Feidhmeannacht na Seirbhíse Sláinte
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CHILDREN'S UNIVERSITY HOSPITAL

Invasive meningococal disease- focus on Meningococcal B - epidemiology, international and Ireland

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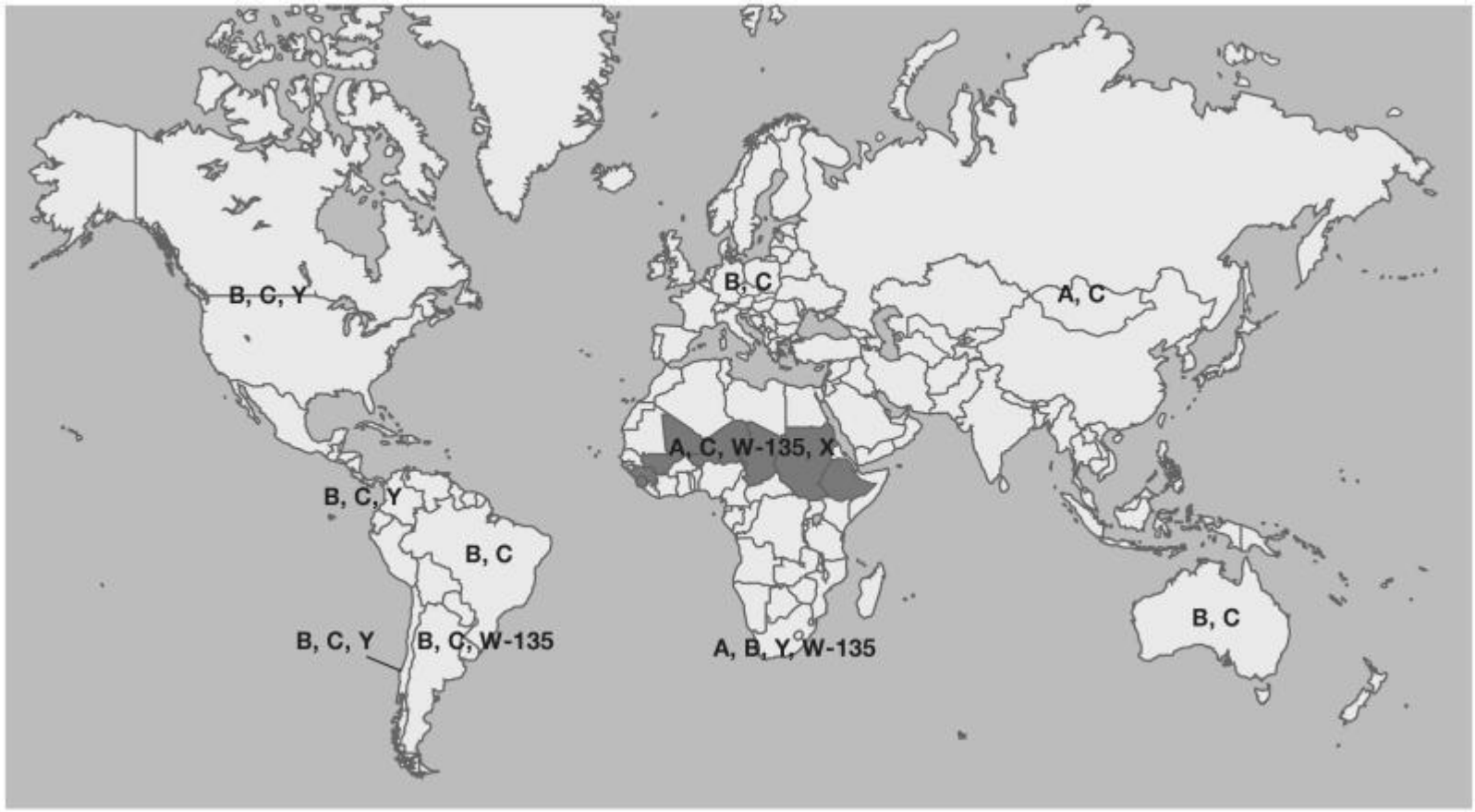
Scope presentation

- Meningococcal disease epidemiology- general
- Meningococcal B disease epidemiology- Ireland
- Rationale for introduction of MenB vaccine

Worldwide distribution of major meningococcal serogroups



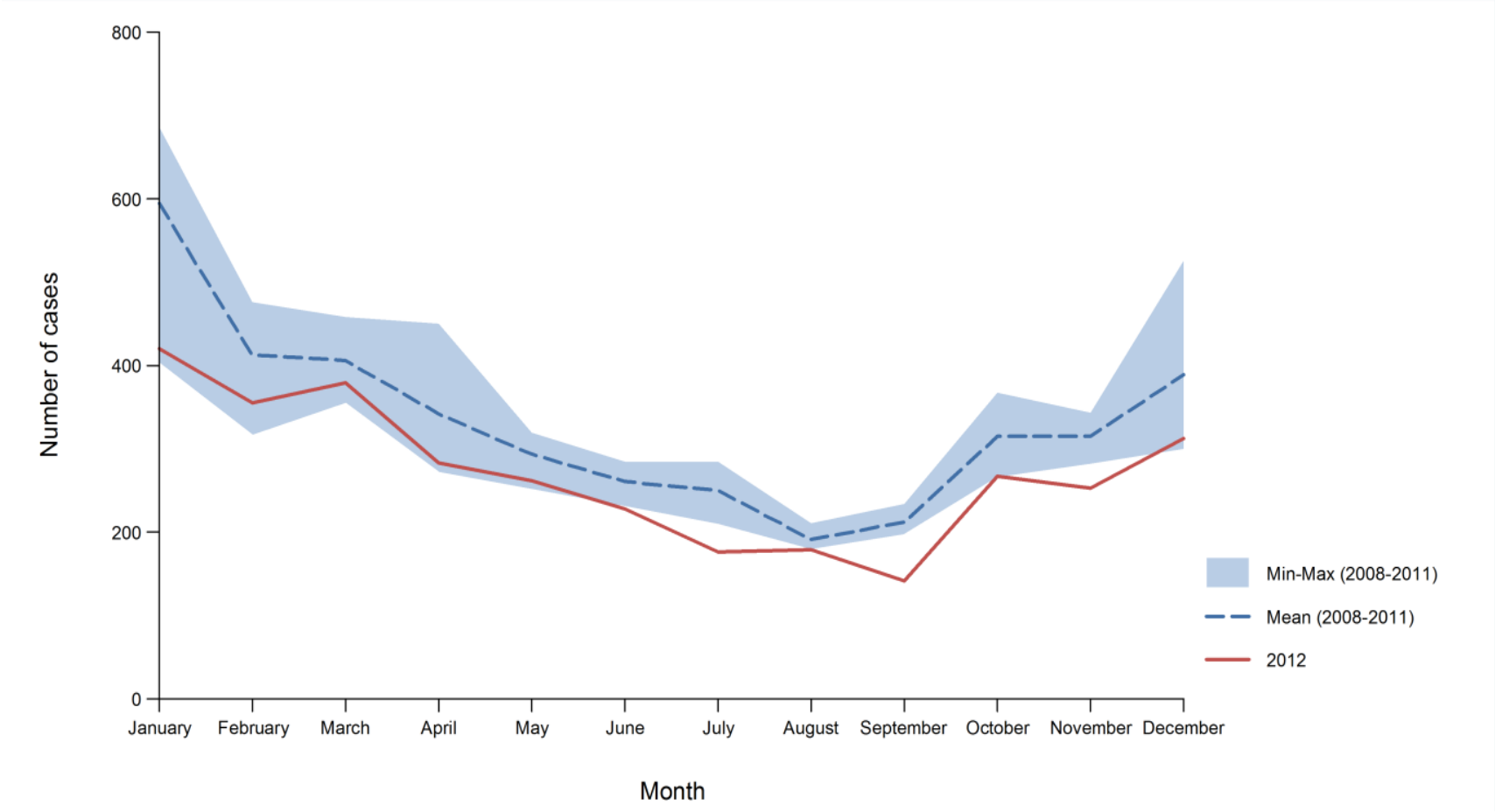
L.Harrison. **The Epidemiology of Meningococcal Disease in the United States**
Clin Infect Dis. 2010 Mar 1; 50(S2): S37.

IMD in Europe*

- IMD is rare in Europe:
  - 0.68 cases per 100 000 population in 2012
  - country-specific rates confirmed IMD : 0.11 to 1.77 cases per 100 000 population
- Infants < 1 year of age highest risk of infection
  - followed by 15–24 year old age group.
- Serogroup B and C dominant
  - Serogroup Y has been increasing, but less frequent than B and C.
- Overall case fatality ~10%,
  - with many survivors suffering serious long-term
- sequelae.
- Overall decreasing trend in last 10 years;
  - serogroup C conjugate vaccine introduced to national immunisation schedules in some countries.

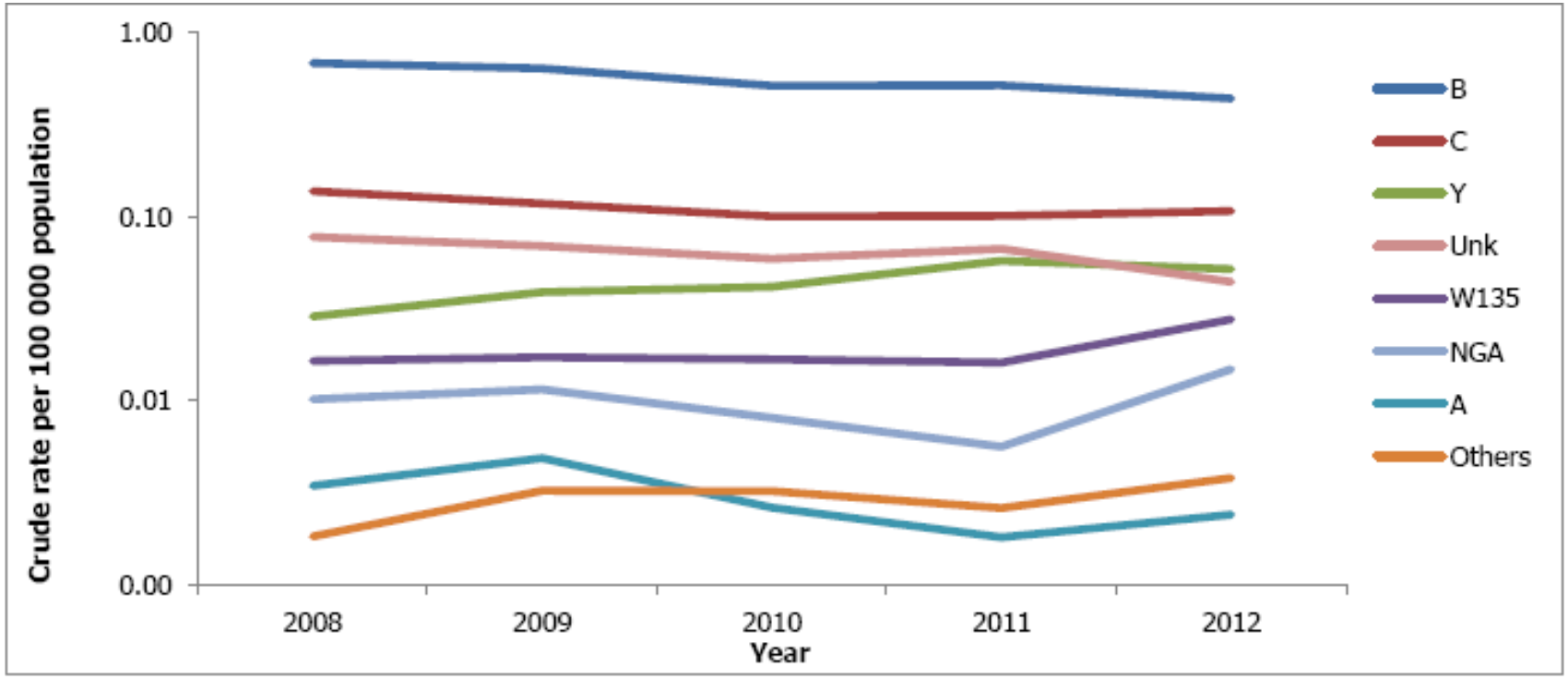
*ECDC Annual epidemiological report 2014

Seasonal distribution of confirmed IMD, EU/EEA, 2008–2012



Annual Epidemiological Report - vaccine-preventable diseases - invasive bacterial diseases. Date publication 11/2/2015
Source: Country reports from Austria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland,Italy, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

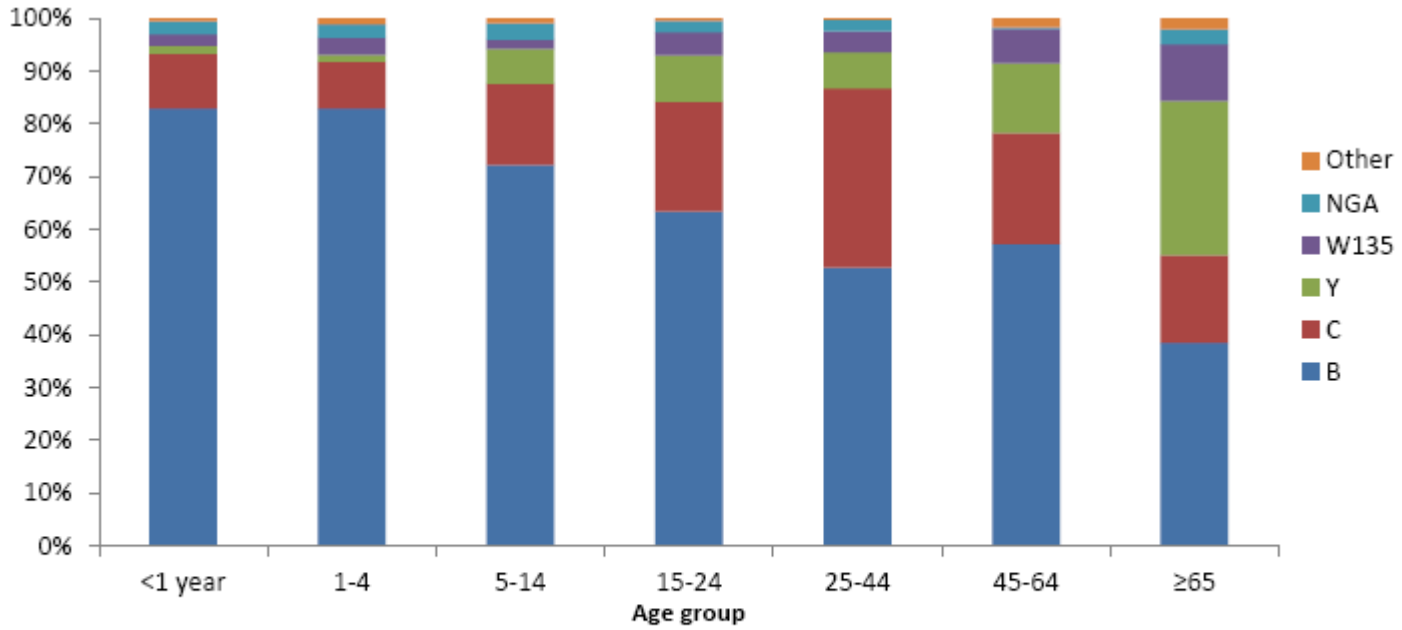
Rates of confirmed IM, by serogroup, EU/EEA,2008-2012 (n=20 161)



Source: Country reports; NGA: non-groupable; Unk: unknown. The specific codes are kept for the most common serogroups. Others are the remaining/other groupable serogroups that should be reported. Apart from serogroups reported as 'other' (n=42), it includes cases of serogroups 29E (13), X (n=13) and Z (n=5) reported during the period 2008–2012.

Annual Epidemiological Report - vaccine-preventable diseases - invasive bacterial diseases. Date publication 11/2/2015

Rates of confirmed IMD, by age and serogroup,EU/EEA, 2012 (n=3 233)

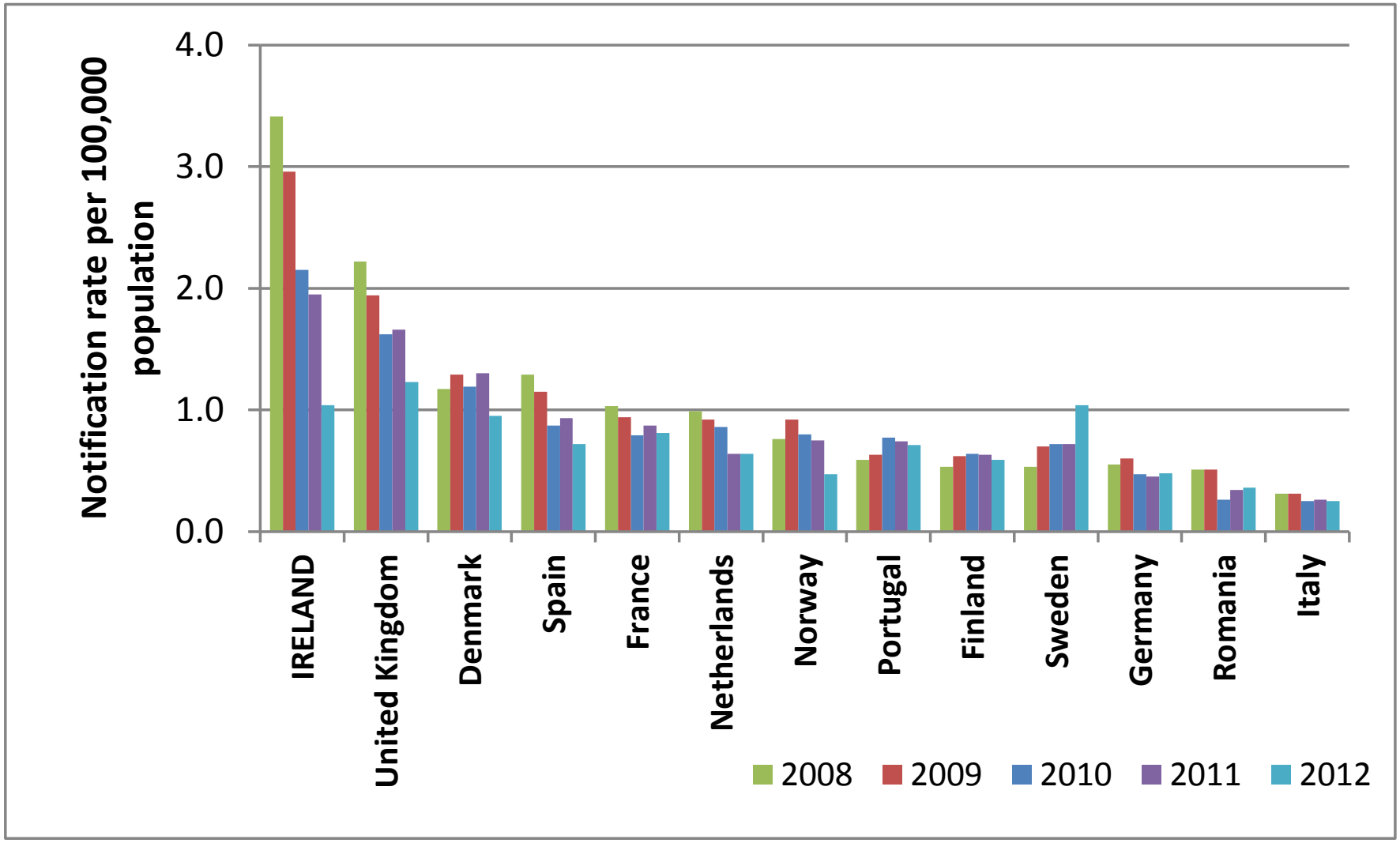


Source: Country reports; NGA: non-groupable.; 'Other' includes confirmed cases reported as serogroup 'other' (n=15), as serogroup A (n=12), serogroup 29E (n=3) and serogroup Z (n=1). The specific codes are kept for the most common serogroups. Others are the remaining/other groupable serogroups that should be reported.

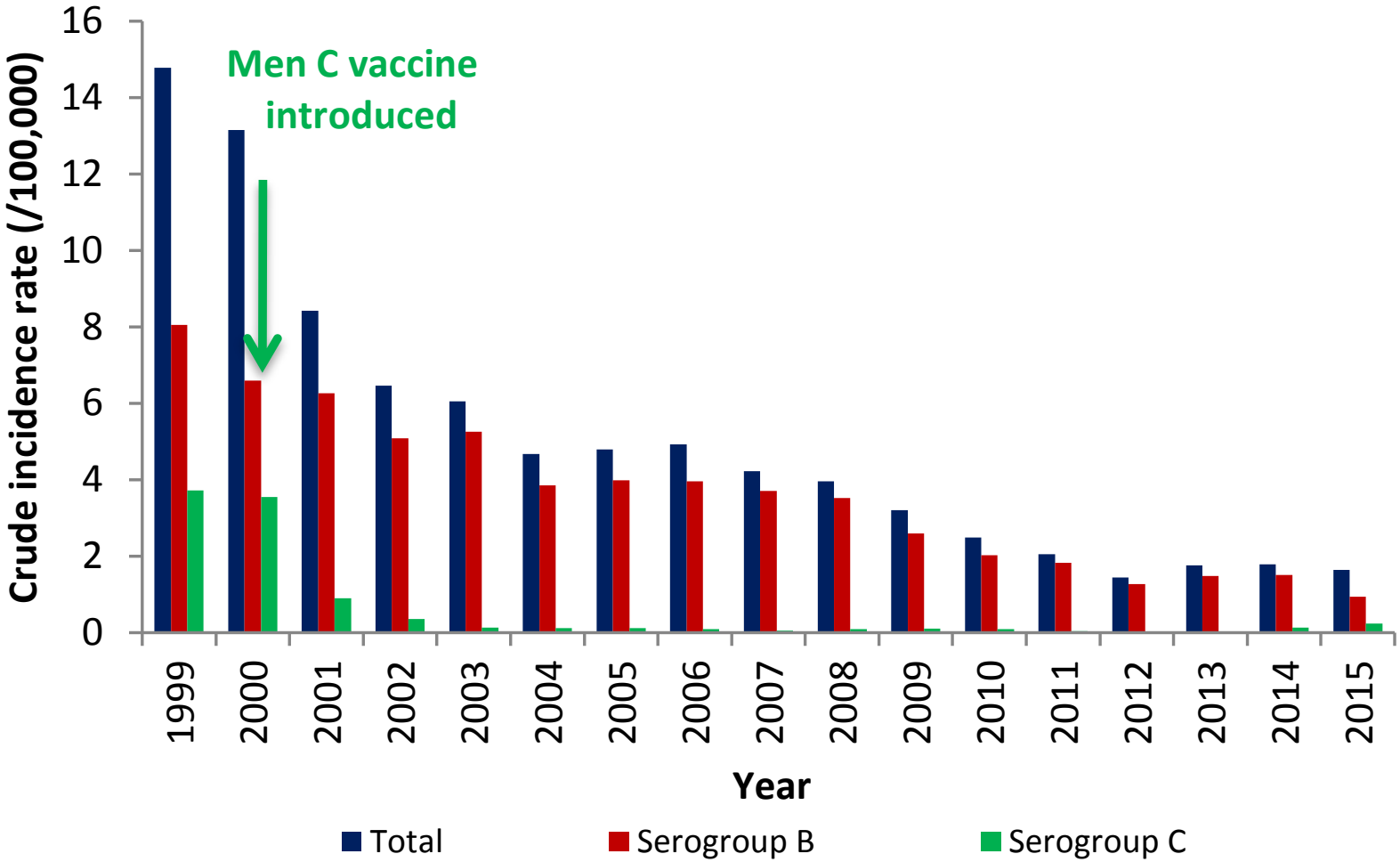
Annual Epidemiological Report - vaccine-preventable diseases - invasive bacterial diseases. Date publication 11/2/2015

Selected Rates of confirmed invasive meningococcal disease reported cases, EU/EEA, 2008, 2012

Source: European Centre for Disease Prevention and Control. Annual epidemiological report 2014 –Vaccine-preventable diseases – invasive bacterial diseases. Stockholm: ECDC; 2015, table 2, page 14

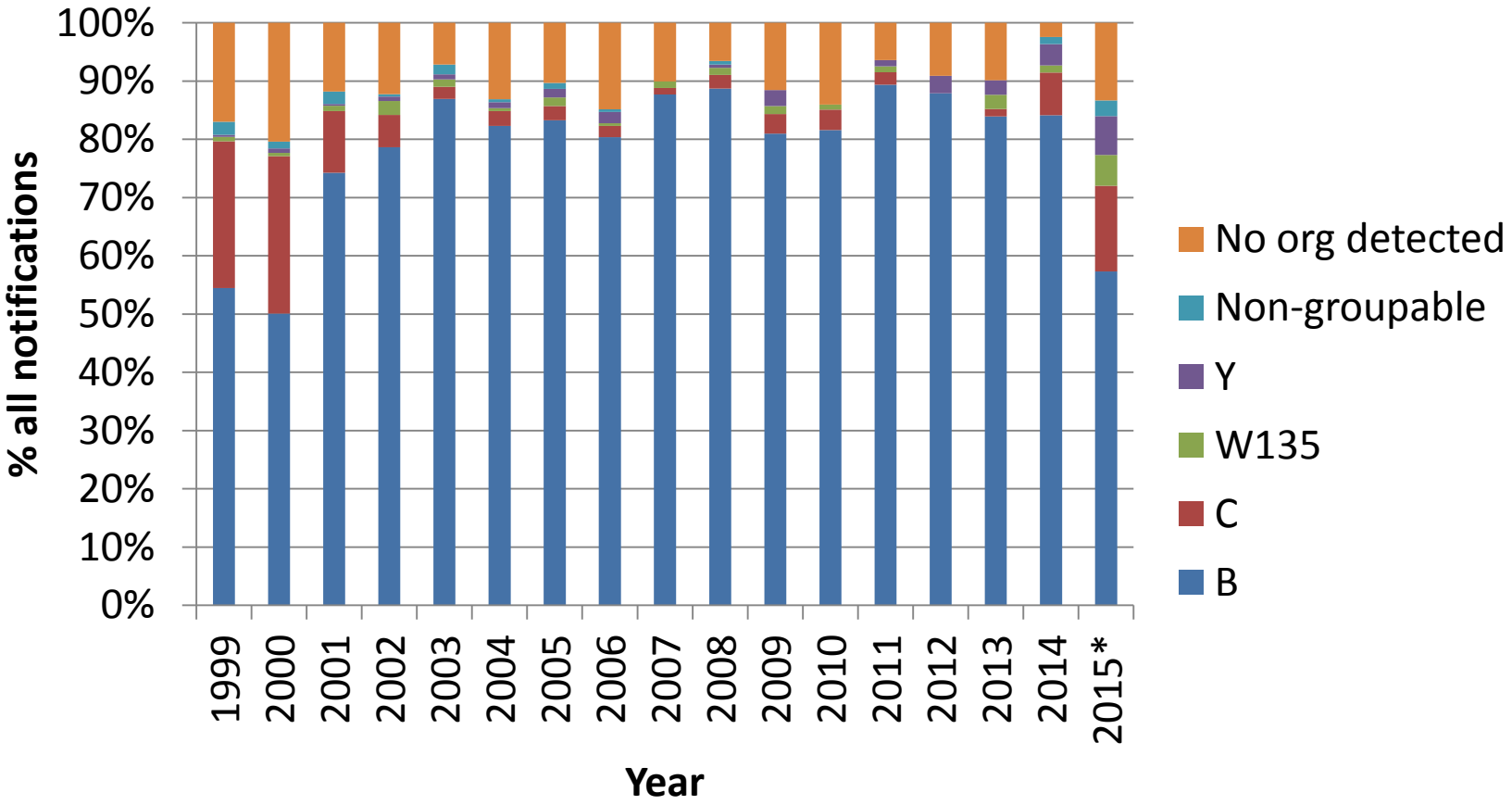


IMD by Serogroup in Ireland, 1999 - 2015*
(Rate per 100,000)



*2015 data provisional

Proportion of IMD by serogroup, ROI 1999-2015*



IMD in Ireland, 1999 - 2015*
Annual Number of Cases by Serogroup

	B	C	W135	Y	Non-groupable	No org detected	Total
1999	292	135	4	2	12	91	**536**
2000	258	139	3	4	6	105	**515**
2001	245	35	3	1	7	39	**330**
2002	199	14	6	2	1	31	**253**
2003	206	5	3	2	4	17	**237**
2004	163	5	1	2	1	26	**198**
2005	169	5	3	3	2	21	**203**
2006	168	4	1	4	1	31	**209**
2007	157	2	2	0	0	18	**179**
2008	149	4	2	1	1	11	**168**
2009	119	5	2	4	0	17	**147**
2010	93	4	1	0	0	16	**114**
2011	84	2	1	1	0	6	**94**
2012	58	0	0	2	0	6	**66**
2013	68	1	2	2	0	8	**81**
2014	69	6	1	3	1	2	**82**
2015*	43	11	4	5	2	10	**75**

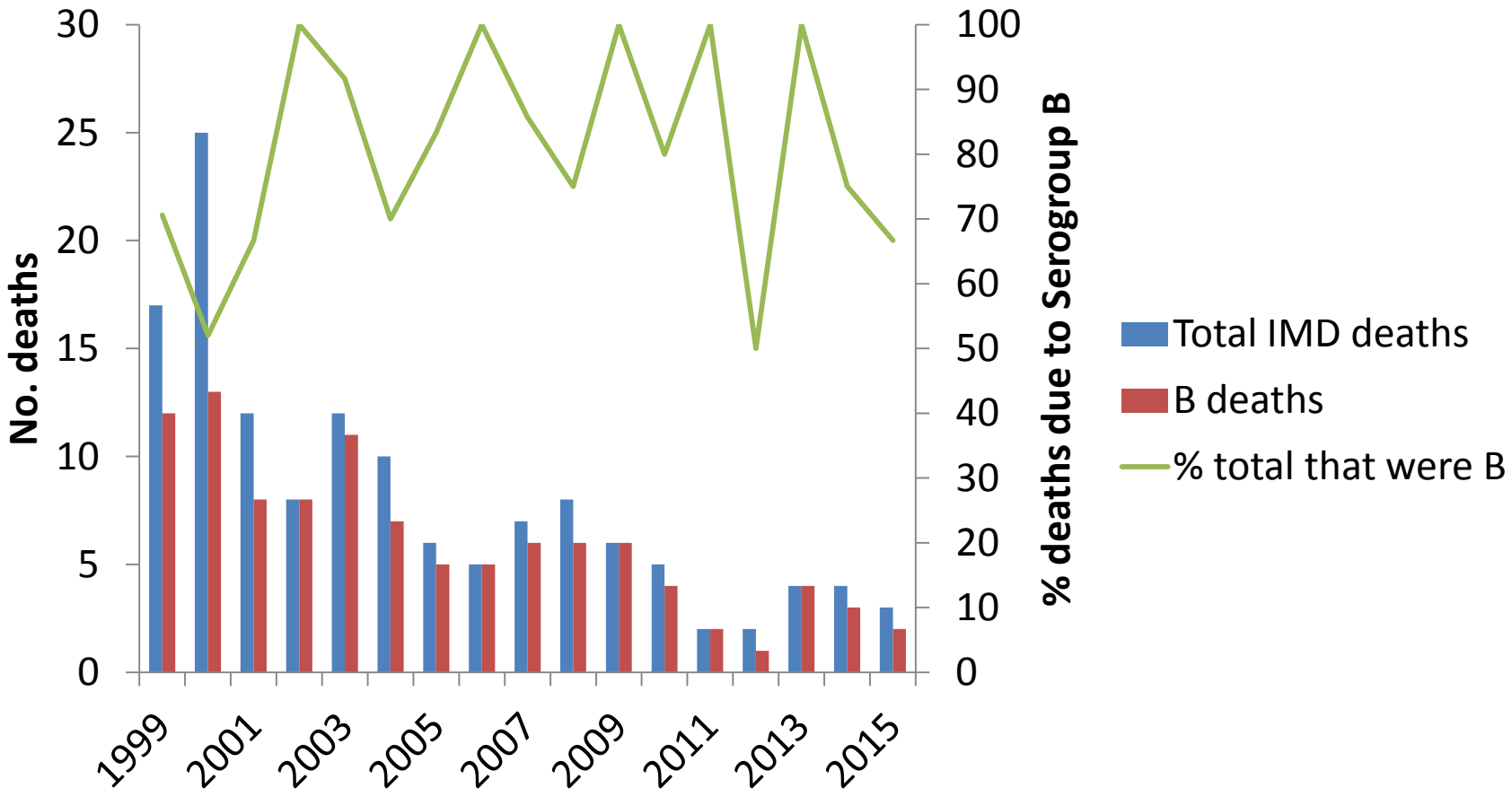
*2015 data provisional

Incidence rates /100,000 IMD in Ireland by Serogroup, 1999 - 2015*

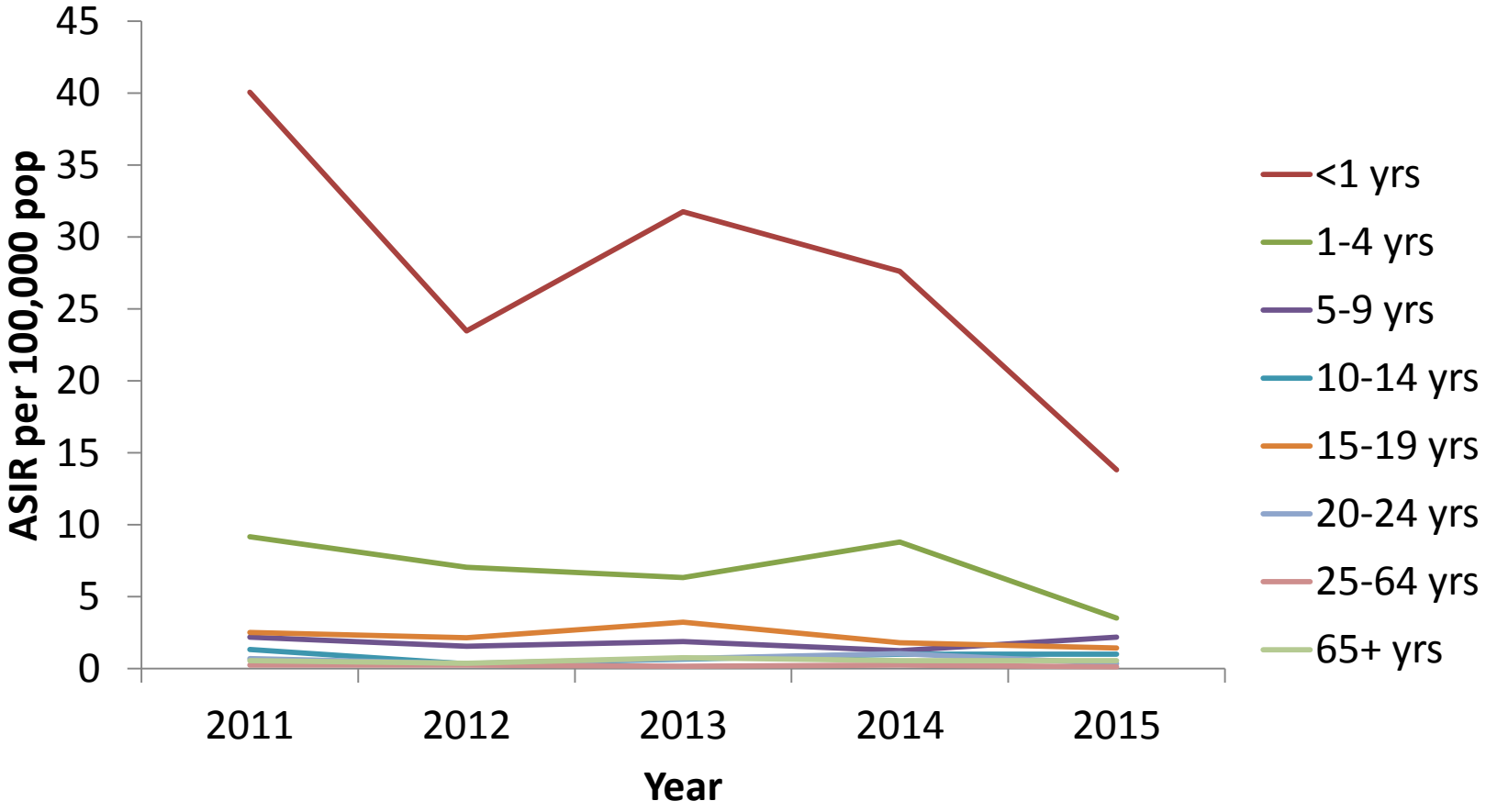
Year	Total	Serogroup B	Serogroup C
1999	14.78	8.05	3.72
2000	13.15	6.59	3.55
2001	8.42	6.25	0.89
2002	6.46	5.08	0.36
2003	6.05	5.26	0.13
2004	4.67	3.84	0.12
2005	4.79	3.99	0.12
2006	4.93	3.96	0.09
2007	4.22	3.70	0.05
2008	3.96	3.51	0.09
2009	3.20	2.59	0.11
2010	2.48	2.03	0.09
2011	2.05	1.83	0.04
2012	1.44	1.26	0.00
2013	1.77	1.48	0.02
2014	1.79	1.50	0.13
2015*	1.63	0.94	0.24

*2015 data provisional

IMD Deaths Ireland, total and serogroup B, 1999-2015



ASIR* MenB disease 2011-2015



*2011 census data

Recent epidemiology of IMD / relevance to new vaccines

- In recent years > 80% of IMD cases due to serogroup B infection
- Majority of IMD deaths are caused by MenB disease
  - Between 1999- 2015 : 76% of all IMD deaths
  - Between 2004-2015 : 82% of all IMD deaths

Novartis ‘Bexsero’ (4CMenB) Meningitis B Vaccine

- Licensed by the European Commission 23/Jan/2013; News report: http://www.bbc.co.uk/news/health-21140285

Re-evaluating cost effectiveness of universal meningitis vaccination (Bexsero) in England: modelling study

- Case reduction greatest with routine infant immunisation (26.3% of cases averted in first five years).
- Strategy could be cost effective at £3 (€3.8, $4.9) a vaccine dose
- If vaccine can disrupt meningococcal transmission more cases are prevented in long term with infant and adolescent combined programme (51.8% after 30 years), could be cost effective at £4/vaccine dose.
- Assuming vaccine reduces acquisition by 30%, adolescent vaccination alone is most favourable strategy economically, but takes more than 20 years to substantially reduce the number of cases.

- Conclusions: Routine infant vaccination most effective short term strategy and could be cost effective with a low vaccine price. Critically, if the vaccine reduces carriage acquisition in teenagers, the combination of infant and adolescent vaccination could result in substantial long term reductions in cases and be cost effective with competitive vaccine pricing.

Re-evaluating cost effectiveness of universal meningitis vaccination (Bexsero) in England: modelling study.Christensen H, Trotter CL,Hickman M,Edmunds WJ. BMJ.2014 Oct 9;349:g5725. doi:10.1136/bmj.g5725

Countries that have introduced MenB vaccine into national programme

- New Zealand – Specific vaccine
- Brazil/Cuba
- UK - 2015
- Czech Republic
- Ireland

Conclusion

- Despite decrease in IMD in recent years, Ireland continues to have high incidence of IMD caused by serogroup B
- Introduction of MenB vaccine expected to further decrease serogroup B incidence
- Need to monitor
  - impact on IMD in Ireland
  - molecular characteristics of strains in circulation
  - Vaccine safety (Health Products Regulatory Authority)

Acknowledgements

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- Department of Health and Children