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Coverage of pertussis and influenza vaccination in pregnant women in Wales 2014/15

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Purpose and Summary of Document:

Our aim was to ascertain coverage of pertussis and influenza vaccine in a sample of pregnant women at the point of their delivery. The survey was conducted on women in post natal wards during one week in February/March 2015. Self-reported uptake was 69.1% for pertussis vaccination, 72.4% for influenza vaccination and 64.3% for both pertussis and influenza vaccination. An offer of both vaccines during pregnancy was recalled by 90.0% of the women surveyed. Coverage of pertussis vaccination has remained stable this year whilst uptake of influenza vaccination has increased from 70.5% last year to 72.4% this year.

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1 Background

Following a rise in the number of cases of whooping cough in young babies during 2012, the Chief Medical Officer (CMO) for Wales announced on 28th September 2012 that pregnant women will be offered vaccination to protect their newborn babies (Welsh Government, 2012). Cases of pertussis in infants born to vaccinated mothers have reduced by over 90% as a result of the programme (Amirthalingam *et al*, 2014). In light of the success of the temporary pertussis vaccination programme in saving infant lives and the continued increase in pertussis incidence, the Joint Committee on Vaccination and Immunisation (JCVI) recommended in June 2014 that the programme should be extended for a further five years. Currently a robust and convenient method for ascertaining uptake of pertussis vaccine in this group, at the point of immunisation, is not available in Wales.

Pregnant women are at higher risk of complications of influenza and therefore are also recommended to receive seasonal influenza vaccine (Welsh Government, 2014). Although routine surveillance data is collected automatically from General Practice on vaccinations given to pregnant women, difficulties in ascertainment of the denominator using General Practice Read codes mean that these data may not be relied upon as an absolute measure and are known to underestimate uptake.

This annual survey was established to provide robust estimates of coverage of pertussis and influenza vaccine in pregnant women at the time of delivery. This year, the survey was conducted in early February 2015¹ in all the main maternity units in Wales.

2 Introduction

2.1 Pertussis

Pertussis incidence typically has a cyclical pattern with peaks of cases every three to four years. The peak prior to 2014 in England and Wales was in 2008, with 902 laboratory confirmed cases (PHE, 2014). In 2012, there was a significant increase in the number of pertussis cases reported in the UK (Kmietowicz, 2012) and in USA (Centers for Disease Control and Prevention, 2015), New Zealand (Institute of Environmental Science and Research Ltd, 2012) and Australia (Government of Western Australia, 2012). In Wales, there were 344 confirmed cases in 2012, 29 cases were in infants under one year of age of which 22 were aged under three months (PHE, 2014). Children under one year of age are the group most susceptible to serious complications. Since 2012, the number of confirmed pertussis cases in Wales for all ages has decreased to 212 cases in 2013 and the provisional figure for cases in Wales during 2014 is currently 114. There has been a decline in the number of pertussis cases in children aged under three months but an increase in the number of cases in those over 5 years of age in recent years. However, annual totals remain higher than annual numbers of confirmed cases reported between 1999 and 2011 (PHW, 2014).

¹ One Health Board conducted the survey between 9 March and 13 March 2015.

2.2 Influenza

Influenza presents significant risks to pregnant women and their babies. A total of 36 women died from influenza infections between 2009 and 2012 in the UK (MBRACE-UK, 2014). If a women catches influenza during pregnancy they are at increased risk of experiencing severe disease, admission to intensive care and perinatal mortality (Jamieson *et al*, 2009; Pierce *et al* 2011).

2.3 Vaccination of pregnant women

Pertussis

The Joint Committee on Vaccination and Immunisation (JCVI) reviewed the available information on the evolving outbreak in August 2012 and recommended that the best way to protect young infants before they are old enough to start their primary immunisations was to offer pertussis vaccination to pregnant women between 28 to 38 weeks gestation (JCVI, 2012). Vaccination of the mother boosts maternal antibodies that can pass across the placenta to the unborn infant to provide protection during the early weeks of life.

The UK's Medicines and Healthcare Products Regulatory Authority (MHRA) recently carried out a study of more than 20,000 pregnant women in the UK who have received the pertussis vaccine (Donegan *et al*, 2014). The study assessed the safety of the vaccine in pregnancy and found no increased risk to the baby or the mother associated with the vaccine. This is an important study evaluating the safety of the pertussis vaccine in pregnancy.

Influenza

All pregnant women are recommended to receive influenza vaccine irrespective of their stage of pregnancy. The vaccine provides protection for the woman and the baby during pregnancy and protects the baby against influenza for up to six months following birth (Dabrera *et al*, 2014).

2.4 Measurement of influenza and pertussis vaccine uptake in pregnant women using Read coded data from General Practice

Public Health Wales monitors uptake of influenza immunisation in pregnant women using data collected by General Practices through Audit+.

There are challenges in collecting and reporting immunisation uptake data for influenza and pertussis in pregnant women, which highlights the importance of surveying the number of women giving birth who have been vaccinated. Current influenza immunisation uptake data collected through Audit+ includes all women who were recorded as being pregnant as at the start of September 2014 or who were newly recorded as being pregnant between September 2014 and January 2015. As a result, the denominator will include a proportion of women whose pregnancies ended before

they would have been offered the vaccine. The current estimated uptake of influenza in all pregnant women using Audit+ data as of 24 March 2014 is 45.3% for Wales (PHW, 2015).

Pertussis immunisation is offered to women in their third trimester of pregnancy. Given that Audit+ data provides an estimate of uptake in women who have been pregnant at any point during pregnancy, it is not possible to accurately identify pregnant women in their third trimester in a systematic way.

3 Methods

The sample frame for this survey was defined as all pregnant women delivering in Wales in main maternity units over a five day period in early February 2015². The Heads of Midwifery in all seven Health Boards agreed to participate in the survey. All fifteen main maternity units in Wales were included in the survey and maternity services collected data for the five survey days using a questionnaire (Appendix 1).

The questionnaire collected self-reported information from the women on their age, the offer and receipt of pertussis vaccination, gestational week when vaccinated and gestational week at delivery. Information was also gathered on the recalled offer and receipt of influenza vaccination.

An estimate for the number of births in a five day period in the Health Board was calculated using live and still births data for 2013 from Welsh Government statistics (Appendix 2). There are differences in the estimates of births for a five day period and some Health Board births data due to a variety of reasons:

- All the main maternity units in Wales participated but some Health Boards have smaller community maternity units that did not participate in the survey.
- The estimate of live births during a five day period calculated from the 2013 Welsh Government statistics is based on an average five day period and does not take into account seasonal fluctuations in birth rate.
- Powys Teaching Health Board (THB) is a rural area with no District General Hospital. Within Powys THB there are six smaller maternity units, with data received from three of these units during the five day survey period. The annual number of all births (live and still) in Powys THB for 2013 was 106. Data was also collected for Powys THB residents that delivered outside of the Health Board area and are presented separately in Appendix three. Only data for Powys THB residents that delivered in Powys THB are presented in the results section.

² One Health Board conducted the survey from 9 March to 13 March 2015.

4 Results

4.1 Survey participation

Table 1 shows the estimated number of births in a five day period, based on Welsh Government 2013 live and still births statistics (Appendix 2), compared to the number of women delivering during the five day survey period. We estimated 436 births would take place in a five day period using Welsh Government data, and data was actually collected through the survey from 431 pregnant women. This suggests that the survey included information from 99% of the women that were estimated to be delivering during the survey period.

Table 1. The number of pregnant women participating in the 2014/15 survey, during the survey week in early February 2015³, compared with the estimated number of births during a five day period in 2013, by Health Board

Health Board	Estimated number of births in 5 day period ¹ (n)	Number of women with uptake data (n)
Abertawe Bro Morgannwg UHB	79	89
Aneurin Bevan UHB	82	76
Betsi Cadwaladr UHB	93	105
Cardiff & Vale UHB	81	60
Cwm Taf UHB	53	47
Hywel Dda UHB	44	50
Powys THB	1	4
Wales	436	431

¹Source: Welsh Government Stats Wales live and still births data for 2013

³ One Health Board conducted the survey from 9 March to 13 March 2015.

4.2 Offer of pertussis vaccination

Women were asked if they were offered pertussis vaccine during their pregnancy. Table 2 shows that more than 9 in 10 women (91.6%) reported they were offered the vaccine during pregnancy. Thirty women (7%) did not recall being offered pertussis vaccination and responses were missing for six women (1.4%) (Table 2).

Table 2. Number of women participating in the 2014/15 survey who recall being offered pertussis vaccination during pregnancy

Offered pertussis vaccination while pregnant	Number of women (n)	Percentage (%)
Yes	395	91.6%
No	30	7.0%
Not known/missing	6	1.4%
Total	431	100%

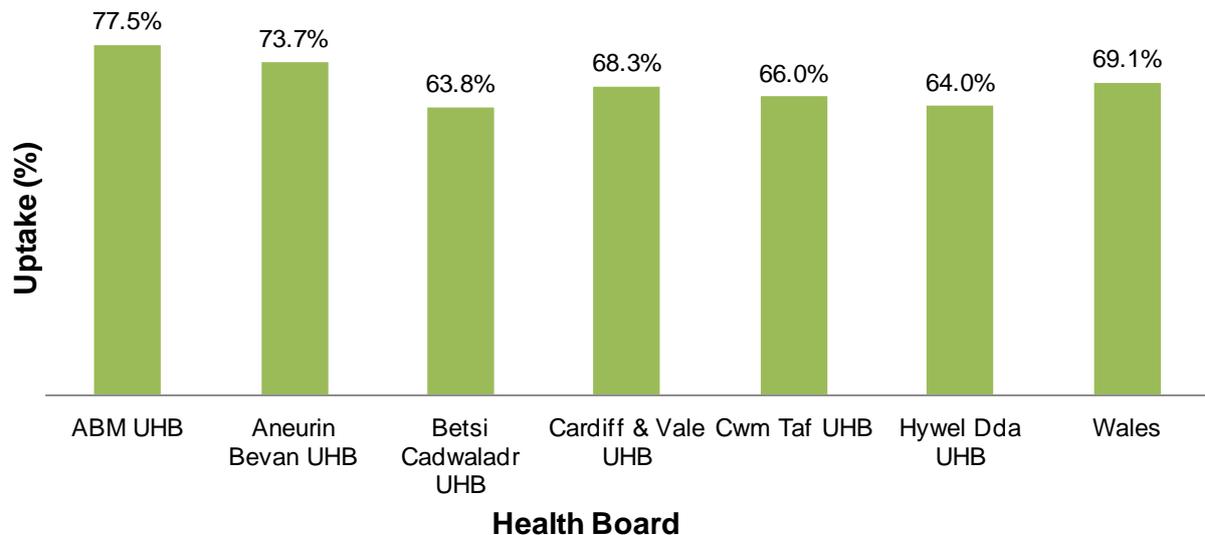
4.3 Uptake of pertussis vaccination

Self-reported coverage of pertussis vaccination in the women surveyed was 69.1% for Wales, and ranged by Health Board from 50.0% (Powys THB) to 77.5% (Abertawe Bro Morgannwg UHB) (Table 3 and Figure 1).

Table 3. Number of women participating in the 2014/15 survey receiving pertussis vaccine during pregnancy

Received pertussis vaccination while pregnant	Number of women (n)	Percentage (%)
Yes	298	69.1%
No	118	27.4%
Not known/missing	15	3.5%
Total	431	100%

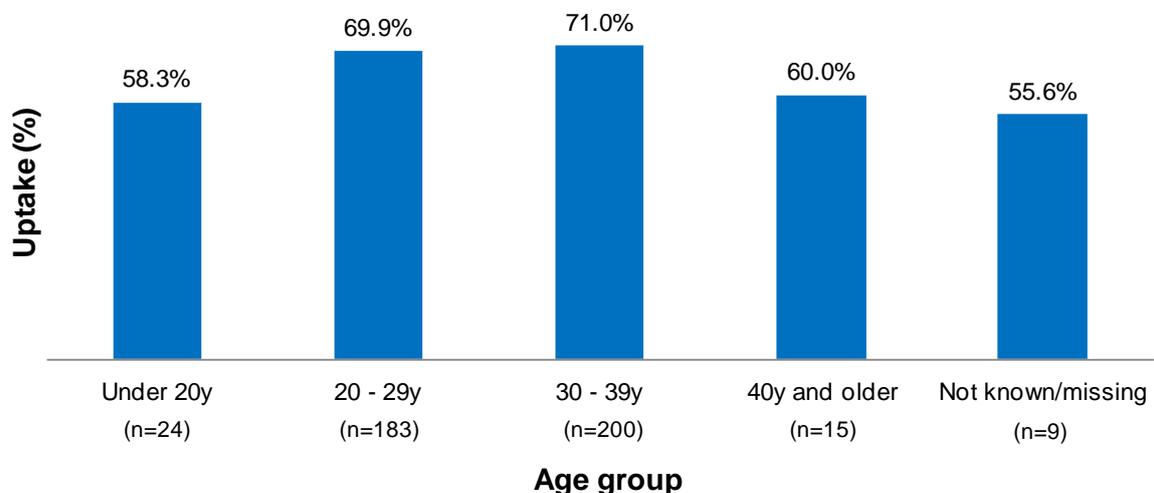
Figure 1. Uptake of pertussis vaccination in pregnant women participating in the 2014/15 survey, by Health Board* (n=431)



*Due to small numbers Powys THB is not presented in the Figure. Uptake of pertussis vaccination in pregnant women participating in the 2014/15 survey in Powys THB was 50.0% (2/4).

Coverage of pertussis vaccination within age groups was highest in women aged 30-39 years (71.0%) and lowest in women aged younger than 20 years of age (Figure 2). Information on age was unknown or missing for 2% of vaccinated women.

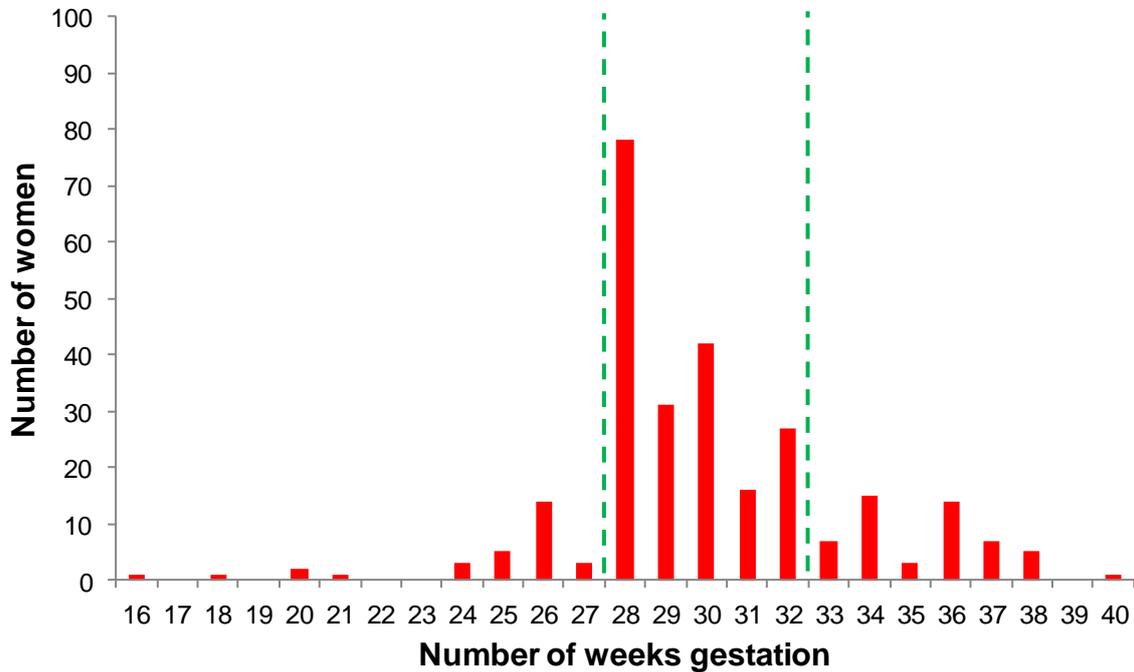
Figure 2. Uptake of pertussis vaccination in pregnant women participating in the 2014/15 survey, by age group (n=431)



Pertussis vaccination is recommended to be received by pregnant women from week 28 to 32 of gestation, but can be given up to week 38. Out of the women who had received pertussis vaccination in this survey, 88.8% (245/298) had received the

vaccine during week 28 to 38 and 70.3% (194/298) had received their vaccination between week 28 and 32 (Figure 3). Information on gestational week when vaccinated was unknown or missing for 7.4% of vaccinated women.

Figure 3. Number of weeks gestation when vaccinated in pregnant women participating in the 2014/15 survey (n=276, dashed green lines refer to the optimal gestational week period to receive pertussis vaccination)



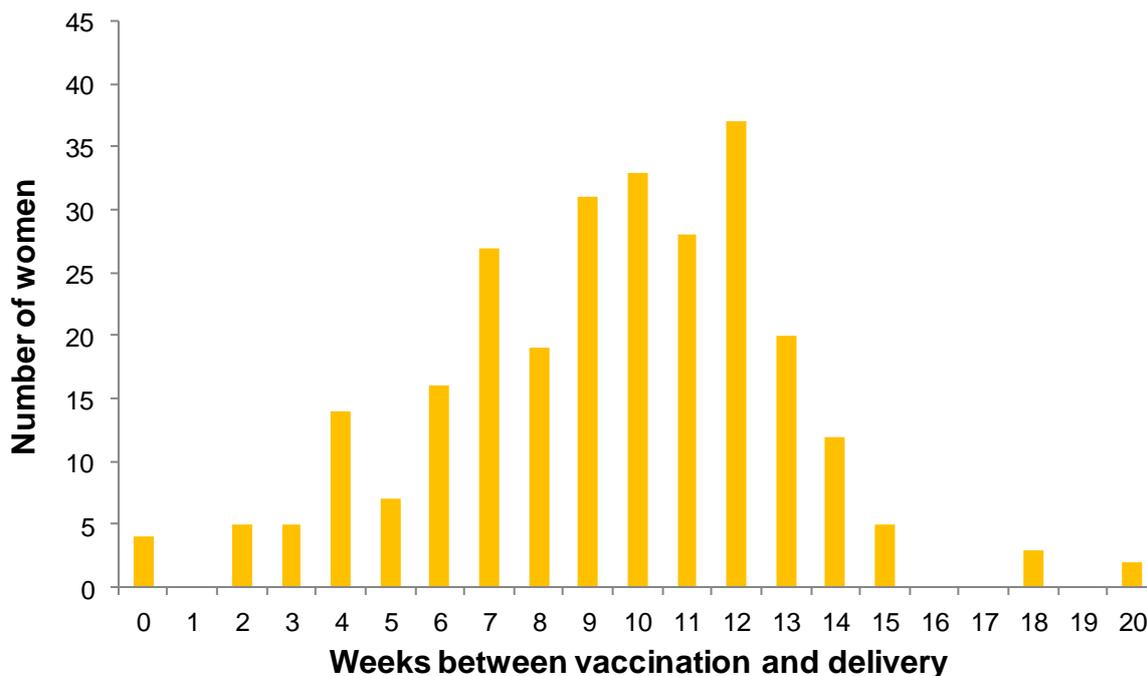
Gestational week at delivery for women who had received pertussis vaccination ranged from week 33 to 42 (Figure 4), and 97.9% of women delivered between week 36 and 42. Information on gestational week at delivery was unknown or missing for 5.4% of vaccinated women.

Figure 4. Number of weeks gestation at delivery for those who received pertussis vaccination in pregnant women participating in the 2014/15 survey (n=282)



The mean interval between pertussis vaccination and delivery was 9 weeks and ranged from 0 weeks to 20 weeks (Figure 5).

Figure 5. Number of weeks interval between receiving pertussis vaccination and delivery in pregnant women participating in the 2014/15 survey (n=268)



4.4 Offer of influenza vaccination

Women were also asked if they were offered influenza vaccination during their pregnancy. Table 4 shows that 9 in 10 pregnant women (92.3%) reported that they were offered influenza vaccine and only 5.6% (24/431) did not recall being offered influenza immunisation. Information was missing or unknown for nine women (2.1%) (Table 4).

Table 4. Number of women participating in the 2014/15 survey who recall being offered influenza vaccination during pregnancy

Offered influenza vaccination while pregnant	Number of women (n)	Percentage (%)
Yes	398	92.3%
No	24	5.6%
Not known/missing	9	2.1%
Total	431	100%

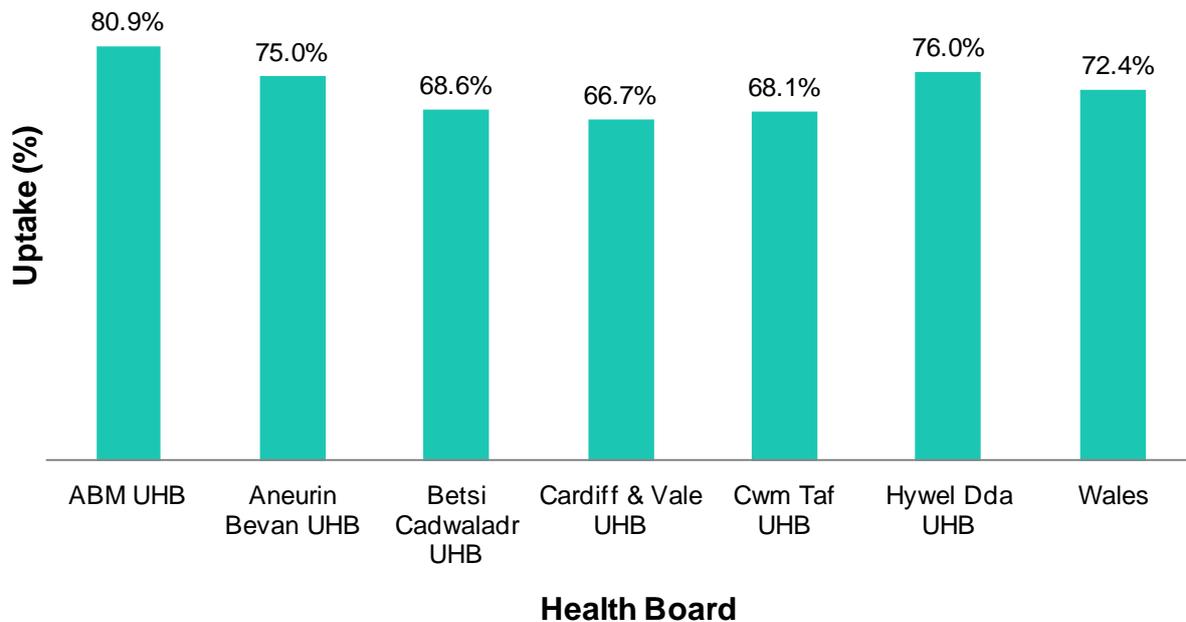
4.5 Uptake of influenza vaccination

Women were asked if they received influenza vaccine during pregnancy. Coverage of influenza vaccination in women included in this survey was 72.4% nationally, ranging by Health Board from 25.0% (Powys THB) to 80.9% (Abertawe Bro Morgannwg UHB) (Table 5 and Figure 6).

Table 5. Number of women participating in the 2014/15 survey receiving influenza vaccine during pregnancy

Received influenza vaccination while pregnant	Number of women (n)	Percentage (%)
Yes	312	72.4%
No	103	23.9%
Not known/missing	16	3.7%
Total	431	100%

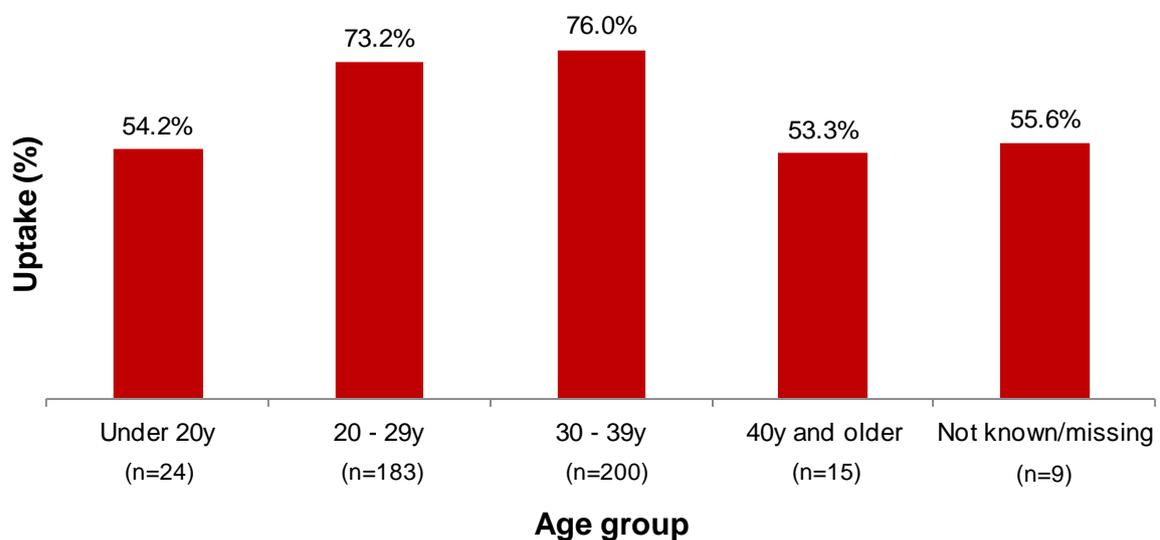
Figure 6. Uptake of influenza vaccination in pregnant women participating in the 2014/15 survey, by Health Board* (n=431)



*Due to small numbers Powys THB is not presented in the Figure. Uptake of influenza vaccination in pregnant women participating in the 2014/15 survey in Powys THB was 25.0% (1/4).

The age-group where uptake of influenza vaccination was highest was women aged 30-39 years (76.0%); it was lowest in women aged 40 years and older (53.3%) (Figure 7).

Figure 7 Uptake of influenza vaccination in pregnant women participating in the 2014/15 survey, by age group (n=431)



4.6 Coverage of both pertussis and influenza vaccination

Of the women surveyed, 90% (388/431) were offered both influenza and pertussis vaccines and 64.3% (277/431) received both influenza and pertussis vaccines (Tables 6 and 7). In addition, 93.0% (277/298) of women who received pertussis vaccine also received the influenza vaccine.

Table 6. Number of women participating in the 2014/15 survey who recall being offered both the pertussis and influenza vaccines during pregnancy

		Offered pertussis vaccine when pregnant (n)			
		Not known/missing	No	Yes	Total
Offered influenza vaccine while pregnant (n)	Not known/missing	6	0	3	9
	No	0	20	4	24
	Yes	0	10	388	398
	Total	6	30	395	431

Table 7. Number of women participating in the 2014/15 survey receiving both the pertussis and influenza vaccines during pregnancy

		Received pertussis vaccine when pregnant (n)			
		Not known/missing	No	Yes	Total
Received influenza vaccine while pregnant (n)	Not known/missing	12	0	4	16
	No	0	86	17	103
	Yes	3	32	277	312
	Total	15	118	298	431

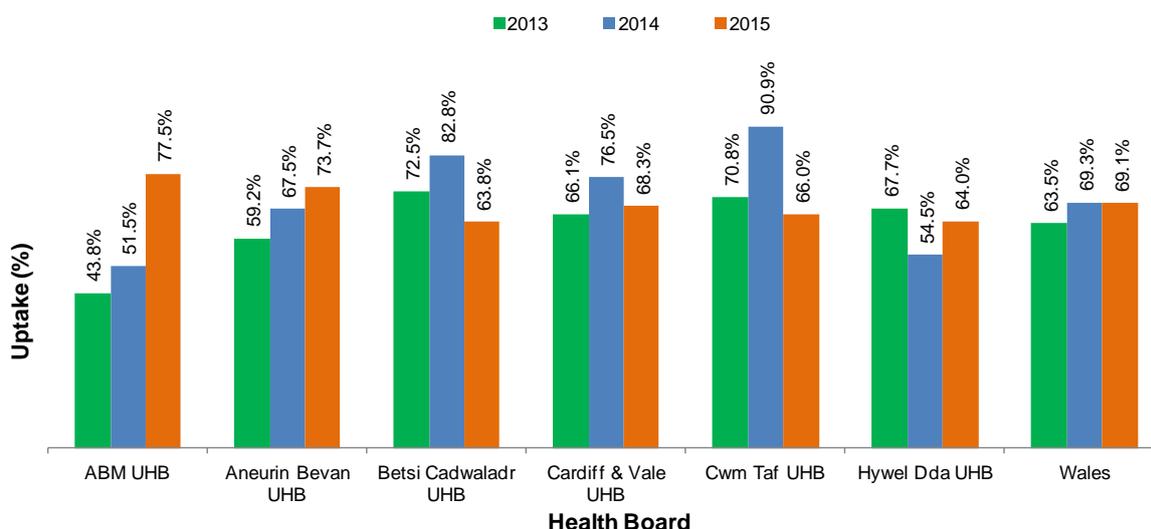
4.7 Trends in pertussis vaccination uptake

National coverage of pertussis vaccination has remained stable between the 2013/14 and 2014/15 point of delivery surveys, but with notable improvements in individual health boards. Continuous improvement has been seen over the three years in which this survey has taken place in two Health Boards. Three Health Boards reported higher uptakes in this year's point of delivery survey compared to the 2013/14 survey (Table 8, Figure 8).

Table 8. Uptake of pertussis vaccination in pregnant women participating in the 2012/13, 2013/14 and 2014/15 surveys, by Health Board

Health Board	% received pertussis vaccination		
	2012/13	2013/14	2014/15
Abertawe Bro Morgannwg UHB	43.8%	51.5%	77.5%
Aneurin Bevan UHB	59.2%	67.5%	73.7%
Betsi Cadwaladr UHB	72.5%	82.8%	63.8%
Cardiff & Vale UHB	66.1%	76.5%	68.3%
Cwm Taf UHB	70.8%	90.9%	66.0%
Hywel Dda UHB	67.7%	54.5%	64.0%
Powys THB	100.0%	100.0%	50.0%
Wales	63.5%	69.3%	69.1%

Figure 8. Uptake of pertussis vaccination in pregnant women participating in the 2012/13, 2013/14 and 2014/15 surveys, by Health Board*



*Due to small numbers Powys THB is not presented in the Figure.

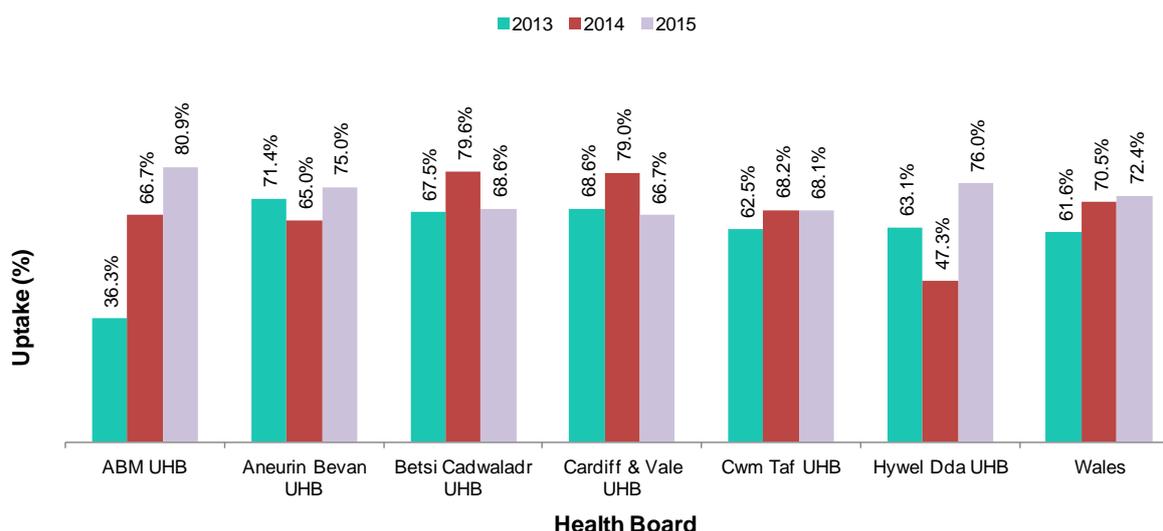
4.8 Trends in influenza vaccination uptake

National coverage of influenza vaccination has increased each year in women included in the point of delivery surveys. Three Health Boards reported higher uptakes in 2014/15 compared to the 2013/14 survey (Table 9, Figure 9).

Table 9. Uptake of influenza vaccination in pregnant women participating in the 2012/13, 2013/14 and 2014/15 surveys, by Health Board

Health Board	% received influenza vaccination		
	2012/13	2013/14	2014/15
Abertawe Bro Morgannwg UHB	36.3%	66.7%	80.9%
Aneurin Bevan UHB	71.4%	65.0%	75.0%
Betsi Cadwaladr UHB	67.5%	79.6%	68.6%
Cardiff & Vale UHB	68.6%	79.0%	66.7%
Cwm Taf UHB	62.5%	68.2%	68.1%
Hywel Dda UHB	63.1%	47.3%	76.0%
Powys THB	100.0%	100.0%	25.0%
Wales	61.6%	70.5%	72.4%

Figure 9. Uptake of influenza vaccination in pregnant women participating in the 2012/13, 2013/14 and 2014/15 surveys, by Health Board*



*Due to small numbers Powys THB is not presented in the Figure.

5 Conclusions

This is the third year that the point of delivery survey has been conducted.

This year:

- 69% of pregnant women reported they received pertussis vaccination,
- 72% of pregnant women reported they received influenza vaccination,
- 64% of pregnant women reported they received both pertussis and influenza vaccination and,
- 90% of pregnant women recall being offered pertussis and influenza vaccines during pregnancy.

Uptake of pertussis vaccine was lowest in women aged under 20 and over 40 years. Most pertussis vaccinations (70%) were given at the recommended stage of pregnancy between weeks 28 and 32, allowing optimum placental transfer of antibody from mother to foetus.

In comparison to last year, pertussis uptake has remained stable, influenza uptake has increased from 71% to 72% and the percentage of women who received both influenza and pertussis vaccines increased from 62% to 64%.

Data automatically collected from General Practice through Audit+ showed that uptake of influenza vaccination in women pregnant at some point during flu season was 45% during 2014/15. This is a measure of the percentage of women immunised, whose general practice record had a pregnancy-associated Read code attached, at any point from September 2014 to January 2015. This figure is expected to underestimate the true coverage of influenza vaccination in pregnant women, and the results of this survey confirm this to be the case.

This survey shows that acceptability of influenza and pertussis vaccine to pregnant women is high. Although this survey did not identify how offers of vaccination were made, the proportion of women who could recall being offered vaccines during pregnancy was very high. Uptake of influenza vaccine in pregnant women has increased for the third consecutive year, and is now approaching the 75% uptake target for influenza vaccination set by Welsh Government.

Investigation into reasons for pregnant women not consenting to influenza or pertussis vaccination and also into the circumstances surrounding the women who did not receive a memorable offer of vaccination could lead to further increases in coverage. This survey highlights the confidence that pregnant women have in receiving both pertussis and influenza vaccines and the effectiveness of primary care and midwifery services delivering the programmes. This survey indicates that the vast majority of women recall being offered immunisation during their pregnancy. A proportion of women may have been offered the vaccines but could not remember however efforts should continue to ensure that the offer rate is 100%. Offering and encouraging women to receive pertussis and influenza immunisation during each pregnancy remains the best way of preventing life-threatening pertussis and influenza infections in babies too young to receive their own vaccinations and women during pregnancy.

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Appendix 2: All births (live and still) in 2013 by Welsh Birth Unit and Health Board

Health Board / Welsh Birth Unit	2013 All births	Estimate of weekly All births	Estimate of All births in 5 days
Abertawe Bro Morgannwg UHB¹	5807	111	79
Neath Port Talbot	386	7	5
Princess of Wales	2161	41	29
Singleton	3259	62	44
Aneurin Bevan UHB	6047	116	82
Nevill Hall	2237	43	30
Royal Gwent	3541	68	48
Ysbyty Ystrad Fawr	257	4	3
Ysbyty Aneurin Bevan	12	0	0
Betsi Cadwaladr UHB	6812	131	93
Bryn Beryl	2	0	0
Dolgellau & Barmouth District	5	0	0
Tywyn & District	0	0	0
Wrexham Maelor	2546	48	34
Ysbyty Glan Clywd	2238	43	30
Ysbyty Gwynedd	2021	38	27
Cardiff & Vale UHB	5958	114	81
University Hospital of Wales	5958	114	81
Cwm Taf UHB	3923	75	53
Aberdare General	33	0	0
Prince Charles	1685	32	23
Royal Glamorgan	2205	42	30
Hywel Dda UHB	3233	62	44
Bronglais General	532	10	7
Withybush	1117	21	15
Glangwili General	1584	30	21
Powys Teaching HB	106	2	1
Powys Maternity Units ²	106	2	1
Wales	31886	613	436

Source: Welsh Government Stats Wales live and still births data for 2013. <https://statswales.wales.gov.uk/Catalogue/Health-and-Social-Care/NHS-Primary-and-Community-Activity/Community-Child-Health/BirthsLiveAndStill-by-WelshBirthUnit-LocalHealthBoard-Year>

¹ Includes one birth with unknown birth unit

² Breconshire Memorial Hospital, Knighton Hospital, Llandrindod Wells Hospital, Llandiloes & District Memorial Hospital, Montgomeryshire County Infirmary and Victoria Memorial Hospital

Appendix 3: Data collected for Powys resident mothers delivering outside Powys Teaching Health Board

Table A3.1: Number of Powys THB residents delivering outside of the Health Board area, participating in the 2014/15 survey, who recall being offered pertussis vaccination during pregnancy

Offered pertussis vaccination while pregnant	Number of women (n)	Percentage (%)
Yes	28	100.0%
No	0	0.0%
Not known/missing	0	0.0%
Total	28	100%

Table A3.2: Number of Powys THB residents delivering outside of the Health Board area, participating in the 2014/15 survey, receiving pertussis vaccine during pregnancy

Received pertussis vaccination while pregnant	Number of women (n)	Percentage (%)
Yes	14	50.0%
No	9	32.1%
Not known/missing	5	17.9%
Total	28	100%

Table A3.3: Number of Powys THB residents delivering outside of the Health Board area, participating in the 2014/15 survey, who recall being offered influenza vaccination during pregnancy

Offered influenza vaccination while pregnant	Number of women (n)	Percentage (%)
Yes	26	92.9%
No	0	0.0%
Not known/missing	2	7.1%
Total	28	100%

Table A3.4: Number of Powys THB residents delivering outside of the Health Board area, participating in the 2014/15 survey, receiving influenza vaccine during pregnancy

Received influenza vaccination while pregnant	Number of women (n)	Percentage (%)
Yes	14	50.0%
No	11	39.3%
Not known/missing	3	10.7%
Total	28	100%