

SMOKING IN PREGNANCY

Introduction

Smoking in pregnancy is widely regarded as the most important modifiable risk factor for poor pregnancy outcomes [197]. It is associated with an increased risk of anaemia, pre-term birth, placental abruption, placenta praevia, chronic hypertension, low birth weight, restricted growth in utero and fetal and neonatal death [197,330,331]. Research has suggested that children whose mothers smoked in pregnancy have higher rates of conduct disorders [332] and attention deficit hyperactivity disorder [333]. However, it is uncertain as to what extent smoking, as opposed to inherited personality traits or other social or environmental factors, is responsible for this [334].

The 2012/13 New Zealand Health Survey indicated that overall, 16% of women were smoking. However, this proportion was higher among women in the age groups where pregnancy most often occurs, with 19% of 15–24 year olds and 21% of 25–34 year olds identified as smoking. The prevalence of smoking among Māori women (42%) was three times higher than among non-Māori women. After adjustment for age, sex and ethnic group, women in the the most deprived neighbourhoods had smoking rates over three times those in the least deprived neighbourhoods [335].

The longitudinal study “Growing Up in New Zealand” (GUiNZ) recruited around 7,000 pregnant women from the Auckland, Counties-Manukau and Waikato DHB regions who were expected to deliver in a 12 month period during 2009–2010. Nearly 11% of the women in this study were smoking an average of eight cigarettes per day during their pregnancy. Smoking in pregnancy was more common in women living in deprived areas and among women with lower levels of education. More than one in three Māori women, one in six Pacific women, and one in twelve European women in the study smoked during pregnancy. However, for Māori and Pacific women, the proportion smoking during pregnancy was lower than proportion smoking before pregnancy [336].

Barriers to smoking cessation among pregnant Māori women has been examined and found to include living with at least one other smoker, socialising mainly with other smokers, using smoking to cope with stress, and having a poor understanding of the risks associated with smoking in pregnancy. The involvement of the whole whānau in interventions to promote smokefree pregnancies was identified as being important [337,338].

In New Zealand, the Ministry of Health’s target “Better help for smokers to quit” includes “progress towards 90 Percentage of pregnant women (who identify as smokers at the time of confirmation of pregnancy in general practice or booking with Lead Maternity Carer)” being offered advice and support to quit [339].

The following section uses data from the National Maternity Collection to examine smoking status during and after pregnancy among women who were registered with a lead maternity carer.

Data Sources and Methods

Indicator

1. *Proportion of babies born to mothers not registered with a lead maternity carer (LMC) at the time of delivery*

Numerator: Number of babies born to mothers who were not registered with a LMC at the time of delivery

Denominator: Number of babies born

2. *Proportion of babies born to mothers who smoked at first registration with a LMC and/or at two weeks post-delivery*

Numerator: Number of babies born to mothers who smoked at first registration with a LMC and/or at two weeks post-delivery

Denominator: Number of babies born to mothers who were registered with a LMC at the time of delivery



3. *Number of cigarettes smoked at first registration with a LMC and at two weeks post-delivery, by the mothers of newborn babies*

Numerator: Number of cigarettes smoked per day at first registration with a LMC and at two weeks post-delivery by the mothers of newborn babies

Denominator: Number of babies born to mothers who were registered with a LMC at the time of delivery and smoked at first registration with a LMC and at two weeks post-delivery

Data source

National Maternity Collection

Notes on Interpretation

Note 1: The National Maternity Collection (MAT) contains information on selected publicly funded maternity services from nine months before to three months after a birth. It integrates information from two data sources: LMC claims for payment for Primary Maternity Services provided under Section 88 of the NZ Public Health and Disability Act 2000; and birth event data from the National Minimum Dataset (NMDS) on hospital admissions (delivery event for the mother and the postnatal period for baby). A limitation of this source is its integration of two data sources. Since different information may be collected in each set, multiple records may exist for the same baby.

Up until June 2007, Section 88 claims data coverage was 95% of known births. However, in July 2007, due to a funding change, DHB-employed midwifery teams ceased to submit claims to the Ministry of Health for their services. Thus no LMC registration data (including smoking status) is currently available in MAT for women who opt for DHB-based primary maternity care. In this dataset it is difficult to distinguish between those who were not registered with a LMC at the time of delivery because they accessed their primary maternity care through DHB services, and those who received no antenatal care at all.

Note 2: Smoking status is self-reported by the mother to the LMC at two points: first registration with the LMC and two weeks post-delivery (postnatal). It is important to note that a woman can be registered with a LMC at any stage throughout the pregnancy, including at delivery.

Note 3: Smoking status was derived based on the provision of either a 'Y' for smoking status or a count of the number of cigarettes smoked at first registration and/or at two weeks postnatal.

Babies born to Mothers Not Registered with a LMC at Delivery

New Zealand Distribution

In New Zealand during 2008–2012, 15.1% of babies were born to mothers who were not registered with a LMC at the time of delivery. However, many of these babies' mothers may have accessed hospital-based maternity services, making it difficult to estimate the proportion who received no antenatal care at all during pregnancy (**Table 1**).

Table 1. Status of maternal registration with a Lead Maternity Carer at the time of delivery for New Zealand babies born 2008–2012

Maternal LMC registration status at delivery	Number of babies: total 2008–2012	Number of babies: annual average	Percent of babies
New Zealand			
Registered with a LMC	268,309	53,662	84.7
Not registered with a LMC	47,926	9,585	15.1
LMC registration status not known	644	129	0.2
Total	316,879	63,376	100.0

Source: National Maternity Collection

New Zealand Distribution by Maternal Age, Ethnicity, and NZDep decile

In New Zealand during 2008–2012, Pacific, Asian/Indian, and Māori babies (vs European babies) had a *significantly higher* proportion of mothers who were not registered with a LMC at delivery, as were the babies of younger mothers (less than 25 years vs. 25 or more years). A *significantly higher* proportion of babies from average to more deprived areas (NZDep deciles 3–10 vs. deciles 1–2) also had mothers who were not registered with a LMC at delivery (**Table 2**).



Table 2. Babies born to mothers not registered with a Lead Maternity Carer at delivery by maternal age, ethnicity, and NZ Deprivation Index decile, New Zealand 2008–2012

Variable	No. of babies: total 2008–2012			Mother not registered with LMC		
	Mother not registered with LMC	Mother registered with LMC	Total	Rate per 100 babies	Rate ratio	95% CI
Maternal age						
<20 years	4,394	17,966	22,396	19.6	1.30	1.26–1.34
20–24 years	10,415	48,040	58,537	17.8	1.18	1.15–1.21
25–29 years	11,913	66,890	78,977	15.1	1.00	
30–34 years	11,163	76,779	88,143	12.7	0.84	0.82–0.86
35+ years	10,031	58,627	68,809	14.6	0.97	0.94–0.99
Baby's ethnicity						
Māori	12,406	71,798	84,309	14.7	1.66	1.63–1.70
Pacific	13,343	21,878	35,245	37.9	4.28	4.19–4.37
Asian/Indian	7,218	27,937	35,213	20.5	2.32	2.26–2.38
European/Other	14,209	146,011	160,675	8.8	1.00	
Maternal NZ Deprivation Index decile						
Deciles 1–2	3,663	40,494	44,256	8.3	1.00	
Deciles 3–4	4,436	42,821	47,413	9.4	1.13	1.08–1.18
Deciles 5–6	6,395	52,388	58,942	10.8	1.31	1.26–1.36
Deciles 7–8	9,785	64,163	74,103	13.2	1.60	1.54–1.65
Deciles 9–10	21,811	67,315	89,198	24.5	2.95	2.86–3.05

Source: National Maternity Collection; Note: Ethnicity is Level 1 prioritised; Decile is NZDep06

South Island DHBs Distribution

During 2008–2012, the proportion of babies whose mothers were not registered with a LMC at delivery were *significantly lower* than the New Zealand rate in South Canterbury (2.7%), Canterbury (3.5%), and in Southern DHB (3.6%), while the proportions were *significantly higher* in Nelson Marlborough (20.9%), and in the West Coast (61.8%) (**Table 3**). However, many of these babies' mothers may have accessed hospital-based maternity services, making it difficult to estimate the proportion who received no antenatal care at all during pregnancy.

Table 3. Status of maternal registration with a Lead Maternity Carer at the time of delivery for babies born, South Island DHBs vs. New Zealand 2008–2012

DHB	No. of babies: total 2008–2012			Mother not registered: rate per 100 babies	Rate ratio	95% CI
	Mother not registered with LMC	Mother registered with LMC	Total			
Nelson Marlborough	1,733	6,542	8,278	20.9	1.38	1.33–1.44
South Canterbury	88	3,149	3,238	2.7	0.18	0.15–0.22
Canterbury	1,129	30,827	32,171	3.5	0.23	0.22–0.25
West Coast	1,264	780	2,044	61.8	4.09	3.95–4.23
Southern	671	17,838	18,510	3.6	0.24	0.04–0.26
New Zealand	47,926	268,309	316,879	15.1	1.00	

Source: National Maternity Collection



Maternal smoking

New Zealand Distribution by Maternal Smoking Status

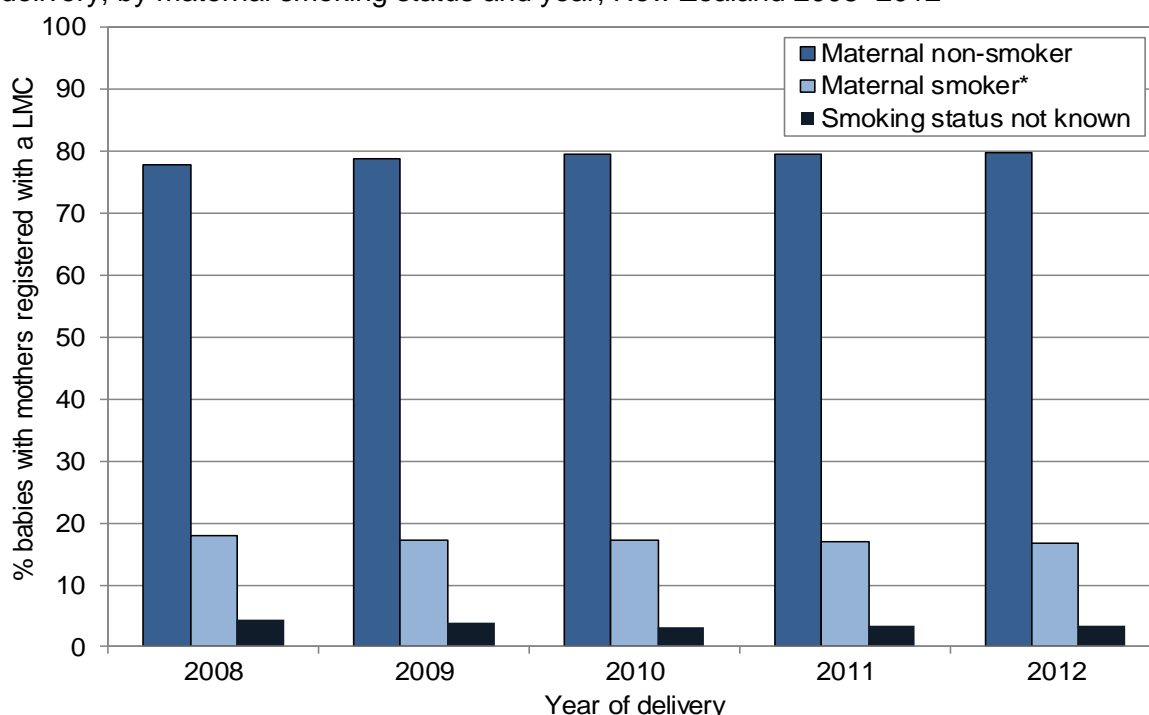
In New Zealand during 2008–2012, of the babies with mothers registered with a LMC at delivery, 79.1% had a non-smoking mother, and 17.3% had a mother who indicated having smoked at some stage during pregnancy and/or at two weeks post-delivery. Mothers who were smoking at first registration and at two weeks post-delivery accounted for 12.8% of the babies with mothers registered with a LMC at delivery (**Table 4**). The proportion of mothers who were non-smokers has increased marginally from 77.7% in 2008 to 79.8% in 2012 (**Figure 1**).

Table 4. Babies born to mothers registered with a Lead Maternity Carer at delivery, by maternal smoking status, New Zealand 2008–2012

Maternal smoking status at:		Number: total 2008–2012	Number: annual average	Percent
first registration with LMC	two weeks postnatal			
Babies with mother registered with a LMC at delivery in New Zealand				
Non-smoker	Non-smoker	212,160	42,432	79.1
	Smoker	3,011	602	1.1
	Not known	9,717	1,943	3.6
Smoker	Non-smoker	6,218	1,244	2.3
	Smoker	34,294	6,859	12.8
	Not known	2,841	568	1.1
Not known	Non-smoker	37	7	0.0
	Smoker	7	1	0.0
	Not known	24	5	0.0
Total		268,309	53,662	100.0

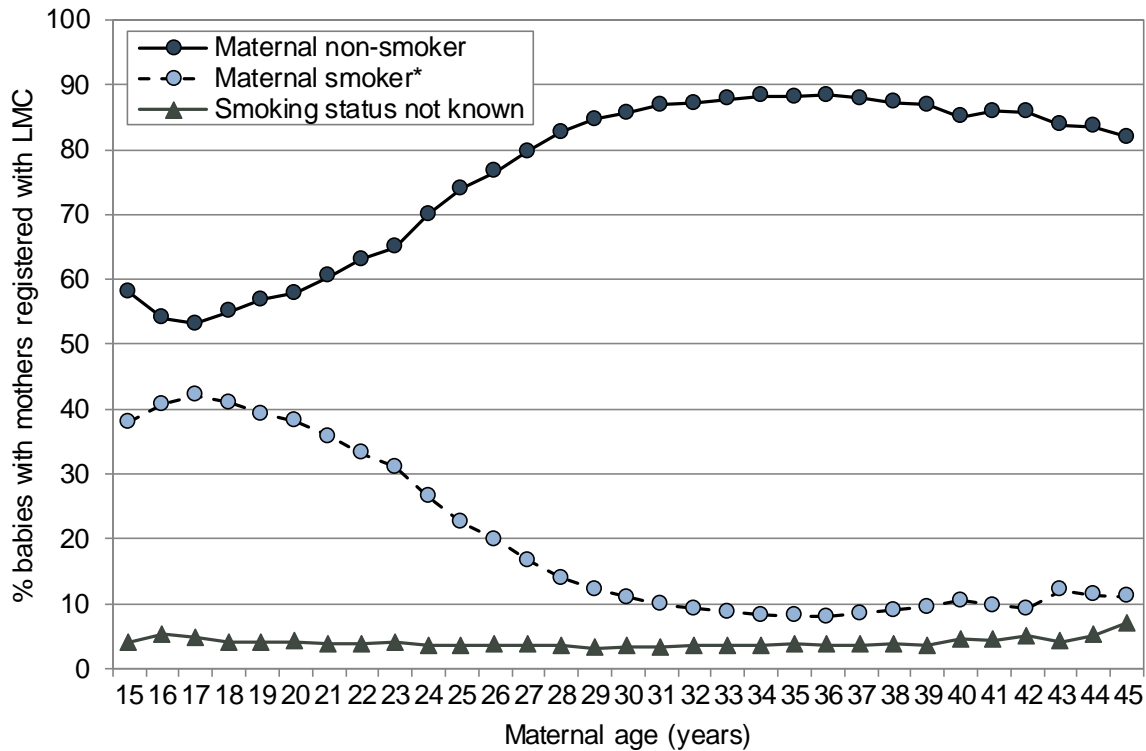
Source: National Maternity Collection; Note: Information is for babies born to mothers registered with a LMC at delivery

Figure 1. Percentage of babies born to mothers registered with a Lead Maternity Carer at delivery, by maternal smoking status and year, New Zealand 2008–2012



Source: National Maternity Collection; Note: Information is for babies born to mothers registered with a LMC at delivery; * Smokers are mothers smoking at first LMC registration and/or at two weeks postnatal for that baby

Figure 2. Percentage of babies born to mothers registered with a Lead Maternity Carer at delivery, by maternal smoking status and age, New Zealand 2008–2012



Source: National Maternity Collection; Note: Information is for babies born to mothers registered with a LMC at delivery; * Smokers are mothers smoking at first LMC registration and/or at two weeks postnatal for that baby

New Zealand Distribution by Maternal Age

In New Zealand during 2008–2012, while the majority of babies had non-smoking mothers, the rate of teenage mothers that smoked was notable (**Figure 2**).

New Zealand Distribution by Maternal Age, Ethnicity, and NZDep decile

In New Zealand during 2008–2012, Māori and Pacific babies (vs European/Other babies), and the babies of younger mothers (less than 25 years vs. 25 or more years), had a *significantly higher* rate of mothers who smoked. A *significantly higher* proportion of babies from average to more deprived areas (NZDep06 deciles 3–10 vs. deciles 1–2) also had mothers who smoked (**Table 5, Figure 3**).

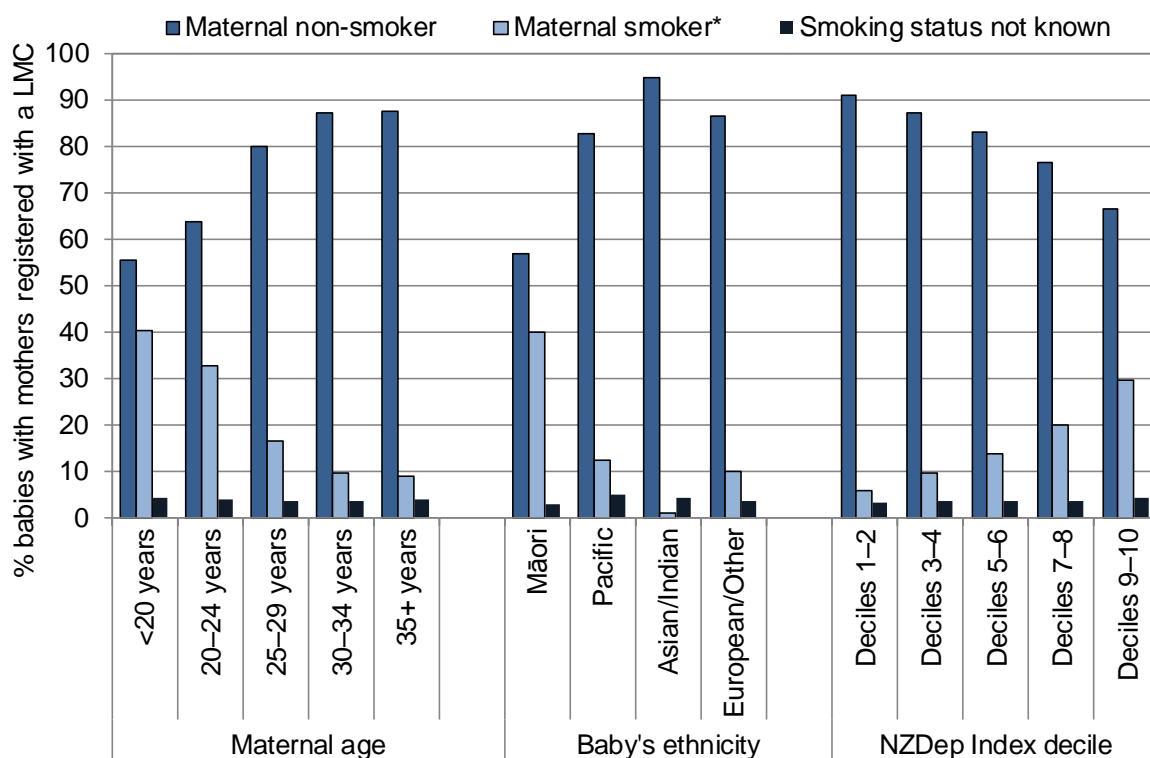


Table 5. Babies born to a mother registered with a LMC at delivery, by smoking status, maternal age, baby's ethnicity, and NZ Deprivation Index decile, New Zealand 2008–2012

Variable	Rate	Rate ratio	95% CI	Rate	Rate ratio	95% CI
	Maternal non-smoker			Maternal smoker		
Maternal age						
<20 years	55.5	0.69	0.68–0.70	40.3	2.43	2.37–2.49
20–24 years	63.6	0.80	0.79–0.80	32.6	1.96	1.92–2.00
25–29 years	79.9	1.00		16.6	1.00	
30–34 years	87.2	1.09	1.09–1.10	9.4	0.57	0.55–0.58
35+ years	87.4	1.09	1.09–1.10	8.8	0.53	0.51–0.54
Baby's prioritised ethnicity						
Māori	56.9	0.66	0.65–0.66	40.1	4.04	3.97–4.11
Pacific	82.9	0.96	0.95–0.96	12.2	1.23	1.18–1.28
Asian/Indian	94.7	1.09	1.09–1.10	1.1	0.11	0.10–0.12
European/Other	86.5	1.00		9.9	1.00	
NZ Deprivation Index decile						
Deciles 1–2	91.0	1.00		5.7	1.00	
Deciles 3–4	87.1	0.96	0.95–0.96	9.6	1.67	1.59–1.76
Deciles 5–6	82.9	0.91	0.91–0.92	13.7	2.40	2.29–2.51
Deciles 7–8	76.5	0.84	0.84–0.85	19.8	3.47	3.33–3.62
Deciles 9–10	66.5	0.73	0.73–0.74	29.5	5.16	4.95–5.38

Source: National Maternity Collection; Note: Rate is per 100 babies born to mothers registered with a LMC at delivery; Maternal smoker are mothers who were smoking at first LMC registration and/or at two weeks postnatal for that baby; Ethnicity is level 1 prioritised; Decile is NZDep06

Figure 3. Percentage of babies born to mothers registered with a Lead Maternity Carer at delivery, by maternal smoking status, maternal age, baby's ethnicity, and NZ Deprivation Index decile, New Zealand 2008–2012



Source: National Maternity Collection; Note: Information is for babies born to mothers registered with a LMC at delivery; * Smokers are mothers smoking at first LMC registration and/or at two weeks postnatal for that baby; Ethnicity is level 1 prioritised; Decile is NZDep06

New Zealand Distribution by Cigarettes Smoked

In New Zealand during 2008–2012, 12.8% of babies ($n=34,294$) had mothers who reported smoked at first registration with a LMC and also at two weeks post-delivery (Table 4). Of these babies, 90.4% had mothers who reported smoked the same number of cigarettes per day at first registration and at two weeks post-delivery (57.7% smoked fewer than 10 cigarettes per day, 28.8% smoked 10–20, and 3.9% smoked more than 20; Table 6).

The proportion of babies with mothers who had decreased the number of cigarettes smoked daily was 1.0% decreased from more than 20, and 4.9% decreased from 10–20 cigarettes, however, 3.1% increased from fewer than 10 cigarettes at first registration to 10 or more at two weeks post-delivery (Table 6).

Table 6. Number of cigarettes smoked daily at first registration with a Lead Maternity Carer and at two weeks post-delivery, by the mothers of babies born in New Zealand 2008–2012

		No.	%	No.	%	No.	%	No.	%
Babies with mothers registered with a LMC at delivery									
New Zealand									
Number of cigarettes smoked daily		At two weeks post-delivery							
		<10		10–20		>20		Total	
At first LMC registration	<10	19,775	57.7	975	2.8	98	0.3	20,848	60.8
	10–20	1,683	4.9	9,880	28.8	204	0.6	11,772*	34.3
	>20	136	0.4	191	0.6	1,347	3.9	1,674	4.9
	Total	21,594	63.0	11,046	32.2	1,649	4.8	34,294	100.0

Source: National Maternity Collection; Note: Information is for those registered with a LMC only; * Total includes five babies with a post-delivery maternal smoking status of "Y" but an incomplete number of cigarettes

South Island DHBs Distribution

South Island DHBs vs. New Zealand

During 2008–2012, the proportion of South Island babies that had a mother who smoked ranged from 13.9% in Canterbury to 23.2% in South Canterbury. The maternal smoking rates (smoking at first registration and/or at two weeks post-delivery) were *significantly higher* than the New Zealand rate in South Canterbury and Southern DHB, and *significantly lower* in Nelson Marlborough and Canterbury (Table 7).

Table 7. Babies born to mothers registered with a Lead Maternity Carer at delivery, by maternal smoking status, South Island DHBs vs. New Zealand 2008–2012

DHB	Number of babies: total 2008–2012			Babies with maternal smoker: rate per 100 babies	Rate ratio	95% CI
	Maternal smoker	Maternal non-smoker	Total			
Babies with mothers registered with a LMC at delivery						
Nelson Marlborough	985	5,335	6,542	15.1	0.87	0.82–0.92
South Canterbury	729	2,228	3,149	23.2	1.34	1.26–1.43
Canterbury	4,271	25,870	30,827	13.9	0.80	0.78–0.83
West Coast	114	550	780	14.6	0.85	0.71–1.00
Southern	3,239	14,039	17,838	18.2	1.05	1.02–1.09
New Zealand	46,371	212,160	268,309	17.3	1.00	

Source: National Maternity Collection; Note: Information is for babies born to mothers registered with a LMC at delivery; * Maternal smokers are mothers smoking at first LMC registration and/or at two weeks postnatal for that baby



Changes in Smoking Status

In all five of the South Island DHBs during 2008–2012, of the mothers who were identified as smoking at either first LMC registration or at two weeks postnatally, the majority were smoking at both time points. A smaller proportion were smoking at first LMC registration but not postnatally, with an even smaller proportion smoking at two weeks postnatally but not at first LMC registration (**Table 8**).

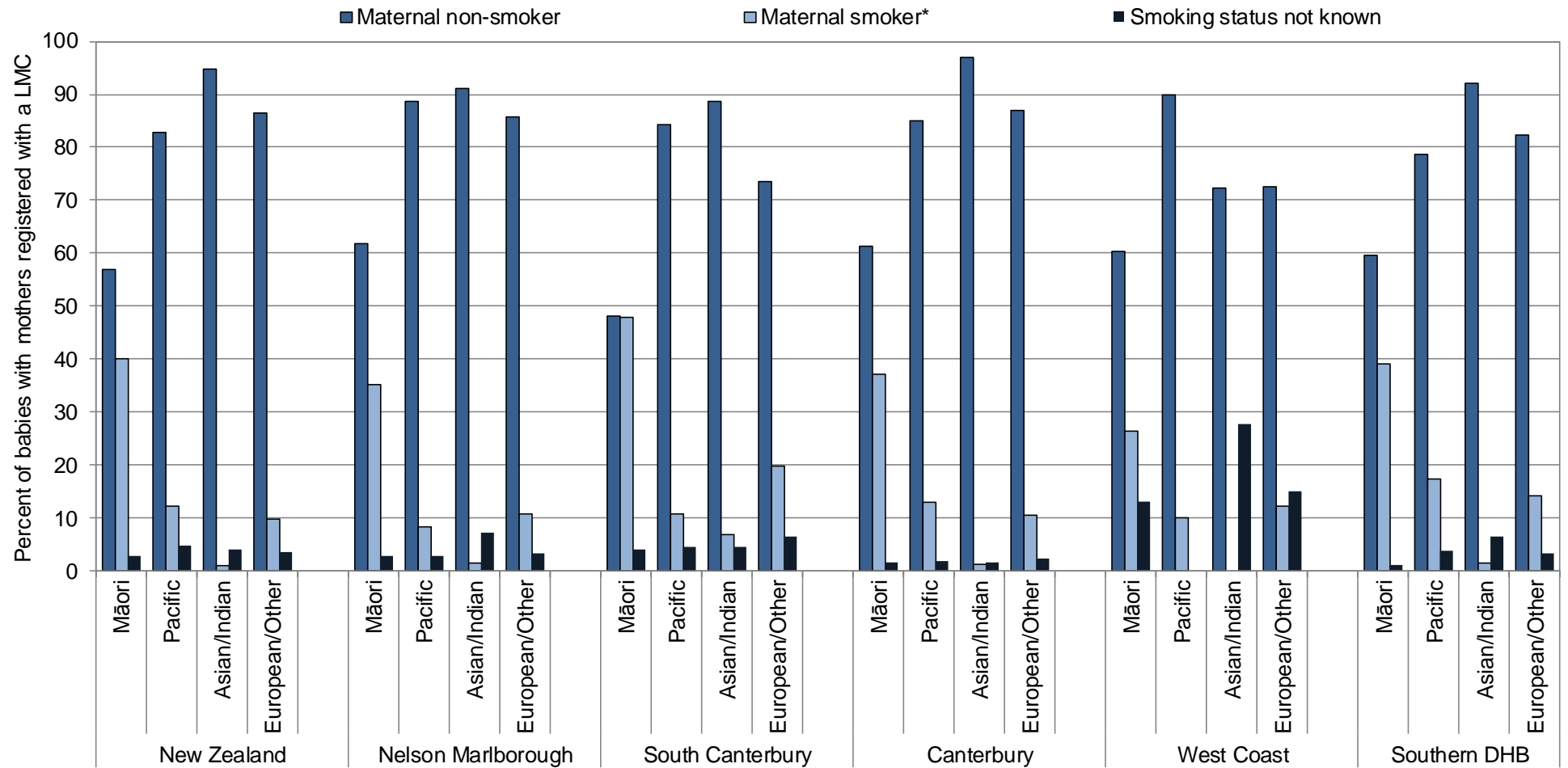
Table 8. Babies born to mothers registered with a Lead Maternity Carer at delivery, by maternal smoking status, South Island DHBs 2008–2012

Maternal smoking status		Babies with mother registered with a LMC at delivery					
first registration with LMC	two weeks postnatal	Number: total 2008–2012	Number: annual average	Percent	Number: total 2008–2012	Number: annual average	Percent
		Nelson Marlborough			South Canterbury		
Non-smoker	Non-smoker	5,335	1,067	81.5	2,228	446	70.8
	Smoker	71	14	1.1	99	20	3.1
	Not known	221	44	3.4	191	38	6.1
Smoker	Non-smoker	95	19	1.5	106	21	3.4
	Smoker	769	154	11.8	473	95	15.0
	Not known	50	10	0.8	51	10	1.6
Not known	Non-smoker	0	0	0.0	1	0	0.0
	Smoker	0	0	0.0	0	0	0.0
	Not known	1	0	0.0	0	0	0.0
Total		6,542	1,308	100.0	3,149	630	100.0
		Canterbury			West Coast		
Non-smoker	Non-smoker	25,870	5,174	83.9	550	110	70.5
	Smoker	306	61	1.0	8	2	1.0
	Not known	680	136	2.2	116	23	14.9
Smoker	Non-smoker	561	112	1.8	8	2	1.0
	Smoker	3,248	650	10.5	72	14	9.2
	Not known	156	31	0.5	26	5	3.3
Not known	Non-smoker	6	1	0.0	0	0	0.0
	Smoker	0	0	0.0	0	0	0.0
	Not known	0	0	0.0	0	0	0.0
Total		30,827	6,165	100.0	780	156	100.0
		Southern					
Non-smoker	Non-smoker	14,039	2,808	78.7			
	Smoker	205	41	1.1			
	Not known	558	112	3.1			
Smoker	Non-smoker	364	73	2.0			
	Smoker	2,581	516	14.5			
	Not known	87	17	0.5			
Not known	Non-smoker	2	0	0.0			
	Smoker	2	0	0.0			
	Not known	0	0	0.0			
Total		17,838	3,568	100.0			

Source: National Maternity Collection; Note: Smokers are mothers who indicated smoking either at first registration with a LMC and/or at two weeks postnatal for that baby



Figure 4. Percentage of babies born to mothers registered with a Lead Maternity Carer at delivery, by maternal smoking status and baby's ethnicity, South Island DHBs vs. New Zealand 2008–2012



Source: National Maternity Collection; Note: * Maternal smokers are mothers smoking at first LMC registration and/or at two weeks postnatal for that baby; Ethnicity is level 1 prioritised

South Island DHBs Distribution by Ethnicity

In Canterbury and Southern DHB during 2008–2012, maternal smoking rates were higher for Māori > Pacific and European/Other > Asian/Indian babies, while in the remaining South Island DHBs maternal smoking rates were higher for Māori than for European/Other babies (Figure 4).

South Island DHBs Distribution by Cigarettes Smoked

In all the South Island DHBs during 2008–2012, the majority of babies whose mothers smoked had mothers who smoked <10 cigarettes a day. However, a smaller proportion smoked 10–20 or >20 cigarettes a day, with a small number of women changing how many cigarettes they smoked between first LMC registration and two week postnatally (Table 9).

Table 9. Number of cigarettes smoked daily at first registration with a Lead Maternity Carer and at two weeks post-delivery, by the mothers of babies born in South Island DHBs 2008–2012

		No.	%	No.	%	No.	%	No.	%
Babies with mothers registered with a LMC at delivery									
Number of cigarettes smoked daily		At two weeks post-delivery							
		<10		10–20		>20		Total	
Nelson Marlborough									
At first LMC registration	<10	444	57.7	20	2.6	2	0.3	466	60.6
	10–20	33	4.3	221	28.7	3	0.4	257	33.4
	>20	1	0.1	5	0.7	40	5.2	46	6.0
	Total	478	62.2	246	32.0	45	5.9	769	100.0
South Canterbury									
At first LMC registration	<10	298	63.0	36	7.6	1	0.2	335	70.8
	10–20	56	11.8	64	13.5	3	0.6	123	26.0
	>20	7	1.5	3	0.6	5	1.1	15	3.2
	Total	361	76.3	103	21.8	9	1.9	473	100.0
Canterbury									
At first LMC registration	<10	1,792	55.2	106	3.3	18	0.6	1,916	59.0
	10–20	119	3.7	997	30.7	20	0.6	1,136	35.0
	>20	18	0.6	26	0.8	152	4.7	196	6.0
	Total	1,929	59.4	1,129	34.8	190	5.8	3,248	100.0
West Coast									
At first LMC registration	<10	31	43.1	3	4.2	0	0.0	34	47.2
	10–20	0	0.0	32	44.4	1	1.4	33	45.8
	>20	0	0.0	1	1.4	4	5.6	5	6.9
	Total	31	43.1	36	50.0	5	6.9	72	100.0
Southern									
At first LMC registration	<10	1,388	53.8	74	2.9	5	0.2	1,467	56.8
	10–20	81	3.1	843	32.7	11	0.4	935	36.2
	>20	10	0.4	32	1.2	137	5.3	179	6.9
	Total	1,479	57.3	949	36.8	153	5.9	2,581	100.0

Source: National Maternity Collection; Note: Information is for those registered with a LMC only

Local Policy Documents and Evidence Based Reviews Relevant to the Cessation of Smoking in Pregnancy

Table 10 (below) provides a brief overview of local policy documents and evidence based reviews which consider interventions to promote smoking cessation during pregnancy. Given that smoking during pregnancy has been shown to be highest amongst younger mothers, Error! Reference source not found. (page **Error! Bookmark not defined.**) and Error! Reference source not found. (page **Error! Bookmark not defined.**) provide an overview of publications on smoking prevention and cessation in young people are relevant.

Table 10. Local policy documents and evidence based reviews relevant to the cessation of smoking in pregnancy

Ministry of Health publications
<p>Ministry of Health. 2007. New Zealand Smoking Cessation Guidelines. Wellington: Ministry of Health. http://www.health.govt.nz/publication/new-zealand-smoking-cessation-guidelines</p> <p>These guidelines identify pregnant and breastfeeding women as priority population groups for cessation throughout pregnancy and the post-partum period. While recognising that there is limited evidence for the effectiveness of nicotine replacement therapy (NRT) in pregnancy, following analysis of the risks and benefits known at the time, the guidelines support the use of NRT in pregnancy and breastfeeding.</p>
International guidelines
<p>National Institute for Health and Care Excellence. 2013. Smoking cessation in secondary care: acute, maternity and mental health services. London: National Institute for Health and Care Excellence. http://www.nice.org.uk/nicemedia/live/14306/65863/65863.pdf</p> <p>The purpose of this guidance is to support smoking cessation, temporary abstinence and smokefree policies in all secondary care settings, including maternity services. The supporting evidence relevant to smoking in pregnant women and new mothers is Review 3: 'Smoking cessation interventions in acute and maternity services: review of barriers and facilitators' was carried out by Tobacco Dependence Research Unit, Queen Mary University of London by Katie Myers, Hayden McRobbie, Oliver West and Peter Hajek.</p>
<p>National Institute for Health and Care Excellence. 2010. Quitting smoking in pregnancy and following childbirth. London: National Institute for Health and Care Excellence. http://www.nice.org.uk/nicemedia/live/13023/49345/49345.pdf</p> <p>This guidance is intended for service commissioners, managers and health professionals who have an interest in, and responsibility for, helping pregnant smokers and new mothers to quit. The first chapter of the guidance includes recommendations on identifying women who smoke and referring them to stop smoking services, contacting and supporting women who have been referred, nicotine replacement therapy and other pharmacological interventions, meeting the needs of disadvantaged women who smoke, helping women's partners and "significant others" who smoke and training for professionals. Subsequent chapters cover public health need and practice, considerations, implementation, and recommendations for research. The appendix provides brief evidence statements from the three reviews and three expert reports on which the guidance was based. These publications can be found on the NICE website here: http://guidance.nice.org.uk/PH26/SupportingEvidence or here: https://beta.nice.org.uk/Guidance/PH26/Documents#resource_Review_Documents (under the heading "Quitting smoking in pregnancy and following childbirth: final evidence reviews").</p> <p>While there was good evidence to support smoking cessation interventions (including financial incentives and self-help), there was a lack of evidence on how to prevent relapse after giving birth and limited evidence of the effectiveness of interventions to help partners to quit or establish smoke-free homes.</p>
Evidence-based medicine reviews
<p>Likis F E, Andrews J C, Fonnesebeck C J, et al. 2014. Smoking Cessation Interventions in Pregnancy and Postpartum Care. Evidence Report/Technology Assessment No.214. (Prepared by the Vanderbilt Evidence-based Practice Center under Contract No. 290-2007-10065-I.) AHRQ Publication No. 14-E001-EF. Rockville, MD: Agency for Healthcare Research and Quality. http://effectivehealthcare.ahrq.gov/ehc/products/517/1871/smoking-pregnancy-infants-report-140226.pdf</p> <p>This systematic review included 59 unique studies. Three were prospective cohort studies and 56 were RCTs. The review authors considered that 13 of the RCTs were good, 15 fair and 28 poor quality. The studies evaluated educational materials, counselling-based interventions, peer support, nicotine replacement therapy (NRT), multi component interventions, and other unique interventions. Overall, the reviewers considered that the strength of evidence regarding interventions for smoking cessation and relapse prevention in pregnant women was low. When assessed by meta-analysis, the strength of evidence was moderate for the effectiveness of incentives (odds ratio 3.23, 95% CI 1.98–4.59) and low for all other intervention components (odds ratios ranged from 1.32 down to 1.05 and all the associated confidence intervals all included 1, the value associated with no effect. The evidence for counselling was not assessed by meta-analysis as in most studies both the intervention and control arms included counselling (so it was not possible to compare counselling vs. no counselling). The reviewers found insufficient evidence to determine the effect</p>

of smoking cessation interventions on gestational age, birth weight, neonatal deaths, or long term or child outcomes, or to assess the harms of smoking interventions. They stated that their review indicated that approaches combining multiple components are most likely to be successful and that incentives were the component with the highest probability of success. Other components with a high probability of success were information, quit guides, feedback about biologic measures, NRT and personal follow up. The components that added little to the success of multi-component interventions were peer support, clinic reinforcement and prescriptions to quit.

Chamberlain C, O'Mara-Eves A, Oliver S, et al. 2013. **Psychosocial interventions for supporting women to stop smoking in pregnancy**. Cochrane Database of Systematic Reviews doi:10.1002/14651858.CD001055.pub4
<http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD001055.pub4/abstract>

This comprehensive review included 86 trials (RCTs, cluster RCTs, randomised cross-over trials, and quasi-randomised trials), 77 of which (including 29,000+ women) provided data on smoking abstinence in late pregnancy. It includes the results of 88 different meta-analyses for a total of 11 comparisons involving 59 outcomes. Counselling appeared to have a modest effect on smoking cessation compared to usual care (27 trials; average risk ratio (RR) 1.44, 95% CI 1.19–1.75) but sub-group analysis indicated that the effect size was different from zero only where counselling was provided in conjunction with other strategies (11 studies; average RR 1.59, 95% CI 1.15–2.21, $I^2=45\%$) or tailored to the needs of individual women (six studies; average RR 1.49, 95% CI 1.01–2.20, $I^2=75\%$). It was unclear whether any one type of counselling was better than any other and for most secondary outcomes the effect of counselling was not significantly different from the null effect.

The largest effect size was for incentive-based interventions: compared to a less intensive intervention (one study; RR 3.64, 95% CI 1.84–7.23) and to an alternative intervention (one study; RR 4.05, 95% CI 1.48–11.11).

Feedback interventions involve the mother being provided with feedback such as information about fetal health status (e.g. from ultrasound monitoring) or the results of measurements of by-products of tobacco smoking such as carbon monoxide or urinary cotinine). Feedback interventions had a significant effect only when compared to usual care (rather than a less intensive intervention) and provided together with other strategies such as counselling (two studies; average RR 4.39, 95% CI 1.89–10.21).

The effect of health education was unclear both in comparison to usual care and to a less intensive intervention. Peer social support appeared effective (five studies; average RR 1.49, 95% CI 1.01–2.19), but the effect of social support by partners was unclear. When smoking interventions were provided as part of broader interventions to improve maternal health rather than as a stand-alone smoking cessation interventions, the effects were mixed.

Pooled data from 14 trials (of various interventions) indicated a significant reduction in low (<2500g) birthweight (average RR 0.82, 95% CI 0.71–0.94) and pooled data from 14 psychosocial intervention trials reporting on pre-term birth showed a significant reduction in pre-term births (average RR 0.82, 95% CI 0.70–0.96). Pooled data from 19 studies showed a statistically significant (but small) increase in birthweight in women who received smoking intervention (mean increase 40.78g, 95% CI 18.45–63.10g).

The review authors concluded that psychosocial interventions can increase the proportion of women who stop smoking in late pregnancy and reduce preterm birth and low birthweight.

Coleman T, Chamberlain C, Davey M-A, et al. 2012. **Pharmacological interventions for promoting smoking cessation during pregnancy**. Cochrane Database of Systematic Reviews doi:10.1002/14651858.CD010078
<http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD010078/abstract>

This review aimed to determine the efficacy and safety of smoking-cessation pharmacotherapy for supporting pregnant women to quit smoking. The review authors failed to find any trials of varenicline or bupropion but they found six RCTs of nicotine replacement therapy (NRT) including a total of 1745 pregnant women smokers. The trials were of generally high quality. They performed a pooled analysis of the data from all six trials which indicated that there was no statistically significant evidence that NRT was more effective than placebo/control: risk ratio 1.33, 95% CI 0.93–1.91, $T^2=0.05$, $I^2=28\%$. The review authors concluded that there was insufficient evidence to draw conclusions about the efficacy and safety of NRT added to behavioural support for quitting smoking during pregnancy but that there were statistically non-significant findings suggesting that further research with higher doses of NRT might provide more definitive evidence.

Filion KB, Abenhaim HA, Mottillo S, et al. 2011. **The effect of smoking cessation counselling in pregnant women: a meta-analysis of randomised controlled trials**. BJOG: An International Journal of Obstetrics & Gynaecology, 118(12), 1422–28.

The aim of this review was to assess the effect of counselling as a smoking cessation intervention for pregnant women in isolation rather than as part of a multi-component intervention. The review authors performed a meta-analysis of data from eight RCTs (3290 women) all of which examined abstinence at six months. The proportion of women who remained abstinent at six months ranges from 4 to 24% in those randomised to receive counselling and from 2 to 21% in the control women. The odds ratio was 1.08, (95% CI 0.84–1.40) indicating little evidence that counselling is efficacious in promoting abstinence. There was no evidence suggesting that efficacy was different for different types of counselling. The authors concluded that the available data was limited but that it was sufficient to rule out large treatment effects.

The CRD noted that there were limitations in the way this review was conducted but the conclusions reflected the evidence and were appropriately cautious. The CRD commentary can be found here:

http://www.crd.york.ac.uk/CRDWeb/ShowRecord.asp?AccessionNumber=12011006690&UserID=0#_U2hEt_mSx8E

Hemsing N, Greaves L, O'Leary R, et al. 2011. **Partner Support for Smoking Cessation During Pregnancy: A Systematic Review.** *Nicotine & Tobacco Research*.

<http://ntr.oxfordjournals.org/content/early/2011/12/14/ntr.ntr278.abstract>

This review included nine intervention studies of a range of interventions. Five of the studies were RCTs, and the others used a variety of pre-post test designs. Of the four studies of interventions aimed at enhancing partner's support for women's smoking cessation, three found no effect but one RCT found a significant effect on smoking quit attempts in pregnant women. In this study the intervention for the women involved a booklet, a video and two 10-minute counselling sessions while the partners were given a booklet explaining the importance of quitting together for the baby's future health. The effect of partner support on the study results was unclear, however, because while 76.2% of the women gave their partner the booklet, only 48.5% of the partners reported having read it. Seven out of the nine studies (2 RCTs, one cluster RCT and four pre-post test) found no effect of the intervention on partner smoking cessation (although three of them found significant increases in partner quit attempts) but two RCTs found a significant effect on partner smoking cessation. The two successful intervention involved multiple components. The review authors noted that because the interventions were dissimilar and often multi-component it was difficult to compare efficacy between interventions. They stated that while the available evidence did not support conclusive recommendations, it did suggest some promising intervention components: multiple points of contact, intervention delivered to partner by someone other than the pregnant woman herself, and tailoring to specific settings and populations (e.g. addressing the particular barriers for low-SES groups). They also stated that their review indicated that smoking cessation interventions are often not sustainable into the post-partum period.

Other relevant publications

Esdonk T, Glover M, Kira A, et al. 2013. **Reducing Smoking in Pregnancy Among Māori Women: "Aunties" Perceptions and Willingness to Help.** *Maternal and Child Health Journal*, 1–7. <http://dx.doi.org/10.1007/s10995-013-1377-8>

Māori women are often late engaging with the health system when they become pregnant, with 42% not registering with a lead maternity carer until after the first trimester of pregnancy. Māori community health workers (CHWs) or "aunties" may be able to provide smoking cessation support to pregnant Māori smokers. This paper reports on data collected during the developmental phase of the Auahi Kore Whakahaere Hapūnga (facilitating smokefree pregnancy) Initiative study (AWHI) at three hui exploring the aunties' (25 in total) opinions about how and why they could help newly-pregnant pregnant smokers. The findings confirmed those of previous research in demonstrating the strengths of CHWs: their familiarity with the local culture and environment and their extensive networking. Aunties who smoked themselves did not feel that it was appropriate for them to provide smoking cessation assistance as they felt that it was important for health advisors to "walk the talk". An outcome of the hui has been the recruitment of ten aunties who will be involved in the on-going AWHI study to deliver the trial intervention to pregnant Māori smokers.

Ryan A. 2013. **Interventions to support smoking cessation in pregnancy: a systematic review of reviews.**

Perspective - NCT's journal on preparing parents for birth and early parenthood (March 2013).

http://www.nct.org.uk/sites/default/files/related_documents/Ryan%20Interventions%20to%20support%20smoking%20cessation%20in%20pregnancy-%20a%20systematic%20review%20of%20reviews%20pp16%20-20%20Mar13.pdf

This concise review offers an easy to read overview of the evidence (both systematic reviews and recent RCTs) regarding smoking cessation interventions, but it was published just too early to include the conclusions from the 2013 Cochrane review on psychosocial interventions.

Allen M, Barnes C, Dalley A. 2012. **Best Practice Framework for Dedicated Pregnancy Smoking Cessation Services: Report for the Ministry of Health.** Wellington: Allen & Clarke. <http://www.sfc.org.nz/documents/Best-Practice-Framework-2012.pdf>

The Ministry of Health commissioned Allen and Clarke to develop an evidence-based best practice framework for the delivery of smoking cessation services for pregnant women in New Zealand. Project team members reviewed the relevant literature from 2007–12, visited and conducted interviews with the six Ministry-funded dedicated pregnancy smoking cessation service providers and 13 other stakeholders to gather information on current New Zealand practice in pregnancy smoking cessation services, and met with a technical advisory group who provided expert advice. The report authors noted that many providers are still basing their practice on the "Stages of Change" model which is contrary to the approach recommended in the latest New Zealand Smoking Cessation guidelines. The best practice framework has three main components: components; philosophical and policy foundations, service delivery systems and coordination and linkages. Following the best practice framework are recommendations in three categories: those for those for structural/policy change (targeted at the Ministry of Health), those for practice and the sector, and those for information, analysis and research.

Glover M, Kira A. 2012. **Pregnant Māori Smokers' Perception of Cessation Support and How It Can Be More Helpful.** *Journal of Smoking Cessation*, 7(02), 65–71. <http://dx.doi.org/10.1017/jsc.2012.13>

This paper reports on face-to-face interviews with 60 pregnant Māori women who were mostly smokers and who were purposely chosen to provide variety in age, stage of pregnancy, number of pregnancies, place of residence and socio-economic status. The women smoked an average of nine cigarettes per day, and most (83%) had been advised to stop, most commonly by the midwife (63%). Few (21%) felt influenced by the advice they had received. Factors that the women thought might help them to quit included more empathetic, accessible and proactive health provider support, resources which included details of the risks of smoking for the foetus, information about smoking cessation products and services, and mass media support specific to pregnancy (similar to the "It's about whānau" campaign).

Canadian Agency for Drugs and Technologies in Health (CADTH). 2012. **Smoking cessation interventions for pregnant women and mothers of infants: a review of the clinical effectiveness, safety, and guidelines.**

<http://www.cadth.ca/media/pdf/htis/mar-2012/RC0329%20Smoking%20Cessation%20Final.pdf>

This “rapid response report” from the CADTH provides a concise and accessible review of the evidence regarding the clinical effectiveness and safety/risk of smoking cessation interventions for pregnant women or mothers of infants and also a brief summary of the recommendations in three recent guidelines: the Canadian one and those of the Royal Australian College of General Practitioners and NICE. Only the NICE one is specific to pregnant women / new mothers.

American College of Obstetricians and Gynecologists. 2011. **Smoking cessation during pregnancy: A clinician’s guide to helping pregnant women quit smoking.**

<https://www.acog.org/~media/Departments/Tobacco%20Alcohol%20and%20Substance%20Abuse/SCDP.pdf>

This publication is a “self-instructional guide and toolkit produced by the American College of Obstetricians and Gynecologists as continuing medical education for clinicians.

Glover M, Kira A. 2011. **Why Māori women continue to smoke while pregnant.** New Zealand Medical Journal, 124(1339), 22–31

This article reports on a qualitative exploratory study involving interviews with 60 pregnant Māori women aged from 17 to 43. The study aimed to determine the attitudes of pregnant Māori smokers towards smoking in pregnancy, the factors which influences continued smoking in pregnancy, and the family (whānau) support that the women received to quit. The women smoked an average of nine cigarettes per day and most (77%) reported no smoking related health problems. All the women lived with at least one other smoker, 62% socialised mostly with people who smoked and almost all said it was easy to smoke where they worked and socialised. The two most common reasons the women cited for contemplating quitting were “for their baby’s health and their own health. The women had poor understanding of the risks related to smoking in pregnancy and low motivation to quit. The authors stated that their findings highlighted the need to involve families in smoking cessation interventions.

Schneider S, Huy C, Schutz J, et al. 2010. **Smoking cessation during pregnancy: a systematic literature review.** Drug Alcohol Rev, 29(1), 81–90

This review aimed to answer the specific question:” What are the differences between specific characteristics referring to social factors, smoking behaviour, personal relationships and pregnancy among women who successfully quit smoking during pregnancy in comparison to those who do not?” The review authors identified 19 relevant studies, published between January 1997 and March 2008. They summarised their results in a table showing the correlates of smoking cessation during pregnancy. The three factors that most inhibited a pregnant woman from quitting were having a partner who smokes, especially for women of low socio-economic status, a high degree of addiction and multiple previous pregnancies.

Websites

Quitline. 2014. **Smoking in pregnancy.** <http://www.quit.org.nz/23/reasons-to-quit/smoking-and-pregnancy> accessed May 2014.

This webpage provides links to Quitline’s resources to help pregnant women quit smoking.

Note: The publications listed above were identified using the search methodology outlines in Appendix 1.