



## Infection report

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### Laboratory confirmed cases of pertussis reported to the enhanced pertussis surveillance programme in England during April to June 2016 (Q2/2016)

In England there were 1447 laboratory confirmed cases of pertussis (culture, PCR, serology or oral fluid) reported to the Public Health England (PHE) pertussis enhanced surveillance programme in the second quarter of 2016, from April to June 2016 (table 1). Total cases were 51% higher than those reported in the same quarter of 2015 (958 cases).

The then HPA declared a national outbreak of pertussis (level 3 incident [1]) in April 2012 and, as a response to the ongoing outbreak and high number of infant deaths, the Department of Health announced the introduction of a temporary immunisation programme for pregnant women on 28 September 2012 [2]. From 1 April 2016 the recommended gestational age for vaccination was revised to between 16-32 weeks, and for operational reasons, should be offered from around 20 weeks on or after the foetal anomaly scan [3].

Pertussis vaccine coverage in pregnant women increased from 64.6% in April 2016 to an average of 70.0% between May and September 2016, 14% higher than the same period in 2015. This increase is thought to be associated with changes to the data extraction criteria from April 2016 and suggests coverage estimates prior to this may have been under-estimated. In addition, the extended eligibility criteria for the vaccine, available to women from 16 weeks of pregnancy since April 2016 (previously available from 28 weeks), would have started to impact coverage from September 2016, and this may have also contributed to the increase [4].

Following the high levels of activity in 2012 (see figure), an overall decrease has been observed with slight annual increases in the third quarters of 2013, 2014 and 2015, in line with the usual seasonal pattern. Pertussis cases usually increase in the third quarter of each year and follow a recognised epidemiological pattern of 3-4 yearly cyclical peaks. The number of laboratory confirmed cases in the first quarter of 2016 (1266 cases) was 13% higher than the 1124 reported during October to December 2015 (Q4). An increase into quarter 1 is not usually observed. This pattern of increase is consistent with that observed nationally in 2011 heading into the 2012 peak. The increase in the number of laboratory confirmed cases continued into quarter 2 (14% higher) and the 2713 confirmed cases in the first half of 2016 were 56% higher than the first half of 2015 (1739 cases) however confirmed cases were 15% lower than the 1697 reported in the second quarter of 2012 (figure and table 2).

Total case numbers of pertussis in all age groups were higher in Q2 2016 than in Q2 2015 (table 2) with the greatest number of laboratory confirmed cases in England persisting in individuals aged 15 years and over. Overall activity remained higher in all age groups from one year and older relative to the pre-2012 peak and exceeded all previous years in the 1-4 and 5-9 year age group in the second quarter of the year. Ascertainment in those aged 5-16 years has improved with availability of oral fluid testing [5].

Although disease incidence continues to be highest in infants <3 months, the number of laboratory confirmed cases aged under three months (50 cases) in the second quarter of 2016) was 61% higher than the 31 cases reported in the same quarter of 2015 (table 2) but remains low relative to the same period in 2012 (118 cases). No deaths have been reported in infants with pertussis confirmed between April and June 2016. Of the 16 infants who have died

following confirmed pertussis disease and who were born after the introduction of the maternal programme on 1 October 2012, 14 have been born to mothers who had not been immunised against pertussis during pregnancy.

Surveillance data in young infants following the introduction of the pertussis immunisation in pregnancy programme are encouraging as a relatively low incidence has been maintained in this age group, with expected seasonal increases. It is important to be aware, however, that raised levels of pertussis persist in groups aged one year and older and women should therefore continue to be encouraged to be immunised against pertussis during pregnancy (ideally between 20-32 weeks) in order to protect their babies from birth. The pertussis immunisation in pregnancy programme in England has shown high levels of protection against pertussis in babies born to vaccinated mothers [6,7,8]. The Medicines and Healthcare Products Regulatory Agency also found no safety concerns relating to pertussis vaccination in pregnancy based on a large study of nearly 18,000 vaccinated women with similar rates of normal, healthy births in vaccinated and in unvaccinated women [9].

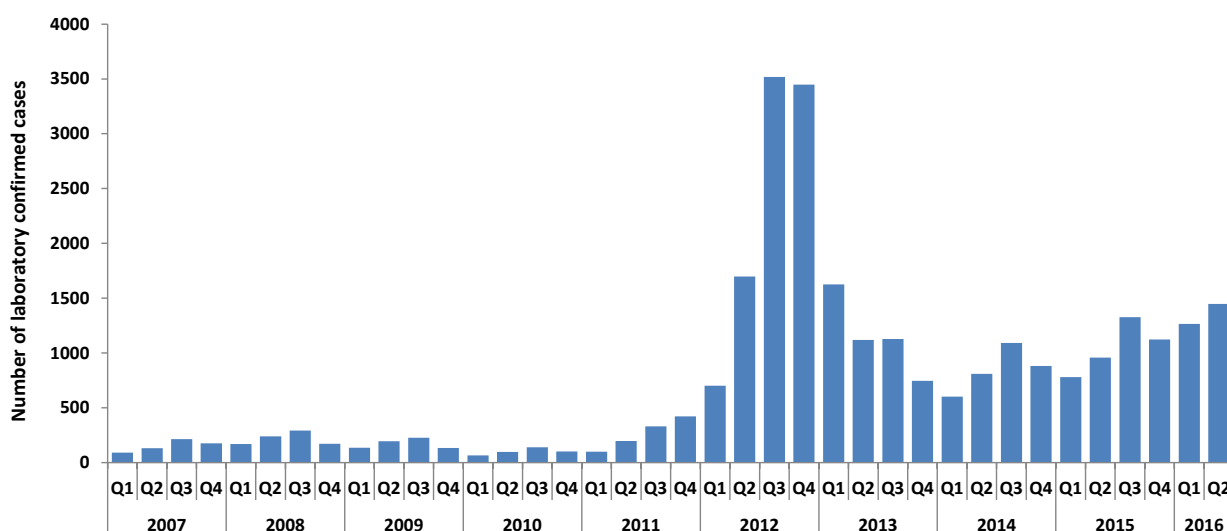
The pertussis disease annual report for 2015 (10) provides details of appropriate laboratory investigation of suspected cases of pertussis which may be affected by the age of the suspect case and time since onset of their symptoms.

**Table 1. Laboratory-confirmed cases of pertussis by age and testing method in England, April to June 2016**

Age group	Culture*	PCR	Serology	Oral fluid only	Total
<3 months	22	27	1	0	50
3-5 months	5	9	1	0	15
6-11 months	5	1	0	0	6
1-4 years	8	4	21	1	34
5-9 years	3	6	45	28	82
10-14 years	7	3	114	31	155
15+ years	15	10	1069	11	1105
Total	65	60	1251	71	1447

\* Culture confirmed cases may additionally have tested positive using other methods. Submission of all presumptive *B. pertussis* isolates is encouraged for confirmation of identity and to allow further characterisation for epidemiological purposes.

**Total number of laboratory-confirmed pertussis cases per quarter in England, 2007 to 2016 (Q2).**



**Table 2: Laboratory-confirmed cases of pertussis by age and year England, April to June: 2012-2016**

Age group	2012	2013	2014	2015	2016
<3 months	118	25	26	31	50
3-5 months	16	12	1	4	15
6-11 months	5	4	2	4	6
1-4 years	12	8	8	14	34
5-9 years	36	19	37	48	82
10-14 years	216	119	89	138	155
15+ years	1294	933	647	719	1105
<b>Grand Total</b>	<b>1697</b>	<b>1120</b>	<b>810</b>	<b>958</b>	<b>1447</b>

## References

1. [National increase in laboratory-confirmed pertussis cases in England and Wales](#), *HPR* 6(15), 13 April 2012.
2. Department of Health: <https://www.gov.uk/government/news/pregnant-women-to-be-offered-whooping-cough-vaccination>
3. JCVI minutes: <https://www.gov.uk/government/groups/joint-committee-on-vaccination-and-immunisation#minutes>
4. [Pertussis Vaccination Programme for Pregnant Women: vaccine coverage estimates in England, April to September 2016](#), *HPR* 10(41), 25 November 2016.
5. [Laboratory confirmed cases of pertussis reported to the enhanced pertussis surveillance programme in England during October to December 2014](#), *HPR* 10(16), 6 May 2016.
6. G Amirthalingam, N Andrews, H Campbell, S Ribeiro, E Kara, K Donegan, N K Fry, E Miller, M Ramsay (2014). Effectiveness of maternal pertussis vaccination in England: an observational study. *Lancet* doi:10.1016/S0140-6736(14)60686-3
7. Dabrera G, Amirthalingam G, Andrews N et al (2014). A Case-Control Study to Estimate the Effectiveness of Maternal Pertussis Vaccination in Protecting Newborn Infants in England and Wales, 2012–2013. *Clin Infect Dis* doi: 10.1093/cid/ciu821.
8. G Amirthalingam, H Campbell, S Ribeiro, N K Fry, M Ramsay, E Miller, N Andrews (2016). Sustained Effectiveness of the Maternal Pertussis Immunization Program in England 3 Years Following Introduction. *Clin Infect Dis* doi: 10.1093/cid/ciw559.
9. Donegan K, King B, Bryan P (2014). Safety of pertussis vaccination in pregnant women in UK: observational study. *BMJ* 349: g4219.
10. [Laboratory confirmed cases of pertussis in England: annual report for 2015](#), *HPR* 10(16), 6 May 2016.