and Josefa Masa (Instituto de Salud Carlos III, CIBERESP, Spain); Solveig Olsson and Tiia Lepp (Swedish Institute for Infectious Disease Control, Sweden); Jean-Luc Richard (Federal Office of Public Health, Switzerland); Aslihan Coskun and Umit Ozdemirer (Primary Health Care General Directorate, Turkey); Antoaneta Bukasa and Joanne White (Health Protection Agency, UK).