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INVASIVE *NEISSERIA MENINGITIDIS* IN EUROPE 2006

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SUMMARY

Introduction

EU-IBIS, a surveillance network for invasive meningococcal disease, continues to fulfil its aims to gather and improve epidemiological information about the disease, to integrate and analyse molecular data, and to form the focus for a wider collaboration. The project, having started in 1999, has now collected eight years worth of data, including consistent data across those years from 21 of its 27 participants countries.

Methods

Participants have continued to submit epidemiological and molecular data to the network, according to the EU agreed case definitions. The project now holds a large amount of molecular typing data, and data that can be further used to explore the impact of routine meningococcal C conjugate (MCC) vaccination. It can also be used to investigate the potential impact of other types of meningococcal vaccines.

Results

Non-culture techniques continued to be used as a means to identify *N meningitidis* infections in many countries, though diagnosis by culture still remains the most common method overall. The incidence of confirmed and probable cases varied considerably across Europe, ranging from 0.3 (Italy) to 8.9 (Malta) and 4.96 (Ireland) per 100,000 population. Incidence rates in countries that have introduced routine MCC vaccination have decreased considerably, especially for serogroup C incidence.

Decreases in incidence have also been seen in some countries whose vaccination policies have not changed. Serogroups B and C remained the major serogroups causing invasive disease in Europe, with B being particularly prevalent in those under 20 years of age. The incidence of both serogroup B and C decrease with age, and older adults (age 25 and over) rarely experience disease. There are distinct serotype distributions for different serogroups: B tends to associate with P3.1, P3.4 and P3.15 (where serosubtype was known, just under 35% of B strains being non-typeable), and C with P2.2a and P2.2b. Serosubtypes also tend to cluster with specific serogroup:serotype combinations, but the numbers of isolates of each phenotype combination do tend to fluctuate with time. Overall case fatality has ranged between 6% and 8% between 1999 and 2006, and remains generally consistent across the different European countries, varying between 5.19% and 11.2%. Disease caused by serogroups C, W135 or Y is most likely to cause death, and death is also most likely to occur in the 65+ age group for all serogroups. Meningitis presents most commonly in the 15-44 age group, and septicaemia and other diagnoses in those 65 years old and above. While disease presentation with a diagnosis did not appear to be affected by the serogroup of the causing organism, a case presenting septicaemia is much more likely to result in death than one presenting with meningitis.

Conclusions

This project has demonstrated the successful development of existing networks towards the objective of providing high quality surveillance information on meningococcal infection in the European Union and neighbouring countries. The role of the European Centre for Disease Prevention and Control as it takes over the responsibility of running Dedicated Surveillance Networks such as EU-IBIS is paramount. This will ensure high value of the network is maintained and strengthened, for example, by integrating available data from different sources and collaborating with other influential organisations such as the European Monitoring Group on Meningococci (EMGM Society).

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INTRODUCTION

The network

The bacteria *Neisseria meningitidis* (meningococci) and *Haemophilus influenzae* are important causes of meningitis and other serious invasive disease across Europe and contribute to morbidity and mortality, particularly in young children. The two organisms thus represent a considerable public health problem, and the surveillance of bacterial meningitis has been identified as a priority by the European Commission (European Commission Decision 2119/98/EC, 24/09/1998).

Surveillance of these diseases is vital so that the epidemiology of these infections can be characterised and the impact of any vaccination programmes measured. Since these diseases are relatively uncommon (particularly after vaccination has been introduced) pooling data across many European countries increases the power of any epidemiological analysis.

The European Union Invasive Bacterial Infections Surveillance Network (EU-IBIS) began in 1999 and is funded by the European Commission DG Sanco. There are two separate, organism-specific, networks, and the countries participating in the *N meningitidis* network are: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Spain, Slovak Republic, Slovenia, Sweden, Switzerland, and UK.

The EU-IBIS *N meningitidis* network built upon established networks including the European Monitoring Group for Meningococci (now known as the EMGM Society) (European Monitoring Group for Meningococci (EMGM), weblink) and the Bacterial Meningitis in Europe surveillance network (Noah and Connolly 1996). EMGM is a consortium of microbiologists and epidemiologists based mainly in reference laboratories in Europe and working to ensure effective and timely exchange of information on meningococcal infections (Taha *et al* 2005). EU-IBIS has collaborated with EMGM to facilitate these aims (Noah and Connolly 1996).

The network originally contained 16 EU and 3 (then) non-EU countries when it was established in 1999, these being Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and the UK, and Czech Republic, Malta and Norway respectively. The number of countries involved has increased over the duration of the project, but particularly in 2004, when 10 Accession countries, including Czech Republic and Malta, joined the EU. The total number of countries involved in the network currently stands at 27; 21 of these countries have contributed comparable data between 1999 to 2006.

In October 2007, the project data was transferred to the European Centre for Disease Prevention and Control in Stockholm, the latter having taken on responsibility for running the project. The transition phrase is ongoing, with close co-operation between all the parties involved.

Project aims related to meningococcal disease

- To improve the epidemiological information on invasive disease caused by *N meningitidis* within the EU
- To improve the laboratory capacity to accurately characterise the isolates of *N meningitidis* using standardised methods
- To evaluate the impact of immunisation with conjugate vaccines on the epidemiology of *N meningitidis* and to compare the impact of vaccination with conjugate vaccines produced by different manufacturers and according to different schedules
- To form a focus for wider collaboration with non-EU countries and candidate EU countries

Due to the relative rarity of meningococcal disease, particularly following the introduction of routine conjugate meningococcal C vaccine in the pertinent countries, pooling of epidemiological data across countries should increase the power of any analysis undertaken. For example, knowledge of changes in serogroup and/or serotype distribution consistent across Europe could provide valuable input when formulating vaccination strategies. However, care must be taken when interpreting the results of any such analysis to allow for any differences in aspects of national surveillance systems such as diagnosis and ascertainment, and to ensure, as far as is possible, that comparisons are valid.

The project also allows opportunity for the sharing of good practice in both laboratory methods and surveillance strategies. In addition, advances and innovations in treatment and in public health control measures can be disseminated in a timely manner, and evidence-based guidance on the control of meningococcal disease, such as optimised vaccine schedules and prophylaxis protocols, might become more consistent across Europe.

The disease

In Europe and North America, meningococcal disease is endemic and, while most cases are sporadic, small clusters also occur. There is a clear seasonal variation, with the majority of cases occurring in winter and early spring. Meningococcal disease manifests itself as meningitis, with or without septicaemia, though a considerable number of cases manifest septicaemia without any other focal features, and it is in this group that death is most likely to occur. Other symptoms can include conjunctivitis, pneumonia, septic arthritis and pericarditis. A significant proportion of meningococcal patients who survive have sequelae, including neurologic disability, limb loss, and hearing loss (ACIP 2000, Harrison 2006c, Public Health Laboratory Service 2002b, Rosenstein *et al* 2001, Tikhomirov *et al* 1997, WHO Editorial Working Group 1998)

Treatment of meningococcal disease requires the prompt administration of antibiotics (Harrison 2006b). Suitable antibiotics include penicillins, 3rd generation cephalosporins (*eg* ceftriaxone, cefotaxime) or chloramphenicol (Public Health Laboratory Service 2002a). Prophylaxis of household contacts with antibiotics that eliminate meningococcal nasopharyngeal carriage, such as

rifampicin/rifampin, ciprofloxacin and ceftriaxone, has been found to reduce the number of subsequent cases (Fraser *et al* 2005, Public Health Laboratory Service 2002c).

The organism and strain identification

N meningitidis is a Gram-negative diplococcus (paired spherical bacterium), normally surrounded by a layer of complex lipids and polysaccharides (the capsule) which protects it against the host immune system and which is thus a potent virulence factor. The organism can be defined by variations in the biochemistry of the capsule, determining its serogroup, and in its outer membrane proteins (OMPs). Class 2 or 3 OMP (PorB gene) determine the serotype and class 1 OMP (PorA gene) determine the serosubtype. Both PorA and PorB gene products have a number of variable regions which are surface-exposed and thus contribute to antigenic variability between strains; in the case of PorA proteins, the variants for two of the variable regions (VR1 and VR2) are frequently quoted, with a third region (VR3) used less often.

Of the 12 different serogroups identified thus far, the major ones associated with disease are A, B, C, W135, and Y, and to a much lesser extent X and Z/29E. However, some disease strains have been isolated for which the serogroup cannot be identified (designated as NGA, or non-groupable), and are thus assumed to have no capsule. An absence of capsule has been shown to facilitate the adherence of meningococci to the human nasopharyngeal epithelium, this being the major method of transmission of the organism between humans, its only host. Although serogroup A continues to be responsible for most of the major meningococcal epidemics in the Africa meningitis belt (and in other countries such as China), its incidence in Europe is relatively low, with serogroups B and C being responsible for most of the invasive meningococcal disease present. Levels of serogroup Y disease remain relatively low in Europe, but are important in the US, rising from 2% of cases 1989-1991 to 37% during 1997-2002 (Bilukha and Rosenstein 2005).

It has been shown that meningococcal strains causing disease are much more genetically restricted than those carried in the nasopharynx. As with serogroups, only a few serotypes and serosubtypes are associated with most meningococcal disease, with other types within the same serogroup remaining mostly non-invasive. Thus serotype (PorB) and serosubtype (PorA) identification is important in enabling identification of strains at a more detailed level and so provide epidemiological studies with a greater resolution. Moreover, OMPs are used as components of vaccines in development, and serotype / serosubtype analysis may give an idea of how wide the coverage of a particular vaccine might be in a particular area. Though strain identification has traditionally been made using the appropriate, and commercially available, monoclonal antibodies (Mab), increasingly across Europe (and reflected in the data collected by EU-IBIS), PorA (serosubtype) identification is being made using genotyping techniques. This is due to the latter's increased sensitivity over serological analysis for detecting PorA / OMP Class I variability, especially as the panel of serosubtyping Mabs has been shown not to cover the full range of variation present. However, genotypic analysis can not always determine definitively whether or not the PorA gene is actually

being expressed and so some phenotypic analysis is still required (Cartwright 2003, Dolan-Livengood *et al* 2003, Frasch *et al* 1985, Harrison 2006a, Keith Cartwright 2003, Lindberg 1999, Ramsay *et al* 1997, Russell *et al* 2004, Taha *et al* 2002).

Vaccines

Currently available meningococcal vaccines are based on the capsule and are serogroup specific, the serogroups which are covered by current vaccines being A, C, W135 and Y. The first vaccines were developed in the 1960's and produced by using purified capsular polysaccharide as antigen. Vaccines protecting against serogroup A and serogroup C were developed first, followed some time later by a tetravalent vaccine covering the A, C, Y and W135 serogroups. An effective vaccine against serogroup B meningococci has yet to be developed, probably due to polysaccharide B having antigenic similarity to a sugar present in mammalian tissue, and thus being poorly immunogenic in humans (Danzig 2004b).

It has been shown that the antibody response to capsular polysaccharide vaccine is not long-lived, particularly among children under two years of age, this age group experiencing the highest incidence of meningococcal disease. Thus, during the 1990s, conjugate vaccines were developed. These vaccines conjugate the antigenic polysaccharide to a suitable carrier protein, such as tetanus toxoid protein, diphtheria toxoid protein or diphtheria cross-reactive material (CRM). This enables the vaccine to produce a stronger immune response among infants, and also to prime immunologic memory, thus eliciting booster responses to subsequent doses. MCC (Meningococcal serogroup C conjugate) was the first such conjugate vaccine to be developed, licensed in UK in 1999 and protecting against serogroup C meningococci, and in 2005, the quadrivalent MCV4 conjugate vaccine was licensed in US, covering serogroups A, C, W135 and Y (Bruge *et al* 2004, Danzig 2004a, Harrison 2006e). A conjugate serogroup A vaccine is currently being developed and trialled for use in Africa (Girard *et al* 2006, Jodar *et al* 2003)

However, even for conjugate vaccines, studies have shown a fall in protective antibody levels 1 to 4 years after vaccination, which is particularly notable in children immunised only in infancy. Although evidence of immunological memory was present even in the youngest children, circulating antibodies may need to be maintained to ensure protection. The maintenance of 'protective' antibody titres may depend on natural immune boosting and since MCC vaccination reduces *N meningitidis* carriage, such boosting might not occur so frequently in the general population. Ongoing surveillance and seroprevalence studies are essential to understand the post-vaccine disease epidemiology and determine whether further changes to the immunisation schedule (eg a teenage 'booster') are required to maintain disease control (Snape and Pollard 2005a).

The development of vaccines that can effectively protect against a broad range of serogroup B strains has been challenging, because the group B capsule is not a suitable vaccine antigen. Alternative approaches include using OMP antigens such as the PorA, and other proteins identified by 'reverse vaccinology' (Giuliani *et al* 2006). Several vaccine candidates are currently in trials.

METHODS

The definitions of the terms used in this report and the glossary are given in Appendix III.

Data submission

Participants are requested to submit data on cases of meningococcal disease at 6 monthly intervals. The agreed dataset comprises information on age, sex, date of onset, method of laboratory confirmation, site of identification, serogroup, serotype and serosubtype. However, not all countries are able to provide this information for all the cases reported to them, especially as some countries which undertake PorA genotyping (=sero)subtype) do not identify the strain serotype (PorB gene product). Susceptibility of strains to various antibiotics such as penicillin, sulphonamide, the cephalosporins and rifampicin are reported by the countries which collect such data. For those countries which have introduced routine serogroup C conjugate vaccination (Belgium, Iceland, Ireland, Netherlands, Spain, UK, and from 2006, Germany and Portugal), information on the vaccine schedule used and vaccine coverage is requested. In addition, these countries report whether or not a case had been vaccinated, if this is known. Case definitions were those adopted by the EC (European Commission Decision 2002/253/EC, 20/03/2002). For most analyses, laboratory-diagnosed probable and confirmed cases were included.

EU case definition to 2006 (European Commission Decision 2002/253/EC, 20/03/2002)

Confirmed case

A clinically compatible case diagnosed by one or more of the following laboratory criteria.

- Isolation of *Neisseria 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 (eg meningitis and/or meningococemia that may progress rapidly to purpura fulminans, shock and death. Other manifestations are possible.) without any laboratory confirmation.

Some countries submit more than one dataset (eg laboratory reports and clinical notifications) as they regard neither dataset to be complete. Where possible participants are encouraged to reconcile their

databases before submission, but if not, then both datasets are accepted, the most appropriate one for a particular analysis being used. Countries are also asked to indicate publicly available age-specific population denominators, or to submit their own datasets. The data requirements for EU-IBIS are given in Appendix I.

Rapid reporting project

This project had been initiated as a result of concern that vaccination with meningococcal serogroup C conjugate (MCC) vaccines would create a selective pressure in favour of serogroup B strains, with serotype strains that had been predominantly associated with serogroup C 'capsule switching' to serogroup B and thus evading vaccine-induced protection (Harrison 2006d, Maiden and Spratt 1999, Swartley *et al* 1997). Serotypes P2.2a and P2.2b were chosen as monitoring targets as these were the most common serogroup C serotypes prior to the introduction of vaccination, and in addition P2.2a strains are associated with the hyperinvasive and hypervirulent sequence type 11 (ST-11) clonal complex (Snape and Pollard 2005b, Trotter *et al* 2002). Sentinel countries included those which did not have routine MCC vaccination as well as those which did, in order to give a representative picture across Europe, and to provide 'controls' against which to judge B:P2.2a and B:P2.2b trends in countries with routine MCC vaccination. Thus, since September 2003, Austria, Czech Republic, Denmark, England and Wales, France, Germany, Greece, Ireland, Italy, Netherlands and Spain have been submitting on a monthly basis the number of cases reported to them of meningococcal disease due to B:2a and B:2b strains. However, at the EU-IBIS *N meningitidis* network meeting in Rome in 2007, participants agreed that on the basis of current experience, while the area should still be monitored, there was no need to collect the data on a monthly basis.

Questionnaires

A database collating replies to questionnaires disseminated in conjunction with the EMGM / network meetings of 2000 and 2005 has been developed.

Quality assurance

An EQAS was carried out in 2007, with 23 participating laboratories, and a separate report on this has been produced.

Website development

With the transfer of responsibility for running the project to ECDC, the EU-IBIS website hosted at the Health Protection Agency, UK will be maintained as a historical site only. A website hosted by ECDC has been created (http://www.ecdc.eu.int/Activities/surveillance/EU_IBIS/index.html)

Dissemination of results/meetings

A half day EU-IBIS meeting was held the day before the 9th European Monitoring Group for Meningococci (EMGM Society) conference in Rome in summer 2007, and relevant presentations have been posted on the EU-IBIS website.

RESULTS

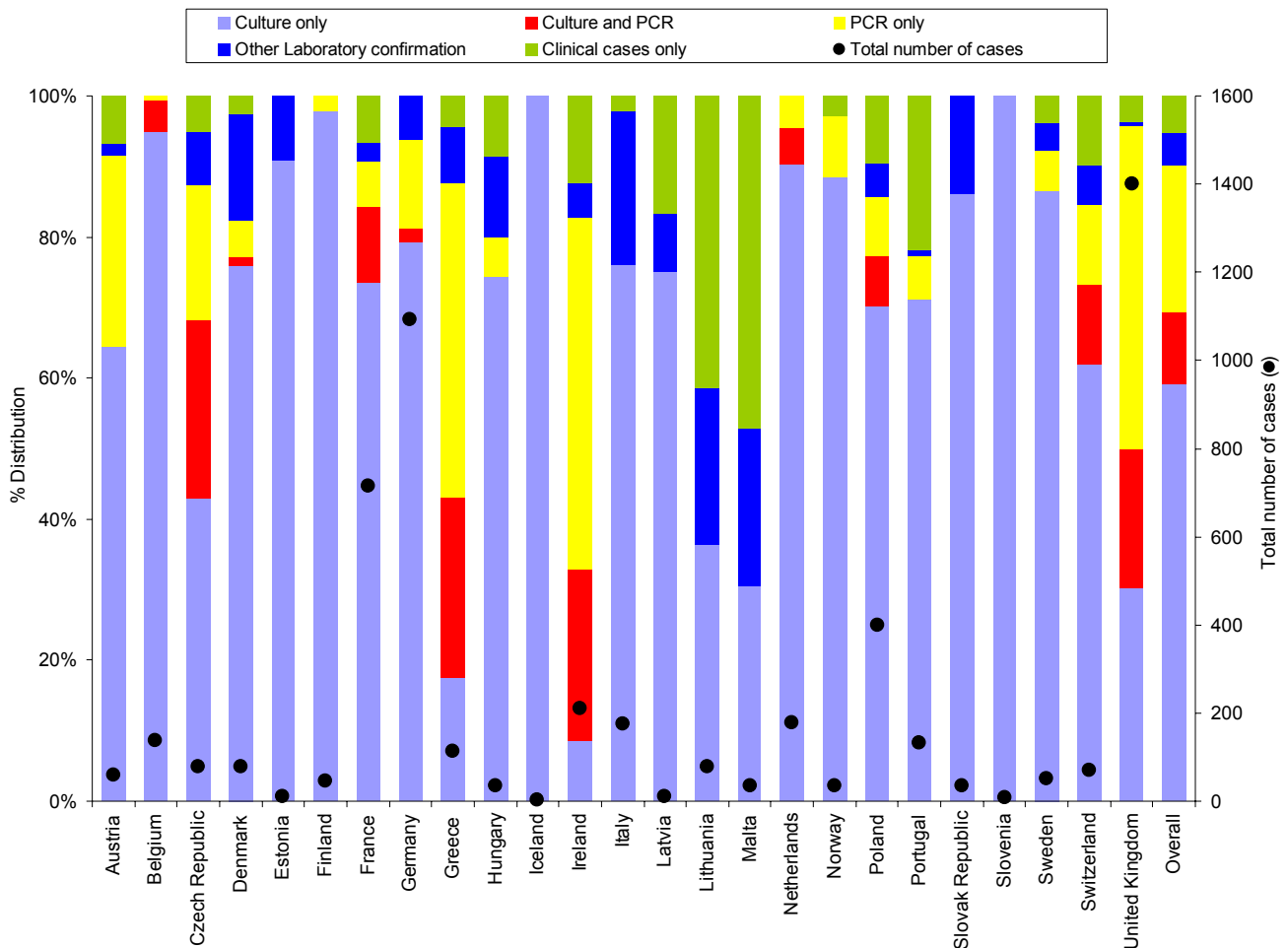
The EU-IBIS database now holds just over 60,000 case reports of meningococcal disease occurring between 1999 and 2006, as submitted by the 27 participant countries.

References to table numbers preceded by an 'A' (eg Table A3) indicate a table in Appendix IV. Graphs refer to laboratory-diagnosed cases (both confirmed and probable) unless otherwise indicated.

A. Methods of identification

Figure 1 shows the percentage distribution of methods used by different countries to identify all cases of meningococcal disease received in 2006. Also shown in Figure 1 is the total number of cases reported by a country. There is considerable variability in both methods of identification and in the total numbers of reported cases amongst different European countries.

Figure 1 Percentage distribution of the methods used to identify all reported cases of meningococcal disease for all participating countries 2006



Spain is not shown as, although most cases were confirmed by either culture or PCR, the actual method is not reported. Determination of an infection by culture represents the most common method of identification for most countries, but in Greece, Ireland and the UK, PCR identification forms a substantial proportion. Lithuania confirms a considerable proportion of its cases using latex and microscopy, but deals only in relatively small numbers. The proportion of cases with only a clinical diagnosis is high in countries reporting small numbers, with Malta and Lithuania both having just under 50% of such cases. The total number of cases also varies by country, from around 1400 reported in UK at the upper end to fewer than 15 cases reported in each of Iceland, Slovenia, Estonia and Latvia.

B. Epidemiology

Overall incidence of meningococcal disease

The considerable variability in the overall incidence of meningococcal disease across Europe seen during 1999 -2002 (Handford *et al* 2003) was also evident in 2006, as seen in Figure 2 and Table 1.

Figure 2 Incidence (per 100,000 population) of confirmed and probable invasive meningococcal disease in all participating countries, 1999 or earliest year, 2006

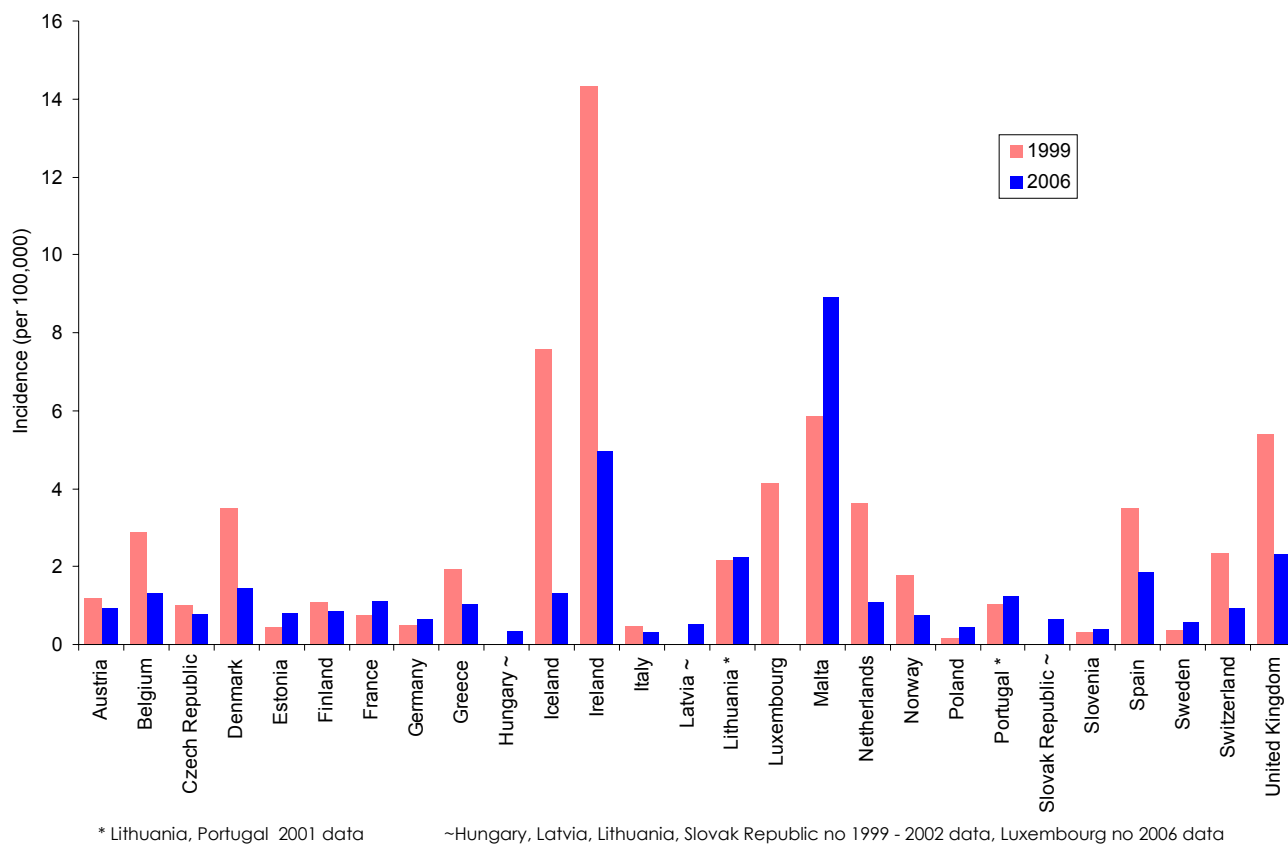


Table 1 Incidence (per 100,000 population) (number of cases) of confirmed and probable meningococcal disease for all participating countries, 1999-2002, 2006

Country	1999	2000	2001	2002	2003	2004	2005	2006
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)
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)
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)
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)
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)
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)
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)
Germany *	0.49 (402)	0.55 (452)	0.64 (530)	0.70 (580)	0.69 (568)	0.54 (447)	0.61 (499)	0.65 (539)
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)
Hungary	-	-	-	-	0.42 (43)	0.43 (43)	0.32 (32)	0.35 (35)
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)
Ireland	14.33 (536)	13.59 (515)	8.58 (330)	6.43 (252)	5.96 (237)	4.92 (199)	4.91 (203)	4.96 (210)
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)
Latvia	-	-	-	-	1.03 (24)	1.03 (24)	0.78 (18)	0.52 (12)
Lithuania	-	-	2.18 (76)	1.90 (66)	1.27 (44)	2.67 (92)	2.36 (81)	2.26 (77)
Luxembourg	4.15 (18)	0.23 (1)	0.23 (1)	0.23 (1)	0.45 (2)	0.00	0.22 (1)	-
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)
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)
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)
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)
Portugal	-	0.57 (59)	1.03 (106)	2.08 (216)	1.99 (208)	1.73 (182)	1.60 (169)	1.25 (132)
Slovak Republic	-	-	-	-	0.91 (49)	0.59 (32)	0.82 (44)	0.67 (36)
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)
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)
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)
Switzerland	2.36 (169)	2.43 (175)	2.31 (168)	1.56 (114)	1.19 (88)	1.16 (86)	1.02 (76)	0.95 (71)
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)
Overall	1.90 (8164)	1.85 (8183)	1.69 (7541)	1.54 (6891)	1.38 (6469)	1.21 (5670)	1.26 (5978)	1.10 (5223)

*Data from the Reference Laboratory ~ Notification data

As can be seen from Table 1, the pattern of meningococcal disease in Europe is complex. In the majority of countries, overall incidence of invasive meningococcal disease has decreased between 1999 and 2006, though for some of these countries, incidence peaked between 2001 and 2003.

Countries experiencing a greater than two-fold drop in incidence between their peak year (given in brackets) and 2006 include Belgium (2001), Denmark (1999), Greece (2000), Iceland (1999), Ireland (1999), Netherlands (2001), Norway (2000), Switzerland (2000) and UK (1999).

Incidence in 2006 ranged from 0.30 (Italy) and 0.4 (Slovenia) to 8.9 (Malta) and 4.96 (Ireland) with the overall European incidence being 1.09 per 100,000 population, this being just under two-fold decrease on the 1999 level of 1.9 per 100,000.

It is known that meningococcal disease incidence varies naturally with time (Jones 1995), though vaccination policies such as the introduction of routine conjugate vaccination and the scope and implementation of a catch-up campaign will also markedly affect incidence rates.

Ascertainment will also affect the level of reported burden of disease, and in some countries, such as Lithuania and Poland, where incidence has appeared to increase in recent years, ascertainment of disease has also improved, and is probably responsible for the apparent increase.

Meningococcal serogroup C conjugate (MCC) vaccination

MCC vaccine schedules

The UK was the first country to introduce MCC vaccines, in November 1999. Between 2000 and 2004 the vaccine has been introduced into the routine vaccination schedules of Ireland, Spain (both 2000), the Netherlands, Belgium and Iceland (all 2002). In 2006, a further two countries, Portugal and Germany, also introduced the conjugate vaccine into their routine schedule. The routine vaccine schedules and details of catch-up campaigns in these countries and the use of MCC vaccine in other European countries are summarised in Table 2. Countries were designated MCC countries if they had implemented routine MCC vaccination for longer than a year. Non-MCC countries were all other countries and for the purposes of this report included Portugal and Germany.

The impact of vaccination is clearly illustrated in Figure 3, which compares the change in incidence of laboratory-confirmed serogroup C meningococcal disease in MCC and non-MCC countries between 1999 and 2006. The 10-fold drop in serogroup C incidence between 1999 – 2006 is clearly indicative of the efficacy of the vaccine, and it is interesting to note that serogroup C incidence in countries which do not include the vaccine in their routine schedule is now actually higher than in countries which do.

MCC vaccine schedules vary quite widely across Europe, as can be seen from Table 2. Work done in Spain and UK does indicate that vaccine protection decreases over time, particularly if no further doses are given after infancy, and this was explored in the *N meningitidis* 2003/2004 report

Table 2 Conjugate meningococcal group C vaccination programmes in European countries, as at October 2007

Countries with routine vaccination

Country	Routine schedule	Year introduced	Catch-up	Year undertaken
Belgium	1. Wallonie	2002	1 year - 6 years	2002
	2. Flanders	2002	1 years - 3 years 1 year - 6 years and 14 years - 17 years 10 years - 14 years 7 years - 9 years	2001 2002 2003 2004
Germany	12 – 23 months	2006	No formal catch-up campaign, general recommendation to complete all outstanding vaccinations, including MCC, in older children	
Iceland	6 and 8 months	2002	6 months - 19 years	October 2002 – October 2003
Ireland	2, 4 and 6 months	2000	<23 years	October 2000 - March 2002
Netherlands	14 months	2002	1 year - 18 years	June 2002 - November 2002
Portugal*	3, 5 and 15 months	2006	<10 years 10 years - 18 years	January – December 2006 January – December 2007
Spain	2, 4 and 6 months	2000	7 months - 19 years 15 out of 19 Spanish regions	2001 – 2004
UK	2, 3 and 4 months	1999 - 2006	<18 years 19 years - 25 years	November 1999 – 2000 December 2001 – 2002
	3, 4 and about 12 months	Sept 2006		

*The Portuguese National Immunisation Programme was introduced in 2004 with the current recommendation, though for logistical reasons routine MCC vaccination was not implemented until 2006; before 2004, the recommended schedule was 3, 5 and 7 months, and the vaccine was given on prescription of family doctors or private paediatricians.

Countries with selective or voluntary vaccination

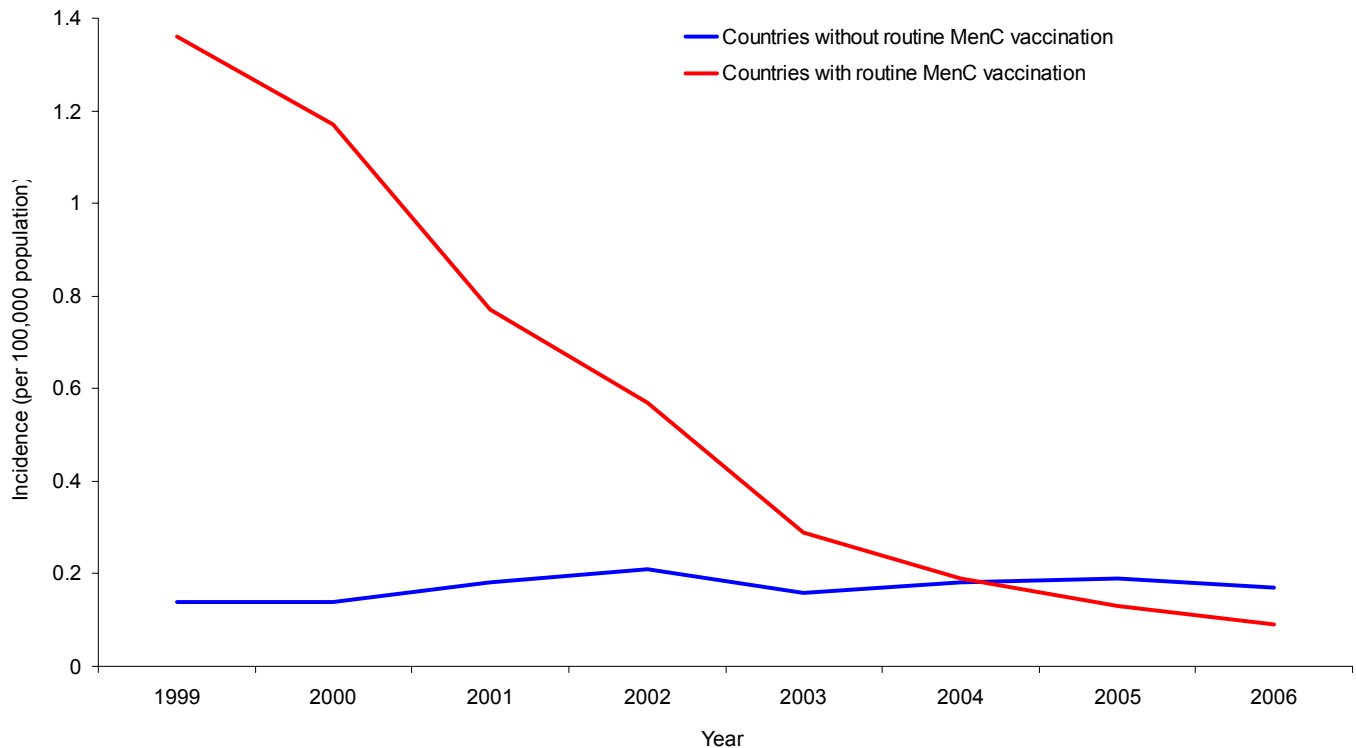
Country	Given to					Year introduced
	Travellers	Contacts of cases	Outbreak control	Underlying conditions	Other	
Czech Republic	Yes	Yes	Yes	Yes	On request	2001
Greece					Given by private paediatricians, targeted at <14 years	2001
Hungary					Children at request of parents	
Italy				Yes		2006
Norway	Yes	Of serogroup C cases				
Poland		Yes*	Yes*		Generally recommended*	
Sweden			Yes		Given rarely	
Switzerland	Yes	Yes	Yes	Yes	Military recruits, exposed laboratory workers	2001

* In practice the vaccine is rarely requested, partly due to the fact that the vaccine is neither free nor partially subsidised

Countries with rare or no vaccination

Austria	Estonia	Latvia	Slovak Republic
Denmark	Finland	Malta	

Figure 3 Incidence of serogroup C confirmed and probable meningococcal disease in countries which do and do not include MCC vaccine in their routine vaccination schedule, 1999-2006



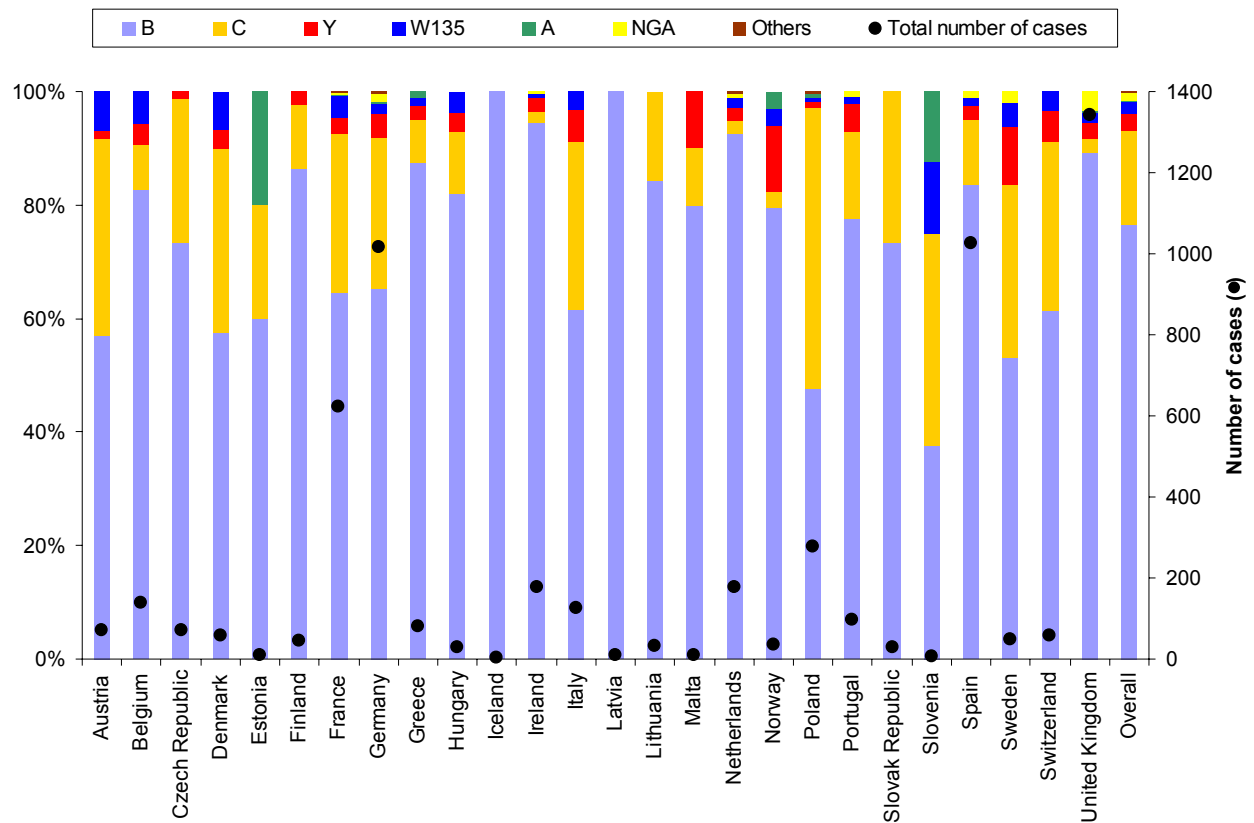
** Countries with routine MCC vaccination programmes: Belgium, Iceland, Ireland, Netherlands, Spain, United Kingdom
 ** Countries without routine MCC vaccination programmes: Austria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Italy, Malta, Norway, Poland, Slovenia, Switzerland

Serogroups

The distribution of serogroups in laboratory-diagnosed cases in all participant countries in 2006 is shown in Figure 4 and also in Tables A10 and A11.

Serogroups B and C comprise the majority of meningococcal isolates recorded, regardless of the total number of cases identified, and together contribute around 90% of cases. Exceptions to this, where the overall number of cases are greater than 10, are three north Scandinavian countries Denmark, Norway and Sweden, where the proportion of Y and W135 isolates lies between 10% and 15%. However, overall numbers of cases are small, being between 30 and 60 respectively for 2006. For Europe as a whole, serogroup Y disease was noticeably more common than W135 disease in 2006.

Figure 4 Percentage distribution of serogroups causing laboratory-diagnosed confirmed and probable meningococcal disease in all participating countries, 2006

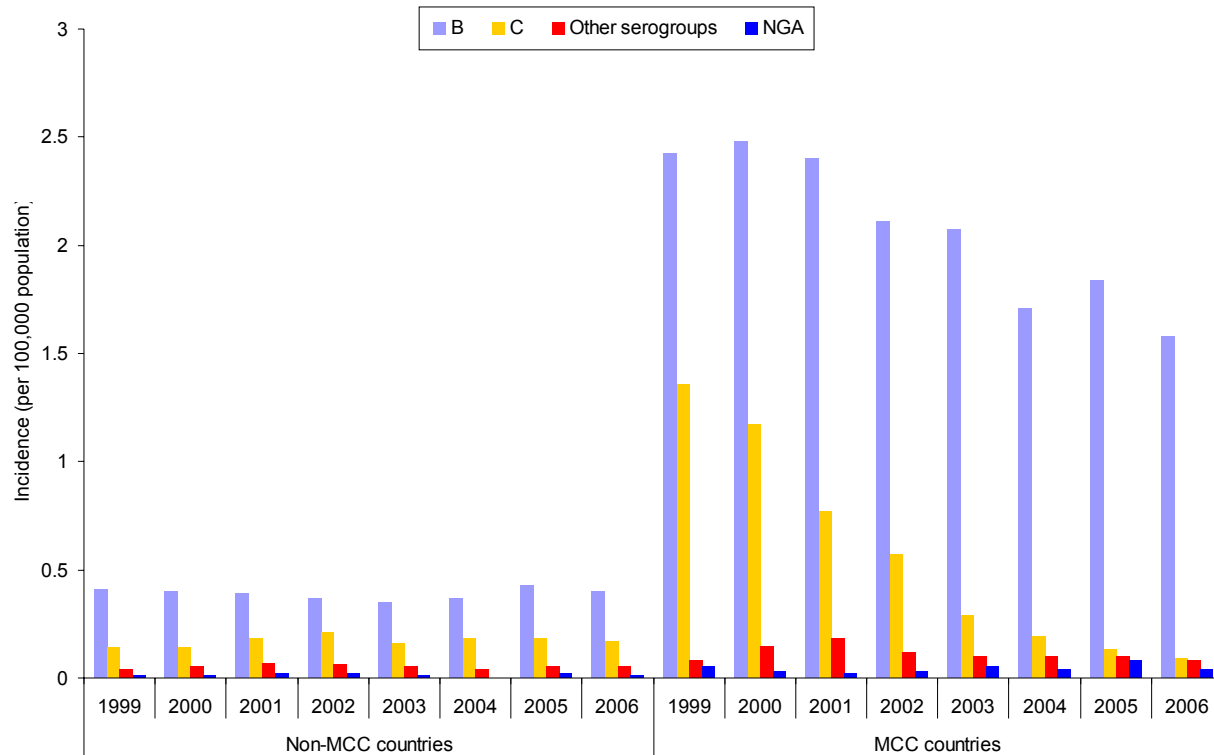


The impact of MCC vaccination on serogroup distribution can be seen in Figures 5 and 6. Figure 5 shows the change in incidence attributable to each serogroup over time, differentiating between MCC and non-MCC countries. Figure 6 shows the percentage distribution of serogroups in MCC countries in the years before and following the introduction of MCC into the routine vaccination schedule.

The incidence of invasive meningococcal disease in 1999 for both serogroups B and C was much higher in MCC countries. Although there is a decrease in incidence of both serogroups between 1999 and 2006 in these countries, the reduction of serogroup C is much larger, being reduced by over 90% compared to a reduction of approximately 40% for serogroup B between 1999 and 2006. The incidence for all serogroups in non-MCC countries has remained relatively constant between 1999 and 2006.

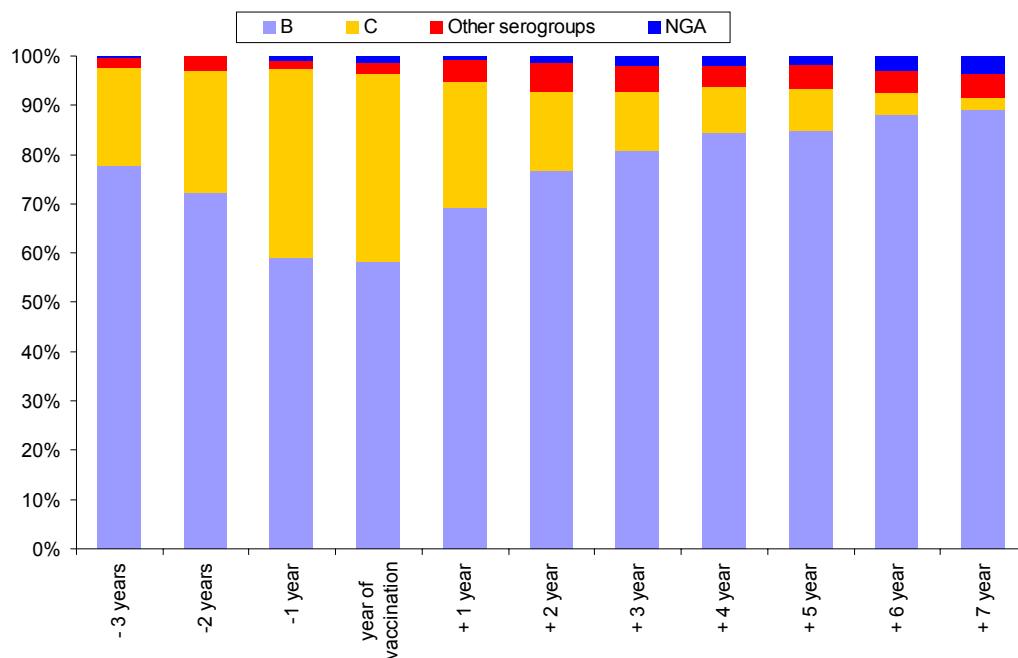
Figure 6 reinforces the impact of MCC vaccination; the greater the number of years post-vaccination, the lower the proportion of cases due to serogroup C.

Figure 5 Serogroup distribution of laboratory-diagnosed confirmed and probable meningococcal disease cases in countries submitting consistent data* with and without routine MCC vaccination, 1999-2006



* Countries as in Figure 3

Figure 6 Serogroup distribution of confirmed and probable meningococcal disease cases in years before, during and after introduction of MCC into routine vaccination schedule*



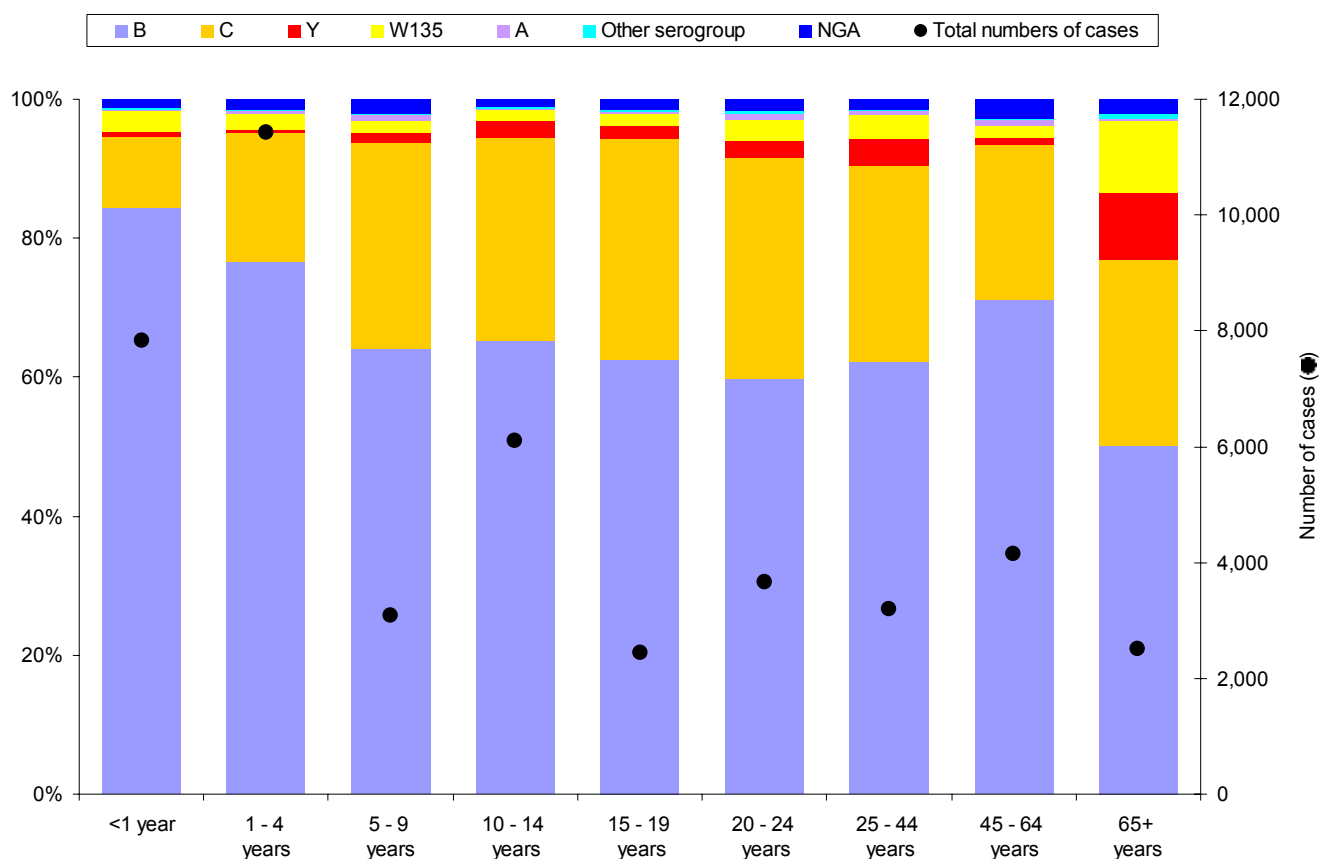
* Data from country (year of MCC introduction) : Belgium (2002), Iceland (2002), Ireland (2000), Netherlands (2002), Spain (2000), UK (1999)

In MCC countries, serogroup B disease is either stable or declining. This suggests that serogroup B strains are not increasing to fill any ecological niches produced by the reduction in serogroup C strains (capsule replacement), and that capsule switching among serogroup C strains is not clinically significant. The reason for the reduction in serogroup C is likely to be due to the introduction of MCC. This is supported by the observations that there is no similar reduction in serogroup C over the same time period in non-MCC countries (Figure 5) and the decreasing proportion of cases of meningococcal disease due to serogroup C with the number of years following MCC introduction (Figure 6). Table A14 shows the change in proportion of cases due to serogroup C for all countries that have submitted consistent data between 1999 and 2006.

Age

The association between age group and serogroup is illustrated in Figure 7.

Figure 7 Percentage serogroup- and age- specific distribution of laboratory-diagnosed confirmed and probable meningococcal disease in countries with consistent data 1999-2006 combined*

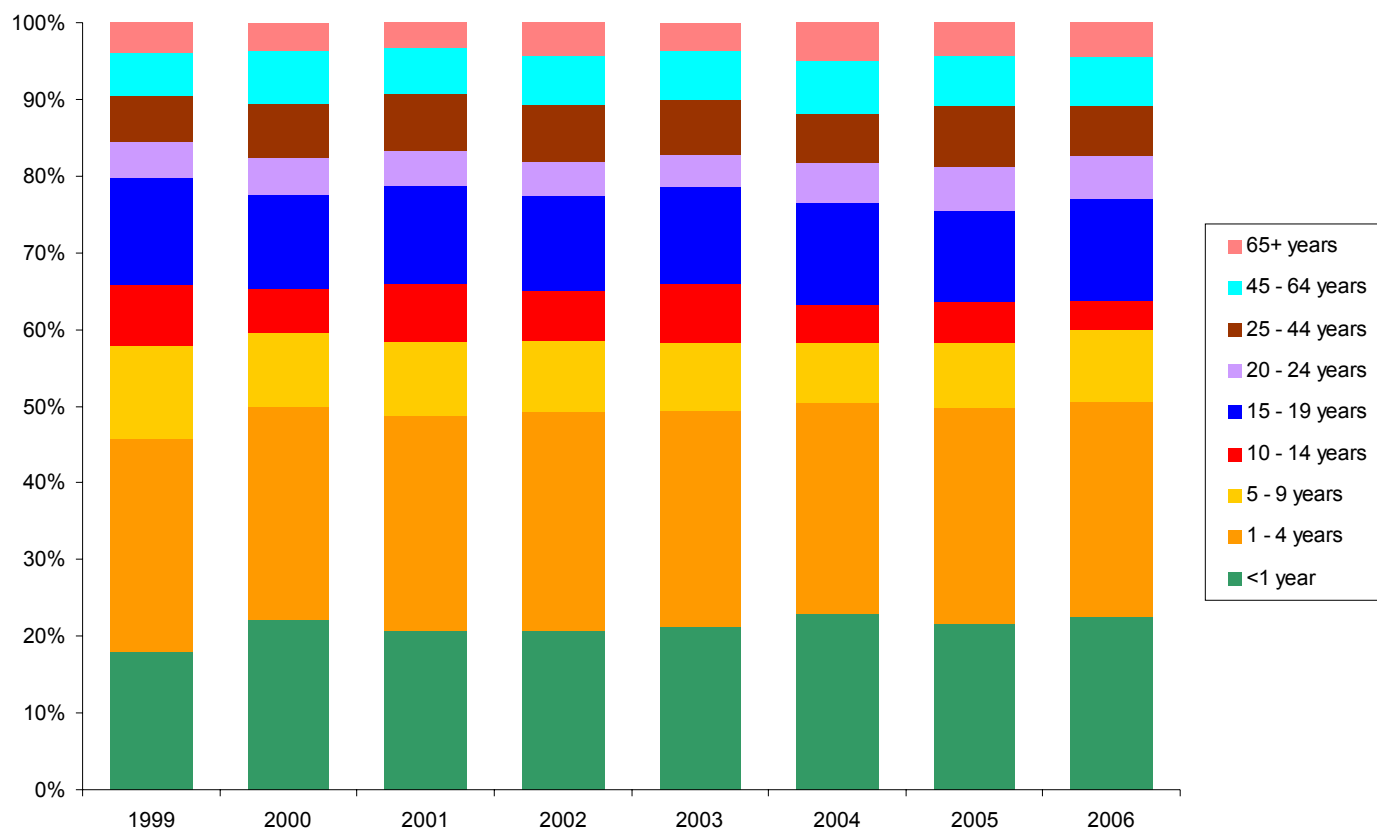


* Data used from: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Malta, Netherlands, Norway, Poland, Slovenia, Spain, Sweden, Switzerland, United Kingdom

There is a clear relationship between serogroup and age, with the highest proportion of serogroup B disease being present in the younger age groups, and by far the highest proportion of non-B, non-C serogroup cases being present in the 65+ age group. The proportion of serogroup C cases generally increases with age.

The age distribution of laboratory-confirmed serogroup B and serogroup C meningococcal disease between 1999 and 2006 is illustrated in Figures 8 and 9 respectively, and in Tables A12 and A13.

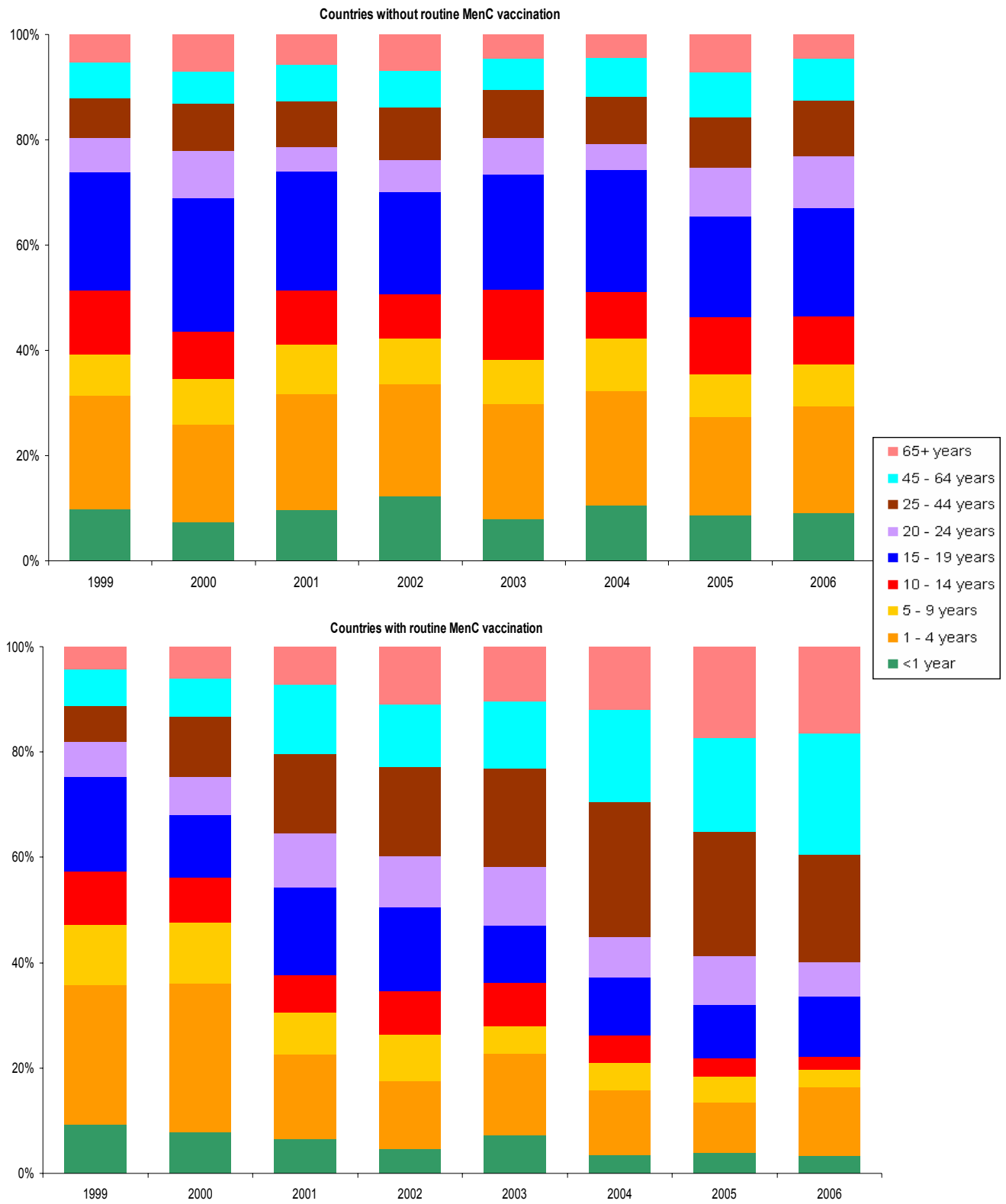
Figure 8 *Percentage age-specific distribution of confirmed and probable serogroup B meningococcal disease in countries with consistent data* 1999-2006*



* Data used from: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Malta, Netherlands, Norway, Poland, Slovenia, Spain, Switzerland, United Kingdom

The age distribution of serogroup B meningococcal disease has not changed greatly between 1999 and 2006, with around 50% of cases occurring in the <5 year olds (Figure 8).

Figure 9 Percentage age-specific distribution of confirmed and probable serogroup C meningococcal disease in countries with consistent data* 1999-2006



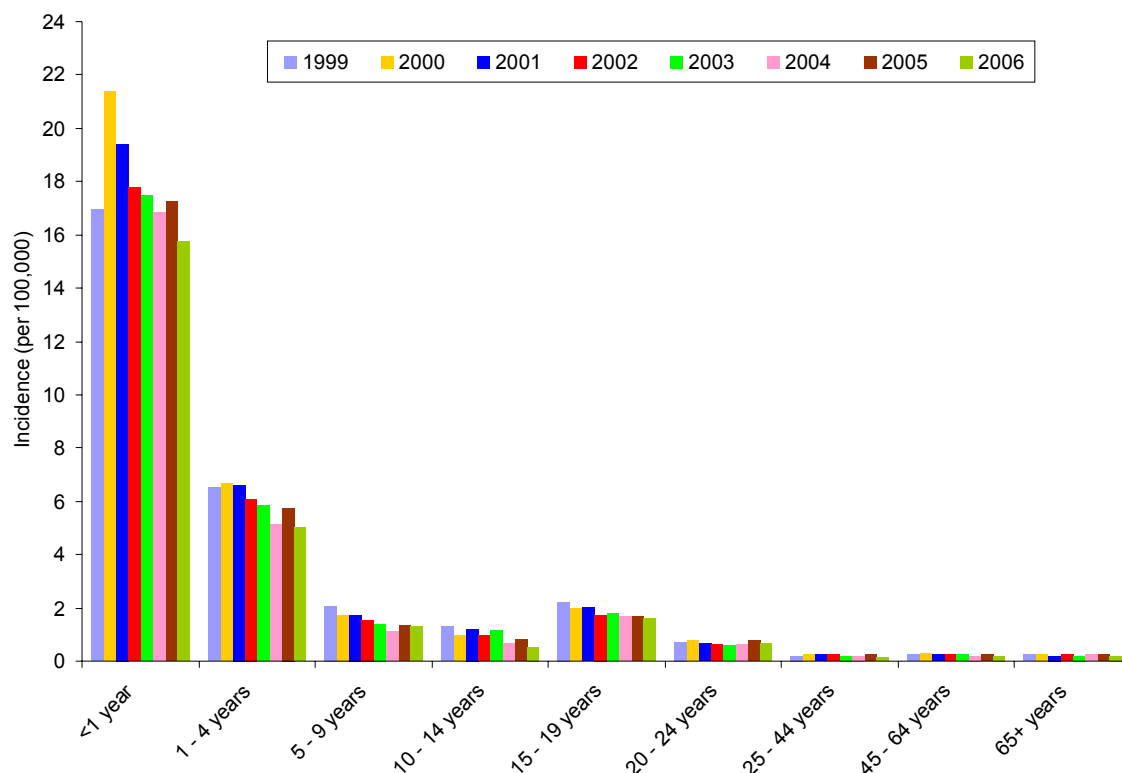
* Data used for non-MCC countries: Austria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Italy, Malta, Norway, Poland, Slovenia, Switzerland
 Data used for MCC countries: Belgium, Iceland, Ireland, Netherlands, Spain, United Kingdom

The distribution of serogroup C disease was more varied with time, particularly in the MCC countries (Figure 9) where the proportion of serogroup C cases occurring in the <15 years age group has decreased steadily with time, reflecting the target groups for vaccination. The proportion of cases occurring in the 25+ years age group has increased correspondingly, with the proportion of cases occurring in the 15 – 24 years age group also varying with time, but not in a consistent manner.

The distribution of serogroup C disease in non-MCC countries remained much more constant with time, though the age distribution is different from that of serogroup B. Less than 40% of cases occurred in <5 years age group, and the age groups experiencing the largest proportion of disease are the 1 – 4 year olds and the 15 – 19 year olds.

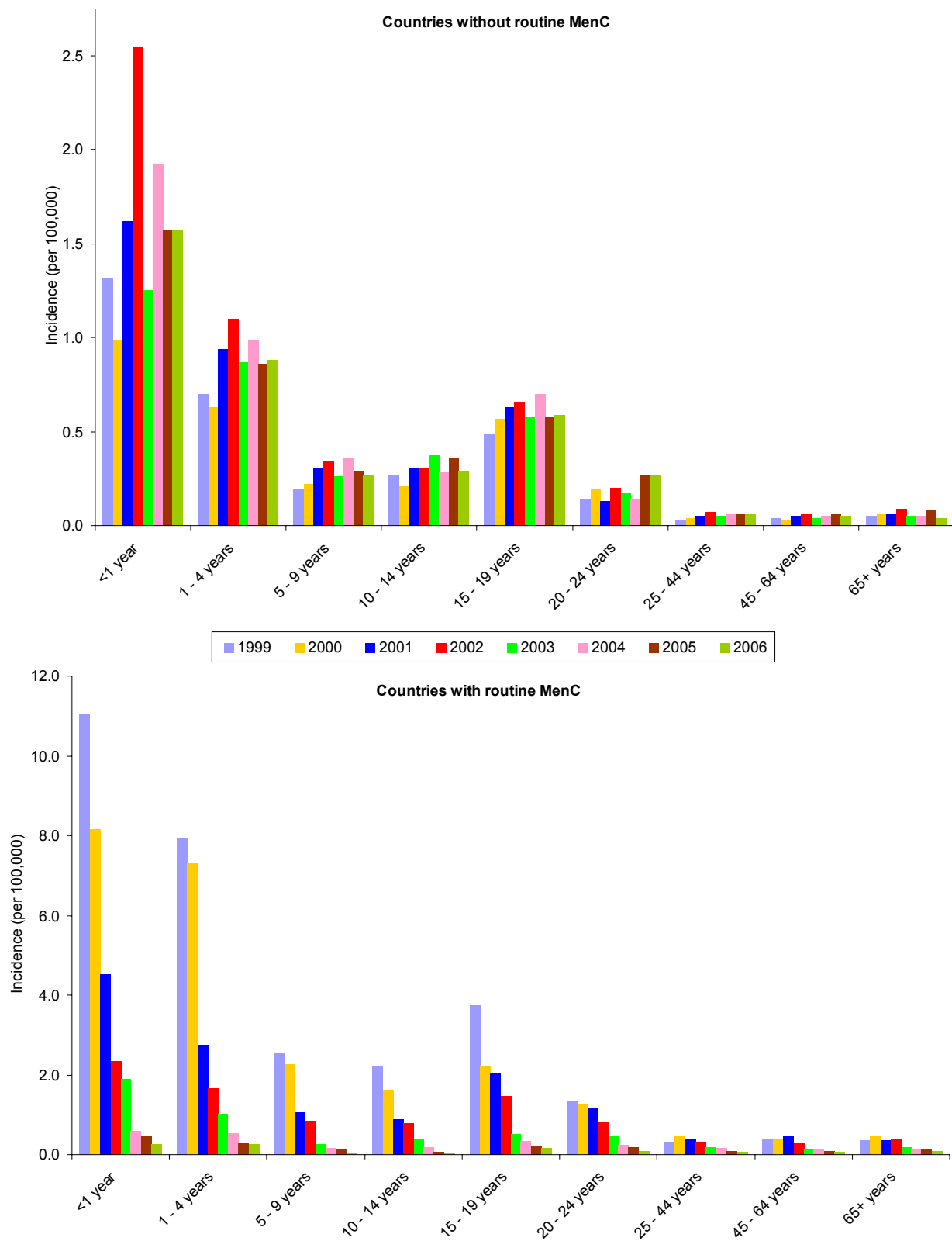
The age-specific incidence of serogroup B and C meningococcal disease from 1999 to 2006 is shown in Figures 10 and 11 respectively.

Figure 10 Age-specific incidence of laboratory-diagnosed confirmed and probable serogroup B meningococcal disease in countries with consistent data* 1999-2006



* Data used from: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Poland, Slovenia, Switzerland, United Kingdom

Figure 11 Age-specific incidence of laboratory-diagnosed confirmed and probable serogroup C meningococcal disease in countries with consistent data* 1999-2004



* Data used as for Figure 10

The pattern of incidence across age groups and years is generally similar between serogroups B and C, although the incidence of serogroup B was much higher. The highest incidence for both serogroups is found in the <1's, followed by the 1 – 4 year age group, with a small but appreciable peak present in the 15 – 19 year age group. There is a small but consistent decrease between 2000 and 2006 across all age groups in serogroup B incidence (Figure 10).

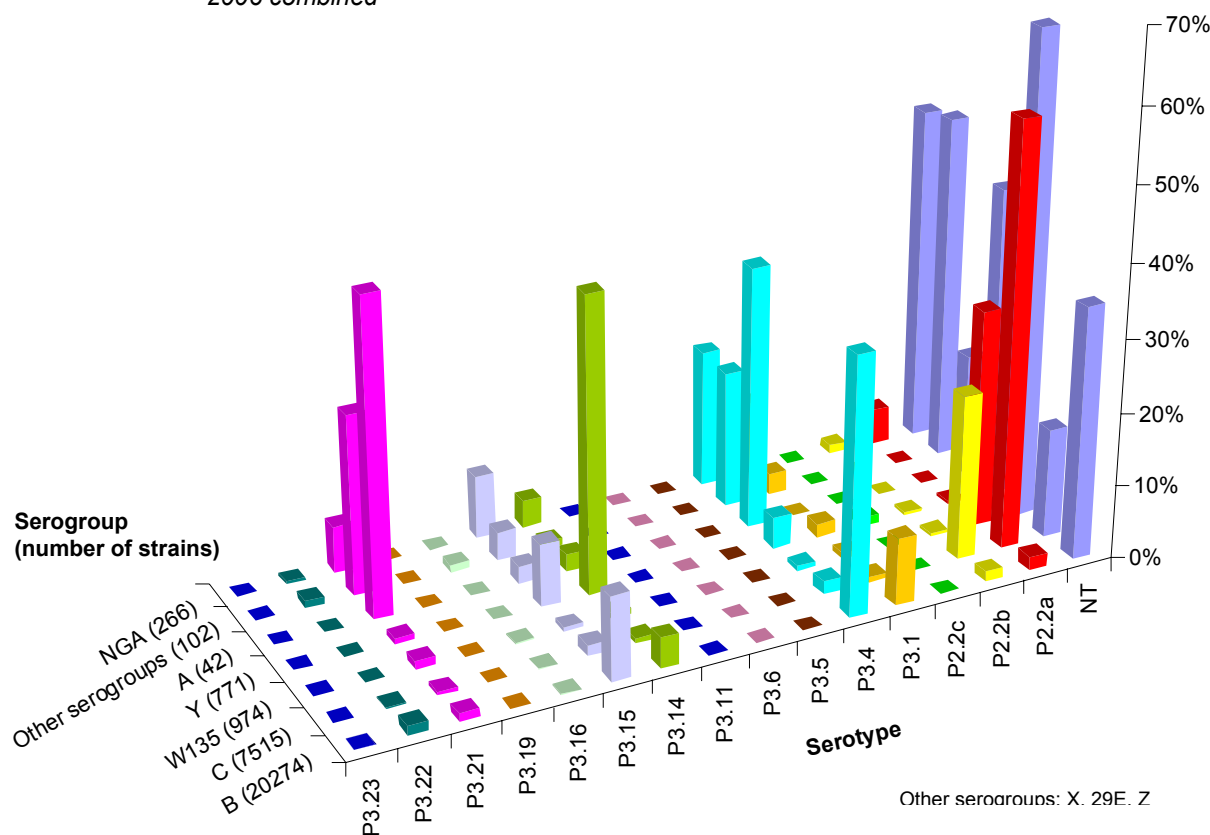
In MCC countries, though there was a large decrease in incidence of serogroup C disease over time, particularly in the <25 year age group (Figure 11). This was due to routine MCC vaccination programmes and accompanying catch-up campaigns that targeted the <25 years age group.

Serotype, serosubtype

Distribution of serotypes

Figure 12 shows the distribution of serotypes associated with serogroups B and C respectively across Europe 1999 – 2006.

Figure 12 Distribution of serotypes associated with serogroups, all participating countries*, 1999 – 2006 combined



* Countries with consistent data which type strains: Austria, Belgium, Czech Republic, Denmark, Finland, France, Greece, Ireland, Italy, Malta, Netherlands, Norway, Poland, Slovenia, Switzerland, United Kingdom

There is a clear association between certain serogroups and serotypes; eg, a higher proportion of serogroup A, NGA and other non-B, non-C strains carried a P3.21 serotype, and only a noticeable proportion of C and W135 strains carried the P2.2a phenotype. However, care must be taken in interpreting this data, as the number of strains belonging to each serogroup varies so widely. For example, although only 1.16% of serogroup B strains carried the P3.21 serotype, as opposed to 43% of serogroup A strains, this related to 235 and 18 strains respectively. A very large number of serogroup B strains (just under 7,000) carried a non-typeable serotype, representing just 35% of all serogroup B strains. A large proportion of Y and W135 strains (42% and 66% respectively) also carried non-identifiable serotypes, though the corresponding proportions of serogroup C and A strains were both under 20%.

Figure 13 illustrates the distribution of serotypes with serogroups B and C respectively over time, in MCC and non-MCC countries. There has been no consistent change with time for either serogroup B or serogroup C strains, in both MCC and non-MCC countries. However, there was a clear difference in distribution in serogroup B serotype strains between the latter two; the proportion of P3.4 strains was much higher in MCC countries. Conversely, non-MCC experienced higher proportions of P3.15, P3.14 and P3.22 strains. By contrast, the distribution of serotypes across serogroup C strains was similar between MCC and non-MCC countries. There were 2 main serotypes associated with serogroup C strains (P2.2a, P2.2b), as opposed to the five or so serotypes commonly associated with serogroup B strains (P3.1, P3.14, P3.15, P3.22, P3.4).

Figure 14 illustrates the regional variability of serogroup B and C serotype distribution.

There was little consistency between different countries with regard to either serogroup B or C strains, although some of the variability would be related to random fluctuations due to the low number of cases present in many of these countries.

Table 3 shows the proportion of serogroup C strains which carried the P2.2a serotype, by country and year.

The proportion of serogroup C strains which carried the P2.2a phenotype varied within countries with time, but without an obviously discernable pattern in either MCC or non-MCC countries. MCC countries did appear to experience a higher proportion of C:P2.2a strains than did non-MCC strains; the overall in the former ranged from 58% to 74% between 1999 and 2006, while the range in non-MCC countries for the same time period was 34% to 53%.

Figure 13 Distribution of serotypes associated with serogroup B and C respectively, all participating countries*, 1999 – 2006

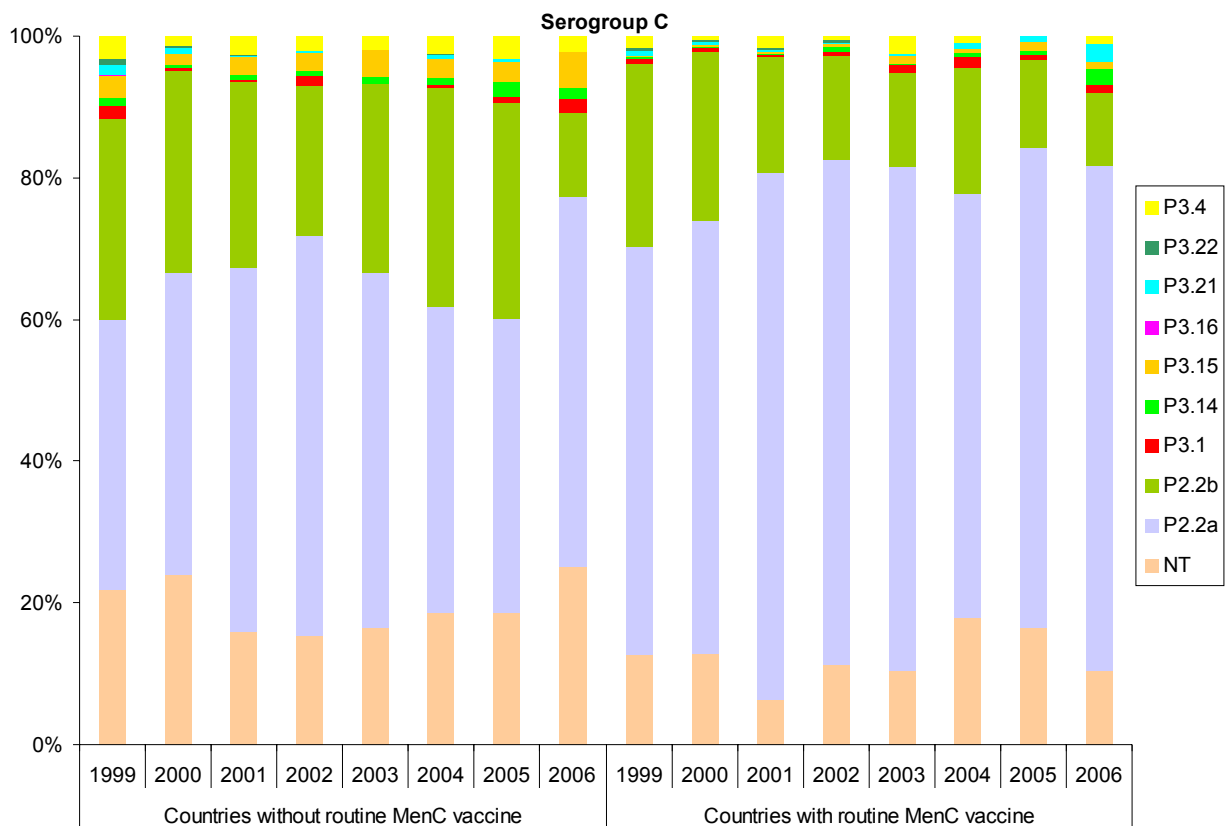
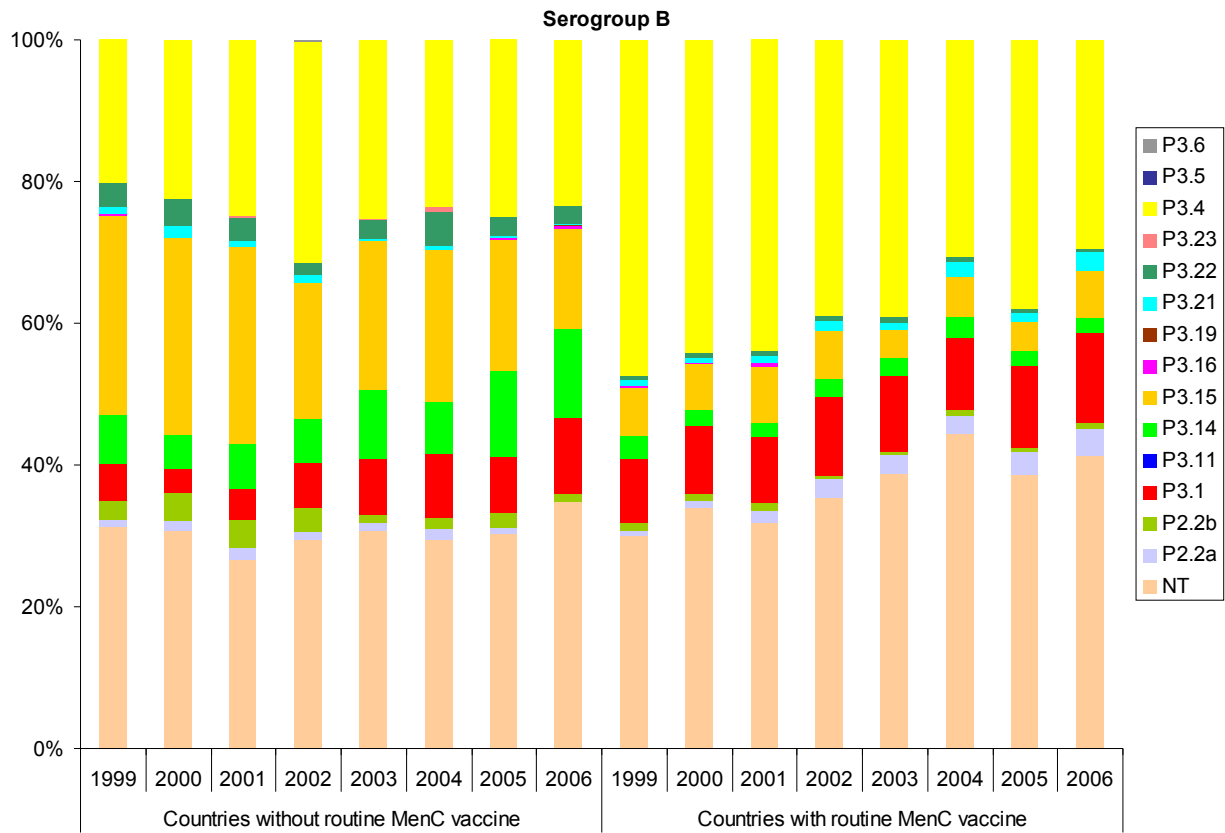


Figure 14 Distribution of serotypes associated with serogroup B and C, by country, 2006

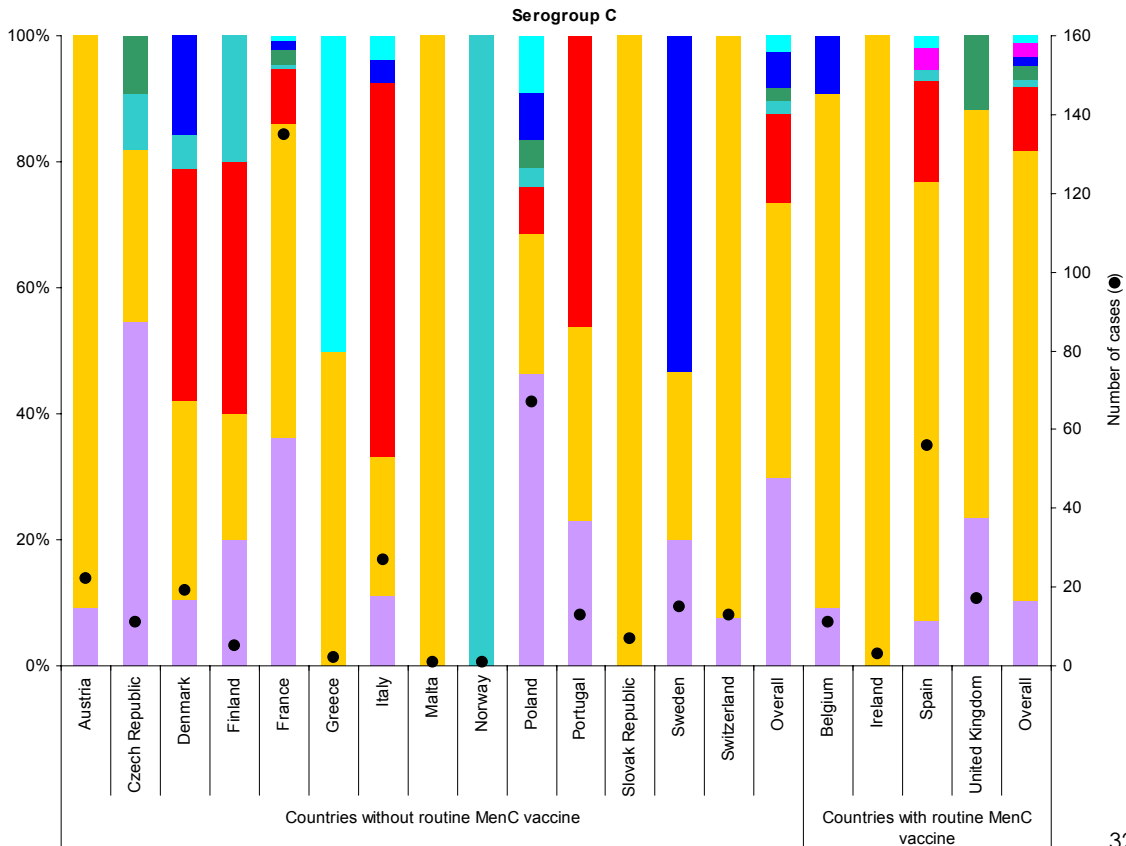
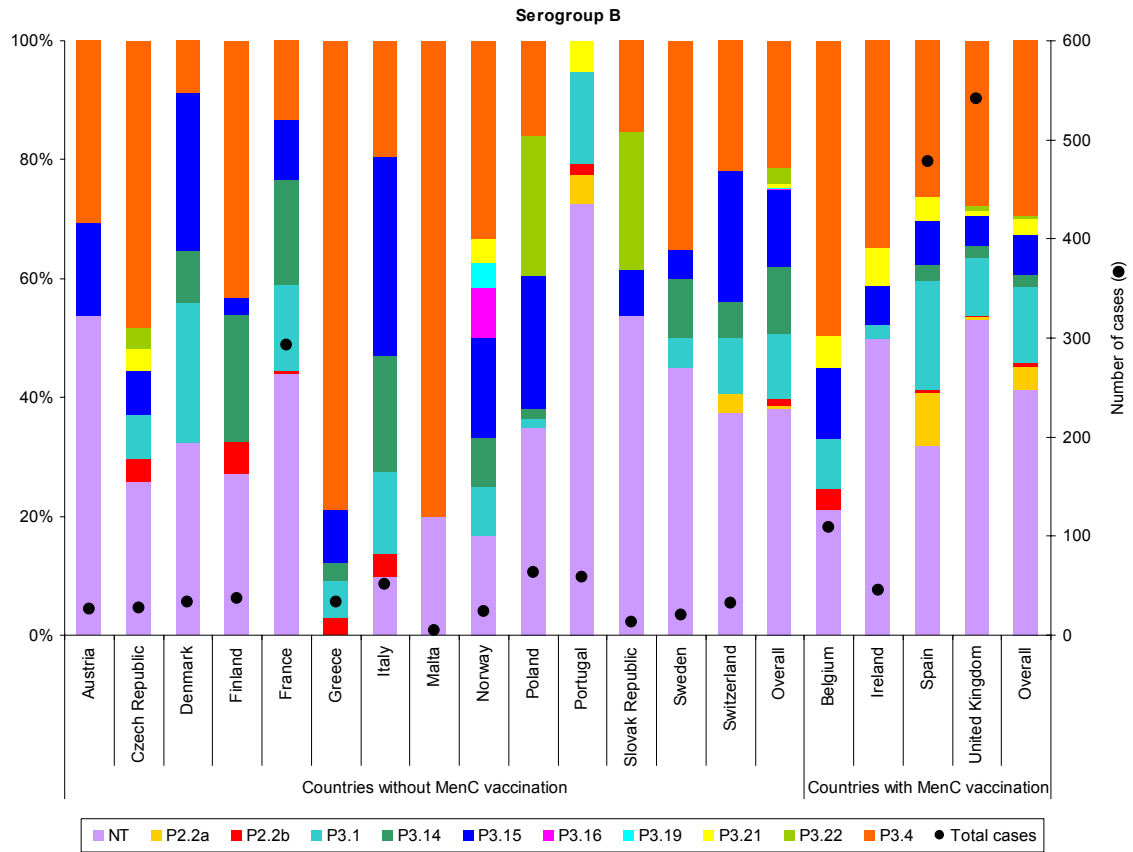


Table 3 Proportion (number of all serotyped C cases) of serogroup C cases which are of serotype P2.2a, all participating countries, 1999 - 2006

Country	1999	2000	2001	2002	2003	2004	2005	2006
<i>Countries without routine MCC vaccination</i>								
Austria	7% (14)	60% (10)	50% (34)	53% (17)	33% (12)	40% (15)	75% (16)	91% (22)
Czech Republic	77% (26)	90% (10)	57% (23)	71% (28)	78% (23)	84% (25)	56% (18)	27% (11)
Denmark	38% (21)	75% (16)	38% (24)	44% (16)	26% (19)	21% (14)	29% (21)	32% (19)
Finland	11% (9)	30% (10)	33% (9)	67% (6)	0% (5)	0% (5)	0% (1)	20% (5)
France	31% (100)	No serotyping data	54% (126)	62% (172)	53% (115)	55% (130)	48% (120)	50% (135)
Greece	76% (17)	89% (9)	63% (8)	33% (6)	100% (2)	0% (0)	0% (5)	0% (1)
Italy	88% (16)	50% (24)	53% (15)	31% (32)	18% (55)	7% (83)	16% (92)	22% (27)
Malta	100% (1)	0% (1)	0% (1)	0% (0)	100% (1)	0% (0)	33% (3)	100% (1)
Norway	40% (10)	67% (12)	38% (13)	0% (3)	44% (9)	100% (1)	33% (3)	0% (1)
Poland	13% (8)	14% (7)	0% (4)	18% (11)	10% (21)	5% (40)	11% (62)	22% (67)
Slovenia	0% (0)	100% (1)	100% (1)	100% (1)	0% (3)	0% (0)	25% (4)	0% (0)
Sweden	0% (11)	0% (14)	57% (14)	9% (11)	8% (12)	18% (11)	13% (15)	27% (15)
Switzerland	28% (57)	33% (83)	38% (69)	44% (39)	48% (23)	56% (18)	92% (13)	92% (13)
Overall	38% (290)	44% (197)	48% (341)	53% (342)	40% (300)	36% (342)	34% (370)	43% (318)
<i>Countries with routine MCC vaccination</i>								
Belgium	38% (77)	47% (85)	69% (178)	61% (89)	67% (46)	60% (20)	56% (18)	82% (11)
Ireland	81% (42)	93% (54)	100% (6)	100% (4)	100% (2)	100% (1)	100% (4)	100% (3)
Netherlands	74% (81)	67% (106)	77% (277)	80% (222)	61% (44)	41% (17)	50% (4)	No serotyping data
Spain	17% (230)	24% (235)	52% (102)	59% (140)	71% (98)	60% (104)	69% (81)	70% (46)
United Kingdom*	69% (713)	76% (514)	85% (220)	75% (128)	78% (65)	59% (34)	65% (17)	65% (17)
Overall	58% (1143)	61% (994)	74% (783)	71% (583)	71% (255)	58% (176)	67% (124)	71% (77)

* Not Scotland

B2a/B2b rapid surveillance project

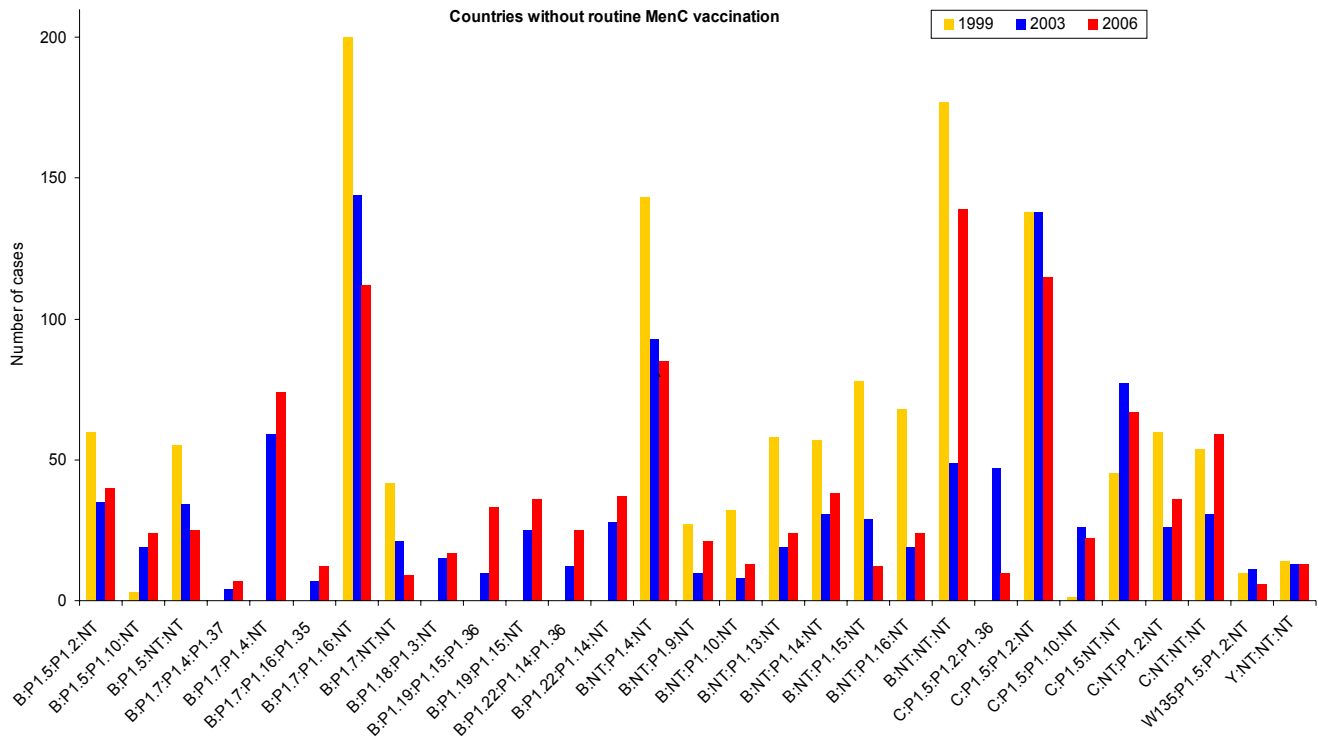
At the *N meningitidis* network meeting in Rome 2007, participants agreed that the project had served its purpose in showing no evidence of capsule switching of P2.2a strains in countries which had implemented routine MCC vaccination, and thus that it should no longer be continued. However, on the Iberian peninsula, the proportion of invasive serogroup B disease caused by B:P2.2a strains remained relatively high, being 9% in Spain, and 5% in Portugal, and in Spain, the number of cases is increasing slightly year-on-year (Julio Vazquez, personal communication). While the reason for this is not known, it remains a matter of concern and will continue to be monitored closely.

Distribution of serosubtypes

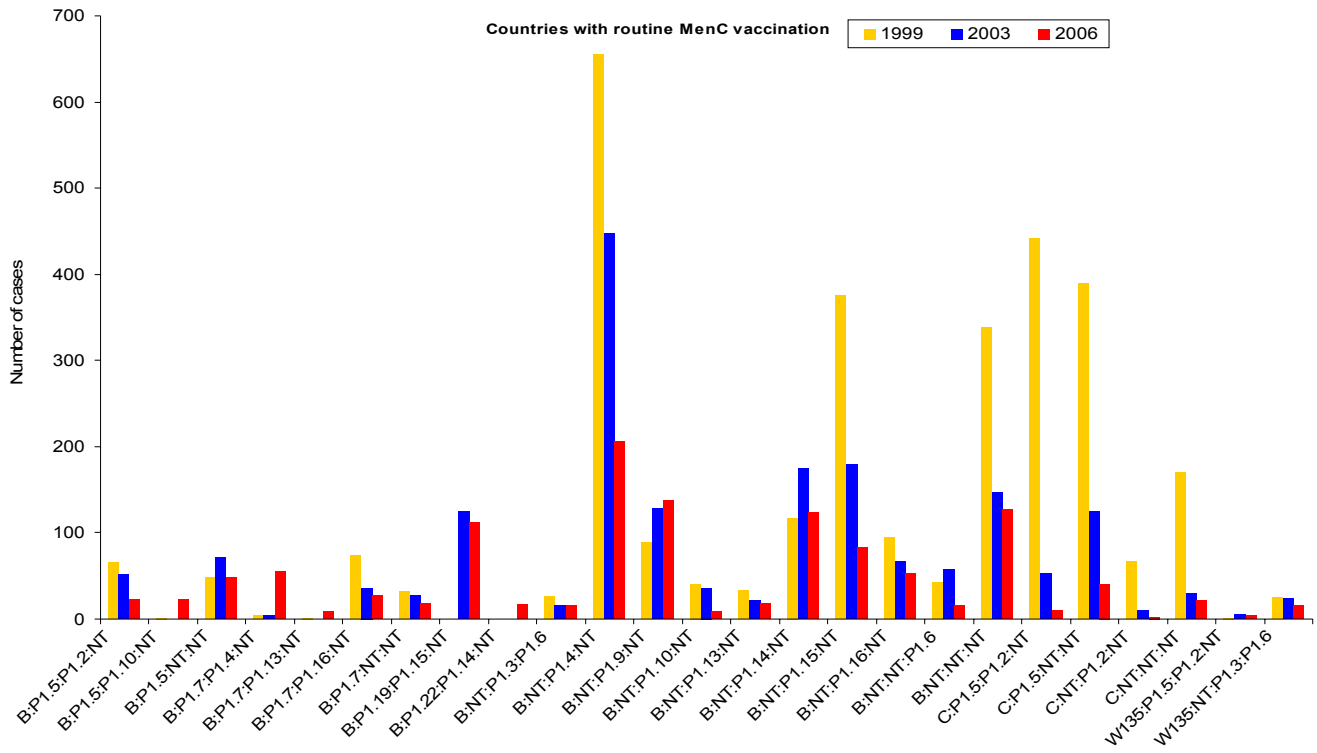
Phenotypic identification of *N meningitidis* strains is usually described in terms of serogroup, serotype and three serosubtype (PorA) variants.

Figure 15 shows the serogroup:serosubtype associations which have been identified in at least 25 strains in any one year between 1999 and 2006, in either MCC or in non-MCC countries.

Figure 15 Distribution of serogroup:serosubtypes identified in at least 20 strains in any year (1999-2006), by MCC and non-MCC country*, 1999, 2003, 2006



* Non-MCC countries with consistent PorA data: Austria, Czech Republic, Denmark, Finland, France, Germany, Greece, Italy, Malta, Norway, Poland, Slovenia, Sweden, Switzerland



~ Non-MCC countries with consistent PorA data: Belgium, Ireland, Netherlands, Spain, United Kingdom

From Figure 15, it is clear that the number of strains bearing any one phenotype has decreased steadily from 1999 to 2006, reflecting the decrease in overall meningococcal incidence over the same time period (Table 1). There appeared to be less strain variability in MCC countries than in non-MCC ones, but this might be simply be due to the much lower number of countries constituting the former.

The number of phenotypes which were present in 2003 and 2006 but not in 1999, such as B:P1.7:P1.4:P1.37, and B:P1.19:P1.15:P1.36 reflect the increase in genotyping in the later years, as variants such as P1.19 and P1.37 cannot be identified by serotyping.

The geographical distribution of these strains in 2006 is given in Table 4.

As can be seen there is little consistency in the distribution of strains between countries.

The epidemiology of different serosubtype variants is becoming increasingly important due to the failure to produce an effective vaccine based on the meningococcal serogroup B polysaccharide. Therefore, attention has switched to developing vaccines directed against OMPs, such as the PorA protein. Vaccines of this type have been developed by the Finlay Institute in Cuba and by the National Institute of Public Health (NIPH) in Norway, the latter also being adapted to tackle an epidemic of meningococcal serogroup B disease in New Zealand. The Cuban vaccine was produced using a B:P3.4:P1.15 strain, and the Norwegian one using a B:P3.15:P1.7,16 strain (Bjune *et al* 1991, Jodar *et al* 2002b, Jodar *et al* 2002a, Rodriguez *et al* 1999, Sierra *et al* 1991). The National Vaccine Institute in the Netherlands has produced recombinant PorA vaccines using two or three strains that each express three different sets of PorA proteins and do not express the capsular B protein. The hexavalent vaccine produces P1.7,16; P1.5-1,2-2; P1.19,15-1; P1.5-2,10; P1.12-1,13; P1.7-2,4 and the nonavalent produces these plus P1.22,14; P1.7-1,1; P1.18-1,3,6 (Claassen *et al* 1996, van der Ley *et al* 1995)

Table 4 Distribution of most common* serogroup:serosubtype phenotypes, by country 2006

Phenotype	non-MCC countries																MCC countries				
	Austria	Czech Republic	Denmark	Finland	France	Germany	Greece	Italy	Malta	Norway	Poland	Portugal	Slovak Republic	Slovenia	Spain	Sweden	Switzerland	Belgium	Ireland	Netherlands	United Kingdom
B:P1.5:P1.2:NT	1		1	4	11	9		1		4	8	3	3		13		1	1	1	1	9
B:P1.5:P1.10:NT						22				2		5								22	1
B:P1.5:NT:NT	3			2	8			4			7		3		46		1	4			13
B:P1.7:NT:NT			3		5										8		1		2		10
B:P1.7:P1.13:NT						4				3		2			1					8	
B:P1.7:P1.16:P1.35		2					9									1					2
B:P1.7:P1.16:NT	4		5	1	43	39		7		3	9	2	1	1	3			5		6	15
B:P1.7:P1.4:P1.37							3									4					9
B:P1.7:P1.4:NT						70				4		9								54	1
B:P1.18:P1.3:NT						17						1								5	
B:P1.19:P1.15:P1.36		12					21														11
B:P1.19:P1.15:NT						29			4	3		7							4	13	97
B:P1.22:P1.14:P1.36		3					16									6					7
B:P1.22:P1.14:NT						37						14								17	
B:NT:P1.3:P1.6								1							3		1		3		10
B:NT:P1.4:NT	3		3	7	49			14			5				20		4	58	17		125
B:NT:P1.9:NT			3		14			1	1						63		2	3	8		85
B:NT:P1.10:NT	1				4			1			5	2			1		2	4	1		2
B:NT:P1.13:NT	1			2	14			4			1				9		2	2			10
B:NT:P1.14:NT			8	1	15						11		1		51		2	11	3		73
B:NT:P1.15:NT			1	5	4						2		1		104			2			1
B:NT:P1.16:NT			6		1			2			7		1		25		8	2			34
B:NT:NT:P1.6	1				9			7							4		1	1			11
B:NT:NT:NT	8		4	12	92		3	10	1		6		3		97		3	13	1		35

* At least 20 strains in any one year between 1999 and 2006

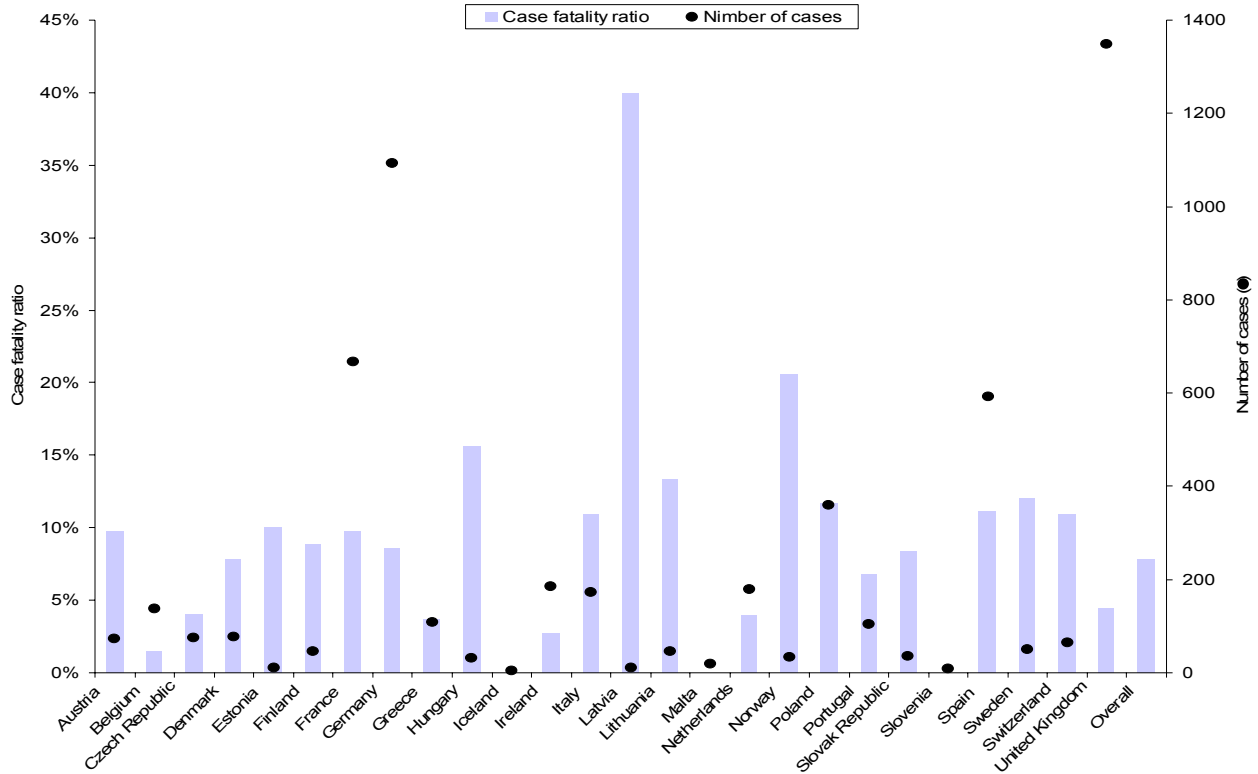
Phenotype	non-MCC countries																MCC countries				
	Austria	Czech Republic	Denmark	Finland	France	Germany	Greece	Italy	Malta	Norway	Poland	Portugal	Slovak Republic	Slovenia	Spain	Sweden	Switzerland	Belgium	Ireland	Netherlands	United Kingdom
C:P1.5:NT:NT			5	1	29			11	1		14				30		6	5	2		8
C:P1.5:P1.2:P1.36		8													2						
C:P1.5:P1.2:NT	1		3		26	69		6			8	10	1		4		2	3		2	2
C:P1.5:P1.10:NT						21		1				1								1	
C:NT:P1.2:NT	10		1		24			1					5		3						
C:NT:NT:NT	11		2	2	26		2	4			9		1		17		3	2	1		5
W135:NT:P1.3:P1.6								1										5			10
W135:P1.5:P1.2:NT			1			3					2				1			1			1
Y:NT:NT:NT	1			1	3		1	5			1				5		1	1	1		7

* At least 20 strains in any one year between 1999 and 2006

Case fatality

The overall case fatality ratio (CFR) in Europe was 7.78% in 2006. The case fatality ratio (CFR) for laboratory confirmed meningococcal disease in different European countries in 2006 is shown in Figure 18, and for selected years 1999–2000, 2003–2006 in the Table A19.

Figure 16 Case fatality ratio due to laboratory-diagnosed confirmed and probable meningococcal disease, and total number of cases, in 2006, in all countries for which outcome data is available



Case fatality ratio calculated using all laboratory-confirmed cases as denominator

Including only those countries with more than 50 cases in 2006, the case fatality for that year ranged from 4% (Czech Republic) to 12% (Poland), and the annual CFR remained stable at around 7.5% between years 2003 and 2006.

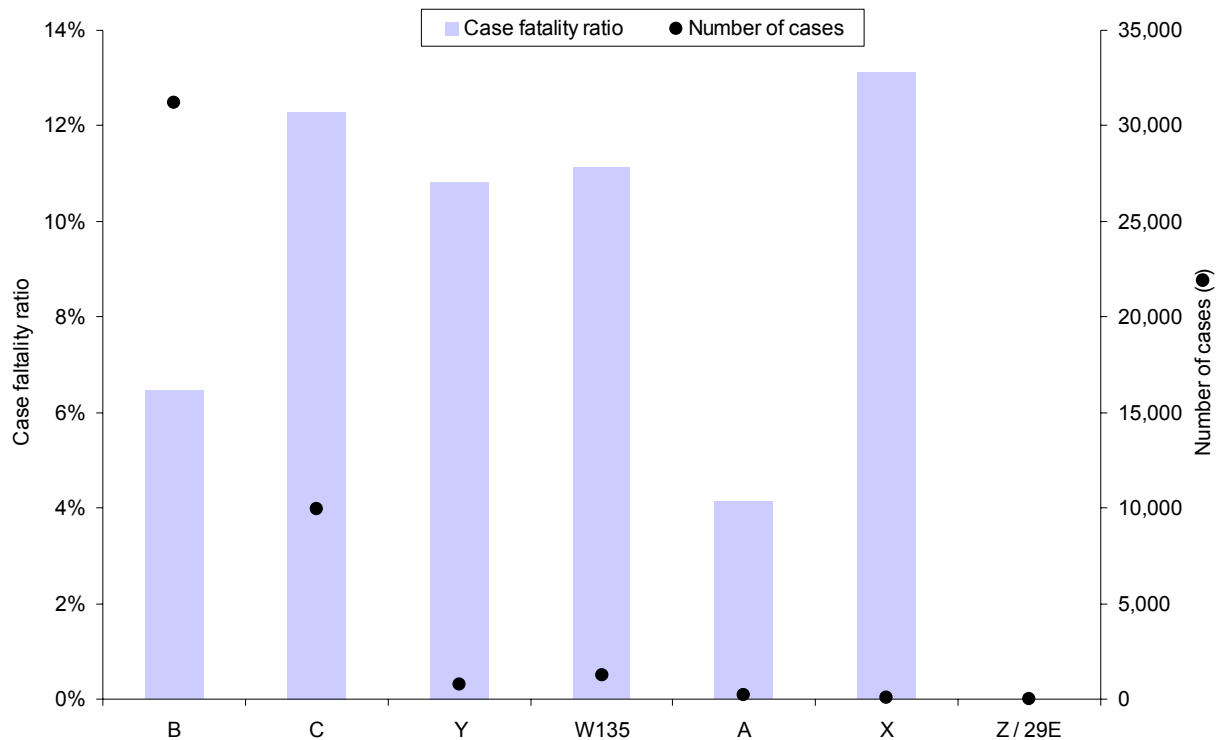
Half of the all countries' CFRs in 2006 are in the range 3.97% to 11.07% (the interquartile range was 7.10%). The highest CFRs were found in Latvia (40%) and Poland (11.67%), the lowest in Iceland, Malta and Slovenia (no deaths) and Belgium (1.45%). However, the CFR can be quite variable in the same country between successive years; for example, in Poland, the CFR was 5.69% in 2005, representing 21 deaths, compared to the 42 deaths seen in 2006. Also, Latvia experienced no deaths in 2005, compared to the four seen in 2006.

One continual problem in comparing CFRs across Europe is that different countries have a different proportion of cases where they know the outcome (survival or death) of a meningococcal case.

However, since it is more likely that an epidemiology centre/reference laboratory would be informed of a patient's death than of their survival, this analysis was conducted assuming that those cases whose outcome is unknown have survived. This means that CFR could be under-estimated in some countries assuming that all cases of unknown outcome survive but, as the likelihood of survival is much higher than that of death, this is the smaller risk.

The effect of serogroup on case fatality ratio is shown in Figure 17 and in Table A20.

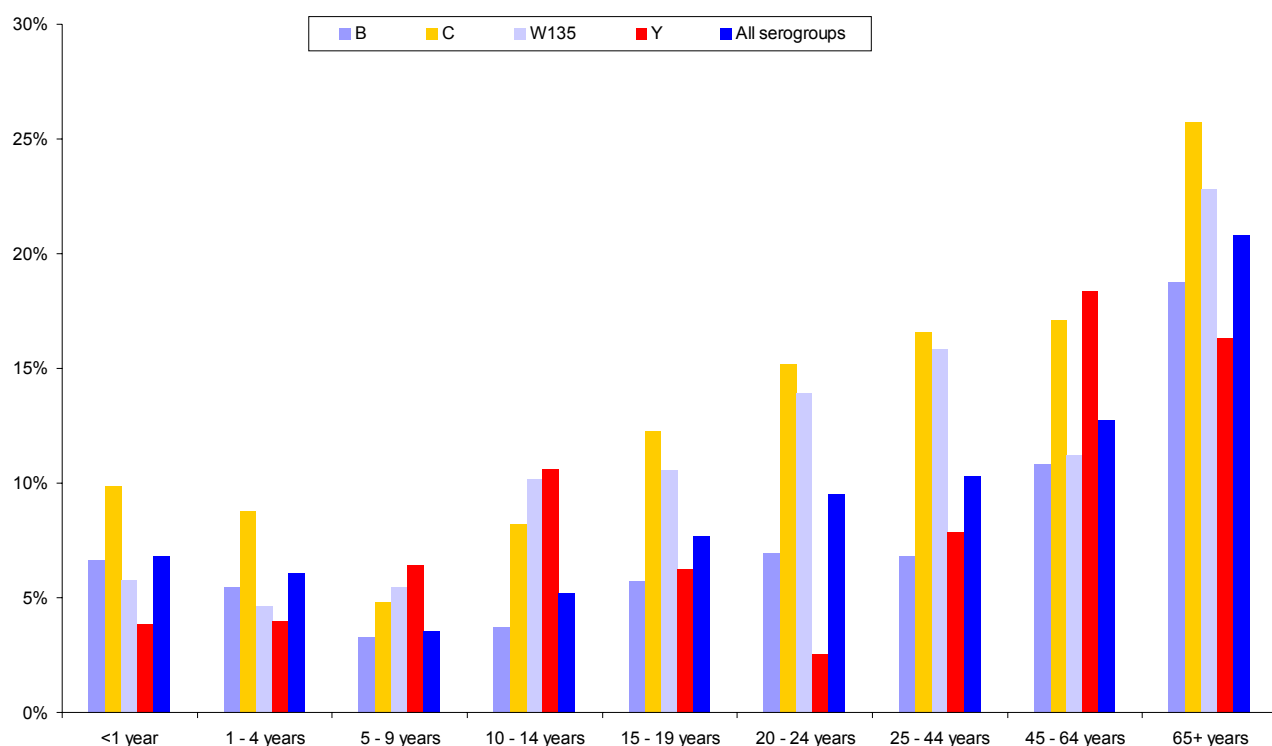
Figure 17 Serogroup specific case fatality ratios in all countries for which outcome data is available, 1999-2006 combined



While serogroup B contributed by far the largest number of overall deaths for the period 1999-2006, the CFR of cases due to serogroups C, W135 and Y were higher than that of serogroup B. While the CFR of serogroup X was also high, there were a small number of overall cases, and thus this could be a statistical anomaly.

The effect of age and serogroup on case fatality is illustrated in Figure 18.

Figure 18 Age and serogroup specific case fatality ratios in all countries for which outcome data is available, 1999-2006 combined



Overall, CFR increases with age, the 65+ year age group suffering an overall CFR of just under 21%, and the lowest overall CFR, of just over 3,5%, being found in the 5 – 9 year old age group. CFRs associated with individual serogroups appear to follow this general pattern.

Disease presentation

The association between disease presentation and age for years 1999 to 2004 is shown in Figure 19.

There is an age-specific distribution of disease presentation, with the proportion of cases of meningitis highest in the 15 – 44 year age group, and that of septicaemia and other diagnoses highest in the 65+ age group. In the <15's, the proportion of cases due to meningitis and septicaemia are approximately equal, and the proportion of cases presenting with both meningitis and septicaemia varies by less than 10% for all age groups.

The relationship between serogroup and disease presentation is shown in Figure 20.

Figure 19 Association between disease presentation and age group, all countries and years combined

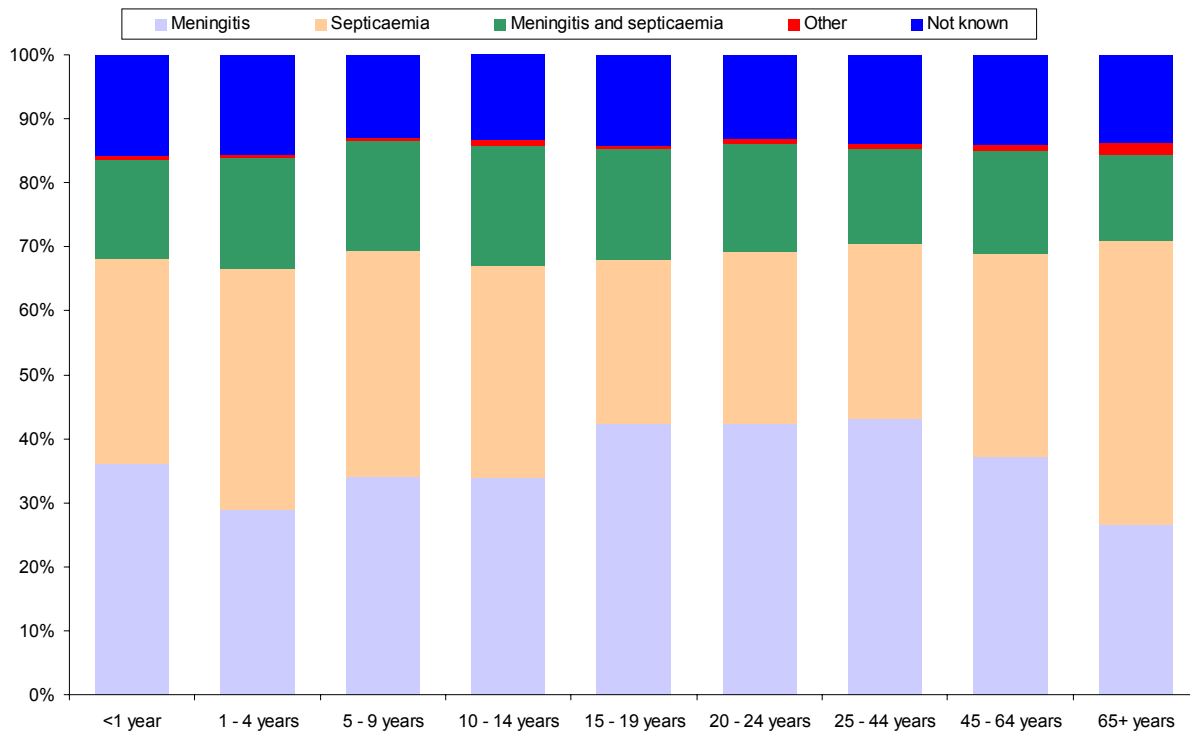
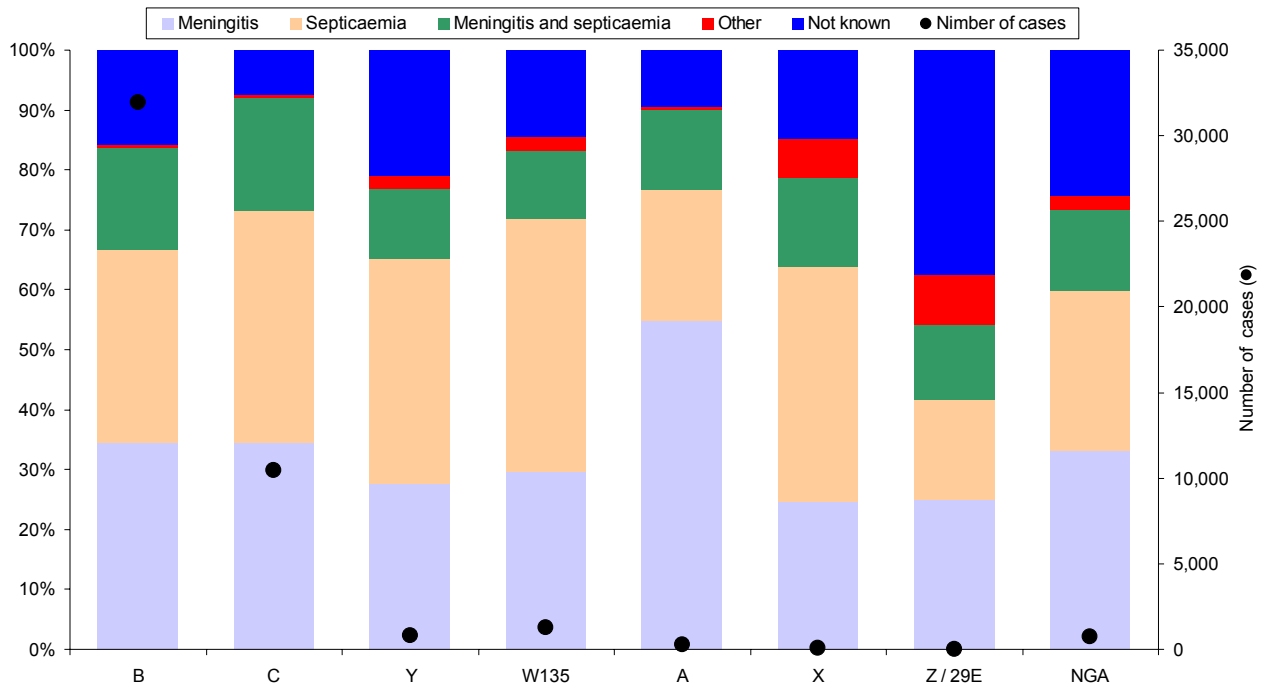


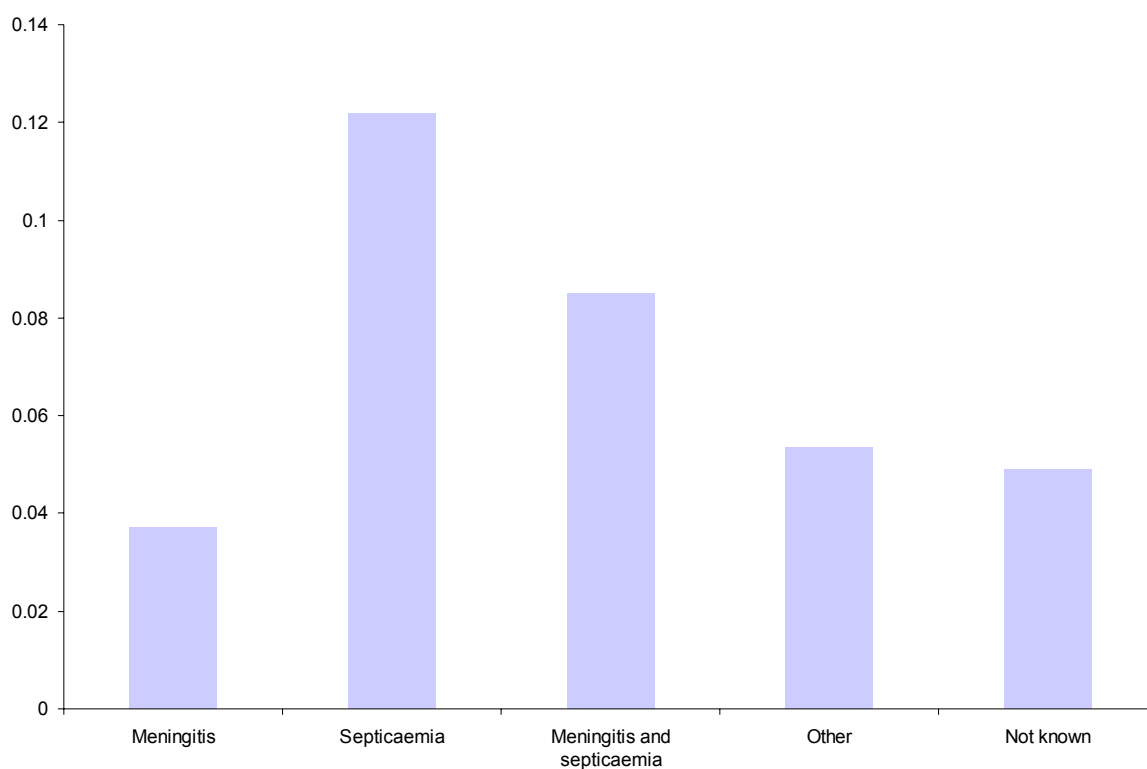
Figure 20 Association between disease presentation and serogroup, all countries and years combined



The majority of serogroup B and C cases cause meningitis and septicaemia in roughly equal proportions. Although disease presentation did appear to differ with the other serogroups, the number of cases of serogroups X and Z / 29E were below 100, and the number of cases of serogroup A below 300. Thus it was not possible to know whether the increased proportion of meningitis only cases seen with serogroup A was a genuine association, or simply a random variation linked to the relatively low numbers of cases.

The association between case fatality and disease presentation is shown in Figure 21.

Figure 21 Association between disease presentation and case fatality in all countries and years combined



The CFR is highest for presentations of septicaemia presentations in all years, with a slightly lower CFR evident in those which present with both septicaemia and meningitis. Those who present with meningitis alone have an appreciably better chance of survival.

C. Website

<http://www.euibis.org>

The website has been developed substantially, and now features:

- a number of dynamically generated graphs,
- Presentations from pertinent meetings

- MCC vaccine schedules used in different countries
- Postal, telephone and email contacts for participating countries
- A participant only area which includes a bulletin board and meeting presentations that are not suitable to be placed in the public domain.

CONCLUSIONS AND PROJECT ACHIEVEMENTS

EU-IBIS has collected data on meningococcal disease in Europe since 1999. Now, with eight years of data, the benefits of such a project are very clear. The amalgamation of data from different countries provides a very large dataset, and subsequent analyses of temporal and geographical trends are very powerful.

The wide range in incidence of probable and confirmed meningococcal disease across Europe is still apparent. There are inevitably differences in how meningococcal disease surveillance is conducted between countries, and while this may account for some of the observed differences in disease epidemiology there are clearly real differences, eg in age distribution, serogroup distribution. A review of the ascertainment of meningococcal disease in Europe has recently been conducted, and the methods highlighted in this paper may help to define the level of under-reporting of meningococcal disease and suggest areas where disease surveillance can be improved (Trotter *et al* 2005).

The data clearly demonstrate the continuing impact of meningococcal C conjugate (MCC) vaccination on reduction of meningococcal disease, and important insights have been gained made through comparisons of the impact of different vaccine schedules and catch-up campaigns. Although incidence rates do fluctuate with time within country (Jones 1995), the consistent impact of MCC vaccination has been seen only in serogroup C epidemiology in a range of different countries and has been sustained over time. The incidence of meningococcal C disease decreased markedly throughout 1999-2006 in the countries that have introduced routine MCC vaccination (Belgium, Iceland, Ireland, Netherlands, Spain, UK), but remained stable in those countries that have not (yet) done so.

Serogroups B and C continue to account for the majority of meningococcal isolates recorded, though there is variation in individual countries. Serogroup distribution is also affected by age, with serogroup B predominating in the younger age groups, and W135 and Y much more in evidence in the 65 years and older age group. The risk of acquiring a serogroup C infection tends to increase gradually with age until about 20-25 years of age.

The greatest risk of meningococcal group B disease is in those under five years of age; this age group accounts for about 50% of all invasive group B disease, with the highest incidence observed in children less than 1 year old. In contrast, certainly in more recent years, only around 25% of serogroup C meningococcal infections occur in the under fives (around 10% lower than in earlier years). This is probably explained by the routine use of MCC vaccination in young children in some countries. For serogroup C a secondary peak of disease in adolescents is relatively more important than for group B. There appears to have been a small decrease in serogroup B incidence over time in all age groups below 25. The larger decrease in serogroup C incidence over the same time period is much more evident in the under fives than in the older age groups.

There is much less variability in serotype for serogroup C than for serogroup B, and the predominant serotypes found with each serogroup are different. Serotypes P3.1, P3.4 and P3.15 tend to cluster with serogroup B isolates, whereas serotypes P2.2a and P2.2b are found in around 80% of serogroup C isolates. However, the proportion of serotype P2.2a has declined consistently since 2002 in serogroup C strains, but without any change in the proportion of P2.2a associated with serogroup B strains. This may reflect the use of MCC vaccine in countries where P2.2a was the most common serogroup C serotype, this particular strain appearing to be associated with high incidence and high case-fatality ratios.

Serosubtypes also show great variability in their association with different serogroup/serotype combinations. Serosubtyping is becoming more important, particularly in relation to serogroup B strains, with the development of outer membrane vesicle/protein (OMV/OMP) vaccines, as the distribution of different serosubtypes within the *N meningitidis* population directly affects how much protection any such vaccine might afford.

Case fatality analyses are probably more robust when comparing the effect of age, serogroup or disease presentation than when comparing rates across countries, as the ability to accurately capture outcome data on all cases of invasive meningococcal disease differs considerably between countries. Case fatality ratios appear to be highest in serogroup C, W135 and Y infections. Case fatality across all serogroups increases with age, with the lowest rates being found in <10's, and the highest in the 65+ age group. A disease presentation of septicaemia is much more likely to result in death than one of meningitis, and while there does not appear to be a noticeable association between serogroup and disease presentation, it is very evident that septicaemia is a more common presentation than meningitis in those aged 65 years and above,

Finally, the website continues to be developed, with better navigation, presentations from past meetings, dynamically-generated data charts, and a participant only area all now part of the improved website.

FUTURE DIRECTIONS

Preliminary data was collected from 2 countries, Sweden and UK (England and Wales only) for the first 6 months of 2007. Sweden reported 24 cases (48% B, 29% C, 19% Y), while the UK had 764 cases (91% B, 3% C, 3%Y, 2% W135). The responsibility for continuing to collect data for 2007 and future years now lies with the European Centre for Disease Prevention and Control (ECDC, <http://www.ecdc.eu.int/>), which was established in summer 2003.

With its assumption of the EU's responsibility to develop epidemiological surveillance at the European level, including oversight of the other Dedicated Surveillance Networks (DSNs), the future direction of the network will be carefully evaluated and possibly new priorities set. The current contract with the EU finished in September 2006, and the transition phase is in operation. The future of the network is very much dependent on the recommendations emanating from the evaluation and how the ECDC implement them.

Another factor to consider is the evolution of the European Monitoring Group on Meningococci, with whom EU-IBIS has worked closely in the past, into a Society, with an agreed constitution and possibly different ways of working. There should be as close liaison as is possible with the new Society, ECDC and other pertinent national and international organisations, both to prevent duplication of work, and to increase the amount of integrated data on the epidemiology of invasive meningococcal disease from which evidence-based conclusions and recommendations might be drawn.

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APPENDIX I - Data Variables submitted to EU-IBIS

Data variable	Data type	Possible values
Year	Number	
Country	Text	
IDNo	Text	
Date of birth Or Age (year/month/days)	DD/MM/YY Number	
Date of onset	DD/MM/YY	
Sex	Number	1=male, 2=female, 3=not known
Geographic location	Text	
Imported	Number	1=yes, 2=no, 3=not known
Country of import	Text	
Outcome	Number	1=alive, 2=died, 3= not known
Clinical diagnosis	Number	1=meningitis only, 2=septicaemia only, 3=meningitis & septicaemia combined, 4=no disease, 5=other, 9=not known
Specify other diagnosis	Text	
Case definition	Number	1=clinical case <u>only</u> , 2=lab confirmed
Culture	Number	1=yes, 2=no
PCR	Number	1=yes, 2=no
PCR group	Text	A, B, C, W135, X, Y, Z, Z/29E, 29E, Other (please specify), NGA (not groupable) NK = Not known/Not typed
Latex	Number	1=yes, 2=no
Microscopy	Number	1=yes, 2=no
Serology	Number	1=yes, 2=no
Other	Text	
Site of isolate1	Number	1=CSF, 2=Blood, 3=Throat swab, 4=Joint 5=Skin lesion, 6=Eye, 7=Other (please specify) 8=Not relevant, 9=Not known
Specify 1	Text	
Site of isolate2	Number	1=CSF, 2=Blood, 3=Throat swab, 4=Joint 5=Skin lesion, 6=Eye, 7=Other (please specify) 8=Not relevant, 9=Not known
Specify 2	Text	
Serogroup	Text	A, B, C, W135, X, Y, Z, Z/29E, 29E, NGA (not groupable), Other (Specify), NK (not known)
Serotype	Text	P2.2a, P2.2b, P3.1, P3.4, P3.14, P3.15, P3.16, P3.21, P3.22, P3.23, NT (not typable), NK (not known)
VR1/PorA1	Text	P1.5, P1.7, P1.12, P1.17, P1.18, P1.19, P1.20, P1.21, P1.22, NST (not typable), NK (not known)
VR2/PorA2	Text	P1.1, P1.2, P1.3, P1.4, P1.9, P1.10, P1.13, P1.14, P1.15, P1.16, P1.19, P1.23, P1.24, P1.25, P1.27, NST (not typable) NK (not known)
VR3/PorA3	Text	P1.6, NST (not typable), NK (not known)
Data variable	Data type	Possible values
Vaccination status	Number	1=yes, 2=no, 3=not known
Resistant to sulphonamide	Number	1=yes, 2=no, 9=not tested
Sulph MIC	Number	

Data variable	Data type	Possible values
Penicillin G sensitive	Number	1=yes, 2=no, 9=not tested
Pen MIC	Number	
Ceftriaxone/Cefotaxime	Number	1=yes, 2=no, 9=not tested
Cef MIC	Number	
Rifampicin sensitive	Number	1=yes, 2=no, 9=not tested
Rif MIC	Number	
Chloramphenicol sensitive	Number	1=yes, 2=no, 9=not tested
Chl MIC	Number	
Ciprofloxacin sensitive	Number	1=yes, 2=no, 9=not tested
Cip MIC	Number	

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APPENDIX III – Glossary and Definitions

Glossary

ECDC	European Centre for Disease Prevention and Control
EMGM	European Monitoring Group for Meningococci
EQAS	External quality assurance scheme
EU	European Union
EU-IBIS	European Union Invasive Bacterial Infection Surveillance
HPA	Health Protection Agency
MCC	Meningococcal serogroup C conjugate [vaccine]
MLST	Multi-locus sequence typing
PCR	Polymerase chain reaction
ST	sequence type
OMP	outer membrane protein
OMV	outer membrane vesicles
MCC	Men C conjugate vaccine
Men C	Meningococcal disease caused by serogroup C strains

Definition of terms used in the report

CFR	Case fatality ratio: with respect to a particular pathogen, the ratio of number of resulting deaths to the total number of invasive cases
Chemoprophylaxis	Administration of antibiotics to close (<i>eg</i> household) contacts of a person with invasive meningococcal disease to prevent outbreaks
Confirmed case	A case with appropriate clinical presentation where presence of <i>N meningitidis</i> has been identified by culture, PCR or latex from a normally sterile site, or where presence of diplococci in a normally sterile site has been identified by microscopy.
Genotypic	Refers to characterisation made by DNA analysis techniques
Laboratory-diagnosed	Refers to a case in which the presence of <i>N meningitidis</i> has been detected, by culture diagnosis, PCR, latex agglutination, serology or microscopy
Mab	Monoclonal antibody, used in serological typing to identify meningococci

	phenotypic markers such as serogroup and serotype
MCC countries	Countries who have introduced meningococcal C conjugate vaccine into their routine schedule
Non-culture	Refers to laboratory methods that do not require growth of meningococcal isolates for confirmation and / or characterisation.
Phenotype	Refers to serological characterisation by serogroup, serotype and serosubtype
Probable case	A case with appropriate clinical presentation where presence of <i>N meningitidis</i> organism, DNA or antigen has been identified in a non-sterile site, or high levels of meningococcal antibody have been found in convalescent serum, or a case presenting with a clinical picture compatible with meningococcal disease

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Table A1 National institutions supplying data

Country	Epidemiology/Surveillance Centre	Laboratory Reference/Microbiology Centre
Austria	FM for Health, Family and Youth, Vienna	Austrian Agency for Food and Health Safety, Graz
Belgium	Epidemiology Section, Scientific Institute of Public Health, Brussels	National Meningococcal Reference Laboratory , Scientific Institute of Public Health, Brussels
Czech Republic	National Institute of Public Health, Prague	National Institute of Public Health, Prague
Denmark	Department of Epidemiology, Statens Serum Institut, Copenhagen	Department of Bacteriology, Mycology and Parasitology, Statens Serum Institut, Copenhagen
Estonia	Health Protection Inspectorate, Tallinn	Health Protection Inspectorate, Tallinn
Finland	Epidemiology, National Public Health Institute, Helsinki	Vaccine Immunology Laboratory, National Public Health Institute, Helsinki
France	Institut de Veille Sanitaire, Saint Maurice	Institut Pasteur, Paris
Germany*	Robert Koch Institute, Berlin	Institute for Hygiene and Microbiology, Würzburg
Greece	Public Health Department, National School of Public Health, Athens	National Meningococcal Reference Laboratory, National School of Public Health, Athens
Hungary	Johan Bela National Centre for Epidemiology, Budapest	Johan Bela National Centre for Epidemiology, Budapest
Iceland	Centre for Infectious Disease Control, Seltjarnarnes	Landspítali University Hospital, Reykjavik
Ireland	Health Protection Surveillance Centre, Dublin	Children's University Hospital, Dublin
Italy	Epidemiologia, Sorveglianza e Promozione della Salute, Istituto Superiore di Sanità, Rome	Department of Infectious, Parasitic and Immune-mediated Disease, Istituto Superiore di Sanità, Rome
Latvia	State Agency "Public Health Agency", Riga	
Lithuania	Centre for Communicable Disease Prevention and Control, Vilnius	National Public Health Laboratory Center, Vilnius
Luxembourg	Inspection Sanitaire	Laboratoire National de Santé
Malta	Department of Public Health, Msida	
Netherlands	National Institute of Public Health and the Environment (RIVM), Bilthoven	Academic Medical Centre, Amsterdam
Norway	Norwegian Institute of Public Health, Oslo	Norwegian Institute of Public Health, Oslo
Poland~	National Institute of Hygiene, Warsaw	National Institute of Public Health, Warsaw
Portugal	Direcção-Geral da Saúde, Lisbon	Instituto Nacional de Saúde Dr Ricardo Jorge, Lisbon
Slovak Republic	Section of Epidemiology, Public Health Authority, Bratislava	National Reference Centre for Meningococci, Public Health Authority, Bratislava
Slovenia	Communicable Diseases Centre, Institute of Public Health Slovenia, Ljubljana	Laboratory for Immunology and Molecular Diagnostics, National Reference Centre for Meningococci, Institute of Public Health Slovenia, Ljubljana
Spain	Centro Nacional de Epidemiología, Instituto de Salud Carlos III, Madrid	Centro Nacional de Microbiología, Instituto de Salud Carlos III, Madrid
Sweden	Swedish Institute for Infectious Disease Control (SMI), Solna	Department of Clinical Microbiology and Immunology, Orebro
Switzerland	Swiss Federal Office of Public Health, Berne	Laboratoire Central de Bactériologie, Geneva
United Kingdom	Health Protection Agency, London / Stobhill Hospital, Glasgow	Manchester Medical Microbiology Partnership, Manchester / Stobhill Hospital, Glasgow

Countries with consistent data 1999 – 2006

* Data from Institute of Hygiene and Microbiology consistent across 1999 to 2006; data from Robert Koch Institute available from 2001

~ Data from Institute of Hygiene consistent across 1999 – 2006; data from Institute of Public Health available from 2003

Table A2 Total population data, by country, 1999 - 2000, 2004 - 2006

Country	1999	2000	2004	2005	2006	Source
Austria	8094156	8113413	8174762	8184691	8192880	www.census.gov/cgi-bin/ipc/idbagg (for Austria)
Belgium	10226419	10251250	10421137	10478617	10478617	www.iph.fgov.be/epidemi/spma/index.htm
Czech Republic	10278098	10266546	10220577	10251079	10251079	www.czso.cz/eng/edicniplan.nsf/t/79005D6975/\$File/40270301.pdf
Denmark	5319111	5337344	5401177	5415978	5434567	www.statbank.dk/statbank5a/default.asp?w=1024
Estonia	1379237	1372071	1351069	1347510	1344684	http://pub.stat.ee/px-web_2001/l_Databas/Population/Population.asp
Finland	5158097	5168595	5214512	5223442	5231372	www.census.gov/cgi-bin/ipc/idbagg (for Finland)
France	60158533	60434492	61684291	62850156	63392140	www.insee.fr
Germany	82074778	82187909	82424609	82431390	82422299	www.census.gov/cgi-bin/ipc/idbagg (for Germany)
Greece	10882607	10917456	11040650	11082751	11125179	www.statistics.gr/eng_tables/S201_SPO_5_TS_91_03_2_Y_EN.pdf
Hungary			10116742	10097549	10097549	portal.ksh.hu/portal/page?_pageid=38,119917&_dad=portal&_schema=PORTAL
Iceland	277184	281154	292587	295864	304334	www.statice.is/?pageid=1178&src=/temp_en/mannfoldi/midarsmannfoldi.asp
Ireland	3741400	3789500	4043700	4130700	4234900	http://www.cso.ie/px/pxeirestat/database/eirestat/Population.asp
Italy	56909109	56923524	57888245	58462375	58751711	demo.istat.it/index_e.html
Latvia			2319203	2306434	2294590	data.csb.lv/EN/Database/annualstatistics/04.%20Population/04.%20Population.asp
Lithuania			3445857	3425324	3403284	epp.eurostat.ec.eu.int/extraction/evalight/EVALight.jsp?A=1&language=en&root=/theme3/demo/dpop/lnava (for Lithuania)
Luxembourg	433600	439000	451600	455000	459500	http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=1059
Malta	391415	391415	390669	404346	404346	http://www.nso.gov.mt/statbase/data_table_options.aspx?id=19
Netherlands	15760225	15863950	16258032	16305526	16334210	statline.cbs.nl/StatWeb/start.asp?LA=en&DM=SL&IP=Search/Search
Norway	4445329	4478497	4577457	4606363	4640219	statbank.ssb.no/statistikbanken/default_fr.asp?PLanguage=1
Poland	38653625	38646201	38180249	38132277	38161313	www.stat.gov.pl and National Institute of Hygiene, Poland
Portugal	10195014	10262877	10529255	10569592	10569592	www.ine.pt/proserv/quadros/periodo.asp and Direcção-Geral da Saúde (Portugal)
Slovak Republic			5380053	5387285	5387285	www.census.gov/cgi-bin/ipc/idbagg (for Slovak Republic)
Slovenia	1985557	1990272	1997004	2001114	2001114	www.stat.si/eng/tema_demografsko_prebivalstvo.asp
Spain	39802827	40049708	42345342	42935001	43483912	www.ine.es/inebase/cgi/um?M=%2Ft20%2Fp251%2Fp2001%2F&O=pcaxis&N=&L=1 www.ine.es/inebase/cgi/um?M=%2Ft20%2Fp251%2Fp2001%2F&O=pcaxis&N=&L=1
Sweden	8861426	8882792	9011392	9047752	9113257	www.ssd.scb.se/databaser/makro/MainTable.asp?yp=tansss&xu=C9233001&omradekod=BE&omradefext=Population&lang=2&langdh=2
Switzerland	7164444	7204055	7415102	7459128	7459128	www.bfs.admin.ch/bfs/portal/fr/index/infotek/lexikon/bienvenue_login/blank/zugang_lexikon.topic.1.html
United Kingdom	58481070	58643230	59834946	60209452	60209452	Office for National Statistics, www.statistics.gov.uk/
Year population	440673261	441895251	470410219	473496696	475182513	

* 1 Jan estimate; others for Greece are mid-year, (http://www.statistics.gr/eng_tables/S201_SPO_5_TS_91_04_4_Y_EN.pdf)

from National Centre for Epidemiology, Budapest, Hungary~ 2000 figures used for 1999, and 2003 figures used for 2004

Table A3 Percentage age distribution of population, by country, 1999 – 2006 combined

Country	<1	1 – 4	5 – 9	10 - 14	15 - 19	20 – 24	25 - 44	45 – 64	65+
Austria	1.12	4.18	5.87	5.77	5.98	5.86	32.24	23.51	15.47
Belgium	1.11	4.55	6.10	5.90	6.04	6.14	29.89	23.60	16.68
Czech Republic	0.87	3.56	5.87	6.31	6.81	8.65	28.18	25.95	13.80
Denmark	1.25	5.19	6.35	5.52	5.33	6.48	29.56	25.47	14.86
Estonia	0.93	3.64	6.52	7.80	7.35	6.85	27.85	24.33	14.72
Finland	1.13	4.71	6.37	6.14	6.42	6.34	27.83	26.31	14.77
France	1.27	4.93	6.27	6.61	6.75	6.31	29.02	23.03	15.81
Germany	0.96	3.84	5.27	5.67	5.62	5.44	31.29	25.83	16.08
Greece	0.93	3.71	4.98	5.34	6.50	7.58	30.08	23.89	17.00
Hungary*	0.94	3.77	5.33	6.07	6.36	7.37	27.98	26.81	15.37
Iceland	1.51	6.20	8.24	7.44	7.89	7.49	29.89	19.80	11.54
Ireland	1.42	5.52	7.23	8.02	9.05	8.12	28.89	20.47	11.28
Italy	0.93	3.69	4.85	4.89	5.52	6.84	30.47	25.00	17.82
Latvia*	0.86	3.28	4.59	7.25	8.03	7.06	28.32	24.75	15.85
Lithuania~	0.97	4.23	6.65	7.84	7.63	6.76	29.47	22.35	14.09
Luxembourg~	1.21	5.01	6.42	6.16	5.71	5.78	31.75	23.87	14.10
Malta	1.09	4.79	6.67	7.21	7.45	7.62	27.59	25.26	12.32
Netherlands	1.27	4.93	6.31	6.00	5.86	6.14	31.95	24.02	13.52
Norway	1.31	5.48	6.90	6.15	5.97	6.41	29.78	22.51	15.48
Poland	1.00	4.37	6.66	7.91	8.68	8.13	28.72	22.57	11.95
Portugal	1.14	4.12	5.29	5.68	6.90	7.83	29.47	23.53	16.04
Slovak Republic*	0.94	4.03	5.89	7.27	8.09	8.63	29.77	23.93	11.46
Slovenia	0.89	3.80	5.33	6.37	7.19	7.57	30.60	24.55	13.71
Spain	0.91	3.68	4.98	5.59	6.99	8.26	30.96	22.16	16.47
Sweden#	1.00	4.29	6.86	6.35	5.70	5.87	27.47	25.16	17.29
Switzerland	1.09	4.51	5.97	5.87	5.79	5.75	31.10	24.66	15.27
United Kingdom	1.20	4.95	6.59	6.55	6.16	5.84	29.34	23.51	15.84
Overall	1.12	4.18	5.87	5.77	5.98	5.86	32.24	23.51	15.47

* 2003 - 2006 figures used

2002 – 2006 figures used

~ 2001 – 2006 figures used

Table A4 Confirmed, probable and confirmed, and laboratory-diagnosed, incidences (all per 100,000), by country 1999, 2003, 2006

Country	1999			2003			2006		
	Confirmed	Probable and confirmed	Laboratory-diagnosed	Confirmed	Probable and confirmed	Laboratory-diagnosed	Confirmed	Probable and confirmed	Laboratory-diagnosed
Austria	1.12	1.20	1.20	0.80	1.00	1.00	0.83	0.93	0.93
Belgium	2.90	2.90	2.90	2.18	2.20	2.20	1.31	1.32	1.32
Czech Republic	0.90	1.00	1.00	0.87	0.98	0.98	0.73	0.77	0.77
Denmark	3.33	3.50	3.50	1.91	1.95	1.95	1.38	1.45	1.45
Estonia	0.22	0.44	0.44	0.59	0.74	0.74	0.82	0.82	0.82
Finland	1.11	1.11	1.11	0.81	0.81	0.81	0.86	0.86	0.86
France	0.74	0.74	0.74	1.06	1.31	1.31	0.91	1.13	1.13
Germany*	0.49	0.49	0.49	0.92	0.94	0.94	0.67	0.67	0.67
Greece	1.77	1.94	1.94	1.08	1.19	1.19	0.88	1.02	1.02
Hungary	-	-	-	0.40	0.42	0.42	0.31	0.35	0.35
Iceland	7.58	7.58	7.58	2.07	2.77	2.77	0.99	1.31	1.31
Ireland	11.89	14.33	14.33	5.53	5.96	5.96	4.09	4.96	4.96
Italy	0.45	0.48	0.48	0.47	0.48	0.48	0.22	0.30	0.30
Latvia	-	-	-	0.64	1.03	1.03	0.39	0.52	0.52
Lithuania	-	-	-	0.87	1.27	1.27	1.32	2.26	2.26
Malta	3.07	5.88	5.88	3.25	4.25	4.25	3.46	8.90	8.90
Netherlands	3.60	3.65	3.65	2.19	2.19	2.19	1.08	1.09	1.09
Norway	1.73	1.80	1.80	1.08	1.12	1.12	0.73	0.75	0.75
Poland~	0.17	0.17	0.17	0.19	0.20	0.20	0.51	0.61	0.61
Portugal	-	-	-	1.39	1.99	1.99	0.36	1.25	1.25
Slovak Republic	-	-	-	0.91	0.91	0.91	0.67	0.67	0.67
Slovenia	0.30	0.30	0.30	0.80	0.80	0.80	0.40	0.40	0.40
Spain [#]	2.38	3.52	3.52	1.91	2.45	2.45	0.83	1.84	1.84
Sweden	0.37	0.37	0.37	0.61	0.63	0.63	0.56	0.57	0.57
Switzerland	2.09	2.36	2.36	1.02	1.19	1.19	0.68	0.95	0.95
United Kingdom	4.72	5.39	5.39	2.85	3.10	3.10	2.03	2.33	2.33

* Data for 1999 from Institute for Hygiene and Microbiology Reference Laboratory; other years from Robert Koch Institute

* Data for 1999 from Institute of Public Health; other years from Institute of Hygiene

Notification data used

Table A5 Number of cases of confirmed and probable laboratory-diagnosed (% culture-diagnosed) invasive meningococcal disease, by country, 1999 – 2006

Country	1999	2000	2001	2002	2003	2004	2005	2006
Austria	97 (82%)	83 (70%)	106 (86%)	81 (74%)	73 (78%)	70 (77%)	88 (73%)	72 (76%)
Belgium	297 (100%)	267 (100%)	380 (100%)	262 (100%)	228 (100%)	157 (100%)	171 (99%)	138 (99%)
Czech Republic	93 (96%)	61 (93%)	93 (97%)	113 (74%)	92 (71%)	96 (97%)	94 (76%)	75 (72%)
Denmark	177 (85%)	151 (80%)	161 (83%)	98 (89%)	103 (82%)	98 (81%)	89 (76%)	77 (79%)
Estonia	3 (67%)	9 (100%)	20 (95%)	8 (100%)	8 (88%)	11 (91%)	12 (92%)	10 (100%)
Finland	57 (100%)	48 (100%)	49 (98%)	49 (98%)	42 (100%)	45 (91%)	40 (93%)	45 (98%)
France	448 (100%)	489 (95%)	559 (94%)	648 (94%)	664 (97%)	634 (84%)	682 (87%)	667 (90%)
Germany*	402 (100%)	452 (100%)	530 (100%)	580 (98%)	768 (73%)	599 (74%)	622 (75%)	554 (75%)
Greece	130 (55%)	174 (35%)	185 (31%)	196 (25%)	119 (33%)	72 (54%)	98 (54%)	109 (45%)
Hungary	-	-	-	-	41 (83%)	43 (93%)	30 (80%)	32 (81%)
Iceland	21 (100%)	18 (89%)	19 (89%)	15 (87%)	8 (100%)	10 (100%)	4 (100%)	4 (100%)
Ireland	445 (42%)	411 (41%)	297 (34%)	225 (36%)	221 (34%)	176 (40%)	187 (44%)	184 (38%)
Italy	254 (63%)	243 (67%)	201 (67%)	214 (72%)	271 (77%)	314 (67%)	319 (81%)	173 (77%)
Latvia	-	-	-	-	16 (100%)	23 (100%)	10 (100%)	10 (90%)
Lithuania	-	-	35 (49%)	29 (69%)	30 (53%)	53 (62%)	66 (58%)	45 (62%)
Luxembourg	18	1	1	1	1	0	1	-
Malta	17 (71%)	20 (80%)	13 (92%)	14 (71%)	16 (94%)	13 (92%)	7 (143%)	19 (58%)
Netherlands	576 (98%)	542 (100%)	721 (100%)	616 (100%)	354 (100%)	278 (95%)	246 (92%)	178 (96%)
Norway	77 (95%)	85 (87%)	77 (87%)	51 (92%)	51 (84%)	34 (85%)	39 (97%)	34 (91%)
Poland~	67 (100%)	43 (100%)	37 (100%)	35 (100%)	57 (93%)	114 (77%)	171 (91%)	195 (86%)
Portugal	-	59 (100%)	106 (100%)	186 (80%)	146 (68%)	124 (91%)	137 (71%)	103 (91%)
Slovak Republic	-	-	-	-	49 (86%)	32 (78%)	44 (91%)	36 (86%)
Slovenia	6 (100%)	8 (100%)	10 (100%)	8 (100%)	16 (100%)	9 (100%)	16 (100%)	8 (100%)
Spain#	947	971	643	834	797	696 (100%)	686	592
Sweden	33 (100%)	41 (100%)	57 (100%)	46 (93%)	55 (80%)	56 (89%)	55 (89%)	50 (90%)
Switzerland	150 (99%)	149 (97%)	147 (98%)	91 (92%)	75 (97%)	79 (82%)	76 (84%)	64 (81%)
United Kingdom	3064 (61%)	2993 (56%)	2570 (52%)	1948 (54%)	1807 (54%)	1500 (53%)	1634 (50%)	1349 (52%)
Total	7379 (64%)	7318 (61%)	7017 (66%)	6348 (64%)	6108 (62%)	5336 (75%)	5624 (62%)	4823 (62%)

* Data for 1999 - 2002 from Institute for Hygiene and Microbiology Reference Laboratory; other years from Robert Koch Institute

~ Data for 1999 – 2003 from Institute of Public Health; other years from Institute of Hygiene

Notification data used

Table A6 Incidence (per 100,000) of confirmed and probable culture-diagnosed cases of invasive meningococcal disease, by country, 1999 - 2006

Country	1999	2000	2001	2002	2003	2004	2005	2006
Austria	0.99	0.71	1.12	0.74	0.70	0.66	0.78	0.67
Belgium	2.90	2.60	3.69	2.54	2.20	1.51	1.62	1.31
Czech Republic	0.87	0.56	0.88	0.82	0.64	0.91	0.69	0.53
Denmark	2.84	2.27	2.50	1.62	1.56	1.46	1.26	1.12
Estonia	0.15	0.66	1.39	0.59	0.52	0.74	0.82	0.74
Finland	1.11	0.93	0.93	0.92	0.81	0.79	0.71	0.84
France	0.74	0.77	0.86	1.00	1.05	0.87	0.95	0.95
Germany*	0.49	0.55	0.64	0.69	0.68	0.54	0.56	0.50
Greece	0.65	0.56	0.53	0.45	0.35	0.35	0.48	0.44
Hungary	-	-	-	-	0.34	0.40	0.24	0.26
Iceland	7.58	5.69	5.96	4.52	2.77	3.42	1.35	1.31
Ireland	5.05	4.46	2.60	2.09	1.88	1.76	1.99	1.63
Italy	0.28	0.29	0.24	0.27	0.36	0.36	0.44	0.23
Latvia	-	-	-	-	0.69	0.99	0.43	0.39
Lithuania	-	-	0.49	0.58	0.46	0.96	1.11	0.82
Malta	3.07	4.09	3.04	2.52	3.75	3.07	2.47	2.72
Netherlands	3.60	3.40	4.50	3.82	2.19	1.62	1.39	1.04
Norway	1.64	1.65	1.49	1.04	0.94	0.63	0.82	0.67
Poland~	0.17	0.11	0.10	0.09	0.14	0.23	0.41	0.44
Portugal	-	0.57	1.03	1.42	0.95	1.07	0.92	0.89
Slovak Republic	-	-	-	-	0.78	0.46	0.74	0.58
Slovenia	0.30	0.40	0.50	0.40	0.80	0.45	0.80	0.40
Spain#	-	-	-	-	-	1.64	-	-
Sweden	0.37	0.46	0.64	0.48	0.49	0.55	0.54	0.49
Switzerland	2.08	2.00	1.98	1.15	0.99	0.88	0.86	0.70
United Kingdom	3.17	2.86	2.29	1.77	1.64	1.34	1.36	1.16
Total	1.07	1.02	1.04	0.91	0.81	0.85	0.73	0.63

* Data for 1999 – 2002 from Institute for Hygiene and Microbiology Reference Laboratory; other years from Robert Koch Institute

~ Data for 1999 – 2003 from Institute of Public Health; other years from Institute of Hygiene

Notification data used

Table A7 Incidence (per 100,000) of laboratory-diagnosed confirmed and probable cases of invasive meningococcal disease, by country, 1999 - 2006

Country	% PCR* (years done)	1999	2000	2001	2002	2003	2004	2005	2006
Austria	28.51% (1999 - 2006)	1.20	1.02	1.30	0.99	0.89	0.86	1.08	0.88
Belgium	1.62% (2000 - 2006)	2.90	2.60	3.69	2.54	2.20	1.51	1.63	1.32
Czech Republic	27.62% (1999 - 2006)	0.90	0.59	0.91	1.11	0.90	0.94	0.92	0.73
Denmark	4.22% (2005 - 2006)	3.33	2.83	3.01	1.82	1.91	1.81	1.64	1.42
Estonia		0.22	0.66	1.46	0.59	0.59	0.81	0.89	0.74
Finland	3.08% (2004 - 2006)	1.11	0.93	0.95	0.94	0.81	0.86	0.77	0.86
France	11.62% (2002 - 2006)	0.74	0.81	0.92	1.06	1.08	1.03	1.09	1.05
Germany~	8.68% (2002 - 2006)	0.49	0.55	0.64	0.70	0.93	0.73	0.75	0.67
Greece	69.71% (1999 - 2006)	1.19	1.59	1.69	1.78	1.08	0.65	0.88	0.98
Hungary	10.96% (2003 - 2006)	-	-	-	-	0.40	0.43	0.30	0.32
Iceland	13.33% (2001 - 2006)	7.58	6.40	6.67	5.22	2.77	3.42	1.35	1.31
Ireland	67.99% (1999 - 2006)	11.89	10.85	7.72	5.74	5.55	4.35	4.53	4.34
Italy		0.45	0.43	0.35	0.38	0.47	0.54	0.55	0.29
Latvia		-	-	-	-	0.69	0.99	0.43	0.44
Lithuania		-	-	1.00	0.83	0.87	1.54	1.93	1.32
Luxembourg		4.15	0.23	0.23	0.23	0.22	0.00	0.22	-
Malta	2.44% (2001 - 2006)	4.34	5.11	3.29	3.52	4.00	3.33	1.73	4.70
Netherlands	6.82% (2003 - 2006)	3.65	3.42	4.51	3.82	2.19	1.71	1.51	1.09
Norway	9.38% (1999 - 2006)	1.73	1.90	1.71	1.13	1.12	0.74	0.85	0.73
Poland~	4.87% (1999 - 2006)	0.17	0.11	0.10	0.09	0.15	0.30	0.45	0.51
Portugal	12.50% (2002 - 2006)	-	0.57	1.03	1.79	1.39	1.18	1.30	0.97
Slovak Republic		-	-	-	-	0.91	0.59	0.82	0.67
Slovenia		0.30	0.40	0.50	0.40	0.80	0.45	0.80	0.40
Spain#		2.38	2.42	1.59	2.04	1.91	1.64	1.60	1.36
Sweden	12.60% (2002 - 2006)	0.37	0.46	0.64	0.51	0.61	0.62	0.61	0.55
Switzerland	6.98% (1999 - 2006)	2.09	2.07	2.02	1.24	1.02	1.07	1.02	0.86
United Kingdom	65.24% (1999 - 2006)	5.24	5.10	4.37	3.29	3.03	2.51	2.71	2.24
Total		1.67	1.66	1.57	1.42	1.30	1.13	1.19	1.01

* of all cases used to calculate laboratory-diagnosed incidence

~ Data for 1999 - 2002 from Institute for Hygiene and Microbiology Reference Laboratory; other years from Robert Koch Institute

~ Data for 1999 - 2003 from Institute of Public Health; other years from Institute of Hygiene

Notification data used

Table A8 Age distribution (number and % distribution) of cases of confirmed and probable meningococcal disease, all countries, 1999 - 2006

Age Group	1999	2000	2001	2002	2003	2004	2005	2006
<i>Numbers of cases</i>								
<1 year	1155	1384	1208	1096	1068	990	1009	916
1 - 4 years	2170	2167	1826	1662	1559	1299	1412	1241
5 - 9 years	997	904	767	649	546	443	481	437
10 - 14 years	718	605	583	468	506	310	353	240
15 - 19 years	1181	1012	1008	869	803	740	687	675
20 - 24 years	444	441	397	361	331	270	330	298
25 - 44 years	543	673	666	619	532	476	525	409
45 - 64 years	477	556	516	470	424	422	438	391
65+ years	359	359	354	402	310	334	369	299
Not known	102	22	33	12	20	13	23	24
<i>% distribution</i>								
<1 year	14.18%	16.99%	14.83%	13.45%	13.11%	12.15%	12.39%	11.24%
1 - 4 years	26.64%	26.60%	22.42%	20.40%	19.14%	15.95%	17.33%	15.23%
5 - 9 years	12.24%	11.10%	9.42%	7.97%	6.70%	5.44%	5.90%	5.36%
10 - 14 years	8.81%	7.43%	7.16%	5.75%	6.21%	3.81%	4.33%	2.95%
15 - 19 years	14.50%	12.42%	12.37%	10.67%	9.86%	9.08%	8.43%	8.29%
20 - 24 years	5.45%	5.41%	4.87%	4.43%	4.06%	3.31%	4.05%	3.66%
25 - 44 years	6.67%	8.26%	8.18%	7.60%	6.53%	5.84%	6.44%	5.02%
45 - 64 years	5.86%	6.83%	6.33%	5.77%	5.21%	5.18%	5.38%	4.80%
65+ years	4.41%	4.41%	4.35%	4.93%	3.81%	4.10%	4.53%	3.67%
Not known	1.25%	0.27%	0.41%	0.15%	0.25%	0.16%	0.28%	0.29%

Calculated using data from countries submitting consistent data 1999 - 2006 (see Table A1)

Table A9 Age-specific incidence (per 100,000) of confirmed and probable meningococcal disease, by country, 2006

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
Austria	14.92	5.43	0.24	1.46	3.95	0.80	0.33	0.33	0.21
Belgium	17.93	6.51	1.86	1.75	3.99	0.47	0.17	0.60	0.89
Czech Republic	17.58	3.72	1.34	0.35	2.14	0.86	0.45	0.07	0.21
Denmark	10.86	5.78	2.36	2.85	5.34	0.34	0.20	0.62	1.09
Estonia	7.51	3.76	1.63	1.34	0.94		0.54	0.59	0.44
Finland	3.62	2.26	0.69	0.31	4.03	1.21	0.37	0.54	0.59
France	14.76	4.77	1.55	0.87	2.68	1.97	0.32	0.31	0.52
Germany*	13.41	4.20	1.13	0.65	2.64	0.74	0.16	0.18	0.18
Greece	14.30	6.91	5.44	1.44	1.67	0.68	0.18	0.25	0.19
Hungary	11.74	2.08	0.80	0.17	0.79	0.15	0.03	0.11	0.06
Iceland	22.38	0.00	4.68	0.00	8.80	0.00	0.00	0.00	0.00
Ireland	88.67	27.05	5.92	4.04	10.19	2.61	0.68	0.97	1.06
Italy	3.47	1.55	0.48	0.46	0.58	0.28	0.18	0.17	0.08
Latvia	9.29	2.48	1.06	0.76	0.00	1.12	0.16	0.35	0.26
Lithuania	52.72	25.59	3.92	0.00	3.32	0.77	0.41	0.98	0.00
Malta	51.80	12.63	12.89	30.42	17.52	10.04	6.31	5.39	0.00
Netherlands	13.89	6.12	2.30	1.10	2.22	0.73	0.27	0.25	0.69
Norway	3.51	1.30	0.98	0.00	3.34	1.09	0.08	0.52	1.03
Poland~	10.53	3.71	1.14	0.97	1.23	0.63	0.17	0.15	0.10
Portugal	34.72	11.05	1.48	1.45	1.02	0.71	0.22	0.35	0.11
Slovak Republic	26.01	5.33	0.70	0.28	0.24	0.22	0.18	0.22	0.00
Slovenia	0.00	2.81	0.00	0.00	0.00	2.12	0.17	0.19	0.32
Spain#	30.30	12.11	3.64	1.25	3.41	1.80	0.60	0.71	0.78
Sweden	1.88	1.48	0.85	0.88	1.29	0.74	0.41	0.34	0.32
Switzerland	11.03	4.10	0.76	0.23	2.72	1.13	0.18	0.82	0.84
United Kingdom	47.91	16.34	3.40	1.41	3.41	1.43	0.48	0.56	0.68

* Data from Robert Koch Institute ~ Data from National Institute of Hygiene # Notification data used

Table A10 Serogroup distribution of cases of confirmed and probable laboratory-diagnosed meningococcal disease, by country, 2006

Country	Serogroup							Non-groupable	Not known	Serogroup C vaccination (year of introduction)
	B	C	Y	W135	A	X	29E			
Austria	41	25	1	5					4	
Belgium	114	11	5	8						Yes (2002)
Czech Republic	52	18	1						8	
Denmark	34	19	2	4					20	
Estonia	6	2			2				1	
Finland	38	5	1						1	
France	402	175	18	23	2	1		2	91	
Germany	330	135	25	12		2		13	22	
Greece	71	6	2	1	1				33	
Hungary	23	3	1	1					7	
Iceland	4									Yes (2002)
Ireland	169	4	4	1				1	31	Yes (2000)
Italy	81	39	7	4					45	
Latvia	9								3	
Lithuania	27	5							45	
Malta	8	1	1						26	
Netherlands	164	4	4	3		1		1	1	Yes (2002)
Norway	27	1	4	1	1				1	
Poland~	70	76	2	2					15	
Portugal	76	15	5	1				1	34	
Slovak Republic	22	8							6	
Slovenia	3	3		1	1					
Spain#	379	46	20	5					38	Yes (2000)
Sweden	26	15	5	2				1	3	
Switzerland	35	17	3	2					14	
United Kingdom	1197	32	38	26	1		1	46	59	Yes (1999)
Total	3408	665	149	102	8	4	1	65	508	

* Data from Institute for Hygiene and Microbiology Reference Laboratory ~ Data from National Institute of Public Health # Notification data used

Table A11 Incidence (per million) of confirmed and probable meningococcal disease, by serogroup and country, 2006

Country	Serogroup							Non-groupable	Not known	Serogroup C vaccination (year of introduction)
	B	C	Y	W135	A	X	29E			
Austria	5.01	3.05	0.12	0.61					0.49	
Belgium	10.88	1.05	0.48	0.76						Yes (2002)
Czech Republic	5.07	1.76	0.10						0.78	
Denmark	6.28	3.51	0.37	0.74					3.69	
Estonia	4.45	1.48			1.48				0.74	
Finland	7.27	0.96	0.19						0.19	
France	6.40	2.78	0.29	0.37	0.03	0.02		0.03	1.45	
Germany*	4.00	1.64	0.30	0.15		0.02		0.16	0.27	
Greece	6.41	0.54	0.18	0.09	0.09				2.98	
Hungary	2.28	0.30	0.10	0.10					0.69	
Iceland	13.52									Yes (2002)
Ireland	40.91	0.97	0.97	0.24				0.24	7.50	Yes (2000)
Italy	1.39	0.67	0.12	0.07					0.77	
Latvia	3.90								1.30	
Lithuania	7.88	1.46							13.14	
Malta	19.79	2.47	2.47						64.30	
Netherlands	10.06	0.25	0.25	0.18		0.06		0.06	0.06	Yes (2002)
Norway	5.86	0.22	0.87	0.22	0.22				0.22	
Poland~	1.84	1.99	0.05	0.05					0.39	
Portugal	7.19	1.42	0.47	0.09				0.09	3.22	
Slovak Republic	4.08	1.48							1.11	
Slovenia	1.50	1.50		0.50	0.50					
Spain#	8.83	1.07	0.47	0.12					0.89	Yes (2000)
Sweden	2.87	1.66	0.55	0.22				0.11	0.33	
Switzerland	4.69	2.28	0.40	0.27					1.88	
United Kingdom	19.88	0.53	0.63	0.43	0.02		0.02	0.76	0.98	Yes (1999)

* Data from Institute for Hygiene and Microbiology Reference Laboratory

~ Data from National Institute of Public Health

Notification data used

Table A12 Age distribution of cases of confirmed and probable laboratory-diagnosed serogroup B meningococcal disease, all countries, 1999 – 2006

Age Group	1999	2000	2001	2002	2003	2004	2005	2006
<i>Numbers of cases</i>								
<1 year	775	976	890	807	801	780	819	747
1 - 4 years	1201	1218	1202	1105	1065	935	1063	937
5 - 9 years	519	427	417	364	333	267	320	311
10 – 14 years	343	254	320	256	295	173	201	132
15 – 19 years	604	537	552	473	475	451	450	440
20 – 24 years	202	215	195	179	159	173	218	190
25 – 44 years	259	311	314	286	273	223	298	215
45 – 64 years	235	304	258	251	239	235	251	215
65+ years	174	157	144	166	140	168	163	147
Not known	48	13	16	8	7	12	16	16
<i>% distribution</i>								
<1 year	17.78%	22.12%	20.66%	20.72%	21.15%	22.83%	21.56%	22.30%
1 - 4 years	27.55%	27.61%	27.90%	28.37%	28.12%	27.36%	27.98%	27.97%
5 - 9 years	11.90%	9.68%	9.68%	9.35%	8.79%	7.81%	8.42%	9.28%
10 – 14 years	7.87%	5.76%	7.43%	6.57%	7.79%	5.06%	5.29%	3.94%
15 – 19 years	13.85%	12.17%	12.81%	12.14%	12.54%	13.20%	11.85%	13.13%
20 – 24 years	4.63%	4.87%	4.53%	4.60%	4.20%	5.06%	5.74%	5.67%
25 – 44 years	5.94%	7.05%	7.29%	7.34%	7.21%	6.53%	7.84%	6.42%
45 – 64 years	5.39%	6.89%	5.99%	6.44%	6.31%	6.88%	6.61%	6.42%
65+ years	3.99%	3.56%	3.34%	4.26%	3.70%	4.92%	4.29%	4.39%
Not known	1.10%	0.29%	0.37%	0.21%	0.18%	0.35%	0.42%	0.48%

Calculated using data from countries submitting consistent data 1999 - 2006 (see Table A1)

Table A13 Age distribution of cases of confirmed and probable laboratory-diagnosed serogroup C meningococcal disease, all countries, 1999 – 2006

Age Group	1999	2000	2001	2002	2003	2004	2005	2006
<i>Numbers of cases</i>								
<1 year	200	148	116	113	67	68	56	53
1 - 4 years	550	503	276	232	168	154	123	124
5 - 9 years	231	212	131	120	62	70	55	47
10 – 14 years	224	168	124	116	97	63	68	52
15 – 19 years	404	288	286	242	151	158	126	124
20 – 24 years	141	146	126	110	76	48	70	60
25 – 44 years	150	210	197	189	118	117	96	82
45 – 64 years	150	136	168	133	77	86	80	71
65+ years	95	120	102	125	63	56	72	44
Not known	17	6	9	1	4	1	3	3
<i>% distribution</i>								
<1 year	9.25%	7.64%	7.56%	8.18%	7.59%	8.28%	7.48%	8.03%
1 - 4 years	25.44%	25.97%	17.98%	16.80%	19.03%	18.76%	16.42%	18.79%
5 - 9 years	10.68%	10.94%	8.53%	8.69%	7.02%	8.53%	7.34%	7.12%
10 – 14 years	10.36%	8.67%	8.08%	8.40%	10.99%	7.67%	9.08%	7.88%
15 – 19 years	18.69%	14.87%	18.63%	17.52%	17.10%	19.24%	16.82%	18.79%
20 – 24 years	6.52%	7.54%	8.21%	7.97%	8.61%	5.85%	9.35%	9.09%
25 – 44 years	6.94%	10.84%	12.83%	13.69%	13.36%	14.25%	12.82%	12.42%
45 – 64 years	6.94%	7.02%	10.94%	9.63%	8.72%	10.48%	10.68%	10.76%
65+ years	4.39%	6.20%	6.64%	9.05%	7.13%	6.82%	9.61%	6.67%
Not known	0.79%	0.31%	0.59%	0.07%	0.45%	0.12%	0.40%	0.45%

Calculated using data from countries submitting consistent data 1999 - 2006 (see Table A1)

Table A14 Percentage distribution of confirmed and probable laboratory-diagnosed cases due to serogroup C, by country (total serogroup cases), 1999 - 2006

	1999	2000	2001	2002	2003	2004	2005	2006
Austria	10 - 19% (90)	10 - 19% (79)	>=40% (98)	20 - 29% (80)	20 - 29% (71)	20 - 29% (66)	20 - 29% (83)	30 - 39% (72)
Belgium	20 - 29% (282)	30 - 39% (257)	>=40% (364)	30 - 39% (253)	20 - 29% (219)	10 - 19% (155)	10 - 19% (171)	<10% (138)
Czech Republic	>=40% (89)	10 - 19% (57)	30 - 39% (91)	>=40% (101)	>=40% (85)	30 - 39% (91)	30 - 39% (91)	20 - 29% (71)
Denmark	10 - 19% (152)	10 - 19% (122)	20 - 29% (131)	10 - 19% (86)	20 - 29% (85)	10 - 19% (78)	30 - 39% (68)	30 - 39% (59)
Estonia	No Serogroup C (1)	No Serogroup C (6)	20 - 29% (9)	No Serogroup C (6)	10 - 19% (7)	30 - 39% (6)	10 - 19% (11)	20 - 29% (10)
Finland	10 - 19% (53)	20 - 29% (47)	10 - 19% (48)	10 - 19% (48)	10 - 19% (42)	10 - 19% (41)	<10% (37)	10 - 19% (44)
France	20 - 29% (448)	20 - 29% (452)	30 - 39% (504)	>=40% (602)	30 - 39% (366)	30 - 39% (609)	20 - 29% (641)	20 - 29% (623)
Germany	20 - 29% (402)	20 - 29% (452)	20 - 29% (530)	30 - 39% (580)	20 - 29% (566)	20 - 29% (447)	20 - 29% (496)	20 - 29% (517)
Greece	20 - 29% (122)	10 - 19% (160)	<10% (160)	<10% (175)	<10% (101)	No Serogroup C (47)	<10% (81)	<10% (81)
Iceland	>=40% (21)	>=40% (16)	>=40% (17)	>=40% (13)	20 - 29% (8)	30 - 39% (10)	20 - 29% (4)	No Serogroup C (4)
Ireland	30 - 39% (445)	30 - 39% (411)	10 - 19% (291)	<10% (222)	<10% (220)	<10% (172)	<10% (182)	<10% (179)
Italy	20 - 29% (126)	20 - 29% (127)	20 - 29% (93)	>=40% (115)	>=40% (160)	>=40% (181)	>=40% (221)	30 - 39% (131)
Malta	20 - 29% (13)	<10% (16)	<10% (12)	20 - 29% (8)	10 - 19% (6)	No Serogroup C (7)	>=40% (7)	<10% (10)
Netherlands	10 - 19% (576)	20 - 29% (542)	30 - 39% (721)	30 - 39% (614)	10 - 19% (354)	<10% (266)	<10% (230)	<10% (177)
Norway	10 - 19% (76)	10 - 19% (84)	10 - 19% (77)	20 - 29% (50)	10 - 19% (50)	10 - 19% (31)	10 - 19% (39)	<10% (34)
Poland	10 - 19% (66)	10 - 19% (43)	10 - 19% (37)	30 - 39% (35)	30 - 39% (55)	30 - 39% (116)	30 - 39% (198)	>=40% (150)
Slovenia	No Serogroup C (6)	10 - 19% (8)	<10% (10)	10 - 19% (8)	10 - 19% (16)	No Serogroup C (9)	20 - 29% (16)	30 - 39% (8)
Spain [#]	30 - 39% (601)	30 - 39% (692)	20 - 29% (391)	20 - 29% (562)	10 - 19% (699)	10 - 19% (614)	10 - 19% (498)	<10% (450)
Sweden	30 - 39% (33)	30 - 39% (41)	20 - 29% (57)	20 - 29% (42)	20 - 29% (46)	20 - 29% (52)	30 - 39% (51)	30 - 39% (49)
Switzerland	>=40% (128)	>=40% (137)	>=40% (135)	>=40% (82)	30 - 39% (71)	30 - 39% (59)	10 - 19% (67)	30 - 39% (57)
United Kingdom	30 - 39% (2755)	20 - 29% (2733)	10 - 19% (2397)	<10% (1815)	<10% (1711)	<10% (1421)	<10% (1614)	<10% (1341)

Calculated using data from countries submitting consistent data 1999 - 2006 (see Table A1)

Laboratory data

Table A15 Dominant serotype of confirmed and probable laboratory-diagnosed serogroup C invasive meningococcal disease (number of serotyped C cases), by country, 1999 - 2006

Country	1999	2000	2001	2002	2003	2004	2005	2006
Austria	P2.2b (14)	P2.2a (10)	P2.2a (34)	P2.2a (17)	P2.2b (12)	NT (15)	P2.2a (16)	P2.2a (22)
Belgium	P2.2b (77)	P2.2a (85)	P2.2a (178)	P2.2a (89)	P2.2a (46)	P2.2a (20)	P2.2a (18)	P2.2a (11)
Czech Republic	P2.2a (26)	P2.2a (10)	P2.2a (23)	P2.2a (28)	P2.2a (23)	P2.2a (25)	P2.2a (18)	NT (11)
Denmark	P2.2a (21)	P2.2a (16)	P2.2a (24)	P2.2a (16)	P3.15 (19)	P3.15 (14)	P2.2b (21)	P2.2b (19)
Finland	NT (9)	NT (10)	NT (9)	P2.2a (6)	NT (5)	NT (5)	P2.2b (1)	P2.2b (5)
France	P2.2b (100)	-	P2.2a (126)	P2.2a (172)	P2.2a (115)	P2.2a (130)	P2.2a (120)	P2.2a (135)
Germany	P2.2a (86)	P2.2a (96)	P2.2a (118)	P2.2a (140)	P2.2a (116)	P2.2a (75)	P2.2a (71)	P2.2a (74)
Greece	P2.2a (17)	P2.2a (9)	P2.2a (8)	NT, P2.2a (6)	P2.2a (2)	-	P2.2a (2)	P2.2a, P3.4 (2)
Ireland	P2.2a (42)	P2.2a (54)	P2.2a (6)	P2.2a (4)	P2.2a (2)	P2.2a (1)	P2.2a (4)	P2.2a (3)
Italy	P2.2a (16)	P2.2a (24)	P2.2a (15)	P2.2b (32)	P2.2b (55)	P2.2b (83)	P2.2b (92)	P2.2b (27)
Malta	P2.2a (1)	P2.2b (1)	NT (1)	-	P2.2a (1)	-	NT (3)	P2.2a (1)
Netherlands	P2.2a (81)	P2.2a (106)	P2.2a (277)	P2.2a (222)	P2.2a (44)	P2.2a (17)	NT, P2.2a (4)	No serotyping
Norway	P2.2a (10)	P2.2a (12)	NT, P2.2a (13)	NT, P3.15, P3.4 (3)	P2.2a (9)	P2.2a (1)	NT (3)	P3.1 (1)
Poland	NT, P3.22 (8)	NT (7)	P3.4 (4)	NT (11)	NT (21)	NT (40)	NT (62)	NT (67)
Slovenia	-	P2.2a (1)	P2.2a (1)	P2.2a (1)	NT (3)	-	P2.2b (4)	-
Spain [#]	P2.2b (230)	P2.2b (235)	P2.2a (102)	P2.2a (140)	P2.2a (98)	P2.2a (104)	P2.2a (81)	P2.2a (46)
Sweden	NT (11)	NT (14)	P2.2a (14)	NT, P3.15 (11)	P3.15 (12)	NT, P3.15 (11)	P3.15 (15)	P3.15 (15)
Switzerland	P2.2b (57)	P2.2b (83)	P2.2b (69)	P2.2a (39)	P2.2a (23)	P2.2a (18)	P2.2a (13)	P2.2a (13)
United Kingdom	P2.2a (713)	P2.2a (514)	P2.2a (220)	P2.2a (128)	P2.2a (65)	P2.2a (34)	P2.2a (17)	P2.2a (17)

Calculated using data from countries submitting consistent data 1999 - 2006 (see Table A1)

Laboratory data

Table A16 Dominant serotype of confirmed and probable laboratory-diagnosed serogroup B invasive meningococcal disease (number of serotyped B cases), by country, 1999 – 2006

	1999	2000	2001	2002	2003	2004	2005	2006
Austria	P3.15 (60)	NT, P3.15 (45)	NT (46)	NT (39)	NT (37)	P3.15 (32)	P3.15 (36)	NT (26)
Belgium	P3.4 (198)	P3.4 (165)	P3.4 (169)	P3.4 (161)	P3.4 (164)	P3.4 (122)	P3.4 (141)	P3.4 (109)
Czech Republic	NT (36)	NT (34)	NT (34)	P3.4 (37)	P3.15 (20)	P3.4 (40)	P3.4 (35)	P3.4 (27)
Denmark	P3.15 (126)	P3.15 (98)	P3.15 (92)	P3.15 (65)	P3.15 (57)	P3.15 (56)	P3.15 (39)	NT (34)
Finland	P3.4 (33)	P3.4 (29)	P3.4 (34)	NT (35)	NT, P3.4 (28)	P3.4 (29)	P3.4 (28)	P3.4 (37)
France	NT (302)	-	NT (194)	NT (224)	NT (213)	NT (239)	NT (292)	NT (293)
Germany	P3.15 (292)	NT (319)	P3.15 (359)	P3.4 (154)	P2.2a (4)	P2.2b (2)	P2.2b (2)	-
Greece	NT (30)	P3.4 (20)	P3.4 (35)	P3.4 (37)	P3.4 (28)	P3.4 (29)	P3.4 (37)	P3.4 (33)
Ireland	P3.4 (86)	P3.4 (86)	P3.4 (55)	NT (51)	NT (49)	NT, P3.4 (45)	P3.4 (40)	NT (46)
Italy	P3.14 (60)	P3.4 (61)	P3.15 (46)	P3.4 (47)	P3.15 (66)	P3.15 (48)	P3.4 (67)	P3.15 (51)
Malta	P3.4 (6)	P3.4 (13)	P3.4 (9)	P3.4 (6)	P3.4 (3)	NT (4)	P3.1, P3.4, P3.15 (3)	P3.4 (5)
Netherlands	P3.4 (466)	P3.4 (413)	P3.4 (417)	P3.4 (371)	P3.4 (293)	P3.4 (232)	P3.4 (211)	-
Norway	P3.15 (57)	P3.15 (49)	P3.15 (32)	P3.4 (24)	P3.4 (31)	P3.4, P3.15 (19)	P3.4 (24)	P3.4 (24)
Poland	NT (55)	NT (33)	P3.22 (29)	NT (23)	NT (31)	NT (71)	NT (113)	NT (63)
Slovenia	NT (6)	P3.15 (4)	NT, P3.15 (8)	NT (5)	NT, P3.22 (6)	NT (5)	NT (9)	-
Spain [#]	P3.4 (345)	P3.4 (431)	NT (268)	NT (375)	NT (479)	NT (442)	NT (362)	NT (379)
Sweden	P3.15 (15)	NT (22)	NT (32)	NT (24)	NT (27)	NT (25)	P3.15 (22)	NT (20)
Switzerland	NT (59)	NT (48)	NT, P3.4 (52)	NT (34)	NT (37)	P3.4 (36)	P3.4 (34)	NT (32)
United Kingdom	P3.4 (1020)	NT (1018)	NT (964)	NT (796)	NT (779)	NT (639)	NT (659)	NT (574)

Calculated using data from countries submitting consistent data 1999 - 2006 (see Table A1)

Laboratory data

Table A17 Frequency of phenotype/genotype present in invasive meningococcal serogroup C isolates, by country, 2006

Serogroup:serotype associations present in 2 or more isolates

	C:NT:NT:NT	C:NT:P1.1:NT	C:NT:P1.14:NT	C:NT:P1.15:NT	C:NT:P1.16:NT	C:NT:P1.2:NT	C:NT:P1.3:NT	C:NT:P1.3:P1.6	C:NT:P1.4:NT	C:NT:P1.9:NT	C:P1.17:P1.16:P1.36	C:P1.18:P1.3:NT	C:P1.19:P1.15:NT	C:P1.21:P1.16:NT	C:P1.21:P1.16:P1.37	C:P1.5:NT:NT	C:P1.5:P1.1:NT	C:P1.5:P1.10:NT	C:P1.5:P1.10:P1.36	C:P1.5:P1.2:NT	C:P1.5:P1.2:P1.36	C:P1.7:NT:NT	C:P1.7:P1.1:NT	C:P1.7:P1.13:NT	C:P1.7:P1.14:NT	C:P1.7:P1.16:NT	C:P1.7:P1.16:P1.35	Listed total (% serotyped total)	
Austria	11				10														1										22 (100%)
Belgium	2															5				3			1						11 (100%)
Czech Republic											1			1							8								10 (91%)
Denmark	2			5	1											5				3		3							19 (100%)
Finland	2		1					1								1													5 (100%)
France	26	6		1	24			3							29					26		1	15			1			132 (98%)
Germany												9	3	3					21	69					3	2	3		113 (93%)
Greece	2										1			1					2										6 (100%)
Ireland	1															2													3 (100%)
Italy	4		1		1		1	1							11			1	6										26 (100%)
Malta															1														1 (100%)
Netherlands																		1	2										3 (75%)
Norway																													0 (0%)
Poland [~]	9		1	4	3		5	14	1	3					14				8				2			2			66 (99%)
Portugal													1					1	10				1						13 (100%)
Slovak Republic	1				5														1										7 (100%)
Slovenia																	2												2 (67%)
Spain [#]	17		1		3										30				4										55 (100%)
Sweden																			2		2							9	13 (87%)
Switzerland	3							1								6				2									12 (92%)
United Kingdom	5								1							8			2	2									18 (95%)
Total	85	6	2	6	9	44	5	17	6	3	2	9	4	3	2	112	2	24	6	137	10	4	19	3	2	6	9		537 (96%)

* Data from Institute for Hygiene and Microbiology Reference Laboratory

~ National Institute of Public Hygiene

Laboratory data

Table A18 Frequency of serosubtypes present in invasive meningococcal serogroup B isolates, by country, 2006

Serogroup:serotype associations present in 10 or more isolates

Country	B:P1.5:P1.2:NT	B:P1.5:P1.10:NT	B:P1.5:NT:NT	B:P1.7:P1.1:NT	B:P1.7:P1.4:P1.37	B:P1.7:P1.4:NT	B:P1.7:P1.13:NT	B:P1.7:P1.16:P1.35	B:P1.7:P1.16:NT	B:P1.7:NT:NT	B:P1.12:P1.13:NT	B:P1.12:NT:NT	B:P1.18:P1.3:NT	B:P1.19:P1.13:NT	B:P1.19:P1.15:NT	B:P1.19:P1.16:NT	B:P1.19:NT:NT	B:P1.21:P1.16:NT	B:P1.22:P1.9:NT	B:P1.22:P1.14:P1.36	B:P1.22:P1.14:NT	B:P1.22:P1.14:P1.36	B:P1.22:P1.14:NT	B:NT:P1.1:NT	B:NT:P1.3:P1.6	B:NT:P1.3:NT	B:NT:P1.4:NT	B:NT:P1.9:NT	B:NT:P1.10:NT	B:NT:P1.13:NT	B:NT:P1.14:NT	B:NT:P1.15:NT	B:NT:P1.16:NT	B:NT:NT:P1.6	B:NT:NT:NT	Total listed (% total known)	
Austria	1		3						4		1													1			3		1	1					1	8	24 (89%)
Belgium	1		4						5		1																58	3	4	2	11	2	2	1	13	107 (98%)	
Czech Republic							2							12							3																17 (61%)
Denmark	1								5	3																	3	3			8	1	6	4		34 (100%)	
Finland	4		2						1																	1	7			2	1	5			12	35 (95%)	
France	11		8	7					43	5	4	4												2			49	14	4	14	15	4	1	9	92	286 (98%)	
Germany*	9	22		5		70	4		39		7		17		29		12	8					37														259 (84%)
Greece					3			9							21								16													3	52 (81%)
Ireland	1									2					4	4										3	1	17	8	1		3			1	45 (98%)	
Italy	1		4	1					7																		1	14	1	1	4			2	7	10	53 (98%)
Malta															4													1							1	6 (100%)	
Netherlands	1	22		5		54	8		6		1		5	5		13		4	1			17															142 (90%)
Norway	4	2		1		4	3		3							3																					20 (87%)
Poland~	8		7						9			1														1	5			5	1	11	2	7	6	63 (98%)	
Portugal	3	5		3		9	2		2		1		1	1		7		2	3			14								2							55 (87%)
Slovak Republic	3		3						1			2																				1	1		3		14 (93%)
Slovenia									1																						1						2 (67%)
Spain#	13		46				1		3	8	4	12													9	3	5	20	63	1	9	51	104	25	4	97	478 (99%)
Sweden					4			1													6																11 (44%)
Switzerland	1		1	1						1		1													2	1		4	2	2	2	2		8	1	3	32 (100%)
United Kingdom	9	1	13	4	9	1		2	15	10	2	2		4	11	97	20				7					10	2	125	85	2	10	73	1	34	11	35	595 (96%)
Total	71	52	91	27	16	138	18	14	144	29	19	24	23	10	44	157	24	18	12	32	68	14	18	10	305	180	23	45	176	120	86	34	288	2330 (93%)			

* Data from Institute for Hygiene and Microbiology Reference Laboratory ~ National Institute of Public Hygiene # Laboratory data

Table A19 Case fatality ratio (CFR) in confirmed and probable cases of meningococcal disease, by country, 1999-2000, 2004– 2006

Country	1999			2000			2004			2005			2006		
	Deaths	Cases	CFR	Deaths	Cases	CFR	Deaths	Cases	CFR	Deaths	Cases	CFR	Deaths	Cases	CFR
Austria	7	97	7.22%	5	83	6.02%	7	70	10.00%	4	88	4.55%	7	72	9.72%
Belgium	16	297	5.39%	13	267	4.87%	10	157	6.37%	14	171	8.19%	2	138	1.45%
Czech Republic	7	93	7.53%	5	61	8.20%	16	96	16.67%	4	94	4.26%	3	75	4.00%
Denmark	14	177	7.91%	11	151	7.28%	5	98	5.10%	3	89	3.37%	6	77	7.79%
Estonia	1	3	33.33%	0	9	0.00%	4	11	36.36%	1	12	8.33%	1	10	10.00%
Finland	10	57	17.54%							8	40	20.00%	4	45	8.89%
France	35	411	8.52%	59	489	12.07%	72	634	11.36%	76	682	11.14%	65	667	9.75%
Germany							47	599	7.85%	45	622	7.23%	94	1093	8.60%
Greece	8	130	6.15%	11	174	6.32%	2	72	2.78%	2	98	2.04%	4	109	3.67%
Hungary							9	43	20.93%	7	30	23.33%	5	32	15.63%
Iceland	2	21	9.52%	2	18	11.11%	1	10	10.00%	0	4	0.00%	0	4	0.00%
Ireland	17	445	3.82%	25	411	6.08%	8	176	4.55%	6	187	3.21%	5	184	2.72%
Italy	13	254	5.12%	20	243	8.23%	30	314	9.55%	26	319	8.15%	19	173	10.98%
Latvia							3	23	13.04%	0	10	0.00%	4	10	40.00%
Lithuania							4	53	7.55%	3	66	4.55%	6	45	13.33%
Malta	5	17	29.41%	3	20	15.00%	3	13	23.08%	1	7	14.29%	0	19	0.00%
Netherlands	23	576	3.99%	29	542	5.35%	13	278	4.68%	12	246	4.88%	7	178	3.93%
Norway	9	77	11.69%	7	85	8.24%	3	34	8.82%	5	39	12.82%	7	34	20.59%
Poland	1	67	1.49%	0	43	0.00%	11	230	4.78%	21	369	5.69%	42	360	11.67%
Portugal							5	124	4.03%	8	137	5.84%	7	103	6.80%
Slovak Republic							2	32	6.25%	3	44	6.82%	3	36	8.33%
Slovenia	0	6	0.00%	2	8	25.00%	0	9	0.00%	3	16	18.75%	0	8	0.00%
Spain	74	947	7.81%				84	696	12.07%	86	686	12.54%	66	592	11.15%
Sweden	6	33	18.18%	8	41	19.51%	5	56	8.93%	5	55	9.09%	6	50	12.00%
Switzerland	11	150	7.33%	10	149	6.71%	5	79	6.33%	5	76	6.58%	7	64	10.94%
United Kingdom	219	3064	7.15%	230	2993	7.68%	81	1500	5.40%	83	1634	5.08%	60	1349	4.45%
Total	478	6922	6.91%	440	5787	7.60%	430	5407	7.95%	431	5821	7.40%	430	5527	7.78%

Table A20 Serogroup-specific case fatality ratio (CFR) in confirmed and probable cases of meningococcal disease, by country, 1999 – 2006 combined

Country	Serogroup B			Serogroup C			Other serogroups / non-groupable		
	Deaths	Cases	CFR	Deaths	Cases	CFR	Deaths	Cases	CFR
Austria	31	435	7.13%	10	168	5.95%	5	36	13.89%
Belgium	51	1245	4.10%	50	527	9.49%	4	67	5.97%
Czech Republic	28	400	7.00%	31	237	13.08%	7	39	17.95%
Denmark	43	585	7.35%	14	157	8.92%	4	39	10.26%
Estonia	3	37	8.11%	0	9	0.00%	1	10	10.00%
Finland	17	106	16.04%	3	15	20.00%	1	13	7.69%
France	227	2518	9.02%	196	1257	15.59%	66	387	17.05%
Germany	196	2439	8.04%	105	933	11.25%	17	288	5.90%
Greece	27	515	5.24%	10	84	11.90%	3	327	0.92%
Hungary	23	119	19.33%	3	14	21.43%	0	4	0.00%
Iceland	3	40	7.50%	3	50	6.00%	2	3	66.67%
Ireland	69	1701	4.06%	21	342	6.14%	3	78	3.85%
Italy	62	654	9.48%	60	452	13.27%	4	41	9.76%
Latvia	5	25	20.00%	0	2	0.00%	0	1	0.00%
Lithuania	10	140	7.14%	0	27	0.00%	1	2	50.00%
Malta	8	61	13.11%	3	12	25.00%	0	6	0.00%
Netherlands	118	2602	4.53%	33	763	4.33%	5	115	4.35%
Norway	36	314	11.46%	6	71	8.45%	2	56	3.57%
Poland	44	586	7.51%	28	356	7.87%	3	51	5.88%
Portugal	24	367	6.54%	8	128	6.25%	3	37	8.11%
Slovak Republic	7	92	7.61%	2	35	5.71%	0	5	0.00%
Slovenia	5	51	9.80%	1	13	7.69%	3	17	17.65%
Spain	299	3513	8.51%	223	1239	18.00%	28	302	9.27%
Sweden	23	202	11.39%	18	105	17.14%	10	64	15.63%
Switzerland	30	346	8.67%	24	319	7.52%	6	71	8.45%
United Kingdom	626	12107	5.17%	373	2644	14.11%	99	1039	9.53%
Total	2015	31200	6.46%	1225	9959	12.30%	277	3098	8.94%

Table A21 Proportion of meningitis in confirmed and probable laboratory-diagnosed cases of invasive meningococcal disease, 1999 – 2006

	1999	2000	2001	2002	2003	2004	2005	2006
<50%	Germany	Germany	Germany	Germany	Lithuania	Iceland	Iceland	Ireland
	Greece	Hungary	Hungary	Hungary	Spain	Ireland	Ireland	Spain
	Hungary	Ireland	Ireland	Ireland	Sweden	Malta	Spain	Sweden
	Ireland	Latvia	Latvia	Latvia		Spain		
	Latvia	Lithuania	Slovak Republic	Slovak Republic				
	Lithuania	Slovak Republic	Sweden	Spain				
	Malta	Sweden	United Kingdom	Sweden				
	Slovak Republic	United Kingdom		United Kingdom				
	Sweden							
United Kingdom								
50 – 70%	Belgium	Belgium	Belgium	Belgium	Austria	Austria	Austria	Belgium
	Estonia	Finland	Finland	Denmark	Belgium	Belgium	Belgium	Denmark
	Iceland	Greece	Iceland	Finland	Denmark	Czech Republic	Denmark	Estonia
	Netherlands	Iceland	Lithuania	France	Finland	Finland	Finland	Finland
	Norway	Malta	Norway	Malta	Germany	Greece	Greece	Italy
	Slovenia	Portugal	Spain	Netherlands	Iceland	Latvia	Latvia	Latvia
	Spain			Norway	Ireland	Lithuania	Lithuania	Lithuania
				Portugal	Latvia	Netherlands	Norway	Norway
				Slovenia	Malta	Norway	Portugal	Portugal
				Switzerland	Netherlands	Slovenia	Slovenia	Portugal
					United Kingdom	Sweden	Sweden	Switzerland
						United Kingdom	Switzerland	United Kingdom
							United Kingdom	
>70%	Austria	Austria	Austria	Austria	Czech Republic	Denmark	Czech Republic	Austria
	Czech Republic	Czech Republic	Czech Republic	Czech Republic	Estonia	Estonia	Estonia	Czech Republic
	Denmark	Denmark	Denmark	Estonia	France	France	France	France
	Finland	Estonia	Estonia	Greece	Greece	Germany	Germany	Germany
	France	France	France	Iceland	Hungary	Hungary	Hungary	Greece
	Italy	Italy	Greece	Italy	Italy	Italy	Italy	Hungary
	Poland	Netherlands	Italy	Lithuania	Norway	Poland	Malta	Iceland
	Portugal	Norway	Malta	Poland	Poland	Portugal	Netherlands	Malta
	Switzerland	Poland	Netherlands		Portugal	Slovak Republic	Poland	Netherlands
		Slovenia	Poland		Slovak Republic	Switzerland	Slovak Republic	Slovak Republic
		Spain	Portugal		Slovenia			Slovenia
		Switzerland	Slovenia		Switzerland			
			Switzerland					

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Table A1 National institutions supplying data

Country	Epidemiology/Surveillance Centre	Laboratory Reference/Microbiology Centre
Austria	FM for Health, Family and Youth, Vienna	Austrian Agency for Food and Health Safety, Graz
Belgium	Epidemiology Section, Scientific Institute of Public Health, Brussels	National Meningococcal Reference Laboratory , Scientific Institute of Public Health, Brussels
Czech Republic	National Institute of Public Health, Prague	National Institute of Public Health, Prague
Denmark	Department of Epidemiology, Statens Serum Institut, Copenhagen	Department of Bacteriology, Mycology and Parasitology, Statens Serum Institut, Copenhagen
Estonia	Health Protection Inspectorate, Tallinn	Health Protection Inspectorate, Tallinn
Finland	Epidemiology, National Public Health Institute, Helsinki	Vaccine Immunology Laboratory, National Public Health Institute, Helsinki
France	Institut de Veille Sanitaire, Saint Maurice	Institut Pasteur, Paris
Germany*	Robert Koch Institute, Berlin	Institute for Hygiene and Microbiology, Würzburg
Greece	Public Health Department, National School of Public Health, Athens	National Meningococcal Reference Laboratory, National School of Public Health, Athens
Hungary	Johan Bela National Centre for Epidemiology, Budapest	Johan Bela National Centre for Epidemiology, Budapest
Iceland	Centre for Infectious Disease Control, Seltjarnarnes	Landspítali University Hospital, Reykjavik
Ireland	Health Protection Surveillance Centre, Dublin	Children's University Hospital, Dublin
Italy	Epidemiologia, Sorveglianza e Promozione della Salute, Istituto Superiore di Sanità, Rome	Department of Infectious, Parasitic and Immune-mediated Disease, Istituto Superiore di Sanità, Rome
Latvia	State Agency "Public Health Agency", Riga	
Lithuania	Centre for Communicable Disease Prevention and Control, Vilnius	National Public Health Laboratory Center, Vilnius
Luxembourg	Inspection Sanitaire	Laboratoire National de Santé
Malta	Department of Public Health, Msida	
Netherlands	National Institute of Public Health and the Environment (RIVM), Bilthoven	Academic Medical Centre, Amsterdam
Norway	Norwegian Institute of Public Health, Oslo	Norwegian Institute of Public Health, Oslo
Poland~	National Institute of Hygiene, Warsaw	National Institute of Public Health, Warsaw
Portugal	Direcção-Geral da Saúde, Lisbon	Instituto Nacional de Saúde Dr Ricardo Jorge, Lisbon
Slovak Republic	Section of Epidemiology, Public Health Authority, Bratislava	National Reference Centre for Meningococci, Public Health Authority, Bratislava
Slovenia	Communicable Diseases Centre, Institute of Public Health Slovenia, Ljubljana	Laboratory for Immunology and Molecular Diagnostics, National Reference Centre for Meningococci, Institute of Public Health Slovenia, Ljubljana
Spain	Centro Nacional de Epidemiología, Instituto de Salud Carlos III, Madrid	Centro Nacional de Microbiología, Instituto de Salud Carlos III, Madrid
Sweden	Swedish Institute for Infectious Disease Control (SMI), Solna	Department of Clinical Microbiology and Immunology, Orebro
Switzerland	Swiss Federal Office of Public Health, Berne	Laboratoire Central de Bactériologie, Geneva
United Kingdom	Health Protection Agency, London / Stobhill Hospital, Glasgow	Manchester Medical Microbiology Partnership, Manchester / Stobhill Hospital, Glasgow

Countries with consistent data 1999 – 2006

* Data from Institute of Hygiene and Microbiology consistent across 1999 to 2006; data from Robert Koch Institute available from 2001

~ Data from Institute of Hygiene consistent across 1999 – 2006; data from Institute of Public Health available from 2003

Table A2 Total population data, by country, 1999 - 2000, 2004 - 2006

Country	1999	2000	2004	2005	2006	Source
Austria	8094156	8113413	8174762	8184691	8192880	www.census.gov/cgi-bin/ipc/idbagg (for Austria)
Belgium	10226419	10251250	10421137	10478617	10478617	www.iph.fgov.be/epidemi/spma/index.htm
Czech Republic	10278098	10266546	10220577	10251079	10251079	www.czso.cz/eng/edicniplan.nsf/t/79005D6975/\$File/40270301.pdf
Denmark	5319111	5337344	5401177	5415978	5434567	www.statbank.dk/statbank5a/default.asp?w=1024
Estonia	1379237	1372071	1351069	1347510	1344684	http://pub.stat.ee/px-web_2001/l_Databas/Population/Population.asp
Finland	5158097	5168595	5214512	5223442	5231372	www.census.gov/cgi-bin/ipc/idbagg (for Finland)
France	60158533	60434492	61684291	62850156	63392140	www.insee.fr
Germany	82074778	82187909	82424609	82431390	82422299	www.census.gov/cgi-bin/ipc/idbagg (for Germany)
Greece	10882607	10917456	11040650	11082751	11125179	www.statistics.gr/eng_tables/S201_SPO_5_TS_91_03_2_Y_EN.pdf
Hungary			10116742	10097549	10097549	portal.ksh.hu/portal/page?_pageid=38,119917&_dad=portal&_schema=PORTAL
Iceland	277184	281154	292587	295864	304334	www.statice.is/?pageid=1178&src=/temp_en/mannfoldi/midarsmannfoldi.asp
Ireland	3741400	3789500	4043700	4130700	4234900	http://www.cso.ie/px/pxeirestat/database/eirestat/Population.asp
Italy	56909109	56923524	57888245	58462375	58751711	demo.istat.it/index_e.html
Latvia			2319203	2306434	2294590	data.csb.lv/EN/Database/annualstatistics/04.%20Population/04.%20Population.asp
Lithuania			3445857	3425324	3403284	epp.eurostat.ec.eu.int/extraction/evalight/EVALight.jsp?A=1&language=en&root=/theme3/demo/dpop/lnava (for Lithuania)
Luxembourg	433600	439000	451600	455000	459500	http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=1059
Malta	391415	391415	390669	404346	404346	http://www.nso.gov.mt/statbase/data_table_options.aspx?id=19
Netherlands	15760225	15863950	16258032	16305526	16334210	statline.cbs.nl/StatWeb/start.asp?LA=en&DM=SL&IP=Search/Search
Norway	4445329	4478497	4577457	4606363	4640219	statbank.ssb.no/statistikkbanken/default_fr.asp?PLanguage=1
Poland	38653625	38646201	38180249	38132277	38161313	www.stat.gov.pl and National Institute of Hygiene, Poland
Portugal	10195014	10262877	10529255	10569592	10569592	www.ine.pt/prodserv/quadros/periodo.asp and Direcção-Geral da Saúde (Portugal)
Slovak Republic			5380053	5387285	5387285	www.census.gov/cgi-bin/ipc/idbagg (for Slovak Republic)
Slovenia	1985557	1990272	1997004	2001114	2001114	www.stat.si/eng/tema_demografsko_prebivalstvo.asp
Spain	39802827	40049708	42345342	42935001	43483912	www.ine.es/inebase/cgi/um?M=%2Ft20%2Fp251%2Fp2001%2F&O=pcaxis&N=&L=1 www.ine.es/inebase/coi/um?M=%2Ft20%2Fp263%2Fp2001%2F&O=pcaxis&N=&L=1 www.ssd.scb.se/databaser/makro/MainTable.asp?yp=tansss&xu=C9233001&omradekod=BE&omradetxt=Population&lang=2&langdh=2
Sweden	8861426	8882792	9011392	9047752	9113257	www.bfs.admin.ch/bfs/portal/fr/index/infotek/lexikon/bienvenue_login/blank/zugang_lexikon.topic.1.html
Switzerland	7164444	7204055	7415102	7459128	7459128	www.bfs.admin.ch/bfs/portal/fr/index/infotek/lexikon/bienvenue_login/blank/zugang_lexikon.topic.1.html
United Kingdom	58481070	58643230	59834946	60209452	60209452	Office for National Statistics, www.statistics.gov.uk/
Year population	440673261	441895251	470410219	473496696	475182513	

* 1 Jan estimate; others for Greece are mid-year, (http://www.statistics.gr/eng_tables/S201_SPO_5_TS_91_04_4_Y_EN.pdf)

from National Centre for Epidemiology, Budapest, Hungary~ 2000 figures used for 1999, and 2003 figures used for 2004

Table A3 Percentage age distribution of population, by country, 1999 – 2006 combined

Country	<1	1 – 4	5 – 9	10 - 14	15 - 19	20 – 24	25 - 44	45 – 64	65+
Austria	1.12	4.18	5.87	5.77	5.98	5.86	32.24	23.51	15.47
Belgium	1.11	4.55	6.10	5.90	6.04	6.14	29.89	23.60	16.68
Czech Republic	0.87	3.56	5.87	6.31	6.81	8.65	28.18	25.95	13.80
Denmark	1.25	5.19	6.35	5.52	5.33	6.48	29.56	25.47	14.86
Estonia	0.93	3.64	6.52	7.80	7.35	6.85	27.85	24.33	14.72
Finland	1.13	4.71	6.37	6.14	6.42	6.34	27.83	26.31	14.77
France	1.27	4.93	6.27	6.61	6.75	6.31	29.02	23.03	15.81
Germany	0.96	3.84	5.27	5.67	5.62	5.44	31.29	25.83	16.08
Greece	0.93	3.71	4.98	5.34	6.50	7.58	30.08	23.89	17.00
Hungary*	0.94	3.77	5.33	6.07	6.36	7.37	27.98	26.81	15.37
Iceland	1.51	6.20	8.24	7.44	7.89	7.49	29.89	19.80	11.54
Ireland	1.42	5.52	7.23	8.02	9.05	8.12	28.89	20.47	11.28
Italy	0.93	3.69	4.85	4.89	5.52	6.84	30.47	25.00	17.82
Latvia*	0.86	3.28	4.59	7.25	8.03	7.06	28.32	24.75	15.85
Lithuania~	0.97	4.23	6.65	7.84	7.63	6.76	29.47	22.35	14.09
Luxembourg~	1.21	5.01	6.42	6.16	5.71	5.78	31.75	23.87	14.10
Malta	1.09	4.79	6.67	7.21	7.45	7.62	27.59	25.26	12.32
Netherlands	1.27	4.93	6.31	6.00	5.86	6.14	31.95	24.02	13.52
Norway	1.31	5.48	6.90	6.15	5.97	6.41	29.78	22.51	15.48
Poland	1.00	4.37	6.66	7.91	8.68	8.13	28.72	22.57	11.95
Portugal	1.14	4.12	5.29	5.68	6.90	7.83	29.47	23.53	16.04
Slovak Republic*	0.94	4.03	5.89	7.27	8.09	8.63	29.77	23.93	11.46
Slovenia	0.89	3.80	5.33	6.37	7.19	7.57	30.60	24.55	13.71
Spain	0.91	3.68	4.98	5.59	6.99	8.26	30.96	22.16	16.47
Sweden#	1.00	4.29	6.86	6.35	5.70	5.87	27.47	25.16	17.29
Switzerland	1.09	4.51	5.97	5.87	5.79	5.75	31.10	24.66	15.27
United Kingdom	1.20	4.95	6.59	6.55	6.16	5.84	29.34	23.51	15.84
Overall	1.12	4.18	5.87	5.77	5.98	5.86	32.24	23.51	15.47

* 2003 - 2006 figures used

2002 – 2006 figures used

~ 2001 – 2006 figures used

Table A4 Confirmed, probable and confirmed, and laboratory-diagnosed, incidences (all per 100,000), by country 1999, 2003, 2006

Country	1999			2003			2006		
	Confirmed	Probable and confirmed	Laboratory-diagnosed	Confirmed	Probable and confirmed	Laboratory-diagnosed	Confirmed	Probable and confirmed	Laboratory-diagnosed
Austria	1.12	1.20	1.20	0.80	1.00	1.00	0.83	0.93	0.93
Belgium	2.90	2.90	2.90	2.18	2.20	2.20	1.31	1.32	1.32
Czech Republic	0.90	1.00	1.00	0.87	0.98	0.98	0.73	0.77	0.77
Denmark	3.33	3.50	3.50	1.91	1.95	1.95	1.38	1.45	1.45
Estonia	0.22	0.44	0.44	0.59	0.74	0.74	0.82	0.82	0.82
Finland	1.11	1.11	1.11	0.81	0.81	0.81	0.86	0.86	0.86
France	0.74	0.74	0.74	1.06	1.31	1.31	0.91	1.13	1.13
Germany*	0.49	0.49	0.49	0.92	0.94	0.94	0.67	0.67	0.67
Greece	1.77	1.94	1.94	1.08	1.19	1.19	0.88	1.02	1.02
Hungary	-	-	-	0.40	0.42	0.42	0.31	0.35	0.35
Iceland	7.58	7.58	7.58	2.07	2.77	2.77	0.99	1.31	1.31
Ireland	11.89	14.33	14.33	5.53	5.96	5.96	4.09	4.96	4.96
Italy	0.45	0.48	0.48	0.47	0.48	0.48	0.22	0.30	0.30
Latvia	-	-	-	0.64	1.03	1.03	0.39	0.52	0.52
Lithuania	-	-	-	0.87	1.27	1.27	1.32	2.26	2.26
Malta	3.07	5.88	5.88	3.25	4.25	4.25	3.46	8.90	8.90
Netherlands	3.60	3.65	3.65	2.19	2.19	2.19	1.08	1.09	1.09
Norway	1.73	1.80	1.80	1.08	1.12	1.12	0.73	0.75	0.75
Poland~	0.17	0.17	0.17	0.19	0.20	0.20	0.51	0.61	0.61
Portugal	-	-	-	1.39	1.99	1.99	0.36	1.25	1.25
Slovak Republic	-	-	-	0.91	0.91	0.91	0.67	0.67	0.67
Slovenia	0.30	0.30	0.30	0.80	0.80	0.80	0.40	0.40	0.40
Spain [#]	2.38	3.52	3.52	1.91	2.45	2.45	0.83	1.84	1.84
Sweden	0.37	0.37	0.37	0.61	0.63	0.63	0.56	0.57	0.57
Switzerland	2.09	2.36	2.36	1.02	1.19	1.19	0.68	0.95	0.95
United Kingdom	4.72	5.39	5.39	2.85	3.10	3.10	2.03	2.33	2.33

* Data for 1999 from Institute for Hygiene and Microbiology Reference Laboratory; other years from Robert Koch Institute

* Data for 1999 from Institute of Public Health; other years from Institute of Hygiene

Notification data used

Table A5 Number of cases of confirmed and probable laboratory-diagnosed (% culture-diagnosed) invasive meningococcal disease, by country, 1999 – 2006

Country	1999	2000	2001	2002	2003	2004	2005	2006
Austria	97 (82%)	83 (70%)	106 (86%)	81 (74%)	73 (78%)	70 (77%)	88 (73%)	72 (76%)
Belgium	297 (100%)	267 (100%)	380 (100%)	262 (100%)	228 (100%)	157 (100%)	171 (99%)	138 (99%)
Czech Republic	93 (96%)	61 (93%)	93 (97%)	113 (74%)	92 (71%)	96 (97%)	94 (76%)	75 (72%)
Denmark	177 (85%)	151 (80%)	161 (83%)	98 (89%)	103 (82%)	98 (81%)	89 (76%)	77 (79%)
Estonia	3 (67%)	9 (100%)	20 (95%)	8 (100%)	8 (88%)	11 (91%)	12 (92%)	10 (100%)
Finland	57 (100%)	48 (100%)	49 (98%)	49 (98%)	42 (100%)	45 (91%)	40 (93%)	45 (98%)
France	448 (100%)	489 (95%)	559 (94%)	648 (94%)	664 (97%)	634 (84%)	682 (87%)	667 (90%)
Germany*	402 (100%)	452 (100%)	530 (100%)	580 (98%)	768 (73%)	599 (74%)	622 (75%)	554 (75%)
Greece	130 (55%)	174 (35%)	185 (31%)	196 (25%)	119 (33%)	72 (54%)	98 (54%)	109 (45%)
Hungary	-	-	-	-	41 (83%)	43 (93%)	30 (80%)	32 (81%)
Iceland	21 (100%)	18 (89%)	19 (89%)	15 (87%)	8 (100%)	10 (100%)	4 (100%)	4 (100%)
Ireland	445 (42%)	411 (41%)	297 (34%)	225 (36%)	221 (34%)	176 (40%)	187 (44%)	184 (38%)
Italy	254 (63%)	243 (67%)	201 (67%)	214 (72%)	271 (77%)	314 (67%)	319 (81%)	173 (77%)
Latvia	-	-	-	-	16 (100%)	23 (100%)	10 (100%)	10 (90%)
Lithuania	-	-	35 (49%)	29 (69%)	30 (53%)	53 (62%)	66 (58%)	45 (62%)
Luxembourg	18	1	1	1	1	0	1	-
Malta	17 (71%)	20 (80%)	13 (92%)	14 (71%)	16 (94%)	13 (92%)	7 (143%)	19 (58%)
Netherlands	576 (98%)	542 (100%)	721 (100%)	616 (100%)	354 (100%)	278 (95%)	246 (92%)	178 (96%)
Norway	77 (95%)	85 (87%)	77 (87%)	51 (92%)	51 (84%)	34 (85%)	39 (97%)	34 (91%)
Poland~	67 (100%)	43 (100%)	37 (100%)	35 (100%)	57 (93%)	114 (77%)	171 (91%)	195 (86%)
Portugal	-	59 (100%)	106 (100%)	186 (80%)	146 (68%)	124 (91%)	137 (71%)	103 (91%)
Slovak Republic	-	-	-	-	49 (86%)	32 (78%)	44 (91%)	36 (86%)
Slovenia	6 (100%)	8 (100%)	10 (100%)	8 (100%)	16 (100%)	9 (100%)	16 (100%)	8 (100%)
Spain#	947	971	643	834	797	696 (100%)	686	592
Sweden	33 (100%)	41 (100%)	57 (100%)	46 (93%)	55 (80%)	56 (89%)	55 (89%)	50 (90%)
Switzerland	150 (99%)	149 (97%)	147 (98%)	91 (92%)	75 (97%)	79 (82%)	76 (84%)	64 (81%)
United Kingdom	3064 (61%)	2993 (56%)	2570 (52%)	1948 (54%)	1807 (54%)	1500 (53%)	1634 (50%)	1349 (52%)
Total	7379 (64%)	7318 (61%)	7017 (66%)	6348 (64%)	6108 (62%)	5336 (75%)	5624 (62%)	4823 (62%)

* Data for 1999 - 2002 from Institute for Hygiene and Microbiology Reference Laboratory; other years from Robert Koch Institute

~ Data for 1999 – 2003 from Institute of Public Health; other years from Institute of Hygiene

Notification data used

Table A6 Incidence (per 100,000) of confirmed and probable culture-diagnosed cases of invasive meningococcal disease, by country, 1999 - 2006

Country	1999	2000	2001	2002	2003	2004	2005	2006
Austria	0.99	0.71	1.12	0.74	0.70	0.66	0.78	0.67
Belgium	2.90	2.60	3.69	2.54	2.20	1.51	1.62	1.31
Czech Republic	0.87	0.56	0.88	0.82	0.64	0.91	0.69	0.53
Denmark	2.84	2.27	2.50	1.62	1.56	1.46	1.26	1.12
Estonia	0.15	0.66	1.39	0.59	0.52	0.74	0.82	0.74
Finland	1.11	0.93	0.93	0.92	0.81	0.79	0.71	0.84
France	0.74	0.77	0.86	1.00	1.05	0.87	0.95	0.95
Germany*	0.49	0.55	0.64	0.69	0.68	0.54	0.56	0.50
Greece	0.65	0.56	0.53	0.45	0.35	0.35	0.48	0.44
Hungary	-	-	-	-	0.34	0.40	0.24	0.26
Iceland	7.58	5.69	5.96	4.52	2.77	3.42	1.35	1.31
Ireland	5.05	4.46	2.60	2.09	1.88	1.76	1.99	1.63
Italy	0.28	0.29	0.24	0.27	0.36	0.36	0.44	0.23
Latvia	-	-	-	-	0.69	0.99	0.43	0.39
Lithuania	-	-	0.49	0.58	0.46	0.96	1.11	0.82
Malta	3.07	4.09	3.04	2.52	3.75	3.07	2.47	2.72
Netherlands	3.60	3.40	4.50	3.82	2.19	1.62	1.39	1.04
Norway	1.64	1.65	1.49	1.04	0.94	0.63	0.82	0.67
Poland~	0.17	0.11	0.10	0.09	0.14	0.23	0.41	0.44
Portugal	-	0.57	1.03	1.42	0.95	1.07	0.92	0.89
Slovak Republic	-	-	-	-	0.78	0.46	0.74	0.58
Slovenia	0.30	0.40	0.50	0.40	0.80	0.45	0.80	0.40
Spain#	-	-	-	-	-	1.64	-	-
Sweden	0.37	0.46	0.64	0.48	0.49	0.55	0.54	0.49
Switzerland	2.08	2.00	1.98	1.15	0.99	0.88	0.86	0.70
United Kingdom	3.17	2.86	2.29	1.77	1.64	1.34	1.36	1.16
Total	1.07	1.02	1.04	0.91	0.81	0.85	0.73	0.63

* Data for 1999 – 2002 from Institute for Hygiene and Microbiology Reference Laboratory; other years from Robert Koch Institute

~ Data for 1999 – 2003 from Institute of Public Health; other years from Institute of Hygiene

Notification data used

Table A7 Incidence (per 100,000) of laboratory-diagnosed confirmed and probable cases of invasive meningococcal disease, by country, 1999 - 2006

Country	% PCR* (years done)	1999	2000	2001	2002	2003	2004	2005	2006
Austria	28.51% (1999 - 2006)	1.20	1.02	1.30	0.99	0.89	0.86	1.08	0.88
Belgium	1.62% (2000 - 2006)	2.90	2.60	3.69	2.54	2.20	1.51	1.63	1.32
Czech Republic	27.62% (1999 - 2006)	0.90	0.59	0.91	1.11	0.90	0.94	0.92	0.73
Denmark	4.22% (2005 - 2006)	3.33	2.83	3.01	1.82	1.91	1.81	1.64	1.42
Estonia		0.22	0.66	1.46	0.59	0.59	0.81	0.89	0.74
Finland	3.08% (2004 - 2006)	1.11	0.93	0.95	0.94	0.81	0.86	0.77	0.86
France	11.62% (2002 - 2006)	0.74	0.81	0.92	1.06	1.08	1.03	1.09	1.05
Germany~	8.68% (2002 - 2006)	0.49	0.55	0.64	0.70	0.93	0.73	0.75	0.67
Greece	69.71% (1999 - 2006)	1.19	1.59	1.69	1.78	1.08	0.65	0.88	0.98
Hungary	10.96% (2003 - 2006)	-	-	-	-	0.40	0.43	0.30	0.32
Iceland	13.33% (2001 - 2006)	7.58	6.40	6.67	5.22	2.77	3.42	1.35	1.31
Ireland	67.99% (1999 - 2006)	11.89	10.85	7.72	5.74	5.55	4.35	4.53	4.34
Italy		0.45	0.43	0.35	0.38	0.47	0.54	0.55	0.29
Latvia		-	-	-	-	0.69	0.99	0.43	0.44
Lithuania		-	-	1.00	0.83	0.87	1.54	1.93	1.32
Luxembourg		4.15	0.23	0.23	0.23	0.22	0.00	0.22	-
Malta	2.44% (2001 - 2006)	4.34	5.11	3.29	3.52	4.00	3.33	1.73	4.70
Netherlands	6.82% (2003 - 2006)	3.65	3.42	4.51	3.82	2.19	1.71	1.51	1.09
Norway	9.38% (1999 - 2006)	1.73	1.90	1.71	1.13	1.12	0.74	0.85	0.73
Poland~	4.87% (1999 - 2006)	0.17	0.11	0.10	0.09	0.15	0.30	0.45	0.51
Portugal	12.50% (2002 - 2006)	-	0.57	1.03	1.79	1.39	1.18	1.30	0.97
Slovak Republic		-	-	-	-	0.91	0.59	0.82	0.67
Slovenia		0.30	0.40	0.50	0.40	0.80	0.45	0.80	0.40
Spain#		2.38	2.42	1.59	2.04	1.91	1.64	1.60	1.36
Sweden	12.60% (2002 - 2006)	0.37	0.46	0.64	0.51	0.61	0.62	0.61	0.55
Switzerland	6.98% (1999 - 2006)	2.09	2.07	2.02	1.24	1.02	1.07	1.02	0.86
United Kingdom	65.24% (1999 - 2006)	5.24	5.10	4.37	3.29	3.03	2.51	2.71	2.24
Total		1.67	1.66	1.57	1.42	1.30	1.13	1.19	1.01

* of all cases used to calculate laboratory-diagnosed incidence

~ Data for 1999 - 2002 from Institute for Hygiene and Microbiology Reference Laboratory; other years from Robert Koch Institute

~ Data for 1999 - 2003 from Institute of Public Health; other years from Institute of Hygiene

Notification data used

Table A8 Age distribution (number and % distribution) of cases of confirmed and probable meningococcal disease, all countries, 1999 - 2006

Age Group	1999	2000	2001	2002	2003	2004	2005	2006
<i>Numbers of cases</i>								
<1 year	1155	1384	1208	1096	1068	990	1009	916
1 - 4 years	2170	2167	1826	1662	1559	1299	1412	1241
5 - 9 years	997	904	767	649	546	443	481	437
10 - 14 years	718	605	583	468	506	310	353	240
15 - 19 years	1181	1012	1008	869	803	740	687	675
20 - 24 years	444	441	397	361	331	270	330	298
25 - 44 years	543	673	666	619	532	476	525	409
45 - 64 years	477	556	516	470	424	422	438	391
65+ years	359	359	354	402	310	334	369	299
Not known	102	22	33	12	20	13	23	24
<i>% distribution</i>								
<1 year	14.18%	16.99%	14.83%	13.45%	13.11%	12.15%	12.39%	11.24%
1 - 4 years	26.64%	26.60%	22.42%	20.40%	19.14%	15.95%	17.33%	15.23%
5 - 9 years	12.24%	11.10%	9.42%	7.97%	6.70%	5.44%	5.90%	5.36%
10 - 14 years	8.81%	7.43%	7.16%	5.75%	6.21%	3.81%	4.33%	2.95%
15 - 19 years	14.50%	12.42%	12.37%	10.67%	9.86%	9.08%	8.43%	8.29%
20 - 24 years	5.45%	5.41%	4.87%	4.43%	4.06%	3.31%	4.05%	3.66%
25 - 44 years	6.67%	8.26%	8.18%	7.60%	6.53%	5.84%	6.44%	5.02%
45 - 64 years	5.86%	6.83%	6.33%	5.77%	5.21%	5.18%	5.38%	4.80%
65+ years	4.41%	4.41%	4.35%	4.93%	3.81%	4.10%	4.53%	3.67%
Not known	1.25%	0.27%	0.41%	0.15%	0.25%	0.16%	0.28%	0.29%

Calculated using data from countries submitting consistent data 1999 - 2006 (see Table A1)

Table A9 Age-specific incidence (per 100,000) of confirmed and probable meningococcal disease, by country, 2006

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
Austria	14.92	5.43	0.24	1.46	3.95	0.80	0.33	0.33	0.21
Belgium	17.93	6.51	1.86	1.75	3.99	0.47	0.17	0.60	0.89
Czech Republic	17.58	3.72	1.34	0.35	2.14	0.86	0.45	0.07	0.21
Denmark	10.86	5.78	2.36	2.85	5.34	0.34	0.20	0.62	1.09
Estonia	7.51	3.76	1.63	1.34	0.94		0.54	0.59	0.44
Finland	3.62	2.26	0.69	0.31	4.03	1.21	0.37	0.54	0.59
France	14.76	4.77	1.55	0.87	2.68	1.97	0.32	0.31	0.52
Germany*	13.41	4.20	1.13	0.65	2.64	0.74	0.16	0.18	0.18
Greece	14.30	6.91	5.44	1.44	1.67	0.68	0.18	0.25	0.19
Hungary	11.74	2.08	0.80	0.17	0.79	0.15	0.03	0.11	0.06
Iceland	22.38	0.00	4.68	0.00	8.80	0.00	0.00	0.00	0.00
Ireland	88.67	27.05	5.92	4.04	10.19	2.61	0.68	0.97	1.06
Italy	3.47	1.55	0.48	0.46	0.58	0.28	0.18	0.17	0.08
Latvia	9.29	2.48	1.06	0.76	0.00	1.12	0.16	0.35	0.26
Lithuania	52.72	25.59	3.92	0.00	3.32	0.77	0.41	0.98	0.00
Malta	51.80	12.63	12.89	30.42	17.52	10.04	6.31	5.39	0.00
Netherlands	13.89	6.12	2.30	1.10	2.22	0.73	0.27	0.25	0.69
Norway	3.51	1.30	0.98	0.00	3.34	1.09	0.08	0.52	1.03
Poland~	10.53	3.71	1.14	0.97	1.23	0.63	0.17	0.15	0.10
Portugal	34.72	11.05	1.48	1.45	1.02	0.71	0.22	0.35	0.11
Slovak Republic	26.01	5.33	0.70	0.28	0.24	0.22	0.18	0.22	0.00
Slovenia	0.00	2.81	0.00	0.00	0.00	2.12	0.17	0.19	0.32
Spain#	30.30	12.11	3.64	1.25	3.41	1.80	0.60	0.71	0.78
Sweden	1.88	1.48	0.85	0.88	1.29	0.74	0.41	0.34	0.32
Switzerland	11.03	4.10	0.76	0.23	2.72	1.13	0.18	0.82	0.84
United Kingdom	47.91	16.34	3.40	1.41	3.41	1.43	0.48	0.56	0.68

* Data from Robert Koch Institute ~ Data from National Institute of Hygiene # Notification data used

Table A10 Serogroup distribution of cases of confirmed and probable laboratory-diagnosed meningococcal disease, by country, 2006

Country	Serogroup							Non-groupable	Not known	Serogroup C vaccination (year of introduction)
	B	C	Y	W135	A	X	29E			
Austria	41	25	1	5					4	
Belgium	114	11	5	8						Yes (2002)
Czech Republic	52	18	1						8	
Denmark	34	19	2	4					20	
Estonia	6	2			2				1	
Finland	38	5	1						1	
France	402	175	18	23	2	1		2	91	
Germany	330	135	25	12		2		13	22	
Greece	71	6	2	1	1				33	
Hungary	23	3	1	1					7	
Iceland	4									Yes (2002)
Ireland	169	4	4	1				1	31	Yes (2000)
Italy	81	39	7	4					45	
Latvia	9								3	
Lithuania	27	5							45	
Malta	8	1	1						26	
Netherlands	164	4	4	3		1		1	1	Yes (2002)
Norway	27	1	4	1	1				1	
Poland~	70	76	2	2					15	
Portugal	76	15	5	1				1	34	
Slovak Republic	22	8							6	
Slovenia	3	3		1	1					
Spain#	379	46	20	5					38	Yes (2000)
Sweden	26	15	5	2				1	3	
Switzerland	35	17	3	2					14	
United Kingdom	1197	32	38	26	1		1	46	59	Yes (1999)
Total	3408	665	149	102	8	4	1	65	508	

* Data from Institute for Hygiene and Microbiology Reference Laboratory ~ Data from National Institute of Public Health # Notification data used

Table A11 Incidence (per million) of confirmed and probable meningococcal disease, by serogroup and country, 2006

Country	Serogroup							Non-groupable	Not known	Serogroup C vaccination (year of introduction)
	B	C	Y	W135	A	X	29E			
Austria	5.01	3.05	0.12	0.61					0.49	
Belgium	10.88	1.05	0.48	0.76						Yes (2002)
Czech Republic	5.07	1.76	0.10						0.78	
Denmark	6.28	3.51	0.37	0.74					3.69	
Estonia	4.45	1.48			1.48				0.74	
Finland	7.27	0.96	0.19						0.19	
France	6.40	2.78	0.29	0.37	0.03	0.02		0.03	1.45	
Germany*	4.00	1.64	0.30	0.15		0.02		0.16	0.27	
Greece	6.41	0.54	0.18	0.09	0.09				2.98	
Hungary	2.28	0.30	0.10	0.10					0.69	
Iceland	13.52									Yes (2002)
Ireland	40.91	0.97	0.97	0.24				0.24	7.50	Yes (2000)
Italy	1.39	0.67	0.12	0.07					0.77	
Latvia	3.90								1.30	
Lithuania	7.88	1.46							13.14	
Malta	19.79	2.47	2.47						64.30	
Netherlands	10.06	0.25	0.25	0.18		0.06		0.06	0.06	Yes (2002)
Norway	5.86	0.22	0.87	0.22	0.22				0.22	
Poland~	1.84	1.99	0.05	0.05					0.39	
Portugal	7.19	1.42	0.47	0.09				0.09	3.22	
Slovak Republic	4.08	1.48							1.11	
Slovenia	1.50	1.50		0.50	0.50					
Spain#	8.83	1.07	0.47	0.12					0.89	Yes (2000)
Sweden	2.87	1.66	0.55	0.22				0.11	0.33	
Switzerland	4.69	2.28	0.40	0.27					1.88	
United Kingdom	19.88	0.53	0.63	0.43	0.02		0.02	0.76	0.98	Yes (1999)

* Data from Institute for Hygiene and Microbiology Reference Laboratory ~ Data from National Institute of Public Health # Notification data used

Table A12 Age distribution of cases of confirmed and probable laboratory-diagnosed serogroup B meningococcal disease, all countries, 1999 – 2006

Age Group	1999	2000	2001	2002	2003	2004	2005	2006
<i>Numbers of cases</i>								
<1 year	775	976	890	807	801	780	819	747
1 - 4 years	1201	1218	1202	1105	1065	935	1063	937
5 - 9 years	519	427	417	364	333	267	320	311
10 – 14 years	343	254	320	256	295	173	201	132
15 – 19 years	604	537	552	473	475	451	450	440
20 – 24 years	202	215	195	179	159	173	218	190
25 – 44 years	259	311	314	286	273	223	298	215
45 – 64 years	235	304	258	251	239	235	251	215
65+ years	174	157	144	166	140	168	163	147
Not known	48	13	16	8	7	12	16	16
<i>% distribution</i>								
<1 year	17.78%	22.12%	20.66%	20.72%	21.15%	22.83%	21.56%	22.30%
1 - 4 years	27.55%	27.61%	27.90%	28.37%	28.12%	27.36%	27.98%	27.97%
5 - 9 years	11.90%	9.68%	9.68%	9.35%	8.79%	7.81%	8.42%	9.28%
10 – 14 years	7.87%	5.76%	7.43%	6.57%	7.79%	5.06%	5.29%	3.94%
15 – 19 years	13.85%	12.17%	12.81%	12.14%	12.54%	13.20%	11.85%	13.13%
20 – 24 years	4.63%	4.87%	4.53%	4.60%	4.20%	5.06%	5.74%	5.67%
25 – 44 years	5.94%	7.05%	7.29%	7.34%	7.21%	6.53%	7.84%	6.42%
45 – 64 years	5.39%	6.89%	5.99%	6.44%	6.31%	6.88%	6.61%	6.42%
65+ years	3.99%	3.56%	3.34%	4.26%	3.70%	4.92%	4.29%	4.39%
Not known	1.10%	0.29%	0.37%	0.21%	0.18%	0.35%	0.42%	0.48%

Calculated using data from countries submitting consistent data 1999 - 2006 (see Table A1)

Table A13 Age distribution of cases of confirmed and probable laboratory-diagnosed serogroup C meningococcal disease, all countries, 1999 – 2006

Age Group	1999	2000	2001	2002	2003	2004	2005	2006
<i>Numbers of cases</i>								
<1 year	200	148	116	113	67	68	56	53
1 - 4 years	550	503	276	232	168	154	123	124
5 - 9 years	231	212	131	120	62	70	55	47
10 – 14 years	224	168	124	116	97	63	68	52
15 – 19 years	404	288	286	242	151	158	126	124
20 – 24 years	141	146	126	110	76	48	70	60
25 – 44 years	150	210	197	189	118	117	96	82
45 – 64 years	150	136	168	133	77	86	80	71
65+ years	95	120	102	125	63	56	72	44
Not known	17	6	9	1	4	1	3	3
<i>% distribution</i>								
<1 year	9.25%	7.64%	7.56%	8.18%	7.59%	8.28%	7.48%	8.03%
1 - 4 years	25.44%	25.97%	17.98%	16.80%	19.03%	18.76%	16.42%	18.79%
5 - 9 years	10.68%	10.94%	8.53%	8.69%	7.02%	8.53%	7.34%	7.12%
10 – 14 years	10.36%	8.67%	8.08%	8.40%	10.99%	7.67%	9.08%	7.88%
15 – 19 years	18.69%	14.87%	18.63%	17.52%	17.10%	19.24%	16.82%	18.79%
20 – 24 years	6.52%	7.54%	8.21%	7.97%	8.61%	5.85%	9.35%	9.09%
25 – 44 years	6.94%	10.84%	12.83%	13.69%	13.36%	14.25%	12.82%	12.42%
45 – 64 years	6.94%	7.02%	10.94%	9.63%	8.72%	10.48%	10.68%	10.76%
65+ years	4.39%	6.20%	6.64%	9.05%	7.13%	6.82%	9.61%	6.67%
Not known	0.79%	0.31%	0.59%	0.07%	0.45%	0.12%	0.40%	0.45%

Calculated using data from countries submitting consistent data 1999 - 2006 (see Table A1)

Table A14 Percentage distribution of confirmed and probable laboratory-diagnosed cases due to serogroup C, by country (total serogroup cases), 1999 - 2006

	1999	2000	2001	2002	2003	2004	2005	2006
Austria	10 - 19% (90)	10 - 19% (79)	>=40% (98)	20 - 29% (80)	20 - 29% (71)	20 - 29% (66)	20 - 29% (83)	30 - 39% (72)
Belgium	20 - 29% (282)	30 - 39% (257)	>=40% (364)	30 - 39% (253)	20 - 29% (219)	10 - 19% (155)	10 - 19% (171)	<10% (138)
Czech Republic	>=40% (89)	10 - 19% (57)	30 - 39% (91)	>=40% (101)	>=40% (85)	30 - 39% (91)	30 - 39% (91)	20 - 29% (71)
Denmark	10 - 19% (152)	10 - 19% (122)	20 - 29% (131)	10 - 19% (86)	20 - 29% (85)	10 - 19% (78)	30 - 39% (68)	30 - 39% (59)
Estonia	No Serogroup C (1)	No Serogroup C (6)	20 - 29% (9)	No Serogroup C (6)	10 - 19% (7)	30 - 39% (6)	10 - 19% (11)	20 - 29% (10)
Finland	10 - 19% (53)	20 - 29% (47)	10 - 19% (48)	10 - 19% (48)	10 - 19% (42)	10 - 19% (41)	<10% (37)	10 - 19% (44)
France	20 - 29% (448)	20 - 29% (452)	30 - 39% (504)	>=40% (602)	30 - 39% (366)	30 - 39% (609)	20 - 29% (641)	20 - 29% (623)
Germany	20 - 29% (402)	20 - 29% (452)	20 - 29% (530)	30 - 39% (580)	20 - 29% (566)	20 - 29% (447)	20 - 29% (496)	20 - 29% (517)
Greece	20 - 29% (122)	10 - 19% (160)	<10% (160)	<10% (175)	<10% (101)	No Serogroup C (47)	<10% (81)	<10% (81)
Iceland	>=40% (21)	>=40% (16)	>=40% (17)	>=40% (13)	20 - 29% (8)	30 - 39% (10)	20 - 29% (4)	No Serogroup C (4)
Ireland	30 - 39% (445)	30 - 39% (411)	10 - 19% (291)	<10% (222)	<10% (220)	<10% (172)	<10% (182)	<10% (179)
Italy	20 - 29% (126)	20 - 29% (127)	20 - 29% (93)	>=40% (115)	>=40% (160)	>=40% (181)	>=40% (221)	30 - 39% (131)
Malta	20 - 29% (13)	<10% (16)	<10% (12)	20 - 29% (8)	10 - 19% (6)	No Serogroup C (7)	>=40% (7)	<10% (10)
Netherlands	10 - 19% (576)	20 - 29% (542)	30 - 39% (721)	30 - 39% (614)	10 - 19% (354)	<10% (266)	<10% (230)	<10% (177)
Norway	10 - 19% (76)	10 - 19% (84)	10 - 19% (77)	20 - 29% (50)	10 - 19% (50)	10 - 19% (31)	10 - 19% (39)	<10% (34)
Poland	10 - 19% (66)	10 - 19% (43)	10 - 19% (37)	30 - 39% (35)	30 - 39% (55)	30 - 39% (116)	30 - 39% (198)	>=40% (150)
Slovenia	No Serogroup C (6)	10 - 19% (8)	<10% (10)	10 - 19% (8)	10 - 19% (16)	No Serogroup C (9)	20 - 29% (16)	30 - 39% (8)
Spain [#]	30 - 39% (601)	30 - 39% (692)	20 - 29% (391)	20 - 29% (562)	10 - 19% (699)	10 - 19% (614)	10 - 19% (498)	<10% (450)
Sweden	30 - 39% (33)	30 - 39% (41)	20 - 29% (57)	20 - 29% (42)	20 - 29% (46)	20 - 29% (52)	30 - 39% (51)	30 - 39% (49)
Switzerland	>=40% (128)	>=40% (137)	>=40% (135)	>=40% (82)	30 - 39% (71)	30 - 39% (59)	10 - 19% (67)	30 - 39% (57)
United Kingdom	30 - 39% (2755)	20 - 29% (2733)	10 - 19% (2397)	<10% (1815)	<10% (1711)	<10% (1421)	<10% (1614)	<10% (1341)

Calculated using data from countries submitting consistent data 1999 - 2006 (see Table A1)

Laboratory data

Table A15 Dominant serotype of confirmed and probable laboratory-diagnosed serogroup C invasive meningococcal disease (number of serotyped C cases), by country, 1999 - 2006

Country	1999	2000	2001	2002	2003	2004	2005	2006
Austria	P2.2b (14)	P2.2a (10)	P2.2a (34)	P2.2a (17)	P2.2b (12)	NT (15)	P2.2a (16)	P2.2a (22)
Belgium	P2.2b (77)	P2.2a (85)	P2.2a (178)	P2.2a (89)	P2.2a (46)	P2.2a (20)	P2.2a (18)	P2.2a (11)
Czech Republic	P2.2a (26)	P2.2a (10)	P2.2a (23)	P2.2a (28)	P2.2a (23)	P2.2a (25)	P2.2a (18)	NT (11)
Denmark	P2.2a (21)	P2.2a (16)	P2.2a (24)	P2.2a (16)	P3.15 (19)	P3.15 (14)	P2.2b (21)	P2.2b (19)
Finland	NT (9)	NT (10)	NT (9)	P2.2a (6)	NT (5)	NT (5)	P2.2b (1)	P2.2b (5)
France	P2.2b (100)	-	P2.2a (126)	P2.2a (172)	P2.2a (115)	P2.2a (130)	P2.2a (120)	P2.2a (135)
Germany	P2.2a (86)	P2.2a (96)	P2.2a (118)	P2.2a (140)	P2.2a (116)	P2.2a (75)	P2.2a (71)	P2.2a (74)
Greece	P2.2a (17)	P2.2a (9)	P2.2a (8)	NT, P2.2a (6)	P2.2a (2)	-	P2.2a (2)	P2.2a, P3.4 (2)
Ireland	P2.2a (42)	P2.2a (54)	P2.2a (6)	P2.2a (4)	P2.2a (2)	P2.2a (1)	P2.2a (4)	P2.2a (3)
Italy	P2.2a (16)	P2.2a (24)	P2.2a (15)	P2.2b (32)	P2.2b (55)	P2.2b (83)	P2.2b (92)	P2.2b (27)
Malta	P2.2a (1)	P2.2b (1)	NT (1)	-	P2.2a (1)	-	NT (3)	P2.2a (1)
Netherlands	P2.2a (81)	P2.2a (106)	P2.2a (277)	P2.2a (222)	P2.2a (44)	P2.2a (17)	NT, P2.2a (4)	No serotyping
Norway	P2.2a (10)	P2.2a (12)	NT, P2.2a (13)	NT, P3.15, P3.4 (3)	P2.2a (9)	P2.2a (1)	NT (3)	P3.1 (1)
Poland	NT, P3.22 (8)	NT (7)	P3.4 (4)	NT (11)	NT (21)	NT (40)	NT (62)	NT (67)
Slovenia	-	P2.2a (1)	P2.2a (1)	P2.2a (1)	NT (3)	-	P2.2b (4)	-
Spain [#]	P2.2b (230)	P2.2b (235)	P2.2a (102)	P2.2a (140)	P2.2a (98)	P2.2a (104)	P2.2a (81)	P2.2a (46)
Sweden	NT (11)	NT (14)	P2.2a (14)	NT, P3.15 (11)	P3.15 (12)	NT, P3.15 (11)	P3.15 (15)	P3.15 (15)
Switzerland	P2.2b (57)	P2.2b (83)	P2.2b (69)	P2.2a (39)	P2.2a (23)	P2.2a (18)	P2.2a (13)	P2.2a (13)
United Kingdom	P2.2a (713)	P2.2a (514)	P2.2a (220)	P2.2a (128)	P2.2a (65)	P2.2a (34)	P2.2a (17)	P2.2a (17)

Calculated using data from countries submitting consistent data 1999 - 2006 (see Table A1)

Laboratory data

Table A16 Dominant serotype of confirmed and probable laboratory-diagnosed serogroup B invasive meningococcal disease (number of serotyped B cases), by country, 1999 – 2006

	1999	2000	2001	2002	2003	2004	2005	2006
Austria	P3.15 (60)	NT, P3.15 (45)	NT (46)	NT (39)	NT (37)	P3.15 (32)	P3.15 (36)	NT (26)
Belgium	P3.4 (198)	P3.4 (165)	P3.4 (169)	P3.4 (161)	P3.4 (164)	P3.4 (122)	P3.4 (141)	P3.4 (109)
Czech Republic	NT (36)	NT (34)	NT (34)	P3.4 (37)	P3.15 (20)	P3.4 (40)	P3.4 (35)	P3.4 (27)
Denmark	P3.15 (126)	P3.15 (98)	P3.15 (92)	P3.15 (65)	P3.15 (57)	P3.15 (56)	P3.15 (39)	NT (34)
Finland	P3.4 (33)	P3.4 (29)	P3.4 (34)	NT (35)	NT, P3.4 (28)	P3.4 (29)	P3.4 (28)	P3.4 (37)
France	NT (302)	-	NT (194)	NT (224)	NT (213)	NT (239)	NT (292)	NT (293)
Germany	P3.15 (292)	NT (319)	P3.15 (359)	P3.4 (154)	P2.2a (4)	P2.2b (2)	P2.2b (2)	-
Greece	NT (30)	P3.4 (20)	P3.4 (35)	P3.4 (37)	P3.4 (28)	P3.4 (29)	P3.4 (37)	P3.4 (33)
Ireland	P3.4 (86)	P3.4 (86)	P3.4 (55)	NT (51)	NT (49)	NT, P3.4 (45)	P3.4 (40)	NT (46)
Italy	P3.14 (60)	P3.4 (61)	P3.15 (46)	P3.4 (47)	P3.15 (66)	P3.15 (48)	P3.4 (67)	P3.15 (51)
Malta	P3.4 (6)	P3.4 (13)	P3.4 (9)	P3.4 (6)	P3.4 (3)	NT (4)	P3.1, P3.4, P3.15 (3)	P3.4 (5)
Netherlands	P3.4 (466)	P3.4 (413)	P3.4 (417)	P3.4 (371)	P3.4 (293)	P3.4 (232)	P3.4 (211)	-
Norway	P3.15 (57)	P3.15 (49)	P3.15 (32)	P3.4 (24)	P3.4 (31)	P3.4, P3.15 (19)	P3.4 (24)	P3.4 (24)
Poland	NT (55)	NT (33)	P3.22 (29)	NT (23)	NT (31)	NT (71)	NT (113)	NT (63)
Slovenia	NT (6)	P3.15 (4)	NT, P3.15 (8)	NT (5)	NT, P3.22 (6)	NT (5)	NT (9)	-
Spain [#]	P3.4 (345)	P3.4 (431)	NT (268)	NT (375)	NT (479)	NT (442)	NT (362)	NT (379)
Sweden	P3.15 (15)	NT (22)	NT (32)	NT (24)	NT (27)	NT (25)	P3.15 (22)	NT (20)
Switzerland	NT (59)	NT (48)	NT, P3.4 (52)	NT (34)	NT (37)	P3.4 (36)	P3.4 (34)	NT (32)
United Kingdom	P3.4 (1020)	NT (1018)	NT (964)	NT (796)	NT (779)	NT (639)	NT (659)	NT (574)

Calculated using data from countries submitting consistent data 1999 - 2006 (see Table A1)

Laboratory data

Table A17 Frequency of phenotype/genotype present in invasive meningococcal serogroup C isolates, by country, 2006

Serogroup:serotype associations present in 2 or more isolates

	C:NT:NT:NT	C:NT:P1.1:NT	C:NT:P1.14:NT	C:NT:P1.15:NT	C:NT:P1.16:NT	C:NT:P1.2:NT	C:NT:P1.3:NT	C:NT:P1.3:P1.6	C:NT:P1.4:NT	C:NT:P1.9:NT	C:P1.17:P1.16:P1.36	C:P1.18:P1.3:NT	C:P1.19:P1.15:NT	C:P1.21:P1.16:NT	C:P1.21:P1.16:P1.37	C:P1.5:NT:NT	C:P1.5:P1.1:NT	C:P1.5:P1.10:NT	C:P1.5:P1.10:P1.36	C:P1.5:P1.2:NT	C:P1.5:P1.2:P1.36	C:P1.7:NT:NT	C:P1.7:P1.1:NT	C:P1.7:P1.13:NT	C:P1.7:P1.14:NT	C:P1.7:P1.16:NT	C:P1.7:P1.16:P1.35	Listed total (% serotyped total)	
Austria	11				10														1										22 (100%)
Belgium	2															5				3			1						11 (100%)
Czech Republic											1			1							8								10 (91%)
Denmark	2			5	1											5				3		3							19 (100%)
Finland	2		1					1								1													5 (100%)
France	26	6		1	24			3								29				26		1	15			1			132 (98%)
Germany												9	3	3				21	69						3	2	3		113 (93%)
Greece	2										1			1					2										6 (100%)
Ireland	1															2													3 (100%)
Italy	4		1		1		1	1								11		1	6										26 (100%)
Malta																1													1 (100%)
Netherlands																		1	2										3 (75%)
Norway																													0 (0%)
Poland~	9		1	4	3		5	14	1	3						14			8				2			2			66 (99%)
Portugal													1					1	10				1						13 (100%)
Slovak Republic	1					5													1										7 (100%)
Slovenia																	2												2 (67%)
Spain#	17		1			3										30			4										55 (100%)
Sweden																			2		2							9	13 (87%)
Switzerland	3							1								6				2									12 (92%)
United Kingdom	5								1							8			2	2									18 (95%)
Total	85	6	2	6	9	44	5	17	6	3	2	9	4	3	2	112	2	24	6	137	10	4	19	3	2	6	9		537 (96%)

* Data from Institute for Hygiene and Microbiology Reference Laboratory

~ National Institute of Public Hygiene

Laboratory data

Table A18 Frequency of serosubtypes present in invasive meningococcal serogroup B isolates, by country, 2006

Serogroup:serotype associations present in 10 or more isolates

Country	B:P1.5:P1.2:NT	B:P1.5:P1.10:NT	B:P1.5:NT:NT	B:P1.7:P1.1:NT	B:P1.7:P1.4:P1.37	B:P1.7:P1.4:NT	B:P1.7:P1.13:NT	B:P1.7:P1.16:P1.35	B:P1.7:P1.16:NT	B:P1.7:NT:NT	B:P1.12:P1.13:NT	B:P1.12:NT:NT	B:P1.18:P1.3:NT	B:P1.19:P1.13:NT	B:P1.19:P1.15:P1.36	B:P1.19:P1.15:NT	B:P1.19:NT:NT	B:P1.21:P1.16:NT	B:P1.22:P1.9:NT	B:P1.22:P1.14:P1.36	B:P1.22:P1.14:NT	B:P1.22:P1.14:P1.36	B:P1.22:P1.14:NT	B:NT:P1.1:NT	B:NT:P1.3:P1.6	B:NT:P1.3:NT	B:NT:P1.4:NT	B:NT:P1.9:NT	B:NT:P1.10:NT	B:NT:P1.13:NT	B:NT:P1.14:NT	B:NT:P1.15:NT	B:NT:P1.16:NT	B:NT:P1.16:NT	B:NT:P1.16:NT	B:NT:NT:NT	Total listed (% total known)
Austria	1		3						4		1													1			3		1	1					1	8	24 (89%)
Belgium	1		4						5		1																58	3	4	2	11	2	2	1	13	107 (98%)	
Czech Republic								2							12						3																17 (61%)
Denmark	1								5	3																	3	3			8	1	6	4		34 (100%)	
Finland	4		2						1																	1	7			2	1	5			12	35 (95%)	
France	11		8	7					43	5	4	4													2		49	14	4	14	15	4	1	9	92	286 (98%)	
Germany*	9	22		5		70	4		39		7		17			29		12	8				37														259 (84%)
Greece					3			9							21																					3	52 (81%)
Ireland	1									2						4	4									3	1	17	8	1		3			1	45 (98%)	
Italy	1		4	1					7																		1	14	1	1	4			2	7	10	53 (98%)
Malta																4												1								1	6 (100%)
Netherlands	1	22		5		54	8		6		1		5	5		13		4	1			17															142 (90%)
Norway	4	2		1		4	3		3							3																					20 (87%)
Poland~	8		7						9			1														1	5			5	1	11	2	7	6	63 (98%)	
Portugal	3	5		3		9	2		2		1		1	1		7		2	3			14								2							55 (87%)
Slovak Republic	3		3						1			2																				1	1		3		14 (93%)
Slovenia									1																						1						2 (67%)
Spain#	13		46				1		3	8	4	12													9	3	5	20	63	1	9	51	104	25	4	97	478 (99%)
Sweden					4			1														6															11 (44%)
Switzerland	1		1	1						1		1													2	1		4	2	2	2	2		8	1	3	32 (100%)
United Kingdom	9	1	13	4	9	1		2	15	10	2	2		4	11	97	20					7				10	2	125	85	2	10	73	1	34	11	35	595 (96%)
Total	71	52	91	27	16	138	18	14	144	29	19	24	23	10	44	157	24	18	12	32	68	14	18	10	305	180	23	45	176	120	86	34	288	2330 (93%)			

* Data from Institute for Hygiene and Microbiology Reference Laboratory ~ National Institute of Public Hygiene # Laboratory data

Table A19 Case fatality ratio (CFR) in confirmed and probable cases of meningococcal disease, by country, 1999-2000, 2004– 2006

Country	1999			2000			2004			2005			2006		
	Deaths	Cases	CFR	Deaths	Cases	CFR	Deaths	Cases	CFR	Deaths	Cases	CFR	Deaths	Cases	CFR
Austria	7	97	7.22%	5	83	6.02%	7	70	10.00%	4	88	4.55%	7	72	9.72%
Belgium	16	297	5.39%	13	267	4.87%	10	157	6.37%	14	171	8.19%	2	138	1.45%
Czech Republic	7	93	7.53%	5	61	8.20%	16	96	16.67%	4	94	4.26%	3	75	4.00%
Denmark	14	177	7.91%	11	151	7.28%	5	98	5.10%	3	89	3.37%	6	77	7.79%
Estonia	1	3	33.33%	0	9	0.00%	4	11	36.36%	1	12	8.33%	1	10	10.00%
Finland	10	57	17.54%							8	40	20.00%	4	45	8.89%
France	35	411	8.52%	59	489	12.07%	72	634	11.36%	76	682	11.14%	65	667	9.75%
Germany							47	599	7.85%	45	622	7.23%	94	1093	8.60%
Greece	8	130	6.15%	11	174	6.32%	2	72	2.78%	2	98	2.04%	4	109	3.67%
Hungary							9	43	20.93%	7	30	23.33%	5	32	15.63%
Iceland	2	21	9.52%	2	18	11.11%	1	10	10.00%	0	4	0.00%	0	4	0.00%
Ireland	17	445	3.82%	25	411	6.08%	8	176	4.55%	6	187	3.21%	5	184	2.72%
Italy	13	254	5.12%	20	243	8.23%	30	314	9.55%	26	319	8.15%	19	173	10.98%
Latvia							3	23	13.04%	0	10	0.00%	4	10	40.00%
Lithuania							4	53	7.55%	3	66	4.55%	6	45	13.33%
Malta	5	17	29.41%	3	20	15.00%	3	13	23.08%	1	7	14.29%	0	19	0.00%
Netherlands	23	576	3.99%	29	542	5.35%	13	278	4.68%	12	246	4.88%	7	178	3.93%
Norway	9	77	11.69%	7	85	8.24%	3	34	8.82%	5	39	12.82%	7	34	20.59%
Poland	1	67	1.49%	0	43	0.00%	11	230	4.78%	21	369	5.69%	42	360	11.67%
Portugal							5	124	4.03%	8	137	5.84%	7	103	6.80%
Slovak Republic							2	32	6.25%	3	44	6.82%	3	36	8.33%
Slovenia	0	6	0.00%	2	8	25.00%	0	9	0.00%	3	16	18.75%	0	8	0.00%
Spain	74	947	7.81%				84	696	12.07%	86	686	12.54%	66	592	11.15%
Sweden	6	33	18.18%	8	41	19.51%	5	56	8.93%	5	55	9.09%	6	50	12.00%
Switzerland	11	150	7.33%	10	149	6.71%	5	79	6.33%	5	76	6.58%	7	64	10.94%
United Kingdom	219	3064	7.15%	230	2993	7.68%	81	1500	5.40%	83	1634	5.08%	60	1349	4.45%
Total	478	6922	6.91%	440	5787	7.60%	430	5407	7.95%	431	5821	7.40%	430	5527	7.78%

Table A20 Serogroup-specific case fatality ratio (CFR) in confirmed and probable cases of meningococcal disease, by country, 1999 – 2006 combined

Country	Serogroup B			Serogroup C			Other serogroups / non-groupable		
	Deaths	Cases	CFR	Deaths	Cases	CFR	Deaths	Cases	CFR
Austria	31	435	7.13%	10	168	5.95%	5	36	13.89%
Belgium	51	1245	4.10%	50	527	9.49%	4	67	5.97%
Czech Republic	28	400	7.00%	31	237	13.08%	7	39	17.95%
Denmark	43	585	7.35%	14	157	8.92%	4	39	10.26%
Estonia	3	37	8.11%	0	9	0.00%	1	10	10.00%
Finland	17	106	16.04%	3	15	20.00%	1	13	7.69%
France	227	2518	9.02%	196	1257	15.59%	66	387	17.05%
Germany	196	2439	8.04%	105	933	11.25%	17	288	5.90%
Greece	27	515	5.24%	10	84	11.90%	3	327	0.92%
Hungary	23	119	19.33%	3	14	21.43%	0	4	0.00%
Iceland	3	40	7.50%	3	50	6.00%	2	3	66.67%
Ireland	69	1701	4.06%	21	342	6.14%	3	78	3.85%
Italy	62	654	9.48%	60	452	13.27%	4	41	9.76%
Latvia	5	25	20.00%	0	2	0.00%	0	1	0.00%
Lithuania	10	140	7.14%	0	27	0.00%	1	2	50.00%
Malta	8	61	13.11%	3	12	25.00%	0	6	0.00%
Netherlands	118	2602	4.53%	33	763	4.33%	5	115	4.35%
Norway	36	314	11.46%	6	71	8.45%	2	56	3.57%
Poland	44	586	7.51%	28	356	7.87%	3	51	5.88%
Portugal	24	367	6.54%	8	128	6.25%	3	37	8.11%
Slovak Republic	7	92	7.61%	2	35	5.71%	0	5	0.00%
Slovenia	5	51	9.80%	1	13	7.69%	3	17	17.65%
Spain	299	3513	8.51%	223	1239	18.00%	28	302	9.27%
Sweden	23	202	11.39%	18	105	17.14%	10	64	15.63%
Switzerland	30	346	8.67%	24	319	7.52%	6	71	8.45%
United Kingdom	626	12107	5.17%	373	2644	14.11%	99	1039	9.53%
Total	2015	31200	6.46%	1225	9959	12.30%	277	3098	8.94%

Table A21 Proportion of meningitis in confirmed and probable laboratory-diagnosed cases of invasive meningococcal disease, 1999 – 2006

	1999	2000	2001	2002	2003	2004	2005	2006
<50%	Germany	Germany	Germany	Germany	Lithuania	Iceland	Iceland	Ireland
	Greece	Hungary	Hungary	Hungary	Spain	Ireland	Ireland	Spain
	Hungary	Ireland	Ireland	Ireland	Sweden	Malta	Spain	Sweden
	Ireland	Latvia	Latvia	Latvia		Spain		
	Latvia	Lithuania	Slovak Republic	Slovak Republic				
	Lithuania	Slovak Republic	Sweden	Spain				
	Malta	Sweden	United Kingdom	Sweden				
	Slovak Republic	United Kingdom		United Kingdom				
	Sweden							
United Kingdom								
50 – 70%	Belgium	Belgium	Belgium	Belgium	Austria	Austria	Austria	Belgium
	Estonia	Finland	Finland	Denmark	Belgium	Belgium	Belgium	Denmark
	Iceland	Greece	Iceland	Finland	Denmark	Czech Republic	Denmark	Estonia
	Netherlands	Iceland	Lithuania	France	Finland	Finland	Finland	Finland
	Norway	Malta	Norway	Malta	Germany	Greece	Greece	Italy
	Slovenia	Portugal	Spain	Netherlands	Iceland	Latvia	Latvia	Latvia
	Spain			Norway	Ireland	Lithuania	Lithuania	Lithuania
				Portugal	Latvia	Netherlands	Norway	Norway
				Slovenia	Malta	Norway	Portugal	Poland
				Switzerland	Netherlands	Slovenia	Slovenia	Portugal
					United Kingdom	Sweden	Sweden	Switzerland
						United Kingdom	Switzerland	United Kingdom
>70%	Austria	Austria	Austria	Austria	Czech Republic	Denmark	Czech Republic	Austria
	Czech Republic	Czech Republic	Czech Republic	Czech Republic	Estonia	Estonia	Estonia	Czech Republic
	Denmark	Denmark	Denmark	Estonia	France	France	France	France
	Finland	Estonia	Estonia	Greece	Greece	Germany	Germany	Germany
	France	France	France	Iceland	Hungary	Hungary	Hungary	Greece
	Italy	Italy	Greece	Italy	Italy	Italy	Italy	Hungary
	Poland	Netherlands	Italy	Lithuania	Norway	Poland	Malta	Iceland
	Portugal	Norway	Malta	Poland	Poland	Portugal	Netherlands	Malta
	Switzerland	Poland	Netherlands		Portugal	Slovak Republic	Poland	Netherlands
		Slovenia	Poland		Slovak Republic	Switzerland	Slovak Republic	Slovak Republic
		Spain	Portugal		Slovenia			Slovenia
		Switzerland	Slovenia		Switzerland			
			Switzerland					