

# Factors influencing women's decisions about having the pertussis-containing vaccine during pregnancy

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## ABSTRACT

**INTRODUCTION:** New Zealand experienced a major epidemic of pertussis from September 2011 to January 2014. In response to this epidemic, a pertussis-containing tetanus, diphtheria and acellular pertussis (Tdap) vaccine was funded for pregnant women of 28–38 weeks' gestation.

**AIM:** To investigate the factors influencing women's decisions regarding having the Tdap vaccine during pregnancy.

**METHODS:** A retrospective, self-reported postal survey of early postpartum women in Canterbury that assessed participant knowledge, beliefs, attitudes and influencing factors about the Tdap vaccine was conducted from June to October 2013.

**RESULTS:** Of the 1883 surveys distributed, 596 women completed the survey. The main factors influencing women's decisions to accept the Tdap vaccine during pregnancy were: the desire to protect their baby, a health professional's recommendation, the threat of pertussis in the community and the fact that the vaccine was administered at no cost. Conversely, for women who did not receive the Tdap vaccine, the main factors that influenced their decisions were: they did not know the vaccine was available, fear of side-effects and doubt regarding vaccine effectiveness.

**CONCLUSION:** A clear health professional recommendation for maternal Tdap immunisation was a significant factor influencing pregnant women and would most likely improve the uptake of the vaccine.

**KEYWORDS:** infectious diseases, maternal immunisation, pertussis, pregnancy, vaccination

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## Introduction

Inadequate control of pertussis in infants persists worldwide, even in countries with high infant vaccination coverage.<sup>1</sup> Many countries have observed recent increases in pertussis cases, including England and Wales,<sup>2</sup> the United States<sup>3</sup> and New Zealand (NZ). In 2012, the Advisory Committee on Immunization Practices in the USA and the Joint Committee on Vaccination and Immunisation in the UK both responded with the recommendation for the use of the Tdap vaccination (tetanus, diphtheria and acellular pertussis) late in the third trimester of pregnancy.<sup>4</sup> During the recent pertussis epidemic

in the UK, with high vaccine coverage (given between 28 and 38 weeks' gestation), the vaccine efficacy was estimated to be 91% for preventing infants developing laboratory-confirmed pertussis in the first 3 months of life.<sup>5</sup>

New Zealand has traditionally had high rates of pertussis disease. In the early 2000s, infant rates of pertussis disease in NZ (196/100,000) were three-fold higher than infant rates in Australia (56/100,000) or England (65/100,000).<sup>6</sup> During the recent epidemic from September 2011 until January 2014, there were more than 600 hospitalisations and three infant deaths.<sup>7</sup>

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The overall rate of pertussis disease in the NZ population in the third quarter of 2013 was 12.9/100,000 population.<sup>8</sup>

The national immunisation schedule includes a three-dose infant schedule of acellular pertussis-containing vaccine for babies aged 6 weeks, 3 months and 5 months, and two booster doses for children aged 4 years and 11 years.<sup>9</sup> In January 2013, the Ministry of Health introduced the Tdap vaccine during pregnancy between 28 and 38 weeks' gestation (Boostrix; GlaxoSmithKline Biologicals, Rixensart, Belgium, and Novartis Vaccines and Diagnostics Marburg, Germany), in response to the pertussis epidemic. All vaccines on the national immunisation schedule are provided free-of-charge through private general practices (family medicine specialist, doctors known as general practitioners; nurses known as practice nurses).

Antenatal care is provided at no charge to families as part of routine mother-and-infant health care during this time period, mainly by midwives; antenatal care of women includes their infant until 6 weeks of age, at which time mother and infant care is transferred to their general practitioner. Most midwives do not have the facilities to provide administration of vaccines routinely. Therefore, women must visit their general practitioner to receive the funded vaccines during pregnancy. This visit is additional to, and not part of, routine antenatal health care, but funded for the purpose of the receiving the maternal vaccination of Tdap and influenza vaccines.

At the time of Tdap introduction during pregnancy into the national immunisation schedule, there was limited promotional material provided by the Ministry of Health to general practitioners and lead maternity carers. In addition, data on the uptake of the vaccine was collected by individual District Health Boards, but no national estimates of coverage were available.

The primary objective of this study was to establish what factors had the greatest influence on pregnant women in their decisions to accept or decline immunisation during pregnancy.

## Methods

This was a retrospective observational study involving postpartum women and utilising a self-administered postal survey. The target population was all postpartum women in the Canterbury District Health Board region of New Zealand; the country's second largest DHB with ~6000 births annually.<sup>10</sup> Women were identified from birth notifications, both home and hospital births, from June until October 2013. The survey was mailed within 1–2 days of an infant birth to avoid influencing maternal choices on vaccination during the pregnancy.

The survey was developed after reviewing available scientific literature. Two surveys were identified as applicable<sup>11,12</sup> and adapted for this study. The surveys identified were adapted to reflect a pertussis focus rather than a measles focus<sup>11</sup> and the service delivery provided in NZ via general practice during pregnancy rather than postpartum hospital clinic service delivery.<sup>12</sup> A pilot of the survey was conducted to determine its acceptability and understanding. No changes were made and it was expected to take 15 min to complete. The questionnaire consisted of 35 fixed-answer questions to ascertain vaccination status, lead maternity carer, information received, reasons for accepting or not accepting Tdap during pregnancy and participants' sociodemographic information. The survey was completed on hard copy and returned in the pre-paid envelope provided, or via an online option. Two weeks after the survey was distributed, a follow-up phone call or text message was made to offer participation in the study, and as a reminder to complete the survey.

No identifying information was included in the survey responses. Completion of the survey implied the participant gave their consent. An Access Database (Microsoft Corporation, Redmond, USA) package was used to code and double enter all data received, then uploaded to the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) for data analysis. The ethnicity of participants was prioritised and reported based on level one of the Statistics NZ standard classification of ethnicity, which included five categories: European, Māori,

Pacific, Asian and Middle Eastern/Latin American/African (MELAA). The demographics of our study population were compared with the total Canterbury female population limited to childbearing ages from NZ census data, using a Chi-squared test for comparison of proportions. Prior to commencing, the survey was approved by the Upper South A Ethics Committee – approval URA/12/EXP/021.

## Results

A total of 1883 surveys were sent, with 596 surveys returned, giving a response rate of 31.7% (596/1883). Overall, 74% (441/596) of participants had received the Tdap vaccine during pregnancy, compared to 25.8% (154/596) who had not received the Tdap vaccine. One person could not remember. The mean age of women who responded was in the 30- to 33-year-old age group (range <18 to >38 years) (Table 1). The women who responded were not representative of the overall Canterbury population of women this age (Fig. 1). Māori women, and women in age groups who were aged <29 years, were all under-represented, while there was a higher proportion of NZ European women in the participant group compared to the community ( $P < 0.001$ ).

## Information sources identified

Women identified the two most helpful sources of information when making the decision about the Tdap vaccine; their midwife (64.1% (382/596)) and practice nurse (48.7% (290/596)). Further sources of information were indicated at lower rates, and multiple responses were possible (Fig. 2).

Participants were asked if the information received was encouraging or discouraging, including the source of that information. Participants who responded indicate multiple responses of one or more information sources. Most participants listed the source of encouraging information to be from midwives (54.9% (327/596)), followed by general practitioners (37.9% (226/596)) and then practice nurses (11.7% (70/596)). Other sources were identified, but at lower rates (Fig. 2).

Participants were asked about discouraging information they may have received,

with multiple responses possible. General practitioners were identified most commonly as the group from whom participants received discouraging information, representing (40.8% (243/596)). Otherwise, participants did not receive discouraging information (37.8% (225/596)) (Fig. 2).

Due to the higher response of general practitioners as the source of discouraging information,

Figure 1. Comparison of the ethnic proportions of participants within the Canterbury female population

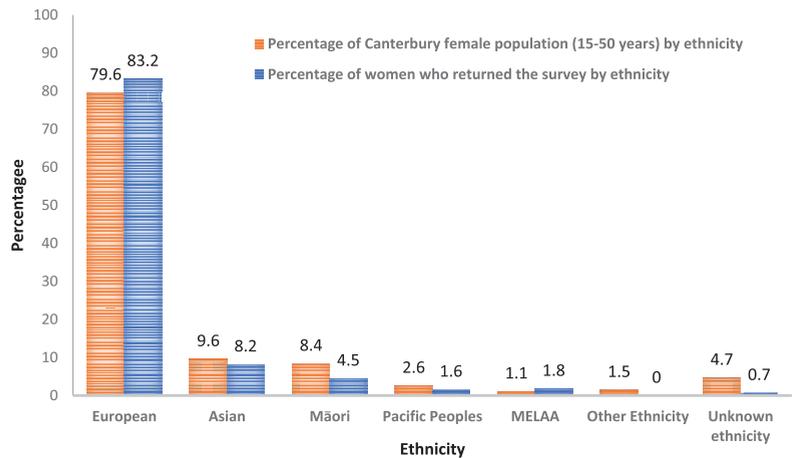


Table 1. Participant characteristics: age, ethnicity and vaccination status

Age (years)	Surveys received (n)	Vaccinated n (%)	Unvaccinated n (%)
≤ 25	60	27 (6.1)	33 (21.7)
26–29	100	75 (17)	25 (16.4)
30–33	188	156 (35.4)	32 (21)
34–37	158	119 (27)	39 (25.7)
≥ 38	87	64 (14.5)	23 (15.2)
Missing	3	1	2
<b>Total</b>	<b>596</b>	<b>442</b>	<b>154</b>
Ethnicity	Surveys received (n)	Vaccinated n (%)	Unvaccinated n (%)
<b>European</b>	496	376 (86)	120 (79)
<b>Māori</b>	27	18 (4)	9 (6)
<b>Pacific</b>	9	5 (1.1)	4 (2.6)
<b>Asian</b>	49	36 (8.2)	13 (8.5)
<b>MELAA</b>	11	5 (1.1)	6 (3.9)
<b>Missing</b>	4	2	2
<b>Total</b>	<b>596</b>	<b>442</b>	<b>154</b>

MELAA, Middle Eastern/Latin American/African.

Figure 2. Information sources used: relating to the tetanus, diphtheria and acellular pertussis (Tdap) vaccine during pregnancy

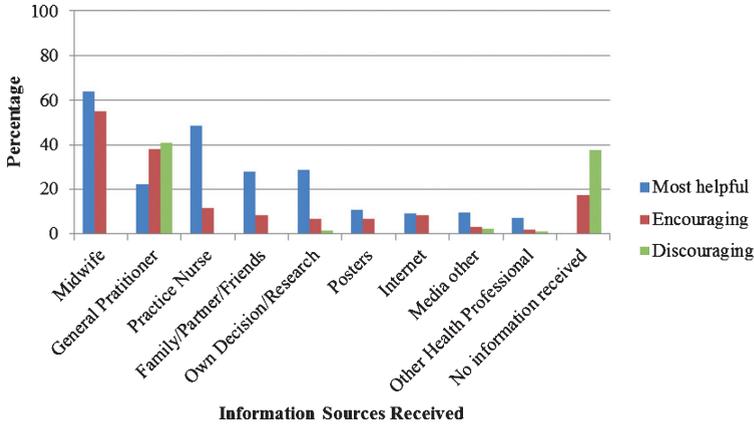


Table 2. Sets of statements: most important to women when deciding whether to have the Tdap vaccine

Three sets of statements put to women who received the Tdap vaccine: Choose one statement that you consider to be the 'most important' to you:	%
I decided to have the pertussis containing vaccine:	
To prevent the pertussis disease circulating in the community	3.1
To protect myself from the disease	1.4
To protect my baby from the disease	96.4
I decided to have the pertussis containing vaccine because it was:	
Recommended by a health professional	84.2
Recommended by my spouse/family/friends	9.5
I knew others who had had it	6.2
I decided to have the pertussis containing vaccine because:	
The vaccine was free and available	42.8
There is a lot of pertussis in the community	50.8
Of the convenience and ease to receive it	6.7
Three sets of statements put to women who did not receive the Tdap vaccine: Choose one statement that you consider to be the 'most important' to you:	%
I decided not to have the pertussis containing vaccine because it was:	
Too expensive	4.7
I was unable to get to the practice (or it was inconvenient)	22.1
I didn't know about the vaccine or that it was available	73.3
I decide not to have the pertussis containing vaccine because of:	
The low risk of pertussis in Canterbury	22.2
Fear of side-effects	68.5
Fear of needles/injections	9.3
I decided not to have the pertussis containing vaccine due to being:	
Doubtful of the vaccine's effectiveness	56.5
Anti-vaccines (do not believe in/against vaccines)	28.3
Mistrust of the information	15.2

the data was analysed to explore how many women who received discouraging information from their general practitioners did not receive the vaccine.

Of the 154 women who indicated that they did not receive the Tdap vaccine, 60.4% (93/154) received discouraging information from a general practitioner source. In comparison, of the 432 women who indicated that they had received the Tdap vaccine, 7.9% (34/432) had received discouraging information from a general practitioner ( $P < 0.001$ ).

### Factors associated with Tdap vaccine statements

Women who received the Tdap vaccine were asked to consider the 'most important' statement describing potential factors influencing their decision to be vaccinated; a different set of statements were put to women who reported they had not received the Tdap vaccine during pregnancy. Three options were given to each statement (Table 2).

The most common reason for a woman deciding to get vaccinated was 'to protect my baby from disease'. More than half of the vaccinated women indicated that they were aware that there was a lot of pertussis in the community, and 95.5% (421/441) of vaccinated women had had the vaccination recommended by a healthcare professional. In unvaccinated women, the most common reason for deciding not to get vaccinated was the fear of side-effects. More than half (56.5% (26/46)) were doubtful of the vaccine's effectiveness.

The 154 women who had not received the vaccine were asked two further questions: (1) 'were you aware the pertussis-containing vaccine was available to you during pregnancy?' If they answered 'no', they were then asked: (2) 'would you have considered having the pertussis-containing vaccine during pregnancy if you had been offered it?'

Of the possible 154 responses, 151 women responded to these questions, most of whom responded (56.3% (85/151)) by indicating that they were aware of the vaccine, compared to 43.7%

(66/151) who were unaware that the vaccine was available.

Of the 66 participants who indicated that they were not aware the Tdap vaccine was available, 54.5% (36/66) indicated they would have considered the Tdap vaccine if it had been offered to them.

## Discussion

Our data suggest that the Tdap vaccination in pregnancy may have been underutilised due to missed opportunities to discuss, recommend, offer and administer maternal pertussis vaccination to eligible patients.

There are no national figures available for Tdap vaccine coverage in pregnant women, because at the time of the survey, vaccine administration was not recorded on the National Immunisation Register. However, reported estimates suggest that coverage may have been as low as 13%.<sup>13</sup> A high proportion of unvaccinated women surveyed ( $n = 154$ ) said they had not received any information that the Tdap vaccine was available (73.3% (63/86)), recommended or funded during pregnancy. There are clearly opportunities for increasing uptake of the vaccine by increasing awareness and providing information about the vaccine to pregnant women.

The women who had received the Tdap vaccine appeared to have good knowledge about pertussis and almost all chose to be vaccinated to protect their baby. The most helpful sources of information for them were their midwife or practice nurse. This is important information for policymakers because almost 84.2% (353/419) of women listed a recommendation by a healthcare professional as the most important reason they decided to have the vaccine.

Providing information to pregnant women is critical in helping them decide whether they wish to have the Tdap vaccine.<sup>14-17</sup> It is not surprising that the sources of encouraging information for the women in our survey were the health professionals they were most likely to encounter during their pregnancy; their midwife and their general practitioner. This suggests that encourag-

ing healthcare professionals to not just provide information but to recommend the Tdap vaccine during pregnancy is likely to be an important strategy for increasing vaccine coverage.

Conversely, our results suggest that receiving discouraging information from a general practitioner may have been influential for women who did not get vaccinated. The reported discouraging information received from the general practitioner was not specified and therefore it could have been that they were not confident in discussing vaccination during pregnancy, not aware or unsure of the national expert recommendations or that funding was available.<sup>16</sup> A high proportion of women who did not receive the Tdap vaccine said that they were worried about side-effects. General practitioners have a key role in providing information to women around the safety of vaccines. Previous studies report that women are often willing to be vaccinated while pregnant following recommendations from their healthcare provider.<sup>16,18,19</sup> Strategies around increasing awareness and knowledge about the vaccine need to target not just pregnant women but general practitioners as well.

The survey response rate in our study was high when compared to other postal survey studies; however, we acknowledge that with a response rate of 31.7% (596/1883), conclusions need to be made with caution, as the sample population will not be representative of the women in the region. We used self-report to determine if a woman had been given Tdap. Vaccines given during pregnancy were not included on the National Immunisation Register and we were therefore unable to verify if a woman had been vaccinated. It is possible that some women may have reported receiving the Tdap vaccine when they had been given an influenza vaccine.

The uptake of the vaccine among women who responded to the survey was very high compared to the estimated national coverage rate. Hence, there is likely to be some response bias, with women who have positive views on vaccination more likely to respond. The survey still included more than 150 women who had not received the vaccine, providing some valuable insight into the reasons they declined or were not offered the

vaccine. Future work in this area would need to focus on obtaining responses from younger women in particular.

Despite these limitations, this study provides some important information for policymakers. There is a need for a change in Ministry of Health policy to include specific education and communication for health professionals promoting the recommendations and importance of the Tdap vaccine in pregnancy, and include information on its funding. We recommend funding be provided for an extra visit in the form of an 'antenatal General Practitioner or Practice Nurse consultation', additional to current antenatal care, to discuss the benefits and importance of the Tdap vaccine in pregnancy and for infants. This visit would also provide both an opportunity to administer the vaccine and the availability of it for those women still deciding whether to be vaccinated. Since this study was performed, Tdap vaccination during pregnancy has been included in the National Immunisation Register, thus ensuring that more accurate estimates of coverage will be available in future.

## Conclusion

A recommendation by a healthcare professional is one of the most important factors influencing women's decisions to have the Tdap vaccine during pregnancy. Providing opportunities for this and developing knowledge and confidence among midwives and general practitioners about recommending the vaccine should be given a high priority by policymakers.

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## COMPETING INTERESTS

None.