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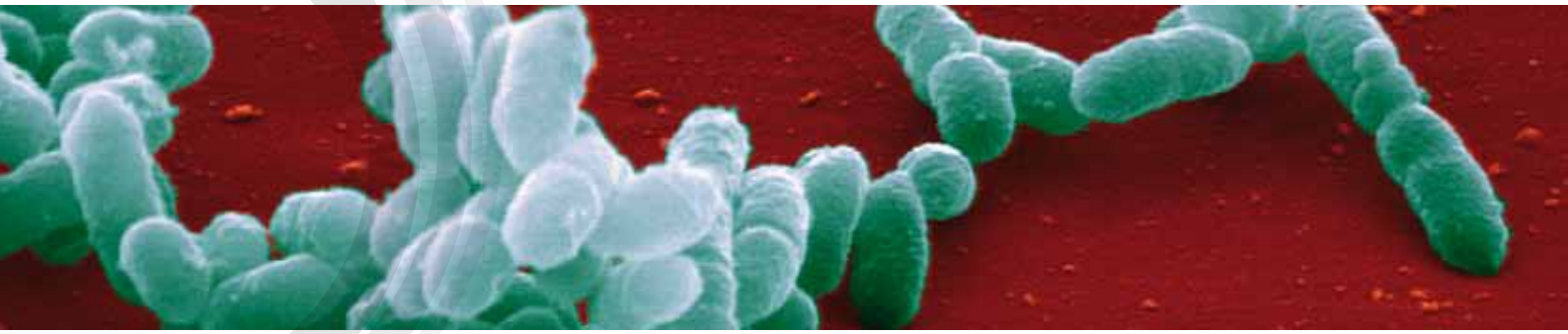

Surveillance of invasive bacterial diseases in Europe

2008/09

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2008/2009

This report was produced by the ECDC Vaccine-preventable Diseases Group, coordinated by Ida Czumbel.

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Abbreviations

CFR	Case fatality ratio
ECDC	European Centre for Disease Prevention and Control
EEA	European Economic Area
EU	European Union
EUCAST	European Committee on Antimicrobial Susceptibility Testing
EU-IBIS	European Union Invasive Bacterial Infections Surveillance Network
Eurostat	Statistical office of the European Union
Hi	*Haemophilus influenzae*
Hib	*H. influenzae* type b
IBD	Invasive bacterial disease
IMD	Invasive meningococcal disease
MCC	Meningococcal C vaccination
MIC	Minimal inhibitory concentration
MLST	Multilocus sequence typing
MS	Member State
PCR	Polymerase chain reaction
WHO	World Health Organization

Executive summary

This report describes the epidemiology of invasive bacterial diseases due to *Haemophilus influenzae* and *Neisseria meningitidis* in the European Union (EU) Member States in 2008 and 2009. Designated national contact points from national public health institutes submitted data using the revised metadata set for both diseases.

Out of the 30 EU/EEA Member States, 29 submitted data on invasive *Haemophilus influenzae* (Hi) disease and on invasive meningococcal disease. The majority of participating countries (Belgium, Spain and France reported voluntary system for Hi) have a passive and compulsory surveillance system in place for both diseases. In terms of comprehensiveness, two countries (France and Spain) provided sentinel surveillance data for invasive *Haemophilus influenzae* disease. Twenty-eight countries reported case-based data and one country (Bulgaria) submitted aggregated data. The used case definitions differed from country to country, with the majority applying 2008 case definitions. Historical data used in this analysis (1999–2006) were retrieved from the European Union Invasive Bacterial Infections Surveillance Network (EU-IBIS) database, now hosted at ECDC. Population statistics were derived from Eurostat, the statistical office of the European Union.

Various changes in the surveillance methods occurred along the years – changes in case definitions, in population sources, in data collection methods, in validation rules, new laboratory methodologies became available and the systems became more comprehensive.

Furthermore, the heterogeneity in the data reporting may be attributable to a number of possible differences:

- among disease surveillance systems in the Member States (MS), such as sensitivity of the surveillance systems, variation in the types of clinical presentations under surveillance (i.e., sepsis or meningitis or both) in each MS;
- in the applied case definitions;
- in the laboratory capacities; or
- in the healthcare practices for ensuring early blood culture sampling.

Therefore, the results should be interpreted with proper care, taking into account the above mentioned changes and variations.

Invasive meningococcal disease

In 2008–2009, 9 615 cases of invasive bacterial disease due to *N. meningitidis* were notified in the EU/EEA, with an overall notification rate of 0.99 in 2008 and 0.92 in 2009 per 100 000. Almost all cases were laboratory confirmed (96% in 2008, 97% in 2009). Meningococcal disease appears to be rare in the majority of MS. The two most affected countries were Ireland (3.68 in 2008 and 3.37 in 2009) and UK (2.29 in 2008 and 2.02 in 2009) compared to the rest of Europe, although in both countries there is a sustained declining trend. Apart from these two countries, another four MS had notification rates above 1.00 per 100 000 in 2008 and 2009: Lithuania, Spain, Denmark, and Austria.

Information on age was available for 99.4% of reported cases. The most affected age group was infants younger than 1 year (notification rate: 18.3 in 2008 and 15.9 in 2009) followed by 1–4 year-olds (notification rate: 5.8 in 2008 and 5.4 in 2009) and teenagers 15–19 years old (notification rate: 2.1 in 2008 and 2.0 in 2009). Among the older age groups the disease was reported only rarely.

Information on serogroup was available in 88% of reported cases. Twenty-six out of 28 reporting countries provided data on serogroup. The serogroup identification has improved substantially over the years, with the number of unknown cases decreasing substantially over the last seven years, from 1 448 in 2003 to 347 of unknown serogroup in 2009.

Among the known serogroups, B formed the largest proportion (71% in 2008 and 2009) followed by serogroup C (14% in 2008 and 13% in 2009). The highest proportion of Y cases was reported in Nordic countries in a range lying between 34% and 15% (Sweden: 20% in 2008 and 34% in 2009; Norway: 17% in 2008 and 25% in 2009; Finland: 15% in 2009), followed by Estonia (17% in 2008). In the rest of Europe, the Y disease was present in a range lying between 0% and 8%.

Serogroup A activity still remains low in Europe (< 1% in 2008 and 2009; n=18 in 2008 and n=24 in 2009).

In countries with meningococcal C vaccination (MCC), there is a large predominance of B cases in all age groups and, in particular, in the age groups younger than 1 year and 1–4 years (76% and 78% of cases, respectively), the usual targeted groups for vaccination against serogroup C.

In countries with MCC vaccination, the proportion of cases due to serogroup C has decreased dramatically and the notification rates (per 100 000 population) of C disease fell by half in age groups targeted by vaccination (< 1 year: 0.54; 1–4 years: 0.22; 15–19 years: 0.17), compared with countries without MCC vaccination (< 1year: 1.01; 1–4 years: 0.45; 15–19 years: 0.29).

Information on serotyping and subtyping of strains is increasing due to the adoption of molecular technologies in more and more countries. However, the number of samples serotyped and serosubtyped remains low and the interpretation of these results must be done with care. For multilocus sequence typing (MLST), data completeness was 10.9% of cases. Taking into account 2008 and 2009 data (n=981), MLST showed that the bacterial population was highly diverted, comprising 26 different clonal complexes, of which 26.1% of isolates (n=256) belonged to CC ST-41 complex, followed by CC ST-11 complex (21.1% n=207) and CC ST-32 complex (16.3% n=160). Outcome was available in 92% of cases. With 340 deaths attributed to invasive meningococcal disease (IMD), the overall case fatality ratio was 7.4%.

Until vaccines against a broad range of serogroup B meningococci become available for universal use, the main methods of control remain the early detection, adequate treatment of primary cases and the prevention of secondary cases.

Invasive *Haemophilus influenzae* disease

A total of 3 572 cases of invasive *Haemophilus influenzae* disease were reported in 2008 and 2009 with an overall European notification rate of 0.41 per 100 000 population in 2008 and 0.36 per 100 000 population in 2009. The notification rates varied across the MS and the rates in the Nordic countries, in particular Sweden (1.78 in 2008 and 1.58 in 2009) and Norway (1.58 in 2008 and 1.48 in 2009) were higher compared to the rest of Europe. However, the majority of the countries stayed below 1 case per 100 000 population.

The highest overall notification rates have been reported among infants younger than 1 year of age (2.84 in 2008 and 2.69 in 2009) and persons over 65 years old (1.09 in 2008 and 0.84 in 2009).

While notification rates among infants younger than 1 year decreased substantially for serotype b (from 2.94 in 1999 to 0.50 in 2009), they increased for non-capsulated strains, moving from 1.57 up to 3.45 in the same period.

In 2008 and 2009, 68% of all reported invasive *H. influenzae* cases were due to non-capsulated strains.

Non-capsulated strains have been the most frequently reported serotype among countries that consistently report all serotypes. The increase in the number of non-capsulated strains reported over the years may be partially attributable to an improvement in the sensitivity of the surveillance systems, which have also been documented in several MS; however, it could also be explained by changes in the epidemiological profile of the disease [1].

After a peak in 2002–2003, a gradual decrease in the notification rate of b serotype has been observed. The introduction of the *H. influenzae* type b (Hib) conjugate vaccine has led to a higher proportion of invasive *H. influenzae* infection attributable to non-type b strains and noticeably, over the last years, diseases due to non-type b strains are becoming relatively more frequent.

However, unlike the pneumococcal conjugate vaccination programme, there is no consistent or robust evidence to suggest that mass Hib vaccination in infancy has led to serotype replacement. A World Health Organization position paper on Hib conjugate vaccines[1] concluded that 'so far, bacterial strain replacement has not been a prominent feature of large-scale Hib immunisation'.

In terms of absolute numbers of reported Hi cases, there appears to be a shift towards older age groups. Of all cases reported in 2008 and 2009, 46% were among adults 65 years of age and older. The epidemiological characteristics of *H. influenzae* also changed from a disease predominantly found in children and dominated by serotype b to a disease predominantly found in adults and dominated by non-typeable serotypes.

With the data available, it was not possible in this report to assess in depth primary or secondary vaccine failures. This is because of the data completeness for vaccination status was very low (8.9%) and only few countries reported complete information. In addition, an enhanced dataset on vaccination status (availability of type of vaccine, number of doses received, period interval between doses and date of the last dose) and data pertaining to multiple risk factors of vaccine failure was not collected.

[1] World Health Organization. WHO position paper on *Haemophilus influenzae* type b conjugate vaccines. (Replaces WHO position paper on Hib vaccines previously published in the Weekly Epidemiological Record. Wkly Epidemiol Rec. 2006 Nov 24;81(47):445-52.

1 Introduction

Invasive bacterial infections caused by *Haemophilus influenzae* and *Neisseria meningitidis* pathogens represent a significant public health problem across Europe due to the rapid onset of the disease, high case fatality and the high proportion of surviving patients with severe complications, such as permanent disabilities including neurological sequelae and subsequent death. Children below 5 years are the most affected age group. Early diagnosis and treatment play an essential role in the control of invasive bacterial disease. The introduction of mass vaccination against the meningococcal C strain in several European countries has resulted in a dramatic decrease in the number of reported cases due to serogroup C in the last decade. Similarly, the incidence of *H. influenzae* type b disease has decreased substantially after the introduction of the vaccine on a national level, and has contributed immensely to changing the epidemiology of the disease.

The surveillance of these diseases is important to study the epidemiological trends and to monitor the circulating strains, as incidence varies geographically and temporally. Since the number of cases is decreasing because of the availability of effective vaccines, pooling European data together increases the power of the epidemiological analysis.

EU-IBIS was established in 1999, funded by the European Commission's Directorate-General for Health and Consumers (DG SANCO). Since the year of establishment, EU-IBIS collected data on invasive meningococcal and *H. influenzae* disease between 1999 and 2007 in EU/EEA countries and was successful in providing relevant epidemiological information to help guide decision-making process on vaccine policies.

In October 2007, the coordination of the network was transferred to the ECDC and data collection of invasive bacterial infections has been carried out through The European Surveillance System (TESSy). Coordination of laboratory surveillance activities, such as external quality assessments (EQA) and training, have been outsourced, and a consortium of European laboratory experts, mainly coming from national reference laboratories, has been set up to work together on these topics.

Thirty countries now participate in the network: the 27 countries of the European Union plus three EEA countries (Iceland, Liechtenstein and Norway).

2 Methods

2.1 Case definition

2.1.1 Invasive *H. influenzae* disease

For the 2008–2009 data collection, participants were requested to submit data on cases of invasive *H. influenzae* using the 2008 EU case definition. However, several case definitions have been used:

- 18 countries applied the 2008 version of the EU case definition;
- seven countries applied the 2002 version of the EU case definition;
- two countries applied other case definitions; and
- three countries did not refer to any case definition.

A key difference between the 2008 version of the case definition and the previous version of 2002 is that possible and probable category are no longer applicable and clinical criteria are no longer relevant. In addition, there is no distinction between serotypes and the laboratory methods used to confirm a case (see Table A1 in Annex 2).

For 2008 and 2009 data, according to 2008 EU case definition, only confirmed cases are relevant for surveillance purpose. Therefore, in this analysis a total of five (0.1%) probable cases were excluded, three from Poland and two from Lithuania. On the other hand, regarding historical data there is no distinction made between the case definitions used; hence until 2007 all reported cases were included in the analysis, incorporating also probable and cases defined according to other case definition.

2.1.2 Invasive meningococcal disease

The case definitions referring to meningococcal disease applied by the Member States differed, with the majority applying the 2008 EU case definitions:

- 18 countries applied the 2008 version of the EU case definition;
- five countries applied the 2002 version of the EU case definition;
- four countries applied other case definitions;
- three countries did not refer to any case definition.

A major difference between the 2008 version of the case definition and the previous version (2002) is that in the 2008 case definition the cases are defined as probable according to epidemiological criteria only. This is different from the previous definition as no laboratory methods are included in the definition of a probable case. In addition, the category of a possible case has been introduced (see Table B1 in Annex 3).

2.2 Data sources

The report includes data on invasive *H. influenzae* and invasive meningococcal disease cases submitted by the national public health institutes from the EU/EEA countries. The current data collection concerned 2008–2009 data.

Historical data used in the analysis (1999–2006) were transferred from the former EU-IBIS database, now housed at ECDC. All participating countries have a surveillance system in place for both diseases. Twenty-eight countries reported case-based data for both diseases, and one country (Bulgaria) reported aggregated data.

The Member States are asked in the annual data call to ensure that the data source information is up-to-date since the correct interpretation of the surveillance data relies heavily on this information being current and accurate.

Clinically and laboratory-notified cases are linked at national level and submitted to TESSy with a single record number.

At this stage, ECDC does not yet have a comprehensive overview of what variables are collected and available in the countries, partly because the information on data sources were not fully provided by MS. Therefore, comparisons within countries should be done with caution. Specific characteristics of the national surveillance systems should be taken into account for data interpretation. Caution must also be taken while analysing trends as various changes in the surveillance methods occurred over the years: availability of new laboratory methodologies, comprehensiveness of the system, expansion of age groups and serotypes, and syndromes under surveillance.

Regarding invasive *H. influenzae* disease, France reported sentinel surveillance data only for 2008. Regarding invasive meningococcal disease, all reporting countries have a comprehensive, passive and compulsory surveillance system in place.

Tables A2 (Annex 2) and B2 (Annex 3) present an overview of surveillance systems by diseases and by country, listing the main characteristics of each data source.

2.2.1 Population data

The population on 1 January of each year is used for most analyses as denominator. The 1 January data is obtained from the Eurostat database (http://epp.eurostat.ec.europa.eu) and is extracted on a regular basis by TESSy data managers.

Historical notification rates 1999–2006 (EU-IBIS) and 2007 rates were retrieved from 2007 epidemiological report [2].

2.3 Data submission and validation

Specifications of variables for each disease were specified in TESSy metadata set 16, either case based or aggregated data were submitted, but case-base data were preferred.

Designated national contact points were requested to submit data using the latest version of the metadata set. This incorporates case-based information on epidemiological and laboratory variables, a common set of variables applicable to all diseases and a disease specific enhanced set of variables.

To facilitate the data submission, the Member States received online training in April 2010, and online supplementary training video materials were made available prior to the data call.

Out of the 30 EU/EEA countries, 29 submitted data for each disease. After data submission, data were validated and approved by Member States' disease-specific experts. The cleaning and validation process included two components: automatic checks and manual checks, which aim to identify any potential inconsistency in the database. Once a first draft of the annual report was prepared, it was shared with all the Member States for comments and final confirmation.

Regarding invasive meningococcal disease, a consensus for molecular typing has been achieved in Europe and as a result a new set of variables has been introduced, which enable a more in-depth analysis on information retrieved form microbiology laboratories, in particular a number of variables regarding methods used to identify *Neisseria meningitis*.

2.4 Data analysis

The notification rates were calculated by using total population estimates at the beginning of the year published by Eurostat (see 2.2.1). If zero cases were reported, then the notification rate would similarly be zero. The validation rules were based on the EU 2008 case definition and the data analysis was done accordingly.

Only known laboratory methods were taken into account, as well as laboratory methods declared as 'unknown' for which the specimen was known. If both the methods and the specimens could not be identified, the laboratory methods were not added to the 'unknown' category; instead the case was excluded from the totals.

Vaccination failures were not estimated due to the lack of sufficient information provided by the current variables in the IBD metadata set. The vaccination status 'fully vaccinated' and 'partly vaccinated' were defined by the reporting country, according the country's immunisation schedule.

Unless stated otherwise, all 'unknown' and 'missing' responses were excluded from the epidemiological analysis.

It should be noted that the annual number of cases by country is calculated over a reporting period of one year defined as 'Date used for Statistics', which is the date that the country chooses as its preferred date for reporting. This could be either date of onset of disease, date of diagnosis, date of notification, or any other date the country uses in its report.

2.4.1 Invasive *Haemophilus influenzae* disease

With regard to invasive *H. influenzae* disease, only confirmed cases were taken into account.

The notification data and the age-specific population data were aggregated into the following age groups used in the analysis: < 1, 1–4, 5–14, 15–64 and ≥ 65 years.

The serotypes were categorised into three major groups: serotype b; non-b (a, c, d, e, f, unspecified non-b); and non-capsulated (non-typeable).

The trends in notification rates by serotype expressed as numbers of confirmed cases of either serotype b, non-b or non-capsulated (non-typeable) per population of 100 000 were analysed.

Only the countries that have had a surveillance system with consistent reporting (they have all serotypes available) to EU-IBIS and TESSy in 1999–2009 were included in the trend analyses. For 2008 and 2009 data, were included in the analysis those countries who reported at least one known serotype.

2.4.2 Invasive meningococcal disease

For the analysis of the data containing laboratory variables, only 'confirmed' cases were filtered. For the general epidemiological variables, such as classification, seasonality, age and gender distribution, clinical presentation and case fatality ratio the total number of reported cases was taken into account.

The notification data and the Eurostat age-specific population data were aggregated into the following age groups used in the analysis: 1, 1-4, 5-9,10-14,15-19, 20-24, 25-44, 45-64, ≥ 65 years.

The distributions of minimal inhibitory concentrations (MIC) were displayed for all cases reported on a numeric scale by rounding the values to next two-fold dilution. The occurrence of resistant cases out of all cases reported on a numeric scale was shown. Cut-off values for resistant versus non-resistant cases were based on the values published at the European Committee on Antimicrobial Susceptibility Testing (EUCAST) website (www.eucast.org), if available. The cut-off values for penicillin and rifampicin were not available at the EUCAST website and occurrence was not reported (see Annex 3, Tables B34 and B35).

In the trend analysis were included countries with consistent reporting, those who reported at least one case to EU-IBIS network and TESSy in 1999–2009.

3 Results: invasive *Haemophilus influenzae* disease

3.1 Laboratory methods used for strain identification

Confirming a case of invasive disease caused by *H. influenzae* requires isolating and culturing the bacterium from a normally sterile body site such as: cerebrospinal fluid (CSF), blood, joint fluid, pleural effusion, pericardial effusion, peritoneal fluid, subcutaneous tissues fluid, placenta, and amniotic fluid. Laboratory methods used to detect the pathogen are: culture, serology, immunodiagnostic tests, antigen detection, and detection of nucleic acid, genotyping and sequencing. Culture was overall the most frequently method reported, performed 79.7% of total methods reported in 2008–2009. See Tables A4 and A51 in Annex 2.

3.2 Data quality

In Table A3 (Annex 2) the completeness of data reporting is presented for 2008–2009. It shows the completeness by variable and the minimum and the maximum value. The completeness of reporting for variables such as: age, gender and all laboratory variables (specimen, test method) is high ranging between 50–100%. Completeness of variable reporting clinical information ('Clinical Presentation' and 'Outcome') is around 40% to 73%. The 'Vaccination status' show considerably less completeness (around 8.5–9.1%).

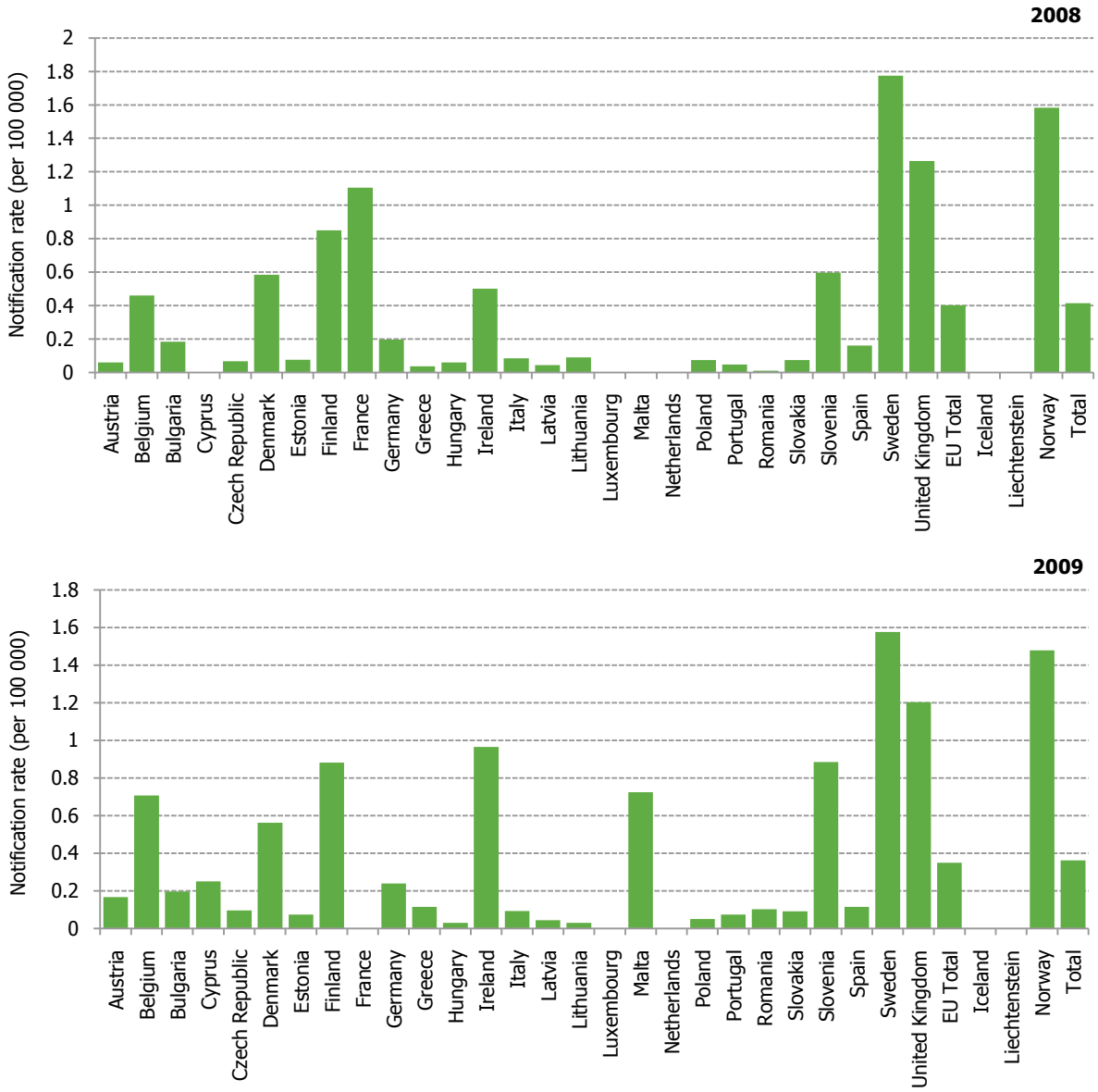
3.3 Epidemiological analysis

In 2008–2009, a total of 3 572 confirmed cases of invasive *H. influenzae* disease were reported from 29 countries: 1 976 in 2008 and 1 596 in 2009. Three out of 29 Member States reported zero cases in both years (Iceland, Luxembourg and the Netherlands). Bulgaria reported data related to the common set of variables in the aggregated format, no data related to enhanced variables were included. France and Spain reported data collected by a sentinel system. France reported data and specific denominator for 2008 only. No invasive *H. influenzae* data was reported by Liechtenstein. The number of cases, notification rate and case definition used are displayed in Tables A6 and A7 in Annex 2.

Five probable cases were reported, two from Latvia and three from Poland. According to 2008 EU case definition probable cases are not relevant for surveillance purposes, therefore they were not included in the following analysis.

The overall notification rates are presented in Figure 1; the overall European notification rate in 2008 was 0.41 per 100 000 population while in 2009 was 0.36.

Figure 1 Overall notification rates of invasive *H. influenzae* disease by country, 2008 (n=1 976) and 2009 (n=1 596)



Note: Zero cases reported from Luxembourg, Iceland and the Netherlands. No data available from France (2009) and Liechtenstein.

These data are further illustrated in Table 1, presenting the number of reported cases and notification rates 1999–2009 (EU-IBIS data 1999–2006). For a more in-depth analysis, country profiles are presented in Annex 2, Tables A6 and A7.

Table 1 Notification rates (per 100 000 population) and total number of cases of invasive *H. influenzae* disease by country, 1999–2009[1]

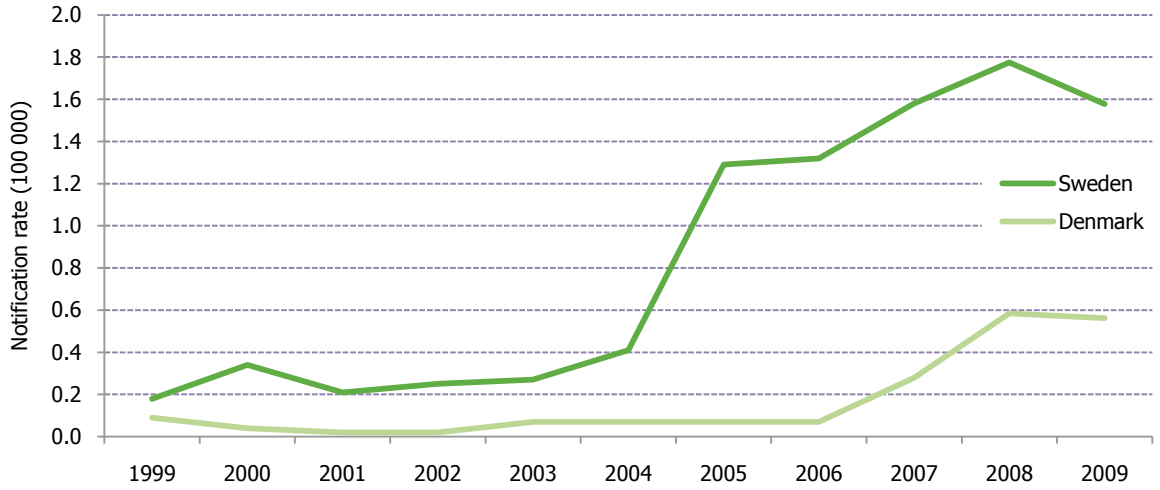
Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Austria	-	-	-	0.05 (4)	0.05 (4)	0.13 (11)	0.18 (15)	0.09 (7)	0.05 (4)	0.06 (5)	0.17 (14)
Belgium	-	0.61 (63)	0.52 (54)	0.63 (65)	0.53 (55)	0.56 (58)	-	-	0.52 (55)	0.46 (49)	0.71 (76)
Bulgaria	-	-	-	-	-	-	-	-	0.26 (20)	0.18 (14)	0.20 (15)
Cyprus	-	-	-	-	-	-	-	-	0.00 (0)	0.00 (0)	0.25 (2)
Czech Republic[2]	1.00 (103)	1.02 (105)	0.90 (92)	0.55 (56)	0.49 (50)	0.16 (16)	0.18 (18)	0.11 (11)	0.13 (13)	0.07 (7)	0.10 (10)
Denmark[3]	0.09 (5)	0.04 (2)	0.02 (1)	0.02 (1)	0.07 (4)	0.07 (4)	0.07 (4)	0.07 (4)	0.28 (15)	0.58 (32)	0.56 (31)
Estonia[4]	0.22 (3)	0.07 (1)	0.22 (3)	0.22 (3)	0.07 (1)	1.33 (18)	1.49 (20)	0.60 (8)	0.22 (3)	0.08 (1)	0.08 (1)
Finland	0.56 (29)	0.72 (37)	0.95 (49)	0.44 (23)	0.69 (36)	0.50 (26)	0.84 (44)	0.61 (32)	1.02 (54)	0.85 (45)	0.88 (47)
France[5]	0.89 (521)	0.96 (565)	1.01 (598)	0.81 (479)	0.91 (546	1.01 (608)	1.06 (646)	0.98 (605)	1.06 (658)	1.10 (442)	-
Germany[6]	0.33 (42)	0.57 (73)	0.45 (57)	0.38 (47)	0.37 (46)	0.26 (32)	0.29 (34)	0.49 (57)	0.11 (93)	0.20 (160)	0.24 (196)
Greece[7]	0.35 (2)	0.52 (3)	0.34 (2)	1.39 (8)	0.50 (8)	0.56 (9)	0.13 (2)	0.19 (3)	0.06 (7)	0.04 (4)	0.12 (13)
Hungary[8]	-	-	-	-	0.07 (7)	0.12 (12)	0.01 (1)	0.00 (0)	0.02 (2)	0.06 (6)	0.03 (3)
Ireland	0.78 (27)	0.55 (21)	0.70 (27)	0.54 (21)	0.56 (22)	0.94 (38)	0.82 (34)	0.90 (38)	0.72 (31)	0.50 (22)	0.97 (43)
Italy	0.19 (109)	0.11 (64)	0.05 (31)	0.03 (19)	0.04 (24)	0.02 (9)	0.03 (15)	0.04 (23)	0.06 (33)	0.08 (50)	0.09 (56)
Latvia	-	-	-	-	0.13 (3)	0.04 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.04 (1)	0.04 (1)
Lithuania[8]	-	-	-	-	0.03 (1)	0.23 (8)	0.09 (3)	0.06 (2)	0.00 (0)	0.09 (3)	0.03 (1)
Luxembourg	-	-	-	-	-	-	-	-	0.21 (1)	0.00 (0)	0.00 (0)
Malta	0.00 (0)	0.26 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.77 (3)	0.00 (0)	0.00 (0)	0.25 (1)	0.00 (0)	0.73 (3)
Netherlands	0.43 (68)	0.49 (77)	0.57 (91)	0.67 (108)	0.82 (132)	0.78 (127)	0.85 (139)	0.75 (122)	-	0.00 (0)	0.00 (0)
Poland[9]	0.06 (25)	0.08 (31)	0.09 (35)	0.09 (33)	0.09 (36)	0.08 (32)	0.05 (19)	0.05 (20)	0.11 (43)	0.07 (28)	0.05 (19)
Portugal	0.09 (9)	0.10 (10)	0.15 (16)	0.12 (12)	0.12 (13)	0.11 (12)	0.13 (14)	0.22 (23)	0.15 (16)	0.05 (5)	0.08 (8)
Romania	-	-	-	-	-	-	-	-	-	0.01 (2)	0.10 (22)
Slovakia	0.35 (19)	0.28 (15)	0.20 (11)	0.13 (7)	0.17 (9)	0.07 (4)	0.13 (7)	0.06 (3)	0.11 (6)	0.07 (4)	0.09 (5)
Slovenia	-	0.65 (13)	0.85 (17)	0.40 (8)	0.65 (13)	0.70 (14)	0.40 (8)	0.65 (13)	0.65 (13)	0.60 (12)	0.89 (18)
Spain[10]	-	-	-	-	-	-	-	-	(66)	(73)	(53)

Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Sweden[11]	0.18 (16)	0.34 (30)	0.21 (19)	0.25 (22)	0.27 (24)	0.41 (37)	1.29 (117)	1.32 (120)	1.58 (144)	1.78 (163)	1.58 (146)
United Kingdom	0.68 (400)	0.85 (498)	1.03 (605)	1.28 (757)	1.26 (750)	0.92 (550)	1.10 (661)	1.08 (650)	1.14 (696)	1.26 (773)	1.20 (742)
Iceland[12]	1.44 (4)	0.36 (1)	0.70 (2)	0.00 (0)	0.00 (0)	0.34 (1)	0.00 (0)	0.00 (0)	0.33 (1)	0.00 (0)	0.00 (0)
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-
Norway	1.62 (72)	1.27 (57)	1.09 (49)	1.57 (71)	1.69 (77)	1.70 (78)	1.67 (77)	1.59 (74)	1.77 (83)	1.58 (75)	1.48 (71)

[1] 1999–2006 from EU-IBIS 2006 report, 2007–2009 using Eurostat as population source.
[2] Serotype b only 1999–2004.
[3] Meningitis only/mostly meningitis 1999–2006, thereafter all.
[4] Serotype b only; all rates from 1999–2006 are recalculated from EU-IBIS 2006 report using the overall population (Eurostat) as denominator. Previously rates were calculated for population < 15 years.
[5] Data collected by a sentinel surveillance system and corrected for underreporting and undercoverage.
[6] Rates based on < 15 years old population 1999–2006. From 2007, all age groups have been included.
[7] Mainly serotype b & non-b; meningitis and meningitis/septicaemia rates. Rates were calculated on population < 15 years old for 1999–2006, from 2007 all age groups have been included.
[8] Only meningitis and septicaemia.
[9] Serotype b, non-caps have been added since 2004; only meningitis 1999–2006.
[10] Data collected by sentinel surveillance.
[11] Only serotype b 1999–2004; aggregated data 2000–2001.
[12] Serotype b.

The overall notification rates were higher in northern European countries. In particular Sweden and Denmark reported highest rates compared to previous years but the trend seems stabilising recently as illustrated in Figure 2 (more detailed information is available in the country profiles, Annex 1). The increased reporting can be explained by the implementation of enhanced surveillance systems, including all serotypes and/or clinical presentations, the increased awareness among the clinicians to notify, and the improved high case ascertainment in general (i.e. enhanced sensitivity).

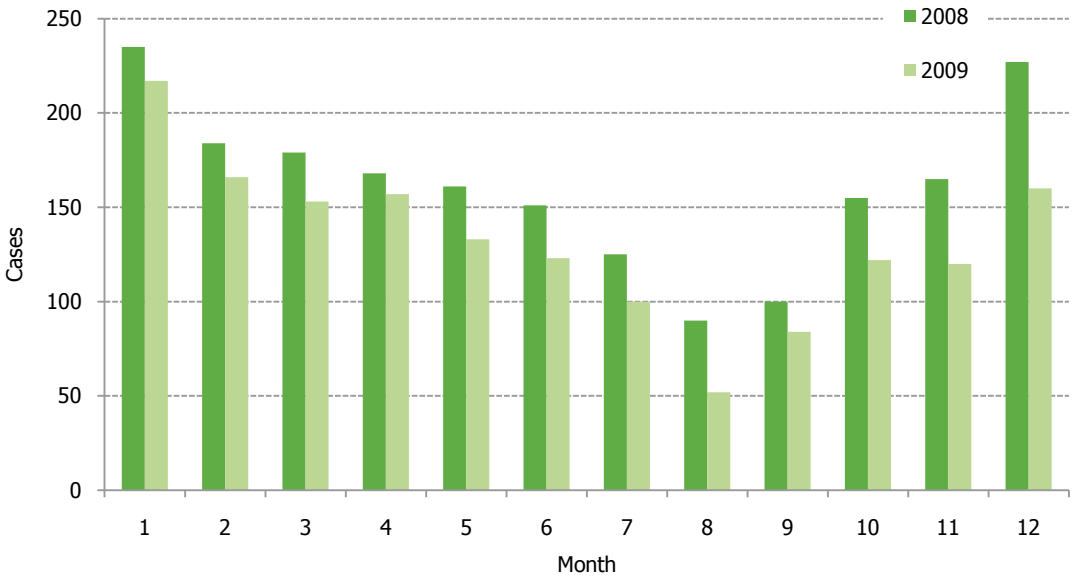
Figure 2 Overall notification rates (100 000) of invasive *H. influenzae* disease in Sweden and Denmark, 1999–2009 (n=941)



3.3.1 Seasonal trend

The data showed a typical seasonal trend. The highest number of invasive *H. influenzae* infections was observed during the winter months followed by a steady decrease until September, no differences were observed among serotypes. See Tables A8 and A9 in Annex 2 for further details, reporting number of cases by month and country.

Figure 3 Number of reported invasive *H. influenzae* cases by month in 2008 (n=1940) and 2009 (n=1587)



Contributing countries: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Germany, Denmark, Estonia, Spain, Finland, France (2008), Greece, Hungary, Ireland, Italy, Lithuania, Latvia, Malta, Norway, Poland, Portugal, Romania, Sweden, Slovenia, Slovakia, United Kingdom.

3.3.2 Gender distribution

Information on gender was available in 98% of all cases in 2008 and in 2009. The male-to-female ratio was 1.1 overall, 1.0 in 2008 and 1.1 in 2009. In Table A10in Annex 2, sex ratio by year and country is displayed.

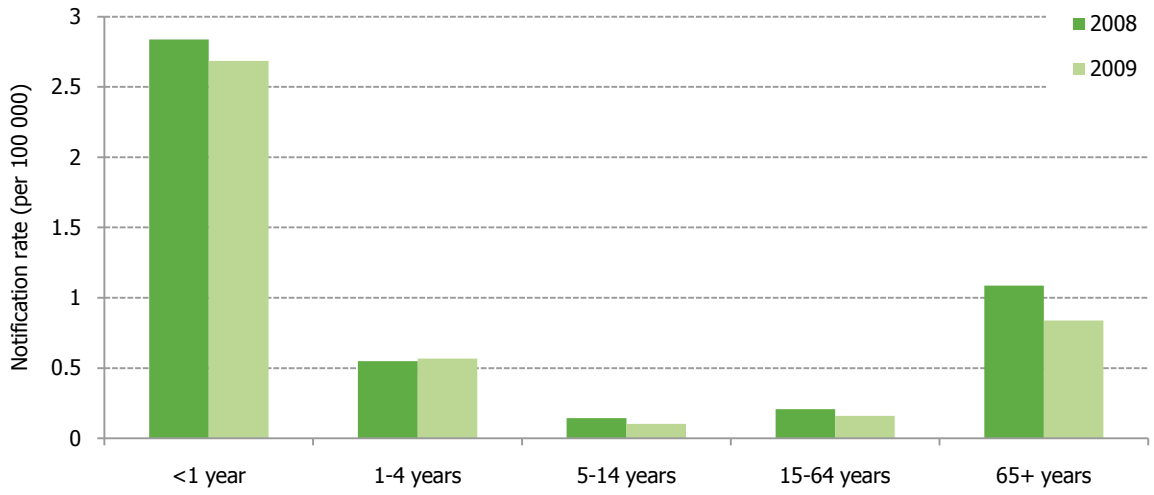
3.3.3 Age distribution

Information on age was available in 99.5% of all cases in 2008 and 2009. Overall 46% of reported cases were 65 years of age or older and 35% between 15 and 64 years. Figure 4 presents the age distribution in percentage by age category and year.

In 2008 the mean age of cases affected by invasive *H. influenzae* disease was 54.3±28.9 years, and the median age 63 years (range: 0–102). This data is comparable to 2009, in which the mean was 52.5±30.1 years and the median 62 years (range 0–106).

Infants below one year of age had an overall notification rate of 2.88 per 100 000 in 2008 and 2.69 in 2009; the highest rates were reported from United Kingdom (11.01 per 100 000 in 2008 and 11.53 per 100 000 in 2009). Persons over 65 years old are the second most affected group with an overall notification rate of 1.09 per 100 000 in 2008 and 0.84 in 2009. The highest rates were reported from Sweden (5.78 per 100 000 in 2008; 4.80 per 100 000 in 2009) and Norway (5.76 per 100 000 in 2008; 4.39 per 100 000 in 2009). Additional numbers and notification rates are illustrated in Tables A11 and A12 in Annex 2.

Figure 4 Notification rate of confirmed *H. Influenzae* disease cases, by age group, in EU/EEA countries, 2008 (n=1 974) and 2009 (n=1 582)



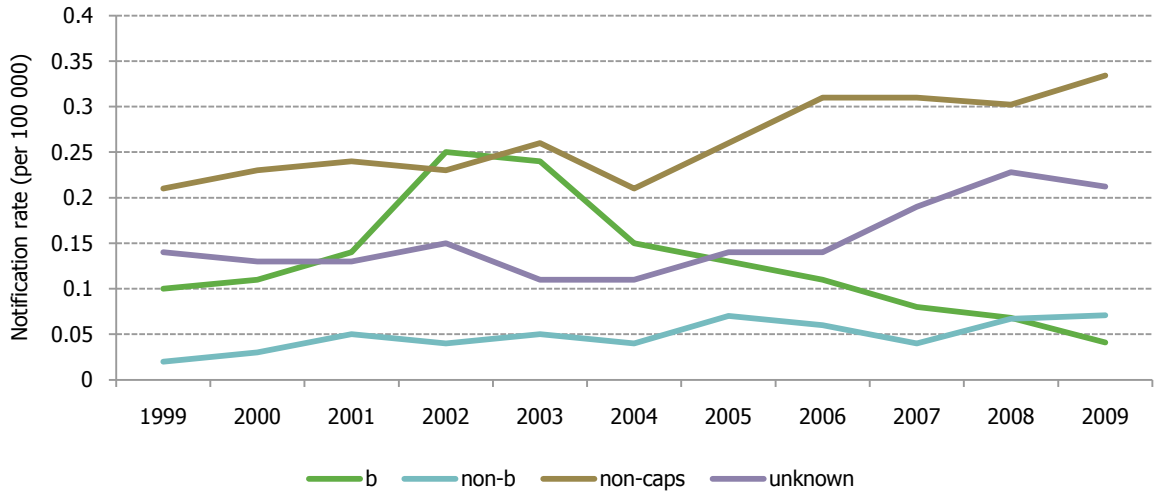
Contributing countries: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France (2008), Germany, Greece, Hungary, Ireland, Italy, Lithuania, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

3.3.4 Serotypes

Figure 5 illustrates the notification rates by serotype for the period 1999–2009 in selected countries with consistent reporting of all strains (criteria for the 2007 Report), these being: Finland, Ireland, Italy, Norway, Portugal and United Kingdom [2]. As illustrated in Table 1 in the previous section, the overall notification rates from these six countries varied over the years under observation, but tended to be higher during most recent years.

After the peak in 2002–2003, a decrease in serotype b notification rates had been observed. While the notification rates of non-b strains remained constant, there are no indications of a serotype replacement from type b to non-capsulated (non-typable) b strains.

Figure 5 Notification rates (100 000) of invasive *H. influenzae* disease by serotype in countries consistently reporting all serotypes, 1999–2009 (n=9 260)

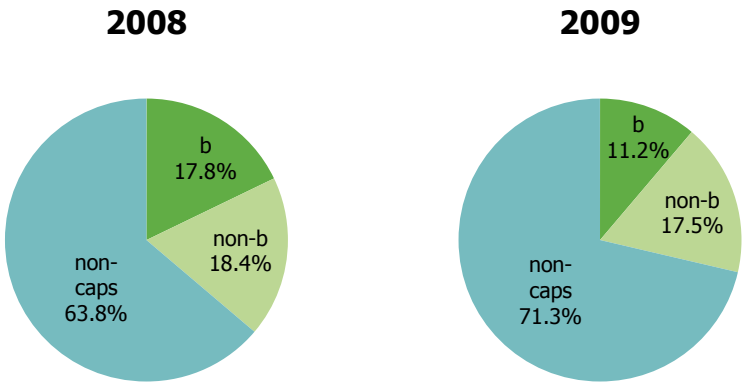


Contributing countries: Finland, Ireland, Italy, Norway, Portugal and the United Kingdom.

The case ascertainment and the extent of serotyping varied during the observed years, and therefore the notification rates of serotypes reported as unknown were also included for comparison. As non capsulated strains account for the greatest part of Hi strains since 2004, it is likely that the trend in unknown serotypes follows that of non-capsulated (non-typable) strains.

Information on serotype was available in 44.9% of cases, 40.0% in 2008 and 50.9% in 2009. After exclusion of serotypes reported as unknown or missing (n=1 186 in 2008 and n=783 in 2009), a total of 67.6% were reported as non-typable, 17.9% as serotype non-b and 14.5% as serotype b. Figure 6 illustrates the reported serotype distribution in 2008 and 2009.

Figure 6 Serotype distribution of invasive *H. influenzae* disease in 2008 (n=790) and 2009 (n=813)



Contributing countries: Austria, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, Norway, Poland, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.
Unknown serotypes were excluded.

Figures 7 and 8 illustrate the proportion of reported serotypes by country. The limited data completeness should be taken into account when comparing serotype distribution.

Based on the available data in 2008–2009, it is notable that 89.5% cases from Austria (n=17) and 73.3% Slovenia (n=22) were reported as non-capsulated strains. Also Finland (68.5%, n=63), Norway (65.8%, n=96), Denmark (58.7%, n=37) reported more than the half of their cases as non-capsulated strains.

For Belgium and Bulgaria, information on serotype is missing. See also Tables A13 and A14 in Annex 2.

Figure 1 Reported serotype distribution of reported invasive *H. influenzae* disease by country in 2008 (n=1 913)

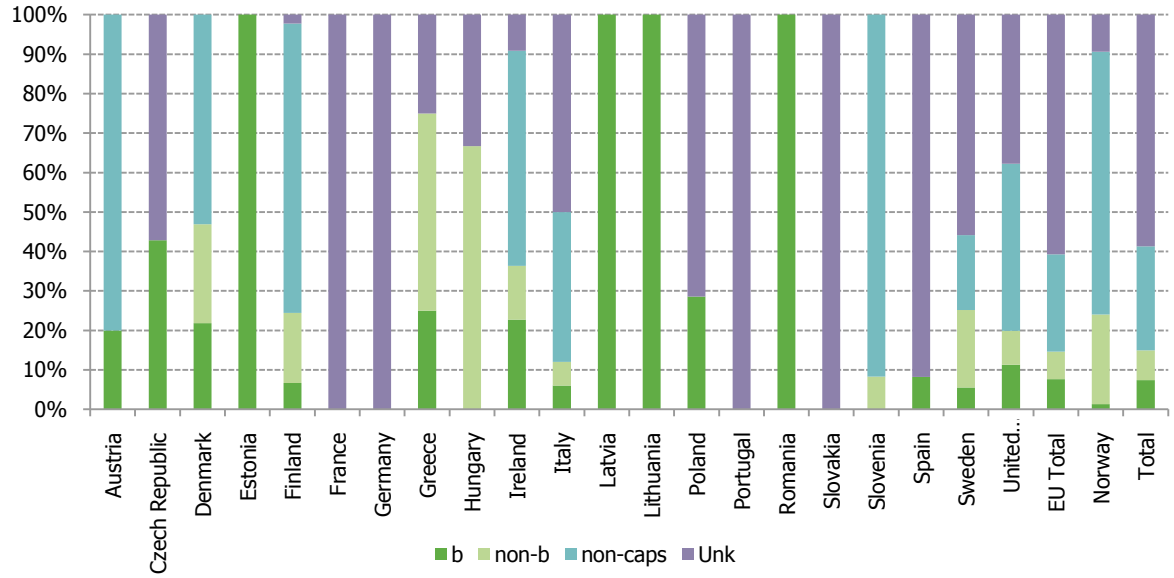


Figure 2 Reported serotype distribution of reported invasive *H. influenzae* disease by country in 2009 (n=1 504)

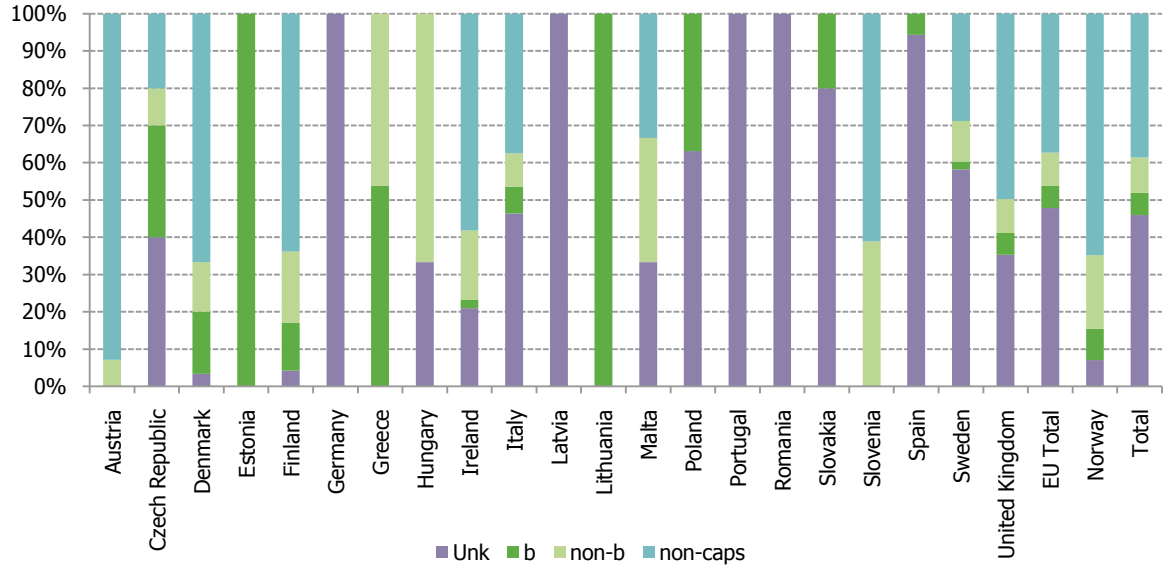
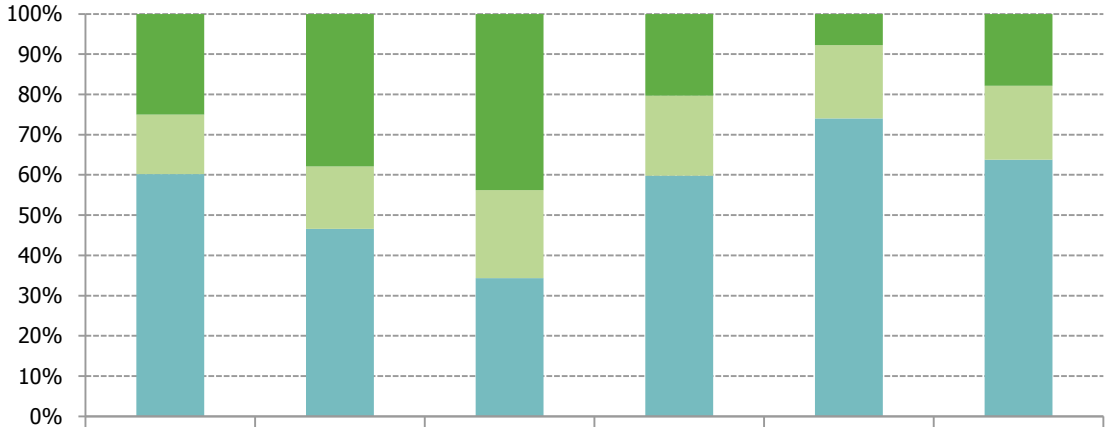


Figure 9 and 10 illustrate the distribution of serotypes by age group in countries collecting all serotypes. Cases reported as unknown serotype or unknown age were excluded from the analysis. Non-capsulated strains were the most commonly reported across all age groups for both years, followed by non-type b.

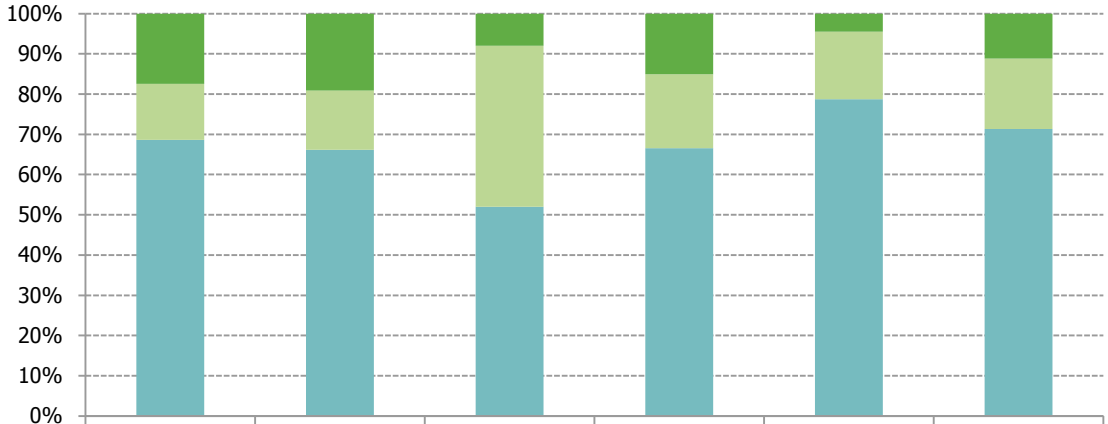
Figure 9 Serotype distribution of confirmed invasive *H. influenzae* cases by age group, of countries collecting at least one known serotype in 2008 (n=790)



	<1 year	1-4 years	5-14 years	15-64 years	65+ years	Total
b	22	22	14	56	26	141
non-b	13	9	7	55	61	145
non-caps	53	27	11	165	248	504

Contributing countries: Austria, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Italy Latvia, Lithuania, Norway, Poland, Romania, Slovenia, Spain, Sweden and the United Kingdom.

Figure 10 Serotype distribution of confirmed invasive *H. influenzae* cases by age group, in countries collecting at least one known serotype in 2009 (n=813)



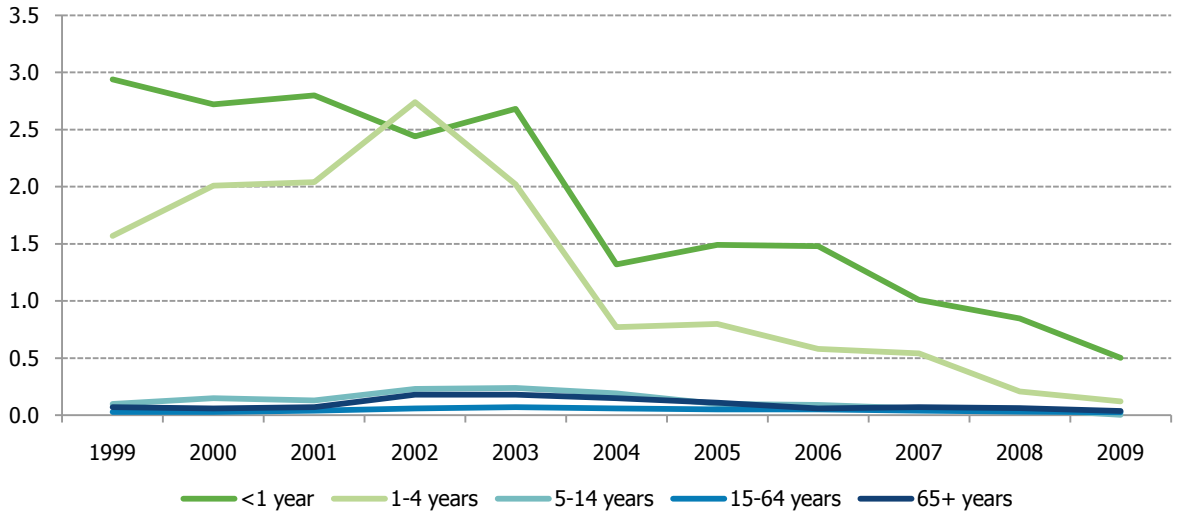
	<1 year	1-4 years	5-14 years	15-64 years	65+ years	Total
b	15	13	2	41	16	91
non-b	12	10	10	50	60	142
non-caps	59	45	13	181	282	580

Contributing countries: Austria, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Italy, Lithuania, Malta, Norway, Poland, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

3.3.4.1 Serotype b strains

The notification rates of serotype b, by age group in 1999–2009, in those countries with consistent reporting, were selected according to criteria defined in 2007 (countries with consistent reporting of all strains)[2]. Reports are illustrated in Figure 11. The rates appear to be decreasing across all age groups and infants below 1 year of age were the most affected.

Figure 11 Notification rate (per 100 000 population) of invasive *H. influenzae serotype b* disease, by age group, in selected countries, 1999–2009 (n=2 718)



Contributing countries: Czech Republic, Finland, Iceland, Ireland, Italy, Malta, Norway, Poland and the United Kingdom.

Overall, the number of cases reported with serotype b in 2008 and 2009 was low and notification rates were below 0.1 per 100 000 population, consequently a limited number of cases in smaller countries resulted in a large difference in notification rates. Infants < 1 year of age were the most affected, in this group Ireland (2.84 per 100 000) reported the higher notification rate in 2008 and Lithuania (2.87 per 100 000) in 2009. See further details in Tables A15 and A16 in Annex 2.

The rate of invasive *H. influenzae serotype b* disease among the < 5-year-olds is often used as main indicator of the burden of disease and it is the most reliable notification rate for comparisons between countries. Table 2

illustrates the notification rates of *H. influenzae serotype b* in Europe among < 5–year-olds in 2008–2009. All countries reported notification rate < 1 per 100 000 population, except Lithuania (1.30 per 100 000 population (n=2) in 2008).

Table 2 Notification rate (per 100 000 population) of invasive *H. influenzae* serotype b disease in the < 5 years age group, by countries who reported serotypes, 2008 (n=43) and 2009 (n=28)

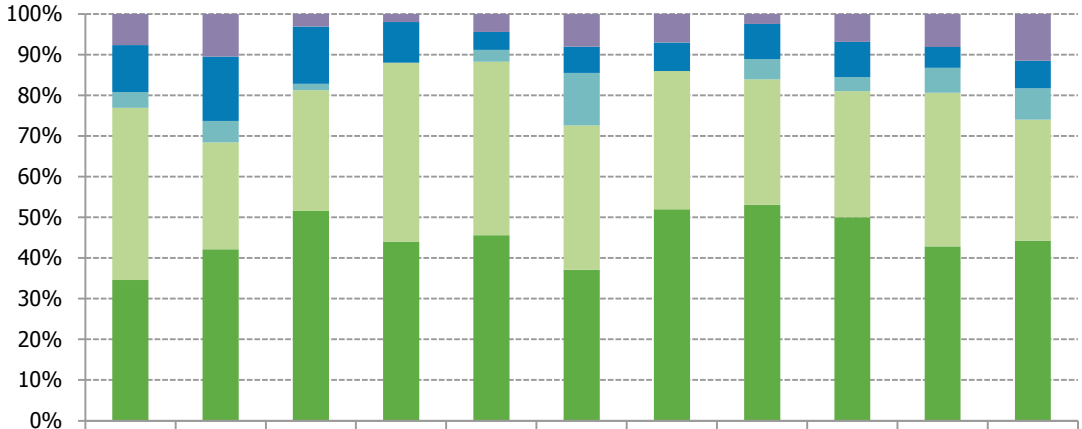
Country	2008	2009
Czech Republic	0.19	0.18
Denmark	0.61	0.31
Estonia	0.00	0.00
Finland	0.34	0.68
Greece	0.00	0.36
Ireland	0.93	0.30
Italy	0.04	0.04
Lithuania	1.30	0.63
Netherlands	0.00	0.00
Norway	0.34	0.34
Poland	0.27	0.32
Slovakia	0.00	0.37
Spain	0.04	0.04
Sweden	0.00	0.19
United Kingdom	0.63	0.25

3.3.4.2 Non-type b strains

Due to the small number of reported non-type b strains, only absolute numbers are illustrated below. Figure 12 shows the absolute numbers of reported cases with non-type b strains across age groups from 1999–2009 in countries with consistent reporting according to the criteria defined in the 2007 IBD report [2].

The overall rate was 0.10 per 100 000 population in 2008 (n=145) and in 2009 (n=142). The notification rate was highest in the age group < 1 year (0.80, n=13, in 2008; and 0.73, n=12, in 2009). The oldest age group was the most affected comparing absolute numbers (44%).

Figure 12 Percentage distribution of confirmed invasive *H. influenzae* non-b cases, by age group, in selected countries, 1999–2009 (n=749)

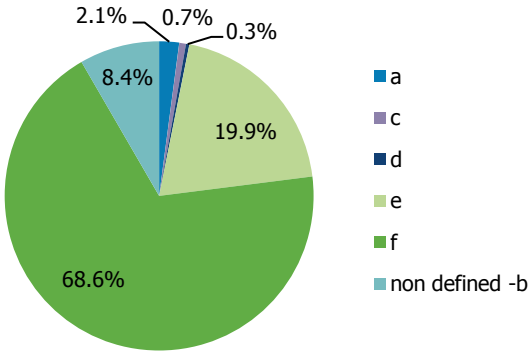


	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
<1 year	2	4	2	1	3	5	7	2	4	8	12
1-4 years	3	6	9	5	3	4	7	7	5	5	7
5-14 years	1	2	1	0	2	8	0	4	2	6	8
15-64 years	11	10	19	22	29	22	34	25	18	37	31
>65 years	9	16	33	22	31	23	52	43	29	42	46

Contributing countries: Finland, Ireland, Italy, Norway, Portugal and the United Kingdom.
Included strains: a, c, d, e, f, and non-defined b

Figure 13 gives the distribution of the typed non-b strains in 2008–2009. The percentages reported comparable, the reported non-type b strains comprised of serotype f 68.6% (n=197), followed by e 19.9% (n =57), a 2.1% (n=6), c 0.7% (n=2) and d 0.3% (n=1).

Figure 13 Non-type b distribution of invasive *H. influenzae* disease reported from countries collecting all serotypes in 2008 (n=145) and 2009 (n=142)



Contributing countries: Austria, Czech Republic, Denmark, Finland, Greece, Hungary, Ireland, Italy, Malta, Norway, Slovenia, Sweden and the United Kingdom.

The absolute numbers of reported cases and notification rates of non-type b strains by age group and by country for 2008 and 2009 are presented in Tables A17 and A18 in Annex 2.

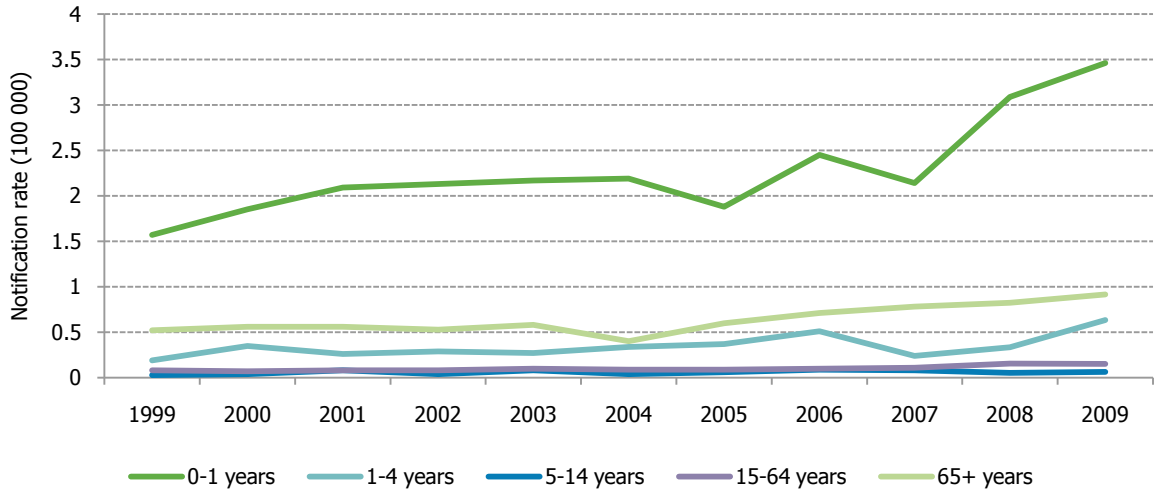
The highest notification rates in the EU were reported in infants younger than 1 year of age (0.24 per 100 000; n=13 in 2008, and 0.22 per 100 000; n=12) in 2009.

The highest notification rates in infants in 2008 were reported in Slovenia (5.13 per 100 000), Ireland (2.84 per 100 000) and Sweden (1.86 per 100 000), while in 2009 Finland (1.68 per 100 000), Norway (1.65 per 100 000) and United Kingdom (1.04 per 100 000) registered the highest rates.

3.3.4.3 Non-capsulated strains

Figure 14 shows the notification rates of non-capsulated (non-typeable) strains across age groups in 1999–2009, for countries with consistent reporting during the time period which were selected according to the 2007 IBD Report criteria (countries with consistent reporting of all strains). In these countries combined, the highest rates continued to occur in the youngest age group (<1 year of age) followed by ≥ 65 year-olds. Rates showed a steady but slight increasing trend in both age groups and in 1–4 year-olds.

Figure 14 Notification rate (per 100 000 population) of invasive *H. influenzae* non-capsulated (non-typeable) disease in different age groups, in selected countries, 1999–2009 (n=3 817)



Contributing countries: Finland, Ireland, Italy, Malta, Norway, Portugal, Poland and the United Kingdom.

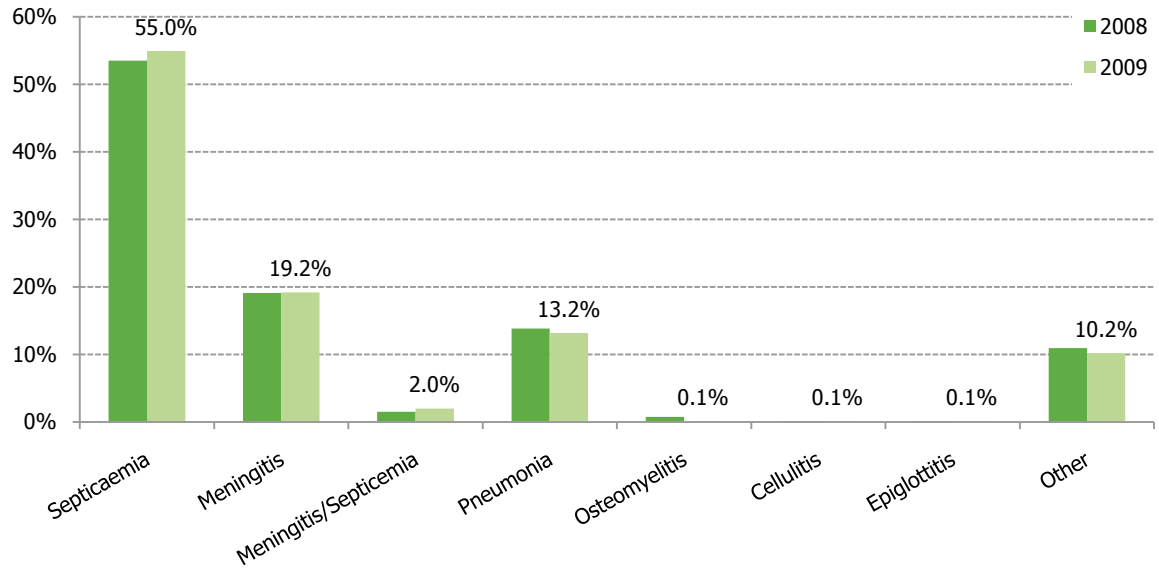
A similar distribution among age groups is showed in Tables A19 and A20 in Annex 2, reporting number of cases and notification rates by country for 2008 and 2009. In 2008, persons ≥ 65 years old were the most represented.

In children younger than 1 year, the United Kingdom (5.96 per 100 000) reported the highest notification rate. In 2009, Norway reported the highest rate in both children < 1 year (6.59 per 100 000) and persons ≥ 65 years (2.29 per 100 000).

3.3.5 Clinical presentation

The distribution of clinical information was available in 39.8% of reported cases (33.7% in 2008 and 46.6% in 2009) and is presented in Figure 15. Septicaemia was the most common presentation, accounting for 54.0% of the cases overall, 53.5% in 2008 and 55.0% in 2009. Of all cases affected by septicaemia and in which the serotype is known, 73.9% (n=439) were reported as non-capsulated strains. Meningitis was reported in 19.2% (n=270), and of these 48.7% (n=73) were non-capsulated, and 26.7% (n=40) serotype strains.

Figure 15 Reported distribution of invasive *H. influenzae* disease clinical presentation in 2008 (n=663) and 2009 (n=740)



Contributing countries: Austria, Czech Republic, Denmark, Estonia, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and the United Kingdom.

Variations were observed across age groups, serotypes and clinical presentation and while meningitis was reported mostly in children, septicaemia occurred mainly among adults (Figure 16 and 17).

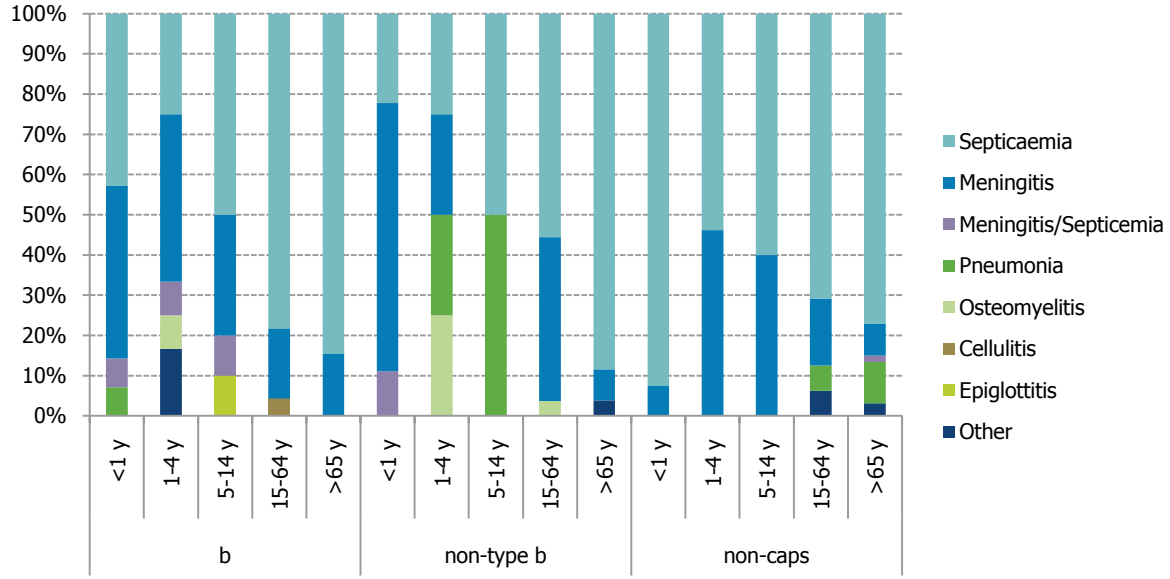
Regarding cases affected by type b infection, meningitis and septicaemia were reported as the most frequent cause of disease among infants < 1 year of age, more than 90.0% of cases were diagnosed with meningitis, septicaemia or both infections. Septicaemia accounted for 90.5% of all reported serotype b cases among >65 years. Overall 3.3% of the cases were reported as affected by pneumonia. Epiglottis was reported in two cases, both children: one 8-year-old and one 3-year-old. A single case each of cellulitis and osteomyelitis were reported, and 1.7% was referred to other clinical presentation.

The number of non-type b infections was limited (n=68 in 2008, n=68 in 2009, among cases with a known age). Among them, septicaemia (64.0% of cases) was the most common presentation.

Overall, non-capsulated serotypes accounted for 569 (n=268 in 2008, n=301 in 2009) cases; septicaemia (77.2% of cases) was the leading presentation reported.

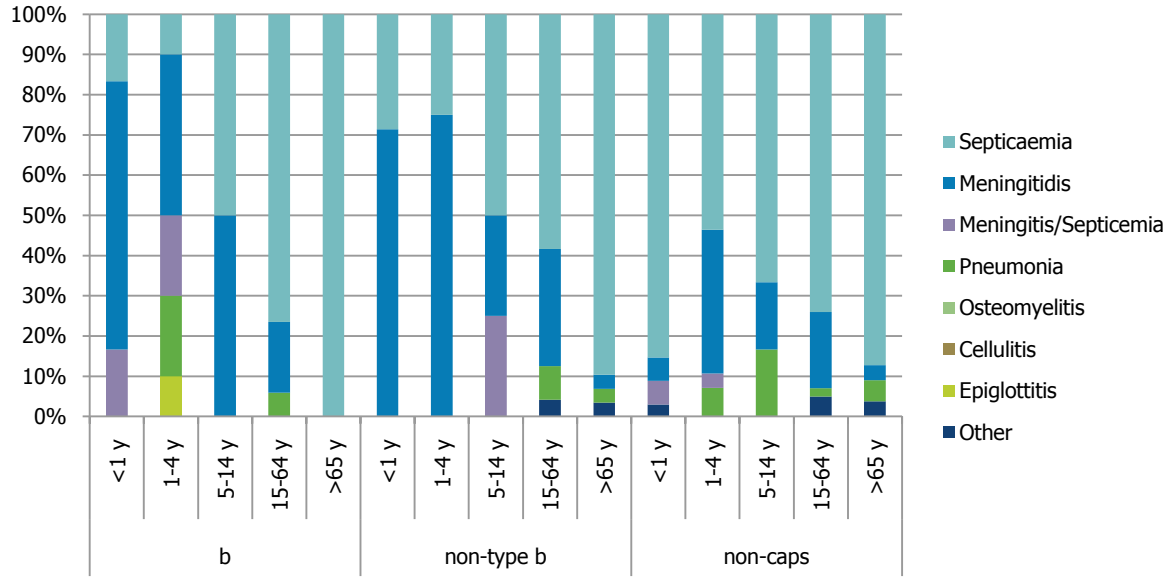
These findings are consistent with data presented in the 2007 IBD Report.

Figure 16 Clinical presentation of invasive *H. influenzae* disease by serotype and age group, 2008 (n=411*)



**Cases missing clinical presentation, serotype information and age were excluded.*
Contributing countries: Austria, Czech Republic, Denmark, Estonia, Greece, Hungary, Ireland, Italy, Lithuania, Norway, Poland, Romania, Slovenia, Spain and the United Kingdom.

Figure 17 Clinical presentation of invasive *H. influenzae* disease by serotype and age group, 2009 (n=415*)



**Cases missing clinical presentation, serotype information and age were excluded.*
Contributing countries: Austria, Czech Republic, Denmark, Estonia, Greece, Hungary, Ireland, Italy, Lithuania, Malta, Norway, Poland, Slovakia, Slovenia and the United Kingdom.

3.3.6 Case fatality ratio

Outcome was reported in 56% of reported cases in 2008 and in 73% of reported cases in 2009. Overall, the case fatality ratio (CFR) of invasive *H. influenzae* among the European countries was 4.5% (n=1 913) in 2008 and 7.8% (n=1 505) in 2009. This calculation was made including all countries that reported at least one case with a known outcome. See Tables A21 and A22 in Annex 2.

The CFR varied markedly across age groups. The highest was observed in age group < 1 year (8.3% in 2008 and 10.9% in 2009), followed by age group 5–14 (5.26 % in 2008) and 1–4 year-olds (4.80% in 2008), while in 2009

the second most affected were persons aged 65 and over (9.39%) followed by persons aged 15–65 (6.07%). The CFR was also associated with serotype. The highest overall CFRs were observed in non-capsulated strains, 8.5% in 2008 and 12.4% in 2009. Tables A23 and A24 in Annex 2 show the relationship between CFR and serotype stratified by age. The increased number of death in 2009 compared to 2008 can be explained by the better data completeness of variable.

As expected, the CFR varied widely across clinical presentations. The overall highest CFR was observed in septicaemia (11.5%) in 2008 and in meningitis and septicaemia (13.3%) in 2009. When interpreting the data it must be taken into account that small number of cases resulted in high CFR.

The CFR varied also considering serotypes and clinical presentation, as showed in Tables A25 and A26 in Annex 2.

In 2008 septicaemia caused the highest CFR in almost all serotypes, and among them the highest rate was observed in cases affected by b serotype (16. 3 %), followed by cases reported with an unknown serotype (12.9%).

In 2009 meningitis and septicaemia caused the highest CFR in almost all serotypes. The highest rates for meningitis and septicaemia were reported among persons infected with non-capsulated strains (33%) followed by non-b strains (20.0%). Pneumonia accounted for 25.0% of persons infected with non-capsulated strains.

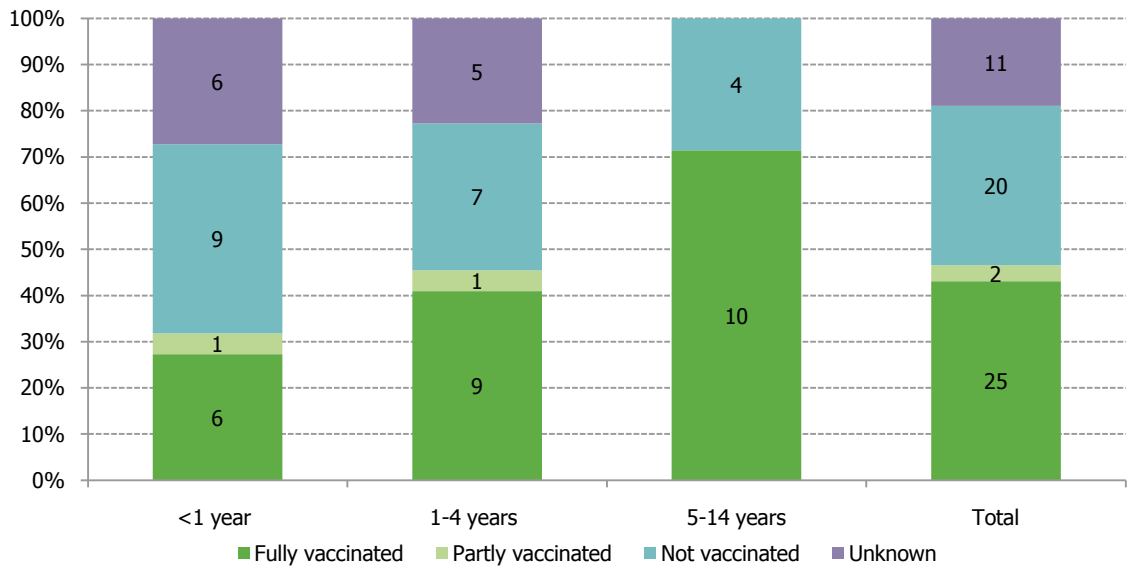
3.3.7 Vaccination status

It was not possible to determine vaccination failures from the data on vaccination, thus numbers and proportions of reported vaccination status are described. Figures 18 and 19 display the distribution of the reported vaccination status by age groups among children < 15 years in cases affected by serotype b in 2008 and 2009, respectively.

In 2008 (n=58), in all age groups, cases reported fully vaccinated accounted the highest proportion (43.1%, n=25). If stratified by age group, those aged 5–14 years were the most represented (71.4%, n=10). Among non-vaccinated cases, those aged below one year were the most represented (41%, n=9).

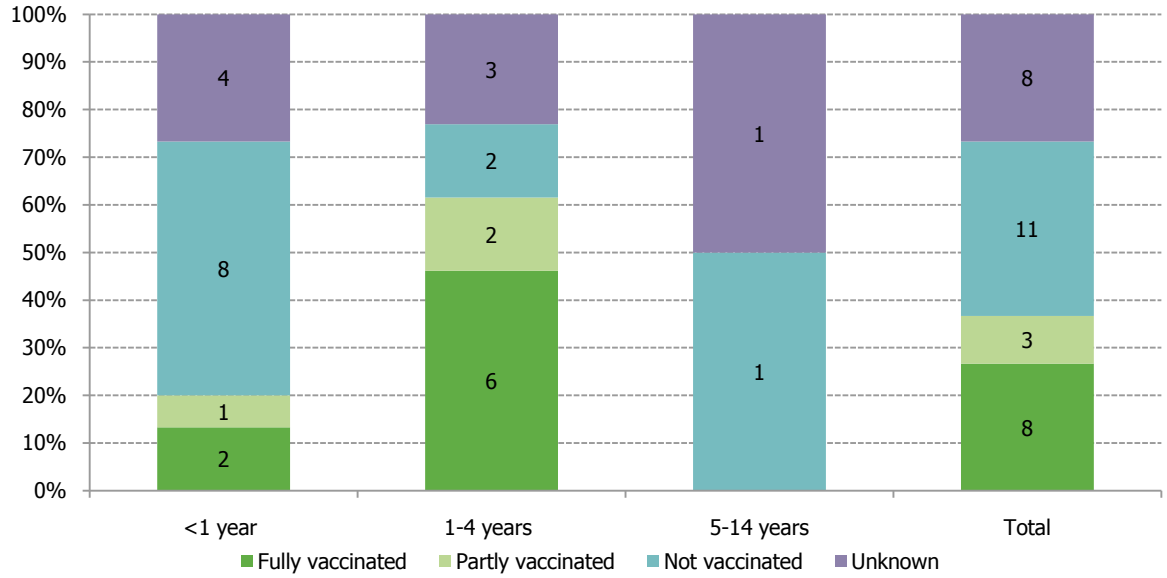
In 2009, the highest proportion of notified cases (n=30) was reported among cases non-vaccinated (36%, n=25). Among non-vaccinated, children < 1 year of age (53.3 %, n=8) were the most represented. The largest proportion of fully vaccinated cases occurred in those aged 1–4 years old (46%, n=6).

Figure 18 Distribution of vaccination status and number of cases reported with invasive *H. influenzae* serotype b disease among children < 15 years, all countries combined, 2008 (n=58)



Contributing countries: Czech Republic, Denmark, Estonia, Finland, Greece, Ireland, Italy, Latvia, Norway, Poland, Romania, Sweden and the United Kingdom.
Unknown = vaccination status unknown.
Fully vaccinated = according to the recommended schedule in the reporting country.
Partly vaccinated = according to the recommended schedule in the reporting country.
Not vaccinated = not vaccinated at all.

Figure 19 Distribution of vaccination status and number of cases reported with invasive *H. influenzae* serotype b disease among children < 15 years, all countries combined, 2009 (n=30)



Contributing countries: Czech Republic, Denmark, Estonia, Finland, Greece, Ireland, Italy, Lithuania, Norway, Poland, Slovakia, Sweden and the United Kingdom.
Unknown = vaccination status unknown.
Fully vaccinated = according to the recommended schedule in the reporting country.
Partly vaccinated = according to the recommended schedule in the reporting country.
Not vaccinated = not vaccinated at all.

The numbers and percentage of reported *H. influenzae* serotype b cases by age group, country and vaccination status are listed in Tables A27 and A28 in Annex 2. Data must be analysed with caution as sensitivity of surveillance system varies considerable, as well as vaccination data completeness. In addition, the United Kingdom alone accounted for 47.6% of cases.

3.3.8 Vaccination schedules

In 1992, the conjugate *H. influenzae serotype b* vaccine was introduced into the national immunisation programme in several EU/EEA countries. By 2010, all Member States had included the vaccine into their programmes. However, the vaccine strategies implemented varies widely across Europe in terms of combined products used, vaccination schedule and population covered (see Table A29 in Annex 2 for more details).

4 Results: invasive meningococcal disease

4.1 Laboratory methods used for strain identification

The laboratory methods used in the routine strain characterisation in the majority of Member States, include phenotyping (serogroup, serotype and serosubtype) and genotyping (/FetA), multilocus sequence typing (MLST), techniques used on cultured isolates and, when available, detection and strain characterisation from non-culture specimens, as well as antibiotic sensitivity testing for the pathogen.

The methods used range from basic microbiology for meningococcal specification to immunoassays for phenotype, to nucleic acid amplification (including real-time PCR) and nucleic acid sequencing for genotyping. Molecular subtyping also allows recognition of outbreak strains and permits a better demarcation of outbreaks from endemic disease. Tables B4 and B5 in Annex 3 illustrate the percentage distribution of laboratory methods used for confirming a case.

Although culture was the most frequent method reported for identifying a case (47.9% in 2008 and 44.7% in 2009), PCR-based approaches have increasingly been used and 25% of the reported cases were confirmed by PCR in 2009. A significant proportion of cases was identified by PCR in Ireland (59.4% in 2008 and 58.3% in 2009), UK (48.2% in 2008 and 51.6% in 2009) and Greece (30.9% in 2008 and 42.7% in 2009).

4.2 Data quality

Table B3 in Annex 3 shows the proportion of reported data with 'known' information per variable in 2008 and 2009, highlighting the minimum and maximum values of data completeness from all countries (n=28) that reported case-based data. Aggregated data from Bulgaria were not included in this table. The completeness of reporting varied substantially between variables.

Taking into account the two years' average, the data completeness of the common set of variables was very high (Pathogen 99%, Age 99%, Classification 99%, Gender 98%, Outcome 92%). The data completeness on enhanced set of the variables ranged between 88% (Serogroup) and 10% (MIC_CTX). Information on basic laboratory variables was available in the majority of cases; however, information on advanced laboratory methods for the diagnosis of *N. meningitidis* was reported in 10–25% of the cases. Looking into this in more detail, the molecular typing variables data completeness was very low (e.g. MLST 2008: 6.8% and 2009: 16%). The variables were reported by seven countries in 2008 and by nine countries in 2009.

The information on minimum inhibitory concentration (MIC) for different kinds of antibiotics was also very low. The highest completeness on MIC was reported on penicillin, 25% of the total number of cases, and this was reported by 7–13 countries.

Vaccination status was reported in 35% of cases.

4.3 Epidemiological analysis

4.3.1 Overall notification rates

In 2008 (n=4 978) and in 2009 (n=4 637), a total number of 9 615 cases of invasive meningococcal disease were reported by 29 countries with an overall notification rate of 0.99 per 100 000 population in 2008 and 0.92 in 2009. The decline was substantial compared to the rate 10 years ago (1.9 per 100 000 in 1999). Almost all cases were laboratory confirmed (96% in 2008, 97% in 2009). Only 126 cases (2.6%) were classified as probable in 2008 and even fewer cases, 77 (1.6%), were classified as probable in 2009, compared with 347 (6%)in 2007. A total of 68 cases in 2008 and 74 cases in 2009 were reported as invasive meningococcal cases with unknown classification. For further details, see Tables B6 and B7 in Annex 3.

Meningococcal disease appears to be rare in the majority of MS, although Ireland (3.68 in 2008 and 3.37 in 2009) and United Kingdom (2.29 in 2008 and 2.02 in 2009) reported a relatively higher notification rate per 100 000 population. The lowest notification rate was reported by Cyprus (0.25 in 2008 and 0.13 in 2009), Hungary (0.37 in 2008 and 0.30 in 2009) and Italy (0.30 in 2008 and 2009). These figures may reflect real differences in incidences, but might also reflect the difference in the sensitivity of the surveillance systems and in the case definition used. The differences can be understood in the context of national surveillance systems as well as vaccination programmes.

Figure 20 Overall notification rate (per 100 000 population) of invasive meningococcal disease by case classification and by country, 2008 and 2009 (n=9615)

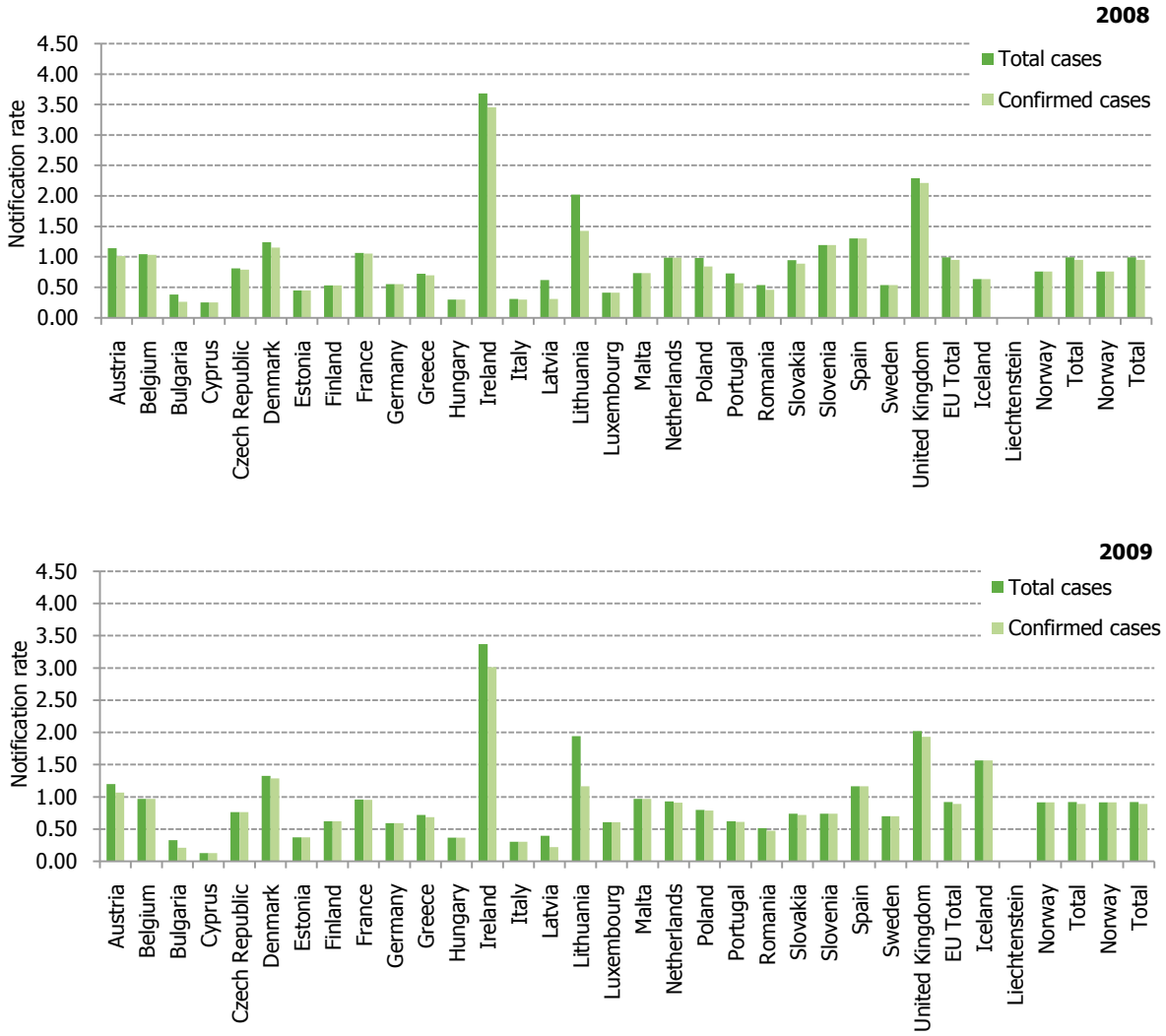


Table 3 illustrates the notification rates and in brackets the total number of cases reported by countries between 1999 and 2009.

For the majority of countries with consistent reporting the notification rate peaked between 1999 and 2003. Belgium, Denmark, Ireland, the Netherlands, Spain and the United Kingdom reported relatively higher notification rates, however, the data in Finland, Ireland, the Netherlands and the United Kingdom show consistently decline over the period. A great care must be taken while analysing the trends as disease surveillance varies among Member States and various changes in the surveillance methods occurred along the years.

Table 3 Notification rates (per 100 000) and total number cases of invasive meningococcal disease by country, 1999–2009[1]

Country	1999	2000	2001	2002	2003	2004	2005	2006	2007[2]	2008[2]	2009[2]
Austria	1.20 (97)	1.05 (85)	1.32 (107)	1.06 (86)	1.00 (82)	1.08 (88)	1.30 (106)	0.93 (76)	0.74 (69)	1.01 (84)	1.07 (89)
Belgium	2.90 (297)	2.60 (267)	3.69 (380)	2.54 (262)	2.20 (228)	1.51 (157)	1.63 (171)	1.32 (138)	1.49 (158)	1.03 (110)	0.97 (104)
Bulgaria	-	-	-	-	-	-	-	-	0.31 (24)	0.26 (20)	0.21 (16)
Cyprus	-	-	-	-	-	-	-	-	0.51 (4)	0.25 (2)	0.13 (1)
Czech Republic	1.00 (103)	0.72 (74)	1.06 (108)	1.20 (122)	0.98 (100)	1.03 (105)	0.95 (97)	0.77 (79)	0.73 (75)	0.79 (82)	0.76 (80)
Denmark	3.50 (186)	3.00 (160)	3.08 (165)	1.86 (100)	1.95 (105)	1.85 (100)	1.64 (89)	1.45 (79)	1.43 (78)	1.15 (63)	1.29 (71)
Estonia	0.44 (6)	0.80 (11)	1.61 (22)	0.73 (10)	0.74 (10)	0.81 (11)	0.96 (13)	0.82 (11)	0.82 (11)	0.45 (6)	0.37 (5)
Finland	1.11 (57)	0.93 (48)	0.98 (51)	0.94 (49)	0.81 (42)	0.86 (45)	0.77 (40)	0.86 (45)	0.81 (43)	0.53 (28)	0.62 (33)
France	0.74 (448)	0.81 (489)	0.92 (559)	1.11 (678)	1.31 (803)	1.13 (699)	1.19 (748)	1.13 (714)	1.07 (680)	1.05 (673)	0.95 (614)
Germany	0.49 (402)	0.55 (452)	0.95 (782)	0.89 (736)	0.94 (774)	0.73 (601)	0.76 (629)	0.67 (555)	0.53 (439)	0.55 (452)	0.59 (485)
Greece	1.94 (211)	2.39 (261)	2.14 (234)	2.12 (233)	1.19 (131)	0.65 (72)	0.88 (98)	1.02 (114)	0.95 (106)	0.70 (78)	0.68) (77)
Hungary	-	-	-	-	0.42 (43)	0.43 (43)	0.32 (32)	0.35 (35)	0.43 (43)	0.30 (30)	0.37 (37)
Ireland	14.33 (536)	13.59 (515)	8.58 (330)	6.49 (253)	5.96 (237)	4.92 (198)	4.91 (203)	4.97 (209)	3.76 (162)	3.45 (152)	3.01 (134)
Italy	0.48 (275)	0.44 (250)	0.36 (203)	0.39 (223)	0.48 (278)	0.55 (321)	0.56 (327)	0.30 (176)	0.30 (178)	0.30 (178)	0.30 (181)
Latvia	-	-	-	-	1.03 (24)	1.03 (24)	0.78 (18)	0.52 (12)	0.66 (15)	0.31 (7)	0.22 (5)
Lithuania	-	-	2.18 (76)	1.90 (66)	1.27 (44)	2.67 (92)	2.36 (81)	2.26 (77)	1.48 (50)	1.43 (68)	1.16 (39)
Luxembourg	4.15 (18)	0.23 (1)	0.23 (1)	0.23 (1)	0.45 (2)	0.00	0.22 (1)	-	0.42 (2)	0.41 (2)	0.61 (3)
Malta	5.88 (23)	7.92 (31)	5.32 (21)	3.52 (14)	4.25 (17)	3.33 (13)	2.47 (10)	8.90 (36)	1.47 (6)	0.73 (3)	0.97 (4)
Netherlands	3.65 (576)	3.42 (542)	4.51 (721)	3.82 (616)	2.19 (354)	1.75 (284)	1.51 (246)	1.09 (178)	1.19 (195)	0.99 (162)	0.91 (150)
Poland	0.17 (67)	0.11 (43)	0.10 (37)	0.09 (35)	0.15 (58)	0.31 (117)	0.52 (198)	0.43 (165)	0.88 (335)	0.84 (321)	0.79 (301)
Portugal	-	0.57 (59)	1.03 (106)	2.08 (216)	1.99 (208)	1.73 (182)	1.60 (169)	1.25 (132)	0.92 (98)	0.57 (60)	0.61 (65)
Romania	-	-	-	-	-	-	-	-	0.67 (145)	0.46 (99)	0.47 (102)
Slovakia	-	-	-	-	0.91 (49)	0.59 (32)	0.82 (44)	0.67 (36)	0.65 (35)	0.89 (48)	0.72 (39)
Slovenia	0.30 (6)	0.40 (8)	0.50 (10)	0.40 (8)	0.80 (16)	0.45 (9)	0.80 (16)	0.40 (8)	0.90 (18)	1.19 (24)	0.74 (15)
Spain	3.52 (1403)	3.74 (1499)	2.23 (904)	2.71 (1109)	2.45 (1019)	2.11 (892)	2.15 (923)	1.84 (800)	1.39 (620)	1.30 (590)	1.16 (533)
Sweden	0.37 (33)	0.46 (41)	0.64 (57)	0.53 (47)	0.63 (56)	0.65 (59)	0.63 (57)	0.57 (52)	0.54 (49)	0.53 (49)	0.70 (65)
United Kingdom	5.39 (3150)	5.23 (3067)	4.51 (2655)	3.38 (2004)	3.10 (1848)	2.59 (1549)	2.78 (1672)	2.33 (1401)	2.50 (1522)	2.21 (1355)	1.93 (1190)
Iceland	7.58 (21)	6.40 (18)	6.67 (19)	5.22 (15)	2.77 (8)	3.42 (10)	1.69 (5)	1.31 (4)	1.30 (4)	0.63 (2)	1.57 (5)
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-
Norway	1.80 (80)	1.94 (87)	1.71 (77)	1.13 (51)	1.12 (51)	0.74 (34)	0.85 (39)	0.75 (35)	0.64 (30)	0.76 (36)	0.92 (44)

[1] Population data source: EU-IBIS; 1999-2006 contains laboratory-confirmed and laboratory-confirmed probable cases according to the 2002 case definition.

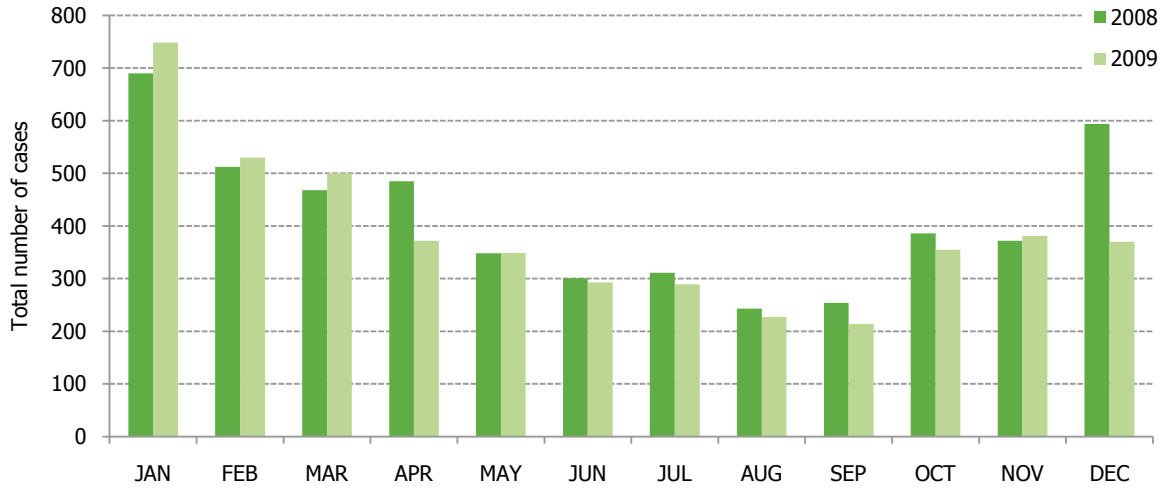
[2] Population data source: Eurostat; 2007–2009 contains only confirmed cases. -: no data was reported (unknown number of cases, not necessarily zero).

4.3.2 Seasonal trend

Information on seasonal distribution was available for both years for 9 592 cases. Disease occurs throughout the year with peak levels in the winter months, declining to low levels by late summer.

See Tables B8 and B9 in Annex 3 for number of cases reported per month and per country.

Figure 21 Number of reported invasive meningococcal disease cases per month*, 2008 (n=4 964) and 2009 (n=4 628)



Contributing countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.
**Date used is DateForStatistics.*

4.3.3. Gender distribution

Information on gender was available for 4 929 cases in 2008 and 4 412 cases in 2009, with an average percentage of data completeness of 98% of the total number of reported cases for 2008 and 2009.

As expected, males and females were almost equally affected, with a male-to-female ratio of 1.14 in 2008 and 1.11 in 2009, remaining relatively constant across countries. Belgium (2009), the Czech Republic (2008), Spain (2009), Iceland (2009), the Netherlands (2009), Norway (2008), Slovenia (2008) and Sweden (2009) experienced a slightly higher level of the disease rate among females (see Tables B10 and B11 in Annex 3).

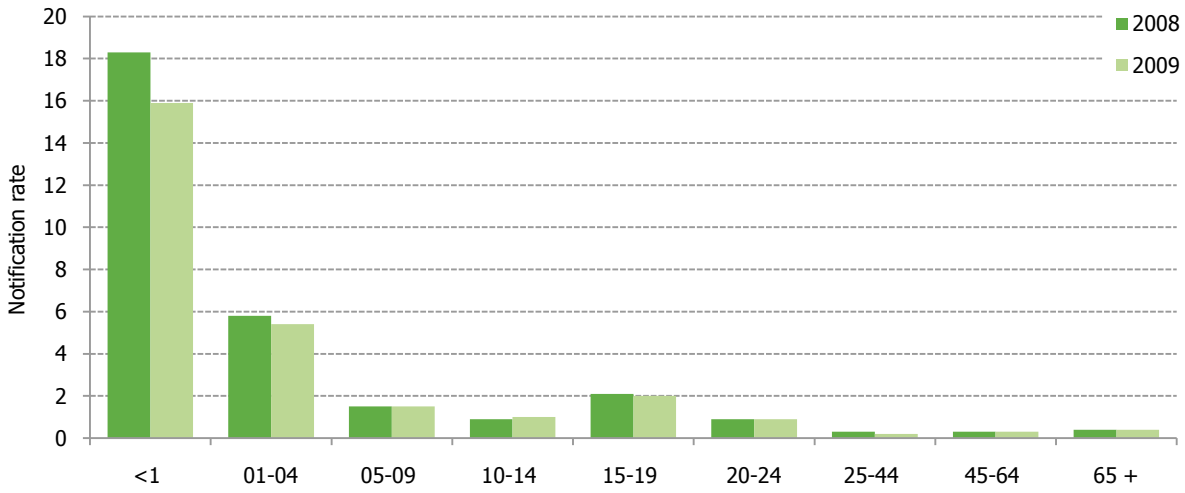
Poland reported only female (45.6%) and unknown (54.2%) cases in 2009; therefore, it was not included in this analysis.

4.3.4 Age distribution

Information on age was available for 99.4% of total number of cases for 2008 and 2009. In 2008 and 2009, there were 9 508 cases reported with known age and 44% and 43%, respectively, of reported cases affected children younger than 10 years old.

Figure 22 shows the notification rates per 100 000 population by age group of invasive meningococcal disease in reporting countries. The highest rates were notified in infants younger than 1 year (18.3 in 2008 and 15.9 per 100 000 population in 2009), children aged between 1–4 years (5.8 in 2008 and 5.4 per 100 000 population in 2009) and teenagers 15–19 years old (2.1 in 2008 and 2.0 per 100 000 population in 2009). Among the older age groups, the disease was reported only rarely. For further details see Tables B12, B13 and B16 in Annex 3.

Figure 22 Notification rates per 100 000 population of total number of reported invasive meningococcal disease cases, 2008 and 2009, all countries combined (n=4 978 in 2008, n=4 637 in 2009)



Contributing countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom. Age class for Bulgaria is missing due to aggregated data.

4.3.5 Probable country of infection

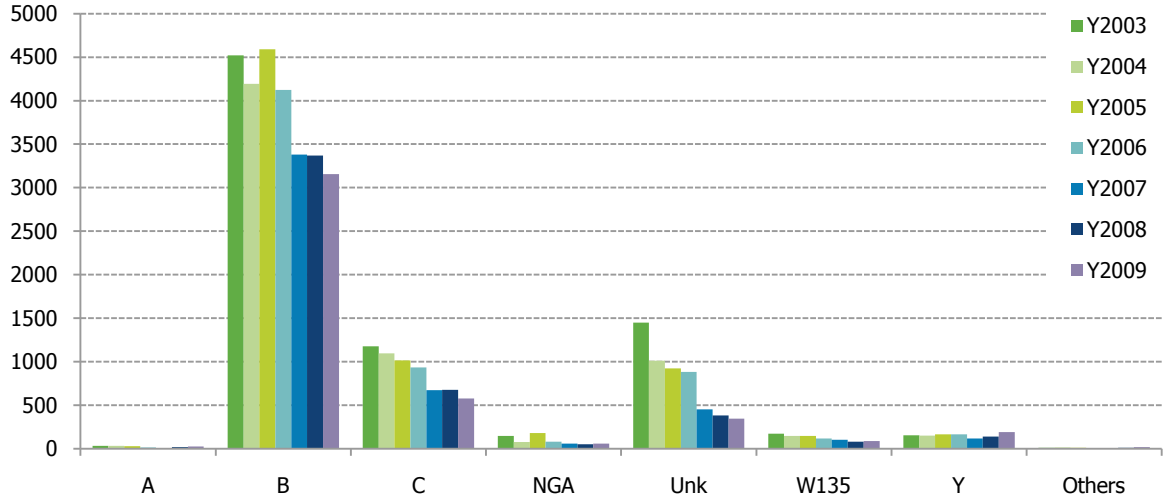
According to the cases reported in 2008–2009, 12 cases were reported as acquired out of EU: three cases in Albania (B serogroup), one in Bosnia-Herzegovina (B serogroup), one in Turkey (B serogroup), one in Russia (unkown serogroup), one from Morocco (B serogroup), one from Mexico (B serogroup), two cases in Thailand (B and W135 serogroups), one in Philippines (B serogroup), one from USA (Y serogroup). However, this variable was only 47% completed for both years of the case reports.

4.3.6 Serogroups

The distribution of serogroups among laboratory-diagnosed cases reported between 2003 and 2009 is shown in Figure 23. There was a decreasing trend over time, especially in serogroup B and C, that dropped from 4 522 (2003) to 3 010 (2009) and from 1 177 (2003) to 565 (2009), respectively.

The distribution of the other (NGA, W135, Y) serogroups remained relatively unchanged, however, the figure suggests an increasing number (154 in 2003, 118 in 2007 and 187 in 2009) of Y cases. The data quality has improved over the years and the number of cases with unknown serogroup decreased from 1 448 (19% of reported cases) in 2003 to 261 (6% of reported cases) in 2009.

Figure 23 Distribution of serogroups among laboratory-diagnosed invasive meningococcal disease cases in EU/EEA countries with consistent reporting, 2003–2009 (n=41 745)



Contributing countries: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

The distribution of serogroups in laboratory-diagnosed cases in all participant countries in 2008 and 2009 is shown in Figures 24 and 25. The vast majority of cases reported was caused by serogroup B (71% in 2008 and 2009) followed by serogroup C (14% in 2008 and 13% in 2009).

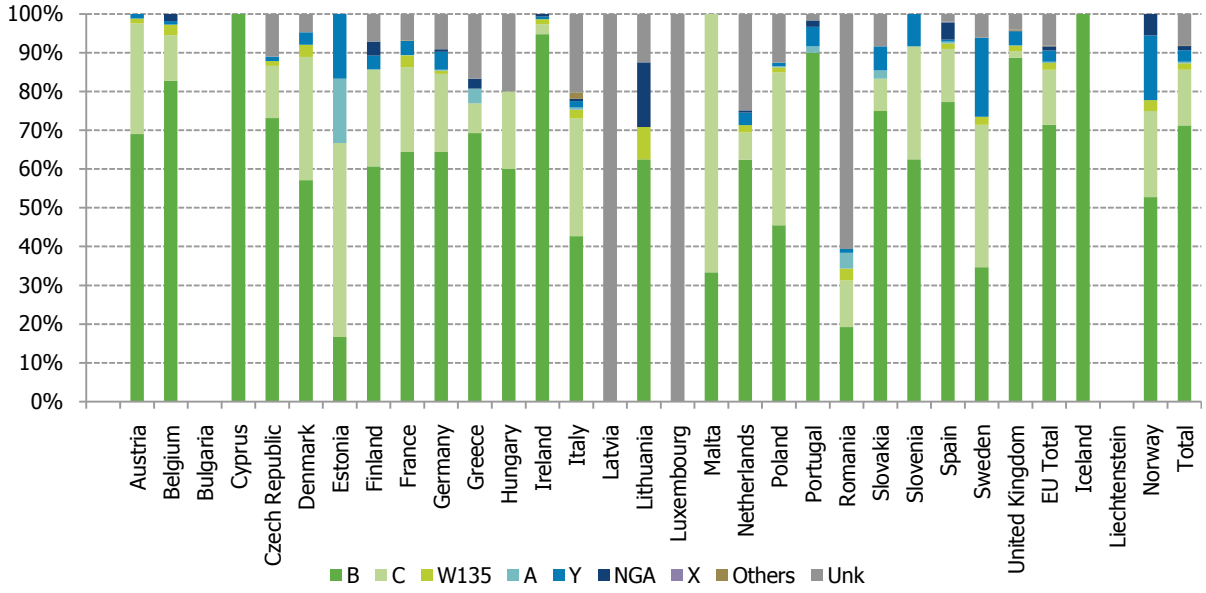
The third most frequent serogroup reported in the EU was serogroup Y (3% in 2008 and 4% in 2009). Overall, the number of Y cases has increased by 42% between 2007 and 2009. The highest proportion of Y cases was reported in Sweden (20% in 2008 and 34% in 2009) and Norway (17% in 2008 and 25% in 2009) followed by Estonia (17% in 2008) and Finland (15% in 2009). In the rest of the countries, serogroup Y was present in a range lying between 0% and 8% in 2008 and 2009.

The highest proportion of serogroup W135 was notified by Lithuania (8%) in 2008 and Slovenia (7%) in 2009. In the rest of the countries, serogroup W135 present in a range lying between 0% and 5%, considering both years together.

Serogroup A activity still remains low in Europe, below 1% of the total number of cases with reported serogroup (n=18 in 2008 and n=24 in 2009).

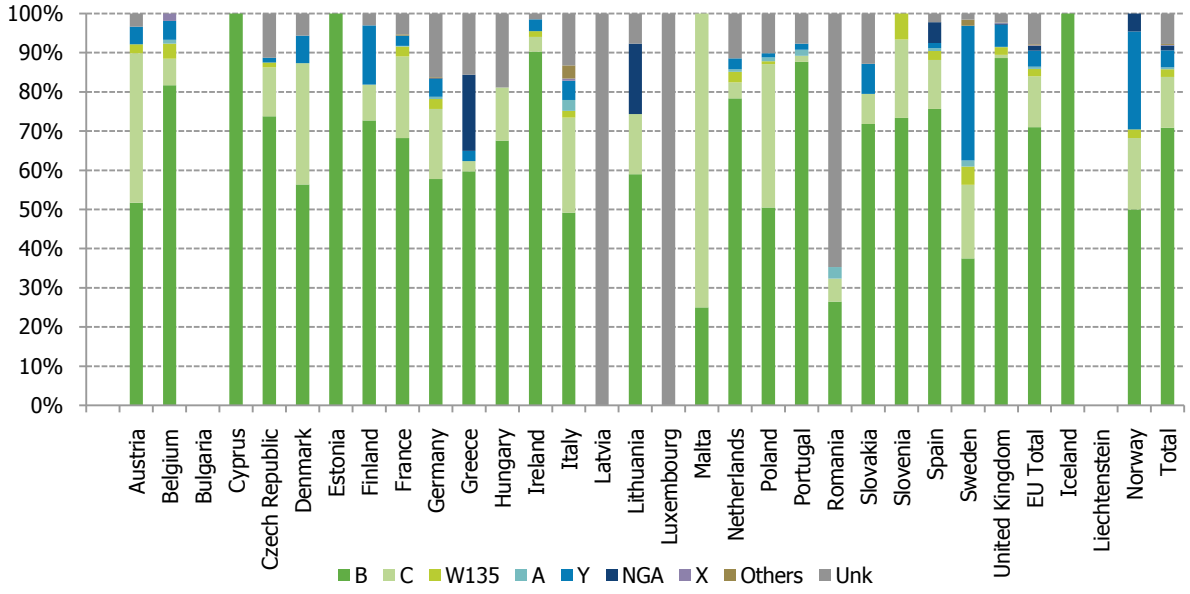
The proportion of cases with missing information remains relatively high (8%) (n=383 in 2008 and n=347 in 2009). Luxembourg and Latvia reported 100% unknown serogroup considering both years. Cases in which a serogroup could not be identified were designated as non-groupable (NGA=1% taking into consideration both years). For further details, see Tables B14 and B15 in Annex 3.

Figure 24 Percentage distribution of serogroups of laboratory-confirmed invasive meningococcal disease cases by country, 2008 (n=4 764)



Data from Bulgaria is not included since aggregated reporting did not include reporting of serogroups.
Unk = the serogroup is not known at MS level.
O = Other. The specific codes are kept for the most common serogroups. Others are the remaining/other groupable serogroups that should be reported.

Figure 25 Percentage distribution of serogroups of laboratory-confirmed invasive meningococcal disease cases by country, 2009 (n=4 487)



Data from Bulgaria is not included since aggregated reporting did not include reporting of serogroups.
Unk = the serogroup is not known at MS level.
O = Other. The specific codes are kept for the most common serogroups. Others are the remaining/other groupable serogroups that should be reported.

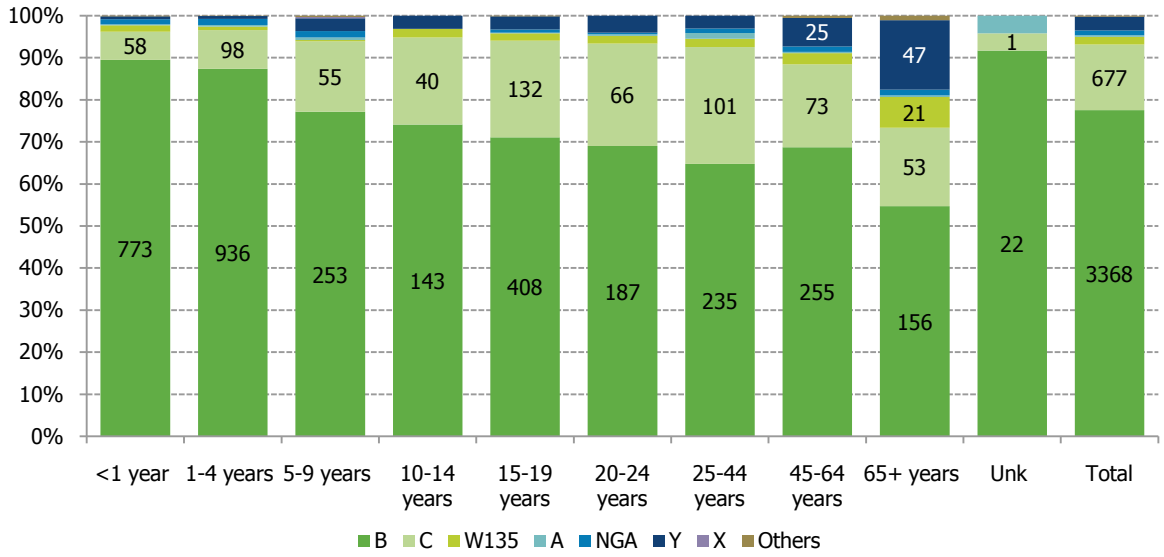
The distribution of serogroups by age group is illustrated in Figures 26 and 27. Among the cases in infants younger than 1 year, 89.4% in 2008 and 88.9 % in 2009 were due to serogroup B and only 6.7% in 2008 and 7.1% in 2009 to serogroup C. Among cases in children aged 1–4 years, 87.3% in 2008 and 86.3% in 2009 were due to serogoup B, and 9.1% in 2008 and 9.5% in 2009 due to serogroup C.

The proportion of serogroup C cases increased with age and the highest percentages were reported in young adults 20–25 years (24.3%) and adults 25–44 years (27.8%) in 2008, whereas in 2009 the highest proportion was registered in teenagers 10–14 years (25.5%) and in young adults 20–25 years (19.3%).

Compared to previous years' data, a shift from adolescents to an older, unvaccinated, young adults age group is noticeable. This finding could be explained by the impact of the vaccination against serogroup C in age groups targeted by vaccination.

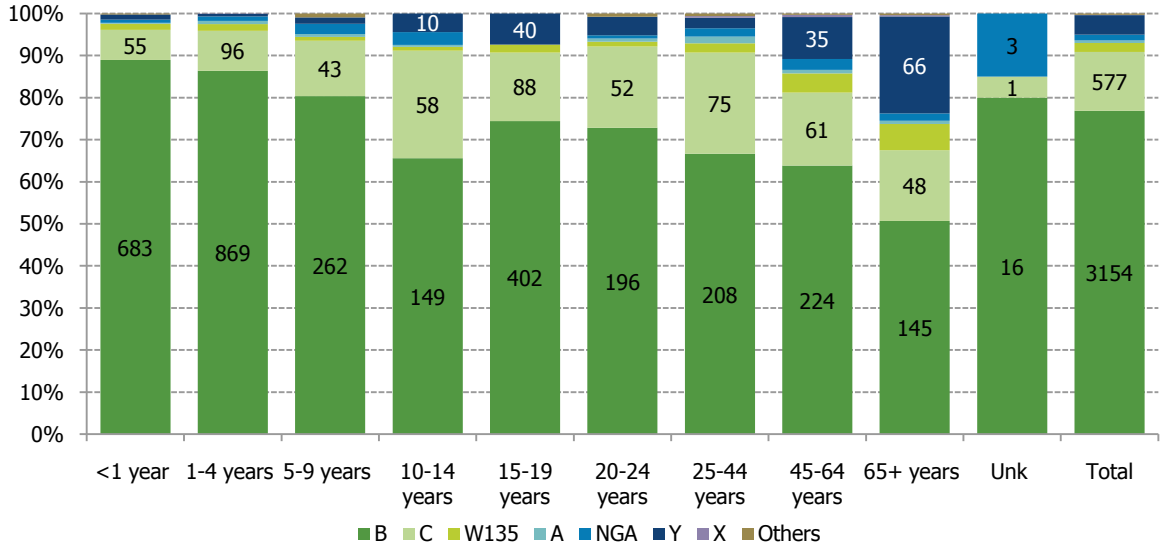
The highest proportion of Y and W135 cases was reported among elderly people above 65 years (Y: 16.4% in 2008 and 23.0% in 2009; W135: 7.3% in 2008 and 6.2% in 2009). Cases reported as unknown serogroup were not included in the analysis.

Figure 26 Distribution of confirmed invasive meningococcal disease by serogroups and by age group, 2008 (n=4 344)



Contributing countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg , Malta, Netherlands , Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

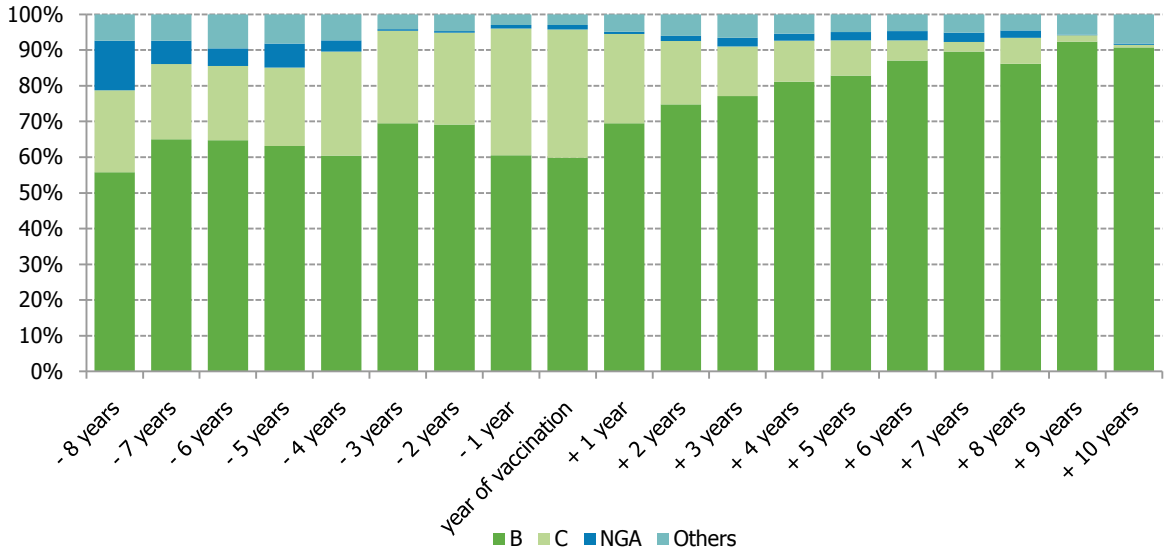
Figure 27 Distribution of confirmed invasive meningococcal disease serogroups by age group, 2009 (n=4 452)



Contributing countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg , Malta, Netherlands , Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

The percentage distribution of serogroups over time, before and after the year of introduction of MCC into the country's routine vaccination schedule is shown in Figure 28 (source for vaccination schedules provided by EUVAC.NET). The figure highlights the impact of MCC vaccination as the proportion of cases due to serogroup C dramatically decreased in the post-vaccination years. Not all countries have available data for all 19 years (eight years before starting the vaccination programme and 10 after), this, however, does not invalidate the results since the percentage distribution is analysed.

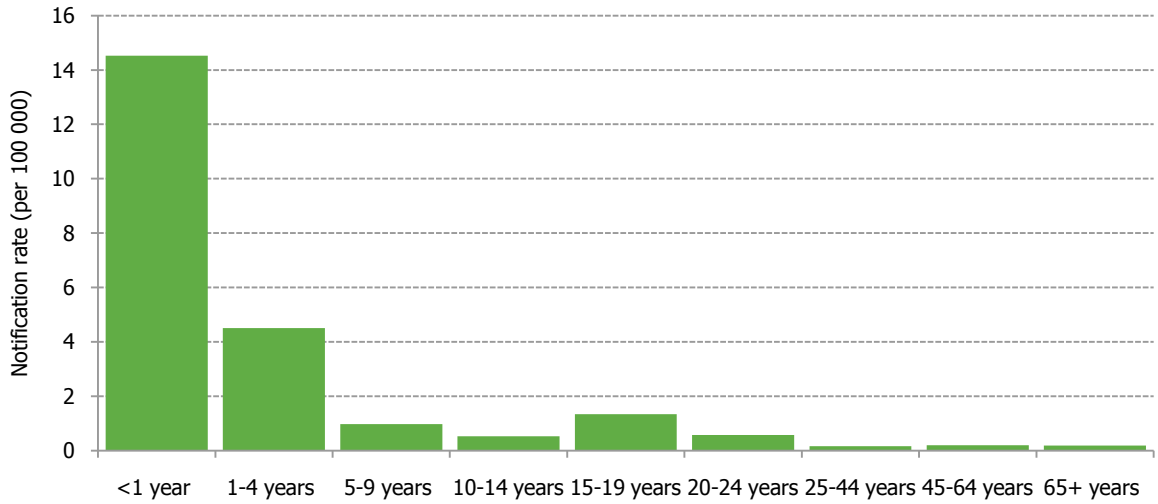
Figure 28 Percentage distribution of invasive meningococcal disease by serogroup in MCC countries* in the years before and after the introduction of MCC vaccination into the routine vaccination schedule, 1999–2009 (n=56 385)



**Countries included as MCC countries: Belgium, Germany, Greece, Iceland, Italy, Ireland, Netherlands, Portugal, Spain and the United Kingdom.*

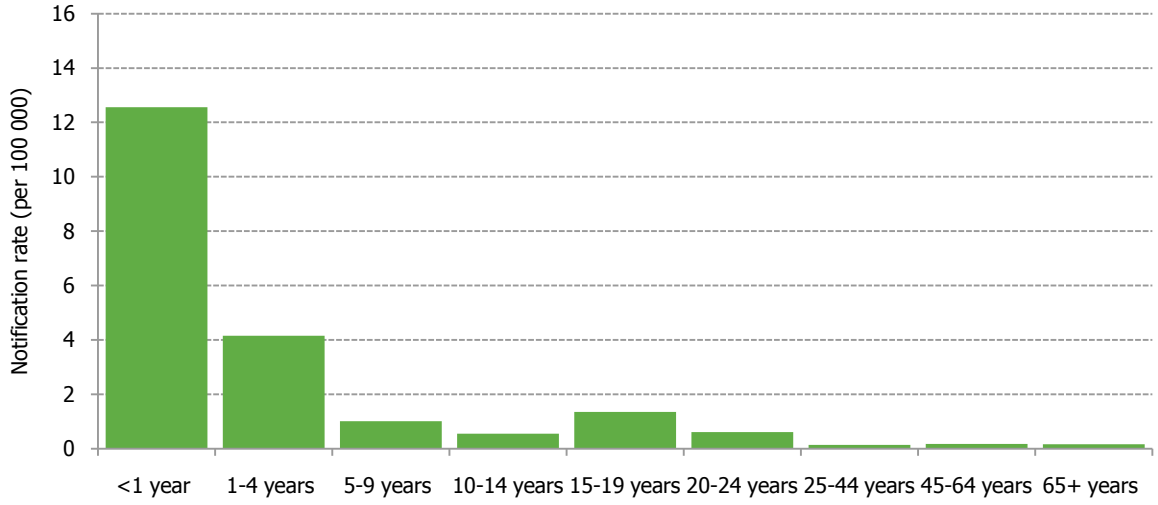
Age-group-specific notification rates of serogroup B cases for 2008 and 2009 are shown in Figures 29 and 30. The highest rates were notified in infants and children younger than 4 years, followed by adolescents 15–19 years old. For further details see Tables B19 and B20 in Annex 3.

Figure 29 Age-group-specific notification rates (per 100 000) of serogroup B invasive meningococcal disease cases, 2008 (n=3 346)



Population data: Eurostat
Contributing countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

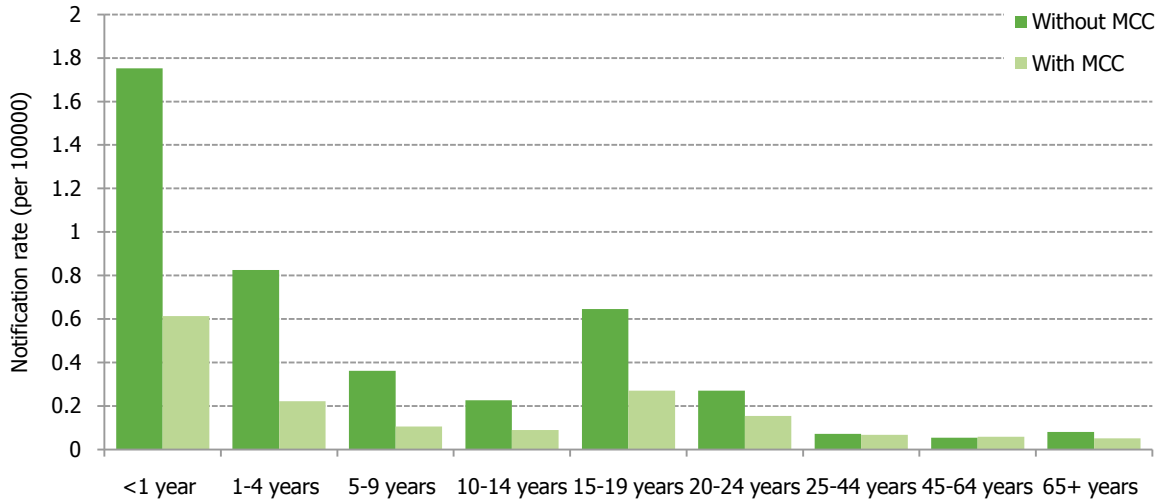
Figure 30 Age-group-specific notification rates (per 100 000) of serogroup B invasive meningococcal disease cases, 2009 (n=3 138)



Population data: Eurostat
Contributing countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

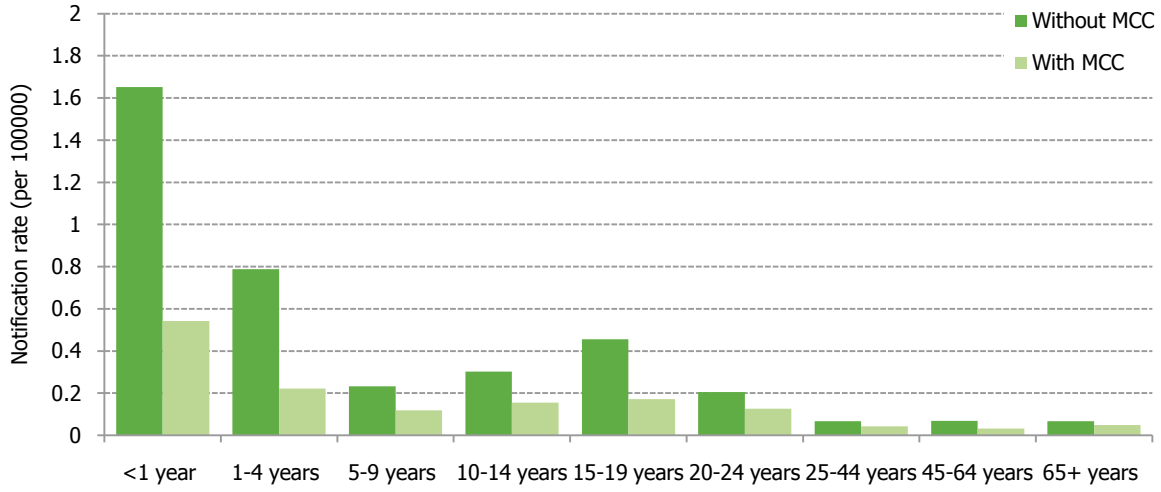
The age-specific rates for serogroup C in 2008 and 2009, by countries with and without MCC vaccination, is shown in Figures 31 and 32. In countries with MCC vaccination, the notification rates were below 0.6 per 100 000 population in infants and particularly low rates (0.2 to 0.0 per 100 000) were reported in all the other age groups. See Tables B21 and B22 in Annex 3.

Figure 31 Age-group-specific notification rates (per 100 000) of serogroup C invasive meningococcal disease cases, in countries with MCC and without MCC vaccination, 2008 (n=676)



Population data: Eurostat.
**Countries included as MCC countries: Belgium, Germany, Greece, Iceland, Ireland, Italy, Netherlands, Portugal Spain and the United Kingdom.*
***Countries included as non-MCC countries: Austria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Hungary, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Romania, Slovakia, Slovenia and Sweden.*

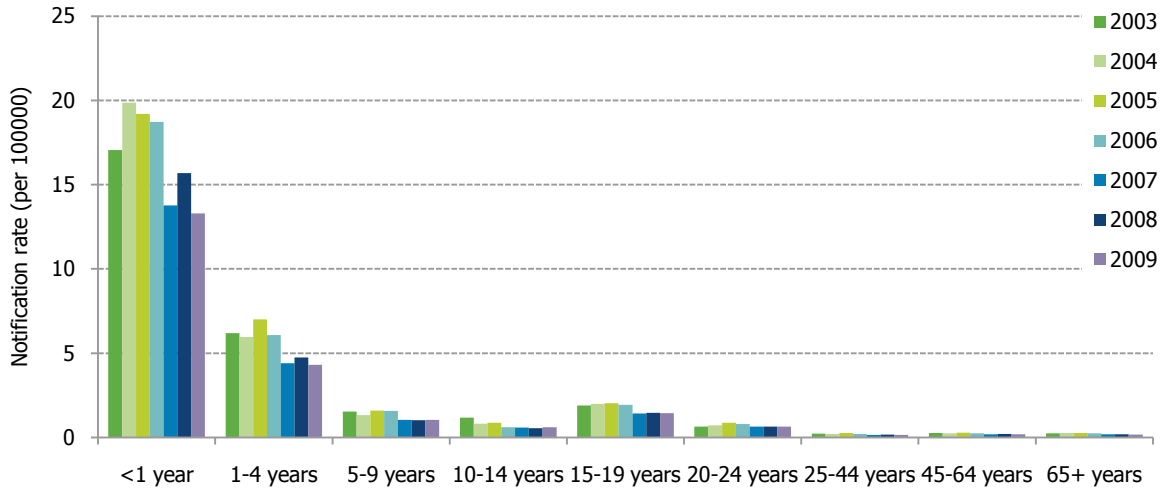
Figure 32 Age-group-specific notification rates (per 100 000) of serogroup C invasive meningococcal disease cases, in countries with MCC and without MCC vaccination, 2009 (n=576)



Population data: Eurostat.
**Countries included as MCC countries: Belgium, Germany, Greece, Iceland, Ireland, Italy, Netherlands, Portugal Spain and the United Kingdom.*
***Countries included as non-MCC countries: Austria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Hungary, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Romania, Slovakia, Slovenia and Sweden.*

The notification rate of serogroup B cases by age group in countries with consistent reporting between 2003 and 2007 is illustrated in Figure 33. Contributing countries were selected if reported ≥ 1 case in the this period. Cases reported as unknown serogroup or unknown age were not included in the analysis. A decreasing trend is noticeable over the years in all age groups; however, infants younger than 1 year had the highest incidence, followed by children aged 1–4 years. For further details see Table B17 in Annex 3.

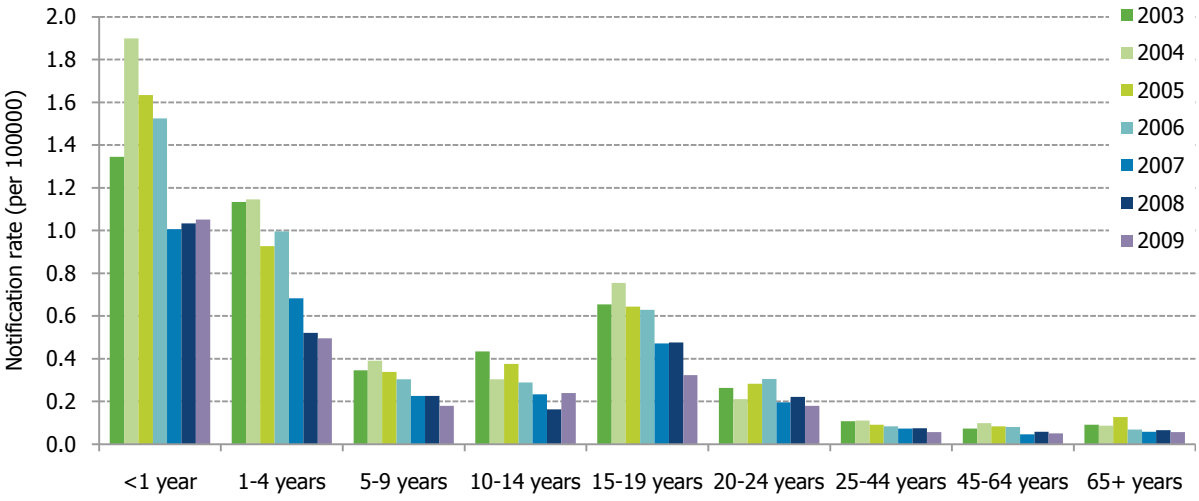
Figure 33 Notification rate (per 100 000) of serogroup B invasive meningococcal disease cases by year and age group in countries with consistent reporting between 2003 and 2009 (n=26 105)



Population source: 2003-2009: Eurostat.
Contributing countries 2003-2009: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

The notification rate of serogroup C cases by age group in countries with consistent reporting between 2003 and 2009 is illustrated in Figure 34. The notification rates among C cases decreased progressively over time in all age groups, especially in those aged 0–4 years. For further details see Table B18 in Annex 3.

Figure 34 Notification rate (per 100 000) of serogroup C invasive meningococcal disease cases by year and age group in countries with consistent reporting, 2003–2009 (n=5 871)



Population source: Eurostat.
Contributing countries: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

4.3.7 Further characterisation of *N. meningitidis*

Data on FetVR was available in 11.4% (n=1 008) of total number of cases and 61 variants have been reported for 2008 and 2009 together. Isolates of the variant F1-5 (n=208; 20.6%), F3-3 (n=110; 10.9%) and F5-1 (n=97; 9.6%) were the most frequently reported. Table 4 below shows the most frequent FetVR variants in the EU.

Table 4 Total number and percentage distribution of FetVR variants, in reporting countries, 2008 and 2009 combined

Fet VR	Number of cases N	Percentage distribution %
F1-5	208	20.6
F3-3	110	10.9
F5-1	97	9.6
F3-6	94	9.3
F5-5	75	7.4
F3-9	69	6.8
F4-1	58	5.8
F1-7	54	5.4
F5-9	47	4.7
F5-8	26	2.6
F5-2	21	2.1
F5-12	16	1.6
F1-15	15	1.5

Multilocus sequence typing (MLST) data completeness was 10.9% (n=981) of all cases for 2008 and 2009. MLST showed that the bacterial population was highly diverse, comprising 26 different clonal complexes: 256 (26.1%) isolates belong to CC ST-41 complex, followed by CC ST-11 complex (21.1% n=207) and CC ST-32 complex (16.3% n=160).

ST-11 complex/ET-37 complex strains were identified in C disease, while ST-41/44 complex/Linage 3 strains and ST-32 complex/ET-5 complex were responsible for B disease.

The most frequently reported invasive meningococcal lineages are shown in Table 5.

The clonal complex distribution by country and by serogroup is illustrated Tables B28 and B29 in Annex 3.

Table 5 Total number and percentage distribution of reported virulent clonal complexes in reporting countries, 2008 and 2009 combined (n=981)

Clonal Complex	Number of cases (N)	Percentage distribution %
ST-41/44 complex/Lineage 3	256	26.1
ST-11 complex/ET-37 complex	207	21.1
ST-32 complex/ET-5 complex	160	16.3
ST-269 complex	97	9.9
ST-23 complex/Cluster A3	39	4.0
ST-461 complex	35	3.6
ST-213 complex	34	3.5
ST-162 complex	32	3.3
ST-103 complex	18	1.8
ST-18 complex	16	1.6
ST-22 complex	16	1.6
ST-8 complex/Cluster A4	14	1.4
ST-865 complex	13	1.3
ST-35 complex	11	1.1

Reporting countries: Austria, Czech Republic, France, Greece, Italy, Norway, Poland, Portugal and Romania.

Data on PorA1 was available in 20% of total number of reported cases and 59 variants were reported for 2008 and 2009. Isolates of the variant 7-2 (n=684; 23%), 5 (n=348; 12%) and 22 (n=294; 10%) were the most frequently reported. Table 6 shows the 10 most frequent PorA1variants in the EU.

Table 6 Total number and percentage distribution of total number of known cases of PorA1 variant, in reporting countries, 2008 and 2009 combined (n=2 969)

PorA1	Number of cases	Percentage distribution (%) of known isolates
7-2	684	23.0
5	348	11.7
22	294	9.9
5-1	271	9.1
7	255	8.6
18-1	201	6.8
5-2	176	5.9
19	103	3.5
19-1	88	3.0
7-1	87	2.9

Data on PorA2 was available in 20% of total number of reported cases and 123 variants were reported in 2008 and 2009. Isolates of the variant 4 (n=527; 18%), 16 (n=344; 12%) and 2 (n=335; 11%) were the most frequently reported. Table 7 shows the 10 most frequent variants in the EU.

Table 7 Total number and percentage distribution of total number of known cases of PorA2 variant, in reporting countries, 2008 and 2009 combined (n=2 981)

PorA2	Number of cases	Percentage distribution (%) of known isolates
4	527	17.7
16	344	11.5
2	335	11.2
14	213	7.1
3	162	5.4
10-1	133	4.5
10-8	109	3.7
13-1	100	3.4
9	99	3.3
15	96	3.2

4.3.8 Antimicrobial susceptibility of isolates of *N. meningitidis*

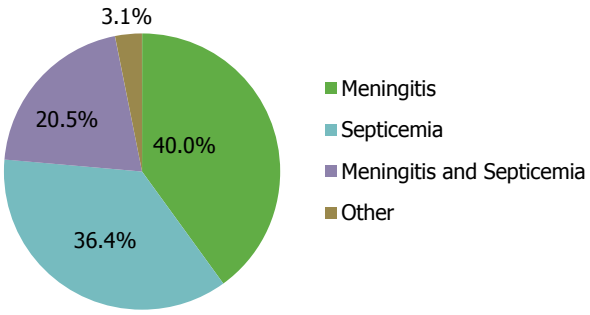
The majority of isolates tested were susceptible to the antibiotics that are currently used in treatment and prophylaxis (rifampicin, cefotaxime, penicillin G, and ciprofloxacin). In 2008 and 2009, six strains were reported as resistant to ciprofloxacin (Austria (n=2), Slovakia (n=1), Estonia (n=1), Italy (n=1) and Sweden (n=1)) and six strains were resistant to ceftriaxone in Estonia (n=3 in 2008 and n=3 in 2009). Only the numeric values were included in the analysis; for data interpretation, the EUCAST guideline was used. The results intermediated between twofold dilutions were converted to the next twofold dilution. Detailed information on antimicrobial susceptibility is shown in Tables B34 and B35 in Annex 3.

4.3.9 Clinical presentation

The average data completeness was 50.7% of the total number of reported cases for 2008 and 2009.

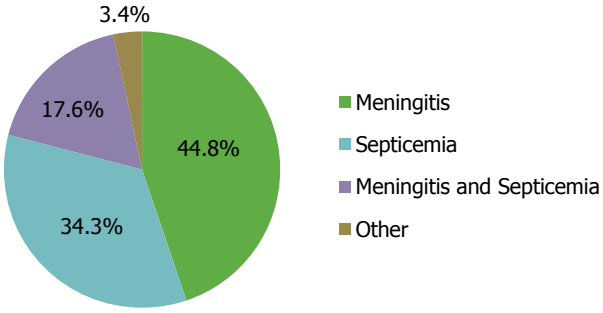
Among known cases meningitis (40.0% in 2008 and 44.8% in 2009) contributed in the highest proportion to the clinical picture of the disease in Europe. In Slovakia and Romania, the ratio for meningitis was considerably higher (81.2% and 71.3% in 2008; 82.0% in 2009 and 68.5% in 2009) than the EU overall. In Malta (66.6% in 2008), Estonia (50% in 2008), Lithuania (47.7% in 2009) and Spain (48.2% in 2009), septicaemia contributed in the highest proportions to the clinical picture of the disease. See Tables B23, B24 and B25 in Annex 3 for details by country.

Figure 35 Percentage distribution of clinical presentation of invasive meningococcal disease cases, all countries, 2008 (n=2 542)



Contributing countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg Malta, Norway, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and the United Kingdom.

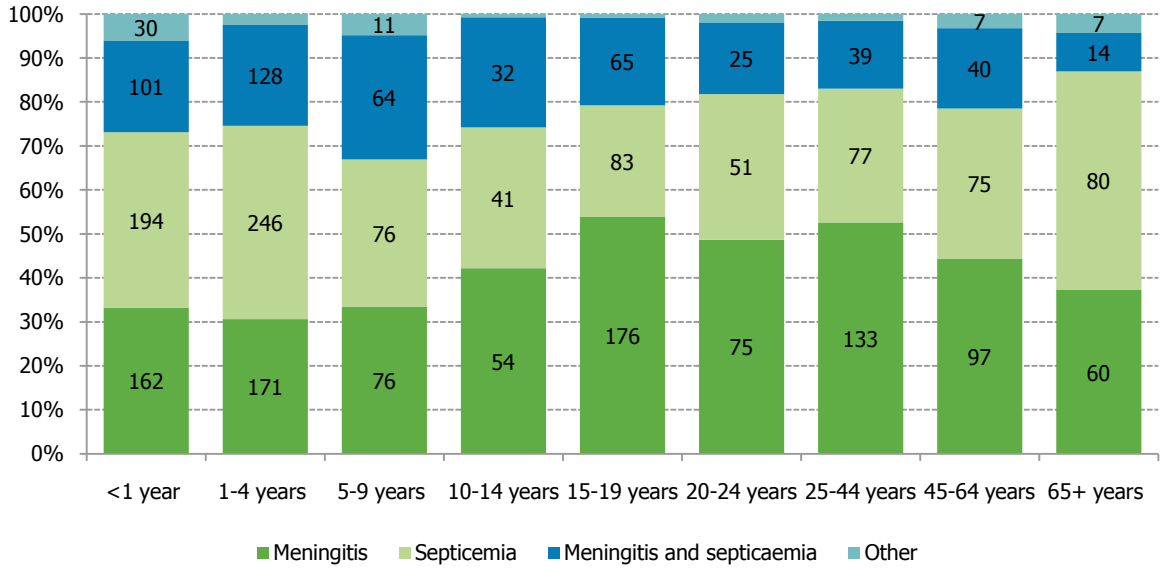
Figure 36 Percentage distribution of clinical presentation of invasive meningococcal disease cases, all countries, 2009 (n=2 440)



Contributing countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg Malta, Norway, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and the United Kingdom.

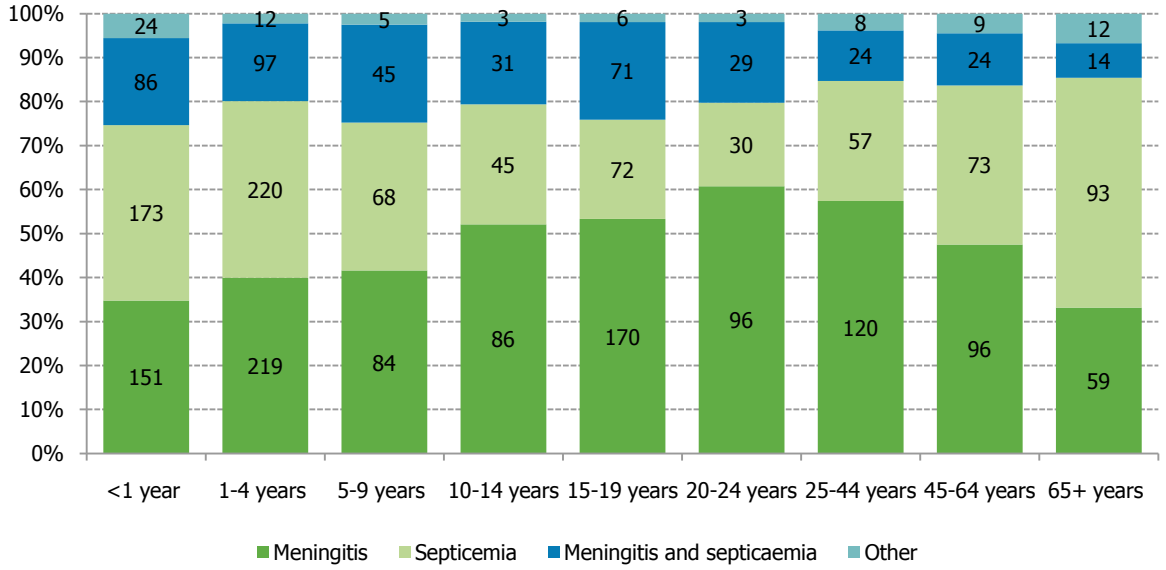
The association between clinical presentation and age is shown in Figures 37 and 38. Variations were observed across age and clinical presentation. Meningitis was reported mainly (30%) in adolescents aged 15–19 yeas (27.7% in 2008) and young adults aged 25–44 years (31.5 in 2008); while the proportion of septicaemia occurred in infants younger than 1 year old (20.2% in 2008) and in persons over 65 years of age (24.5% in 2008).

Figure 37 Clinical presentation of confirmed invasive meningococcal disease cases by age group, in EU/EEA countries, 2008 (n=2 514)



Contributing countries: Austria, Belgium, Denmark, Estonia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Slovakia, Spain and the United Kingdom.

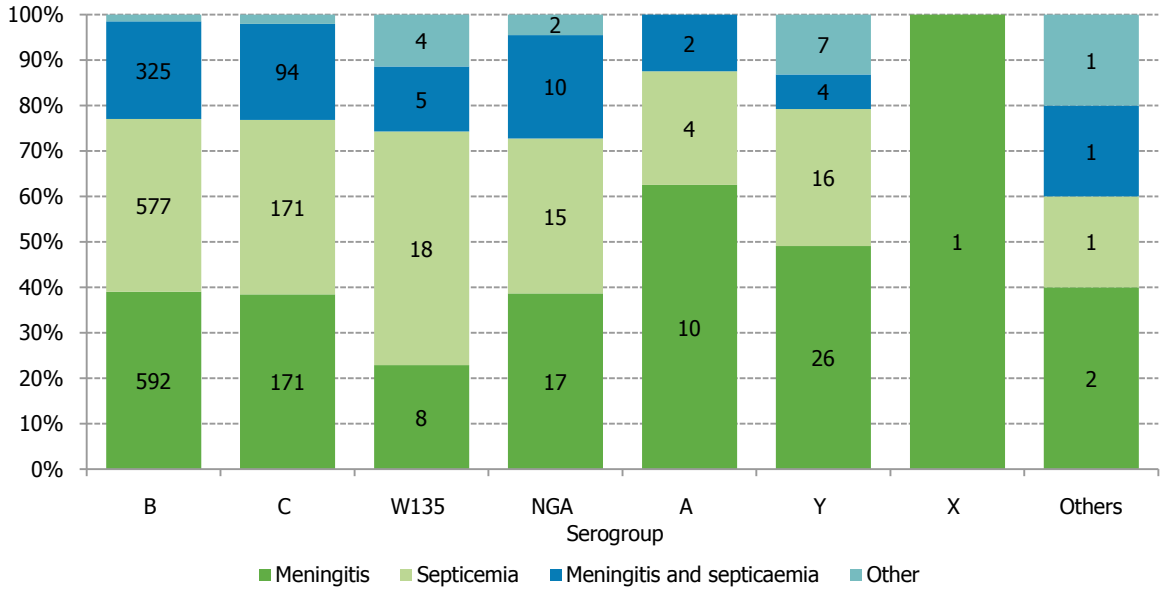
Figure 38 Clinical presentation of confirmed invasive meningococcal disease cases by age group, in EU/EEA countries, 2009 (n=2 415)



Contributing countries: Austria, Belgium, Denmark, Estonia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Romania, Slovakia, Spain and the United Kingdom.

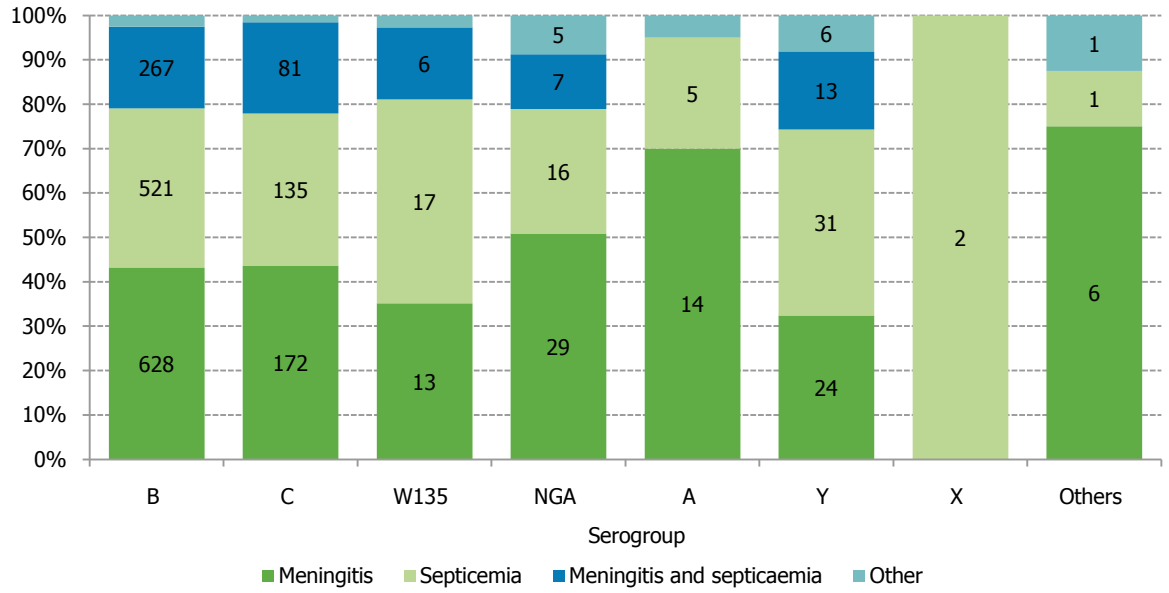
Figures 39 and 40 show the association between clinical presentation and serogroup considering cases with known serogroup and known age group. Among serogroup B and C, meningitis and septicaemia were reported in about equal proportions (B: 17.6%; C: 17.1% in 2008 and B: 19.9%; C: 16.5% in 2009). Meningitis was the most common clinical form of serogrop A (2008 and 2009) and Y (2008), however, the total number of reported cases for these serogroups was considerably low.

Figure 39 Clinical presentation of confirmed invasive meningococcal disease cases by serogroup, all countries, 2008 (n=4 344)



Contributing countries: Austria, Belgium, Denmark, Estonia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Netherlands, Poland, Portugal, Romania, Slovakia, Spain and the United Kingdom.

Figure 40 Clinical presentation of confirmed invasive meningococcal disease cases by serogroup, all countries, 2009 (n=4 105)



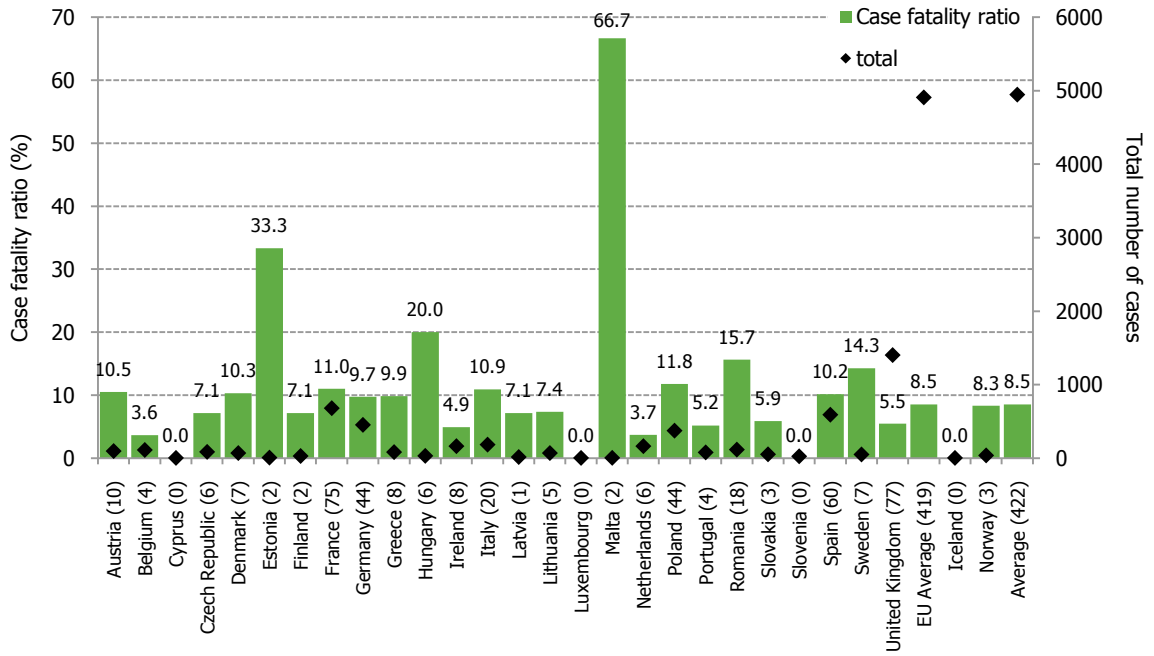
Contributing countries: Austria, Belgium, Denmark, Estonia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Netherlands, Poland, Portugal, Romania, Slovakia, Spain and the United Kingdom.

4.3.10 Case fatality ratio

Case fatality ratio (CFR) for the total number of cases reported in 2008 and 2009 is shown in Figures 41 and 42. Data completeness was quite high: outcome was available in average for 92% of reported cases for both years. No death were reported from four countries in 2008 (Cyprus, Iceland, Luxembourg and Slovenia) and five countries in 2009 (Cyprus, Latvia, Luxembourg, Slovenia and Iceland). Outcome data were lacking from two countries (Bulgaria and Liechtenstein), therefore they were excluded from calculations.

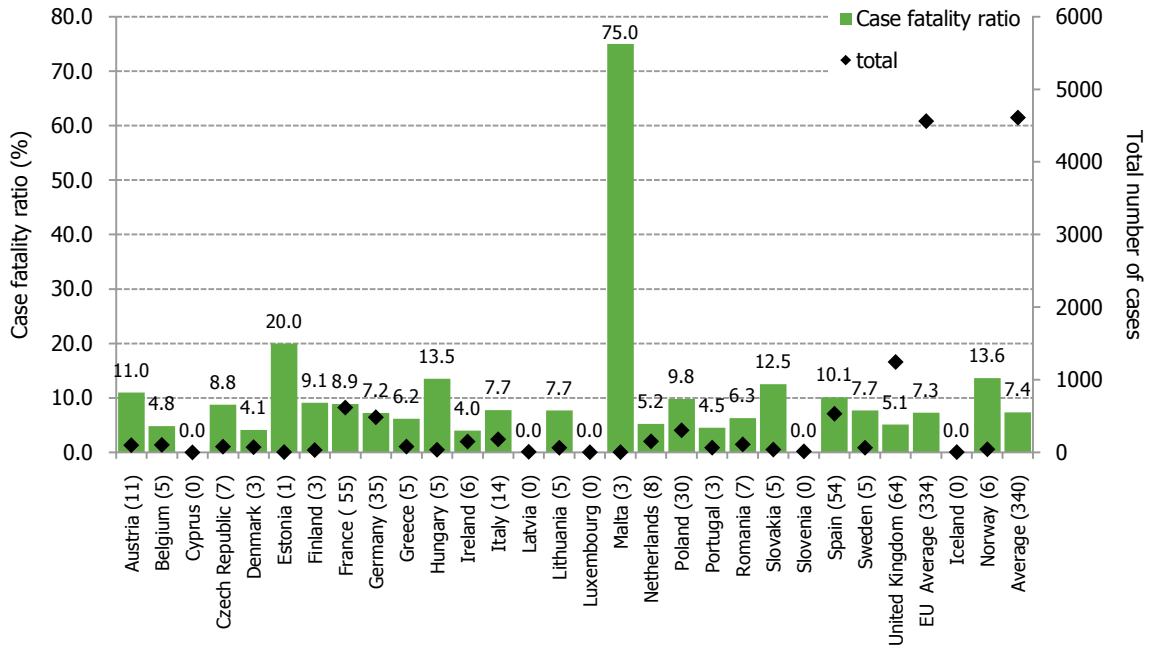
When interpreting the data, it must be taken into account that a limited number of cases in smaller countries resulted in a large difference in case fatality ratio. The overall CFR among the European countries was 8.5% in 2008 and 7.3% in 2009, almost the same range of values as in the previous years (7.7 in 2006% and 8.1 in 2007%). However, the highest CFR was found in Malta (66.6% in 2008 and 75% in 2009), Estonia (33.3% in 2008 and 20% in 2009), followed by Hungary (20% in 2008 and 13.5 in 2009). The lowest CF in 2008 was reported in Belgium (3.6%), Netherlands (3.7%) and Ireland (4.9%), and in 2009 in Ireland (4% in 2009), Denmark (4.1% in 2009) and Portugal (4.5% in 2009).

Figure 41 Case fatality ratio and total number of invasive meningococcal disease cases, by country, 2008 (n=4 948)



Note: Number of deaths in brackets.

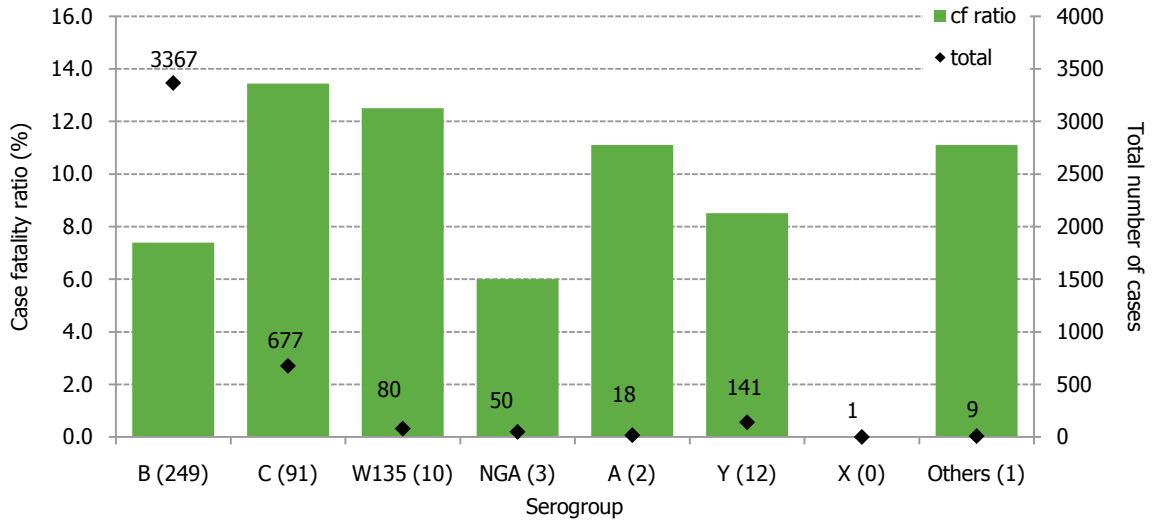
Figure 42 Case fatality ratio and total number of invasive meningococcal disease cases, by country, 2009 (n=4 612)



Note: Number of deaths in brackets.

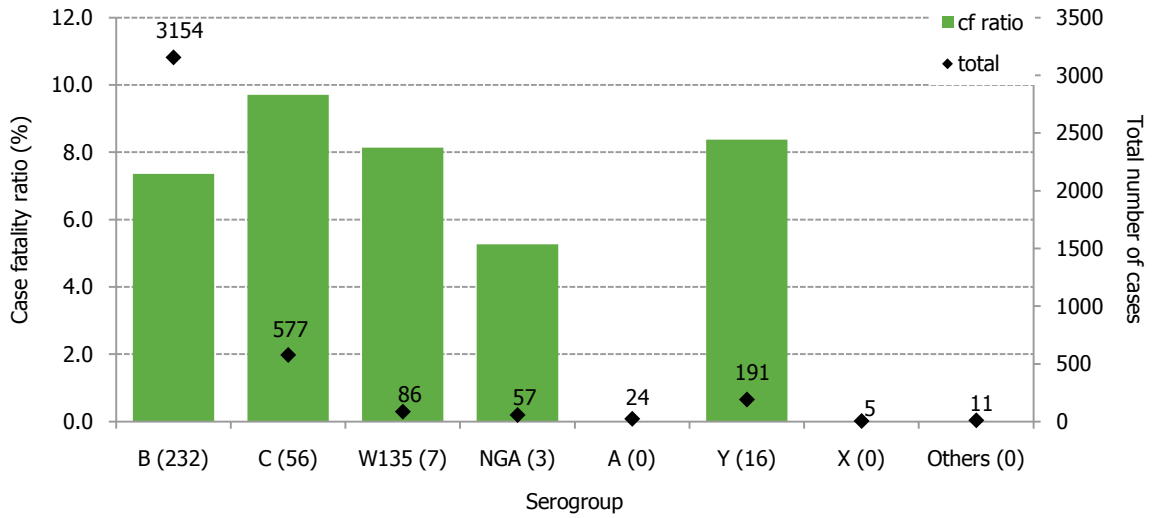
Figures 43 and 44 show the CFR by serogroup in 2008 and 2009. While the highest number of deaths was reported among serogroup B (n=249), the case fatality ratio was higher for cases due to serogroup C (13.4% in 2008; 9.7% in 2009) and due to W135 (12.5% in 2008; 8.1% in 2009) than that of serogroup B (CFR= 7.4%). CFR associated with serogroup Y was 8.9 in 2008 and 8.3 in 2009. When interpreting this graph it must be taken into account that the small number of cases resulted in high CFR (A: n=18 in 2008; others: n=9 in 2008). See also Tables B26 and B27 in Annex 3.

Figure 43 Serogroup-specific case fatality ratio of confirmed invasive meningococcal disease cases in EU/EEA countries, 2008 (n=4 343)



Contributing countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.
Note: Number of deaths in brackets

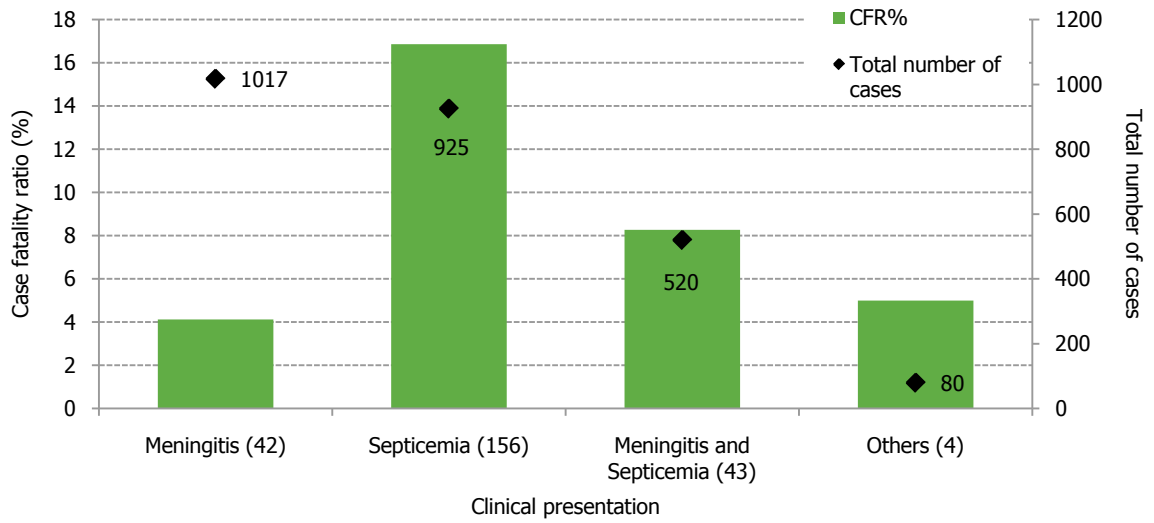
Figure 44 Serogroup-specific case fatality ratio of confirmed invasive meningococcal disease cases in EU/EEA countries, 2009 (n=4 105)



Contributing countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Norway, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.
Note: Number of deaths in brackets.

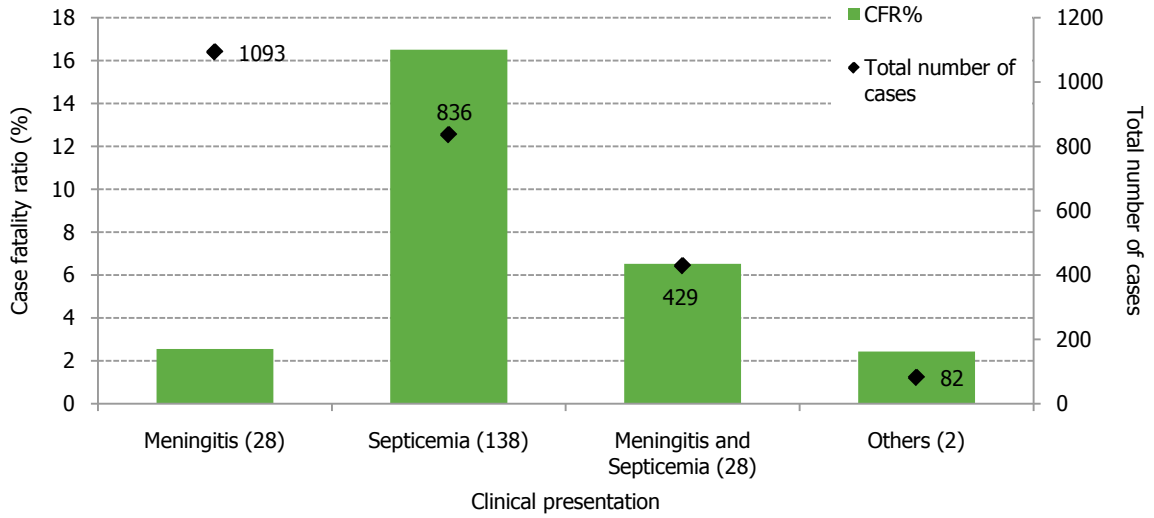
Figures 45 and 46 show the percentage distribution of CFR by clinical presentation in 2008 and 2009. The highest CFR was found among cases reported as septicaemia (16.9% in 2008 and 16.5% in 2009). Those who presented with meningitis and septicaemia (8.3% in 2008 and 6.5% in 2009) and meningitis (4.1% in 2008 and 2.6% in 2009) had a lower CFR.

Figure 45 Case fatality ratio by clinical presentation of total number of invasive meningococcal disease cases in EU/EEA countries, 2008 (n=2 542)



Contributing countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.
Note: Number of deaths in brackets.

Figure 46 Case fatality ratio by clinical presentation of total number of invasive meningococcal disease cases in EU/EEA countries, 2009 (n=2 440)

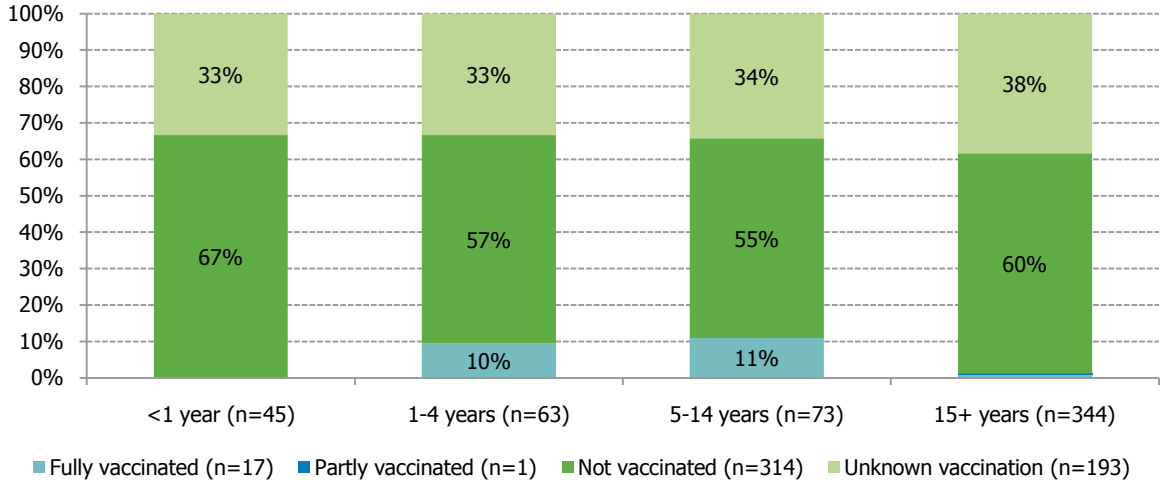


Contributing countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.
Note: Number of death in brackets.

4.3.11 Vaccination status

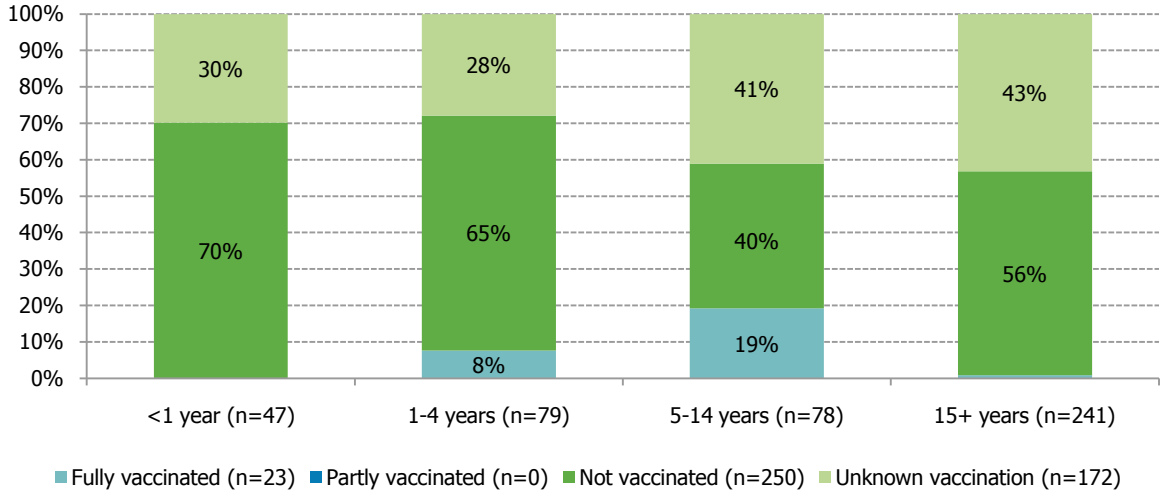
Data completeness on vaccination status (33.8% in 2008 and 36.1% in 2009) did not allow the analysis of vaccination failure, therefore only numbers and proportions of reported vaccinations status are presented. The total proportion of unvaccinated cases accounted for the overall highest proportion in all age groups (60%, n=314, in 2008; and 56%, n=250, in 2009) followed by those whose vaccination status was reported as unknown (37%, n=193, in 2008; and 39%, n=172, in 2009). Only a small proportion of notified cases were reported as fully vaccinated (3%, n=17, in 2008; and 5%, n=23, in 2009). See Tables B30 and B31 in Annex 3.

Figure 47 Vaccination status by age group among confirmed serogroup C invasive meningococcal disease cases, in EU/EEA countries, 2008 (n=525)



Contributing countries: Austria, Belgium, Czech Republic, Denmark, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain, Sweden and the United Kingdom.
Fully vaccinated = according to age and the recommended schedule in the reporting country.
Partly vaccinated = according to age and the recommended schedule in the reporting country.
Not vaccinated = not vaccinated at all.
Unknown = vaccination status unknown

Figure 48 Vaccination status by age group among confirmed serogroup C invasive meningococcal disease cases, in EU/EEA countries, 2009 (n=445)



Contributing countries: Austria, Belgium, Czech Republic, Denmark, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain, Sweden and the United Kingdom.
Fully vaccinated = according to age and the recommended schedule in the reporting country.
Partly vaccinated = according to age and the recommended schedule in the reporting country.
Not vaccinated = not vaccinated at all.
Unknown = vaccination status unknown

4.3.12 Vaccination schedules

Before the introduction of the new meningococcal C conjugate vaccine (MCC), the polysaccharide meningococcal vaccine was the only vaccine available against the disease caused by serogroup C.

Vaccination with polysaccharide products provides short-term protection and confers poor immunogenicity in children below 5 years of age. It is mainly offered as a vaccine for people travelling to high risk destinations.

Tetravalent conjugate vaccine against serogroup A, C, W135 and Y has recently been licensed in Europe and recommended for persons aged 11 years and up.

Three different single MCC vaccines are currently available, two of which are conjugated to diphtheria, and one to tetanus toxoid.

The first MCC vaccines were licensed and have been in used in Europe since 1999. The United Kingdom was the first country to introduce MCC vaccination followed by Ireland and Spain (both in 2000). By 2009, 12 European countries included MCC vaccine in their routine vaccination programme.

In some of the countries (UK, Iceland) the infant schedule was offered and in other countries (Belgium, Netherlands, Luxembourg, Germany) only a single dose was recommended in the second year of life and a catch up campaign targeted adolescents younger than 19 years of age (with the exception of Germany, where only catch-up was recommended on an individual basis only).

The vaccination schedules and details of catch-up campaigns are summarised in Tables B32 and B33 in Annex 3.

5 Discussion

5.1 Case definitions

The EU case definition changed twice over the past few years. For defining a case, the majority of the countries applied the 2008 version of the EU case definition, however, 2002 version and other case definition were also applied, and few countries did not define the case definition used.

5.2 Data sources

The general overview of national surveillance systems reveals a heterogeneous situation for both diseases. Of the 29 countries reporting, most data came from surveillance systems working on the general population, but there are differences in terms of age groups under surveillance, sensitivity of the systems, laboratory methods used for case confirmation, completeness information on clinical symptoms and outcome and consistency of information on vaccination status collected. In the majority of the countries, the epidemiological and laboratory data are merged at country level, however, there are some countries where this is not possible and the epidemiological data and laboratory data are submitted to ECDC from two different sources. These differences in surveillance systems in the MS complicate comparative analyses. In addition, changes in the systems over time and improvement in case ascertainment further complicated the comparability of trend data, even within countries.

ECDC did not have a full overview of the surveillance systems in place. Therefore, the inclusion criteria for different analyses followed what was stated in the EU-IBIS report from 2006 and were consistent with the reported data from 2008-2009. However, only countries with consistent reporting over the years have been included for trend analyses.

Based upon the information above, inferences on the difference observed between MS have to be made with caution. It is expected that the data comparability will gradually improve in the coming years as MS move more towards a common EU surveillance system.

5.3 Laboratory test methods

One of the objectives of the IBD surveillance is to monitor circulating strains in order to detect any modification in phenotype and genotype characteristics of the more commonly observed strains. The surveillance can also serve to monitor the circulation of emerging strains and any serotype replacement due to the selective pressure of vaccines. Therefore, a high completeness of laboratory data is desirable for accurate epidemiological analyses.

Laboratory capacities have improved over the years and the number of countries that are able to perform molecular typing methods of *N. meningitidis,* in particular, is increasing. However, only few of them provided this information. Culture was the most frequently reported laboratory method for both diseases; and the information on nucleic acid detection and the genotyping approaches have increasingly been reported, especially in Ireland, the United Kingdom and Greece. This is quite encouraging; nevertheless the routine use for strain characterisation appears to be limited in the majority of MS. On the other hand, the feedback received by many MS during the validation period of the data call indicated that the descriptions of the variables related to the test method used, and its link to a particular specimen, provided a certain level of confusion and may have been interpreted differently in different MS. Therefore, even if information on further test methods performed would have been available in MS, only information on the test methods used on the first specimen taken for case confirmation was reported.

The description about the variables related to the specimen collected and the test method used would benefit further simplifications and standardisation before the next data call in order to obtain valid and utilisable data.

5.4 Completeness of surveillance data

The completeness of reporting varied greatly between variables and across countries.

The data completeness improved consistently comparing with 2007, in which a total of 12 variables were reported as 100% unknown by 2–14 countries. In 2008 and 2009, no variable was reported 100% unknown.

This was the first data call using the new metadata set. Several lessons were learned and further revision of the metadata set will be carried out prior to the next data call. This may include a removal or change of certain variables, changes/additions in codes of the variables, and development of further automatic validation rules when uploading the data.

With regard to invasive meningococcal disease cases, information on basic laboratory variables were reported in almost all MS (26 countries), however, further information on advanced laboratory methods for the diagnosis of *N. meningitid*s was reported between 10–25% by a limited number of countries (8–15countries).

5.5 Epidemiology of invasive *H. influenzae* disease

5.5.1 Overall notification rates

H. influenzae type b has been a major cause of morbidity and mortality prior to the introduction of conjugate vaccines [3]. However, since their inclusion in routine childhood vaccination programmes, invasive *H. influenzae* type b disease has been practically eliminated in some parts of the developing world [4]. In EU/EEA countries the disease became rare, an overall notification rate of 0.41 per 100 000 population in 2008 and 0.32 in 2009 was observed. Comparisons of absolute number and rates between and within countries should be done with caution as specific characteristics of the national surveillance systems and its level of sensitivity may vary. Caution must also be taken while analysing trends as various changes in the surveillance methods occurred during the years: availability of new laboratory methodologies, comprehensiveness of the system, expansion of age groups and serotypes and syndromes under surveillance. In addition to being a rare disease, small changes in numbers may cause large differences in notification rates in smaller countries.

Increasing rates were observed in some countries but this trend has slowed down recently. As previously suggested in 2007 data report, these findings are possibly due to the improved sensitivity of the surveillance system more than a true increase in the incidence rates. However, there are exceptions, e.g. in Germany the increase was limited to the older age groups and is not likely explainable by changes in the surveillance system.

In the past few years, an improved case ascertainment in those countries may also have contributed as well as the implementation of enhanced surveillance systems including all serotypes, clinical presentations and age groups. In addition, a delay of several years until a new notifiable disease reaches a level of acceptable sensitivity have been reported in the literature in one of those countries (Sweden) and is probably attributed to the level of awareness among physicians and laboratories [5]. A number of additional factors could explain the changes in serotype distribution observed, such as a true increase in the non-capsulated strains, an increased completeness of serotype reporting due to an increased proportion of serotyping in the laboratories, and enhanced laboratory methods.

5.5.2 Age distribution

The mean and the median age of cases affected by invasive *H. influenzae* disease are comparable in the observed years: mean=54.3±28.9 years and median=63 years in 2008, and mean=52.5±30.1 years and median=62 years in 2009. The findings are also in line with the previous year. In terms of absolute numbers, the age group of ≥ 65 years is the most affected group, while the highest notification rates were reported among infants < 1 year of age.

5.5 3 Serotypes

Non-capsulated strains were the most frequently reported serotype during the period 1999–2009, and with an increasing trend. Among non-b serotypes f was the one most commonly isolated. There have been some concerns regarding the replacement of *H. influenzae* serotype in populations where the conjugated *H. influenzae* type b vaccines have been introduced, but so far there do not appear to be indications of any increase among the capsulated non-b strains in the EU. However, is not possible to infer that the trend is increasing, as was reported in Canada [6]. There are too many influencing factors that may bias the data and, as such, do not allow any inference to be made with confidence. One such factor is the low completeness of reported serotypes; another is the small sample of countries with stable surveillance systems and consistent reporting.

The issue of serotype replacement was discussed in a position paper by the WHO concluding 'so far, bacterial strain replacement has not been a prominent feature of large-scale *H. influenzae* type b immunisation' [4]. Ladhani et al. suggested that the introduction of the *H. influenzae* type b conjugate vaccine has led to a higher proportion of *H influenzae* cases attributable to non-b strains because of the reduction in *H. influenzae* type b disease and that unlike the pneumococcal conjugate vaccination programme, there is no consistent or robust evidence to suggest that mass *H. influenzae* type b vaccination in infancy has led to serotype replacement in either carriage or disease [7]. However, the continued increasing trend observed is an important observation, and needs to be followed up.

Serotype b is continuing to decrease; notification rates were below 0.1 per 100 000 population. In particular, the decreasing trend is beneficial to the children below 5 years old. It is important to continue monitoring the trend and evaluate the effectiveness of the vaccination on a long-term perspective, in particular comparing it with the vaccination coverage and the strategy adopted.

5.5.4 Clinical presentation

Clinical presentation is associated with different serotypes and strongly related to age. Sixty per cent of the reported cases lack information on clinical presentation. Septicaemia accounted for the largest proportion of the reported cases (54.0% in 2008–2009), with the majority occurring in the oldest age group (65+). It is well known that it is often the most severe cases of the disease that are reported, with many countries reporting only meningitis or meningitis/septicaemia, mainly based on hospital data.

5.5.5 Case fatality ratio

Outcome was reported in 63% of the invasive *H. influenzae* cases, and the calculations of case fatality ratio are most likely an underestimate of the actual CFR in the EU, due to the inclusion of cases with unknown outcome in the denominator. Based upon the available data, the overall CFR in 2008–2009 was 6.15% (204 deaths) and highest among cases with the non-capsulated strains in the oldest age group (12.8%). In total, during this period, 14 deaths were reported among serotype b, with three deaths among children younger than five years of age – one was reported as partly vaccinated and the other two were not vaccinated.

5.5.6 Vaccination status

Based on the variables currently collected, it is not possible to analyse the vaccination data and determine the vaccine failures, as additional variables such as birth date, number and dates of doses are necessary. In addition, data completeness of the values included in the current vaccination status variable is low (below 10% overall).

Further discussion is needed among the experts to improve the data completeness and to facilitate this analysis. In any population with high vaccination coverage, the majority of observed cases are expected to be vaccinated, as happened in 2008. However, in 2009, the proportion of cases in vaccinated patients was lower compared to non-vaccinated population.

In addition, the United Kingdom accounted for 47.8% of cases in children < 15 years old for which the vaccine information was reported. This is probably due to an increased awareness following the vaccines failure observed in England and Wales in 1999–2003. The data, therefore, are more likely to depict a picture of that country than of the EU [8].

5.5.7 Vaccination schedule

In 2010, the *H. influenzae* b vaccine was included in national immunisation programmes by Romania and Bulgaria, hence all EU countries are currently vaccinating against *H. influenzae* b disease. In addition, Romania implemented a *H. influenzae* surveillance system in 2010; however the reported incidence was low. In other countries, such as Sweden, a delay of several years was described until a new notifiable disease reaches a level of acceptable sensitivity [5]. Bulgaria reported aggregated data with a limited set of variables, not including information on serotypes.

The vaccination schedules continue to vary across the countries; both in number of doses and age of administration (see Table A29 in Annex 2 for *H. influenzae* serotype b vaccination schedules).

5.6 Epidemiology of invasive meningococcal disease

5.6.1 Overall notification rates

The incidence of invasive meningococcal disease varies in Europe and the reported data show that this variation is about 10-fold among the Member States. This variation might reflect real differences but might also be due to various changes in the surveillance methods that occurred over time, changes in case definitions, in population data sources, in the set of variables collected and in validation rules applied. Caution must be taken in analysing trends as disease surveillance varies across the Member States as well. For in-depth explanations of these variations, a better understanding of the data sources and a better knowledge of the healthcare practices (blood culture sampling) available at the Member States level would be required [9, 10].

In 2008 and 2009, 9 615 cases of invasive meningococcal disease were reported by 29 countries with an overall notification rate of 0.99 per 100 000 population in 2008 and 0.92 in 2009, which indicates an important decline compared to the rates reported 9–10 years before. Since that time several countries have introduced MCC vaccination in their national immunisation programmes, so even people who are not vaccinated are also protected [11, 12].

The disease remains rare in Europe with most countries reporting a notification rate below 1 per 100 000 population. A notification rate of less than 0.5 per 100 000 was registered in five countries in 2009. However, Ireland and the United Kingdom still experience a relatively high rate (3.2 and 2.02 in 2009, respectively) [13].

5.6.2 Age distribution

As in previous years, the highest incidence of meningococcal infections was still that among children younger than 5 years old and adolescents aged between 15–19 years. The rates in children 5–9 years old and in the older age groups remained relatively unchanged compared with the previous years.

A high number of cases was still observed in age groups targeted by vaccination programmes. These cases need to be further investigated, especially those due to serogroup C observed in countries with MCC vaccination. They should be followed up more closely to identify any cases due to waning immunity [14].

It is important to maintain and continue high-quality disease surveillance, both at national and at EU level, complemented by seroprevalence studies of serogroup C in order to identify groups that may be susceptible to infection [12].

5.6.3 Serogroups

Serogroup data were provided in average in 87.7% of total cases. As in the previous years, the most frequent serogroup causing invasive meningococcal disease in the EU in 2008 and 2009 was serogroup B (n=3 154 in 2009), especially prevalent in those under 5 years old and in teenagers. The number of cases of meningococcal C (n=577 in 2009) disease is currently low. The reported data accurately show that in countries with MCC vaccination the notification rates due to serogroup C remained considerably lower than in countries where vaccination against serogroup C is not included or the coverage is still very low. Regarding percentage distribution of serogroups, the data show that the proportion of serogroup C cases increased with age and, compared to previous year's data, a shift from adolescents to an older, unvaccinated, young adults age group is noticeable.

Serogroup A disease remains low in Europe, and serogroups W135 and Y are not currently a major cause of disease in the continent. The highest proportion of W135 and Y cases was reported in the oldest age group, 65 years old and above [14, 15].

The incidence of meningococcal disease due to all serogroups decreased. Over the years a gradual decrease has been observed, especially in serogroup B and C, in each age group. In countries with MCC, the decrease in serogroup C disease has been greater than in serogroup B. A particular focus should be given to serogroup Y disease to monitor over time the observed increasing trend.

5.6.4 Molecular typing data

A limited number of countries have the facilities for the typing of strains from all invasive cases. Seven countries in 2008 and nine countries in 2009 reported data on multilocus sequence typing (MLST).

In this report due to low data availability it was not possible to analyse these results in depth. Therefore, only the percentage distribution tables are shown. Multilocus sequence typing showed that the bacterial population was highly diverse, comprising 26 different clonal complexes: 256 (26.1%) isolates belonged to CC ST-41 complex, 207 (21.1%) to CC ST-11 complex 160 (16.3%) to CC ST-32 complex.

Particular clonal complexes were found to be preferentially associated with certain serogroups: ST-41/44 complex/Lineage3 with B and C serogroups; ST-32 complex/ET-5 complex with mainly C but also B serogroup; and ST-23 comlex/cluster A3 with Y serogroup [9, 13, 16].

According to the available data, the meningococcal FetA, an iron-regulated outer membrane protein, was shown to be highly diverse: 61 variants were reported in 2008 and 2009 from 1 008 *N. meningitidis* isolates. Variants F1-5, F3-3 and F5-1 were the most commonly represented [17].

The PorA outer membrane protein is a key immunogenic component of several meningococcal vaccines under development, and the subtypes defined by variation in the PorA provide comprehensive epidemiologic information [18].

5.6.5 Clinical presentation

Information on clinical presentation was available in 50.7% of total number of reported cases. Overall, meningococcal meningitis was the most commonly recognised presentation (40.0% in 2008 and 44.8% in 2009). Septicaemia was the most common reported presentation in children younger than five years of age and in the oldest age group, while meningitis was most frequently reported in adolescents in 2008, with a peak in those aged 15–19 years (53.2%), and in young adults in 2009, with a peak in those aged 20–24 years (60.7%).

Meningitis and septicaemia were reported in roughly equal proportions among serogroups B and C: B 39.0% and C 38.4% in meningitis 2008, and B 38.8% and C 38.4% in septicaemia in 2008). It is clear that these data need to be interpreted with caution as in some countries meningitis is mainly or only reported, while the proportion of septicaemia notified is heavily influenced by the health practices in MS and is likely to be underreported. Better

data completeness and understanding of the different practices applied in different Member States is required in order to interpret the results.

The case fatality ratio is an important measure of the effectiveness of treatment and the virulence of *Neisseria meningitidis*. Meningococcal septicaemia and meningitis are common causes of death in children and adults. Disease due to serogroup C (CFR: 13.4 in 2008 and 9.7 in 2009) appears to cause death more frequently than that due to other serogroups.

Outcome was reported in 91.7% of the cases for both years, with 26 out of 28 countries providing data on outcome in 2008 and 28 out of 28 countries providing data in 2009. Due to the inclusion of cases with unknown outcome, CFR might be underestimated especially in countries with a high percentage of unknown outcomes or late report of outcome. The overall case fatality ratio was 8.1% and ranged between 3.6% and 75.0%. The highest CFR in countries with low notification rates may indicate a bias in their data towards reporting the most severe cases. Similarly, the low CFR in countries with high notification rates may indicate that their system has a higher sensitivity. In addition, in small countries the low number of cases seemed to be associated with a high CF, possibly due to small number of cases or underreporting of less severe cases (Malta: 66.7% in 2008 and 75.0% in 2009).

5.6.6 Vaccination status and vaccination schedule

The prevention of meningococcal disease depends greatly on effective vaccination on a large scale. Although polysaccharide vaccines have been available for serogroup A, C, Y and W135 for many years in several European countries, serogroup C polysaccharide–protein conjugate vaccines have been licensed 10 years ago. Newly licensed quadrivalent meningococcal conjugate vaccine for routine use among adolescents has been available in Europe since spring 2010. The United Kingdom was the first country to introduce MCC vaccination in 1999. Subsequently, Ireland, Belgium, Iceland, Portugal and Germany incorporated the vaccine into the routine vaccination schedule, offering two alternatives: the infant schedule (two doses in the first year of life followed by a third dose in the second year) or a single dose of vaccine in the second year of life. An essential element of the success of the vaccine introduction was the catch-up campaign that aimed at immunising adolescents younger than 19 years. Three further countries (Greece, Luxembourg and Cyprus) included the vaccine into the national vaccination programme. In Italy, the vaccination is recommended in many regions, but with different time of introduction for specific groups.

In addition, there are six countries (Austria, the Czech Republic, Hungary, Norway, Poland and Sweden) where the vaccine is available, used for outbreak control, and generally recommended to contacts of the disease cases, to travellers or to patients with underlying conditions.

Although recent vaccines have improved coverage for the targeted age group, there is still no vaccine available against invasive meningococcal disease group B, now the predominant serogroup responsible for the disease in Europe.

However several conjugate vaccines B are now in phase III trials with promising results and it is likely that some of them will be available in the near future [19].

Unfortunately, it was not possible in this report to analyse in depth primary or secondary vaccine failures or to make inferences on the proportion of cases among vaccinated individuals in countries with and without vaccination. This is because of the data completeness for vaccination status was very low, on average 8.9% of total number of cases for both years (2008 and 2009). In addition, an enhanced dataset on vaccination status (availability of type of vaccine, number of doses received, period interval between doses and date of the last dose) and data pertaining to multiple risk factors of vaccine failure was not collected [15].

6 Conclusions

- Meningococcal disease remains rare in Europe with almost twofold decrease of incidence compared to the 1999 rate (1.9 per 100 000).
- Infants and children experienced the highest number of invasive meningococcal disease (IMD) cases.
- Currently, serogroup B cause the majority of infections of IMD.
- In countries with MCC, the proportion of IMD cases due to serogroup C decreased.
- *Haemophilus influenzae* disease was predominantly found in infants younger than 1 year old and in the oldest age group (65 years old and over).
- *Haemophilus influenzae* non-capsulated and non-b notifications are increasing.
- *Haemophilus influenzae* b notifications are gradually decreasing.
- *Haemophilus influenzae* non-capsulated and non-b were the most frequently reported serotypes.
- The most affected age groups by *Haemophilus influenzae* serotype b were infants younger than 1 year old and children below 5 years of age.
- Surveillance systems for invasive bacterial diseases are very diverse across Europe.
- Although the European Union standard case definition (2008/426/EC) for invasive meningococcal disease and invasive *Haemophilus influenzae* disease are in place, the case definition used in 2008 and 2009 for identifying a case differed from country to country. However, the majority of the Member States applied 2008 EU case definition.
- Case-based data were available in almost all Member States, with information usually collected on the common set of variables (classification, age, sex, outcome). However, only a few countries routinely reported information on the vaccination status of cases.
- The data show an improving level of completeness comparing to previous years, although the low level of completeness on the enhanced set of variables considerably affected the validity of the data and, consequently, the results.
- In Europe, a consensus for molecular typing has been achieved [20].

7 Recommendations

- Further work on the surveillance data standardisation across Europe is needed.
- Strengthening surveillance activities and establishing a better standardisation of laboratory methods used are required.
- In order to provide reliable and comprehensive information on highly virulent strains, genotyping methods should be used more frequently in Europe.
- Representative case ascertainment strategies are necessary if data are to be exploited for trend analysis, geographic visualization, detection of outbreaks and prediction of vaccine coverage.
- To further develop the integration of laboratory data into surveillance data, close collaboration between networks of epidemiologists and microbiologists is needed.

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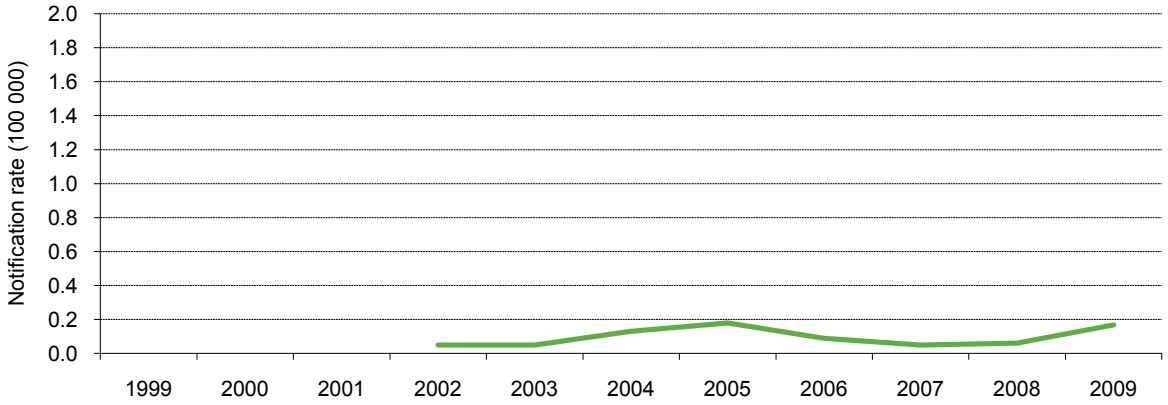
Annex 1: Country profiles – *H. influenzae* disease

Country profiles and overall notification rates of invasive *H. influenzae* disease and information of data sources by country, 1999–2009

1999–2006 notification rates where based on the 2006 EU-IBIS Report using national population data sources or TESSy historical data using Eurostat as population source; 2007–2009 notification rates were calculated using Eurostat as population source.

Austria



Data available: 2002–2009

Age coverage: All

Serotype: All

Clinical presentation: All

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: No

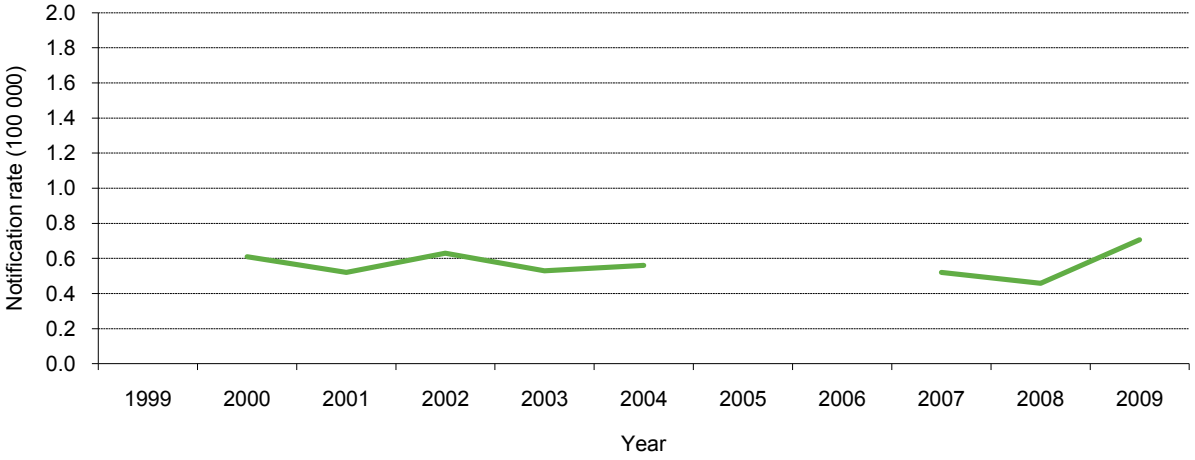
Compulsory

Comprehensive

Case-based

Hib vaccine introduced: 1994

Belgium



Data available: 2002–2009

Age coverage: All

Serotype: Not determined

Clinical presentation: All: 2000–2004; not determined: 2007–2009

Reporting 'outcome' in 2008–2009: No

Reporting 'vacc status' 2008–2009: No

Voluntary

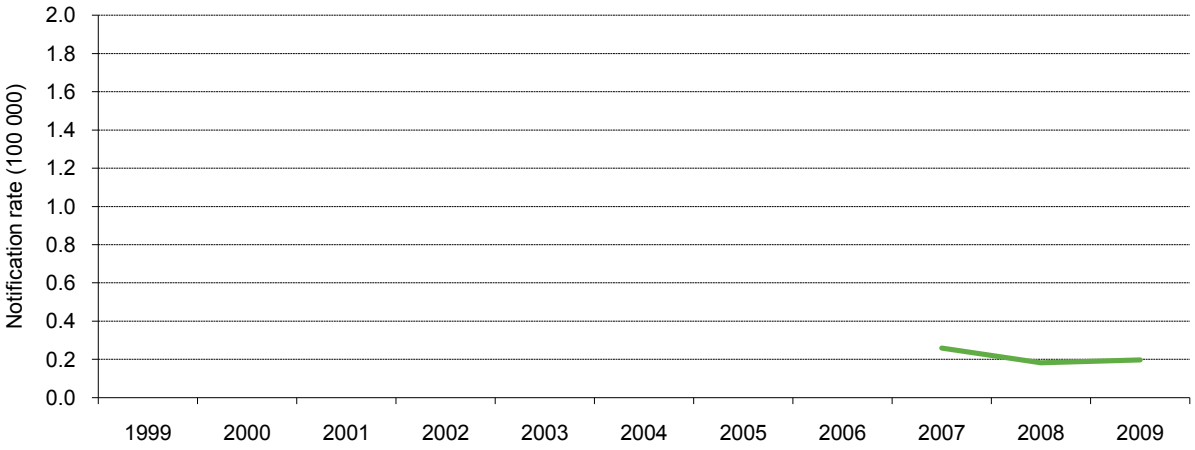
Sentinel

Case-based

Hib vaccine introduced: 1993

Comments: No reporting 2005-2006

Bulgaria



Data available: 2007–2009

Age coverage: All

Serotype: Not determined

Clinical presentation: Not determined

Reporting 'outcome' in 2008–2009: No

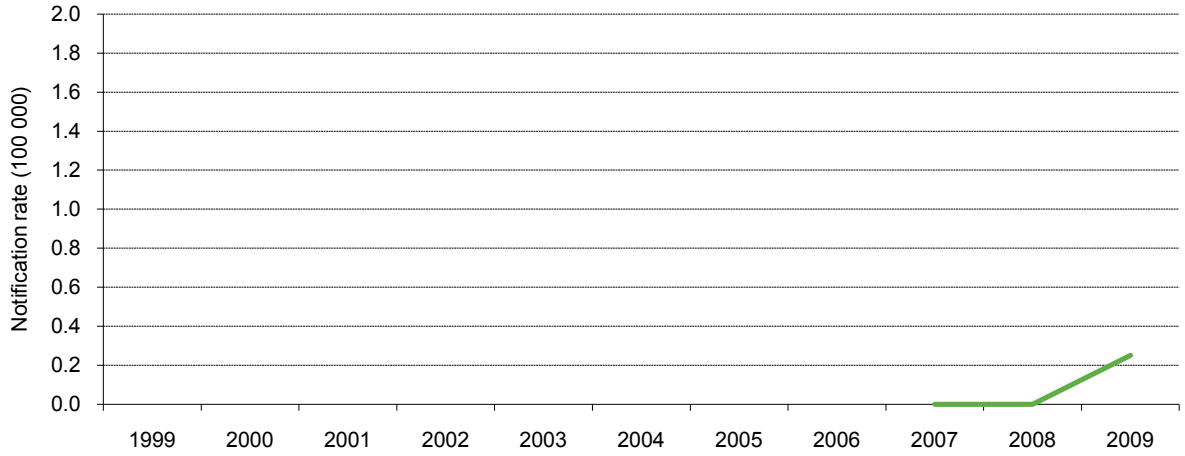
Reporting 'vacc status' 2008–2009: No

Aggregated

Hib vaccine introduced: No

Comments: Aggregated reporting in 2007–2009, which only enabled reporting a common set of variables. Information on gender available since 2008.

Cyprus



Data available: 2007–2009

Age coverage: All

Serotype: Unknown

Clinical presentation: Unknown

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Unknown

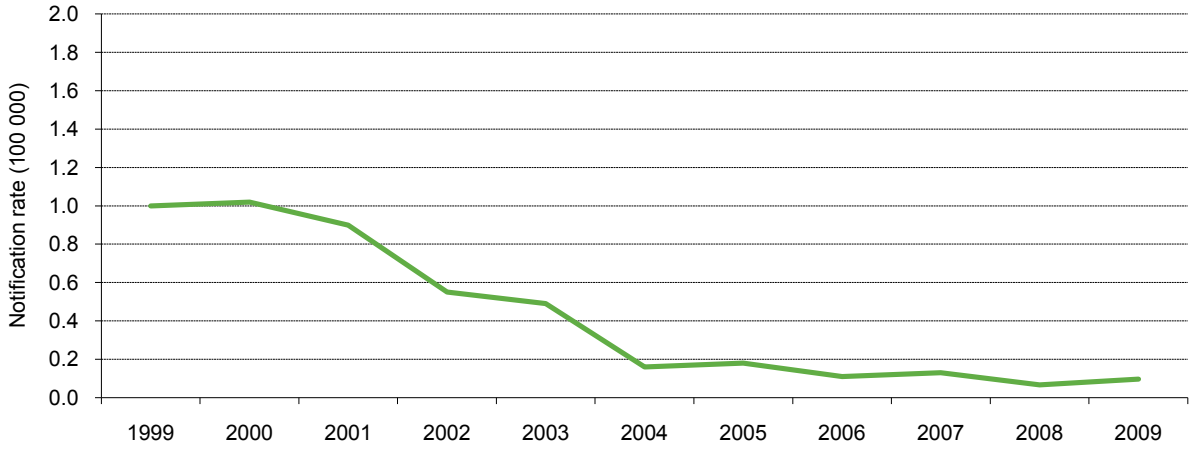
Compulsory

Comprehensive

Case-based

Hib vaccine introduced: 2001.

Czech Republic



Data available: 1999–2009

Age coverage: All

Serotype: b 1999–2004; all 2005–2009

Clinical presentation: All

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Yes

Compulsory

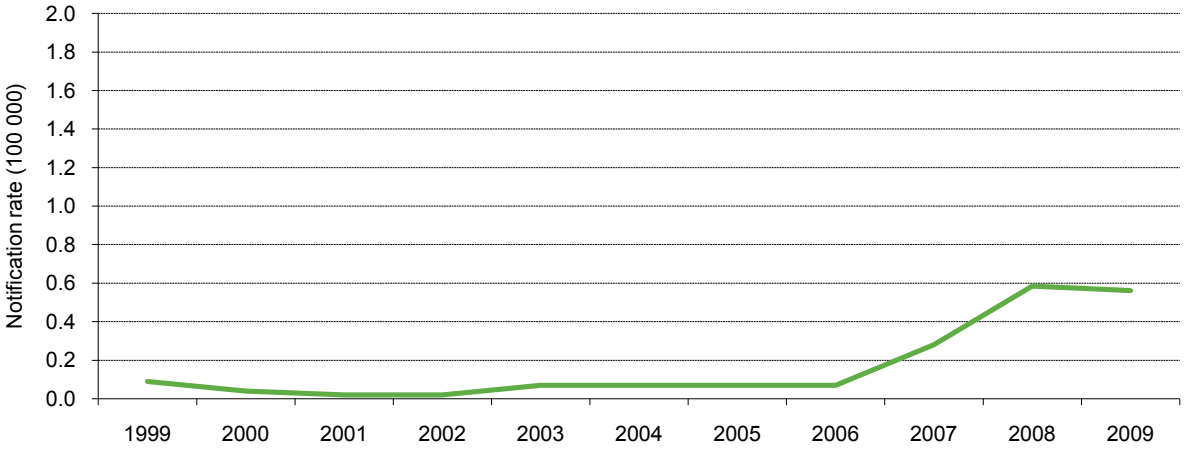
Comprehensive

Case-based

Hib vaccine introduced: 2001

Comments: Sharp decrease in notification rates over 2001–2004 attributed mainly to the introduction of the Hib vaccine in 2001. Since 2005, all strains are typed and reported, which may explain the stabilisation in the overall notification rates.

Denmark



Data available: 1999–2009

Age coverage: All

Serotype: All

Clinical presentation: Meningitis only 1999–2006, All 2007–2009

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Yes

Compulsory

Comprehensive

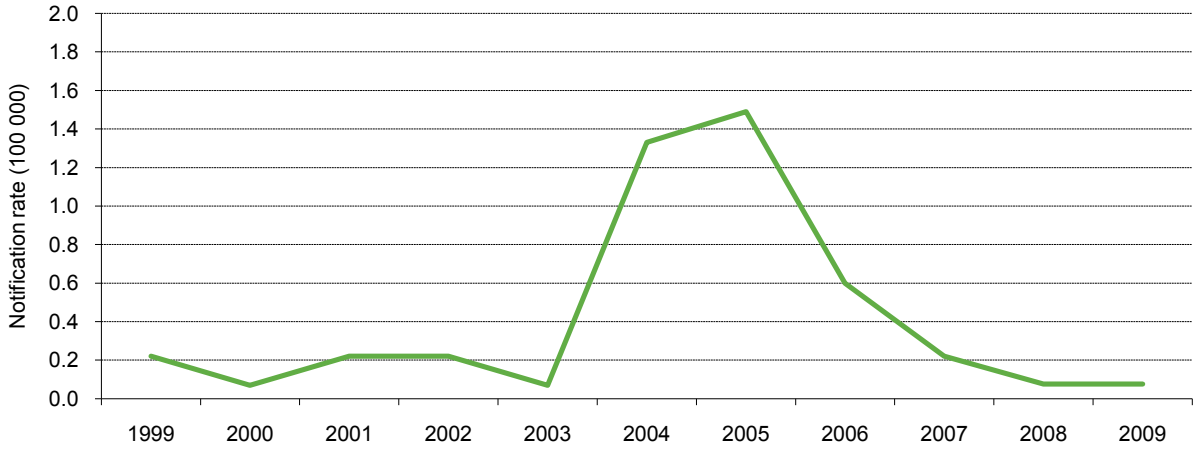
Case-based

Hib vaccine introduced: 1993

Comments: Increases in overall notification rates from 2006–2008 attributable to the inclusion of more clinical presentation, such as bacteraemia and septicaemia. During 2003–2006, four cases per year, all classified as meningitis, were reported. In 2007, two out of 15 cases were reported as meningitis, in 2008, six cases out of 32, and in 2009, five (three meningitis and two meningitis-sepsis) out of 31.

Reporting of invasive isolates of *H. influenzae* type b have been mandatory since October 2007, thus an expected increase in notification rates the following year. However, since non-type b and non-capsulated are not mandatory, the serotype distribution is also expected to be skewed (source: SSI/DK).

Estonia



Data available: 1999–2009

Age coverage: All

Serotype: b

Clinical presentation: Septicaemia: 1999–2003; All: 2004–2009

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Yes

Compulsory

Comprehensive

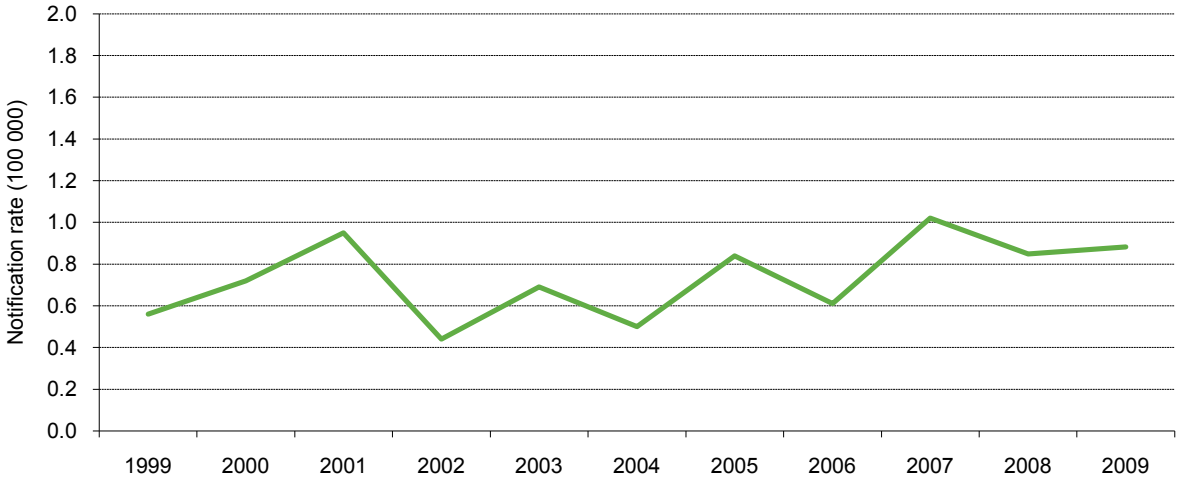
Case-based

Hib vaccine introduced: 2005

Comments: The increase is partially explained by improved case ascertainment and by inclusion of all clinical presentation. The decrease after 2005 is possibly explained by the Hib vaccine introduction the same year (source: NSCP/EE).

Rates 1999–2006 recalculated from EU-IBIS 2006 Report using total population as denominator (Eurostat).

Finland



Data available: 1999–2009

Age coverage: All

Serotype: All

Clinical presentation: All

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Yes

Compulsory

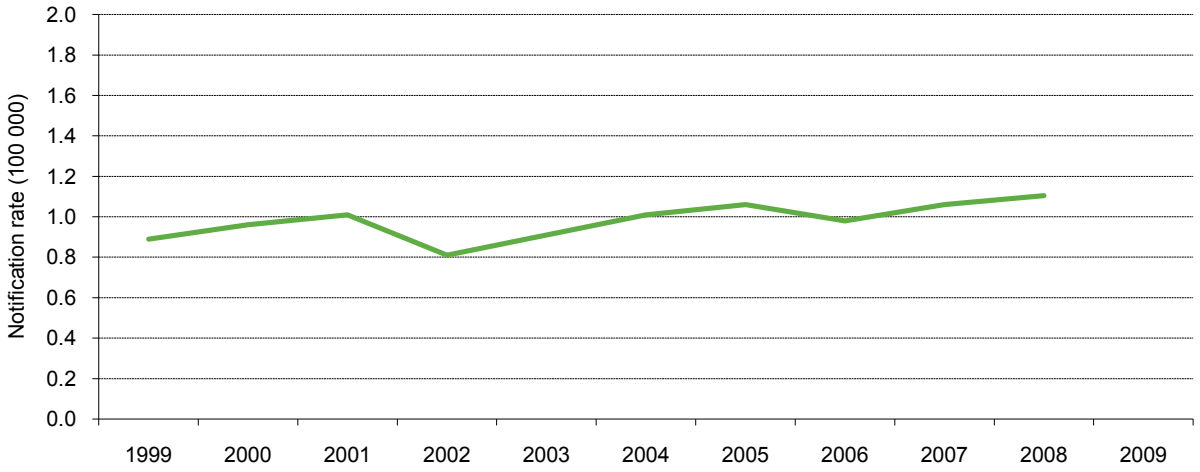
Comprehensive

Case-based

Hib vaccine introduced: 1986

Comments: Consistent reporting/stable surveillance system 1999–2009, with coverage of strains typed very high since 1995 (Source: THL/FI).

France



Data available: 1999–2008

Age coverage: All

Serotype: All: 1999–2006, not determined in 2007–2008

Clinical presentation: All: 1999–2006, not determined in 2007–2008

Reporting 'outcome' in 2008: No

Reporting 'vacc status' 2008: No

Voluntary

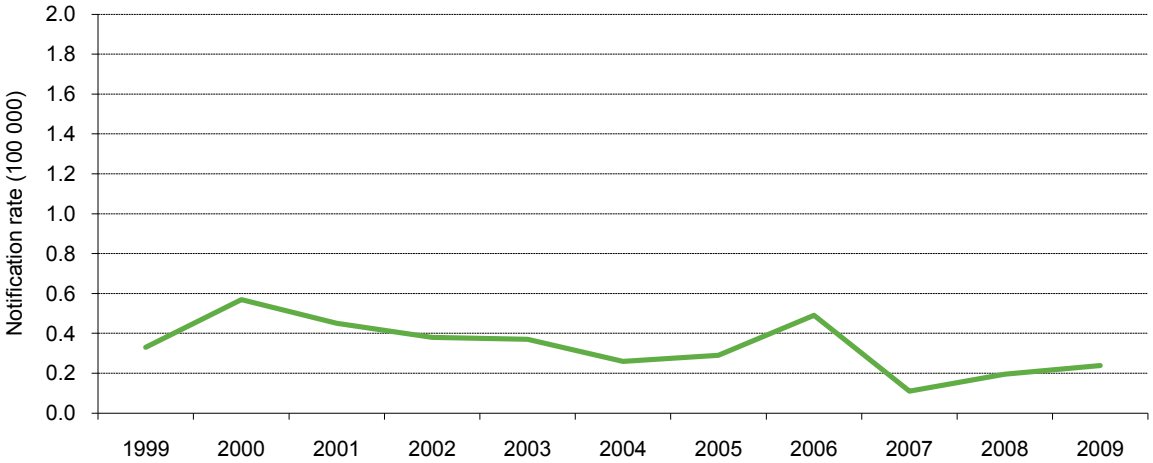
Sentinel

Case-based

Hib vaccine introduced: 1992

Comments: In 2007 aggregated data corrected for underreporting and undercoverage were reported. In 2008 case-based data were reported along with the correction factor for undernotification and undercoverage. No data available for 2009.

Germany



Data available: 1999–2009

Age coverage: < 15 years: 1999–2006; All: 2007–2009

Serotype: All

Clinical presentation: All

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: No

Compulsory

Comprehensive

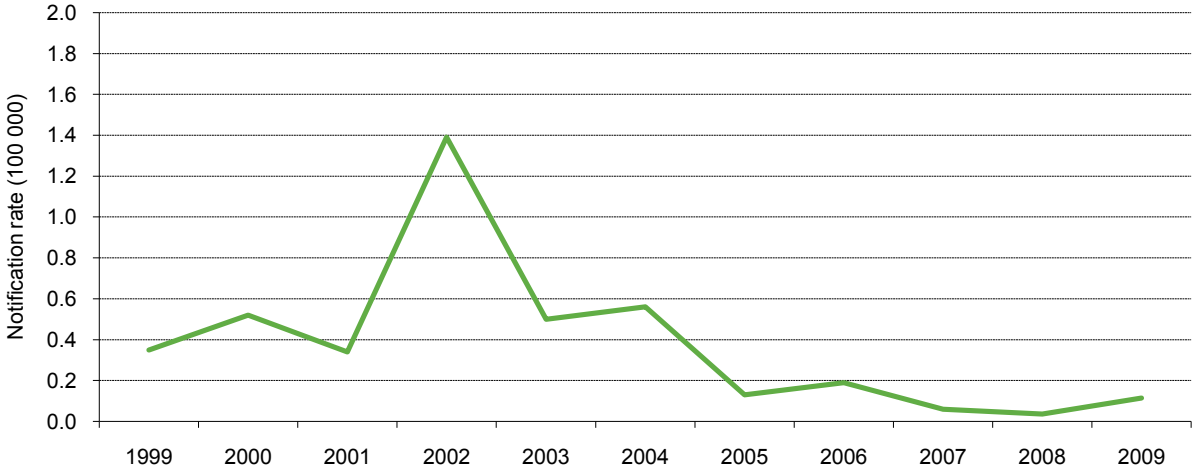
Case-based

Hib vaccine introduced: 1990

Comments: Notification rates 1999–2006 based upon < 15 years of age population data only (from EU-IBIS Report 2006). Since 2007 all age groups have been reported thus an increase of number of cases, but a decrease in the overall notification rate.

Between 1999–2006, active hospital- and lab-based surveillance in children < 16 years and between 2007–2009 (passive) statutory reporting of laboratories.

Greece



Data available: 1999–2009

Age coverage: < 15 years

Serotype: All (mainly b & non-b)

Clinical presentation: meningitis and meningitis/septicaemia only

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: No

Compulsory

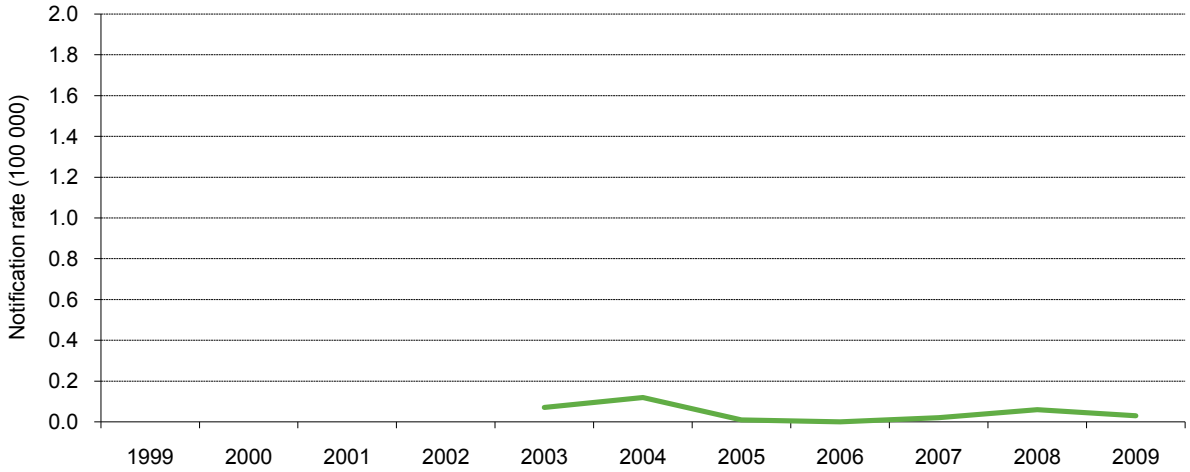
Comprehensive

Case-based

Hib vaccine introduced: 1999

Comments: Notification rates 1999–2006 based upon < 15 years of age population data only (from EU-IBIS Report 2006). Since 2007, all age groups have been reported, thus an increase of number of cases, but a decrease in the overall notification rate.

Hungary



Data available: 2003–2009

Age coverage: All

Serotype: All

Clinical presentation: Meningitis and septicaemia only

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Yes

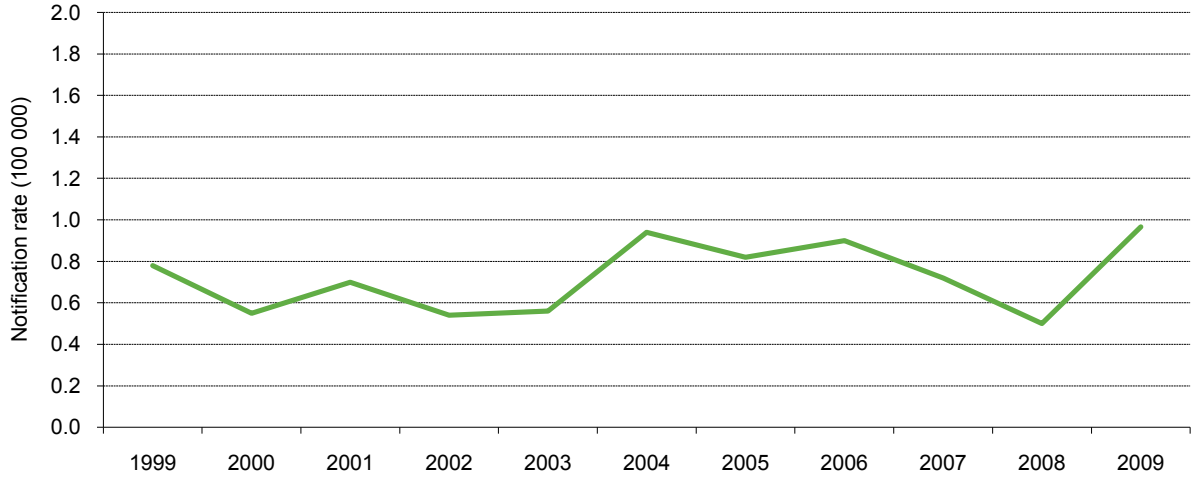
Compulsory

Comprehensive

Case-based

Hib vaccine introduced: 1999

Ireland



Data available: 1999–2009

Age coverage: All

Serotype: All

Clinical presentation: All

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Yes

Compulsory

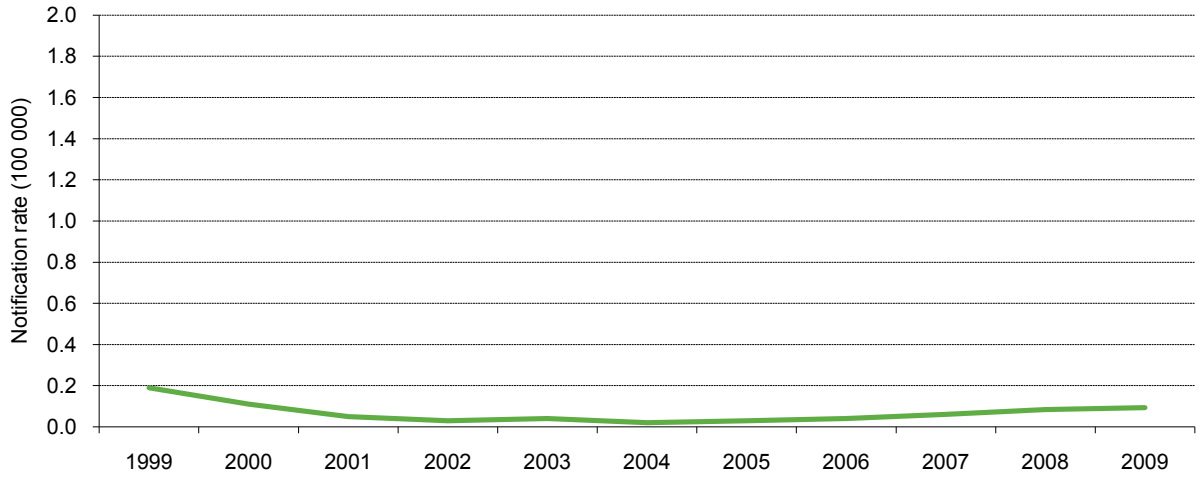
Comprehensive

Case-based

Hib vaccine introduced: 1992

Comments: Consistent reporting/stable surveillance system 1999–2009

Italy



Data available: 1999–2009

Age coverage: All

Serotype: All

Clinical presentation: All

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: No

Compulsory

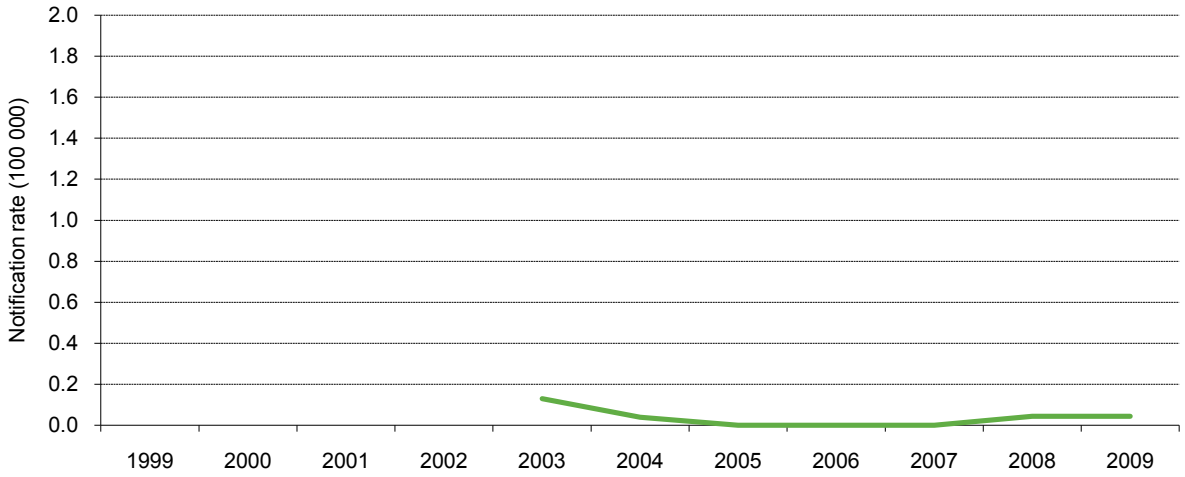
Comprehensive

Case-based

Hib vaccine introduced: 1995 (1999 in routine schedule)

Comments: Consistent reporting/stable surveillance system 1999–2009.

Latvia



Data available: 2003–2009

Age coverage: All

Serotype: All

Clinical presentation: All

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009:Yes

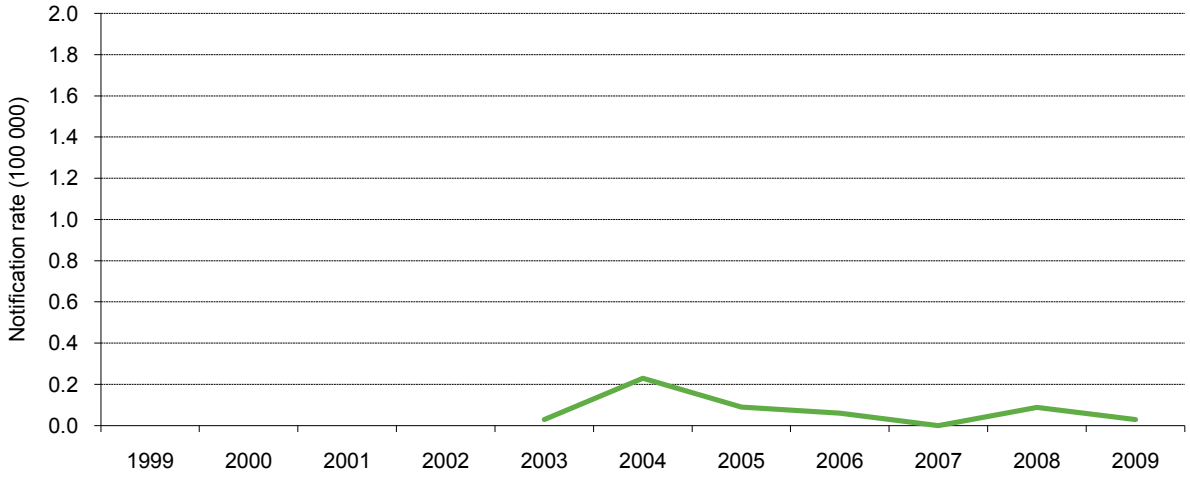
Compulsory

Comprehensive

Case-based

Hib vaccine introduced: 1994

Lithuania



Data available: 2003–2009

Age coverage: All

Serotype: b

Clinical presentation: Meningitis and septicaemia only

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Yes

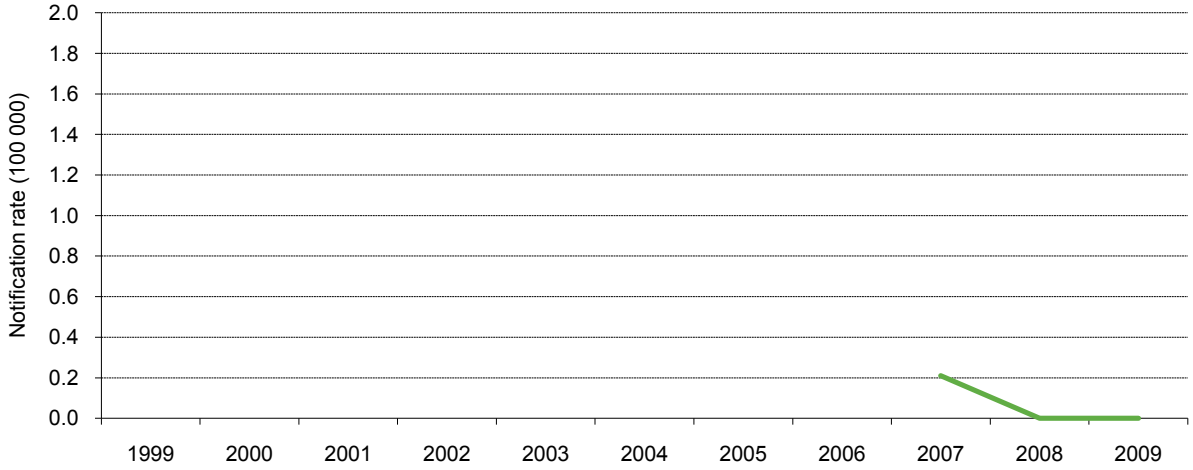
Compulsory

Comprehensive

Case-based

Hib vaccine introduced: 2004

Luxembourg



Data available: 2007–2009

Age coverage: All

Serotype: Not determined

Clinical presentation: Meningitis

Reporting 'outcome' in 2008–2009: Yes

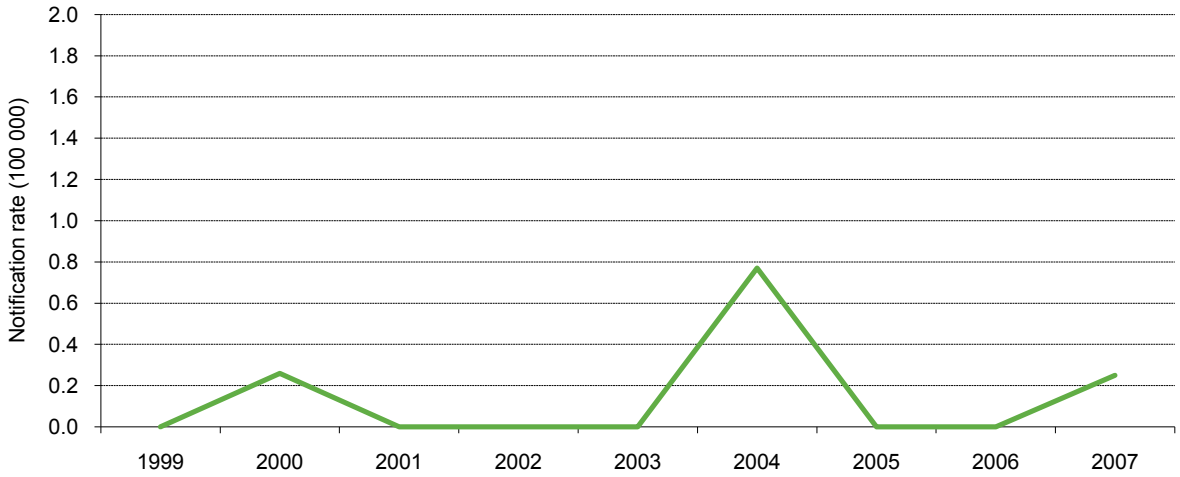
Reporting 'vacc status' 2008–2009: No

Compulsory

Comprehensive

Case-based

Malta



Data available: 1999–2009

Age coverage: All

Serotype: All

Clinical presentation: Yes

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Yes

Compulsory

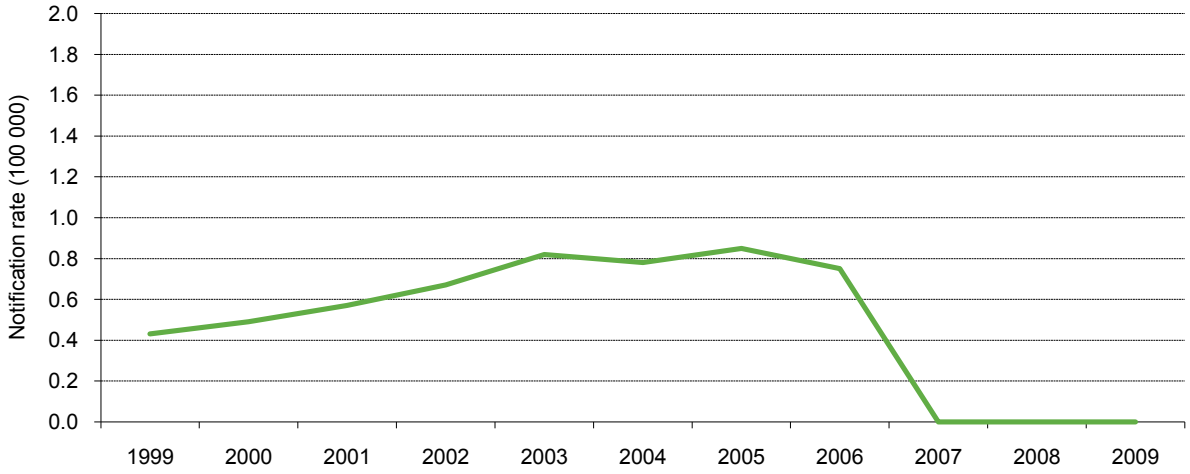
Comprehensive

Case-based

Hib vaccine introduced: 1996

Comments: Few cases in a small population, with a total of eight cases reported during 1999–2009

Netherlands



Data available: 1999–2006

Age coverage: All

Serotype: All

Clinical presentation: All

Reporting 'outcome' in 2008–2009: zero reporting

Reporting 'vacc status' 2008–2009: zero reporting

Compulsory

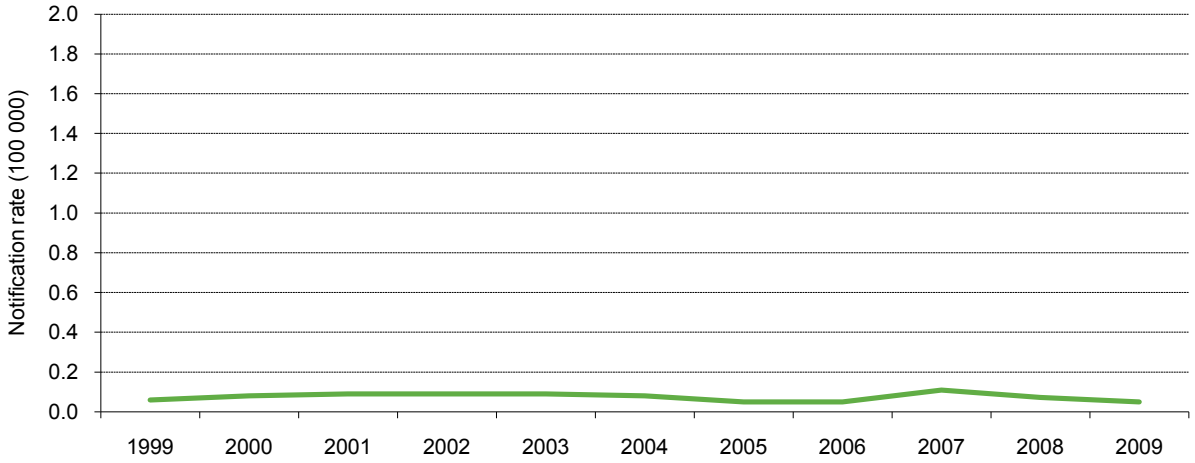
Comprehensive

Case-based

Hib vaccine introduced: 1993

Comments: Consistent reporting until 2006. No available data in 2007 due to larger changes (upgrading) in the national surveillance system. In 2008–2009, zero reporting.

Poland



Data available: 1999–2009

Age coverage: All

Serotype: Mainly b 1999–2003, all 2004–2009

Clinical presentation: Meningitis: 1999–2006; All: 2007–2009

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Yes

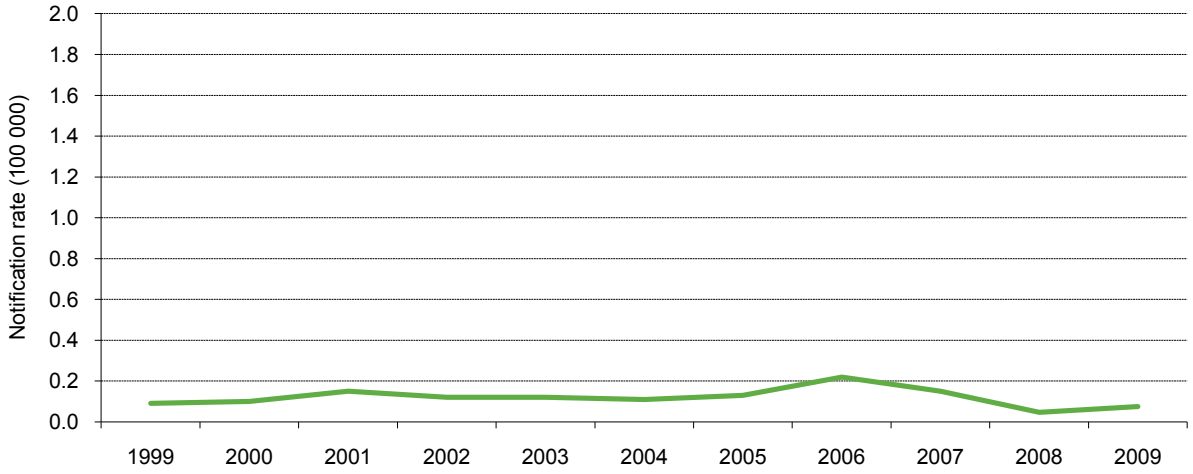
Compulsory

Comprehensive

Case-based

Hib vaccine introduced: 2005

Portugal



Data available: 1999–2009

Age coverage: All

Serotype: All

Clinical presentation: All

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Yes

Compulsory

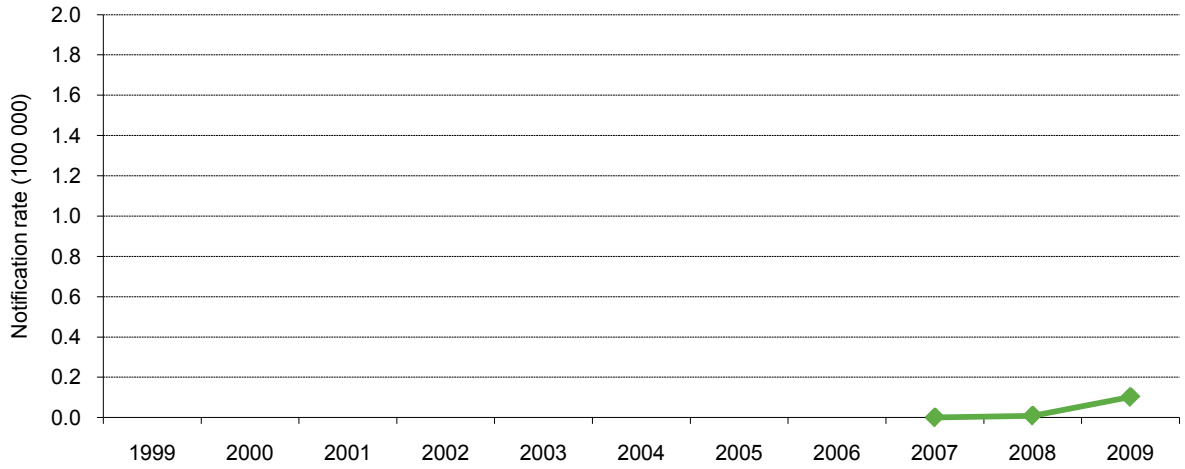
Comprehensive

Case-based

Hib vaccine introduced: 2000

Comments: Consistent reporting/stable surveillance system 1999–2009.

Romania



Data available: 2008–2009

Age coverage: All

Serotype: All

Clinical presentation: All

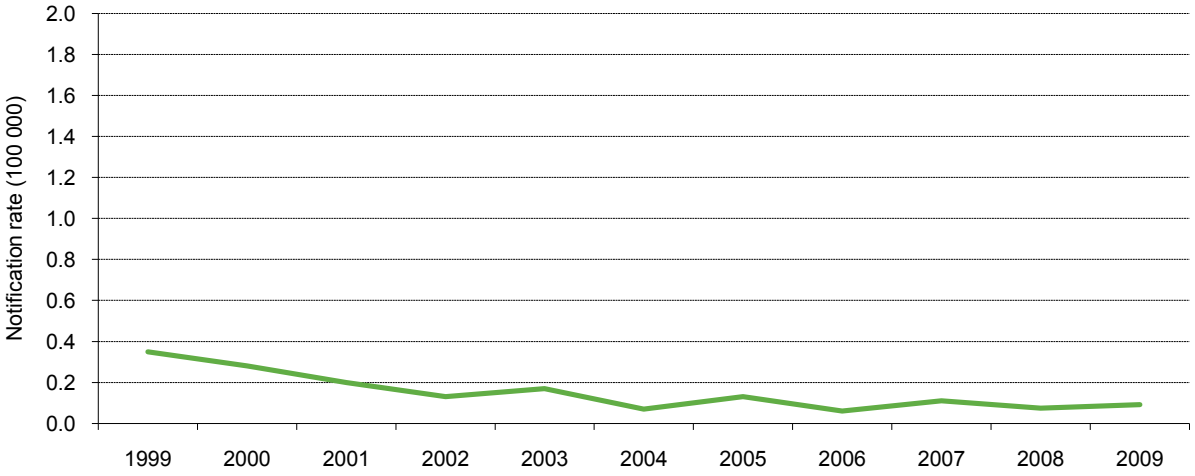
Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Yes

Hib vaccine introduced: No

Comments: *H. influenzae* disease surveillance started in 2008.

Slovakia



Data available: 1999–2009

Age coverage: All

Serotype: Not determined: 1999–2006, all: 2007–2009

Clinical presentation: All

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Yes

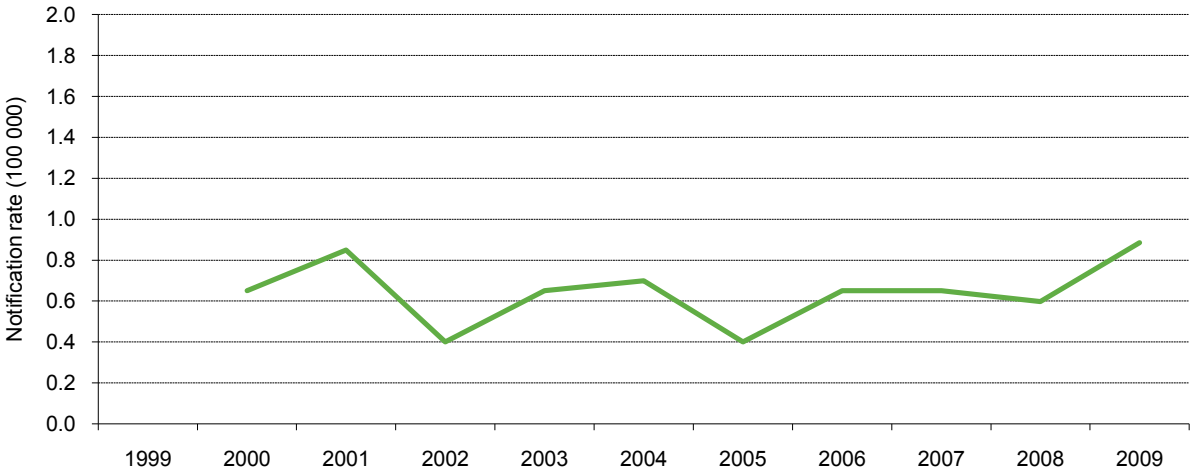
Compulsory

Comprehensive

Case-based

Hib vaccine introduced: 2000

Slovenia



Data available: 2000–2009

Age coverage: All

Serotype: All

Clinical presentation: All

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Yes

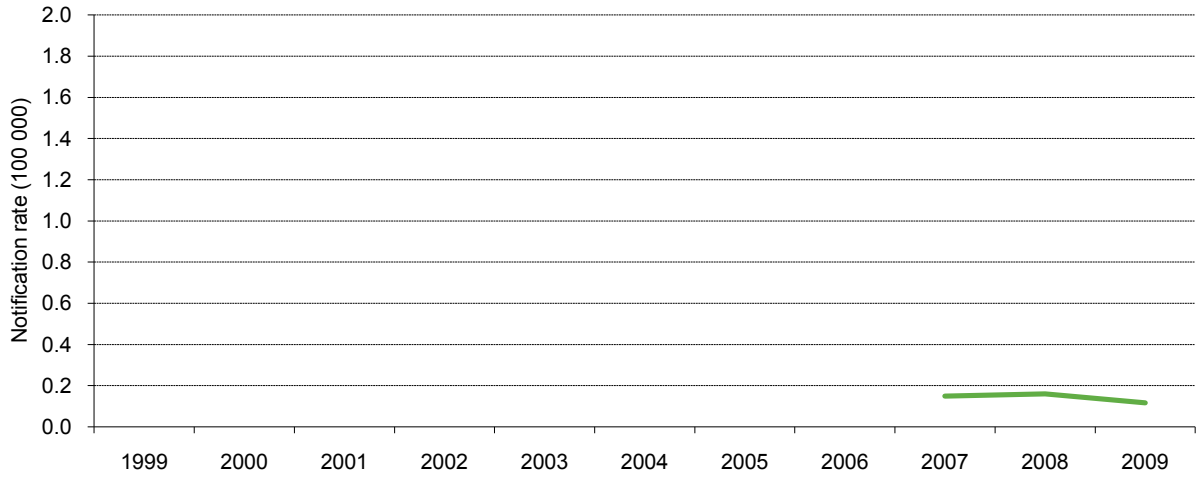
Compulsory

Comprehensive

Case-based

Hib vaccine introduced: 1994

Spain



Data available: 2007–2009

Age coverage: All

Serotype: All

Clinical presentation: All

Reporting 'outcome' in 2008–2009: No

Reporting 'vacc status' 2008–2009: No

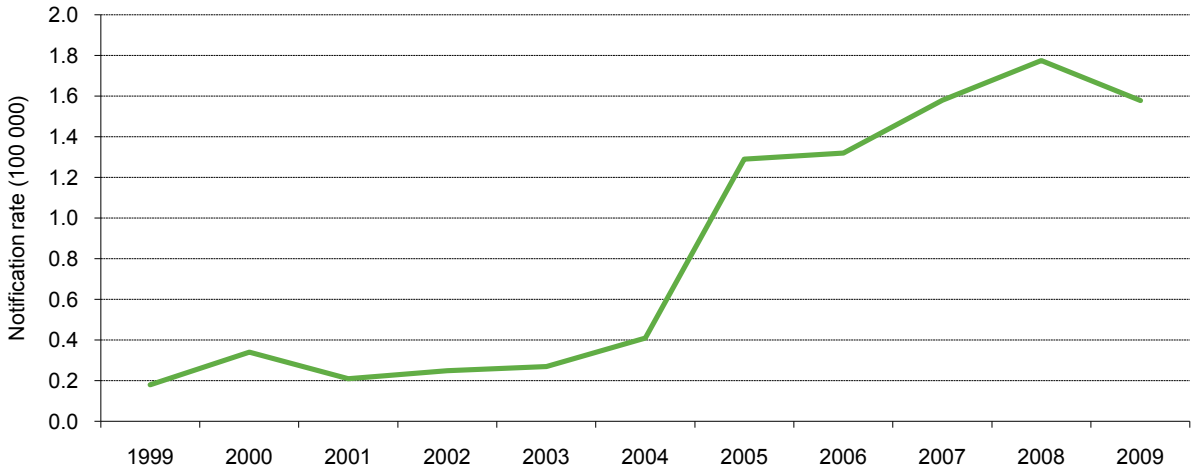
Voluntary

Sentinel/Regional

Case-based

Hib vaccine introduced: 1998

Sweden



Data available: 1999–2009

Age coverage: All

Serotype: b: 1999–2004, All: 2005–2009

Clinical presentation: All: 1999–2006; Not determined: 2007–2009

Reporting 'outcome' in 2008–2009: No

Reporting 'vacc status' 2008–2009: Yes

Compulsory

Comprehensive

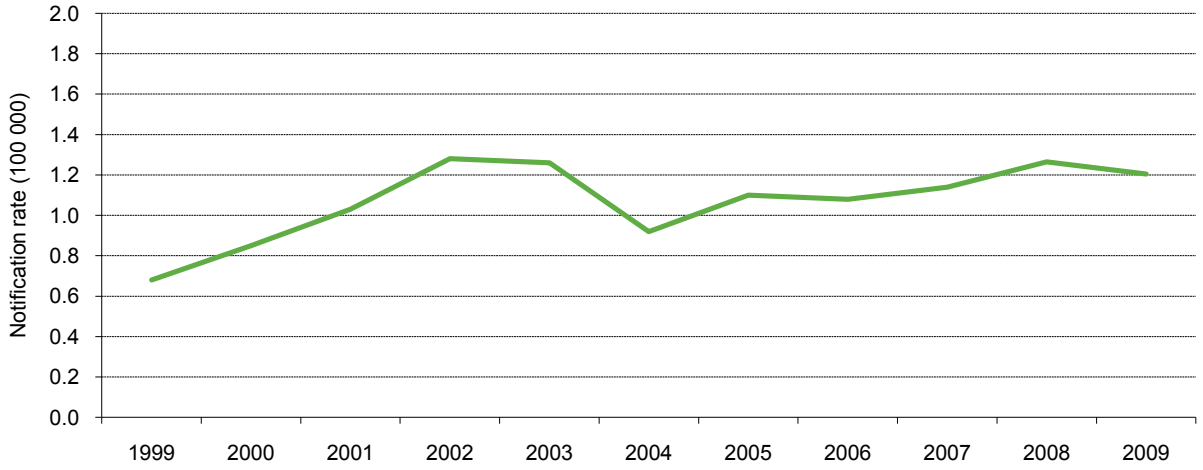
Case-based

Hib vaccine introduced: 1993

Comments: Only Hib was notifiable until July 2004 when a new Communicable Disease Act came into place and all strains became mandatorily notifiable.

Since 2006, an enhanced surveillance collecting all invasive isolates is ongoing. Since 2007, a questionnaire on clinical information of invasive bacterial infections is sent to physicians, this may have increased the awareness and thus the sensitivity of the surveillance.

United Kingdom



Data available: 1999–2009

Age coverage: All

Serotype: All

Clinical presentation: All

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Yes

Compulsory

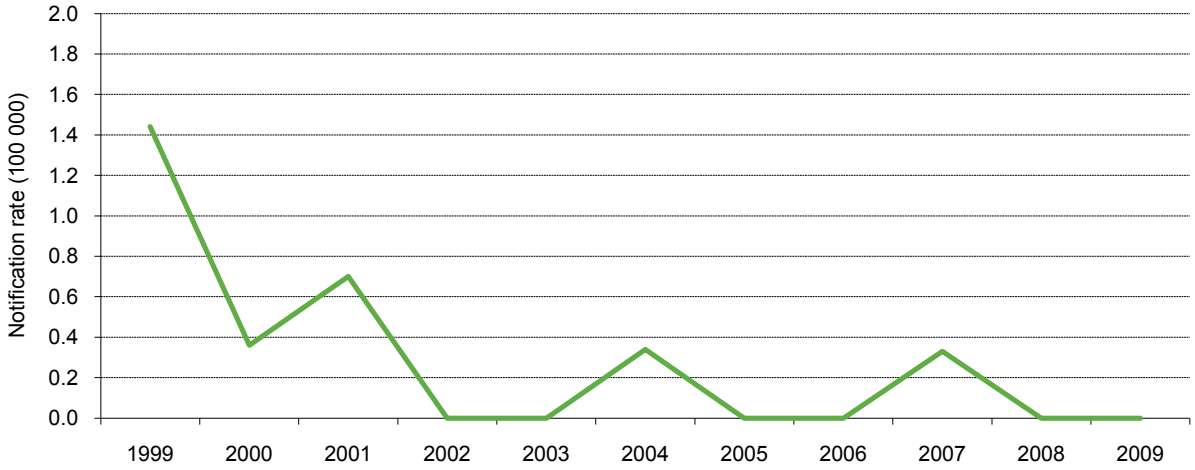
Comprehensive

Case-based

Hib vaccine introduced: 1992

Comments: Consistent reporting/stable surveillance system 1999–2009. Booster introduced into the vaccination programme in September 2006, and a catch-up campaign organised September 2007–March 2009.

Iceland



Data available: 1999–2009

Age coverage: All

Serotype: Mainly b

Clinical presentation: All

Reporting 'outcome' in 2008–2009: Zero reporting

Reporting 'vacc status' 2008–2009: Zero reporting

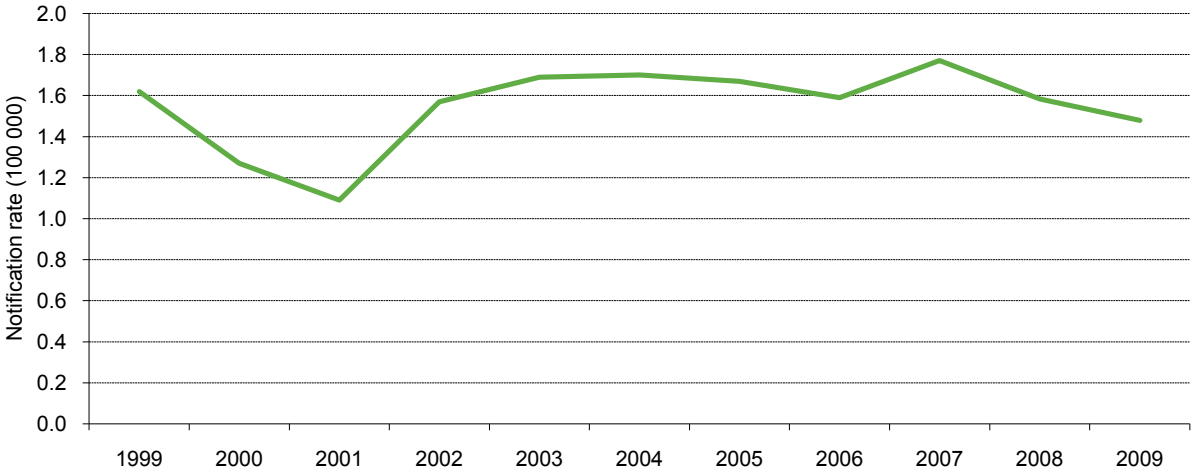
Compulsory

Comprehensive

Case-based

Hib vaccine introduced: 1989

Norway



Data available: 1999–2009

Age coverage: All

Serotype: All

Clinical presentation: All

Reporting 'outcome' in 2008–2009: Yes

Reporting 'vacc status' 2008–2009: Yes

Compulsory

Comprehensive

Case-based

Hib vaccine introduced: 1992

Comments: Consistent reporting/stable surveillance system 1999–2009.

Highest overall notification rate in Europe. The majority of the cases are hospitalised cases based upon positive culture from blood or CSF.

Strengthening of reference laboratory in recent years, but inclusion of results into MSIS surveillance not done systematically, which may have influenced the serotype data (completeness and/or skewed distribution).

Annex 2: Invasive *H. influenzae* disease

Methods

Table A1 Invasive *H. influenzae* disease EU case definitions, 2002 and 2008

EU case definition confirmed 2002 (Decision 2002/253/EC)	EU case definition confirmed 2008 (EC Decision of 28/IV/2008)
Confirmed case A clinically compatible case diagnosed by one of the following laboratory criteria: • Isolation of *H. influenzae* serotype b from a normally sterile site • Detection *of H. influenzae* nucleic acid from a normally sterile site *Probable case* A clinically compatible case diagnosed by the following laboratory criteria: • Detection of *H influenzae* antigen from normally sterile site. *Possible case* A case with clinical epiglottitis without any laboratory confirmation or with identification only from non-sterile site	*Clinical Criteria* Not relevant for surveillance purposes *Laboratory Criteria* Laboratory criteria for case definition At least one of the following two: • Isolation of *H. influenzae* from a normally sterile site • Detection of *H. influenzae* nucleic acid from a normally sterile site Typing of the isolates should be performed, if possible *Epidemiological link: NA* *Case Classification* • Possible case: NA • Probable case: NA • Confirmed case: Any person meeting the laboratory criteria for case confirmation

Data source table

Table A2 Overview of the sources of data used for *H. influenzae* disease report, 2008–2009

Country	Data source*	Compulsory (Cp) / Voluntary (V)	Comprehensive (Co) / Sentinel (Se)	Active(A) / Passive(P)	Case-based (CB) / Aggregated (A)	Data reported by			
						Laboratories	Physicians	Hospitals	Others
Austria	AT-Epidemiegesetz	Cp	Co	P	C	Y	Y	Y	Y
Belgium	BE-LABNET	V	Se	A	C	Y	N	U	U
Bulgaria	BG-NATIONAL_SURVEILLANCE	Cp	Co	P	A	Y	Y	Y	Y
Cyprus	CY-NOTIFIED_DISEASES	Cp	Co	P	C	N	Y	N	N
Czech Republic	CZ-EPIDAT	Cp	Co	A	C	Y	Y	Y	N
Denmark	DK-MIS	Cp	Co	P	C	N	Y	N	N
Estonia	EE-HIB	Cp	Co	P	C	Y	Y	Y	Y
Finland	FI-NIDR	Cp	Co	P	C	Y	N	N	N
France	FR-EPIBAC	V	Se	A	C	Y	N	Y	N
Germany	DE-SURVNET@RKI-7.1	Cp	Co	P	C	Y	N	N	Y
Greece	GR-NOTIFIABLE_DISEASES	Cp	Co	P	C	Y	Y	Y	N
Hungary	HU-EFRIR	Cp	Co	P	C	Y	Y	Y	N
Iceland	IS-SUBJECT_TO_REGISTRATION	Cp	Co	P	C	Y	Y	Y	N
Ireland	IE-CIDR	Cp	Co	P	C	Y	Y	Y	N
Italy	IT-MENINGITIS	Cp	Co	P	C	N	Y	Y	Y
Latvia	LV-BSN	Cp	Co	P	C	Y	Y	Y	N
Liechtenstein	-	-	-	-	-	-	-	-	-
Lithuania	LT-COMMUNICABLE_DISEASES	Cp	Co	P	C	Y	Y	N	N
Luxembourg	LU-SYSTEM1	Cp	Co	P	C	U	Y	N	N
Malta	MT-DISEASE_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	Y
Netherlands	NL-OSIRIS	Cp	Co	P	C	Y	Y	N	N
Norway	NO-MSIS_A	Cp	Co	P	C	Y	Y	Y	N
Poland	PL-NATIONAL_SURVEILLANCE	Cp	Co	P	C	Y	Y	N	N
Portugal	PT-HAEMOPHILUS_INFLUENZAE	Cp	Co	P	C	N	Y	N	N
Romania	RO-RNSSy	Cp	Co	P	C	N	N	Y	N
Slovakia	SK-EPIS	Cp	Co	A	C	Y	Y	Y	N
Slovenia	SI-SURVIVAL	Cp	Co	P	C	Y	Y	Y	N
Spain	ES-MICROBIOLOGICAL	V	Se	P	C	Y	N	N	N
Sweden	SE-SMINET	Cp	Co	P	C	Y	Y	N	N
United Kingdom	UK-HIB	O	Co	P	C	Y	N	Y	Y

Note: The clinically reported and laboratory reported cases are linked at national level.
**Sources of data used in the report.*
Cp= Comprehensive, Se= Sentinel, V= Voluntary, O= Other, Y= Yes, N= No.

Table A3 Summary of the completeness of invasive *H. influenzae* disease surveillance data, EU/EEA countries, 2008–2009

Variable	Completeness (%)			2008			2009		
	2008–2009	2008	2009	Countries (N=23)	Min %	Max %	Countries (N=24)	Min %	Max %
Age	99.5	99.9	99.1	23	50.0	100.0	24	69.2	100.0
Classification	100.0	100.0	100.0	23	100.0	100.0	24	100.0	100.0
ClinicalPresentation	39.8	34.0	47.0	18	11.0	100.0	19	9.4	100.0
DateUsedForStatistics	100.0	100.0	100.0	23	100.0	100.0	24	100.0	100.0
DateOfDiagnosis	44.4	50.5	37.0	15	60.1	100.0	15	30.2	100.0
DateOfNotification	25.1	21.8	29.1	14	25.0	100.0	16	12.9	100.0
DateOfOnset	65.8	58.9	74.3	19	25.0	100.0	19	16.1	100.0
Gender	98.2	98.3	98.2	23	95.9	100.0	24	96.1	100.0
LaboratoryResult	96.3	97.4	95.1	22	71.4	100.0	23	50.0	100.0
Outcome	63.4	55.5	73.3	18	9.4	100.0	21	6.5	100.0
Pathogen	96.5	97.5	95.2	22	100.0	100.0	23	100.0	100.0
Serotype	45.2	40.3	51.4	18	8.2	100.0	18	5.7	100.0
Specimen1	91.7	93.1	89.9	20	57.1	100.0	20	50.0	100.0
Specimen2	4.8	4.4	5.4	10	1.7	100.0	7	3.6	87.2
TestMethod1	88.1	89.7	86.2	19	71.4	100.0	19	84.2	100.0
TestMethod2	3.7	3.4	4.1	7	0.1	100.0	5	1.6	87.2
VaccStatus	8.9	8.6	9.3	18	2.2	100.0	18	1.8	100.0

Note: At this stage, ECDC does not yet have a comprehensive overview of what variables are collected and available in the countries, therefore, missing, not applicable and variables reported as unknown have been classified as incomplete values.
N= Number of countries reporting the variable.
Due to aggregated reporting, Bulgaria is not included in the table.

Results

Table A4 Number and proportion (%) of all reported test methods used among cases of invasive *H. influenzae* disease by country, 2008

Country	Culture		Nuclear Acid		Antigen		Other		Not Applicable		Unknown		Missing		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
Austria	1	20.0	4	80.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	5
Belgium	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	49	100	49
Bulgaria	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	14	100	14
Cyprus	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Czech Republic	3	42.9	1	14.3	1	14.3	0	0.0	0	0.0	2	28.6	0	0.0	7
Denmark	32	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	32
Estonia	1	50.0	0	0.0	0	0.0	0	0.0	1	50.0	0	0.0	0	0.0	2
Finland	89	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	89
France	452	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	452
Germany	156	95.7	6	3.7	0	0.0	1	0.6	0	0.0	0	0.0	0	0.0	163
Greece	2	40.0	3	60.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	5
Hungary	6	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	6
Ireland	19	86.4	0	0.0	0	0.0	0	0.0	3	13.6	0	0.0	0	0.0	22
Italy	49	94.2	1	1.9	1	1.9	0	0.0	0	0.0	1	1.9	0	0.0	52
Latvia	1	50.0	0	0.0	0	0.0	0	0.0	0	0.0	1	50.0	0	0.0	2
Lithuania	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	100	0	0.0	3
Luxembourg	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Malta	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Netherlands	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Poland	31	55.4	1	1.8	4	7.1	0	0.0	0	0.0	20	35.7	0	0.0	56
Portugal	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	5	100	0	0.0	5
Romania	3	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3
Slovakia	4	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	4
Slovenia	12	33.3	12	33.3	12	33.3	0	0.0	0	0.0	0	0.0	0	0.0	36
Spain	73	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	73
Sweden	137	71.7	13	6.8	16	8.4	0	0.0	0	0.0	25	13.1	0	0.0	191
United Kingdom	660	77.3	0	0.0	0	0.0	0	0.0	0	0.0	194	22.7	0	0.0	854
EU total	**1 731**	**81.5**	**41**	**1.9**	**34**	**1.6**	**1**	**0.0**	**4**	**0.2**	**251**	**11.8**	**63**	**3.0**	**2 125**
Iceland	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	75	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	75
Total	**1 806**	**82.1**	**41**	**1.9**	**34**	**1.5**	**1**	**0.0**	**4**	**0.2**	**251**	**11.4**	**63**	**2.9**	**2 200**

Table A5 Number and proportion (%) of all reported test methods used among cases of invasive *H.influenzae* disease by country, 2009

Country	Culture		Nuclear Acid		Antigen		Other		Not Applicable		Unknown		Missing		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
Austria	14	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	14
Belgium	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	76	100	76
Bulgaria	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	15	100	15
Cyprus	0	0.0	0	0.0	0	0.0	0	0.0	2	100	0	0.0	0	0.0	2
Czech Republic	7	70.0	3	30.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	10
Denmark	30	96.8	0	0.0	0	0.0	1	3.2	0	0.0	0	0.0	0	0.0	31
Estonia	1	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1
Finland	88	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	88
France	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany	186	93.0	11	5.5	0	0.0	2	1.0	0	0.0	1	0.5	0	0.0	200
Greece	5	27.8	12	66.7	1	5.6	0	0.0	0	0.0	0	0.0	0	0.0	18
Hungary	3	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3
Ireland	39	90.7	2	4.7	0	0.0	0	0.0	0	0.0	2	4.7	0	0.0	43
Italy	55	87.3	3	4.8	3	4.8	0	0.0	0	0.0	2	3.2	0	0.0	63
Latvia	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	100	0	0.0	2
Lithuania	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	100	0	0.0	1
Luxembourg	0	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Malta	3	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3
Netherlands	0	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Poland	20	83.3	0	0.0	3	12.5	0	0.0	0	0.0	1	4.2	0	0.0	24
Portugal	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	8	100	0	0.0	8
Romania	17	77.3	0	0.0	0	0.0	5	22.7	0	0.0	0	0.0	0	0.0	22
Slovakia	5	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	5
Slovenia	18	33.3	18	33.3	18	33.3	0	0.0	0	0.0	0	0.0	0	0.0	54
Spain	53	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	53
Sweden	121	77.1	6	3.8	7	4.5	0	0.0	0	0.0	23	14.6	0	0.0	157
United Kingdom	652	77.3	0	0.0	0	0.0	0	0.0	0	0.0	192	22.7	0	0.0	844
EU total	**1 317**	**75.8**	**55**	**3.2**	**32**	**1.8**	**8**	**0.5**	**2**	**0.1**	**232**	**13.4**	**91**	**5.2**	**1 737**
Iceland	0	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	71	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	71
Total	**1 388**	**76.8**	**55**	**3.0**	**32**	**1.8**	**8**	**0.4**	**2**	**0.1**	**232**	**12.8**	**91**	**5.0**	**1 808**

Table A6 Number and notification rates (per 100 000 population) of confirmed and probable cases of invasive *H. influenzae* disease EU/EEA countries by country, 2008

Country	Case definition	Number of cases			Population	Notification rate
		Confirmed	Probable	Total		Confirmed
Austria	EU'08	5	0	5	8 318 592	0.06
Belgium	Not determined	49	0	49	10 666 866	0.46
Bulgaria	EU'02	14	0	14	7 640 238	0.18
Cyprus	EU'08	0	0	0	789 269	0.00
Czech Republic	EU'08	7	0	7	10 381 130	0.07
Denmark	Other	32	0	32	5 475 791	0.58
Estonia	EU'02	1	0	1	1 340 935	0.08
Finland	EU'02	45	0	45	5 300 484	0.85
France	EU'08	442	0	442	40 034 089	1.10
Germany	Other	160	0	160	82 217 837	0.20
Greece	Other	4	0	4	11 213 785	0.04
Hungary	EU'08	6	0	6	10 045 401	0.06
Ireland	EU'02	22	0	22	4 401 335	0.50
Italy	EU'08	50	0	50	59 619 290	0.08
Latvia	EU'08	1	0	1	2 270 894	0.04
Lithuania	Not determined	3	1	4	3 366 357	0.09
Luxembourg	none	0	0	0	483 799	0.00
Malta	EU'08	0	0	0	410 290	0.00
Netherlands	EU'08	0	0	0	16 405 399	0.00
Poland	EU'02	28	3	31	38 115 641	0.07
Portugal	EU'02	5	0	5	10 617 575	0.05
Romania	EU'08	2	0	2	21 528 627	0.01
Slovakia	EU'08	4	0	4	5 400 998	0.07
Slovenia	EU'08	12	0	12	2 010 269	0.60
Spain*	EU'08	73	0	73	45 283 259	0.16
Sweden	EU'08	163	0	163	9 182 927	1.78
United Kingdom	EU'02	773	0	773	61 179 256	1.26
EU total		**1 901**	**4**	**1 905**	**497 649 125**	**0.38**
Iceland	EU'08	0	0	0	315 459	0.00
Liechtenstein	Not determined	-	-	-	35 356	-
Norway	EU'08	75	0	75	4 737 171	1.58
Total		**1 976**	**4**	**1 980**	**502 737 111**	**0.41**

**Spain reported data from sentinel surveillance.*

Table A7 Number and notification rates (per 100 000 population) of confirmed and probable cases of invasive *H. influenzae* disease EU/EEA countries by country, 2009

Country	Case definition	Number of cases			Population	Notification rate
		Confirmed	Probable	Total		Confirmed
Austria	EU'08	14	0	14	8 355 260	0.17
Belgium	Not determined	76	0	76	10 750 000	0.71
Bulgaria	EU'02	15	0	15	7 606 551	0.20
Cyprus	EU'08	2	0	2	796 875	0.25
Czech Republic	EU'08	10	0	10	10 467 542	0.10
Denmark	Other	31	0	31	5 511 451	0.56
Estonia	EU'02	1	0	1	1 340 415	0.08
Finland	EU'02	47	0	47	5 326 314	0.88
France	EU'08	-	-	-	64 350 759	-
Germany	Other	196	0	196	82 002 356	0.24
Greece	EU-2008	13	0	13	11 260 402	0.12
Hungary	EU'08	3	0	3	10 030 975	0.03
Ireland	EU'02	43	0	43	4 450 014	0.97
Italy	EU'08	56	0	56	60 045 068	0.09
Latvia	EU'08	1	0	1	2 261 294	0.04
Lithuania	EU'08	1	1	2	3 349 872	0.03
Luxembourg	Not determined	0	0	0	493 500	0.00
Malta	EU'08	3	0	3	413 609	0.73
Netherlands	EU'08	0	0	0	16 485 787	0.00
Poland	EU'02	19	0	19	3 8135 876	0.05
Portugal	EU'02	8	0	8	10 627 250	0.08
Romania	EU'08	22	0	22	21 498 616	0.10
Slovakia	EU'08	5	0	5	5 412 254	0.09
Slovenia	EU'08	18	0	18	2 032 362	0.89
*Spain	EU'08	53	0	53	45 828 172	0.12
Sweden	EU'08	146	0	146	9 256 347	1.58
United Kingdom	EU'02	742	0	742	61 634 599	1.20
EU total		**1 525**	**1**	**1 526**	**499 723 520**	**0.35**
Iceland	EU'08	0	0	0	319 368	0.00
Norway	EU'08	71	0	71	4 799 252	1.48
Total		**1 596**	**1**	**1 597**	**504 877 729**	**0.36**

**Spain reported data from sentinel surveillance.*

Table A8 Number of reported invasive *H. influenzae* cases by country and month in 2008

Country	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Austria	0	1	0	2	0	1	0	1	0	0	0	0	5
Belgium	6	10	6	3	5	3	2	3	4	3	1	3	49
Bulgaria	2	2	1	1	1	1	0	0	2	1	1	2	14
Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0
Czech Republic	0	1	0	1	1	1	0	1	0	0	1	1	7
Denmark	6	1	6	2	2	4	1	2	1	3	3	1	32
Estonia	0	1	0	0	0	0	0	0	0	0	0	0	1
Finland	6	3	4	4	5	3	1	6	2	4	2	5	45
France	55	46	50	40	32	27	28	22	24	31	39	48	442
Germany	11	13	14	17	16	18	11	4	13	13	12	18	160
Greece	1	1	0	0	1	0	0	0	0	0	1	0	4
Hungary	1	0	0	0	2	0	1	0	1	0	0	1	6
Ireland	3	0	3	4	2	2	1	1	2	1	1	2	22
Italy	5	6	8	3	4	4	0	5	1	2	5	7	50
Latvia	0	0	0	0	1	0	0	0	0	0	0	0	1
Lithuania	0	0	0	0	0	0	0	0	0	2	1	0	3
Luxembourg	0	0	0	0	0	0	0	0	0	0	0	0	0
Malta	0	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0
Poland	4	4	3	0	4	3	2	0	1	3	3	1	28
Portugal	0	2	0	0	1	0	1	0	0	0	0	1	5
Romania	0	0	0	1	0	0	0	0	0	0	0	1	2
Slovakia	0	0	1	0	0	0	0	0	1	1	1	0	4
Slovenia	1	2	1	0	3	1	1	0	0	1	0	2	12
Spain	11	9	2	8	2	9	6	4	2	6	6	8	73
Sweden	19	7	7	14	13	13	10	11	10	22	21	16	163
United Kingdom	92	72	67	63	56	57	54	24	34	57	57	104	737
EU total	**223**	**181**	**173**	**163**	**151**	**147**	**119**	**84**	**98**	**150**	**155**	**221**	**1 865**
Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway	12	3	6	5	10	4	6	6	2	5	10	6	75
Total	**235**	**184**	**179**	**168**	**161**	**151**	**125**	**90**	**100**	**155**	**165**	**227**	**1 940**

Table A9 Number of reported invasive *H. influenzae* cases by country and month in 2009

Country	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Austria	2	1	1	3	2	1	1	0	0	1	2	0	14
Belgium	4	14	5	8	4	3	2	2	3	11	12	8	76
Bulgaria	2	2	0	1	1	2	0	2	1	2	0	2	15
Cyprus	0	0	0	0	0	0	1	0	0	1	0	0	2
Czech Republic	0	4	0	1	1	0	0	0	2	1	0	1	10
Denmark	2	2	7	3	2	2	4	2	2	1	1	3	31
Estonia	0	0	0	0	0	0	1	0	0	0	0	0	1
Finland	3	3	5	2	8	2	2	2	6	4	6	4	47
France	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany	23	17	25	22	17	21	14	7	9	11	11	19	196
Greece	1	2	2	2	0	2	2	0	0	1	0	1	13
Hungary	0	0	0	0	1	0	1	0	0	0	0	1	3
Ireland	7	9	3	7	2	3	1	1	1	3	4	2	43
Italy	6	10	5	6	9	1	1	2	3	1	4	8	56
Latvia	1	0	0	0	0	0	0	0	0	0	0	0	1
Lithuania	1	0	0	0	0	0	0	0	0	0	0	0	1
Luxembourg	0	0	0	0	0	0	0	0	0	0	0	0	0
Malta	0	0	1	1	0	1	0	0	0	0	0	0	3
Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0
Poland	2	0	0	2	4	3	1	3	1	0	1	2	19
Portugal	0	1	0	0	2	0	1	0	0	1	2	1	8
Romania	5	2	2	2	1	3	1	0	0	2	3	1	22
Slovakia	0	1	1	1	0	1	0	0	0	0	0	1	5
Slovenia	1	0	1	5	2	1	1	1	0	0	2	4	18
Spain	10	5	1	7	2	5	6	1	1	4	2	9	53
Sweden	20	11	11	10	14	13	11	7	9	19	11	10	146
United Kingdom	117	76	75	67	53	53	47	19	43	54	50	79	733
EU total	**207**	**160**	**145**	**150**	**125**	**117**	**98**	**49**	**81**	**117**	**111**	**156**	**1 525**
Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	10	6	8	7	8	6	2	3	3	5	9	4	71
Total	**217**	**166**	**153**	**157**	**133**	**123**	**100**	**52**	**84**	**122**	**120**	**160**	**1 587**

Table A10 Total number of invasive *H. influenzae* disease cases by country and gender, 2008–2009

Country	2008				2009			
	Males	Females	Unknown	Gender ratio	Males	Females	Unknown	Gender ratio
Austria	2	3	0	0.7	5	9	0	0.6
Belgium	24	25	0	1.0	47	29	0	1.6
Bulgaria	9	5	0	1.8	7	8	0	0.9
Cyprus	0	0	0	0	2	0	0	
Czech Republic	2	5	0	0.4	8	2	0	4.0
Denmark	17	15	0	1.1	12	19	0	0.6
Estonia	0	1	0	0.0	1	0	0	
Finland	25	20	0	1.3	22	25	0	0.9
France	241	201	0	1.2	-	-	-	-
Germany	84	75	10	1.1	110	86	0	1.3
Greece	3	1	0	3.0	5	8	0	0.6
Hungary	3	3	0	1.0	1	2	0	0.5
Ireland	14	8	0	1.8	23	20	0	1.2
Italy	23	27	0	0.9	33	23	0	1.4
Latvia	1	0	0	0	1	0	0	0
Lithuania	1	2	0	0.5	0	1	0	0.0
Luxembourg	0	0	0	0	0	0	0	0
Malta	0	0	0	0	1	2	0	0.5
Netherlands	0	0	0	0	0	0	0	0
Poland	13	15	0	0.9	13	6	0	2.2
Portugal	2	3	0	0.7	5	3	0	1.7
Romania	1	1	0	1.0	16	6	0	2.7
Slovakia	3	1	0	3.0	1	4	0	0.3
Slovenia	5	7	0	0.7	11	7	0	1.6
Spain	44	28	1	1.6	21	32	0	0.7
Sweden	71	92	0	0.8	82	64	0	1.3
United Kingdom	370	371	32	1.0	370	343	29	1.1
EU total	**958**	**909**	**34**	**1.1**	**797**	**699**	**29**	**1.1**
Iceland	0	0	0	0	0	0	0	0
Liechtenstein	-	-	-	-	-	-	-	-
Norway	36	39	0	0.9	26	45	0	0.6
Total	**994**	**948**	**34**	**1.0**	**823**	**744**	**29**	**1.1**

Table A11 Total number and notification rates (per 100 000 population) of invasive *H. influenzae* disease by country and age group, 2008

Country	< 1 year		1–4 years		5–14 years		15–64 years		65+ years		Unk	Total
	n	rate	n	rate	n	rate	n	rate	n	rate	n	n
Austria	2	2.64	0	0.00	0	0.00	0	0.00	3	0.21	0	5
Belgium	2	1.65	4	0.83	1	0.08	15	0.21	27	1.48	0	49
Bulgaria	5	6.99	6	2.15	0	0.00	3	0.06	0	0.00	0	14
Cyprus	-	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	0	0.00	1	0.25	3	0.31	1	0.01	2	0.13	0	7
Denmark	2	3.11	3	1.15	2	0.29	10	0.28	15	1.76	0	32
Estonia	0	0.00	0	0.00	0	0.00	1	0.11	0	0.00	0	1
Finland	2	3.4	3	1.29	0	0.00	19	0.54	21	2.40	0	45
France	20	2.45	21	0.67	17	0.22	170	0.41	214	2.04	0	442
Germany	7	1.02	8	0.29	4	0.05	49	0.09	92	0.56	0	160
Greece	0	0.00	0	0.00	0	0.00	2	0.03	0	0.00	2	4
Hungary	1	1.04	1	0.26	0	0.00	3	0.04	1	0.06	0	6
Ireland	5	7.11	2	0.79	2	0.34	5	0.17	8	1.67	0	22
Italy	1	0.18	4	0.18	3	0.05	18	0.05	24	0.20	0	50
Latvia	0	0.00	1	1.16	0	0.00	0	0.00	0	0.00	0	1
Lithuania	1	3.11	1	0.82	0	0.00	1	0.04	0	0.00	0	3
Luxembourg	-	-	-	-	-	-	-	-	-	-	-	-
Malta	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	-	-	-	-
Poland	5	1.3	8	0.56	5	0.12	9	0.03	1	0.02	0	28
Portugal	1	0.98	0	0.00	1	0.09	2	0.03	1	0.05	0	5
Romania	0	0.00	2	0.23	0	0.00	0	0.00	0	0.00	0	2
Slovakia	0	0.00	0	0.00	1	0.17	3	0.08	0	0.00	0	4
Slovenia	2	10.3	3	4.1	0	0.00	3	0.21	4	1.22	0	12
Spain	5	1.02	3	0.16	4	0.09	14	0.05	47	0.63	0	73
Sweden	4	3.71	4	0.96	4	0.39	58	0.96	93	5.78	0	163
United Kingdom	85	11	36	1.25	29	0.41	286	0.71	337	3.42	0	773
EU total	**150**	**2.85**	**111**	**0.54**	**76**	**0.15**	**672**	**0.20**	**890**	**1.05**	**2**	**1 901**
Norway	1	1.71	3	1.28	1	0.16	30	0.96	40	5.77	0	75
Total	**151**	**2.84**	**114**	**0.55**	**77**	**0.15**	**702**	**0.21**	**930**	**1.09**	**2**	**1 976**

Table A12 Total number and notification rates (per 100 000 population) of invasive *H. influenzae* disease by country and age group, 2009

Country	< 1 year		1–4 years		5–14 years		15–64 years		65+ years		Unk	Total
	n	rate	n	rate	n	rate	n	rate	n	rate	n	n
Austria	0	0.00	3	0.94	1	0.12	6	0.11	4	0.28	0	14
Belgium	5	4.13	4	0.83	2	0.17	23	0.33	32	1.76	10	76
Bulgaria	4	5.41	7	2.44	1	0.15	2	0.04	1	0.08	0	15
Cyprus	0	0.00	0	0.00	0	0.00	2	0.36	0	0.00	0	2
Czech Republic	0	0.00	2	0.47	0	0.00	4	0.05	4	0.26	0	10
Denmark	2	3.06	1	0.38	0	0.00	18	0.50	10	1.14	0	31
Estonia	0	0.00	0	0.00	0	0.00	0	0.00	1	0.44	0	1
Finland	2	3.36	1	0.43	2	0.34	19	0.54	23	2.58	0	47
France	-	-	-	-	-	-	-	-	-	-	-	-
Germany	10	1.46	7	0.25	8	0.10	57	0.11	114	0.68	0	196
Greece	0	0.00	2	0.46	1	0.10	5	0.07	1	0.05	4	13
Hungary	0	0.00	1	0.26	1	0.10	1	0.01	0	0.00	0	3
Ireland	4	5.47	4	1.51	7	1.18	12	0.40	16	3.25	0	43
Italy	7	1.21	3	0.13	0	0.00	20	0.05	26	0.22	0	56
Latvia	1	4.28	0	0.00	0	0.00	0	0.00	0	0.00	0	1
Lithuania	1	2.87	0	0.00	0	0.00	0	0.00	0	0.00	0	1
Luxembourg	-	-	-	-	-	-	-	-	-	-	-	-
Malta	0	0.00	0	0.00	0	0.00	2	0.69	1	1.72	0	3
Netherlands	-	-	-	-	-	-	-	-	-	-	-	-
Poland	5	1.21	5	0.34	3	0.08	3	0.01	3	0.06	0	19
Portugal	1	0.96	2	0.47	0	0.00	3	0.04	2	0.11	0	8
Romania	5	2.27	9	1.05	4	0.18	2	0.01	2	0.06	0	22
Slovakia	1	1.75	0	0.00	0	0.00	2	0.05	2	0.31	0	5
Slovenia	0	0.00	0	0.00	1	0.54	12	0.85	5	1.50	0	18
Spain	1	0.20	7	0.37	1	0.02	13	0.04	31	0.41	0	53
Sweden	3	2.74	3	0.70	3	0.30	58	0.96	79	4.80	0	146
United Kingdom	89	11.53	53	1.84	19	0.27	244	0.60	337	3.42	0	742
EU total	**141**	**2.63**	**114**	**0.55**	**54**	**0.10**	**508**	**0.15**	**694**	**0.81**	**14**	**1 525**
Norway	5	8.24	5	2.10	1	0.16	29	0.91	31	4.40	0	71
Total	**146**	**2.69**	**119**	**0.57**	**55**	**0.10**	**537**	**0.16**	**725**	**0.84**	**14**	**1 596**

Table A13 Proportion of reported serotypes of invasive *H. influenzae* cases by country, 2008

Country	b		non-b		non-caps		Unk		Missing	Total
	n	%	n	%	n	%	n	%	n	n
Austria	1	20.0	0	0.0	4	80.0	0	0.0	0	5
Belgium	0	-	0	-	0	-	0	-	49	49
Bulgaria	0	-	0	-	0	-	0	-	14	14
Cyprus	-	-	-	-	-	-	-	-	-	-
Czech Republic	3	42.9	0	0.0	0	0.0	4	57.1	0	7
Denmark	7	21.9	8	25.0	17	53.1	0	0.0	0	32
Estonia	1	100.0	0	0.0	0	0.0	0	0.0	0	1
Finland	3	6.7	8	17.8	33	73.3	1	2.2	0	45
France	0	0.0	0	0.0	0	0.0	442	100.0	0	442
Germany	0	0.0	0	0.0	0	0.0	160	100.0	0	160
Greece	1	25.0	2	50.0	0	0.0	1	25.0	0	4
Hungary	0	0.0	4	66.7	0	0.0	2	33.3	0	6
Ireland	5	22.7	3	13.6	12	54.5	2	9.1	0	22
Italy	3	6.0	3	6.0	19	38.0	25	50.0	0	50
Latvia	1	100.0	0	0.0	0	0.0	0	0.0	0	1
Lithuania	3	100.0	0	0.0	0	0.0	0	0.0	0	3
Luxembourg	-	-	-	-	-	-	-	-	-	-
Malta	-	-	-	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	-	-
Poland	8	28.6	0	0.0	0	0.0	20	71.4	0	28
Portugal	0	0.0	0	0.0	0	0.0	5	100.0	0	5
Romania	2	100.0	0	0.0	0	0.0	0	0.0	0	2
Slovakia	0	0.0	0	0.0	0	0.0	4	100.0	0	4
Slovenia	0	0.0	1	8.3	11	91.7	0	0.0	0	12
Spain	6	8.2	0	0.0	0	0.0	67	91.8	0	73
Sweden	9	5.5	32	19.6	31	19.0	91	55.8	0	163
United Kingdom	87	11.3	67	8.7	327	42.3	292	37.8	0	773
EU total	**140**	**7.6**	**128**	**7.0**	**454**	**24.7**	**1116**	**60.7**	**63**	**1 901**
Iceland	-	-	-	-	-	-	-	-	-	-
Liechtenstein	-	-	-	-	-	-	-	-	-	-
Norway	1	1.3	17	22.7	50	66.7	7	9.3	0	75
Total	**141**	**7.4**	**145**	**7.6**	**504**	**26.3**	**1123**	**58.7**	**63**	**1 976**

Table A14 Proportion of reported serotypes of invasive *H. influenzae* cases by country, 2009

Country	b		non-b		non-caps		Unk		Missing	Total
	n	%	n	%	n	%	n	%	n	n
Austria	0	0.0	1	7.1	13	92.9	0	0.0	0	14
Belgium	0	-	0	-	0	-	0	-	76	76
Bulgaria	0	-	0	-	0	-	0	-	15	15
Cyprus	0	0.0	0	0.0	0	0.0	2	100.0	0	2
Czech Republic	3	30.0	1	10.0	2	20.0	4	40.0	0	10
Denmark	5	16.7	4	13.3	20	66.7	1	3.3	1	31
Estonia	1	100.0	0	0.0	0	0.0	0	0.0	0	1
Finland	6	12.8	9	19.1	30	63.8	2	4.3	0	47
France	-	-	-	-	-	-	-	-	-	-
Germany	0	0.0	0	0.0	0	0.0	196	100.0	0	196
Greece	7	53.8	6	46.2	0	0.0	0	0.0	0	13
Hungary	0	0.0	2	66.7	0	0.0	1	33.3	0	3
Ireland	1	2.3	8	18.6	25	58.1	9	20.9	0	43
Italy	4	7.1	5	8.9	21	37.5	26	46.4	0	56
Latvia	0	0.0	0	0.0	0	0.0	1	100.0	0	1
Lithuania	1	100.0	0	0.0	0	0.0	0	0.0	0	1
Luxembourg	-	-	-	-	-	-	-	-	-	-
Malta	0	0.0	1	33.3	1	33.3	1	33.3	0	3
Netherlands	-	-	-	-	-	-	-	-	-	-
Poland	7	36.8	0	0.0	0	0.0	12	63.2	0	19
Portugal	0	0.0	0	0.0	0	0.0	8	100.0	0	8
Romania	0	0.0	0	0.0	0	0.0	22	100.0	0	22
Slovakia	1	20.0	0	0.0	0	0.0	4	80.0	0	5
Slovenia	0	0.0	7	38.9	11	61.1	0	0.0	0	18
Spain	3	5.7	0	0.0	0	0.0	50	94.3	0	53
Sweden	3	2.1	16	11.0	42	28.8	85	58.2	0	146
United Kingdom	43	5.8	68	9.2	369	49.7	262	35.3	0	742
EU total	**85**	**5.9**	**128**	**8.9**	**534**	**37.3**	**686**	**47.9**	**92**	**1 525**
Iceland	-	-	-	-	-	-	-	-	-	-
Liechtenstein	-	-	-	-	-	-	-	-	-	-
Norway	6	8.5	14	19.7	46	64.8	5	7.0	0	71
Total	**91**	**6.1**	**142**	**9.4**	**580**	**38.6**	**691**	**45.9**	**92**	**1 596**

Table A15 Notification rate (per 100 000 population) of invasive *H. influenzae* serotype b disease by age group and country, 2008

Country	< 1 year		1–4 years		5–14 years		≥ 15 years	
	n	Not. rate (100 000)	n	Not. rate (100 000)	n	Not. rate (100 000)	n	Not. rate (100 000)
Austria	1	1.32	0	0.00	0	0.00	0	0.00
Czech Republic	0	0.00	1	0.25	2	0.21	0	0.00
Denmark	1	1.55	1	0.38	0	0.00	5	0.11
Estonia	0	0.00	0	0.00	0	0.00	1	0.09
Finland	0	0.00	1	0.43	0	0.00	2	0.05
Ireland	2	2.84	1	0.39	0	0.00	2	0.06
Italy	0	0.00	1	0.04	1	0.02	1	0.00
Latvia	0	0.00	1	1.16	0	0.00	0	0.00
Lithuania	1	3.11	1	0.82	0	0.00	1	0.04
Norway	0	0.00	1	0.43	0	0.00	0	0.00
Poland	2	0.52	3	0.21	2	0.05	1	0.00
Romania	0	0.00	2	0.23	0	0.00	0	0.00
Spain*	1	0.20	0	0.00	0	0.00	5	0.01
Sweden	0	0.00	0	0.00	2	0.20	7	0.09
United Kingdom	14	1.81	9	0.31	7	0.10	57	0.11
Grand Total	**22**	**0.41**	**22**	**0.11**	**14**	**0.03**	**82**	**0.02**

Inclusion criteria: Countries reporting ≥ 1 case(s) of serotype b in 2008.
**Spain reported data from sentinel surveillance.*

Table A16 Notification rate (per 100 000 population) of invasive *H. influenzae* serotype b disease by age group and country, 2009

Country	< 1 year		1–4 years		5–14 years		≥ 15 years	
	n	Not. rate (100 000)	n	Not. rate (100 000)	n	Not. rate (100 000)	n	Not. rate (100 000)
Czech Republic		0.00	1	0.24		0.00	2	0.02
Denmark	1	1.53		0.00		0.00	4	0.09
Estonia		0.00		0.00		0.00	1	0.09
Finland	1	1.68	1	0.42		0.00	4	0.09
Greece		0.00	2	0.46	1	0.09	0	0.00
Ireland		0.00	1	0.38		0.00	0	0.00
Italy		0.00	1	0.04		0.00	3	0.01
Lithuania	1	2.87		0.00		0.00	0	0.00
Norway		0.00	1	0.42		0.00	5	0.13
Poland	4	0.97	2	0.14	1	0.03	0	0.00
Slovakia	1	1.75		0.00		0.00	0	0.00
Spain		0.00	1	0.05		0.00	2	0.01
Sweden	1	0.91		0.00		0.00	2	0.03
United Kingdom	6	0.78	3	0.10		0.00	34	0.07
Grand Total	**15**	**0.28**	**13**	**0.06**	**2**	**0.00**	**57**	**0.01**

Inclusion criteria: Countries reporting ≥ 1 case(s) of serotype b in 2009.

Table A17 Total number of cases and notification rates (per 100 000 population) of invasive *H. influenzae* non-type b disease by age group and reporting country, 2008

Country	< 1 year		1–4 years		5–14 years		15+ years	
	n	NR (100 000)	n	NR (100 000)	n	NR (100 000)	n	NR (100 000)
Denmark	1	1.55	-	-	-	-	7	0.16
Finland	-	-	-	-	-	-	8	0.18
Greece	-	-	-	-	-	-	2	0.02
Hungary	1	1.04	1	0.26	-	-	2	0.02
Ireland	2	2.84	1	0.39	-	-	-	-
Italy	-	-	-	-	-	-	3	0.01
Slovenia	1	5.13	-	-	-	-	-	-
Sweden	2	1.86	3	0.72	1	0.10	26	0.34
United Kingdom	5	0.65	3	0.10	5	0.07	54	0.11
EU total	**12**	**0.23**	**8**	**0.04**	**6**	**0.01**	**102**	**0.02**
Norway	1	1.71	1	0.43	1	0.16	14	0.37
Total	**13**	**0.24**	**9**	**0.04**	**7**	**0.01**	**116**	**0.03**

Inclusion criteria: Countries reporting ≥ 1 case(s) of serotype non-type b in 2008.
NR= notification rate.

Table A18 Total number of cases and notification rates (per 100 000 population) of invasive *H. influenzae* non-type b disease by age group and reporting country, 2009

Country	< 1 year		1–4 years		5–14 years		15+ years	
	n	NR (100 000)	n	NR (100 000)	n	NR (100 000)	n	NR (100 000)
Czech Republic	-	-	-	-	-	-	1	0.01
Denmark	-	-	-	-	-	-	4	0.09
Finland	1	1.68	-	-	1	0.17	7	0.16
Greece	-	-	-	-	-	-	6	0.06
Hungary	-	-	1	0.26	-	-	1	0.01
Ireland	-	-	1	0.38	3	0.51	4	0.11
Italy	2	0.35	-	-	-	-	3	0.01
Malta	-	-	-	-	-	-	1	0.29
Slovenia	-	-	-	-	1	0.54	6	0.34
Spain	-	-	-	-	-	-	-	-
Sweden	-	-	1	0.23	1	0.10	14	0.18
United Kingdom	8	1.04	5	0.17	3	0.04	52	0.10
EU total	**11**	**0.20**	**9**	**0.04**	**9**	**0.02**	**99**	**0.02**
Norway	1	1.65	1	0.42	1	0.16	11	0.28
Total	**12**	**0.22**	**10**	**0.05**	**10**	**0.02**	**110**	**0.03**

Inclusion criteria: Countries reporting ≥ 1 case(s) of serotype non-type b in 2009.
NR= notification rate

Table A19 Total number of cases and notification rate (per 100 000 population) of invasive *H. influenzae* non-capsulated disease by age group and reporting country, 2008 (n=504)

Country	< 1 year		1–4 years		5–14 years		15–64 years		65+ years	
	n	NR (100 000)	n	NR (100 000)	n	NR (100 000)	n	NR (100 000)	n	NR (100 000)
Austria	1	1.32	-	-	-	-	-	-	3	0.21
Denmark	-	-	2	0.77	2	0.29	5	0.14	8	0.94
Finland	2	3.40	2	0.86	-	-	11	0.31	18	2.06
Ireland	1	1.42	-	-	1	0.17	4	0.13	6	1.25
Italy	1	0.18	2	0.09	-	-	7	0.02	9	0.08
Slovenia	1	5.13	3	4.10	-	-	3	0.21	4	1.22
Sweden	1	0.93	1	0.24	1	0.10	7	0.12	21	1.31
United Kingdom	46	5.96	16	0.56	7	0.10	110	0.27	148	1.50
EU total	**53**	**1.01**	**26**	**0.13**	**11**	**0.02**	**147**	**0.04**	**217**	**0.26**
Norway	-	-	1	0.43	-	-	18	0.57	31	4.47
Total	**53**	**1.00**	**27**	**0.13**	**11**	**0.02**	**165**	**0.05**	**248**	**0.29**

Inclusion criteria: Countries reporting ≥ 1 case(s) of non-caps in 2008.
NR= notification rate

Table A20 Total number of cases and notification rate (per 100 000 population) of invasive *H. influenzae* non-capsulated disease by age group and reporting country, 2009

Country	< 1 year		1–4 years		5–14 years		15–64 years		65+ years	
	n	NR (100 000)	n	NR (100 000)	n	NR (100 000)	n	NR (100 000)	n	NR (100 000)
Austria	-	-	2	0.63	1	0.12	6	0.11	4	0.28
Czech Republic	-	-	1	0.24	-	-	-	-	1	0.06
Denmark	1	1.53	1	0.38	-	-	9	0.25	9	1.03
Finland	-	-	-	-	1	0.17	13	0.37	16	1.79
Ireland	2	2.74	2	0.75	4	0.67	8	0.26	9	1.83
Italy	3	0.52	2	0.09	-	-	7	0.02	9	0.07
Malta	-	-	-	-	-	-	1	0.34	-	-
Slovenia	-	-	-	-	-	-	8	0.57	3	0.90
Sweden	1	0.91	1	0.23	2	0.20	10	0.16	28	1.70
United Kingdom	48	6.22	33	1.15	5	0.07	101	0.25	182	1.85
EU total	**55**	**1.02**	**42**	**0.20**	**13**	**0.02**	**163**	**0.05**	**261**	**0.30**
Norway	4	6.59	3	1.26	-	-	18	0.57	21	2.98
Total	**59**	**1.08**	**45**	**0.21**	**13**	**0.02**	**181**	**0.05**	**282**	**0.33**

Inclusion criteria: Countries reporting ≥ 1 case(s) of non-caps in 2009.
NR= notification rate

Table A21 Case fatality ratio and total number of confirmed invasive *H. influenzae* cases, by country, 2008

Country	Deaths (n)	Total number of cases (n)	Case fatality ratio (%)
Austria	0	5	0.0
Belgium	-	-	-
Bulgaria	-	-	-
Cyprus	-	-	-
Czech Republic	0	7	0.0
Denmark	1	32	3.1
Estonia	0	1	0.0
Finland	4	45	8.9
France	0	442	0.0
Germany	8	160	5.0
Greece	0	4	0.0
Hungary	2	6	33.3
Ireland	2	22	9.1
Italy	3	50	6.0
Latvia	0	1	0.0
Lithuania	0	3	0.0
Luxembourg	-	-	-
Malta	-	-	-
Netherlands	-	-	-
Poland	2	28	7.1
Portugal	0	5	0.0
Romania	1	2	50.0
Slovakia	0	4	0.0
Slovenia	1	12	8.3
Sweden	0	163	0.0
United Kingdom	59	773	7.6
EU total	**83**	**1 838**	**4.5**
Iceland	-	-	-
Liechtenstein	-	-	-
Norway	4	75	5.3
Total	**87**	**1 913**	**4.5**

Note: Outcome data are not collected in Spain.

Table A22 Case fatality ratio and total number of confirmed invasive *H. influenzae* cases, by country, 2009

Country	Deaths (n)	Total number of cases (n)	Case fatality ratio (%)
Austria	2	14	14.3
Belgium	-	-	-
Bulgaria	-	-	-
Cyprus	0	2	0.0
Czech Republic	0	10	0.0
Denmark	0	31	0.0
Estonia	1	1	100.0
Finland	13	47	27.7
France	-	-	-
Germany	10	196	5.1
Greece	0	13	0.0
Hungary	0	3	0.0
Ireland	2	43	4.7
Italy	4	56	7.1
Latvia	0	1	0.0
Lithuania	0	1	0.0
Luxembourg	-	-	-
Malta	2	3	66.7
Netherlands	-	-	-
Poland	1	19	5.3
Portugal	0	8	0.0
Romania	0	22	0.0
Slovakia	0	5	0.0
Slovenia	2	18	11.1
Sweden	0	146	0.0
United Kingdom	71	742	9.6
EU total	**108**	**1434**	**7.5**
Iceland	-	-	-
Liechtenstein	-	-	-
Norway	9	71	12.7
Total	**117**	**1505**	**7.8**

Note: Outcome data are not collected in Spain.

Table A23 Case fatality ratio of invasive *H. influenzae* disease and total number of cases by age group and serotype, all countries combined, 2008

Age group	b			non-b			non-caps			unknown		
	n deaths	n cases	CFR %	n deaths	n cases	CFR %	n deaths	n cases	CFR %	n deaths	n cases	CFR %
< 1 year	1	22	4.5	1	13	7.7	6	53	11.3	4	56	7.1
1–4 years	1	22	4.5	0	9	0.0	3	27	11.1	1	46	2.2
5–14 years	1	14	7.1	1	7	14.3	1	11	9.1	1	44	2.3
15–64 years	4	56	7.1	4	55	7.3	7	165	4.2	6	408	1.5
65+ years	2	26	7.7	4	61	6.6	26	248	10.5	13	568	2.3

Contributing countries: Austria, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Norway, Poland, Portugal, Romania, Slovakia, Slovenia and the United Kingdom.

Table A24 Case fatality ratio of invasive *H. influenzae* disease and total number of cases by age group and serotype, all countries combined, 2009

Age group	b			non-b			non-caps			unknown		
	n deaths	n cases	CFR	n deaths	n cases	CFR	n deaths	n cases	CFR	n deaths	n cases	CFR
<1 year	0	15	0.0	0	12	0.0	14	59	23.7	1	51	2.0
1-4 years	1	13	7.7	0	10	0.0	3	45	6.7	1	40	2.5
5-14 years	0	2	0.0	0	10	0.0	1	13	7.7	0	27	0.0
15-64 years	2	41	4.9	2	50	4.0	18	181	9.9	9	239	3.8
65+ years	2	16	12.5	6	60	10.0	36	282	12.8	21	334	6.3

Contributing countries: Austria, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia and the United Kingdom.

Table A25 Case fatality ratio of invasive *H. influenzae* by serotype and clinical presentation, all countries combined, 2008

Clinical presentation	b			non-b			non-caps			Unknown serotype		
	n deaths	n cases	CFR	n deaths	n cases	CFR	n deaths	n cases	CFR	n deaths	n cases	CFR
Meningitis and septicaemia	0	3	0.0	0	1	0.0	0	2	0.0	0	4	0.0
Meningitis	1	21	4.8	3	20	15.0	0	36	0.0	1	50	2.0
Septicemia	7	43	16.3	5	42	11.9	20	201	10.0	9	70	12.9
Pneumonia	0	1	0.0	0	2	0.0	2	19	10.5	3	70	4.3
Osteomyelitis	0	1	0.0	0	2	0.0	-	-	-	0	2	0.0
Cellulitis	0	1	0.0	-	-	-	-	-	-	-	-	-
Epiglottitis	0	1	0.0	-	-	-	-	-	-	-	-	-
Other	0	2	0.0	0	1	0.0	1	10	10.0	3	60	5.0
Unknown clinical presentation	1	58	1.7	2	74	2.7	20	236	8.5	3	812	0.4
Total serotype	9	131	6.9	10	142	7.0	43	504	8.5	19	1068	1.8

Contributing countries: Austria, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Norway, Poland, Portugal, Romania, Slovakia, Slovenia and the United Kingdom.

Table A26 Case fatality ratio of invasive *H. influenzae* by serotype and clinical presentation, all countries combined, 2009

Clinical presentation	b			non-b			non-caps			Unknown		
	n deaths	n cases	CFR	n deaths	n cases	CFR	n deaths	n cases	CFR	n deaths	n cases	CFR
Meningitis and septicaemia	1	5	20.0	0	1	0.0	1	3	33.3	0	6	0.0
Meningitis	0	19	0.0	0	17	0.0	4	37	10.8	1	70	1.4
Septicemia	2	25	8.0	4	45	8.9	21	238	8.8	12	101	11.9
Pneumonia	0	3	0.0	0	3	0.0	3	12	25.0	4	80	5.0
Osteomyelitis	-	-	-	-	-	-	-	-	-	0	1	0.0
Cellulitis	-	-	-	-	-	-	-	-	-	0	1	0.0
Epiglottitis	0	1	0.0	-	-	-	-	-	-	-	-	-
Other	-	-	-	1	2	50.0	2	11	18.2	1	63	1.6
Unknown clinical presentation	2	33	6.1	2	66	3	41	279	14.7	4	319	1.3
Total serotype	5	86	5.8	7	134	5.2	72	580	12.4	22	641	3.4

Contributing countries: Austria, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, Norway, Poland, Portugal, Romania, Slovakia, Slovenia and the United Kingdom.

Table A27 Total numbers of invasive *H. influenzae* serotype b disease among cases < 15 year of age with reported vaccination status, by country, 2008

Age groups	Country	Fully vaccinated		Partly vaccinated		Not vaccinated		Unknown		Total
		n	%	n	%	n	%	n	%	n
< 1 year	Denmark	0	0.0%	0	0.0%	1	100%	0	0.0%	1
	Ireland	0	0.0%	1	50.0%	1	50.0%	0	0.0%	2
	Poland	0	0.0%	0	0.0%	2	100%	0	0.0%	2
	United Kingdom	6	42.9%	0	0.0%	5	35.7%	3	21.4%	14
1–4 years	Czech Republic	0	0.0%	0	0.0%	1	100%	0	0.0%	1
	Denmark	1	100%	0	0.0%	0	0.0%	0	0.0%	1
	Finland	1	100%	0	0.0%	0	0.0%	0	0.0%	1
	Ireland	0	0.0%	0	0.0%	1	100%	0	0.0%	1
	Italy	1	100%	0	0.0%	0	0.0%	0	0.0%	1
	Norway	1	100%	0	0.0%	0	0.0%	0	0.0%	1
	Poland	0	0.0%	1	33.3%	2	66.7%	0	0.0%	3
	Romania	0	0.0%	0	0.0%	2	100%	0	0.0%	2
	United Kingdom	5	55.6%	0	0.0%	0	0.0%	4	44.4%	9
5–14 years	Czech Republic	1	50.0%	0	0.0%	1	50.0%	0	0.0%	2
	Italy	0	0.0%	0	0.0%	1	100%	0	0.0%	1
	Poland	0	0.0%	0	0.0%	2	100%	0	0.0%	2
	Sweden	2	100%	0	0.0%	0	0.0%	0	0.0%	2
	United Kingdom	7	100%	0	0.0%	0	0.0%	0	0.0%	7

Inclusion criteria: Countries reporting ≥ 1 case(s) of serotype b in 2008.

Table A28 Total numbers of invasive *H. influenzae* serotype b disease among cases < 15 year of age with reported vaccination status, by country, 2009

Age groups	Country	Fully vaccinated		Partly vaccinated		Not vaccinated		Unknown		Total
		n	%	n	%	n	%	n	%	n
< 1 year	Denmark	0	0.0%	0	0.0%	0	0.0%	1	100%	1
	Finland	0	0.0%	0	0.0%	0	0.0%	1	100%	1
	Lithuania	0	0.0%	0	0.0%	1	100%	0	0.0%	1
	Poland	0	0.0%	1	25.0%	3	75.0%	0	0.0%	4
	Slovakia	0	0.0%	0	0.0%	1	100%	0	0.0%	1
	Sweden	0	0%	0	0.0%	1	100%	0	0%	1
	United Kingdom	6	50%	2	16.7%	2	16.7%	2	16.7%	12
1–4 years	Czech Republic	1	100%	0	0.0%	0	0.0%	0	0.0%	1
	Finland	1	100%	0	0.0%	0	0.0%	0	0.0%	1
	Greece	0	0%	0	0.0%	1	50.0%	1	50.0%	2
	Ireland	0	0.0%	1	100%	0	0.0%	0	0.0%	1
	Italy	0	0.0%	0	0.0%	0	0.0%	1	100%	1
	Norway	1	100%	0	0.0%	0	0.0%	0	0.0%	1
	Poland	3	100%	0	0.0%	0	0.0%	0	0.0%	3
	United Kingdom	0	0.0%	0	0.0%	1	50.0%	1	50.0%	2
5–14 years	Greece	0	0.0%	0	0.0%	0	0.0%	1	100%	1
	Poland	0	0%	0	0.0%	1	100%	0	0.0%	1

Inclusion criteria: Countries reporting ≥ 1 case(s) of serotype b in 2009.

Table 24 Year of introduction of conjugate *H. influenzae* serotype b vaccination and childhood immunisation schedule in 2010

Country	Year of Hib introduction	Vaccine given	Combined with	Immunisation schedule	*Source date:*
Austria	1994	Hib-PRP-T	DTaP, IPV, HBV	2, 4, 6 months, AND 2nd year of life	*Jan-08*
Belgium	1993	Hib-PRP-T	DTaP, IPV, HBV	8, 12, 16 weeks AND 15 months	*Aug-08*
Bulgaria	2010	Hib-PRP-T	DTaP, IPV, Hib	2, 3, 4 months AND 16 months	*Jan -10*
Cyprus	2001	Hib-PRP-T	not combined	2–3, 4–5, 6–8, AND 12–18 months	*Mar-09*
Czech Republic	2001	Hib-PRP-T	DTaP, IPV, HBV	13 weeks, 17 weeks–1 year, 21 weeks–1 year, 11 months 1 week–18 months	*Sep-07*
Denmark	1993	Hib-PRP-T	DTaP, IPV	3, 5, AND 12 months	*Mar-09*
Estonia	2005	Hib-PRP-T	DTaP, IPV	3, 4.5, 6 months AND 2 years	*Febr-11*
Finland	1986	Hib-PRP-T	DTaP, IPV	3, 5, AND 12 months	*Sep-09*
France	1992	Hib-PRP-T	DTaP, IPV, HBV	2, 3, 4, AND 16–18 months	*Mar-09*
Germany	1990	Hib-PRP-T	DTaP, IPV, HBV	2, 3, 4 months AND 11–14 months	*Jul-09*
Greece	1999	Hib-PRP-T	DTaP, IPV/OPV, HBV	2, 4, 6, AND 12–15 months	*Apr-07*
Hungary	1999	Hib-PRP-T	DTaP, IPV	2, 3, 4, AND 18 months	*Jan-10*
Iceland	1989	Hib-PRP-T	DTaP, IPV	3, 5, AND 12 months	*Oct-07*
Ireland	1992	Hib-PRP-T	DTaP, IPV, HBV	2, 4, 6, AND 13 months	*Jan-09*

Country	Year of Hib introduction	Vaccine given	Combined with	Immunisation schedule	*Source date:*
Italy	1995 (1999 included in routine schedule)	Hib PRP-T	DTaP, IPV, HBV	3, 5, AND 11 months	*Oct-10*
Latvia	1994	Hib-PRP-T	DTaP, IPV, HBV	2, 4, 6 AND 12–15 months	*Apr-10*
Lichtenstein	-	-	-	-	
Lithuania	2004	Hib-PRP-T	DTaP, IPV	2, 4, 6 AND 18 months	*Jan-08*
Luxembourg	-	-	1st, 2nd and 4th dose: DTaP, IPV, HBV 3rd dose: DTaP, IPV	2, 3, 4 AND 12 months	*Apr-08*
Malta	1996	Hib-PRP-T	Public: DTwP-OPV Private: DTaP-IPV-HBV	Public: 6–8 weeks, 3 AND 4 months Private: 2, 3, 4, AND 12–18 months	*Mar-09*
Netherlands	1993	Hib-PRP-T	DTaP, IPV	2, 3, 4, AND 11 months	*Dec-06*
Norway	1992	-	DTaP, IPV	3, 5, 12 months	*Sep-06*
Poland	2005	Hib		2, 3–4, 5–6, AND 16–18 months	*Apr-07*
Portugal	2000	Hib	1st, 2nd and 3rd dose: DTaP, IPV 4th dose: DTaP	2, 4, 6, AND 18 months	*Mar-09*
Romania	2010	Hib-PRP-T	DTaP-IPV-Hib	2, 4, 6 AND 12 months	*Jan-10*
Slovakia	2000	Hib	DTaP-IPV-HBV	2, 4 AND 10 months	*Mar-09*
Slovenia	2000	Hib-PRP-T	DTaP, IPV	3, 4–5, 6, AND 12–24 months	*Apr-09*
Spain	1998	Hib-PRP-T	DTaP, IPV, IPV	2, 4, 6, AND 15–18 months	*Jun-08*
Sweden	1993	Hib-PRP-T	DTaP, IPV	3, 5, AND 12 months	*Apr-10*
United Kingdom	1992	Hib-PRP-T	1st, 2nd and 3rd dose: DTaP, IPV 4th dose: MenC	2, 3, 4 AND 12 months	*Apr-10*

Source: EUVAC.NET (June 2010) *http://www.euvac.net/graphics/euvac/vaccination/vaccination.html*
Cyprus and Estonia: comments from the countries.

Annex 3: Invasive meningococcal disease

Methods

Table B1 Invasive menincococcal disease EU case definitions, 2002 and 2008

EU case definition confirmed 2002 (Decision 2002/253/EC)	EU case definition confirmed 2008 (EC Decision of 28/IV/2008)
Confirmed case A clinically compatible case diagnosed by one or more of the following laboratory criteria: • Isolation of *N. meningitidis* from a normally sterile site • Detection of *N. meningitidis* nucleic acid from normally sterile site • Detection of *N. meningitidis* antigen from normally sterile site • Demonstration of Gram-negative diplococci from normally sterile site by microscopy *Probable case* A clinically compatible case that is diagnosed by one or more of the following laboratory criteria: • *N. meningitidis* identification from a non-sterile site • High levels of meningococcal antibody in convalescent serum or • Clinical picture compatible with meningococcal disease (e.g. meningitis and/or meningococcemia that may progress rapidly to *purpura fulminans*, shock and death. Other manifestations are possible) without any laboratory confirmation.	*Clinical criteria* Any person with at least one of the following five: • Fever • Meningeal signs • Petechial rash • Septic shock • Septic arthritis *Laboratory criteria* At least one of the following four: • Isolation of *N. meningitidis* from normally sterile site, including purpuric skin lesions • Detection of *N. meningitidis* nucleic acid from a normally sterile site, including purpuric skin lesions • Detection of *N. meningitidis* antigen in CSF • Detection of Gram-negative stained diplococci in CSF *Epidemiological criteria* • An epidemiological link by human-to-human transmission *Case classification* A. Possible case • Any person meeting the clinical criteria B. Probable case • Any person meeting the clinical criteria and with an epidemiological link C. Confirmed case • Any person meeting the laboratory criteria

Data source

Table B2 Overview of the sources of data used for invasive meningococcal disease report, 2008–2009

Country	DataSource*	LegalCharacter	Comprehensiveness	Active	CaseBased	Data reported by			
						Laboratories	Physicians	Hospitals	Others
Austria	AT-Epidemiegesetz	Cp	Co	P	C	Y	Y	Y	Y
Belgium	BE FRENCHCOMMUNITY BE FLANDERS_BRUSSEL	Cp	Co	P	C	Y	Y	Y	Y
Bulgaria	BG-NATIONAL_SURVEILLANCE	Cp	Co	P	A	Y	Y	Y	Y
Cyprus	CY -NOTIFIED_DISEASES	Cp	Co	P	C	N	Y	N	N
Czech Republic	CZ-EPIDAT	Cp	Co	P	C	Y	Y	Y	N
Denmark	DK-MIS	Cp	Co	P	C	N	Y	N	N
Estonia	EE-MENINGOCOCC	Cp	Co	P	C	Y	Y	Y	Y
Finland	FI-NIDR	Cp	Co	P	C	Y	Y	N	N
France	FR-MANDATORY_INFECTIOUS_DISEASES	Cp	Co	P	C	Y	Y	Y	Y
Germany	DE-SURVNET@RKI-7.1/6	Cp	Co	P	C	Y	Y	Y	Y
Greece	GR-NOTIFIABLE_DISEASES	Cp	Co	P	C	Y	Y	Y	N
Hungary	HU-EFRIR	Cp	Co	P	C	Y	Y	Y	N
Iceland	IS-SUBJECT_TO_REGISTRATION	Cp	Co	P	C	Y	Y	Y	N
Ireland	IE-CIDR	Cp	Co	P	C	Y	Y	Y	N
Italy	IT-MENINGITIS	Cp	Co	P	C	N	Y	Y	N
Latvia	LV-BSN	Cp	Co	P	C	Y	Y	Y	N
Latvia	LV-LABORATORY	Cp	Co	P	C	Y	N	N	N
Lithuania	LT-COMMUNICABLE_DISEASES	Cp	Co	P	C	Y	Y	N	N
Luxembourg	LU-SYSTEM1	Cp	Co	P	C	-	Y	N	N
Malta	MT-DISEASE_SURVEILLANCE	Cp	Co	P	C	Y	Y	Y	Y
Netherlands	NL-AGGR	Cp	Co	P	A	Y	Y	N	Y
Netherlands	NL-OSIRIS	Cp	Co	P	C	Y	Y	N	Y
Norway	NO-MSIS_A	Cp	Co	P	C	Y	Y	Y	N
Poland	PL-NATIONAL_SURVEILLANCE	Cp	Co	P	C	Y	Y	N	N
Portugal	PT-MENINGOCOCAL	Cp	Co	P	C	Y	Y	N	N
Romania	RO-RNSSy	Cp	Co	P	C	N	N	Y	N
Slovakia	SK-EPIS	Cp	Co	P	C	Y	Y	Y	N
Slovenia	SI-SURVIVAL	Cp	Co	P	C	Y	Y	Y	N
Spain	ES STATUTORY_DISEASES	Cp	Co	P	C	N	Y	Y	N
Sweden	SE-SMINET	Cp	Co	P	C	Y	Y	N	N
United Kingdom	UK-MENINGOCOCCAL	O	Co	P	C	Y	N	Y	Y

**Sources of data used in the report.*
Cp: compulsory; Co: comprehensive; P: passive; C: case-based; A: active; Y: Yes; N: No.
Clinically and laboratory notified cases are linked at national level, and submitted to TESSY with a single identifier.

Data quality

Table B3 Summary of the completeness of invasive meningococcal disease surveillance data, EU/EEA countries, 2008–2009

Variable	Completeness (%)			2008			2009		
	2008–2009	2008	2009	Countries (N=28)	Min %	Max %	Countries (N=28)	Min %	Max %
Age	99.4	99.4	99.4	27	74.1	100.0	28	71.6	100.0
Classification	98.5	98.6	98.4	27	57.1	100.0	28	66.7	100.0
ClinicalCriteria	82.6	80.4	85.0	23	1.2	100.0	26	57.1	100.0
ClinicalPresentation	50.7	48.6	52.8	18	8.9	100.0	21	11.2	100.0
DateUsedForStatistics	100.0	100.0	100.0	28	100.0	100.0	28	100.0	100.0
DateOfDiagnosis	41.1	39.6	42.6	16	59.3	100.0	18	50.0	100.0
DateOfNotification	46.2	46.4	46.1	22	2.1	100.0	21	11.2	100.0
DateOfOnset	79.4	78.7	80.1	24	50.0	100.0	25	48.5	100.0
EpiLinked	34.6	34.9	34.2	18	1.2	100.0	17	1.2	100.0
Gender	97.7	99.6	95.7	27	98.6	100.0	28	45.6	100.0
Imported	46.8	45.1	48.6	21	4.4	100.0	23	1.4	100.0
LaboratoryResult	95.4	93.9	96.9	25	50.0	100.0	28	55.6	100.0
MIC_CIP	24.8	27.9	21.4	10	21.6	100.0	11	20.0	100.0
MIC_CTX	9.8	9.1	10.5	7	3.3	100.0	7	32.4	94.2
MIC_PEN	25.1	28.2	21.8	13	9.9	100.0	14	2.5	100.0
MIC_RIF	23.6	26.7	20.2	9	21.6	100.0	11	20.0	100.0
Outcome	91.7	91.6	91.8	26	24.7	100.0	28	34.6	100.0
Pathogen	98.7	97.6	99.9	26	50.0	100.0	28	55.6	100.0
ResultFetVR	11.4	6.1	17.1	8	0.5	86.1	9	13.3	81.8
ResultMLST1	10.9	6.2	16.0	7	3.5	66.7	9	8.6	70.5
ResultPorA1	25.1	20.9	29.5	13	7.0	91.7	15	12.4	97.7
ResultPorA2	25.2	20.9	29.7	13	7.5	91.7	15	12.4	97.7
Serogroup	87.7	87.6	87.8	25	33.9	100.0	26	32.4	100.0
Specimen1	78.1	76.0	80.2	23	1.2	100.0	25	45.7	100.0
Specimen2	16.1	16.2	15.9	18	0.3	100.0	21	0.2	100.0
TestMethod1	79.5	77.8	81.3	21	85.3	100.0	23	60.0	100.0
TestMethod2	52.7	54.2	51.0	17	2.5	100.0	19	2.9	100.0
VaccStatus	34.9	33.8	36.1	16	7.6	100.0	19	7.9	100.0

**N= Number of countries reporting the variable*
Due to aggregated reporting, Bulgaria is not included in the table.
Missing, not applicable and UNK values have been classified as incomplete values.

Results

Table B4 Number and percentage distribution of laboratory test methods used to confirm a case of invasive meningococcal disease, by country, 2008

Country	Cult		Nuclacid		ATG		Genoseq		Micro		Other		Na		Unk		Missing		Total (valid tests)	Total
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%		
Austria	60	66.67	27	30.00	0	0.00	0	0.00	3	3.33	0	0.00	8	8.16	0	0.00	0	0.00	90	98
Belgium	109	99.09	1	0.91	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	110	110
Bulgaria	0	-	0	-	0	0.00	0	-	0	-	0	-	0	0.00	0	-	20	-	-	20
Cyprus	2	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	2
Czech Republic	59	71.95	20	24.39	0	0.00	0	0.00	2	2.44	0	0.00	0	0.00	1	1.22	0	0.00	82	82
Denmark	59	93.65	1	1.59	3	4.76	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	63	63
Estonia	6	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	25.00	0	0.00	0	0.00	6	8
Finland	54	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	54	54
France	613	58.10	176	16.68	21	1.96	0	0.00	227	21.52	0	0.00	0	0.00	18	1.71	15	0.00	1055	1070
Germany	331	60.96	71	13.08	45	8.29	0	0.00	0	0.00	95	17.50	0	0.00	1	0.18	0	0.00	543	543
Greece	54	29.35	57	30.98	12	6.52	32	17.39	29	15.76	0	0.00	0	0.00	0	0.00	0	0.00	184	184
Hungary	26	42.62	9	14.75	9	14.75	0	0.00	17	27.87	0	0.00	0	0.00	0	0.00	0	0.00	61	61
Ireland	79	40.51	116	59.49	0	0.00	0	0.00	0	0.00	0	0.00	1	0.50	3	0.00	0	0.00	195	199
Italy	158	77.07	7	3.41	33	16.10	0	0.00	7	3.41	0	0.00	0	0.00	0	0.00	0	0.00	205	205
Latvia	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	14	100.00	0	0.00	7	14
Lithuania	0	-	0	-	0	0.00	0	-	0	-	0	-	0	0.00	0	-	68	-	-	68
Luxembourg	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	4	100.00	0	0.00	2	4
Malta	0	0.00	0	0.00	0	0.00	0	0.00	5	100.00	0	0.00	0	0.00	0	0.00	0	0.00	5	5
Netherlands	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	162	100.00	0	0.00	162	162
Poland	230	71.65	82	25.55	1	0.25	0	0.00	0	0.00	0	0.00	66	16.58	19	2.49	0	0.00	321	398
Portugal	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	60	100.00	0	0.00	60	60
Romania	29	28.43	0	0.00	25	24.51	11	10.78	36	35.29	1	0.98	0	0.00	0	0.00	0	0.00	102	102
Slovakia	36	75.00	0	0.00	8	16.67	0	0.00	3	6.25	0	0.00	0	0.00	1	2.08	0	0.00	48	48
Slovenia	20	83.33	4	16.67	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	24	24
Spain	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	590	100.00	0	0.00	590	590
Sweden	41	73.21	8	14.29	7	12.50	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	56	56
United Kingdom	598	44.04	655	48.23	0	0.00	23	1.69	0	0.00	78	5.74	0	0.00	5	0.29	0	0.00	1358	1359
EU total	**2564**	**47.61**	**1234**	**22.92**	**164**	**2.93**	**66**	**1.23**	**329**	**6.11**	**174**	**3.23**	**77**	**1.38**	**878**	**15.86**	**103**	**0.00**	**5385**	**5589**
Iceland	3	100.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	3
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	29	80.56	6	16.67	0	0.00	0	0.00	0	0.00	0	0.00	3	7.69	1	2.78	0	0.00	36	39
Total	**2596**	**47.86**	**1240**	**22.86**	**164**	**2.91**	**66**	**1.22**	**329**	**6.07**	**174**	**3.21**	**80**	**1.42**	**879**	**15.76**	**103**	**0.00**	**5424**	**5631**

Table B5 Number and percentage distribution of laboratory test methods used to confirm a case of invasive meningococcal disease, by country, 2009

Country	Culture		Nuclacid		ATG		GENOSEQ		Microscopy		Other		Not applicable		Unk		Missing		Total (valid tests)	Total
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%		
Austria	54	57.45	37	39.36	0	0	0	0	0	0	3	3.19	0	0	0	0	0	0	94	94
Belgium	103	99.04	0	0	0	0	1	0.96	0	0	0	0	0	0	0	0	0	0	104	104
Bulgaria	0	-	0	-	0	-	0	-	0	-	0	-	0	0	0	-	16	-	-	16
Cyprus	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Czech Republic	58	72.5	19	23.75	1	1.25	0	0	2	2.5	0	0	0	0	0	0	0	0	80	80
Denmark	58	81.69	4	5.63	3	4.23	0	0	2	2.82	1	1.41	0	0	3	4.23	0	0	71	71
Estonia	7	100	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	7	10
Finland	65	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	65
France	486	50.26	216	22.34	20	2.07	0	0	224	23.16	0	0	0	0	21	2.17	11	0	967	978
Germany	310	55.56	94	16.85	40	7.17	0	0	0	0	108	19.35	0	0	6	1.08	0	0	558	558
Greece	32	22.07	62	42.76	5	3.45	28	19.31	18	12.41	0	0	0	0	0	0	0	0	145	145
Hungary	25	34.25	16	21.92	10	13.7	5	6.85	17	23.29	0	0	0	0	0	0	0	0	73	73
Ireland	70	40.46	101	58.38	0	0	0	0	0	0	0	0	0	0	5	1.16	0	0	173	176
Italy	164	80.79	16	7.88	21	10.3	0	0	2	0.99	0	0	0	0	0	0	0	0	203	203
Latvia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	100	0	0	5	10
Lithuania	36	65.45	0	0	0	0	0	0	0	0	19	34.55	0	0	0	0	0	0	55	55
Luxembourg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	100	0	0	3	6
Malta	0	0	0	0	0	0	0	0	5	100	0	0	0	0	0	0	0	0	5	5
Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	100	0	0	150	150
Poland	206	66.88	87	28.25	14	4.55	0	0	0	0	0	0	40	11.49	1	0.32	0	0	308	348
Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	100	0	0	65	65
Romania	24	22.86	0	0	21	20	15	14.29	45	42.86	0	0	0	0	0	0	0	0	105	105
Slovakia	34	87.18	1	2.56	3	7.69	0	0	1	2.56	0	0	0	0	0	0	0	0	39	39
Slovenia	11	73.33	4	26.67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	15
Spain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	533	100	0	0	533	533
Sweden	53	67.95	22	28.21	3	3.85	0	0	0	0	0	0	0	0	0	0	0	0	78	78
United Kingdom	463	38.84	615	51.59	1	0.08	29	2.43	0	0	83	6.96	0	0	1	0.08	0	0	1192	1192
EU total	**2260**	**44.37**	**1294**	**25.4**	**142**	**2.79**	**78**	**1.53**	**316**	**6.2**	**214**	**4.2**	**40**	**0.77**	**804**	**15.51**	**27**	**0**	**5094**	**5175**
Iceland	3	60	2	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	38	86.36	6	13.64	0	0	0	0	0	0	0	0	3	6.38	0	0	0	0	44	47
Total	**2301**	**44.74**	**1302**	**25.32**	**142**	**2.76**	**78**	**1.52**	**316**	**6.14**	**214**	**4.16**	**43**	**0.82**	**804**	**15.36**	**27**	**0**	**5143**	**5227**

Table B6 Notification rate (per 100 000 population) and total number of cases on invasive meningococcal disease cases by classification, by country, 2008

Country	Number of cases				Population	Incidence			
	Confirmed	Probable	Other	Total		Confirmed	Probable	Other	Total
Austria	84	0	11	95	8 318 592	1.01	0.00	0.13	1.14
Belgium	110	0	1	111	10 666 866	1.03	0.00	0.01	1.04
Bulgaria	20	0	9	29	7 640 238	0.26	0.00	0.12	0.38
Cyprus	2	0	0	2	789 269	0.25	0.00	0.00	0.25
Czech Republic	82	2	0	84	10 381 130	0.79	0.02	0.00	0.81
Denmark	63	0	5	68	5 475 791	1.15	0.00	0.09	1.24
Estonia	6	0	0	6	1 340 935	0.45	0.00	0.00	0.45
Finland	28	0	0	28	5 300 484	0.53	0.00	0.00	0.53
France	673	0	6	679	63 982 881	1.05	0.00	0.01	1.06
Germany	452	0	0	452	82 217 837	0.55	0.00	0.00	0.55
Greece	78	1	2	81	11 213 785	0.70	0.01	0.02	0.72
Hungary	30	0	0	30	10 045 401	0.30	0.00	0.00	0.30
Ireland	152	0	10	162	4 401 335	3.45	0.00	0.23	3.68
Italy	178	0	5	183	59 619 290	0.30	0.00	0.01	0.31
Latvia	7	1	6	14	2 270 894	0.31	0.04	0.26	0.62
Lithuania	48	0	20	68	3 366 357	1.43	0.00	0.59	2.02
Luxembourg	2	0	0	2	483 799	0.41	0.00	0.00	0.41
Malta	3	0	0	3	410 290	0.73	0.00	0.00	0.73
Netherlands	162	0	0	162	16 405 399	0.99	0.00	0.00	0.99
Poland	321	0	52	373	38 115 641	0.84	0.00	0.14	0.98
Portugal	60	0	17	77	10 617 575	0.57	0.00	0.16	0.73
Romania	99	16	0	115	21 528 627	0.46	0.07	0.00	0.53
Slovakia	48	2	1	51	5 400 998	0.89	0.04	0.02	0.94
Slovenia	24	0	0	24	2 010 269	1.19	0.00	0.00	1.19
Spain	590	0	0	590	45 283 259	1.30	0.00	0.00	1.30
Sweden	49	0	0	49	9 182 927	0.53	0.00	0.00	0.53
United Kingdom	1 355	0	47	1 402	61 179 256	2.21	0.00	0.08	2.29
EU total	**4 726**	**22**	**192**	**4 940**	**497 649 125**	**0.95**	**0.00**	**0.04**	**0.99**
Iceland	2	0	0	2	315 459	0.63	0.00	0.00	0.63
Liechtenstein	-	-	-	-	35 356	-	-	-	-
Norway	36	0	0	36	473 7171	0.76	0.00	0.00	0.76
Total	**4 764**	**22**	**192**	**4 978**	**502 737 111**	**0.95**	**0.00**	**0.04**	**0.99**

Table B7 Notification rate (per 100 000 population) and total number of cases on invasive meningococcal, disease cases by classification, by country, 2009

Country	Number of cases				Population	Incidence			
	Confirmed	Probable	Other	Total		Confirmed	Probable	Other	Total
Austria	89	0	11	100	8 355 260	1.07	0.00	0.13	1.20
Belgium	104	0	0	104	10 750 000	0.97	0.00	0.00	0.97
Bulgaria	16	0	9	25	7 606 551	0.21	0.00	0.12	0.33
Cyprus	1	0	0	1	796 875	0.13	0.00	0.00	0.13
Czech Republic	80	0	0	80	10 467 542	0.76	0.00	0.00	0.76
Denmark	71	0	2	73	5 511 451	1.29	0.00	0.04	1.32
Estonia	5	0	0	5	1 340 415	0.37	0.00	0.00	0.37
Finland	33	0	0	33	5 326 314	0.62	0.00	0.00	0.62
France	614	0	4	618	64 350 759	0.95	0.00	0.01	0.96
Germany	485	0	0	485	82 002 356	0.59	0.00	0.00	0.59
Greece	77	1	3	81	11 260 402	0.68	0.01	0.03	0.72
Hungary	37	0	0	37	10 030 975	0.37	0.00	0.00	0.37
Ireland	134	0	16	150	4 450 014	3.01	0.00	0.36	3.37
Italy	181	0	0	181	60 045 068	0.30	0.00	0.00	0.30
Latvia	5	1	3	9	2 261 294	0.22	0.04	0.13	0.40
Lithuania	39	0	26	65	3 349 872	1.16	0.00	0.78	1.94
Luxembourg	3	0	0	3	493 500	0.61	0.00	0.00	0.61
Malta	4	0	0	4	413 609	0.97	0.00	0.00	0.97
Netherlands	150	0	3	153	16 485 787	0.91	0.00	0.02	0.93
Poland	301	0	4	305	38 135 876	0.79	0.00	0.01	0.80
Portugal	65	0	1	66	10 627 250	0.61	0.00	0.01	0.62
Romania	102	9	0	111	21 498 616	0.47	0.04	0.00	0.52
Slovakia	39	0	1	40	5 412 254	0.72	0.00	0.02	0.74
Slovenia	15	0	0	15	2 032 362	0.74	0.00	0.00	0.74
Spain	533	0	0	533	45 828 172	1.16	0.00	0.00	1.16
Sweden	65	0	0	65	9 256 347	0.70	0.00	0.00	0.70
United Kingdom	1 190	0	56	1 246	61 634 599	1.93	0.00	0.09	2.02
EU total	**4 438**	**11**	**139**	**4 588**	**499 723 520**	**0.89**	**0.00**	**0.03**	**0.92**
Iceland	5	0	0	5	319 368	1.57	0.00	0.00	1.57
Liechtenstein	-	-	-	-	35 589	-	-	-	-
Norway	44	0	0	44	4 799 252	0.92	0.00	0.00	0.92
Total	**4 487**	**11**	**139**	**4 637**	**504 877 729**	**0.89**	**0.00**	**0.03**	**0.92**

Table B8 Seasonal distribution of total number of invasive meningococcal disease cases, by country, 2008

Country	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Unk	Total
Austria	8	15	16	8	4	9	6	1	4	5	4	15	0	95
Belgium	16	12	12	10	6	8	6	6	7	7	8	13	0	111
Bulgaria	4	6	2	2	2	2	3	0	1	2	1	4	0	29
Cyprus	0	0	1	0	0	0	1	0	0	0	0	0	0	2
Czech Republic	15	6	8	12	8	4	7	5	3	2	5	9	0	84
Denmark	4	7	9	4	4	4	0	2	8	8	7	11	0	68
Estonia	1	1	0	1	0	0	0	0	1	0	0	2	0	6
Finland	3	5	5	2	0	4	1	0	2	0	4	2	0	28
France	95	62	65	75	54	46	45	38	36	54	52	57	0	679
Germany	49	56	51	31	35	41	21	23	32	28	40	45	0	452
Greece	11	13	10	10	5	2	4	3	1	6	5	11	0	81
Hungary	7	0	5	4	2	2	0	0	1	7	2	0	0	30
Ireland	25	17	10	10	13	8	16	8	10	7	15	23	0	162
Italy	27	24	29	18	9	8	9	3	5	14	17	20	0	183
Latvia	0	0	0	0	0	0	0	0	0	0	0	0	14	14
Lithuania	5	5	5	9	9	6	3	2	8	8	7	1	0	68
Luxembourg	0	0	0	0	0	0	0	0	1	0	0	1	0	2
Malta	0	1	0	0	0	1	0	1	0	0	0	0	0	3
Netherlands	21	10	11	24	12	0	17	12	13	14	12	16	0	162
Poland	32	43	40	35	30	25	20	18	12	31	33	54	0	373
Portugal	9	8	8	7	9	3	4	2	8	5	6	8	0	77
Romania	4	11	8	18	16	10	8	10	5	10	4	11	0	115
Slovakia	3	6	7	7	1	5	4	4	2	4	3	5	0	51
Slovenia	3	6	1	3	1	2	1	2	0	1	2	2	0	24
Spain	106	83	57	53	25	36	39	21	25	43	43	59	0	590
Sweden	8	1	0	5	3	6	3	4	6	4	6	3	0	49
United Kingdom	234	111	103	135	95	69	89	74	57	121	96	218	0	1 402
EU total	**690**	**509**	**463**	**483**	**343**	**301**	**307**	**239**	**248**	**381**	**372**	**590**	**14**	**4 940**
Iceland	0	0	1	0	0	0	0	0	0	1	0	0	0	2
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	0	3	4	2	5	0	4	4	6	4	0	4	0	36
Total	**690**	**512**	**468**	**485**	**348**	**301**	**311**	**243**	**254**	**386**	**372**	**594**	**14**	**4 978**

Table B9 Seasonal distribution of total number of invasive meningococcal disease cases, by country, 2009

Country	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Unk	Total
Austria	15	10	8	7	11	7	8	5	5	4	13	7	0	100
Belgium	15	17	13	8	9	3	5	7	4	8	4	11	0	104
Bulgaria	4	4	2	2	2	1	3	2	0	1	3	1	0	25
Cyprus	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Czech Republic	10	6	10	5	2	2	10	3	4	11	10	7	0	80
Denmark	11	9	5	6	5	8	7	2	3	4	6	7	0	73
Estonia	0	0	2	0	1	1	0	0	0	0	0	1	0	5
Finland	3	2	5	1	3	2	3	5	1	4	3	1	0	33
France	95	73	65	60	49	33	38	34	26	46	52	47	0	618
Germany	78	56	78	37	33	34	23	24	23	23	37	39	0	485
Greece	9	15	11	10	5	5	6	1	3	4	5	7	0	81
Hungary	10	2	5	2	4	3	3	1	0	3	0	4	0	37
Ireland	21	23	12	11	9	12	11	7	13	12	5	14	0	150
Italy	27	24	29	24	11	13	6	4	7	10	17	9	0	181
Latvia	0	0	0	0	0	0	0	0	0	0	0	0	9	9
Lithuania	6	3	5	6	9	4	6	4	6	3	6	7	0	65
Luxembourg	0	0	0	0	0	0	1	0	0	0	2	0	0	3
Malta	0	2	2	0	0	0	0	0	0	0	0	0	0	4
Netherlands	0	24	23	16	6	10	26	15	7	12	10	4	0	153
Poland	35	40	32	17	36	21	21	12	12	24	29	26	0	305
Portugal	20	7	8	4	4	2	1	5	3	1	5	6	0	66
Romania	21	19	12	13	8	2	0	5	7	6	7	11	0	111
Slovakia	4	6	3	4	2	2	4	4	0	1	6	4	0	40
Slovenia	4	0	1	1	0	1	3	0	0	3	0	2	0	15
Spain	110	65	50	35	48	25	28	26	26	34	42	44	0	533
Sweden	10	9	5	1	4	3	7	5	9	5	5	2	0	65
United Kingdom	234	109	110	99	84	94	68	52	52	129	112	103	0	1 246
EU total	**742**	**525**	**496**	**370**	**345**	**288**	**288**	**223**	**211**	**348**	**379**	**364**	**9**	**4 588**
Iceland	1	0	1	0	1	0	0	0	0	1	1	0	0	5
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	5	5	3	2	3	5	1	4	3	6	1	6	0	44
Total	**748**	**530**	**500**	**372**	**349**	**293**	**289**	**227**	**214**	**355**	**381**	**370**	**9**	**4 637**

Table B10 Total number of invasive meningococcal disease cases and notification rate by gender and by country, 2008

Country	Males cases	Females cases	Unknown gender cases	Male population	Fermale population	Incidence in males	Incidence in females
Austria	53	42	0	4 048 633	4 269 959	1.31	0.98
Belgium	56	55	0	5 224 309	5 442 557	1.07	1.01
Bulgaria	0	0	29	3 699 689	3 940 549	0.00	0.00
Cyprus	1	1	0	389 562	399 707	0.26	0.25
Czech Republic	39	45	0	5 082 934	5 298 196	0.77	0.85
Denmark	36	32	0	2 712 666	2 763 125	1.33	1.16
Estonia	3	3	0	617 410	723 525	0.49	0.41
Finland	15	13	0	2 596 787	2 703 697	0.58	0.48
France	356	323	0	30 978 462	33 025 871	1.15	0.98
Germany	239	213	0	40 274 292	41 943 545	0.59	0.51
Greece	41	40	0	5 553 895	5 659 890	0.74	0.71
Hungary	15	15	0	4 769 562	5 275 839	0.31	0.28
Ireland	96	66	0	2 197 483	2 203 852	4.37	2.99
Italy	103	80	0	28 949 747	30 669 543	0.36	0.26
Latvia	9	5	0	1 046 904	1 223 990	0.86	0.41
Lithuania	38	30	0	1 566 994	1 799 363	2.43	1.67
Luxembourg	0	2	0	239 607	244 192	0.00	0.82
Malta	0	3	0	204 106	206 184	0.00	1.46
Netherlands	83	79	0	8 112 073	8 293 326	1.02	0.95
Poland	214	159	0	18 411 501	19 704 140	1.16	0.81
Portugal	49	28	0	5 138 807	5 478 768	0.95	0.51
Romania	66	49	0	10 490 913	11 037 714	0.63	0.44
Slovakia	29	22	0	2 623 127	2 777 871	1.11	0.79
Slovenia	10	14	0	986 533	1 023 736	1.01	1.37
Spain	298	291	1	22 356 882	22 926 377	1.33	1.27
Sweden	27	22	0	4 563 921	4 619 006	0.59	0.48
United Kingdom	730	653	19	30 033 722	31 145 534	2.43	2.10
EU total	**2 606**	**2 285**	**49**	**242 870 521**	**254 800 056**	**1.07**	**0.90**
Iceland	1	1	0	160 896	154 563	0.62	0.65
Liechtenstein	-	-	-	17 448	17 908	-	-
Norway	15	21	0	2 359 690	2 377 481	0.64	0.88
Total	**2 622**	**2 307**	**49**	**245 408 555**	**257 350 008**	**1.07**	**0.90**

Cases with blank gender are not shown.

Table B11 Total number of invasive meningococcal disease cases and notification rate by gender and by countries, 2009

Country	Mele cases	Female cases	Unknown gender cases	Male population	Female population	Incidence in males	Incidence in females
Austria	53	47	0	4 068 047	4 287 213	1.30	1.10
Belgium	40	64	0	5 224 309	5 442 557	0.77	1.18
Bulgaria	0	0	25	3 681 280	3 925 271	0.00	0.00
Cyprus	0	1	0	395 001	401 874	0.00	0.25
Czech Republic	40	40	0	5 136 377	5 331 165	0.78	0.75
Denmark	40	33	0	2 732 020	2 779 431	1.46	1.19
Estonia	5	0	0	617 299	723 116	0.81	0.00
Finland	19	14	0	2 611 653	2 714 661	0.73	0.52
France	336	281	0	31 158 647	33 208 315	1.08	0.85
Germany	264	221	0	40 184 283	41 818 073	0.66	0.53
Greece	43	38	0	5 576 740	5 683 662	0.77	0.67
Hungary	22	15	0	4 763 050	5 267 925	0.46	0.28
Ireland	84	65	1	2 214 847	2 235 183	3.79	2.91
Italy	92	85	4	29 152 423	30 892 645	0.32	0.28
Latvia	5	4	0	1 043 120	1 218 174	0.48	0.33
Lithuania	35	30	0	1 559 247	1 790 625	2.24	1.68
Luxembourg	2	1	0	244 835	248 665	0.82	0.40
Malta	4	0	0	205 873	207 736	1.94	0.00
Netherlands	73	80	0	8 156 396	8 329 391	0.90	0.96
Poland	0	139	166	18 414 926	19 720 950	0.00	0.70
Portugal	43	23	0	5 142 566	5 484 684	0.84	0.42
Romania	64	47	0	10 472 812	11 025 804	0.61	0.43
Slovakia	27	13	0	2 629 804	2 782 450	1.03	0.47
Slovenia	11	4	0	1 003 945	1 028 417	1.10	0.39
Spain	262	271	0	22 628 444	23 199 728	1.16	1.17
Sweden	30	35	0	4 603 710	4 652 637	0.65	0.75
United Kingdom	633	585	28	30 033 722	31 145 534	2.11	1.88
EU total	**2 227**	**2 136**	**224**	**243 655 376**	**255545886**	**0.91**	**0.84**
Iceland	1	4	0	162 068	157 300	0.62	2.54
Liechtenstein	-	-	-	17 591	17 998	-	-
Norway	22	22	0	2 395 053	2 404 199	0.92	0.92
Total	**2 250**	**2 162**	**224**	**246 230 088**	**258 125 383**	**0.91**	**0.84**

Cases with blank gender are not shown.

Table B12 Notification rate (per 100 000) and total number of reported invasive meningococcal disease cases by age group and country, 2008

Country	< 1 year	1–4 years	5–9 years	10–14 years	15–19 years	20–24 years	25–44 years	45–64 years	65+ years	Unk
	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	n
Austria	14.53 (11)	4.68 (15)	1.94 (8)	1.70 (8)	4.20 (21)	2.12 (11)	0.37 (9)	0.63 (9)	0.21 (3)	0
Belgium	19.01 (23)	5.84 (28)	1.36 (8)	0.33 (2)	2.45 (16)	0.16 (1)	0.41 (12)	0.60 (11)	0.55 (10)	0
Bulgaria	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	29
Cyprus	0.00 (0)	2.95 (1)	0.00 (0)	0.00 (0)	1.76 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0
Czech Republic	9.61 (11)	2.99 (12)	1.98 (9)	1.19 (6)	3.09 (20)	1.29 (9)	0.31 (10)	0.33 (5)	0.13 (2)	0
Denmark	18.63 (12)	4.98 (13)	2.11 (7)	1.14 (4)	4.19 (14)	0.99 (3)	0.07 (1)	0.47 (4)	1.17 (10)	0
Estonia	6.36 (1)	1.79 (1)	1.61 (1)	0.00 (0)	1.03 (1)	0.00 (0)	0.27 (1)	0.43 (1)	0.00 (0)	0
Finland	6.80 (4)	1.29 (3)	0.00 (0)	0.63 (2)	1.21 (4)	0.31 (1)	0.29 (4)	0.34 (3)	0.80 (7)	0
France	13.00 (106)	4.81 (152)	1.31 (52)	0.86 (33)	2.41 (99)	1.74 (71)	0.36 (62)	0.48 (50)	0.51 (54)	0
Germany	10.36 (71)	2.77 (77)	0.84 (32)	0.57 (23)	2.15 (100)	0.58 (28)	0.21 (48)	0.27 (45)	0.17 (28)	0
Greece	0.00 (0)	2.55 (11)	1.75 (9)	1.29 (7)	1.20 (7)	1.05 (7)	0.35 (12)	0.19 (4)	0.14 (3)	21
Hungary	3.12 (3)	2.84 (11)	0.41 (2)	0.37 (2)	0.32 (2)	0.15 (1)	0.07 (2)	0.25 (4)	0.18 (3)	0
Ireland	59.71 (42)	22.47 (57)	3.32 (10)	3.22 (9)	5.27 (15)	3.56 (12)	0.49 (7)	1.67 (8)	0.42 (2)	0
Italy	3.94 (22)	1.11 (25)	0.61 (17)	0.47 (13)	0.94 (28)	0.52 (16)	0.13 (24)	0.23 (27)	0.09 (11)	0
Latvia	8.46 (2)	8.15 (7)	0.00 (0)	0.94 (1)	0.00 (0)	0.00 (0)	0.47 (3)	0.00 (0)	0.26 (1)	0
Lithuania	62.16 (20)	18.93 (23)	3.66 (6)	1.00 (2)	1.91 (5)	0.00 (0)	0.53 (5)	0.94 (5)	0.38 (2)	0
Luxembourg	0.00 (0)	4.43 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	1.48 (1)	0.00 (0)	0
Malta	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	3.42 (1)	0.00 (0)	3.52 (2)	0.00 (0)	0
Netherlands	9.96 (18)	6.67 (51)	1.78 (18)	0.92 (9)	1.29 (13)	0.51 (5)	0.22 (10)	0.83 (20)	0.75 (18)	0
Poland	17.87 (69)	5.98 (86)	1.93 (36)	0.99 (22)	1.96 (53)	0.84 (27)	0.37 (41)	0.55 (28)	0.21 (11)	0
Portugal	19.58 (20)	7.83 (34)	1.81 (10)	0.19 (1)	0.51 (3)	0.00 (0)	0.09 (3)	0.22 (4)	0.11 (2)	0
Romania	10.35 (22)	3.16 (27)	1.66 (18)	0.53 (6)	0.54 (8)	0.36 (6)	0.17 (11)	0.22 (7)	0.31 (10)	0
Slovakia	16.61 (9)	4.71 (10)	3.37 (9)	1.58 (5)	1.28 (5)	0.69 (3)	0.36 (6)	0.46 (3)	0.15 (1)	0

Country	< 1 year	1–4 years	5–9 years	10–14 years	15–19 years	20–24 years	25–44 years	45–64 years	65+ years	Unk
	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	n
Slovenia	20.50 (4)	5.46 (4)	2.21 (2)	0.00 (0)	4.39 (5)	2.27 (3)	0.00 (0)	0.61 (2)	1.22 (4)	0
Spain	25.37 (124)	7.52 (141)	2.40 (52)	0.91 (19)	1.93 (44)	1.15 (32)	0.45 (68)	0.65 (49)	0.73 (55)	6
Sweden	1.86 (2)	0.72 (3)	0.21 (1)	0.37 (2)	1.88 (12)	1.26 (7)	0.16 (4)	0.44 (7)	0.68 (11)	0
United Kingdom	48.71 (376)	14.51 (417)	2.40 (82)	1.60 (59)	3.72 (149)	1.31 (55)	0.46 (78)	1.17 (115)	0.72 (71)	0
EU total	**18.49 (972)**	**5.90 (1 210)**	**1.52 (389)**	**0.88 (235)**	**2.08 (625)**	**0.93 (299)**	**0.29 (421)**	**0.49 (414)**	**0.38 (319)**	**56**
Iceland	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	4.42 (1)	0.00 (0)	2.75 (1)	0.00 (0)	0
Liechtenstein	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	-
Norway	6.82 (4)	2.13 (5)	0.00 (0)	0.64 (2)	3.17 (10)	1.05 (3)	0.08 (1)	0.58 (4)	1.01 (7)	0
Total	**18.34 (976)**	**5.85 (1 215)**	**1.50 (389)**	**0.88 (237)**	**2.09 (635)**	**0.94 (303)**	**0.29 (422)**	**0.49 (419)**	**0.38 (326)**	**56**

Age class for Bulgaria is missing due to implausible age classification.

Table B13 Notification rate (per 100 000) and total number of reported invasive meningococcal disease cases by age group and country, 2009

Country	< 1 year	1–4 years	5–9 years	10–14 years	15–19 years	20–24 years	25–44 years	45–64 years	65+ years	Unk
	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	n
Austria	10.36 (8)	4.38 (14)	3.44 (14)	2.40 (11)	5.37 (27)	0.58 (3)	0.33 (8)	0.41 (6)	0.62 (9)	0
Belgium	11.57 (14)	5.00 (24)	1.19 (7)	0.66 (4)	2.61 (17)	0.47 (3)	0.34 (10)	0.33 (6)	1.04 (19)	0
Bulgaria	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	25
Cyprus	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	1.76 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0
Czech Republic	6.67 (8)	5.91 (25)	1.30 (6)	0.42 (2)	2.35 (15)	0.14 (1)	0.40 (13)	0.58 (9)	0.06 (1)	0
Denmark	13.78 (9)	9.56 (25)	0.91 (3)	1.71 (6)	2.92 (10)	1.90 (6)	0.13 (2)	0.57 (5)	0.80 (7)	0
Estonia	6.27 (1)	1.71 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.27 (1)	0.87 (2)	0.00 (0)	0
Finland	10.07 (6)	0.42 (1)	0.35 (1)	0.00 (0)	1.80 (6)	1.23 (4)	0.22 (3)	0.67 (6)	0.67 (6)	0
France	11.20 (93)	4.07 (130)	1.23 (49)	0.77 (30)	2.53 (102)	1.43 (59)	0.33 (57)	0.55 (59)	0.37 (39)	0
Germany	8.93 (61)	3.19 (88)	0.65 (24)	0.96 (38)	2.10 (94)	1.02 (50)	0.16 (35)	0.27 (46)	0.29 (49)	0

Country	< 1 year	1–4 years	5–9 years	10–14 years	15–19 years	20–24 years	25–44 years	45–64 years	65+ years	Unk
	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	Rate (n)	n
Greece	0.00 (0)	1.59 (7)	2.12 (11)	1.49 (8)	1.57 (9)	0.77 (5)	0.26 (9)	0.24 (5)	0.19 (4)	23
Hungary	6.18 (6)	2.31 (9)	0.42 (2)	0.38 (2)	0.82 (5)	0.62 (4)	0.20 (6)	0.18 (3)	0.00 (0)	0
Ireland	56.08 (41)	15.09 (40)	3.91 (12)	2.10 (6)	7.86 (22)	3.20 (10)	0.49 (7)	0.81 (4)	1.63 (8)	0
Italy	2.77 (16)	1.50 (34)	0.64 (18)	0.50 (14)	0.84 (25)	0.55 (17)	0.14 (25)	0.19 (23)	0.07 (9)	0
Latvia	4.28 (1)	4.51 (4)	1.01 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.31 (2)	0.00 (0)	0.26 (1)	0
Lithuania	40.14 (14)	18.66 (23)	3.16 (5)	3.18 (6)	1.97 (5)	1.10 (3)	0.32 (3)	0.93 (5)	0.19 (1)	0
Luxembourg	0.00 (0)	0.00 (0)	3.37 (1)	3.29 (1)	3.43 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0
Malta	0.00 (0)	12.54 (2)	4.82 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	1.72 (1)	0.00 (0)	0
Netherlands	10.85 (20)	6.69 (50)	1.78 (18)	0.71 (7)	1.39 (14)	0.80 (8)	0.15 (7)	0.49 (12)	0.69 (17)	0
Poland	15.97 (66)	5.69 (84)	1.05 (19)	1.08 (23)	1.34 (35)	0.72 (22)	0.26 (29)	0.33 (17)	0.19 (10)	0
Portugal	18.23 (19)	5.18 (22)	1.25 (7)	0.19 (1)	1.04 (6)	0.16 (1)	0.12 (4)	0.21 (4)	0.05 (1)	1
Romania	13.64 (30)	4.08 (35)	0.93 (10)	0.54 (6)	0.22 (3)	0.18 (3)	0.12 (8)	0.38 (12)	0.13 (4)	0
Slovakia	17.50 (10)	4.64 (10)	0.00 (0)	1.00 (3)	1.57 (6)	0.93 (4)	0.30 (5)	0.31 (2)	0.00 (0)	0
Slovenia	22.83 (5)	6.55 (5)	2.22 (2)	1.05 (1)	0.00 (0)	0.75 (1)	0.16 (1)	0.00 (0)	0.00 (0)	0
Spain	20.23 (101)	7.03 (135)	2.45 (55)	1.48 (31)	1.59 (36)	0.85 (23)	0.29 (44)	0.72 (55)	0.67 (51)	2
Sweden	5.47 (6)	0.47 (2)	0.41 (2)	0.97 (5)	2.34 (15)	1.03 (6)	0.24 (6)	0.61 (10)	0.79 (13)	0
United Kingdom	41.97 (324)	12.04 (346)	3.37 (115)	1.30 (48)	3.25 (130)	1.29 (54)	0.42 (71)	0.91 (90)	0.69 (68)	0
EU total	**15.99 (859)**	**5.39 (1 116)**	**1.50 (383)**	**0.96 (253)**	**1.98 (584)**	**0.90 (287)**	**0.25 (356)**	**0.45 (382)**	**0.37 (317)**	**51**
Iceland	0.00 (0)	5.54 (1)	4.68 (1)	0.00 (0)	8.38 (2)	0.00 (0)	0.00 (0)	0.00 (0)	2.69 (1)	0
Liechtenstein	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	-
Norway	9.89 (6)	1.68 (4)	0.00 (0)	0.64 (2)	4.07 (13)	0.68 (2)	0.30 (4)	0.71 (5)	1.14 (8)	0
Total	**15.91 (865)**	**5.35 (1 121)**	**1.48 (384)**	**0.95 (255)**	**2.01 (599)**	**0.90 (289)**	**0.25 (360)**	**0.45 (387)**	**0.38 (326)**	**51**

Age class for Bulgaria is missing due to implausible age classification.

Table B14 Notification rate (per 100 000) of confirmed cases of invasive meningococcal disease, by serogroup, by country, 2008

Country	Serogrop									Non-groupable	Not known	Serogroup C vaccine-tion (year of intro-duction)
	B	C	W 135	A	X	Y	Z 29E	29E	O			
Austria	0.70	0.29	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	-
Belgium	0.85	0.12	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	2002
Bulgaria	-	-	-	-	-	-	-	-	-	-	-	-
Cyprus	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Czech Republic	0.58	0.11	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.09	-
Denmark	0.66	0.37	0.04	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.05	-
Estonia	0.07	0.22	0.00	0.07	0.00	0.07	0.00	0.00	0.00	0.00	0.00	-
Finland	0.32	0.13	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.04	-
France	0.67	0.23	0.03	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.07	-
Germany	0.35	0.11	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.05	2006
Greece	0.48	0.05	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.12	2007
Hungary	0.18	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	-
Ireland	3.27	0.09	0.05	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	2000
Italy	0.13	0.09	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.06	2005
Latvia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	-
Lithuania	0.89	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.18	-
Luxembourg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	-
Malta	0.24	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Netherlands	0.60	0.07	0.02	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.24	2002
Poland	0.38	0.33	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.10	-
Portugal	0.51	0.00	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.01	0.01	2006
Romania	0.09	0.06	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.28	-
Slovakia	0.67	0.07	0.00	0.02	0.00	0.06	0.00	0.00	0.00	0.00	0.07	-
Slovenia	0.75	0.35	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	-
Spain	1.01	0.18	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.06	0.03	2000
Sweden	0.19	0.20	0.01	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.03	-
United Kingdom	1.96	0.04	0.03	0.00	0.00	0.08	0.00	0.01	0.00	0.00	0.09	1999
EU total	**0.67**	**0.13**	**0.02**	**0.00**	**0.00**	**0.03**	**0.00**	**0.00**	**0.00**	**0.01**	**0.08**	**-**
Iceland	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2002
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-
Norway	0.40	0.17	0.02	0.00	0.00	0.13	0.00	0.00	0.00	0.04	0.00	-
Total	**0.67**	**0.13**	**0.02**	**0.00**	**0.00**	**0.03**	**0.00**	**0.00**	**0.00**	**0.01**	**0.08**	**-**

Table B15 Notification rate (per 100 000) of confirmed cases of invasive meningococcal disease, by serogroup, by country, 2009

Country	Serogrop									Non-groupable	Not known	Serogroup C vaccine-tion (year of intro-duction)
	B	C	W1 35	A	X	Y	Z 29E	29E	O			
Austria	0.55	0.41	0.02	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.04	-
Belgium	0.79	0.07	0.04	0.01	0.02	0.05	0.00	0.00	0.00	0.00	0.00	2002
Bulgaria	-	-	-	-	-	-	-	-	-	-	-	-
Cyprus	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Czech Republic	0.56	0.10	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.09	-
Denmark	0.73	0.40	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.07	-
Estonia	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Finland	0.45	0.06	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.02	-
France	0.64	0.20	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.05	-
Germany	0.34	0.11	0.01	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.10	2006
Greece	0.41	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.13	0.11	2007
Hungary	0.25	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	-
Ireland	2.72	0.11	0.04	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.04	2000
Italy	0.15	0.07	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.04	2005
Latvia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	-
Lithuania	0.69	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.09	-
Luxembourg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	-
Malta	0.24	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Netherlands	0.70	0.04	0.02	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.10	2002
Poland	0.39	0.28	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.08	-
Portugal	0.54	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.05	2006
Romania	0.13	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.31	-
Slovakia	0.52	0.06	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.09	-
Slovenia	0.54	0.15	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Spain	0.88	0.15	0.03	0.01	0.00	0.02	0.00	0.00	0.00	0.06	0.03	2000
Sweden	0.26	0.13	0.03	0.01	0.00	0.24	0.00	0.01	0.00	0.00	0.01	-
United Kingdom	1.71	0.01	0.04	0.00	0.00	0.11	0.00	0.00	0.00	0.01	0.04	1999
EU total	**0.63**	**0.11**	**0.02**	**0.00**	**0.00**	**0.04**	**0.00**	**0.00**	**0.00**	**0.01**	**0.07**	**-**
Iceland	1.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2002
Liechtenstein	-	-	-	-	-	-	-	-	-	-	-	-
Norway	0.46	0.17	0.02	0.00	0.00	0.23	0.00	0.00	0.00	0.04	0.00	-
Total	**0.62**	**0.11**	**0.02**	**0.00**	**0.00**	**0.04**	**0.00**	**0.00**	**0.00**	**0.01**	**0.07**	**-**

Table B16 Number of cases and percentage distribution of confirmed invasive meningococcal disease cases, by age group, EU/EEA countries, 1999–2009

Age group	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Numbers of cases											
< 1 year	1155	1384	1208	1096	1068	990	1009	916	888	976	865
01–04 years	2170	2167	1826	1662	1559	1299	1412	1241	1457	1215	1121
05–09 years	997	904	767	649	546	443	481	437	487	389	384
10–14 years	718	605	583	468	506	310	353	240	307	237	255
15–19 years	1181	1012	1008	869	803	740	687	675	702	635	599
20–24 years	444	441	397	361	331	270	330	298	316	303	289
25–44 years	543	673	666	619	532	476	525	409	485	422	360
45–64 years	477	556	516	470	424	422	438	391	412	419	387
65+ years	359	359	354	402	310	334	369	299	336	326	326
Unk	102	22	33	12	20	13	23	24	174	56	51
Total	**8 146**	**8 123**	**7 358**	**6 608**	**6 099**	**5 297**	**5 627**	**4 930**	**5 564**	**4 978**	**4 637**
% distribution											
<1 year	14%	17%	16%	17%	18%	19%	18%	19%	16%	20%	19%
01–04 years	27%	27%	25%	25%	26%	25%	25%	25%	26%	24%	24%
05–09 years	12%	11%	10%	10%	9%	8%	9%	9%	9%	8%	8%
10–14 years	9%	7%	8%	7%	8%	6%	6%	5%	6%	5%	5%
15–19 years	14%	12%	14%	13%	13%	14%	12%	14%	13%	13%	13%
20–24 years	5%	5%	5%	5%	5%	5%	6%	6%	6%	6%	6%
25–44 years	7%	8%	9%	9%	9%	9%	9%	8%	9%	8%	8%
45–64 years	6%	7%	7%	7%	7%	8%	8%	8%	7%	8%	8%
65+ years	4%	4%	5%	6%	5%	6%	7%	6%	6%	7%	7%
Unk	1%	0%	0%	0%	0%	0%	0%	0%	3%	1%	1%

Table B17 Number of cases and percentage distribution of serogroup B invasive meningococcal disease cases, by age group, EU/EEA countries, 1999–2009

Age group	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Numbers of cases											
< 1 year	775	976	890	807	801	780	819	747	670	773	683
01–04 years	1201	1218	1202	1105	1065	935	1063	937	1026	936	869
05–09 years	519	427	417	364	333	267	320	311	274	253	262
10–14 years	343	254	320	256	295	173	201	132	144	143	149
15–19 years	604	537	552	473	475	451	450	440	414	408	402
20–24 years	202	215	195	179	159	173	218	190	188	187	196
25–44 years	259	311	314	286	273	223	298	215	248	235	208
45–64 years	235	304	258	251	239	235	251	215	222	255	224
65+ years	174	157	144	166	140	168	163	147	144	156	145
Unk	48	13	16	8	7	12	16	16	76	22	16
Total	**4 360**	**4 412**	**4 308**	**3 895**	**3 787**	**3 417**	**3 799**	**3 350**	**3 406**	**3 368**	**3 154**
% distribution											
< 1 year	18%	22%	21%	21%	21%	23%	22%	22%	20%	23%	22%
01–04 years	28%	28%	28%	28%	28%	27%	28%	28%	30%	28%	28%
05–09 years	12%	10%	10%	9%	9%	8%	8%	9%	8%	8%	8%
10–14 years	8%	6%	7%	7%	8%	5%	5%	4%	4%	4%	5%
15–19 years	14%	12%	13%	12%	13%	13%	12%	13%	12%	12%	13%
20–24 years	5%	5%	5%	5%	4%	5%	6%	6%	6%	6%	6%
25–44 years	6%	7%	7%	7%	7%	7%	8%	6%	7%	7%	7%
45–64 years	5%	7%	6%	6%	6%	7%	7%	6%	7%	8%	7%
65+ years	4%	4%	3%	4%	4%	5%	4%	4%	4%	5%	5%
Unk	1%	0%	0%	0%	0%	0%	0%	0%	2%	1%	1%

Table B18 Number of cases and percentage distribution of serogroup C invasive meningococcal disease cases, by age group, EU/EEA countries, 1999–2009

Age group	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Numbers of cases											
< 1 year	200	148	116	113	67	68	56	53	50	58	55
01–04 years	550	503	276	232	168	154	123	124	128	98	96
05–09 years	231	212	131	120	62	70	55	47	56	55	43
10–14 years	224	168	124	116	97	63	68	52	60	40	58
15–19 years	404	288	286	242	151	158	126	124	130	132	88
20–24 years	141	146	126	110	76	48	70	60	57	66	52
25–44 years	150	210	197	189	118	117	96	82	100	101	75
45–64 years	150	136	168	133	77	86	80	71	53	73	61
65+ years	95	120	102	125	63	56	72	44	46	53	48
Unk	17	6	9	1	4	1	3	3	4	1	1
Total	**2 162**	**1 937**	**1 535**	**1 381**	**883**	**821**	**749**	**660**	**684**	**677**	**577**
% distribution											
< 1 year	9%	8%	8%	8%	8%	8%	7%	8%	7%	9%	10%
01–04 years	25%	26%	18%	17%	19%	19%	16%	19%	19%	14%	17%
05–09 years	11%	11%	9%	9%	7%	9%	7%	7%	8%	8%	7%
10–14 years	10%	9%	8%	8%	11%	8%	9%	8%	9%	6%	10%
15–19 years	19%	15%	19%	18%	17%	19%	17%	19%	19%	19%	15%
20–24 years	7%	8%	8%	8%	9%	6%	9%	9%	8%	10%	9%
25–44 years	7%	11%	13%	14%	13%	14%	13%	12%	15%	15%	13%
45–64 years	7%	7%	11%	10%	9%	10%	11%	11%	8%	11%	11%
65+ years	4%	6%	7%	9%	7%	7%	10%	7%	7%	8%	8%
Unk	1%	0%	1%	0%	0%	0%	0%	0%	1%	0%	0%

Table B19 Distribution of confirmed serogroup B cases of invasive meningococcal disease, by age group, countries with and without MCC vaccination, 2008

Age group	With MCC (% in each age group)	Without MCC (% in each age group)	Total (% of B cases)
< 1 year	590 (76.3%)	183 (23.7%)	773 (23.0%)
1–4 years	732 (78.2%)	204 (21.8%)	936 (27.8%)
5–9 years	186 (73.5%)	67 (26.5%)	253 (7.5%)
10–14 years	103 (72.0%)	40 (28.0%)	143 (4.2%)
15–19 years	277 (67.9%)	131 (32.1%)	408 (12.1%)
20–24 years	106 (56.7%)	81 (43.3%)	187 (5.6%)
25–44 years	160 (68.1%)	75 (31.9%)	235 (7.0%)
45–64 years	182 (71.4%)	73 (28.6%)	255 (7.6%)
65+ years	109 (69.9%)	47 (30.1%)	156 (4.6%)
Unk	22 (100%)		22 (0.7%)
Total	**2 467**	**901**	**3 368 (100%)**

Table B20 Distribution of confirmed serogroup B cases of invasive meningococcal disease, by age group, countries with and without MCC vaccination, 2009

Age group	With MCC (% in each age group)	Without MCC (% in each age group)	Total (% of B cases)
< 1 year	509 (74.5%)	174 (25.5%)	683 (21.7%)
1–4 years	648 (74.6%)	221 (25.4%)	869 (27.6%)
5–9 years	200 (76.3%)	62 (23.7%)	262 (8.3%)
10–14 years	106 (71.1%)	43 (28.9%)	149 (4.7%)
15–19 years	263 (65.4%)	139 (34.6%)	402 (12.7%)
20–24 years	125 (63.8%)	71 (36.2%)	196 (6.2%)
25–44 years	130 (62.5%)	78 (37.5%)	208 (6.6%)
45–64 years	154 (68.8%)	70 (31.3%)	224 (7.1%)
65+ years	106 (73.1%)	39 (26.9%)	145 (4.6%)
Unk	16 (100%)		16 (0.5%)
Total	**2 257**	**897**	**3 154 (100%)**

Table B21 Distribution of confirmed serogroup C cases of invasive meningococcal disease, by age group, countries with and without MCC vaccination, 2008

Age group	With MCC (% in each age group)	Without MCC (% in each age group)	Total (% of B cases)
< 1 year	19 (32.8%)	39 (67.2%)	58 (8.6%)
1–4 years	27 (27.6%)	71 (72.4%)	98 (14.5%)
5–9 years	16 (29.1%)	39 (70.9%)	55 (8.1%)
10–14 years	14 (35.0%)	26 (65.0%)	40 (5.9%)
15–19 years	46 (34.8%)	86 (65.2%)	132 (19.5%)
20–24 years	28 (42.4%)	38 (57.6%)	66 (9.7%)
25–44 years	60 (59.4%)	41 (40.6%)	101 (14.9%)
45–64 years	45 (61.6%)	28 (38.4%)	73 (10.8%)
65+ years	28 (52.8%)	25 (47.2%)	53 (7.8%)
Unk	1 (100%)		1 (0.1%)
Total	**284**	**393**	**677 (100%)**

Table B22 Distribution of confirmed serogroup C cases of invasive meningococcal disease, by age group, countries with and without MCC vaccination, 2009

Age group	With MCC (% in each age group)	Without MCC (% in each age group)	Total (% of B cases)
< 1 year	17 (30.9%)	38 (69.1%)	55 (9.5%)
1–4 years	27 (28.1%)	69 (71.9%)	96 (16.6%)
5–9 years	18 (41.9%)	25 (58.1%)	43 (7.5%)
10–14 years	24 (41.4%)	34 (58.6%)	58 (10.1%)
15–19 years	29 (33.0%)	59 (67.0%)	88 (15.3%)
20–24 years	23 (44.2%)	29 (55.8%)	52 (9.0%)
25–44 years	37 (49.3%)	38 (50.7%)	75 (13.0%)
45–64 years	25 (41.0%)	36 (59.0%)	61 (10.6%)
65+ years	27 (56.3%)	21 (43.8%)	48 (8.3%)
Unk	1 (100%)		1 (0.2%)
Total	**228**	**349**	**577 (100%)**

Table B23 Proportion of meningitis in confirmed invasive meningococcal disease cases, reporting countries, 1999–2009

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
<50%	Germany	Germany	Germany	Germany	Lithuania	Iceland	Iceland	Ireland	Austria	Cyprus	Cyprus
	Greece	Hungary	Hungary	Hungary	Spain	Ireland	Ireland	Spain	Belgium	Czech Republic	Czech Republic
	Hungary	Ireland	Ireland	Ireland	Sweden	Malta	Spain	Sweden	Czech Republic	Spain	Spain
	Ireland	Latvia	Latvia	Latvia		Spain			Estonia	Finland	Finland
	Latvia	Lithuania	Slovakia	Slovakia					Finland	France	France
	Lithuania	Slovakia	Sweden	Spain					France	UK	UK
	Malta	Sweden	UK	Sweden					Greece	Ireland	Ireland
	Slovakia	UK		UK					Iceland	Luxem-bourg	Malta
	Sweden								Ireland	Malta	Nether-lands
	UK								Latvia	Nether-lands	Portugal
									Lithuania	Portugal	Sweden
									Luxem-bourg	Sweden	Slovenia
									Malta	Slovenia	
									Nether-lands		
									Norway		
									Poland		
									Portugal		
									Slovenia		
									Spain		
									Sweden		
									UK		
50–70%	Belgium	Belgium	Belgium	Belgium	Austria	Austria	Austria	Belgium	Germany	Austria	Austria
	Estonia	Finland	Finland	Denmark	Belgium	Belgium	Belgium	Denmark	Hungary	Belgium	Belgium
	Iceland	Greece	Iceland	Finland	Denmark	Czech Republic	Denmark	Estonia	Italy	Germany	Germany
	Nether-lands	Iceland	Lithuania	France	Finland	Finland	Finland	Finland	Romania	Denmark	Denmark
	Norway	Malta	Norway	Malta	Germany	Greece	Greece	Italy		Estonia	Lithuania
	Slovenia	Portugal	Spain	Netherla nds	Iceland	Latvia	Latvia	Latvia		Italy	Norway
	Spain			Norway	Ireland	Lithuania	Lithuania	Lithuania		Lithuania	Poland
				Portugal	Latvia	Nether-lands	Norway	Norway		Norway	
				Slovenia	Malta	Norway	Portugal	Poland		Poland	
				Switzer-land	Nether-lands	Slovenia	Slovenia	Portugal			
					UK	Sweden	Sweden	Switzer-land			
						UK	Switzer-land	UK			
							UK				
>70%	Austria	Austria	Austria	Austria	Czech Republic	Denmark	Czech Republic	Austria	Cyprus	Greece	Estonia
	Czech Republic	Czech Republic	Czech Republic	Czech Republic	Estonia	Estonia	Estonia	Czech Republic	Denmark	Hungary	Greece
	Denmark	Denmark	Denmark	Estonia	France	France	France	France	Slovakia	Iceland	Hungary
	Finland	Estonia	Estonia	Greece	Greece	Germany	Germany	Germany		Latvia	Iceland
	France	France	France	Iceland	Hungary	Hungary	Hungary	Greece		Romania	Italy
	Italy	Italy	Greece	Italy	Italy	Italy	Italy	Hungary		Slovakia	Luxem-bourg
	Poland	Nether-lands	Italy	Lithuania	Norway	Poland	Malta	Iceland			Latvia
	Portugal	Norway	Malta	Poland	Poland	Portugal	Netherla nds	Malta			Romania
	Switzer-land	Poland	Netherla nds		Portugal	Slovakia	Poland	Nether-lands			Slovakia
		Slovenia	Poland		Slovakia	Switzer-land	Slovakia	Slovakia			
		Spain	Portugal		Slovenia			Slovenia			
		Switzer-land	Slovenia		Switzer-land						
			Switzer-land								

Table B24 Total number of invasive meningococcal disease cases and percentage distribution, by clinical presentation, 2008

Country	Meningitis		Meningitis and septicaemia		Septicaemia		Other		Unknown	
	Cases	(%)	Cases	(%)	Cases	(%)	Cases	(%)	Cases	(%)
Austria	39	41	27	28	29	31	0	0	0	0
Belgium	38	34	29	26	36	32	0	0	8	7
Bulgaria	-	-	-	-	-	-	-	-	-	-
Cyprus	0	0	0	0	0	0	0	0	2	100
Czech Republic	0	0	0	0	0	0	0	0	1	100
Denmark	17	25	26	38	20	29	4	6	1	1
Estonia	1	17	2	33	3	50	0	0	0	0
Finland	0	0	0	0	0	0	0	0	28	100
France	0	0	0	0	0	0	0	0	679	100
Germany	238	53	38	8	144	32	0	0	32	7
Greece	40	49	40	49	1	1	0	0	0	0
Hungary	17	57	10	33	3	10	0	0	0	0
Ireland	35	22	38	23	74	46	0	0	15	9
Italy	87	48	27	15	62	34	4	2	3	2
Latvia	5	36	8	57	0	0	1	7	0	0
Lithuania	10	15	29	43	24	35	5	7	0	0
Luxembourg	0	0	0	0	0	0	0	0	2	100
Malta	1	33	0	0	2	67	0	0	0	0
Netherlands	0	0	0	0	0	0	0	0	162	100
Poland	112	30	108	29	140	38	13	3	0	0
Portugal	20	26	7	9	38	49	1	1	11	14
Romania	82	71	6	5	7	6	20	17	0	0
Slovakia	39	76	0	0	9	18	0	0	3	6
Slovenia	0	0	0	0	0	0	0	0	24	100
Spain	184	31	88	15	286	48	6	1	26	4
Sweden	0	0	0	0	0	0	0	0	49	100
United Kingdom	38	3	31	2	38	3	18	1	1277	91
EU total	**1 003**	**21**	**514**	**11**	**916**	**19**	**72**	**1**	**2 323**	**48**
Iceland	1	50	1	50	0	0	0	0	0	0
Liechtenstein	-	-	-	-	-	-	-	-	-	-
Norway	13	36	5	14	9	25	8	22	1	3
Total	**1 017**	**21**	**520**	**11**	**925**	**19**	**80**	**2**	**2 324**	**48**

Cases with blank value for clinical presentation are not shown.

Table B25 Total number of invasive meningococcal disease cases and percentage distribution, by clinical presentation, 2009

Country	Meningitis		Meningitis and septicaemia		Septicaemia		Other		Unknown	
	Cases	(%)	Cases	(%)	Cases	(%)	Cases	(%)	Cases	(%)
Country	Cases	(%)	Cases	(%)	Cases	(%)	Cases	(%)	Cases	(%)
Austria	36	36	22	22	41	41	0	0	1	1
Belgium	35	34	30	29	27	26	2	2	10	10
Bulgaria	-	-	-	-	-	-	-	-	-	-
Cyprus	0	0	0	0	0	0	0	0	1	100
Czech Republic	-	-	-	-	-	-	-	-	-	-
Denmark	30	41	17	23	15	21	9	12	2	3
Estonia	5	100	0	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0	0	33	100
France	0	0	0	0	0	0	0	0	618	100
Germany	250	52	38	8	158	33	0	0	39	8
Greece	42	52	23	28	16	20	0	0	0	0
Hungary	17	46	17	46	2	5	1	3	0	0
Ireland	37	25	42	28	57	38	0	0	14	9
Italy	99	55	34	19	47	26	1	1	0	0
Latvia	4	44	4	44	0	0	1	11	0	0
Lithuania	20	31	14	22	31	48	0	0	0	0
Luxembourg	3	100	0	0	0	0	0	0	0	0
Malta	0	0	0	0	4	100	0	0	0	0
Netherlands	0	0	0	0	0	0	0	0	153	100
Poland	107	35	86	28	110	36	2	1	0	0
Portugal	29	44	3	5	16	24	0	0	18	27
Romania	76	68	4	4	4	4	27	24	0	0
Slovakia	32	80	0	0	7	18	0	0	1	3
Slovenia	0	0	0	0	0	0	0	0	15	100
Spain	203	38	55	10	251	47	12	2	12	2
Sweden	0	0	0	0	0	0	0	0	65	100
United Kingdom	47	4	31	2	40	3	21	2	1107	89
EU total	**1 072**	**24**	**420**	**9**	**826**	**18**	**76**	**2**	**2 089**	**47**
Iceland	2	40	2	40	1	20	0	0	0	0
Liechtenstein	-	-	-	-	-	-	-	-	-	-
Norway	19	43	7	16	9	20	6	14	3	7
Total	**1 093**	**24**	**429**	**9**	**836**	**18**	**82**	**2**	**2 092**	**46**

Cases with blank value for clinical presentation are not shown.

Table B26 Serogroup-specific case fatality ratio (CSF) of confirmed invasive meningococcal disease cases, 2008

Country	Serogroup B			Serogroup C			Other serogroups/ non-groupable		
	Deaths	Cases	CFR (%)	Deaths	Cases	CFR (%)	Deaths	Cases	CFR (%)
Austria	7	58	12	3	24	13	0	2	0
Belgium	3	91	3	1	13	8	0	6	0
Bulgaria	-	-	-	-	-	-	-	-	-
Cyprus	0	2	0	-	-	-	-	-	-
Czech Republic	4	60	7	1	11	9	1	11	9
Denmark	3	36	8	4	20	20	0	7	0
Estonia	0	1	0	1	3	33	1	2	50
Finland	2	17	12	0	7	0	0	4	0
France	38	427	9	26	145	18	9	91	10
Germany	27	291	9	10	91	11	7	70	10
Greece	5	54	9	0	6	0	0	18	0
Hungary	4	18	22	1	6	17	1	6	17
Ireland	6	144	4	1	4	25	1	4	25
Italy	7	76	9	8	54	15	5	48	10
Latvia	-	-	-	-	-	-	1	7	14
Lithuania	1	30	3	-	-	-	1	18	6
Luxembourg	-	-	-	-	-	-	0	2	0
Malta	1	1	100	1	2	50	-	-	-
Netherlands	3	98	3	3	11	27	0	48	0
Poland	20	145	14	11	126	9	8	48	17
Portugal	1	54	2	-	-	-	0	6	0
Romania	2	19	11	1	12	8	7	68	10
Slovakia	2	36	6	0	4	0	0	8	0
Slovenia	0	15	0	0	7	0	0	2	0
Spain	45	456	10	13	81	16	2	53	4
Sweden	3	17	18	2	18	11	2	14	14
United Kingdom	63	1201	5	3	24	13	11	130	8
EU total	**247**	**3 347**	**7**	**90**	**669**	**13**	**57**	**673**	**8**
Iceland	0	2	0	-	-	-	-	-	-
Liechtenstein	-	-	-	-	-	-	-	-	-
Norway	2	19	11	1	8	13	0	9	0
Total	**249**	**3 368**	**7**	**91**	**677**	**13**	**57**	**682**	**8**

Cases with blank serogruop are not included.

Table B27 Serogroup-specific case fatality ratio (CFR) of confirmed invasive meningococcal disease cases, 2009

Country	Serogroup B			Serogroup C			Other serogroups/ non-groupable		
	Deaths	Cases	CFR (%)	Deaths	Cases	CFR (%)	Deaths	Cases	CFR (%)
Austria	6	46	13	3	34	9	0	9	0
Belgium	4	85	5	1	7	14	0	12	0
Bulgaria	-	-	-	-	-	-	-	-	-
Cyprus	0	1	0	-	-	-	-	-	-
Czech Republic	4	59	7	2	10	20	1	11	9
Denmark	2	40	5	1	22	5	0	9	0
Estonia	1	5	20	-	-	-	-	-	-
Finland	1	24	4	1	3	33	1	6	17
France	38	412	9	12	126	10	5	66	8
Germany	22	280	8	5	87	6	8	118	7
Greece	4	46	9	0	2	0	0	29	0
Hungary	2	25	8	0	5	0	3	7	43
Ireland	6	121	5	0	5	0	0	8	0
Italy	8	89	9	3	44	7	3	48	6
Latvia	-	-	-	-	-	-	0	5	0
Lithuania	2	23	9	0	6	0	0	10	0
Luxembourg	-	-	-	-	-	-	0	3	0
Malta	1	1	100	2	3	67	-	-	-
Netherlands	6	116	5	1	6	17	0	26	0
Poland	16	149	11	12	108	11	2	38	5
Portugal	3	57	5	0	1	0	0	7	0
Romania	0	27	0	0	6	0	5	69	7
Slovakia	3	28	11	0	3	0	1	8	13
Slovenia	0	11	0	0	3	0	0	1	0
Spain	41	403	10	11	67	16	2	63	3
Sweden	3	24	13	1	12	8	1	28	4
United Kingdom	56	1055	5	1	9	11	7	126	6
EU total	**229**	**3 127**	**7**	**56**	**569**	**10**	**39**	**707**	**6**
Iceland	0	5	0	-	-	-	-	-	-
Liechtenstein	-	-	-	-	-	-	-	-	-
Norway	3	22	14	0	8	0	3	14	21
Total	**232**	**3 154**	**7**	**56**	**577**	**10**	**42**	**721**	**6**

Table B28 Percentage distribution of virulent meningococcal clonal complexes, by serogroup, EU/EEA countries, 2008–2009

MLST Clonal complex	A		B		C		NGA		O		W135		Y		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
ST-41/44 complex/ Lineage 3	0	0.0	228	23.6	19	2.0	0	0.0	0	0.0	5	0.5	3	0.3	255	26.4
ST-11 complex/ ET-37 complex	0	0.0	41	4.2	156	16.1	0	0.0	0	0.0	3	0.3	2	0.2	202	20.9
ST-32 complex/ ET-5 complex	0	0.0	146	15.1	11	1.1	0	0.0	0	0.0	0	0.0	2	0.2	159	16.4
ST-269 complex	0	0.0	78	8.1	9	0.9	6	0.6	0	0.0	3	0.3	1	0.1	97	10.0
ST-23 complex/ Cluster A3	1	0.1	8	0.8	2	0.2	0	0.0	0	0.0	0	0.0	28	2.9	39	4.0
ST-461 complex	0	0.0	29	3.0	4	0.4	0	0.0	0	0.0	0	0.0	0	0.0	33	3.4
ST-213 complex	0	0.0	24	2.5	8	0.8	0	0.0	0	0.0	0	0.0	0	0.0	32	3.3
ST-162 complex	0	0.0	29	3.0	1	0.1	0	0.0	0	0.0	0	0.0	0	0.0	30	3.1
ST-103 complex	0	0.0	4	0.4	12	1.2	0	0.0	0	0.0	0	0.0	1	0.1	17	1.8
ST-18 complex	0	0.0	13	1.3	2	0.2	0	0.0	0	0.0	0	0.0	1	0.1	16	1.7
ST-22 complex	0	0.0	5	0.5	0	0.0	0	0.0	0	0.0	10	1.0	1	0.1	16	1.7
ST-8 complex/ Cluster A4	0	0.0	0	0.0	14	1.4	0	0.0	0	0.0	0	0.0	0	0.0	14	1.4
ST-865 complex	0	0.0	9	0.9	2	0.2	0	0.0	0	0.0	1	0.1	1	0.1	13	1.3
ST-35 complex	0	0.0	10	1.0	1	0.1	0	0.0	0	0.0	0	0.0	0	0.0	11	1.1
ST-60 complex	0	0.0	8	0.8	0	0.0	0	0.0	1	0.1	0	0.0	0	0.0	9	0.9
ST-334 complex	0	0.0	4	0.4	2	0.2	0	0.0	0	0.0	0	0.0	0	0.0	6	0.6
ST-5 complex/ subgroup III	5	0.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	5	0.5
ST-254 complex	0	0.0	1	0.1	2	0.2	0	0.0	0	0.0	0	0.0	0	0.0	3	0.3
ST-167 complex	0	0.0	1	0.1	1	0.1	0	0.0	0	0.0	0	0.0	0	0.0	2	0.2
ST-174 complex	0	0.0	1	0.1	1	0.1	0	0.0	0	0.0	0	0.0	0	0.0	2	0.2
ST-226 complex	0	0.0	1	0.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.1
ST-37 complex	0	0.0	1	0.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.1
ST-1157 complex	0	0.0	1	0.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.1
ST-198 complex	0	0.0	1	0.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.1
ST-4821 complex	0	0.0	1	0.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.1
ST-53 complex	0	0.0	0	0.0	0	0.0	1	0.1	0	0.0	0	0.0	0	0.0	1	0.1

Table B29 Percentage distribution of virulent meningococcal clonal complexes, by serogroup and by countries, EU/EEA countries, 2008–2009

Complex	B	C	W135	Y	Total
ST-41/44 complex/Lineage 3	**23.9%**	**2.0%**	**0.5%**	**0.3%**	**26.8%**
CZ	1.2%	0.1%	0.0%	0.0%	1.3%
FR	14.2%	1.3%	0.5%	0.2%	16.2%
GR	0.9%	0.1%	0.0%	0.0%	1.0%
IT	4.0%	0.1%	0.0%	0.1%	4.2%
NO	1.7%	0.0%	0.0%	0.0%	1.7%
PL	0.7%	0.4%	0.0%	0.0%	1.2%
PT	0.4%	0.0%	0.0%	0.0%	0.4%
RO	0.8%	0.0%	0.0%	0.0%	0.8%
ST-11 complex/ET-37 complex	**4.3%**	**16.4%**	**0.3%**	**0.2%**	**21.2%**
AT	0.6%	1.6%	0.0%	0.0%	2.2%
CZ	0.4%	0.4%	0.0%	0.0%	0.8%
FR	3.0%	9.2%	0.2%	0.2%	12.7%
GR	0.0%	0.1%	0.0%	0.0%	0.1%
IT	0.1%	2.8%	0.1%	0.0%	3.0%
NO	0.0%	0.9%	0.0%	0.0%	0.9%
PL	0.1%	0.9%	0.0%	0.0%	1.0%
RO	0.0%	0.3%	0.0%	0.0%	0.3%
ST-32 complex/ET-5 complex	**15.3%**	**1.2%**	**0.0%**	**0.2%**	**16.7%**
CZ	1.4%	0.1%	0.0%	0.0%	1.5%
FR	8.9%	0.8%	0.0%	0.2%	10.0%
GR	2.0%	0.1%	0.0%	0.0%	2.1%
IT	0.8%	0.0%	0.0%	0.0%	0.8%
NO	0.3%	0.1%	0.0%	0.0%	0.4%
PL	1.6%	0.0%	0.0%	0.0%	1.6%
PT	0.3%	0.0%	0.0%	0.0%	0.3%
ST-269 complex	**8.2%**	**0.9%**	**0.3%**	**0.1%**	**9.5%**
CZ	1.0%	0.2%	0.1%	0.0%	1.4%
FR	3.7%	0.6%	0.2%	0.1%	4.6%
GR	2.5%	0.0%	0.0%	0.0%	2.5%
IT	0.4%	0.1%	0.0%	0.0%	0.5%
NO	0.2%	0.0%	0.0%	0.0%	0.2%
PT	0.3%	0.0%	0.0%	0.0%	0.3%
ST-23 complex/Cluster A3	**0.8%**	**0.2%**	**0.0%**	**2.9%**	**4.0%**
CZ	0.2%	0.0%	0.0%	0.1%	0.3%
FR	0.6%	0.2%	0.0%	0.8%	1.7%
IT	0.0%	0.0%	0.0%	0.4%	0.4%
NO	0.0%	0.0%	0.0%	1.6%	1.6%
ST-461 complex	**3.0%**	**0.4%**	**0.0%**	**0.0%**	**3.5%**
FR	2.3%	0.4%	0.0%	0.0%	2.7%
GR	0.1%	0.0%	0.0%	0.0%	0.1%
IT	0.4%	0.0%	0.0%	0.0%	0.4%
NO	0.1%	0.0%	0.0%	0.0%	0.1%
PT	0.1%	0.0%	0.0%	0.0%	0.1%
ST-213 complex	**2.5%**	**0.8%**	**0.0%**	**0.0%**	**3.4%**
CZ	0.1%	0.5%	0.0%	0.0%	0.6%
FR	1.8%	0.3%	0.0%	0.0%	2.1%
IT	0.4%	0.0%	0.0%	0.0%	0.4%
PT	0.2%	0.0%	0.0%	0.0%	0.2%

Complex	B	C	W135	Y	Total
ST-162 complex	**3.0%**	**0.1%**	**0.0%**	**0.0%**	**3.1%**
CZ	0.1%	0.0%	0.0%	0.0%	0.1%
FR	1.5%	0.1%	0.0%	0.0%	1.6%
GR	0.7%	0.0%	0.0%	0.0%	0.7%
IT	0.4%	0.0%	0.0%	0.0%	0.4%
NO	0.2%	0.0%	0.0%	0.0%	0.2%
PT	0.1%	0.0%	0.0%	0.0%	0.1%
ST-103 complex	**0.4%**	**1.3%**	**0.0%**	**0.1%**	**1.8%**
CZ	0.1%	0.2%	0.0%	0.0%	0.3%
FR	0.2%	0.0%	0.0%	0.1%	0.3%
NO	0.0%	0.1%	0.0%	0.0%	0.1%
PL	0.0%	0.9%	0.0%	0.0%	0.9%
PT	0.1%	0.0%	0.0%	0.0%	0.1%
ST-22 complex	**0.5%**	**0.0%**	**1.0%**	**0.1%**	**1.7%**
FR	0.5%	0.0%	0.7%	0.1%	1.4%
IT	0.0%	0.0%	0.1%	0.0%	0.1%
NO	0.0%	0.0%	0.2%	0.0%	0.2%
ST-18 complex	**1.4%**	**0.2%**	**0.0%**	**0.1%**	**1.7%**
CZ	0.4%	0.0%	0.0%	0.1%	0.5%
FR	0.2%	0.0%	0.0%	0.0%	0.2%
PL	0.6%	0.2%	0.0%	0.0%	0.8%
PT	0.1%	0.0%	0.0%	0.0%	0.1%
ST-8 complex/Cluster A4	**0.0%**	**1.5%**	**0.0%**	**0.0%**	**1.5%**
IT	0.0%	1.3%	0.0%	0.0%	1.3%
PL	0.0%	0.2%	0.0%	0.0%	0.2%
ST-865 complex	**0.9%**	**0.2%**	**0.1%**	**0.1%**	**1.4%**
CZ	0.1%	0.0%	0.0%	0.0%	0.1%
FR	0.4%	0.2%	0.0%	0.1%	0.7%
IT	0.2%	0.0%	0.0%	0.0%	0.2%
RO	0.2%	0.0%	0.1%	0.0%	0.3%
ST-35 complex	**1.0%**	**0.1%**	**0.0%**	**0.0%**	**1.2%**
CZ	0.6%	0.0%	0.0%	0.0%	0.6%
FR	0.2%	0.1%	0.0%	0.0%	0.3%
GR	0.1%	0.0%	0.0%	0.0%	0.1%
IT	0.1%	0.0%	0.0%	0.0%	0.1%
ST-60 complex	**0.8%**	**0.0%**	**0.0%**	**0.0%**	**0.8%**
CZ	0.2%	0.0%	0.0%	0.0%	0.2%
FR	0.1%	0.0%	0.0%	0.0%	0.1%
GR	0.3%	0.0%	0.0%	0.0%	0.3%
IT	0.1%	0.0%	0.0%	0.0%	0.1%
NO	0.1%	0.0%	0.0%	0.0%	0.1%
ST-334 complex	**0.4%**	**0.2%**	**0.0%**	**0.0%**	**0.6%**
FR	0.4%	0.2%	0.0%	0.0%	0.6%
ST-254 complex	**0.1%**	**0.2%**	**0.0%**	**0.0%**	**0.3%**
FR	0.1%	0.2%	0.0%	0.0%	0.3%
ST-174 complex	**0.1%**	**0.1%**	**0.0%**	**0.0%**	**0.2%**
FR	0.1%	0.1%	0.0%	0.0%	0.2%
ST-167 complex	**0.1%**	**0.1%**	**0.0%**	**0.0%**	**0.2%**
FR	0.1%	0.1%	0.0%	0.0%	0.2%
ST-4821 complex	**0.1%**	**0.0%**	**0.0%**	**0.0%**	**0.1%**
FR	0.1%	0.0%	0.0%	0.0%	0.1%

Complex	B	C	W135	Y	Total
ST-1157 complex	**0.1%**	**0.0%**	**0.0%**	**0.0%**	**0.1%**
PT	0.1%	0.0%	0.0%	0.0%	0.1%
ST-37 complex	**0.1%**	**0.0%**	**0.0%**	**0.0%**	**0.1%**
GR	0.1%	0.0%	0.0%	0.0%	0.1%
ST-226 complex	**0.1%**	**0.0%**	**0.0%**	**0.0%**	**0.1%**
NO	0.1%	0.0%	0.0%	0.0%	0.1%
ST-198 complex	**0.1%**	**0.0%**	**0.0%**	**0.0%**	**0.1%**
CZ	0.1%	0.0%	0.0%	0.0%	0.1%
Total	**67.6%**	**25.9%**	**2.3%**	**4.2%**	**100.0%**

Table B30 Vaccination status of reported invasive meningococcal disease cases, by country, 2008

Country	Fully vaccinated	Partly vaccinated	Not vaccinated	Unknown	Total	Fully vaccinated (%)	Partly vaccinated (%)	Not vaccinated (%)
Austria	0	0	0	95	95	0	0	0
Belgium	9	0	27	74	111	8.18	0	24.54
Bulgaria	0	0	0	0	29	-	-	-
Cyprus	0	0	0	2	2	0	0	0
Czech Republic	0	4	76	4	84	0	4.76	90.47
Denmark	2	0	49	17	68	2.94	0	72.05
Estonia	0	0	6	0	6	0	0	100
Finland	0	0	0	0	28	-	-	-
France	0	0	0	0	679	-	-	-
Germany	0	0	0	452	452	0	0	0
Greece	13	14	28	26	81	16.04	17.28	34.56
Hungary	0	0	30	0	30	0	0	100
Ireland	1	0	146	15	162	0.61	0	90.12
Italy	8	0	86	89	183	4.37	0	46.99
Latvia	0	0	14	0	14	0	0	100
Lithuania	1	0	58	9	68	1.47	0	85.29
Luxembourg	0	0	0	2	2	0	0	0
Malta	0	0	3	0	3	0	0	100
Netherlands	78	0	66	18	162	48.14	0	40.74
Poland	4	0	369	0	373	1.07	0	98.924
Portugal	0	0	0	77	77	0	0	0
Romania	0	0	115	0	115	0	0	100
Slovakia	0	0	47	4	51	0	0	92.15
Slovenia	0	0	0	0	24	-	-	-
Spain	230	0	129	231	590	38.98	0	21.86
Sweden	0	0	0	49	49	0	0	0
United Kingdom	43	17	46	1296	1402	3.06	1.21	3.28
EU total	**389**	**35**	**1 295**	**2 460**	**4 940**	**9.30**	**0.83**	**30.98**
Iceland	0	0	0	2	2	0	0	0
Liechtenstein	-	-	-	-	-	-	-	-
Norway	1	0	20	15	36	2.77	0	55.555556
Total	**390**	**35**	**1 315**	**2 477**	**4 978**	**9.24**	**0.82**	**31.18**

Table B31 Vaccination status of reported invasive meningococcal disease cases, by country, 2009

Country	Fully vacci-nated	Partly vacci-nated	Not vacci-nated	Unk	Total	Fully vacci-nated (%)	Partly vacci-nated (%)	Not vacci-nated (%)	Unknown (%)
Austria	0	0	0	100	100	0	0	0	100
Belgium	11	0	20	73	104	10.57	0	19.23	70.192308
Bulgaria	0	0	0	0	25	-	-	-	-
Cyprus	0	0	0	1	1	0	0	0	100
Czech Republic	0	4	74	2	80	0	5	92.5	2.5
Denmark	0	0	69	4	73	0	0	94.52	5.47
Estonia	0	0	5	0	5	0	0	100	0
Finland	0	0	0	0	33	-	-	-	-
France	0	0	0	0	618	-	-	-	-
Germany	0	0	0	485	485	0	0	0	100
Greece	19	8	21	33	81	23.45	9.87	25.92	40.74
Hungary	0	0	36	1	37	0	0	97.29	2.70
Ireland	3	0	123	24	150	2	0	82	16
Italy	10	0	84	87	181	5.52	0	46.40	48.06
Latvia	0	0	9	0	9	0	0	100	0
Lithuania	0	0	50	15	65	0	0	76.92	23.07
Luxembourg	0	0	0	3	3	0	0	0	100
Malta	0	0	4	0	4	0	0	100	0
Netherlands	68	0	67	18	153	44.44	0	43.79	11.76
Poland	1	0	304	0	305	0.32	0	99.67	0
Portugal	29	0	37	0	66	43.93	0	56.06	0
Romania	0	0	111	0	111	0	0	100	0
Slovakia	0	0	36	4	40	0	0	90	10
Slovenia	0	0	0	0	15	-	-	-	-
Spain	203	0	143	187	533	38.08	0	26.82	35.08
Sweden	0	0	0	65	65	0	0	0	100
United Kingdom	40	21	37	1148	1246	3.21	1.68	2.96	92.13
EU total	**384**	**33**	**1230**	**2250**	**4588**	**9.85**	**0.84**	**31.56**	**57.73**
Iceland	0	0	0	5	5	0	0	0	100
Liechtenstein	-	-	-	-	-	-	-	-	-
Norway	0	0	21	23	44	0	0	47.72	52.27
Total	**384**	**33**	**1251**	**2278**	**4637**	**9.73**	**0.83**	**31.70**	**57.72**

Table B32 Countries with routine conjugate meningococcal group C vaccination programmes in European countries

Country	Routine schedule	Year introduced	Catch-up	Year undertaken
Belgium ¤	13–18 months	2002	1 year–17 years	2001–2004
Cyprus	12–13 months	2008	-	-
Germany	12–13 months, one dose in the 2nd year of life	2006	General recommendation to complete all outstanding vaccinations, including MCC in older children	
Greece	2, 4, 15–18 months one dose in the 2nd year of life	2007	No information	
Iceland	6–8 months	2002	6 month–19 years	Oct 2002–Oct 2003
Italy ¤	Between 2 months and 2 years	2005	-	-
Ireland ¤	4, 6 and 13 months one dose in the 2nd year of life	2000	< 23 years	Oct 2000–March 2002
Luxembourg	13 months	2007	No information	
Netherlands	14 months	2002	1 year–18 years	June 2002–Nov 2002
Portugal	3, 5 and 15 months	2006	< 10 years	Jan 2006–Dec 2006
			10 years–18 years	Jan 2007–Dec 2007
Spain ¤	2, 6 months booster dose from the age of 12 months	2000	7 month–19 years	2001–2004
UK ¤	3, 4, 12 months	1999	< 18 years	November 1999–2000
			19 years–25 years	December 2001–2002

Source: EUVAC.NET (22 January 2009); Report EU-IBIS 2006.
Historical changes: BE: 2002–2006: 12 months; IR: 2000–2006: 2, 4, 6 months; UK: 1999–2006: 2, 3, 4 months; ES: 2000–2006: 2, 4, 6 months; IT: vaccination for specific groups.

Table B33 Conjugate meningococcal group C vaccination programmes in European countries, countries with voluntary vaccination, 2008–2009

Country	Given to travellers	Contacts of cases	Outbreak control	Underlying conditions	Other	Year introduced
Austria	Yes	Yes	Yes	Yes	On request	-
Czeck Republic	Yes	Yes	Yes		On request	2001
Hungary	Yes		Yes	Yes	On request	2000
Norway	Yes	Yes				-
Poland		Yes	Yes	Yes	Generally recommended	-
Sweden			Yes		On request	-

Source: EUVAC.NET; Report EU-IBIS 2006; countries specific comments.

Table B34 Antibiotic susceptibility of *N. meningitidis*, EU/EAA countries, 2008

Antibiotic	n	%
Ciprofloxacin		
0.002	487	32.7
0.004	726	48.7
0.008	266	17.9
0.016	4	0.3
0.032	4	0.3
0.125	3	0.2
Unk/NT/Non-numeric	2 166	–
Blank	1 295	–
Resistant (> 0.064)	3	0.2*
Ceftriaxone/Cefotaxime		
0.002	319	55.9
0.004	152	26.6
0.008	73	12.8
0.016	21	3.7
0.032	2	0.4
0.125	1	0.2
2	1	0.2
16	2	0.4
Resistant (> 0.125)	3	0.5*
Penicillin		
0.002	427	28.4
0.004	3	0.2
0.008	8	0.5
0.016	73	4.9
0.032	285	18.9
0.064	431	28.6
0.125	179	11.9
0.25	91	6.0
0.5	4	0.3
1	1	0.1
32	2	0.1
64	1	0.1
Unk/NT/Non-numeric	2 163	–
Rifampicin		
0.002	448	31.3
0.004	142	9.9
0.008	364	25.4
0.016	239	16.7
0.032	118	8.2
0.064	61	4.3
0.125	31	2.2
0.25	20	1.4
0.5	4	0.3
1	1	0.1
16	1	0.1
64	3	0.2
Unk/NT/Non-numeric	2 225	–
Blank	1 294	–

**Proportion of resistant strains out of all cases with numeric value.*

Table B35 Antibiotic susceptibility of *N. meningitidis*, EU/EAA countries, 2009

Antibiotic	n	%
Ciprofloxacin		
0.002	97	9.3
0.004	734	70.6
0.008	189	18.2
0.016	16	1.5
0.064	1	0.1
0.125	1	0.1
0.25	1	0.1
2	1	0.1
Unk/NT/Non-numeric	2 255	.
Blank	1 319	.
Resistant (> 0.064)	2	0.3*
Ceftriaxone/Cefotaxime		
0.002	198	36.9
0.004	207	38.6
0.008	98	18.3
0.016	25	4.7
0.032	3	0.6
0.064	2	0.4
16	3	0.6
Unk/NT/Non-numeric	2 758	.
Blank	1 320	.
Resistant (> 0.125)	3	0.6*
Penicillin		
0.002	3	0.3
0.008	16	1.5
0.016	66	6.2
0.032	311	29.4
0.064	371	35.0
0.125	218	20.6
0.25	56	5.3
0.5	14	1.3
1	1	0.1
32	2	0.2
64	1	0.1
Unk/NT/Non-numeric	2 256	.
Blank	1 299	.
Rifampicin		
0.002	29	3.0
0.004	193	19.6
0.008	315	32.0
0.016	245	24.9
0.032	103	10.5
0.064	53	5.4
0.125	29	3.0
0.25	7	0.7
0.5	2	0.2
2	1	0.1
16	2	0.2
64	4	0.4
Unk/NT/Non-numeric	2 317	.
Blank	1 314	.

**Proportion of resistant strains out of all cases with numeric value.*

Table B36 Proportion of resistant invasive meningococcal disease cases to ciprofloxacin out of all cases with numeric value by country, 2008

Country	Ciprofloxacin	N	%
AT	Resistant (> 0.064)	2	3.5
BE	Resistant (> 0.064)	0	0.0
CZ	Resistant (> 0.064)	0	0.0
DK	Resistant (> 0.064)	0	0.0
GB	Resistant (> 0.064)	0	0.0
HU	Resistant (> 0.064)	0	0.0
IT	Resistant (> 0.064)	0	0.0
MT	Resistant (> 0.064)	0	0.0
NO	Resistant (> 0.064)	0	0.0
PL	Resistant (> 0.064)	0	0.0
SE	Resistant (> 0.064)	0	0.0
SK	Resistant (> 0.064)	1	3.2

Table B37 Proportion of resistant invasive meningococcal disease cases to ciprofloxacin out of all cases with numeric value by country, 2009

Country	Ciprofloxacin	N	%
AT	Resistant (> 0.064)	0	0.0
BE	Resistant (> 0.064)	0	0.0
CZ	Resistant (> 0.064)	0	0.0
DK	Resistant (> 0.064)	0	0.0
GB	Resistant (> 0.064)	0	0.0
HU	Resistant (> 0.064)	0	0.0
IT	Resistant (> 0.064)	1	1.1
MT	Resistant (> 0.064)	0	0.0
NO	Resistant (> 0.064)	0	0.0
PL	Resistant (> 0.064)	0	0.0
SE	Resistant (> 0.064)	1	1.9
SK	Resistant (> 0.064)	0	0.0