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Laboratory confirmed cases of pertussis in England: annual report for 2019

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In England, there were 3681 laboratory confirmed cases of pertussis (culture, PCR, serology or oral fluid) reported to the Public Health England (PHE) pertussis enhanced surveillance programme in 2019. Pertussis is a cyclical disease, with increases occurring every 3-4 years, with pertussis activity usually peaking each year in quarter three. The 3681 confirmed cases in England in 2019 were 25% higher than the 2948 reported in 2018 (Figure 1). Almost a third (32%; 1174/3681) of all confirmed cases in England in 2019 were reported in the third quarter (July to September) (table1).

The maternal pertussis immunisation programme, introduced in response to the 2012 outbreak [1], became permanent from June 2019 [3] based on evidence of disease impact, high effectiveness and safety. [4,5,6,7] The recommended gestational age for vaccination is between 20-32 weeks, ideally after the 20-week scan, but the vaccine can be given as early as 16 weeks [3] for pragmatic reasons to ensure vaccination.

The national incidence for all age groups, based on laboratory confirmations in England and 2018 population estimates [10], was 7 per 100,000 in 2019 compared to 5/100,00 in the previous year and 8/100,000 in 2017; it reached 18/100,000 in 2012 (epidemic peak year). Prior to the major peak in 2012, incidence ranged between 0.4/100,000 to 2/100,000 (figure 2).

Laboratory confirmed pertussis cases in infants aged under one year, were 48% higher in 2019 (136 cases) than in 2018 (92 cases). This compares with 508 confirmed cases reported in 2012.

There has been a decline in pertussis incidence in infants under 3 months of age since the introduction of the maternal vaccination programme, from 234/100,000 in 2012 to 93/100,000 in 2016 and 52/100,000 in 2019 (figure 2). The number of confirmed cases in infants <3 months in 2019 was 69% higher (83 cases) than in 2018 when 49 cases were reported, the lowest number of confirmed cases since the introduction of enhanced surveillance in 1994. Incidence does however remain highest in infants under 3 months who are at most risk of severe disease and too young to be fully vaccinated.

Cases in older infants have also remained low since the 2012 epidemic peak when there were 74 cases (43/100,000) in infants aged 3-5 months. There were 32 cases (20/100,000) in this age group in 2019 compared to 26 (16/100,000) in 2018. In the 2016 cyclical peak, confirmed cases aged 6-11 months were higher (34 cases, 10/100,000) than in any year since the introduction of enhanced surveillance. In both 2017 (16 cases) and 2018 (17 cases), the incidence in this age group was 5/100,000 and 21 cases (7/100,000) reported in 2019. These low numbers are consistent with protection from primary vaccination offered at 2, 3 and 4 months of age.

In all children aged 1 year and older, numbers of confirmed cases were higher in 2019 than in 2018 (69% higher in those aged 1-4 years, 60% higher in 5-9 year olds and 62% higher in 10-14 year olds). Ascertainment in those aged 5 to <17 years has improved with availability of oral fluid testing since 2013. From 1 May 2018, the availability of oral fluid testing was extended to all children aged 2 to <17 years which may underpin the increase observed in the 1-4 year age group where confirmation by oral fluid only accounted for 39% of cases.

Most (74%; 2707/3681) (table 2) laboratory confirmed cases in England in 2019 occurred in individuals aged 15 years and older, total numbers in 2019 were 16% higher than in 2018 (2342 cases).

In England, 14 deaths were reported in infants with confirmed pertussis in the 2012 epidemic peak year. Following the introduction of pertussis vaccination in pregnancy there have been 20 further deaths in babies with confirmed pertussis including one death reported in 2019. All the deaths in 2012 and those that have occurred following the introduction of the maternal programme were too young to be fully protected by infant vaccination. Only two of the infants born after the introduction of the maternal programme had a mother who had been vaccinated during pregnancy. In both cases the vaccination was too close to delivery to confer optimal passive protection in the infant.

The most recent PHE figures report that the proportion of mothers due to give birth between January and December 2019 who had been immunised with a pertussis containing vaccine in pregnancy in England ranged from a monthly average of 68.4% (May) to 73.5% (December) [8], continuing at the higher levels seen since April 2016 when changes to the way coverage data are extracted from GP systems and extended gestational eligibility criteria for the vaccine came into effect [9,3].

Annual vaccine coverage for the financial year 2018/19 was 68.8%, 3.1 percentage points lower compared to 2017/18. The decrease could represent a genuine decrease, or a shift from vaccination in general practice to vaccination in maternities which are not always recorded in primary care records [12].

The surveillance data in young infants following the introduction of a programme to immunise pregnant women demonstrate that, despite high levels of circulating pertussis, a relatively low incidence has been maintained in infants being targeted by the programme, even during the expected seasonal increases. It is important to be aware, however, that raised levels of pertussis persist in all age groups other than infants. Women should, therefore, continue to be encouraged to be immunised against pertussis at the optimal time during pregnancy in order to protect their babies from birth. It is important that information on vaccines administered in pregnancy is transferred to primary care and that records held in primary care are updated accordingly. The advice to offer vaccination earlier in pregnancy should lead to more opportunities for pregnant women to be vaccinated and to have their vaccine status checked.

Supplementary data tables from 1994 to 2019 are available to download from:

<https://www.gov.uk/government/publications/whooping-cough-pertussis-statistics>

Figure 1. Total number of laboratory confirmed pertussis cases per evaluation quarter in England: 2010 to 2019

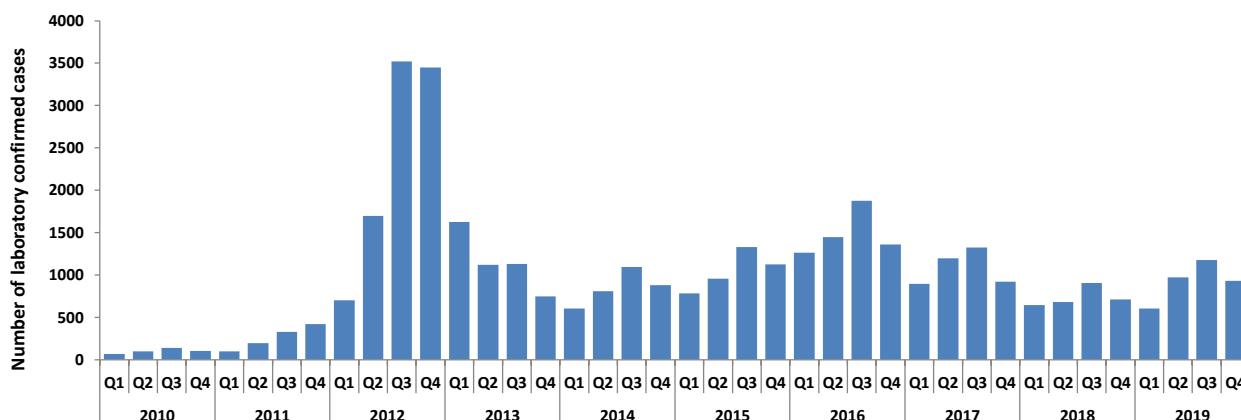


Table 1. Laboratory confirmed cases of pertussis by quarter and test method* in England: 2019

Quarter	Culture	PCR	Serology	Oral fluid only	Total
Jan - Mar	22	41	488	53	604
Apr - Jun	20	74	759	117	970
Jul - Sep	34	74	934	132	1174
Oct - Dec	20	40	784	89	933
Total	96	229	2965	391	3681

* Culture confirmed cases may additionally have tested positive by any other method, PCR confirmed cases may have additionally tested positive by serology or OF and serology confirmed cases may also have been confirmed by OF. Cases are only represented once in the table. Submission of all presumptive *B. pertussis* isolates is encouraged for confirmation of identity and to allow further characterisation for epidemiological purposes.

Figure 2. Incidence of laboratory confirmed pertussis cases by age group in England: 1998-2019

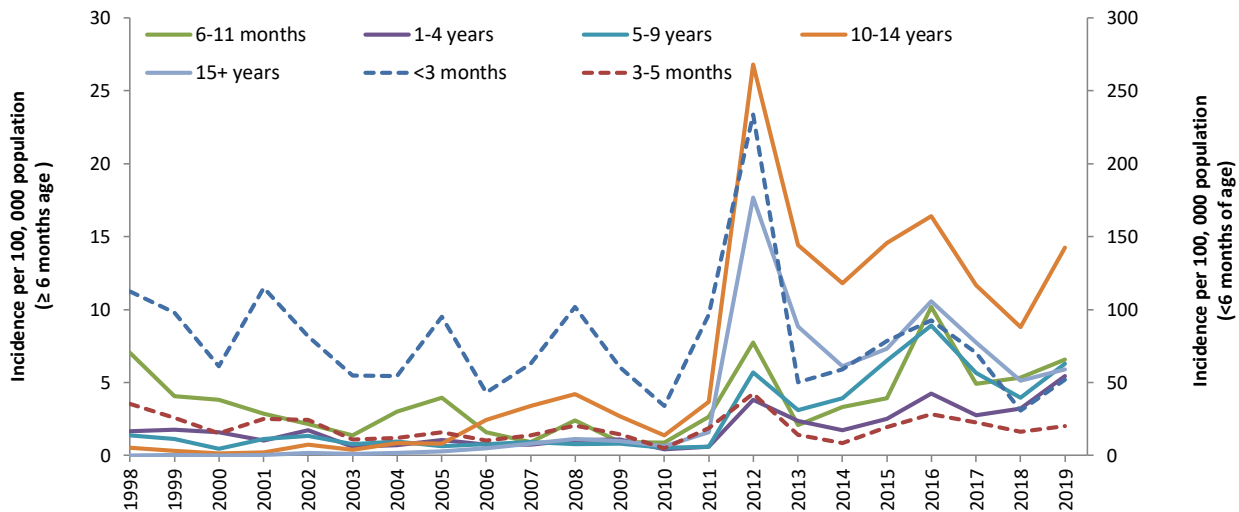


Table 2. Age distribution of laboratory confirmed cases of pertussis by test method* in England: 2019

Age group	Culture	PCR	Serology	Oral fluid only	Total
<3 months	32	51	0	0	83
3-5 months	11	21	0	0	32
6-11 months	7	14	0	0	21
1-4 years	13	47	29	58	147
5-9 years	2	16	95	109	222
10-14 years	5	15	266	181	467
15+ years	26	65	2575	41	2707
Not known	0	0	0	2	2
Total	96	229	2965	391	3681

* Culture confirmed cases may additionally have tested positive by any other method, PCR confirmed cases may have additionally tested positive by serology or OF and serology confirmed cases may also have been confirmed by OF. Cases are only represented once in the table. Submission of all presumptive *B. pertussis* isolates is encouraged for confirmation of identity and to allow further characterisation for epidemiological purposes.

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