

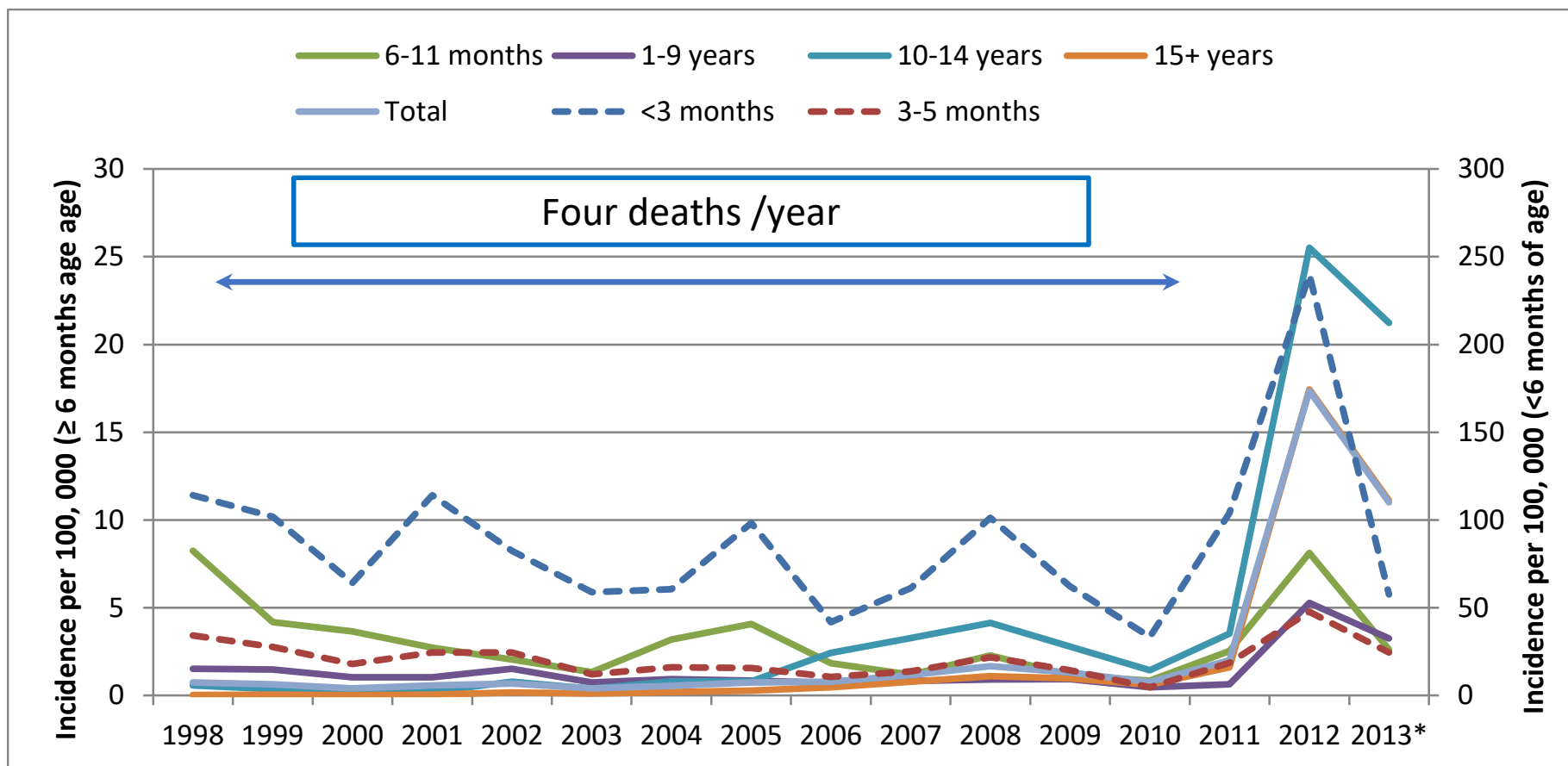
# Pertussis vaccination in pregnant women in the UK

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Declaration of Interest: DMS has acted as a paid consultant to vaccine manufacturers.

## Incidence of laboratory-confirmed pertussis, by total case-patients and age group in England & Wales, 1998–2013 PHE data.



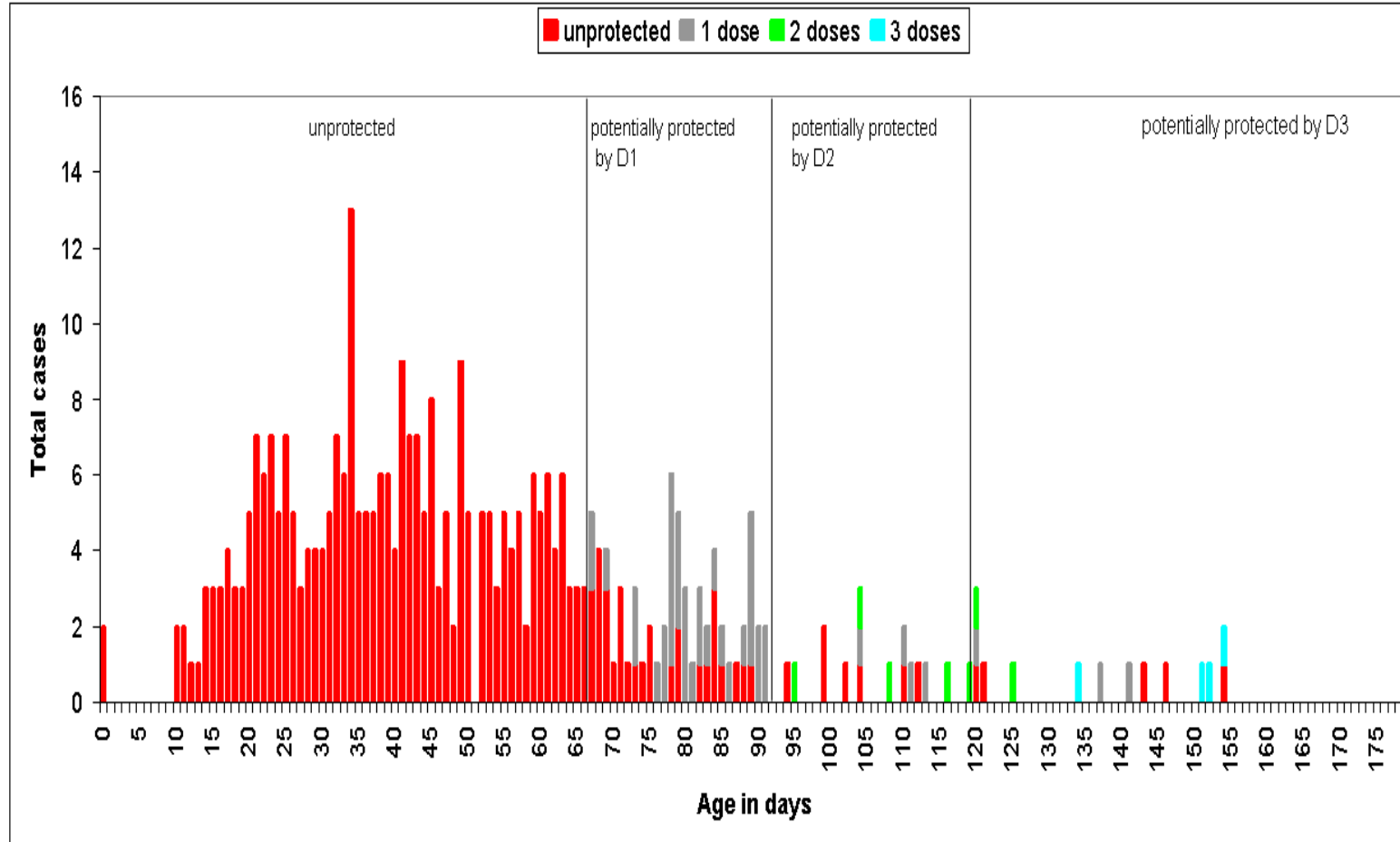
By Aged 24 months	DTaP/IPV/ Hib 3 <sup>rd</sup> dose (%)	MenC 2 <sup>nd</sup> dose (%)	PCV booster(%)	Hib/MenC (%)	MMR 1 (%)
	96.6	95.5	91.2	92.6	92.6

# Options analysis

- Vaccinate adolescents with Tdap/IPV instead of Td/IPV as at present.
- Purpose would be to interrupt transmission.
- Downside – length of time to have an impact.
- Option for the future

# Options analysis: Infants not being vaccinated on time so improve compliance with schedule

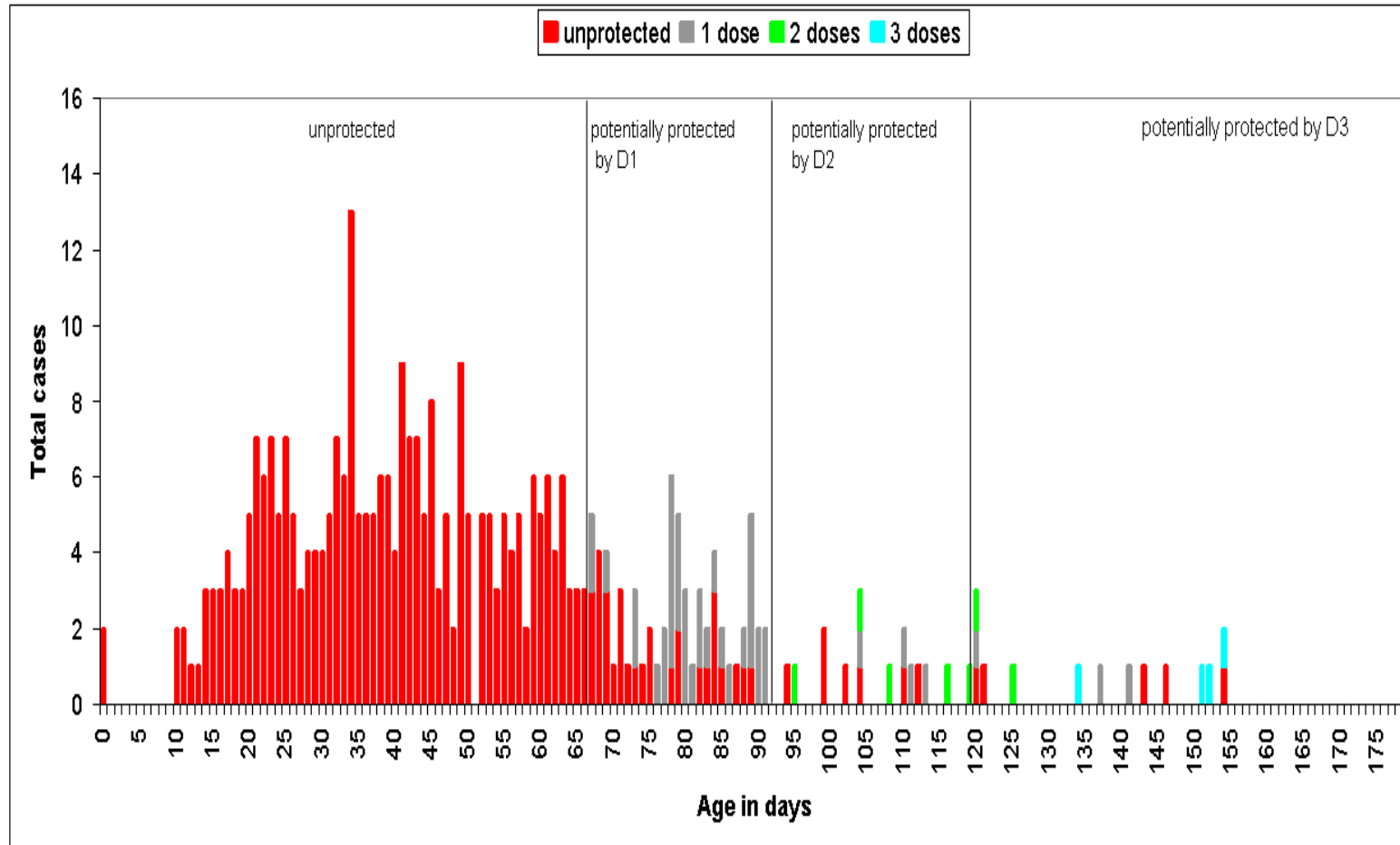
Laboratory confirmed cases of pertussis in England & Wales with vaccine doses administered prior to disease onset in babies <6months of age; 1<sup>st</sup> January 2011 to 10<sup>th</sup> June 2012



\*\* protection based on assumption that antibody response occurs 10 days after 1<sup>st</sup> vaccine dose and 7 days after 2<sup>nd</sup> dose

# Options analysis: Vaccinate earlier starting at 6 weeks

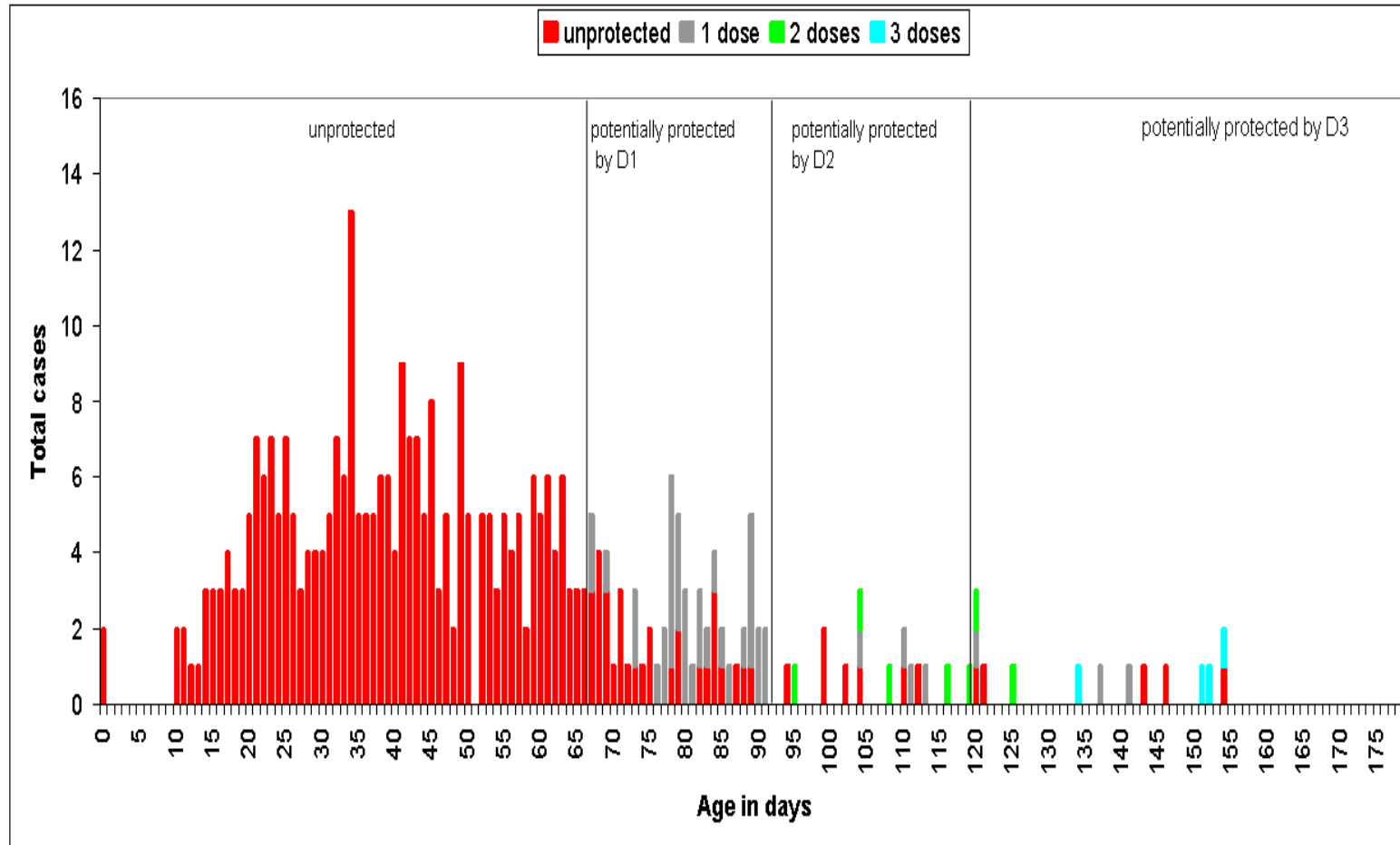
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# Options analysis: Vaccinate pregnant mothers.

Laboratory confirmed cases of pertussis in England & Wales with vaccine doses administered prior to disease onset in babies <6months of age; 1<sup>st</sup> January 2011 to 10<sup>th</sup> June 2012



\*\* protection based on assumption that antibody response occurs 10 days after 1<sup>st</sup> vaccine dose and 7 days after 2<sup>nd</sup> dose

“The Secretary of State would like some information on whooping cough as he’s seen the recent report.”

One month later – new programme implemented to vaccinate all pregnant women in every pregnancy from 28 to 38 weeks of gestation.



## What vaccine was used?

- REPEVAX made by Sanofi Pasteur
- It contains Tetanus, Diphtheria, acellular Pertussis toxoids and inactivated Polio vaccine.
- The Pertussis components are highly purified.
- These are all inactivated or toxoid vaccines
- Repevax is one of the standard vaccines used for a decade in UK children as a pre-school booster. Used in France and Germany as a booster for adults, some of whom were pregnant.
- GPs already have the vaccine in stock and can order supplies, as routinely through ImmForm.

# What did we know about the safety of Repevax?

- Safety profile from paediatric use is excellent.
- Expected adverse reactions are mostly local reactions but some fevers and malaise, briefly.
- We have more 30 years experience of giving tetanus toxoid to pregnant women – a routine WHO recommendation in developing countries, for women in each pregnancy. Same for diphtheria – extensive experience with no safety concerns.
- IPV has also been studied in pregnant women and no safety issues.
- Acellular pertussis vaccines have been given to pregnant women in US studies and no safety concerns identified. Now routinely recommended in pregnancy in the US.

## What does the SPC say about use in pregnancy?

'No teratogenic effects of vaccines containing d, T or IPV have been observed. Limited post-marketing information is available on the safety of administering Repevax to pregnant women. The use of this combined vaccine is not recommended in pregnancy ( **NOTE: this is not a contraindication**).

US SPC states: Adacel vaccine **should be given** to a pregnant woman only if clearly needed.

### **JCVI advice (as in Green Book) is:**

'Healthcare professionals are reminded that in some circumstances the recommendations regarding vaccines given in the Green Book chapters may differ from those in the Summary of Product Characteristics (SPC) for a particular vaccine. When this occurs, the recommendations in the Green Book are based on current expert advice received from the JCVI and should be followed'.

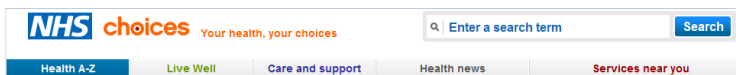
What did JCVI say?

**The Committee has no concerns about the safety of use of this vaccine at any stage of pregnancy.**

<https://app.box.com/s/iddfb4ppwkmtjusir2tc/1/2199012147/18992156735/1>

# Introduction of emergency vaccination programme for pregnant women (Late September 2012 onwards).

- **Vaccination with TdaP/IPV since stocks already available.**
- **All women between 28 and 38 weeks of pregnancy.**
- **Vaccination in each pregnancy.**



## Whooping cough vaccination in pregnancy

It's recommended that, for the time being, all pregnant women should get vaccinated against whooping cough (pertussis) when they are 28-38 weeks pregnant. This is a new recommendation, as there has been a sharp rise in the number of whooping cough cases in the UK.

[Why should pregnant women have the whooping cough vaccine?](#)

[Is the whooping cough vaccine safe in pregnancy?](#)

[What is whooping cough?](#)

[Why do we need to protect against whooping cough?](#)

[Will the vaccine give me whooping cough?](#)

[When should I have the vaccine?](#)

[Can I have the whooping cough vaccine at the same time as the flu jab?](#)

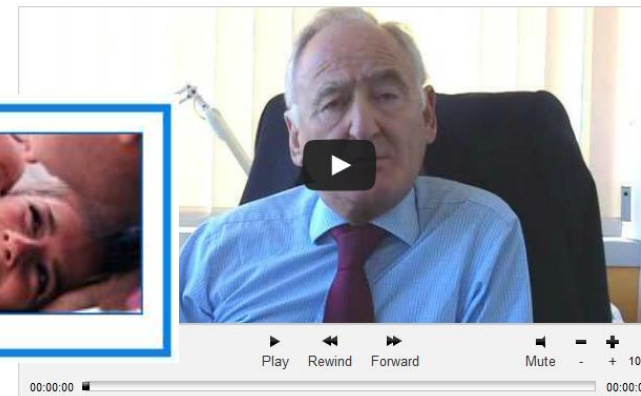
[How can I get the vaccination?](#)

- Related**
- Symptom
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  - Complic

- External**
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### Sign up for emails

Get weekly pregnancy and baby emails, linking to articles and over 100 videos of experts, mums and dads



**NHS**

# Whooping cough and pregnancy

## Help protect your baby

There is a lot of whooping cough around at the moment and babies who are too young to start their vaccinations are at greatest risk. Expectant mothers can help protect their babies by getting vaccinated against whooping cough from week 28 of their pregnancy.



**i**mmunisation  
the safest way to protect yourself and your baby

**NHS**

# Whooping cough and pregnancy

Your questions answered on how to help protect your baby



**i**mmunisation  
the safest way to protect yourself and your baby

**NHS**

Factsheet September 2012

# Pertussis (whooping cough) immunisation for pregnant women



**i**mmunisation  
the safest way to protect yourself and your baby

Professor David Salisbury talking about...

**DH** Department of Health  347 videos

0:07 / 6:28

**NHS**

# Whooping cough and pregnancy

What you need to know and do to help protect your baby



**i**mmunisation  
the safest way to protect yourself and your baby

## Sign up to the emails

### Sign up to emails and text messages

Please complete all the fields below unless otherwise stated. Read our [terms & conditions](#) and [privacy policy](#) for more on our terms of service.

### About you

First name:

I am a:  Mum  Dad

Email:

### About your partner

First name:

They are a:  Mum  Dad

Partner's email:

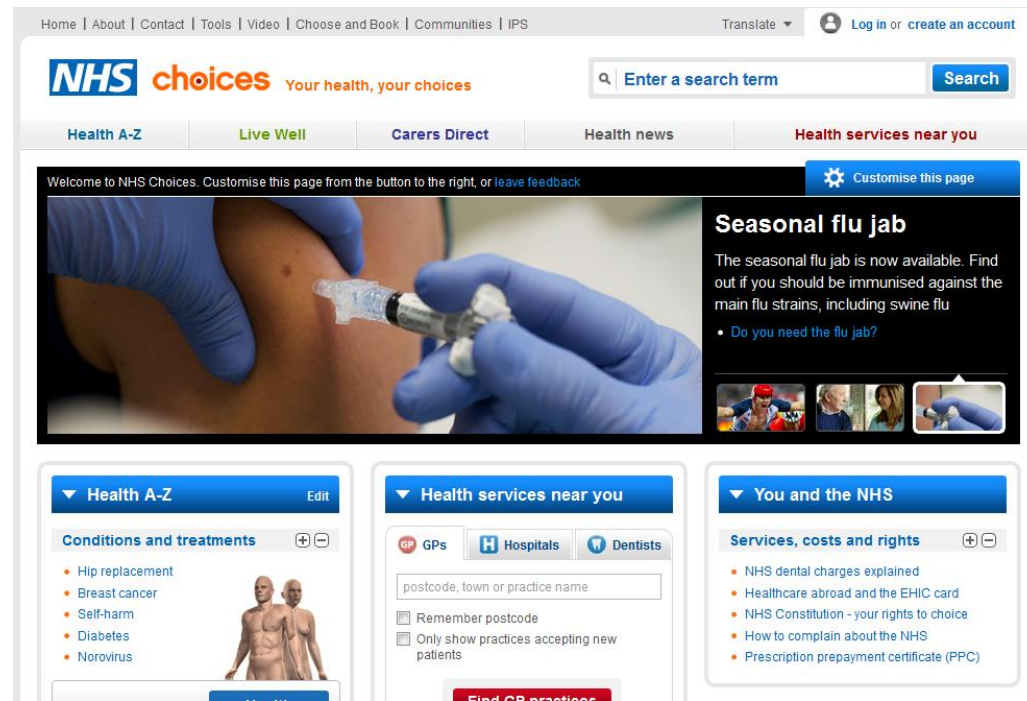
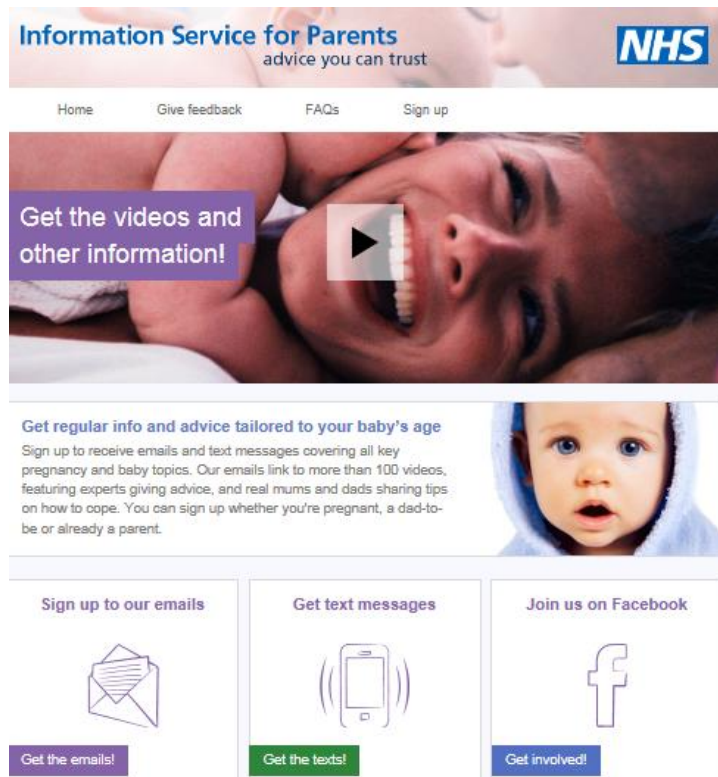
## What is the Information Service for Parents?

A service for mums and dads aimed to help you access the best parenting information available. You can sign up to receive regular emails and text messages, with advice on a range of topics, including:

- How your baby's developing
- Keeping fit and healthy during pregnancy
- Getting ready for your baby's arrival
- Your childcare options
- Money and benefits
- Who's there to support you

## Who can sign up?

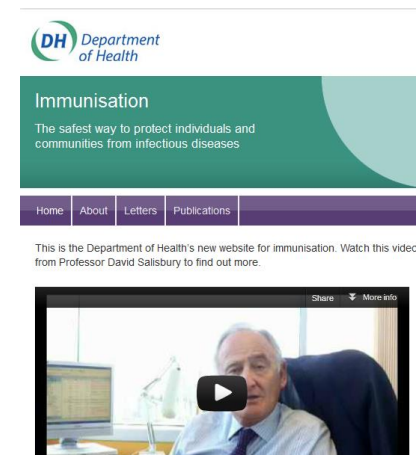
Mums and dads in England who are expecting a baby or who have a child up to 18 months old.



<http://www.nhs.uk/Pages/HomePage.aspx>

<https://www.nhs.uk/InformationServiceForParents/pages/home.aspx>

<http://immunisation.dh.gov.uk/>





Hello

26 weeks

### It's a baby bone-builder!

Make sure you get enough calcium. It's good for you and your baby's growing bones. Foodie calcium sources include dairy foods like milk, cheese and yogurt, fortified breakfast cereals and green leafy veg such as broccoli. Read more about getting enough calcium and other great foods for pregnancy.



[Vitamins and minerals in pregnancy](#) >

### Whooping cough vaccination

You can expect to be offered a vaccination against whooping cough at one of your next antenatal appointments. Due to a sharp rise in the number of whooping cough cases in the UK, it is now recommended that all pregnant women should get vaccinated against whooping cough when they are 28-38 weeks pregnant. Whooping cough is a serious illness and getting vaccinated while you're pregnant may help protect your baby from whooping cough in the first weeks of their life. Find out more about the whooping cough vaccination and why it's recommended.

Hello

34 weeks

### Am I in labour?

Are you anxious about how you'll know when the big event is starting? Try not to worry. Labour usually builds up very slowly. This one-minute video shows you how to spot the clues that your baby is finally on the way.



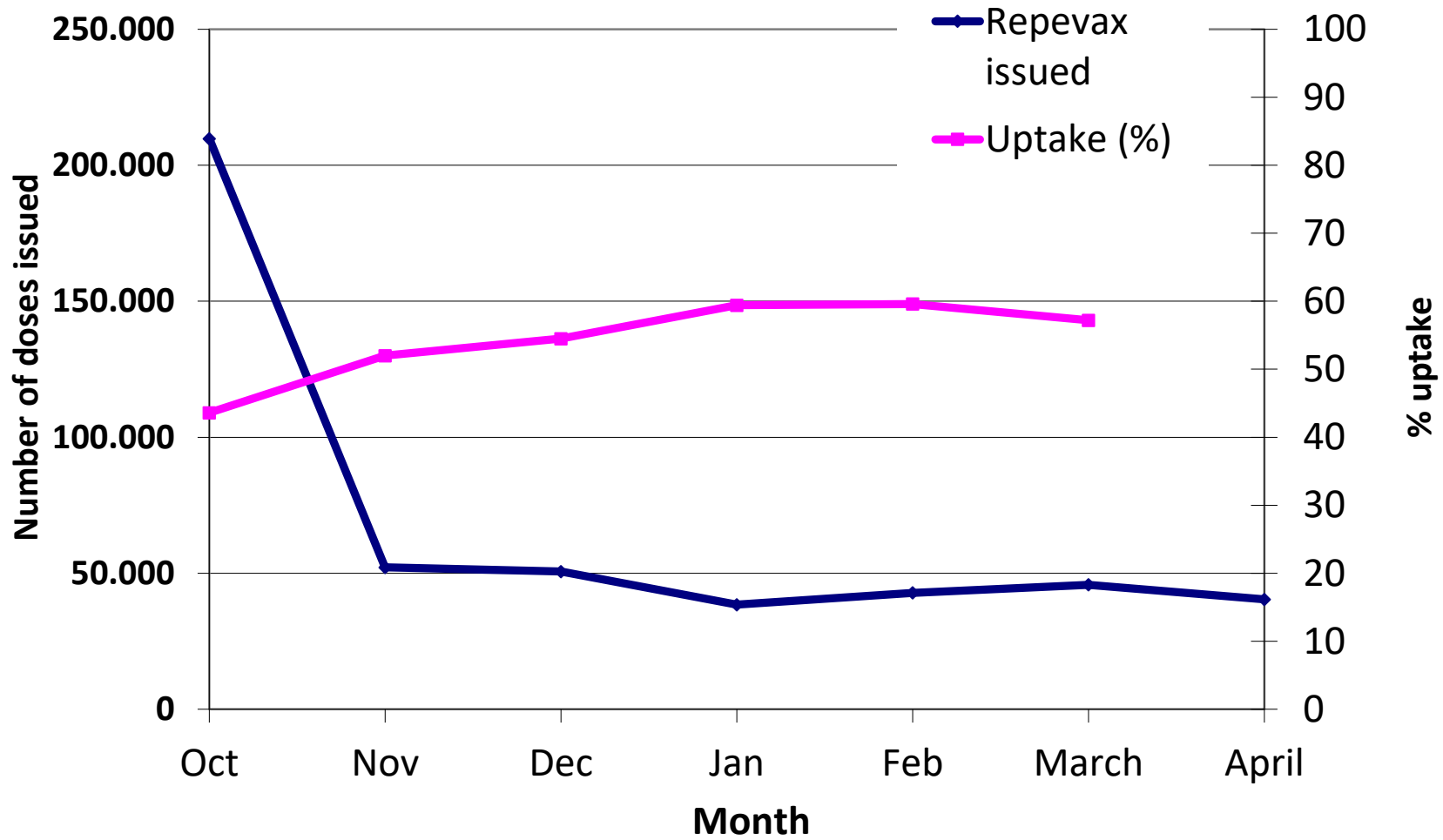
[Watch the video](#) >

### Whooping cough vaccination

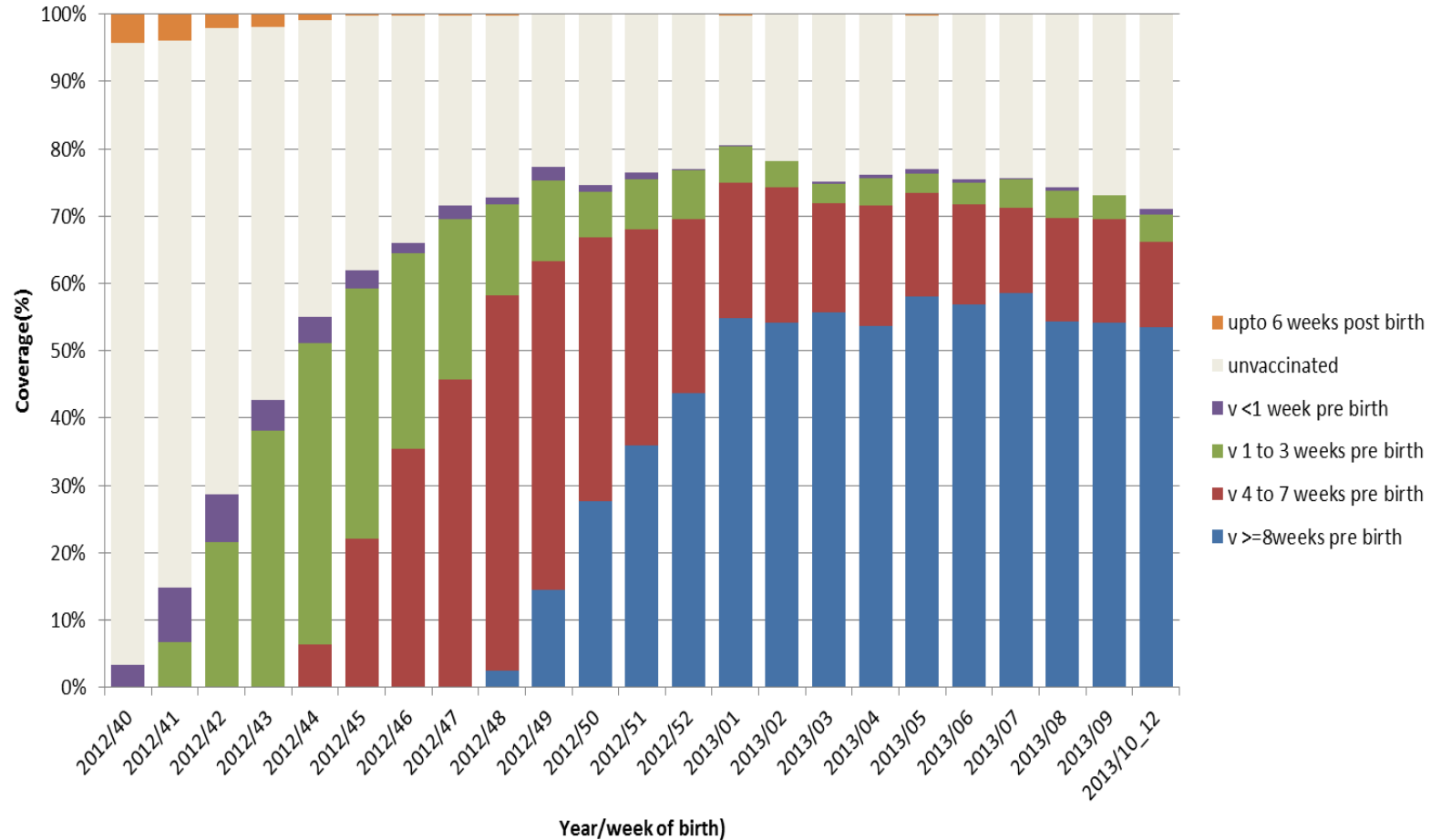
Due to a sharp rise in the number of whooping cough cases in the UK, it is now recommended that all pregnant women should be vaccinated against whooping cough when they are 28-38 weeks pregnant. Whooping cough is a serious illness and getting vaccinated while you're pregnant may help protect your baby from whooping cough in the first weeks of their life. If you haven't heard from your midwife or GP about the vaccination, contact them to discuss having it.

[Whooping cough vaccination](#) >

## Repevax (TdaP/IPV) vaccine issued and monthly vaccine uptake



**Figure1: CPRD Maternal pertussis vaccine coverage by week of child's birth**



Using CPRD: a total of 16146 women with live births from October 1<sup>st</sup> 2012 until the last data extract from their practice were available (6% of births in England).

Safety of pertussis vaccination in pregnant women in UK: observational study  
*BMJ* 2014;349:g4219 Donnegan K, King B, Bryan P.

**Effectiveness of maternal pertussis vaccination in England: an observational study.**  
**Amirthalingam G et al. <http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2814%2960686-3/abstract>**

Analysis	Cases vaccinated / total	VE* (95% CI)
VE for vaccination 28 days before birth	5/29	<b>90%</b> (77% to 96%)
VE for vaccination 7 to 27 days before birth	3/38	<b>76%</b> (42% to 90%)
VE for vaccination 0-6 days before of 1-13 days after birth	2/41	<b>29%</b> (-188% to 83%)

	2008	2009	2010	2011	2012	2013	% change 2013 vs 2012 (95% CI)	% change 2013 vs 2011 (95% CI)
<1 month	24 (3.4%)	16 (2.9%)	6 (2.0%)	16 (2.5%)	43 (0.7%)	10 (0.3%)	-77% (-90 to -53)	-38% (-75 to 46)
1 month	67 (9.5%)	43 (7.7%)	22 (7.2%)	57 (9.1%)	161 (2.7%)	37 (1.0%)	-77% (-84 to -67)	-35% (-58 to 0)
2 months	58 (8.3%)	29 (5.2%)	15 (4.9%)	45 (7.2%)	124 (2.1%)	25 (0.7%)	-80% (-87 to -69)	-44% (-67 to 7)
3-5 months	33 (4.7%)	20 (3.6%)	6 (2.0%)	21 (3.3%)	62 (1.0%)	22 (0.6%)	-65% (-79 to -41)	5% (-45 to 100)
6-11 months	8 (1.1%)	3 (0.5%)	3 (1.0%)	7 (1.1%)	22 (0.4%)	7 (0.2%)	-68% (-89 to -23)	0% (-70 to 234)
1-4 years	21 (3.0%)	19 (3.4%)	7 (2.3%)	10 (1.6%)	58 (1.0%)	41 (1.1%)	-29% (-54 to 7)	310% (102 to 818)
5-19 years	184 (26.2%)	121 (21.8%)	59 (19.4%)	124 (19.7%)	1128 (19.1%)	669 (17.6%)	-41% (-46 to -35)	440% (345 to 559)
≥20 years	307 (43.7%)	304 (54.8%)	186 (61.2%)	349 (55.5%)	4311 (73.0%)	2984 (78.6%)	-31% (-34 to -27)	755% (665 to 860)
Total number of cases	702	555	304	629	5909	3795	-36% (-38 to -33)	503% (454 to 557)
Reported deaths*	5 (CFR 3.4%)	1 (CFR 1.1%)	1 (CFR 2.3%)	3 (CFR 2.5%)	10 (CFR 3.0%)	2 (CFR 2.8%)	..	..

Table shows total number of laboratory-confirmed cases of pertussis in January to September (inclusive) for 2008-13 in England. Data are number of cases in each age group and percentage of total cases in that year. CFR refers to deaths as a percentage of all cases in infants younger than 3 months. CFR=case fatality rate. \*Deaths reconciled from hospital admissions data, follow-up of laboratory-confirmed cases, and death certification.

**Table 1: Laboratory-confirmed cases by age group**

	2008	2009	2010	2011	2012	2013	% change 2013 vs 2012 (95% CI)	% change 2013 vs 2011 (95% CI)
<1 month	31 (9.2%)	24 (10.3%)	10 (8.3%)	25 (10.1%)	73 (11.3%)	18 (6.5%)	-75% (-86 to -58)	-28% (-73 to 37)
1 month	112 (33.1%)	80 (34.5%)	38 (31.4%)	99 (40.1%)	209 (32.3%)	68 (24.7%)	-67% (-76 to -57)	-31% (-50 to -6)
2 months	85 (25.1%)	47 (20.3%)	26 (21.5%)	59 (23.9%)	158 (24.4%)	54 (19.6%)	-66% (-75 to -53)	-8% (-38 to 35)
3-5 months	55 (16.3%)	44 (19.0%)	21 (17.4%)	26 (10.5%)	108 (16.7%)	54 (19.6%)	-50% (-65 to -30)	108% (28 to 246)
6-11 months	22 (6.5%)	10 (4.3%)	7 (5.8%)	11 (4.5%)	30 (4.6%)	11 (4.0%)	-63% (-83 to -25)	0% (-61 to 154)
1-4 years	18 (5.3%)	16 (6.9%)	9 (7.4%)	9 (3.6%)	29 (4.5%)	21 (7.6%)	-28% (-61 to 31)	133% (2 to 479)
5-19 years	11 (3.3%)	7 (3.0%)	5 (4.1%)	7 (2.8%)	23 (3.5%)	12 (4.4%)	-48% (-76 to 9)	71% (-38 to 414)
20+ years	4 (1.2%)	4 (1.7%)	5 (4.1%)	11 (4.5%)	18 (2.8%)	37 (13.5%)	106% (14 to 284)	236% (68 to 631)
Total	338	232	121	247	648	275	-58% (-63 to -37)	11% (-7 to 33)

Table shows total number of hospital admissions for pertussis in January to September (inclusive) for 2008-13 in England. Data are number of admissions in each age group and percentage of total pertussis admissions in that year.

**Table 2: Hospital admissions by age group**

**Effectiveness of maternal pertussis vaccination in England: an observational study. Amirthalingam G et al.**  
<http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2814%2960686-3/abstract>

## Pertussis vaccination of pregnant women: safety studies

- A prospective study using the Clinical Practice Research Database (CPRD) examined a range of pre-defined pregnancy-related adverse events.
- Data on the known rates of events were used to examine the short term risk following vaccination using observed vs. expected analyses.
  - Intrauterine death / stillbirth, Pre-eclampsia / Eclampsia, Ante- / post-partum haemorrhage, Uterine rupture, Placenta praevia, Vasa praevia, Foetal distress, Pre-term birth .
- There was no increase in the rates of specific events in vaccinated women (17,000), including stillbirths.
- For stillbirths, a further matched cohort study was undertaken using the CPRD with three historic controls matched to each vaccinated woman (6,000 vaccinated women matched to 18,000 controls).
- There was no increase in the rate of stillbirths following pertussis vaccination in pregnant women.

Safety of pertussis vaccination in pregnant women in UK: observational study

*BMJ* 2014;349:g4219 doi: 10.1136/bmj.g4219. Donegan K, King B, Bryan P.

## Pertussis vaccine coverage in pregnant women and impact - 2017

Pertussis vaccine coverage in pregnant women averaged **73.8%** across January to March 2017. Vaccine coverage in 2017 remains at the highest level recorded relative to corresponding time points in all previous years.

Although the numbers of deaths in babies born in the three and a half years since the maternal vaccination programme was introduced has fallen, in England, there have been a further 16 deaths in babies aged ten weeks or younger with confirmed pertussis during this time.

**Only two of these babies had mothers who were vaccinated during pregnancy** and in both cases, vaccination was too close to delivery to confer optimal passive protection to the infant.