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Ebola virus disease: international epidemiological summary (at 22 February 2015)

As of 22 February 2015, the World Health Organization reports a total of 23,729 clinically compatible cases (CCC) of Ebola virus disease (EVD), including 9,604 deaths, associated with the West African outbreak (see table). Provided case totals and, particularly, deaths are known to under-represent the true impact of the outbreak in West Africa. While the majority of cases have been reported from Guinea, Liberia and Sierra Leone, cases have also been reported from Mali, Nigeria, Senegal, Spain, the United Kingdom (UK) and the United States of America (USA).

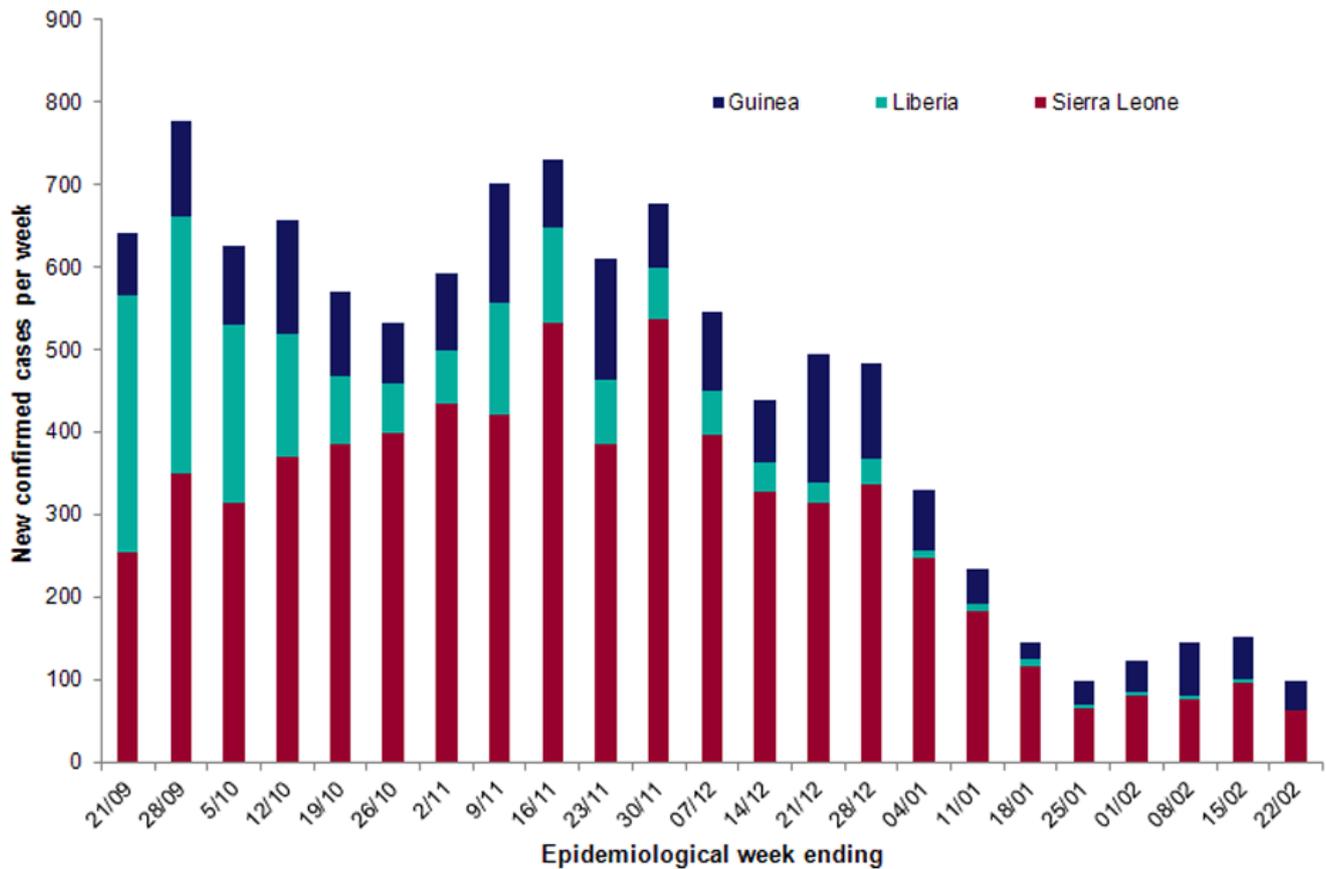
Summary of Ebola virus disease international epidemiological information as at 22 February 2015

Country	Total CCCs	Total deaths	Current status
Guinea	3155	2091	Ongoing transmission
Liberia	9238	4037	Ongoing transmission
Sierra Leone	11,301	3461	Ongoing transmission
Mali	8	6	EVD free
Nigeria	20	8	EVD free
Senegal	1	0	EVD free
Spain	1	0	EVD free
UK	1	0	Single imported case
USA	4	1	Awaiting EVD-free status
TOTAL	23,729	9604	

Substantial improvements in the epidemiological situation in Guinea, Liberia and Sierra Leone have been observed in the last two months. However, the complex nature of this outbreak means that control of EVD in West Africa continues to face significant challenges. In the last week, 99 new confirmed cases were reported from Guinea (35), Liberia (1) and Sierra Leone (63) (see figure).

In Guinea, an increase in national incidence was reported in the last week. The geographical distribution of cases continues to vary and shift, with six prefectures reporting confirmed cases in the last week. While the majority of cases were reported from Forécariah, on the Sierra Leone border, Conakry the capital continues to record transmission. Reports of unsafe burials and incidents of community resistance remain an issue and may be impeding progress in EVD control.

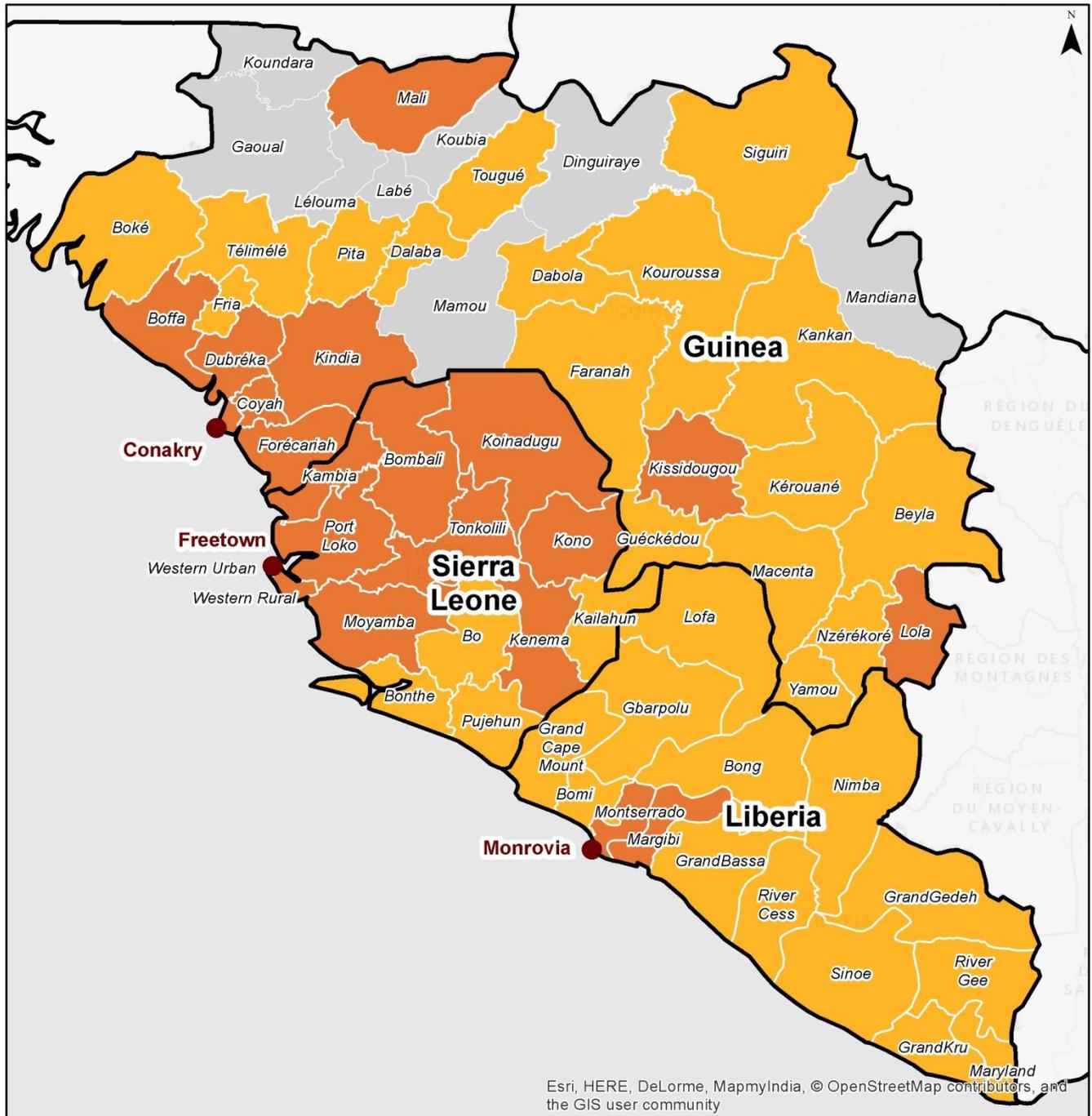
Summary of Ebola virus disease international epidemiological information as at 22 February 2015



In Liberia, reported case incidence remains at a low level with two confirmed cases reported in the last week; in Montserrado county. The situation in Liberia appears to be promising. However, it is important to note that even when no ongoing transmission is reported in Liberia, the porous nature of its borders with other affected countries means that the risk of further outbreaks continues until West Africa is EVD free.

Sierra Leone continues to record the majority of new cases in the West African EVD outbreak. Though a reduced number of confirmed cases was reported in Freetown (14 confirmed cases), a large increase in confirmed cases in the northern district of Bombali (20 confirmed cases) was reported to be linked to a cluster in the Aberdeen area of Freetown. While there has been substantial improvement in the epidemiological situation in Sierra Leone in the last two months, the fluctuating trend in new cases in certain districts, as well as ongoing reports of community resistance, and reports of significant numbers of unsafe burials, may impede control measures. Further information on the international epidemiological situation can be found in PHE's weekly [Ebola Epidemiological Update](#); see also the [Ebola Outbreak Distribution Map](#) below.

Ebola Outbreak Distribution Map



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Confirmed cases by district in the last 21 days

● Capital Cities	■ Newly affected area
 Country Boundaries	■ Active transmission
WHO data as of 22 February (Source: WHO)	■ No longer active transmission
	■ Unaffected

Infection (news) report**Continuing increase in meningococcal group W (MenW) disease in England****Summary**

Meningococcal disease cases in England have been declining since the early 2000s. Within this overall decline, there has, however, been a slow and steady increase in invasive meningococcal disease due to capsular group W (MenW) since 2009. This increase appears to be due to expansion of a single hyper-virulent strain belonging to clonal complex 11 (cc11) and has been observed across all regions. MenW cases were not associated with travel, indicating that this strain is now endemic in England. Since 2011, MenW cases have been diagnosed across all age groups and are associated with higher case fatality than the more common meningococcal group B (MenB) cases [1].

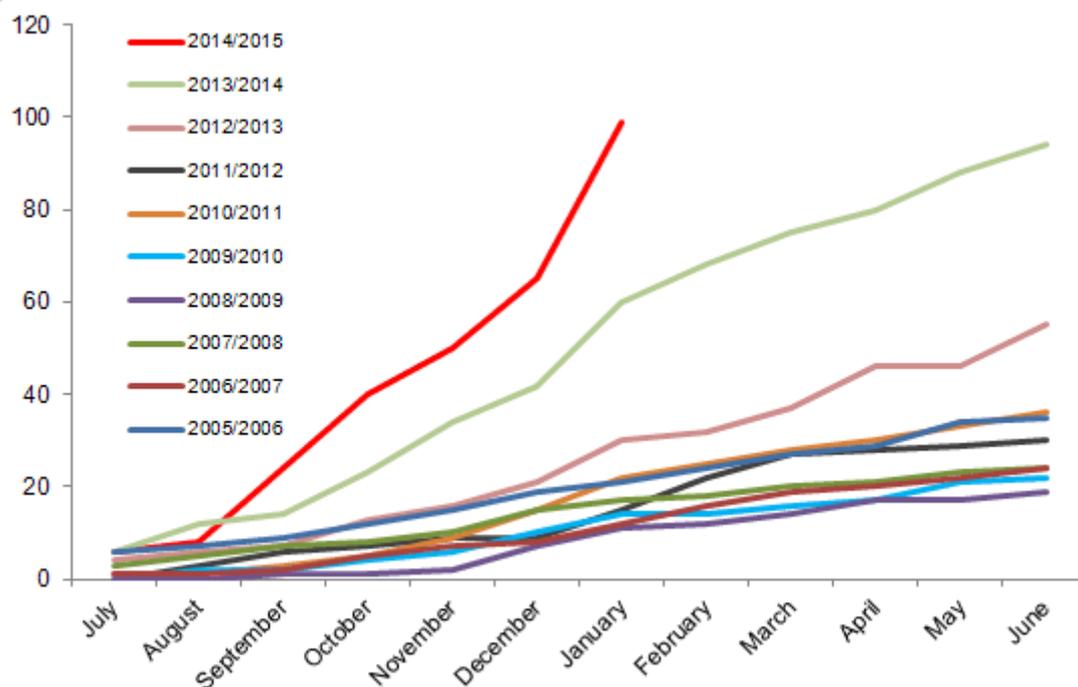
Background

The incidence of invasive meningococcal disease (IMD) in the United Kingdom has been declining since the early 2000's because of the successful introduction of routine immunisation against meningococcal group C (MenC) and a secular decline in meningococcal group B (MenB) disease [2]. Historically, meningococcal group W (MenW) incidence has been low, accounting for only 1%–2% of IMD cases annually. An increase during 2000–2002 was associated with travel to the Hajj, but following mandatory meningococcal vaccination for pilgrims, MenW cases declined rapidly to pre-2000 levels.

Since 2009, however, MenW cases in England have increased year-on-year from 22 in 2009 to 117 in 2014 compared to 867 and 400 MenB cases, respectively. This increase now appears to be accelerating (see figure). In January 2015, there were 34 laboratory-confirmed MenW cases in England, compared to 18 in January 2014 and nine in January 2013. This increase is almost entirely due to endemic expansion of a single hypervirulent sequence type 11 (ST-11) strain belonging to clonal complex 11 (cc11). This clonal complex was previously associated with MenC and was responsible for the large MenC outbreak in the UK in the late 1990s.

MenW:cc11 cases were initially identified in adults but, by 2011, had extended across all age-groups. Between 2009 and 2012, MenW caused around four deaths every year, mainly among the elderly. During 2013 and 2014, however, 24 of the 193 MenW cases died and, for the first time in the past decade, MenW-related deaths were observed in young children.

Cumulative cases of laboratory-confirmed invasive meningococcal group W disease by epidemiological year in England, to end-January 2015



Unlike the international Hajj-associated MenW outbreak, the recent MenW cases were not associated with travel or recent entry into the UK, nor was there any evidence of clustering of cases. Most cases were diagnosed in healthy individuals who developed severe illness, often requiring intensive care support. There has also been an increase in MenW cases among students attending universities across the country, suggesting that this strain is now established in carriage.

Other than the UK, no European country has yet reported an increase in MenW disease. The current adolescent MenC immunisation programme targeting 14-year olds alongside a temporary catch-up campaign for new university entrants began in September 2013, but this vaccine does not protect against other meningococcal groups.

PHE is working with partners in Department of Health and NHS England to review potential options for responding to the increase in MenW nationally.

In the meantime, clinicians, microbiologists and Health Protection Teams should continue to be mindful of the increase in invasive MenW disease and maintain a high index of suspicion across all age groups. Early recognition and prompt initiation of specific and supportive therapy for patients with invasive MenW disease can be life-saving.

Relevant guidelines/FAQs are available at:

<https://www.gov.uk/government/collections/meningococcal-disease-guidance-data-and-analysis>

References

1. Ladhani SN, Beebeejaun K, Lucidarme J, Campbell H, Gray S, Kaczmarski E, *et al* (2015). Increase in endemic *Neisseria meningitidis* capsular Group W sequence type 11 complex associated with severe invasive disease in England and Wales. *Clin Infect Dis.* **60**(4), 578-85.
 2. Invasive meningococcal disease (laboratory reports in England): October to December 2014, *HPR 9*(7): infection report, 27 February 2015. See PHE website: [Meningococcal disease: laboratory confirmed cases in England and Wales](#).
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Infection reports

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Vaccine coverage

Prenatal pertussis vaccine coverage: September to December 2014

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Vaccine preventable infections

Invasive meningococcal disease (laboratory reports in England): October to December 2014

In England, the national Public Health England (PHE) Meningococcal Reference Unit (MRU) confirmed 178 cases of invasive meningococcal disease (IMD) between October and December 2014 [1]. This compares to 183 cases (3% decrease) reported in the equivalent quarter in 2013 (table 1). There were 95 cases of IMD reported from July to September 2014.

The distribution of capsular groups causing IMD by age group is summarised in table 2, with capsular group B (MenB) accounting for 60% (107/178) of all cases, followed by MenW (n=41, 23%), MenY (n=16, 9%) and MenC (n=11, 6%). The number of MenW cases reported in the fourth quarter of 2014 (n=41) was 46% higher than the same period in 2013 (n=28) and MenC cases were 45% higher (11 cases in Q4 2014 versus 6 in Q4 2013). MenB cases fell from 119 in the third quarter of 2013 to 107 cases (10% decrease) in the same quarter of 2014 whilst MenY IMD decreased by 45%, from 29 to 16 cases. During the fourth quarter of 2014 there were no reported cases for capsular groups A, X and Z/E (table 1) in England. During the same period four IMD cases were reported to PHE from Wales; two were MenY, one MenC and one MenB.

An increase in cases of IMD in university students, which began in the third quarter of 2014 resulted in an extension to the MenC vaccination programme for university students until March 2015 [2].

In the fourth quarter of 2014, MenB was responsible for the majority of IMD cases in infants (87%) and toddlers (90%) but contributed to a lower proportion of cases in older age groups, where other capsular groups were more prevalent (table 2). Thirty-four percent of MenW cases were in older adults aged 65+ years, 20% of cases were diagnosed in children younger than five years and 32% were aged 15-24 years. The previously reported increase in group W cases [3] has continued and the situation is being kept under review [4].

Table 1. Invasive meningococcal disease in England by capsular group and laboratory testing method, weeks 40-52 (Q4): 2013 and 2014

Capsular groups ~	Method of diagnosis						Total		Cumulative total	
	CULTURE AND PCR		CULTURE ONLY		PCR ONLY		2013 (Q4)	2014 (Q4)	2013 (Q1-4)	2014 (Q1-4)
	2013 (Q4)	2014 (Q4)	2013 (Q4)	2014 (Q4)	2013 (Q4)	2014 (Q4)				
A	–	–	–	–	–	–	–	–	–	1
B	31	30	29	25	59	52	119	107	535	400
C	2	1	1	6	3	4	6	11	29	33
W	7	7	18	23	3	11	28	41	76	117
Y	5	2	20	12	4	2	29	16	77	69
Ungrouped	–	–	–	–	1	2	1	2	3	7
Ungroupable*	–	–	–	1	–	–	–	1	6	1
Total	45	40	68	67	70	71	183	178	726	628

~ Note: No cases capsular groups X or Z/E were confirmed during any of the periods summarised in the table.

* Ungroupable refers to invasive clinical meningococcal isolates that were non-groupable, while ungrouped cases refers to culture-negative but PCR screen (*ctrA*) positive and negative for the four genogroups [B, C, W and Y] routinely tested for.

Table 2. Invasive meningococcal disease in England by group and age at diagnosis, weeks 40-52 (Q4): 2014

Age groups	Capsular Group~						Total		2014 Total					
	B		C		W		Y		Other*		Q4		Q1 - Q4	
	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
<1 year	27	(25)	–	(0)	4	(10)	–	(0)	–	(0)	31	(17)	129	(21)
1-4 years	38	(35)	–	(0)	4	(10)	–	(0)	–	(0)	42	(24)	124	(20)
5-9 years	9	(8)	–	(0)	–	(0)	1	(6)	1	(33)	11	(6)	34	(5)
10-14 years	3	(3)	–	(0)	1	(2)	1	(6)	–	(0)	5	(3)	13	(2)
15-19 years	13	(12)	2	(18)	11	(27)	2	(13)	1	(33)	29	(16)	68	(11)
20-24 years	3	(3)	–	(0)	2	(5)	1	(6)	–	(0)	6	(3)	31	(5)
25-44 years	3	(3)	6	(55)	3	(7)	–	(0)	–	(0)	12	(7)	52	(8)
45-64 years	5	(5)	1	(9)	2	(5)	2	(13)	–	(0)	10	(6)	61	(10)
>=65 years	6	(6)	2	(18)	14	(34)	9	(56)	1	(33)	32	(18)	116	(18)
Total	107		11		41		16		3		178		628	

~ Note: No cases capsular groups X or Z/E were confirmed during any of the periods summarised in the table.

* Other includes Ungroupable and Ungrouped.

References

1. Data source: PHE Meningococcal Reference Unit.
2. "[Freshers told 'it's not too late' for meningitis C vaccine](#)", PHE press release, 27 November 2014.
3. PHE (2014). Invasive meningococcal disease (laboratory reports in England): July to September 2014 (Q3/2014). [HPR 8\(48\):13-14](#).
4. Continuing increase in Meningococcal Group W disease in England, [HPR 6\(7\): infection \(news\) report](#), 27 February 2015. See PHE website: [Meningococcal disease: laboratory confirmed cases in England and Wales](#).

Infection reports

Volume 9 Number 7 Published on: 27 February 2015

Vaccine preventable infections

Laboratory confirmed cases of measles, mumps and rubella, England: October to December 2014

Measles, mumps and rubella are notifiable diseases and healthcare professionals suspecting a case are legally required to inform the authorities. Oral fluid testing is offered to all notified cases to confirm the diagnosis. This is part of the enhanced surveillance for these vaccine preventable diseases. Recent infection is confirmed by measuring the presence of IgM antibodies or detecting viral RNA (by PCR) in the samples.

Data presented here are for the last quarter of 2014 (i.e. October to December). Cases include those confirmed by oral fluid testing (IgM antibody tests and/or PCR) at the Virus Reference Department, Colindale and national routine laboratory reports (mumps infections only) (table 1). Analyses are by date of onset and regional breakdown figures relate to Government Office Regions.

Quarterly figures from 2013 for cases confirmed by oral fluid antibody detection only and annual total numbers of confirmed cases by region and age are available from:

<https://www.gov.uk/government/publications/measles-confirmed-cases>

<https://www.gov.uk/government/publications/mumps-confirmed-cases>

<https://www.gov.uk/government/publications/rubella-confirmed-cases>

Table 1. Laboratory-confirmed cases of measles, mumps and rubella and oral fluid IgM antibody tests in notified cases: weeks 40-53/2014

Notified and investigated cases		Confirmed cases						
Infecting virus	Cases reported to HPTs in England*	Oral fluid testing					Other samples	Total
		Number tested	% of reported cases tested	Total positive	Recently vaccinated	Confirmed infections		
Measles	564	370	65.6	12	8	4	–	4
Mumps	1911	1189	62.2	88	1	87	53	140
Rubella	127	80	1	1	–	–	–	0

Notes:

"–" Indicates that testing yielded no positives.

* This represents the number of infections reported as possible cases and investigated by individual PHE centres in England. HPT = Health Protection Team.

Measles

Only four measles infections were laboratory confirmed in England with onset dates in October to December compared to 11 cases in the previous quarter of the year [1]. This brings the total confirmed infections in England for 2014 to 103, compared to 1,413 in 2013.

Three of the four confirmed infections this quarter were identified in London and although an epidemiological link was not identified all had the same measles virus strain, a genotype B3. The fourth case from Yorkshire and the Humber had a history of recent travel to India (genotype D8). All cases reported this quarter were unvaccinated children aged between 1 and 4 years.

In Scotland one case was identified in the same period but none were reported from Northern Ireland or Wales.

Mumps

There were 140 laboratory confirmed cases of mumps in England with onset in the last quarter of 2014 compared to 364 previous quarter bringing the total number of mumps infections for the whole of 2014 to 2,224, below the total for 2013 (3,524 cases) and the lowest annual total since 2003 (figure) [1]. Additionally, three oral fluid samples were confirmed from Wales this quarter bringing the Welsh total for the 2014 to 380.

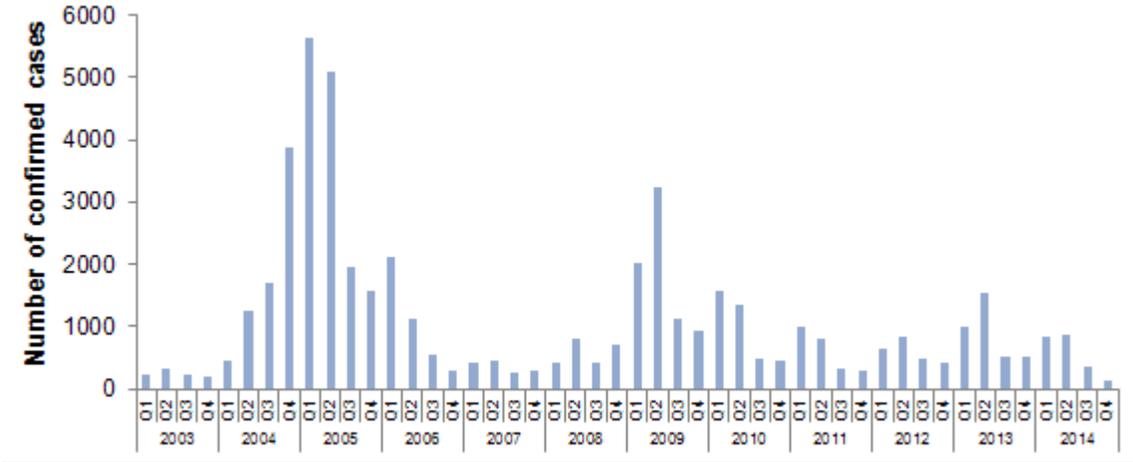
Cases continue to be identified predominantly in young adults between 15 and 30 years of age (84/140 60%, Table 2). Over 26% of all cases this quarter have reported receiving at least one dose of MMR vaccination in childhood, suggesting that some waning immunity may be contributing

to transmission. Mumps cases were identified in all regions of England although greater numbers were reported in London, and the South (table 2).

Table 2. Laboratory confirmed cases of mumps by age group and region, England: weeks 40-53/2014

Region	<1	1-4	5-9	10-14	15-19	20-24	25+	Total
North East	–	–	1	–	2	6	10	19
North West	–	–	1	1	3	4	2	11
Yorkshire & Humber	–	–	4	–	3	1	10	18
East Midlands	–	2	–	1	–	1	4	8
West Midlands	–	–	–	–	3	1	11	15
East of England	–	–	–	–	3	1	11	15
London	–	–	4	1	2	4	12	23
South East	–	–	–	–	3	4	12	19
South West	–	–	–	–	4	7	9	20
Total	–	2	10	3	22	28	75	140

Laboratory confirmed cases of mumps by quarter, England, 2003-2014



Rubella

There were no confirmed rubella infections this quarter and only one confirmed infection this year in a congenitally infected infant.

Reference

1. PHE. Laboratory confirmed cases of measles, mumps and rubella, England: July to September 2014. *Health Protection Report HPR* [serial online] 2014 [cited 28 November 2014]; 8(45): Immunisation. Available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/382399/hpr4514.pdf

Infection reports

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Vaccine preventable infections

Laboratory reports of *Haemophilus influenzae* by age group and serotype (England and Wales): October to December 2014, and consolidated annual report for 2014

- ▶ Laboratory reports of Hib by age group and serotype: Q4/2014
- ▶ Laboratory reports of Hib by age group and serotype, annual report

Laboratory reports of *Haemophilus influenzae* by age group and serotype, England and Wales: fourth quarter 2014

In the fourth quarter of 2014 (October to December) there was a total of 176 laboratory confirmed cases of invasive *Haemophilus influenzae* (Hi). This represents an 8% decrease in the number of cases compared to the fourth quarter of 2013 (n=192). There were 96 cases in the third quarter of 2014.

Of the samples which underwent serotyping (n=145), 86% were non-capsulated *Haemophilus influenzae* (nHi), a further 13% were serotype a, e, or f, and 1% were serotype b (Hib). There was a 6% increase (from 80% in 2013 to 86% in 2014) in the proportion of nHi cases and 53% decrease (from 3% in 2013 to 1.4% in 2014) in the proportion of Hib cases compared to the third quarter of 2013 when; 80% of serotyped samples were nHi, 16% were serotype a, e, or f and 3% were Hib.

Age-group was well reported (see table). Of the laboratory confirmed cases during the fourth quarter of 2014: 80% were aged 15 years and over; 10% were under one year of age, 9% were 1-4 years old, and 3% were among 5-14 year olds. In the third quarter of 2013: 86% were aged 15 years and over; 6% were under 1 year of age, and 4% were among both the 1-4 and 5-14 year olds. There was a 33% increase (from 27 in 2013 to 36 in 2014) in Hi cases among children aged 1-14 years compared to the fourth quarter of 2013; this was due to an increase in the number of nHi cases from 19 to 27. Among those aged 15 years and over there was 15% decrease (from 165 in 2013 to 140 in 2014).

During this quarter, 90% of cases in children under 15 years were nHi (n=27/30). There were no cases of Hib this age-group during the fourth quarter of 2014 or the fourth quarter of 2013.

Age distribution of laboratory-confirmed cases of *Haemophilus influenzae* by serotype England and Wales, fourth quarter 2014 (and 2013)

Serotype	Age-group					Total, third quarter 2014 (2013)
	<1y	1-4y	5-14y	15+	nk	
b	– (–)	1 (–)	1 (–)	2 (5)	– (–)	2 (5)
nc	15 (10)	10 (4)	2 (5)	97 (113)	– (–)	124 (132)
a,e,f	1 (2)	2 (3)	– (1)	16 (21)	– (–)	19 (27)
not typed	2 (–)	3 (–)	1 (2)	1 (2)	– (–)	13 (28)
Total	18(12)	15 (7)	3 (8)	140 (165)	– (–)	176 (192)

Notes: "–" Indicates that testing yielded no positives. Percentages may not add up to 100 due to rounding.

Laboratory reports of *Haemophilus influenzae* by age group and serotype, England and Wales: annual report for 2014

During 2014 (January to December inclusive) there was a total of 665 laboratory confirmed cases of invasive *Haemophilus influenzae* (Hi). This was similar to the 644 cases confirmed in 2013 (3% increase). Of the samples which underwent serotyping (n=541; 81%), 85% were non-capsulated *Haemophilus influenzae* (nHi), a further 13% were serotype a, e, or f, and 2% were serotype b (Hib). In comparison, in 2013; 84% of serotyped samples (n=528, 82%) were nHi, 12% were serotype a, e, or f, and 4% were Hib. The reduction in cases of Hib was due to a decline in the number of cases among those aged 15 years and over from 17 in 2013 to 9 in 2014 (47% decrease).

Age-group was well reported (Table). During 2014, 81% of all Hi cases were aged 15 years and over; 9% were under one year of age; 6% were 1-4 years old; and 3% were 5-14 years old. The majority of serotyped cases in children under 15 years were nHi (n=93/106; 89%). This differed from 2013, where: 86% were aged 15 years and over; 8% were under one year of age; 3% were among 1-4 year olds and 5-14 year olds respectively.

The 44% (from 72 in 2013 to 106 in 2014) increase in cases among children under five years old was due to a two-fold (from 14 to 30 cases) increase in the number of nHi cases among children aged 1-4 years old and a 20% (from 41 to 49 cases) increase in nHi cases among those aged under one year in 2014 compared to 2013.

Annual distribution by serotype and age group 2014 (and 2013)

Serotype	Age-group					Total, 2014 (2013)
	<1y	1-4y	5-14y	15+	nk	
b	1 (2)	1 (-)	1 (-)	9 (17)	- (-)	12 (19)
nc	49 (41)	30 (14)	14 (14)	367 (376)	- (-)	460 (445)
a,e,f	6 (2)	4 (5)	- (3)	59 (54)	- (-)	69 (64)
not typed	7 (6)	8 (2)	3 (4)	106 (104)	- (-)	69 (64)
Total	63 (51)	43 (21)	18 (21)	541 (551)	- (-)	665 (644)

Notes: "-" Indicates that testing yielded no positives. Percentages may not add up to 100 due to rounding.

As reported previously (1), cases of invasive Hib disease have declined since the introduction of the Hib conjugate vaccine in 1992 and remained at low levels since the introduction of a fourth dose of vaccine in 2006 (Figure). In 2014, invasive Hib disease continued to be well controlled across all age groups. Compared to 2013, Hib cases declined by 36% (from 19 to 12 cases); this was due to the decrease in cases among those aged 15 years and over.

During 2014, there were three cases of Hib among children who were eligible for immunisation; none of whom had been immunised. One child presented with pneumonia, one with bacteraemic-tonsillitis, and one with bacteraemia; all subsequently recovered. In 2013, there were two cases of Hib among age-appropriately immunised infants; one presented with meningitis and the other with cellulitis; both fully recovered.

There were no deaths attributed to invasive Hib disease in 2014 or 2013; the most recent death in a child aged under 16 years attributed to invasive Hib disease was in 2011.

Reference

1. Public Health England (2014). Laboratory reports of *Haemophilus influenzae* by age group and serotype (England and Wales): annual report for 2013, *HPR* 8(8): immunisation. Available at: <http://webarchive.nationalarchives.gov.uk/20140505162355/http://www.hpa.org.uk/hpr/archives/2014/hpr0814.pdf>

Infection reports

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Vaccine preventable infections

Pertussis Vaccination Programme for Pregnant Women: vaccine coverage estimates in England, September to December 2014

Background to the pertussis vaccination in pregnancy programme

In the UK the introduction of routine national immunisation against pertussis (whooping cough) in 1957 resulted in a marked reduction in pertussis notifications and deaths [1]. Despite a sustained period of high vaccine coverage since the early 1990s, pertussis has continued to display 3-4 yearly peaks in activity. In the five years prior to 2012, on average, there were nearly 800 confirmed cases of whooping cough, 270 babies admitted to hospital and four deaths in babies each year [Health Protection Agency (HPA) unpublished reconciled data]. The highest disease incidence occurs in infants under three months of age who are too young to have completed the primary vaccine course and have the greatest risk of complications and death. In 2012, pertussis activity increased beyond levels reported in the previous 20 years and extended into all age groups, including infants less than three months of age. This young infant group is considered a key indicator of pertussis activity [2] and the primary aim of the pertussis vaccination programme is to minimise disease, hospitalisation and death in young infants.

A national outbreak (level 3 incident) was declared in April 2012 by the HPA to coordinate the response to increased pertussis activity [3]. In response to this on-going outbreak, the Department of Health announced that pertussis immunisation would be offered to pregnant women from 1 October 2012 to protect infants from birth whilst disease levels remain high [4]. This programme aims to passively protect infants from birth, through intra-uterine transfer of maternal antibodies, until they can be actively protected by the routine infant programme with the first dose of pertussis vaccine scheduled at eight weeks of age [5].

Pertussis activity in England persists at raised levels compared to the years preceding the outbreak in 2012 [6]. The greatest reduction in disease since the peak in 2012 has been in infants under six months of age who are targeted by the maternal pertussis vaccination programme. Disease incidence has, as expected, continued to be highest in this age group but case reports are now in line with those seen before the 2012 peak. Up to 31 October 2014, 10 deaths had been reported in young babies with confirmed pertussis who were born after the introduction of the pregnancy programme on 1 October 2012. Nine of these 10 babies were born to mothers who had not been vaccinated against pertussis, all of the 10 babies were too young to be fully protected by vaccination themselves and none had received their first dose of pertussis-containing vaccine [6].

A UK study examining the safety of pertussis vaccination in pregnancy found no evidence of an increased risk of any of an extensive predefined list of adverse events related to pregnancy for women given pertussis vaccination in the third trimester [7]. Two studies using different methods have each shown that babies born to mothers vaccinated at least seven days before delivery had a reduced risk of pertussis disease, of around 90%, in their first few weeks of life when compared with babies whose mothers had not been vaccinated [8, 9]. In June 2014 the Joint Committee on Vaccination and Immunisation (JCVI) considered available data relating to the coverage, effectiveness and safety of the programme, its impact on disease and current epidemiology and advised that the programme should continue for a further five years [10]. This includes the continuation of all surveillance activities introduced to monitor the programme.

Vaccine coverage collection

In England, monthly data on the uptake of pertussis vaccination in pregnancy are collected from GP records via the ImmForm website* and are monitored, validated and analysed by PHE. This data collection is vital to monitor the uptake of the programme, to identify areas of low coverage and inform public health actions.

Methods

Data from April 2014 onwards have been automatically uploaded from participating GP practices to the ImmForm website and analysed by Area Team. This method can collate data from more than 90% of GP practices in England, and replaces the manual system that was previously in use [11].

The monthly denominator for automated data is the number of women who delivered in the survey month at more than 28 weeks gestational age; the monthly numerator is the number of pregnant women who delivered after 28 weeks gestational age in the survey month that received a dose of pertussis-containing vaccine in the preceding fourteen weeks. During the summer of 2014 Boostrix-IPV® replaced Repevax® as the pertussis-containing vaccine used for pregnant women [12].

In addition to the numerator and denominator, the automated survey records the number and percentage of GP practices responding each month. For accurate denominators to be extracted from GP IT systems by the automated survey and precise coverage estimates to be calculated it is important that the medical records of all women who have given birth have the following fields completed:

- ▶ the date of delivery
- ▶ the date of receipt of a pertussis-containing vaccine at or after week 28 of pregnancy, regardless of the setting where the vaccine was administered
- ▶ where relevant, any record of a premature delivery occurring at less than 28 weeks gestational age

Continued support in the delivery of this important programme is being sought from service providers (GP practices and maternity units), Screening and Immunisation Teams and Health Protection Teams. Screening and Immunisation Teams should continue to update service providers on the current epidemiology of the disease, the effectiveness of the vaccination programme and the need to maintain and improve the high coverage achieved. Further information on the pertussis vaccination programme for pregnant women is available here: <https://www.gov.uk/government/collections/pertussis-guidance-data-and-analysis>

This report updates the previous summary of the pertussis vaccination programme for pregnant women for the five months ending 31 August 2014 [11], presenting data collected using the automated reporting system for the four months ending 31 December 2014.

Results

Pertussis vaccine coverage in pregnant women increased from 55.6% in September to 62.3% in December 2014. Monthly pre-natal pertussis vaccine coverage followed a very similar pattern in 2014 to that observed in 2013 with coverage dipping in the summer months and slowly increasing to a peak in December (figure 1). Vaccine coverage in 2013 and 2014 differed by only 0.2-2.2% each month with the exception of May and June when coverage was 3.6% and 3.9% higher in 2014.

When the automated reporting system was first introduced in April 2014 a drop in coverage was observed but this has picked up and the coverage recorded in December 2014 is the highest since the start of the programme in October 2012. There has also been a steady increase in the proportion of GP practices in England participating in the survey each month (ranging from 91.7% in September to 96.6% in December, see figure 2). In September, all Area Teams had at least 79% of GP practices reporting and by December 2014 this had increased to >91%, with 18 Area Teams reporting data from >95% of GP practices.

* ImmForm is the system used by Public Health England to record vaccine coverage data for some immunisation programmes and to provide vaccine ordering facilities for the NHS. <https://www.immform.dh.gov.uk/SignIn.aspx?ReturnUrl=%2f>

Despite the increase in the proportion of GP practices reporting, the number of women recorded as having delivered in each survey month was, at its maximum (in October 2014), only 70% of the average live births (2004-2013) in England for that month (figure 2). Monthly variations in the denominator closely mirror the seasonal variation observed in national deliveries, providing reassurance on the quality of this data collection (figure 2).

Vaccine coverage by Area Team for the period October 2012 to December 2014 is presented in an Appendix associated with this report. In September 2014 only two Area Teams (Birmingham and the Black Country, and London) reported coverage below 50%; London continued to report coverage below 50% for October and November 2014, rising to 51.0% by the end of the year. Ten Area Teams reported $\geq 60\%$ coverage in September, increasing to 20 Area Teams achieving $\geq 60\%$ in December (12 of these over 65%).

Discussion

Pertussis vaccine coverage in pregnant women reached 62.6% in December 2014, the highest recorded since the start of the programme in October 2012. Comparison of the monthly coverage figures in 2013 and 2014 reveals a seasonal pattern to vaccine uptake with a peak in December and a trough between April and July. The increase in coverage from September 2013 to the early months of 2014, and from September to December 2014 coincides with the delivery of the seasonal influenza vaccination programme which also targets pregnant women. Pregnancy has been included as a clinical risk category for routine seasonal influenza vaccination since 2010 [14]. Unlike pertussis vaccination which is offered ideally between weeks 28 and 32 of the pregnancy (but can be up to week 38), inactivated influenza vaccine can be safely and effectively administered during any point of the pregnancy during the flu season, with the bulk of vaccination occurring between October and December every year. During the flu campaign GP practices actively call and recall eligible patients, which should include pregnant women, and this may be having a positive knock-on effect on pregnant women being offered pertussis vaccine at the same time.

Prenatal pertussis vaccine coverage data should be interpreted with caution for several reasons. Coverage may be over-estimated if women who have received the vaccine are more likely to have their delivery date recorded. In addition, this is a sentinel system which does not cover all GP practices in England, however the proportion of GP practices reporting went up to 96% in December. There may also be variation between the reporting practices with respect to the completeness of the recording of delivery dates in the mother's medical records and as demonstrated by comparison with national data on live births (figure 2), these returns are incomplete and represent about 70% of the population of pregnant women, however, monthly variations in the denominator closely mirror the seasonal variation observed in national deliveries, providing reassurance on the quality of this data collection. Furthermore, women not registered with a GP (and therefore less likely to be having regular contact with the health service prior to delivery) will not be captured by this reporting system.

However, despite these factors contributing to potential over-estimation of coverage, comparison with other data sources examined to estimate the vaccine coverage of this programme suggests that this methodology may be under-estimating coverage [11]. If coverage, and ultimately the impact of the programme itself, is to be accurately monitored, it is essential that GPs and practice nurses ensure that vaccination and date of delivery are recorded in the patient's GP record. GPs and midwives should continue to encourage pregnant women to book an appointment to receive the pertussis vaccine, ideally between weeks 28 and 32 of their pregnancy (but up to week 38) [16], to further reduce the incidence of pertussis disease in young infants. It would be helpful to look at examples of good practice in areas achieving consistently high coverage for pertussis vaccination during pregnancy and to consider the potential benefits of an ongoing call and recall system.

Figure 1. Prenatal pertussis vaccine coverage in England, January to December 2014, with 2013 data for comparison

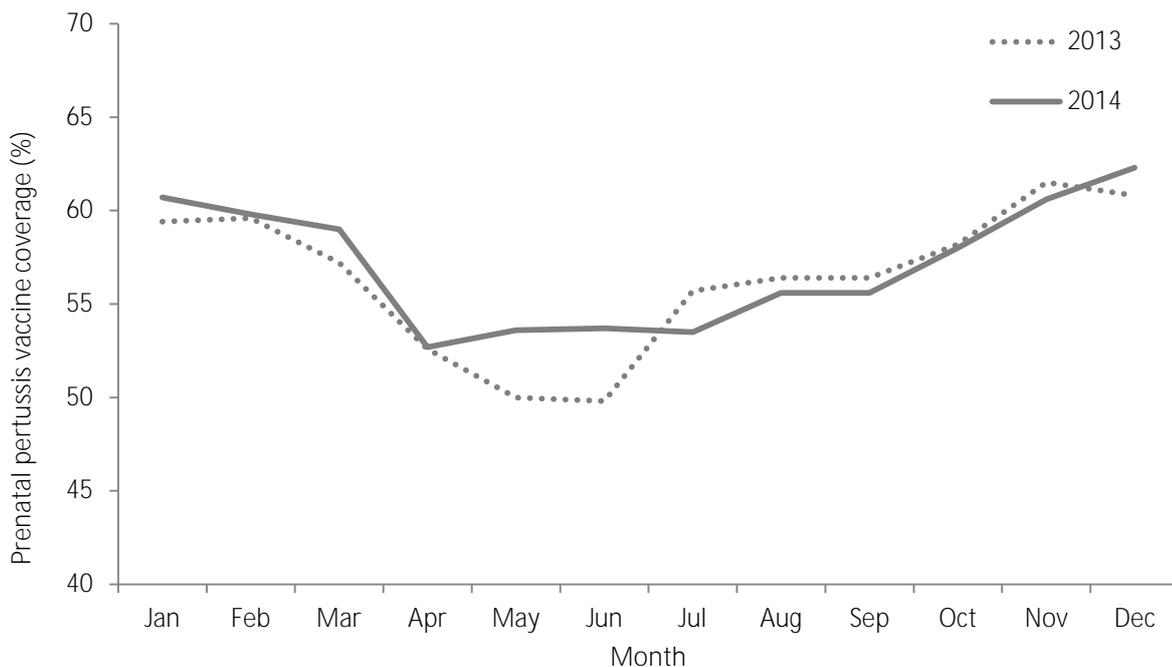


Figure 2. Percentage of GP practices reporting (April to December 2014), and number of women who delivered in the survey month at more than 28 weeks gestational age in 2014 compared with Office for National Statistics (ONS) average live births 2004 to 2013, England



Note: The ONS live births data displayed in figure 2 are derived from England and Wales monthly statistics. They have been adjusted by a factor of 0.95 to represent live births in England only (total live births recorded in England 2008-2013 represented 95% of total live births in England and Wales) [13]. The total number of maternities recorded in England between 2008 and 2010-2013 represented 99% of total live births in England for the same period (data have not been adjusted in this respect) [13].

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Appendix

"Prenatal pertussis Vaccine Coverage Monitoring Programme, England, monthly surveys Oct 2012 to Dec 2014" is available on the HPE website at: [Pertussis immunisation in pregnancy: vaccine coverage estimates \(England\)](#).