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Smoking and quit attempts during pregnancy and postpartum: a longitudinal UK cohort

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3 **Smoking and quit attempts during pregnancy and postpartum: a longitudinal**
4 **UK cohort**
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ABSTRACT**Objectives**

Pregnancy motivates women to try stopping smoking, but little is known about timing of their quit attempts and how quitting intentions change during pregnancy and postpartum. Using longitudinal data, this study aimed to document women's smoking and quitting behaviour throughout pregnancy and after delivery.

Design

Longitudinal cohort survey with questionnaires at baseline (8-26 weeks gestation), late pregnancy (34-36 weeks) and 3 months after delivery.

Setting

Two maternity hospitals in one National Health Service hospital trust, Nottingham, England.

Participants

850 pregnant women, aged 16 or over, who were current smokers or had smoked in the 3 months before pregnancy, were recruited between August 2011 and August 2012.

Outcome measures

Self-reported smoking behaviour, quit attempts and quitting intentions.

Results

Smoking rates, adjusting for non-response at follow-up, were 57.4% (95% CI 54.1-60.7) at baseline, 59.1% (95% CI 54.9-63.4) in late pregnancy and 67.1% (95% CI 62.7-71.5) 3 months postpartum. At baseline, 272 of 488 current smokers had tried to quit since becoming pregnant (55.7%, 95% CI 51.3-60.1); 51.3% (95% CI 44.7-58.0) tried quitting between baseline and late pregnancy and 27.4% (95% CI 21.7-33.2) after childbirth. The percentage who intended to quit within the next month fell as pregnancy

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3 progressed, from 40.4% (95% CI 36.1-44.8) at baseline to 29.7% (95% CI 23.8-35.6)
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5 in late pregnancy and 14.2% (95% CI 10.0-18.3) postpartum. Postpartum relapse was
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7 lower among women who quit in the 3 months before pregnancy (17.8%, 95% CI 6.1-
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9 29.4) than those who stopped between baseline and late pregnancy (42.9%, 95% CI
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11 24.6-61.3)

12 13 **Conclusions**

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16 Many pregnant smokers make quit attempts throughout pregnancy and postpartum, but
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18 intention to quit decreases over time; there is no evidence that smoking rates fall during
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20 gestation.
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22 23 24 25 **Keywords**

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28 Smoking cessation, pregnancy, longitudinal research, quit attempts, postpartum relapse,
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30 survey research
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Strengths and limitations of this study

- As far as we are aware, this is the only study to investigate timing of quit attempts and propensity to stop smoking during pregnancy and postpartum, and to quantify longitudinal changes.
- Smoking behaviour is self-reported rather than validated; misreporting due to recall bias may have been minimised by collecting data at three time points, and by there being no expectation that they should try to stop smoking.
- Later survey findings were adjusted using multiple imputation to help address non-response bias due to attrition.
- As the study was conducted in just one geographical area of the UK and participants were predominantly white British, findings might not be generalisable; however, the demographic profile of participants was similar to that of other UK cohorts of pregnant smokers.

INTRODUCTION

Smoking in pregnancy is associated with increased risks of miscarriage, stillbirth, prematurity, low birth weight, perinatal morbidity and mortality, neo-natal and sudden infant death, infant respiratory problems, poorer infant cognition, and adverse infant behavioural outcomes.^{1 2} Internationally, large numbers of pregnant women smoke; with rates between 12% and 22% in high income countries³⁻⁶ and rates increasing in emerging and developing economies.⁷ Pregnancy is probably the event which most motivates female smokers to try quitting; for example, in the UK over 50 per cent of pregnant smokers try to stop⁵ and pregnant women are, therefore, particularly likely to be interested in receiving cessation support. Some health systems systematically offer such support; in the UK this is largely done in early pregnancy,⁸ although official guidance recommends that support is provided throughout gestation.⁹

We are not aware of any studies that have investigated when, in pregnancy, smokers have the greatest propensity to try stopping, the timing of any quit attempts and potential influences on this. Outside of pregnancy and postpartum, most adults tend to have fairly stable smoking behaviour.¹⁰ Although overall smoking rates in pregnancy have declined, a significant proportion of women continue to smoke throughout pregnancy.¹¹ However, many women who smoke before pregnancy have varied smoking behaviour after conception,^{5 11-16} and although it is logical to try to minimise fetal exposure to tobacco smoke by offering cessation support in early pregnancy, support may be welcomed at other times in gestation. In addition, of those that do stop, many relapse within the first few months postpartum.^{17 18} Relatively few studies of prenatal smoking behaviour have been longitudinal,^{12 13 15 16 19-23} with only two of these following up women postpartum,^{12 13} and the only two studies to have been conducted in the UK are now over 20 years old.^{12 19} Importantly, none of these studies asked about number of quit attempts or reported when in pregnancy women have tried to quit. To help focus smoking cessation interventions at the most effective leverage points, we need

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3 contemporary, longitudinal data on the smoking and quitting behaviours of pregnant
4 women. Consequently, we investigate the frequency and timing of pregnant smokers'
5 quit attempts, and the factors associated with these. We also attempt to quantify
6 individual-level changes in smoking behaviour during these times.
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10 11 12 13 14 **METHODS**

15 16 17 **Study design and configuration**

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20 A longitudinal cohort study was undertaken; eligible women were aged 16 or over, 8 to
21 26 weeks pregnant and currently smoking or had smoked regularly during the 3 months
22 immediately prior to finding out they were pregnant. Surveys were conducted at
23 recruitment (8-26 weeks gestation), in late pregnancy (34-36 weeks gestation) and 3
24 months after delivery. Full methods and characteristics of the recruited participants,
25 including factors associated with being a current smoker, are detailed elsewhere.²⁴
26 STROBE guidance was used for reporting.²⁵ Ethical approval was given by Derbyshire
27 Research Ethics Proportionate Review Sub-Committee.
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39 **Study setting and regimen**

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42 Women were recruited between August 2011 and August 2012 when attending routine
43 hospital or ultrasound appointments at two antenatal clinics within Nottingham
44 University Hospitals National Health Service Trust (City Hospital and Queen's Medical
45 Centre). Women attending clinics first completed a screening questionnaire and those
46 eligible and willing completed a baseline questionnaire and were sent follow-up
47 questionnaires by post or via an email web-link.
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57 **Measurements**

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3 At baseline, 'recent ex-smokers' were women who reported not smoking currently, but
4 had done so during the 3 months before finding out they were pregnant. On later
5 questionnaires, women who reported quitting smoking since the previous survey were
6 also defined as 'recent ex-smokers'. At any time, if women reported smoking either
7 every day or occasionally (smoke, but not every day), they were classified as smokers
8 and were asked further details about this, including if they had made any quit attempts
9 and how many of these attempts had lasted at least 24 hours. On all questionnaires
10 women were asked about timescales of future intentions to quit (within next 2
11 weeks/next 30 days/next 3 months/not planning to quit) (since finding out they were
12 pregnant/since completing the first questionnaire/since the birth of their baby), and
13 about urges to smoke (6 point Likert scale ranging from 'no urges' to 'extremely
14 strong'). The 'Heaviness of Smoking index' (HSI) was calculated as the sum of scores
15 from two items of the Fagerström Test of Cigarette Dependence²⁶ (scores range, 0 to 6;
16 higher score indicates greater cigarette dependence). The questionnaires are available as
17 an appendix to this paper.
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36 **Statistical analysis**

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38 In order to quantify the proportion of quit attempts made after the first trimester of
39 pregnancy, we aimed to recruit 850 participants.²⁴ Analyses were conducted using Stata
40 version 14.0 (Stata Corp, College Station, TX, USA).
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48 Descriptive statistics summarised participants' characteristics and smoking behaviour at
49 each time point and we compared those responding to all three questionnaires with
50 those who did not using chi-squared and t-tests for categorical and continuous variables
51 respectively, with p values of <0.05 deemed significant. Characteristics found to be
52 significantly associated with non-completion of later questionnaires, and hence absence
53 of smoking data, were used with multiple imputation to adjust for attrition of smoking
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behaviour at later time points.

An exploratory analysis was performed to investigate the factors associated with reporting having made a quit attempt of any duration on the baseline questionnaire. For this analysis items were dichotomised; six self-efficacy items that had high internal consistency (Cronbach's $\alpha=0.95$)²⁷ were combined into a single score out of 30 with women scoring ≥ 25 considered to have high self-efficacy. Univariable logistic regression analysis was used to calculate an OR with 95% CIs for each variable (age,^{28 29} ethnicity,³⁰ qualifications held,²⁸ previous pregnancy,^{28 29 31 32} number of cigarettes smoked per day, HSI,^{29 31 33} partner smoking status,²⁹ occupation,³⁴ planned or surprise pregnancy,^{28 35-37} depression, long term disability or mental illness,³⁸ smoking beliefs and self-efficacy³⁹). Variables which showed a significant association ($p<0.05$) in the univariable analysis were included in a multivariable logistic regression model. Variables that achieved significance ($p<0.05$) remained in the multivariable model and all non-significant variables identified from the univariable analysis were re-entered into the model consecutively to assess whether they became significant. The final multivariable model included only significant variables ($p<0.05$). A likelihood ratio test identified that age should be included in the multivariable analysis as a continuous variable. Where collinearity between variables was anticipated (for example, the number of cigarettes smoked per day and HSI), we included the variable that resulted in a better fitting model. As this analysis only included baseline data, we did not need to take account of attrition.

Multiple imputation for missing outcome data for smoking in late pregnancy (34-36 weeks gestation) and at 3 months after delivery was performed using Stata's mi command, based on 20 iterations. The outcomes were imputed using multivariable logistic regression models based on the following baseline variables: age, smoking

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3 status, gestation, general health, depression, previous pregnancy, smoking in previous
4 pregnancy, smoking urges, qualifications, and ethnicity. All baseline variables were
5 included in the analysis in dichotomised format. The percentage of women smoking at
6 each outcome was obtained using Rubin's rule.⁴⁰ Where necessary, an augmented
7 regression approach was used to overcome issues relating to perfect prediction during
8 the multiple imputation.
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14 15 16 17 18 **RESULTS**

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21 Figure 1 summarises questionnaire response rates. Of 1101 eligible women, 966 (88%)
22 completed the baseline survey, and 850 (77%) consented to receive the later surveys.
23 Questionnaires were returned by 509 (59.9%) in late pregnancy, and 476 (56.0%) at 3
24 months postpartum with 407 (47.8%) women completing all three.
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32 **[Figure 1** Diagram showing recruitment and flow of participants through the study]
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38 Participants had similar socio-demographic characteristics to those in previous pregnancy
39 cohorts and have been reported elsewhere.²⁴ Just over half (488, 57.4%) were current
40 smokers and 729 (85.7%) of the 850 women in the cohort reported their longer-term
41 quitting intentions (data missing for 121 (14.2%)). Of these 729 women, 424 (58.2%)
42 planned to stop smoking permanently, 21 (2.9%) intended to stop until their baby was
43 born, and 181 (24.8%) were unsure; however, 103 (14.1%) did not plan to stop.
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49 Amongst the 272 smokers who reported a quit attempt at baseline, 14 (7.6%) reported
50 stopping for >30 days, 32 (12.2%) for 7-30 days, 126 (48.1%) for 1-6 days, and 84
51 (32.1%) for <24 hours.
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3 Responding to all three surveys was associated with being older, less cigarette
4 dependant, primiparous, in a planned pregnancy and being a 'recent ex-smoker' at the
5 outset of the study (Table 1).
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Table 1 Comparison of participants who completed all three questionnaires with those who completed either one or two questionnaires.

Characteristic	Completed all follow-up surveys N = 397 (46.7%) N (%)	Did not complete all surveys N = 453 (53.3%) N (%)	P value
Weeks gestation (mean, SD)	15.8 (4.1)	15.4 (4.1)	0.14
Age, years (mean, SD)	26.5 (5.6)	25.2 (5.5)	<0.001**
Baseline smoking status			
Current smoker	199 (50.1)	289 (63.8)	
Ex-smoker	198 (49.9)	164 (36.2)	<0.001**
Previous pregnancy			
Not been pregnant before	143 (36.0)	132 (29.1)	
Been pregnant before	250 (63.0)	314 (69.3)	0.037*
Partner smoking			
Partner is not a current smoker/no partner	158 (39.8)	187 (41.3)	
Partner is a current smoker	236 (59.4)	263 (58.2)	0.67
Current smokers only:			
Reported quit attempt since learning of pregnancy/previous questionnaire/birth of baby ^a			
Yes	115 (57.8)	157 (54.3)	
No	78 (39.2)	122 (42.2)	0.47
Heaviness of Smoking Index			
Low dependence (0-2)	140 (70.4)	170 (58.8)	
Moderate dependence (3-4)	46 (23.1)	100 (34.6)	
High dependence (5-6)	1 (0.5)	7 (2.4)	0.004*

*significant at <0.05

**significant at <0.001

^a Quit attempts: at baseline, since finding out about the pregnancy; at follow-up 1, since completing previous survey; follow-up 2, since birth of baby

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3 Figure 2 shows a preliminary descriptive analysis of smoking behaviour across pregnancy
4 within the 397 participants who returned all three questionnaires and illustrates
5 variability in individual's smoking behaviour. Of note, 13.5% (5/37) of women who had
6 stopped smoking in the 3 months before pregnancy were smoking again 3 months after
7 childbirth, whereas 34.2% (55/161) of women who reported that they had quit after
8 finding out they were pregnant had returned to smoking 3 months postpartum. As these
9 data are not adjusted for non-response at follow-up, they may not be consistent with
10 adjusted figures reported below.
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22 **[Figure 2** Change in smoking behaviour between early pregnancy, late pregnancy and
23 postpartum amongst respondents to all 3 questionnaires (N = 397)]
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30 Table 2 shows findings from univariable and multivariable analyses that investigated
31 factors associated with baseline current smokers having reported making a quit attempt
32 earlier in pregnancy. As these analyses only used baseline data, adjustment for attrition
33 was not needed. After the multivariable modelling, four factors were independently
34 associated with reporting previous quit attempts at baseline: smoking fewer daily
35 cigarettes, agreeing that smoking during pregnancy can seriously harm the baby, being
36 primiparous and having a planned pregnancy.
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Table 2 Univariable and multivariable associations with previous quit attempts in pregnancy at baseline

Variable	Current smokers in each response category N	Women who made a quit attempt N (row %)	Univariable Model		Multivariable Model	
			Odds Ratio (95% confidence intervals)	P value	Odds Ratio (95% confidence intervals)	P value
Age, years						
<20	97	64 (66.0)	1.00			
21-25	179	101 (56.4)	0.63 (0.37-1.07)			
26-30	123	57 (46.3)	0.42 (0.24-0.74)	0.026		
Over 31	86	48 (55.8)	0.64 (0.35-1.19)			
Age, years Mean (SD)	25.3(5.4)	24.9 (5.7)	0.97 (0.94-1.01)	0.11		
General Health						
Excellent	68	45 (66.2)	1.00			
Good	348	178 (51.2)	0.49 (0.28-0.87)			
Fair	68	47 (69.1)	0.95 (0.46-1.97)	0.016		
Poor	2	1 (50.0)	0.44 (0.03-7.5)			
Qualifications held						
None	121	50 (41.3)	1.00			
GCSEs or above	367	222 (60.5)	2.27 (1.49-3.46)	0.0001		
Previous pregnancy						
Yes	346	169 (48.8)	1.00		1.00	
No	137	101 (73.7)	3.17 (2.02-4.98)	<0.0001	2.20 (1.33-3.66)	0.0019
Number of cigarettes smoked per day						
≤5	191	136 (71.2)	1.00		1.00	
6-10	151	86 (57.0)	0.56 (0.36-0.88)	<0.0001	0.65 (0.39-1.07)	
≥11	131	45 (34.4)	0.22 (0.14-0.36)	1	0.28 (0.16-0.48)	<0.0001
HSI						
Low dependence	310	196 (63.2)	1.00			
Moderate dependence	146	61 (41.8)	0.43 (0.29-0.64)	<0.0001		
High dependence	8	2 (25.0)	0.19 (0.04-0.98)	1		
Urge to smoke in last 24 hours						

No urges	23	14 (60.9)	1.00			
Urges	447	251 (56.2)	0.97 (0.42-2.24)	0.95		
Strength of urges to smoke in last 24 hours						
No urges	31	16 (51.6)	1.00			
Weak	334	194 (58.1)	1.28 (0.60-2.70)	0.82		
Strong	103	59 (57.3)	1.26 (0.55-2.86)			
Partner smoking status						
Non-smoking partner	111	57 (51.4)	1.00			
Smoking partner	334	189 (56.6)	0.88 (0.57-1.37)	0.50		
No partner	41	26 (63.4)	1.38 (0.69-2.73)			
Home Ownership						
Rent/other	427	234 (54.8)	1.00	0.47		
Own home	57	35 (61.4)	1.23 (0.70-2.17)			
Current employment						
Not in current paid work	324	163 (50.3)	1.00	0.0005		
In current paid work	164	109 (66.5)	2.01 (1.35-2.99)			
Usual occupation						
Manual/not-applicable	351	194 (55.3)	1.00	0.13		
Non-manual	75	46 (61.3)	1.50 (0.88-2.57)			
Ethnicity						
White British	447	250 (55.9)	1.00			
Other	39	21 (53.9)	1.05 (0.53-2.10)	0.88		
Timing of pregnancy						
Planned	171	110 (64.3)	1.00		1.00	
Surprise	312	158 (50.6)	0.59 (0.40-0.87)	0.007	0.53 (0.34-0.82)	0.0045
Felt depressed or hopeless in last month						
Yes	144	88 (61.1)	1.00	0.21		
No	338	181 (53.6)	0.77 (0.52-1.16)			
Long term disability or						

mental illness						
Yes	66	34 (51.5)	1.00			
No	416	234 (56.3)	1.25 (0.74-2.11)	0.41		
Smoking during pregnancy can harm your baby						
Disagree	211	81 (38.4)	1.00		1.00	
Agree	266	183 (68.8)	4.08 (2.76-6.02)	<0.0001	4.23 (2.76-6.48)	<0.0001
Self-efficacy in quitting						
Low	412	220 (53.4)	1.00			
High	47	35 (74.5)	3.72 (1.68-8.21)	0.001		

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3 At baseline, smokers reported making a median (IQR) of 2 (1-3) quit attempts lasting at
4 least 24 hours since discovering they were pregnant; in later pregnancy 2 (1-5) quit
5 attempts were reported since completing the first questionnaire and in the postpartum 2
6 (1-4) quit attempts were reported since childbirth (unadjusted data). The median
7 number of quit attempts made by those who smoked across their pregnancy (smokers
8 who completed both baseline and late pregnancy questionnaires, n=177) was 3 (IQR 1-
9 6); these data were highly skewed with a range of 0-60 24-hour quit attempts reported.
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20 Table 3 shows data on smoking rates, quitting behaviour and quit intentions at the three
21 time points adjusted for non-response, as appropriate, using multiple imputation; raw
22 (unadjusted) data are included for reference in a supplementary online table (Appendix
23 Table S1). Adjusted figures show no evidence that smoking rates changed in pregnancy;
24 the proportion of smokers was 57.4% (95% CI 54.1-60.7) at baseline and 59.1% (95%
25 CI 54.9-63.4) in late pregnancy. However, by 3 months postnatally, the adjusted
26 proportion of current smokers was 67.1% (95% CI 62.7-71.5). Over half (55.7%, 95%
27 CI 51.3-60.1) of smokers reported making quit attempts since becoming pregnant and
28 51.3% (95% CI 44.7- 58.0) did so between early and late pregnancy; however, only
29 27.4% (95% CI 21.7-33.2) reported trying to stop after childbirth. The proportion of
30 women who intended to try quitting within the next month fell as pregnancy progressed
31 from 40.4% (95% CI 36.1-44.8) at baseline to 29.7% (95% CI 23.8-35.6) in late
32 pregnancy and only 14.2% (95% CI 10.0-18.3) postpartum.
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Table 3 Smoking behaviours reported in pregnancy and the postpartum adjusted for non-response at late pregnancy and 3 months postpartum using multiple imputation

Characteristic	Baseline (Early pregnancy)			Late pregnancy		Postpartum	
	n	%	95% CI	%	95% CI	%	95% CI
Current smokers^a	488	57.4	54.1-60.7	59.1	54.9-63.4	67.1	62.7-71.5
Reported quit attempt since learning of pregnancy/previous questionnaire/birth of baby^b							
Yes	272	55.7	51.3-60.1	51.3	44.7-58.0	27.4	21.7-33.2
No	200	41.0	36.7-45.4	48.7	42.0-55.3	72.6	66.8-78.3
If have made a quit attempt, attempt lasted at least 24 hours							
Yes	178	65.4	59.6-71.0	78.9	71.6-86.2	67.8	55.8-79.8
No	90	33.1	27.7-38.9	21.1	13.8-28.4	32.2	20.2-44.2
Cigarettes per day							
0-10	342	70.1	65.9-74.0	68.3	63.2-73.3	60.0	54.3-65.7
≥11	131	26.8	23.1-31.0	31.6	26.6-36.7	40.0	34.3-45.7
How soon after waking smoke first cigarette							
≤30 minutes	260	53.3	48.8-57.7	48.6	43.1-54.2	48.2	41.8-54.6
≥31 minutes	206	42.2	37.9-46.7	51.4	45.8-56.9	51.8	45.4-58.2
Heaviness of Smoking Index							
Low dependence (0-2)	310	63.5	59.1-67.7	68.1	62.5-73.8	65.7	59.1-72.3
Moderate-high dependence (3-6)	154	32.6	27.6-35.8	31.9	26.2-37.5	34.3	27.7-40.9
Intention to quit smoking							
Intending to quit within next 30 days	197	40.4	36.1-44.8	29.7	23.8-35.6	14.2	10.0-18.3
Intending to quit within next 3 months/not seriously planning to quit	252	51.6	47.2-56.1	70.3	64.4-76.2	85.8	81.7-90.0
Urges to smoke							
How often felt urges to smoke in previous 24 hours							
No/few urges/don't know	707	83.2	80.5-85.5	82.0	78.7-85.3	78.7	74.8-82.6
Frequent urges (a lot of the time-all of the time)	135	15.9	13.6-18.5	18.0	14.7-21.3	21.3	17.4-25.2
Strength of urges to smoke in previous 24 hours							
No urges/slight-moderate urges/don't know	738	86.8	84.4-88.9	82.8	79.0-86.5	83.0	79.0-87.0
Strong-extremely strong urges	109	12.8	10.7-15.2	17.2	13.5-21.0	17.0	13.0-21.0

^a Includes those who report smoking regularly and those who smoke occasionally (not every day)

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3 ^b Quit attempts: at baseline, since finding out about the pregnancy; at follow-up 1, since
4 completing previous survey; follow-up 2, since birth of baby
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10 Adjusted data show some differences in the rates of women restarting smoking
11 according to when they report that they initially quit. Among women who had either not
12 smoked in the 3 months before pregnancy or during early pregnancy (before completing
13 the baseline questionnaire), 10.2% (95% CI 6.5-13.9) reported smoking on the late
14 pregnancy questionnaire and 31.2% (95% CI 25.2-37.2) did so at 3 months postpartum.
15 However, if this information is broken down further, for those who said they quit *prior* to
16 becoming pregnant, only 2.5% reported smoking by late pregnancy and 17.8% (95% CI
17 6.1-29.5) reported smoking 3 months postpartum. Whereas, of those who reported
18 quitting *after* finding out they were pregnant (but before completing the baseline
19 questionnaire), 11.6% (95% CI 7.3-15.9) were smoking by late pregnancy, and 34.4%
20 (95% CI 27.6-41.2) were smoking 3 months postpartum. By comparison, among
21 smokers at baseline who reported not smoking in late pregnancy, 42.9% (95% CI 24.6-
22 61.3) were smoking 3 months after delivery. Overall, of women who reported abstinence
23 on the late pregnancy questionnaire, 26.2% (95% CI 20.3-32.2) had relapsed by 3
24 months post-delivery.
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43 **DISCUSSION**

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46 To our knowledge, this is the first study to use prospectively collected, longitudinal data
47 to quantify changes in smoking behaviour through the examination of multiple quit
48 attempts and women's intention to quit during pregnancy and postnatally. Despite over
49 50% of smokers reporting quit attempts across all three trimesters, there was no
50 evidence that overall smoking rates changed between joining the study at around 8-24
51 weeks gestation and late pregnancy. In smokers, intention to quit within the next month
52 fell as the pregnancy progressed, and then fell further postpartum. Within 3 months of
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3 giving birth, around one third of women who achieved abstinence before or during early
4 pregnancy had returned to smoking. However, we observed a trend, not previously
5 reported in longitudinal data, whereby those who quit before pregnancy may be less
6 likely to return to smoking postpartum than those that quit on learning of their
7 pregnancy; those that only achieved abstinence in late pregnancy appeared to be most
8 likely to return to smoking postpartum. Women's motivation to try quitting was lowest in
9 the first 3 months following childbirth; only around a quarter tried quitting during this
10 time and far fewer reported intending to quit in the immediate future than had done so
11 at either pregnancy time point.
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24 The originality of this study is a key strength. As previously mentioned, we could find
25 relatively few observational studies in which pregnant women's smoking behaviours were
26 longitudinally recorded at more than one time point in pregnancy and ^{12 13 15 16 19-23} Only
27 two of these longitudinal studies followed women up postpartum, ^{12 13} only four reported
28 any data on fluctuations or trajectories in smoking status, ^{12 13 15 16} and none evaluated
29 multiple quit attempts, often assessing only heaviness of smoking, or successful versus
30 unsuccessful quitting. All other studies investigating individuals' changes in smoking
31 behaviour in pregnancy have asked about this retrospectively after pregnancy or at only
32 one time point, and in contrast, we collected longitudinal data during and after
33 pregnancy. We particularly focussed on quit attempts and quitting intentions, rather than
34 purely on smoking status at different time points, and are not aware of any other
35 longitudinal studies that have attempted this. Additionally, for the first time we have
36 reported 'attrition-adjusted' rates of smoking or quitting in later pregnancy and
37 postpartum. If we had only used cross-sectional data, we might have underestimated
38 the proportion of smokers in later pregnancy and in the postpartum. We believe that we
39 present the most robust available data documenting changes in smoking status and
40 quitting behaviours across pregnancy and into postpartum, for women who are not
41 participating in an intervention study.
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6 A limitation is that, although we followed women longitudinally, at each data collection
7 point we relied on self-reported data and recall of smoking behaviour in the immediate
8 past, so we cannot be completely sure that reports are valid. However, a number of
9 factors should have minimised any misreporting of smoking behaviour: no intervention
10 was tested and there was no expectation that participants should try stopping;
11 researchers emphasised that responses were of interest irrespective of smoking status
12 and, as women completed questionnaires at three stages, they did not have to recollect
13 their behaviour over long periods. Additionally, studies looking at both self-report and
14 biochemically-validated smoking data suggest that self-reported smoking can be both
15 accurate and reliable.^{16 41} It is possible that pregnant women who were concerned about
16 the stigma of smoking may have avoided participation; we do not know how this might
17 have affected findings, but women who consented to join the cohort had similar
18 characteristics to those who declined.²⁴ As the survey was conducted in just two
19 Nottingham hospitals, it is hard to say how far findings can be generalised. To help
20 assess generalisability, we included survey items that permitted comparison with
21 previous studies; we found our participants who continued to smoke in early pregnancy
22 were similar to pregnant smokers enrolled in other major UK cohorts.²⁴ This suggests
23 that the principal findings may apply to pregnant smokers in the UK generally. Likewise,
24 although absolute smoking rates and smoking cessation advice and treatment may vary,
25 pregnant smokers from other high income countries generally have similar
26 characteristics to those in the UK.^{28 42 43} Therefore, it could be considered reasonable to
27 extrapolate many of our findings to pregnant smokers in high income countries
28 generally. Although we had very high rates of eligible women joining the cohort, a
29 further limitation was that attrition was relatively high, with response rates to the two
30 later questionnaires of 60% and 56%. This is a common problem with longitudinal
31 studies,⁴⁴ and as young, pregnant smokers were likely to be a particularly difficult group
32 to maintain contact with, we used a number of recommended methods to try to
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3 maximise response rates.^{24 44 45} However, rather than simply relying on incomplete data,
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5 we have tried to address non-response bias by adjusting later surveys' findings using
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7 multiple imputation. In addition, differences in characteristics between the whole cohort
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9 and those that responded to all three surveys (Table 1) need to be considered when
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11 viewing the unadjusted smoking 'trajectory' analysis shown in Figure 2. Finally, we
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13 assessed smoking status at 3 months postpartum, and it is likely that some women who
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15 were abstinent at this point will have returned to smoking after this.^{17 18}
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21 The finding that most women in our cohort had quit in the early stages of pregnancy
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23 (before joining the study), and that smoking rates did not change between the second
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25 trimester and 36 weeks' gestation is consistent with cross-sectional estimates for
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27 smoking prevalence obtained in a large US study, which reported these by month of
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29 pregnancy.⁴⁶ In that study, smoking prevalence at 1 month gestation was 26%, then
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31 between the fourth and eighth month of gestation, smoking rates each month were 13-
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33 14%.⁴⁶ Other retrospective studies have found that most women who successfully quit
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35 are likely to achieve this soon after finding out they are pregnant,^{5 47} often within the
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37 first few days.⁴⁷ Many quit spontaneously after discovering they are pregnant.⁴⁸
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39 Therefore, it seems that after the early stages of pregnancy, despite still reporting quit
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41 attempts, women's smoking behaviour actually undergoes very little change.
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46 One study found that 70% of pregnant women making their first quit attempt did so in
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48 their first trimester; however, these data were collected up to 5 years after delivery, and
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50 only considered first quit attempts.¹⁵ We found that some women made multiple quit
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52 attempts throughout pregnancy and we have previously reported that, at baseline, most
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54 reported cutting down or only smoking occasionally since becoming pregnant with less
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56 than 8% of our cohort saying that they smoked the same or more than before
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58 pregnancy.²⁴ Although self-reported, this reinforces findings from qualitative studies,
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3 which indicate that many persistent smokers report deliberate, and sometimes detailed,
4 plans to cut down in their pregnancy, seeing this as a positive step and often as a route
5 to quitting.⁴⁹ Far fewer women reported making quit attempts in the 3 months after
6 childbirth than they did during pregnancy. Even in early pregnancy, around half of
7 women had no intention to quit within the next 30 days; intention to quit in the short
8 term was even lower in late pregnancy, and was lowest of all postpartum. This
9 diminishing intention to quit has not been reported before and could be considered when
10 designing and delivering cessation interventions; for example, earlier intervention may
11 be more successful.
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24 We found that women who were primiparous, smoked fewer cigarettes per day, had a
25 planned pregnancy and believed smoking during pregnancy could seriously harm their
26 baby were more likely to have made a quit attempt during early pregnancy. These
27 findings are comparable to previous literature examining the characteristics of pregnant
28 smokers who successfully achieve cessation. Primiparous women have previously been
29 found to be more likely to successfully quit smoking.^{28 29 31 32} This may be because
30 women who have smoked throughout a previous pregnancy without experiencing
31 complications may view the risks of smoking during pregnancy differently to primiparous
32 women, and therefore be less motivated to make a quit attempt.²⁹ Similarly, previous
33 studies have found that heavier smoking is negatively associated with successfully
34 quitting in pregnancy,^{29 31 33} and heavier smokers are less likely to have high motivation
35 to quit during pregnancy.³³ Women whose pregnancies are unintended have previously
36 been found to be more likely to continue smoking during pregnancy,^{28 35-37} and likewise
37 pregnant smokers who do not report concern about the effect smoking might have on
38 the health of their unborn baby were more likely to have low motivation to quit
39 smoking.³³ These findings identify women who are most likely to make a quit attempt
40 and will potentially benefit the most from NHS support. Heavier smokers and women in
41 second or later and unplanned pregnancies who are less likely to try quitting may require
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3 different, more intensive or tailored forms of support.
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8 **Implications for practice** 9

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11 Although our data suggest that motivation to quit may be strongest in early pregnancy,
12 some women will be receptive to quitting at any time, as indicated by their multiple quit
13 attempts throughout pregnancy, and this confirms that it is important to discuss
14 smoking with women at every appointment and to refer them for stop smoking support.⁹
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18 One rather surprising finding was that in early to mid-pregnancy 44% (211/477) of
19 smokers disagreed that smoking in pregnancy can harm their baby; as those who agreed
20 with this statement were more likely to have made previous quit attempts at baseline,
21 additional education on this issue should be considered by health professionals.
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25 Preventing resumption of smoking after pregnancy is a critical public health issue; if
26 women restart their lifelong health is at risk, and their infants are more likely to be
27 exposed to second-hand smoke⁵⁰ and to eventually become smokers.⁵¹ Women often
28 need help to resist returning to smoking after childbirth, but there are currently few
29 effective interventions for this.⁵² Women appear to be more inclined to consider quitting
30 during pregnancy than in postpartum, and this is important when designing
31 interventions. A potential reason for restarting smoking and for making fewer quit
32 attempts postpartum may be that women perceive that harm to the baby from smoking
33 is much higher during pregnancy compared with after delivery. However, some
34 postpartum women do make quit attempts, or may be planning to quit in the medium
35 term, so engaging with them again after birth, to think about planning for this in the
36 medium term, rather than immediately, might be a successful option. Previous studies
37 have shown that women who quit spontaneously early in pregnancy are likely to be
38 different and more successful than those who quit later,⁴⁸ and we found that women
39 appear to be more likely to return to smoking after childbirth the later in pregnancy they
40 quit. Therefore, exploring potential reasons for this, for example demographic factors or
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3 women's intentions, could help to identify if different women may benefit from
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5 alternative approaches to help prevent relapse, perhaps by developing more tailored
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7 interventions. Although quit attempts might suggest receptivity to quitting, what is not
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9 well understood is how interest in smoking cessation support may change during
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11 pregnancy.

12 13 14 15 16 **Conclusions**

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19 Many pregnant women who smoke attempt quitting throughout their pregnancy, but this
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21 makes little difference to overall smoking rates. After giving birth, most smokers seem
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23 less inclined to make further quit attempts and many who quit in early pregnancy return
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25 to smoking. Women who quit in late pregnancy may be most likely to return to smoking
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27 after childbirth, whilst those who stopped prior to pregnancy may be least likely to
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29 relapse. It therefore imperative to discuss smoking with women, including recent ex-
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31 smokers, throughout pregnancy and postpartum, and to continue to offer and provide
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33 specialist stop smoking support.
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CONTRIBUTORS

SC helped conceive the study, made a substantial contribution to the development of the protocol and questionnaires, assisted with day-to-day troubleshooting during the data-collection phase, and drafted and revised this manuscript. SO helped design the data collection process, recruited participants into the cohort, managed the day-to-day running, assisted with data analysis, and contributed to the drafting of this manuscript. JL-B contributed to the development of the study protocol and questionnaires, advised on analysis, and contributed to the preparation of this manuscript. EB undertook the analyses and interpretation of data in Table 2 as part of a BMedSci project and contributed to the preparation of this manuscript. LV assisted with data analysis and interpretation, and contributed to the preparation of this manuscript. KB helped design the data collection process, recruited participants into the cohort, managed the day-to-day running, and contributed to the preparation of this manuscript. FN, MU, KEP and SS all contributed to the development of the study protocol and questionnaires, contributing expertise from their own particular knowledge base, and to the preparation of this manuscript. TC conceived the study, and made substantial contributions to the development of the study protocol and questionnaires, and to the preparation of this manuscript. All authors read and approved the final manuscript. Rachel Whitemore assisted with study administration, telephone follow-ups, and data entry.

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COMPETING INTERESTS

KP is a trustee of The Equality Trust (a registered charity), and receives occasional honoraria, all of which are donated to The Equality Trust or for student support at the University of York. In the last 5 years TC has been paid honoraria on 2 occasions for speaking at meetings or conferences organised by Pierre Fabre Laboratories (a nicotine replacement therapy manufacturer).

Other authors have no conflicts of interest to report.

ETHICS APPROVAL

Derbyshire Research Ethics Proportionate Review Sub-Committee gave ethical approval.

PROVENANCE AND PEER REVIEW

Not commissioned; externally peer reviewed.

DATA SHARING STATEMENT

The dataset is still subject to further analyses. Relevant anonymised data available from the authors on reasonable request.

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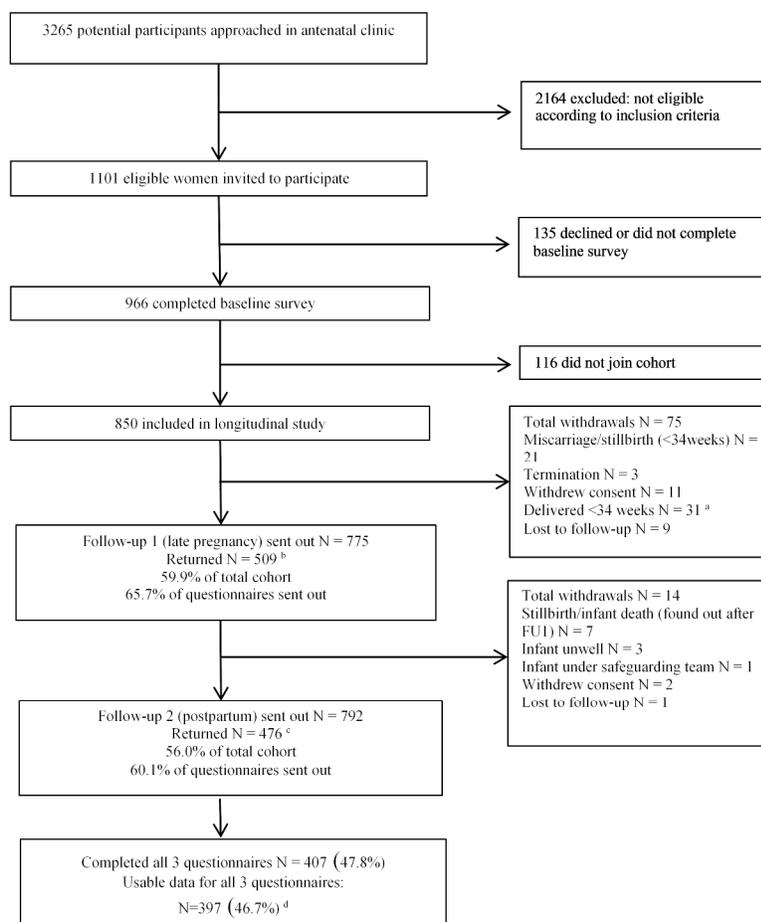
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^a 28 of the participants who delivered before 34 weeks gestation were sent the postpartum questionnaire

^b 13 excluded who completed a follow-up 1 questionnaire, but weren't eligible (i.e. any women who was not still pregnant at 34 weeks)

^c 70 participants who did not complete a late pregnancy questionnaire returned the postpartum questionnaire; of these, seven were women who delivered before 34 weeks gestation

^d 10 excluded who completed all 3 questionnaires, but weren't eligible to complete follow-up 1 questionnaire (i.e. if miscarriage/stillbirth before 34 weeks gestation, terminated pregnancy or gave birth before 34 weeks)

Figure 1 Diagram showing recruitment and flow of participants through the study

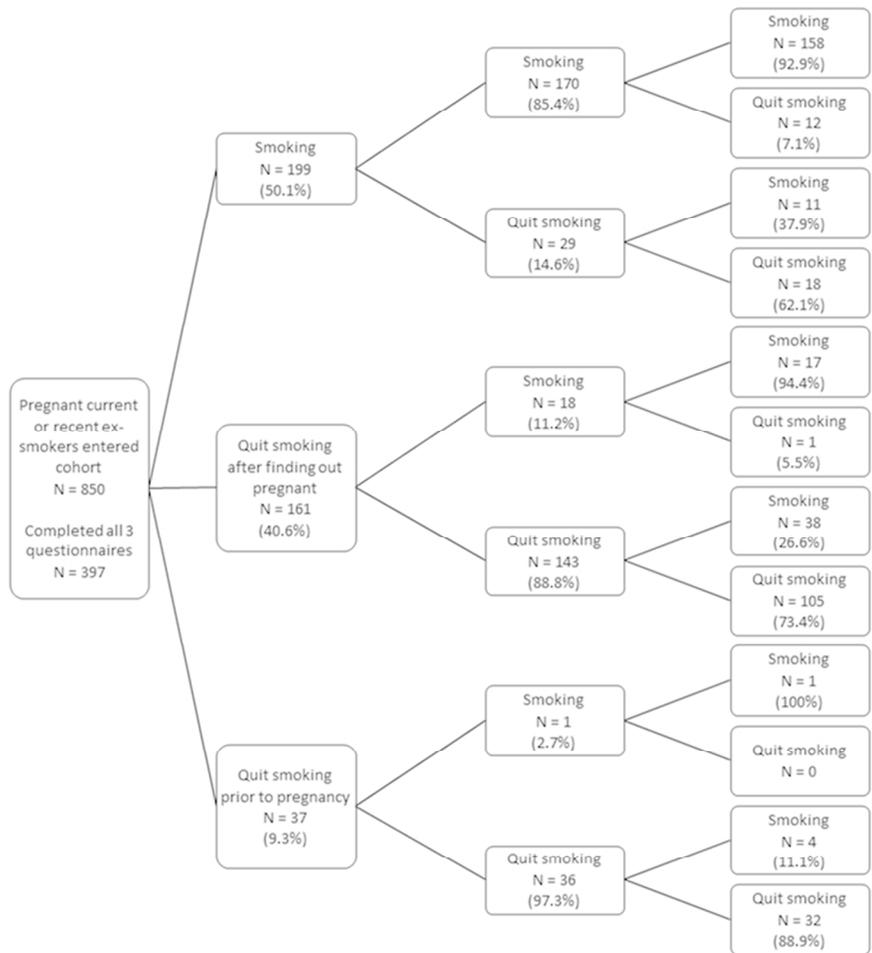


Figure 2 Change in smoking behaviour between early pregnancy, late pregnancy and postpartum amongst respondents to all 3 questionnaires (N = 397)

Appendix Table S1 Cross-sectional data: participants' smoking behaviour for returned questionnaires only at each follow up point

Characteristic	Baseline (Early pregnancy) N (%)	Late pregnancy N (%)	Postpartum N (%)
Respondents (response rate)	850	509 (59.9)	476 (56.0)
Smoking status			
Current smoker	488 (57.4)	252 (49.5)	281 (59.0)
Recent ex-smoker	362 (42.6)	257 (50.5)	195 (41.0)
Current smoking behaviour (all participants)			
Stopped smoking during 3 months prior to pregnancy	61 (7.2)		
Stopped smoking after learning of pregnancy/don't smoke at all now	301 (35.4)	257 (50.5)	195 (41.0)
Smoke occasionally, but not every day now pregnant	117 (13.8)	61 (12.0)	84 (17.6)
Smoke every day, but have cut down since: learning of pregnancy/during pregnancy	304 (35.8)	144 (28.3)	56 (11.8)
Smoke every day, about the same as before/during pregnancy	64 (7.5)	42 (8.3)	80 (16.8)
Smoke every day, tend to smoke more than before/during pregnancy	3 (0.4)	4 (0.8)	59 (12.4)
Missing	0	1 (0.2)	2 (0.4)
Current smokers only:			
Reported quit attempt since learning of pregnancy/previous questionnaire/birth of baby ^a			
Yes	272 (55.7)	130 (51.6)	78 (27.8)
No	200 (41.0)	119 (47.2)	191 (68.0)
Missing	16 (3.3)	3 (1.2)	12 (4.3)
If have made a quit attempt, attempt lasted at least 24 hours			
Yes (% of all current smokers) (% of current smokers making a quit attempt)	178 (36.5%) (65.4%)	103 (40.9%) (79.2%)	61 (21.7%) (78.2%)
No (% of all current smokers) (% of current smokers making a quit attempt)	90 (18.4%) (33.1%)	19 (7.5%) (14.6%)	6 (2.1%) (7.7%)
Number of quit attempts >24 hours, median (IQR)			
	2 (1-3)	2 (1-5)	2 (1-4)
Cigarettes per day			
0-5	191 (39.1)	99 (39.3)	102 (36.3)
6-10	151 (30.9)	85 (33.7)	83 (29.5)
11-15	74 (15.2)	32 (12.7)	55 (19.6)
16-20	47 (9.6)	24 (9.5)	30 (10.7)
21-30	8 (1.6)	9 (3.6)	5 (1.8)
≥31	2 (0.4)	0 (0)	1 (0.4)
Missing	15 (3.1)	3 (1.2)	5 (1.8)
Time to first cigarette			
< 5 minutes	97 (19.9)	31 (12.3)	28 (10.0)
6-30 minutes	163 (33.4)	79 (31.3)	83 (29.5)
31-60 minutes	89 (18.2)	44 (17.5)	50 (17.8)

>60 minutes	117 (24.0)	91 (36.1)	105 (37.4)
Missing	22 (4.5)	7 (2.8)	15 (5.3)
Heaviness of Smoking Index (HSI)			
Low dependence (0-2)	310 (63.5)	178 (70.6)	189 (67.3)
Moderate dependence (3-4)	146 (29.9)	60 (23.8)	75 (26.7)
High dependence (5-6)	8 (1.6)	6 (2.4)	2 (0.7)
Missing	24 (4.9)	8 (3.2)	15 (5.3)
Intention to quit smoking			
Intending to quit within next 2 weeks	138 (28.3)	51 (20.2)	20 (7.1)
Intending to quit within next 30 days	59 (12.1)	23 (9.1)	22 (7.8)
Intending to quit within next 3 months	76 (15.6)	73 (29.0)	100 (35.6)
Not seriously intending to quit	176 (36.1)	90 (35.7)	123 (43.8)
Missing	39 (8.0)	15 (6.0)	16 (5.7)

^a Quit attempts: at baseline, since finding out about the pregnancy; at follow-up 1, since completing previous survey; follow-up 2, since birth of baby



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Researcher's use only

Participant ID number / Initials

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Date returned

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Researcher's initials

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FOLLOW UP QUESTIONNAIRE 2

Final Version number: 2.0

Version date: 2nd December 2011

Please complete this questionnaire **within the next two weeks** and then return it in the envelope provided (no stamp required).

The information you give us will be confidential and only used by the Pregnancy Lifestyle Survey researchers.

If you have any questions or concerns about this questionnaire, please call the Smoking and Pregnancy Research Office on 0115 823 1899.

Thank you for your help

Today's date:

YOUR SMOKING BEHAVIOUR AND BELIEFS

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3
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8 A1 Please tick the box below next to the statement that best describes your
9 smoking right now

- 10
11 I don't smoke at all
12 I smoke occasionally, but not every day
13 I smoke every day, but less than when I was pregnant
14 I smoke every day, and about the same as when I was pregnant
15 I smoke every day, and I tend to smoke more now than when I was
16 pregnant
17
18
19

20
21
22 A2 Did you smoke at all in the week before the birth of your baby ?

- 23
24 Yes No I can't remember
25
26
27

28
29 A3 Have you smoked at all since the birth of your baby?

- 30
31 Yes No (If No – go to question A4)
32

33 If Yes, how soon after the birth of your baby did you first smoke?

- 34
35 Within 24 hours 1-2 months
36 1-6 days More than 2 months
37
38 7-30 days
39
40
41

42
43 A4 If you have a partner, do they smoke tobacco?

- 44
45 Yes No I don't have a partner
46
47
48

49 A5 How much of the time have you felt the urge to smoke in the past 24 hours?

- 50
51 Not at all Almost all of the time
52 A little of the time All the time
53 Some of the time Don't know
54
55 A lot of the time
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A6 How strong have the urges been in the past 24 hours?

- No urges Very strong
 Slight Extremely strong
 Moderate Don't know
 Strong

A7 Please answer each of the following questions by circling the appropriate number. **Please circle one number per question.**

	Not at all	A little	Moderately	Very much	Extremely
How determined are you to stop smoking for good?	1	2	3	4	5
How confident are you that you can stop smoking for good?	1	2	3	4	5
How confident are you that you can stop smoking/remain stopped on your own (i.e. without help from a health professional)?	1	2	3	4	5
How confident are you that you can stop smoking/remain stopped with help from a health professional?	1	2	3	4	5
Do you have support from family or friends to help you stop smoking?	1	2	3	4	5
Do people who are important to you think you should avoid smoking?	1	2	3	4	5

A8 How concerned are you about putting on weight as a result of stopping smoking?

- Not at all Very much
 A little Extremely
 Moderately

If you **SMOKE EVERY NOW & AGAIN** or **MORE OFTEN** continue to question B1 on the next page. If you **DO NOT SMOKE AT THE MOMENT** go to C1 on page 5

YOUR CURRENT SMOKING BEHAVIOUR

Please complete this section if you **SMOKE EVERY NOW AND AGAIN or MORE OFTEN THAN THIS**

B1 Approximately how many cigarettes do you smoke each day?

- | | |
|--------------------------------|-------------------------------------|
| <input type="checkbox"/> 0-5 | <input type="checkbox"/> 16-20 |
| <input type="checkbox"/> 6-10 | <input type="checkbox"/> 21-30 |
| <input type="checkbox"/> 11-15 | <input type="checkbox"/> 31 or more |

B2 How soon after waking do you smoke your first cigarette of the day?

- | | |
|---|---|
| <input type="checkbox"/> Within 5 minutes | <input type="checkbox"/> 31-60 minutes |
| <input type="checkbox"/> 6-30 minutes | <input type="checkbox"/> After 60 minutes |

B3 Since the birth of your baby have you tried to stop smoking?

- Yes No

If yes, please write in how many times during this period you managed to stop smoking **completely** for at least 24 hours

times

B4 Are you seriously planning to quit?

- Within the next 2 weeks
 Within the next 30 days
 Within the next 3 months
 No I am not seriously planning to quit

YOUR INTEREST IN GETTING HELP TO STOP SMOKING

All respondents should complete this section

C1 Since the birth of your baby, have you tried any of the following to help you stop smoking / remain stopped? (**Please tick all that apply**)

- Talked to your GP or a nurse about giving up smoking
- Talked to your midwife about giving up smoking
- Attended a NHS stop smoking service group session
- Attended a solo/individual NHS stop smoking service session (i.e. one-to-one - not with other people)
- Called a stop smoking telephone helpline
- Used Nicotine Replacement Therapy (e.g. nicotine patches or gum)
- Set a quit date
- Other. Please state: _____
- None of the above

C2 Currently, how interested are you in receiving help with stopping smoking?

- | | |
|-------------------------------------|------------------------------------|
| <input type="checkbox"/> Not at all | <input type="checkbox"/> Very much |
| <input type="checkbox"/> A little | <input type="checkbox"/> Extremely |
| <input type="checkbox"/> Moderately | |

C3 How **interested** would you be in the following types of help to stop smoking/stay stopped? Please answer by circling the appropriate number.
Please circle one number per question.

	Not at all	A little	Moderately	Very much	Extremely
<i>How interested would you be in stop-smoking help from a health professional who offered you...</i>					
...a telephone helpline	1	2	3	4	5
...group sessions	1	2	3	4	5
...one-to-one sessions	1	2	3	4	5
<i>How interested would you be in stop-smoking help that you can work through on your own (self-help) if we gave you...</i>					
...a booklet	1	2	3	4	5
...a DVD	1	2	3	4	5
...a website	1	2	3	4	5
... text messages	1	2	3	4	5
...email	1	2	3	4	5
...an application (app) on your mobile phone / device	1	2	3	4	5

C4 Please answer each of the following questions by circling the appropriate number. **Please circle one number per question.**

<i>How USEFUL do you think the following ways would be to help you to stop smoking/stay stopped?</i>					
	Not at all	A little	Moderately	Very much	Extremely
A telephone helpline	1	2	3	4	5
Group sessions with a health professional	1	2	3	4	5
One-to-one sessions with a health professional	1	2	3	4	5
A self-help booklet	1	2	3	4	5
A DVD	1	2	3	4	5
A self-help website	1	2	3	4	5
Self-help mobile phone text messages	1	2	3	4	5
Self-help emails	1	2	3	4	5
A self-help application (app) on your mobile phone / device	1	2	3	4	5

C5 Please answer each of the following questions by circling the appropriate number. **Please circle one number per question.**

<i>If it were available, how DIFFICULT do you think it would be for you to use the following types of stop-smoking help?</i>					
	Not at all	A little	Moderately	Very much	Extremely
A telephone helpline	1	2	3	4	5
Group sessions with a health professional	1	2	3	4	5
One-to-one sessions with a health professional	1	2	3	4	5
A self-help booklet	1	2	3	4	5
A DVD	1	2	3	4	5
A self-help website	1	2	3	4	5
Self-help mobile phone text messages	1	2	3	4	5
Self-help emails	1	2	3	4	5
A self-help application (app) on your mobile phone/device	1	2	3	4	5

C6 Do any of the following describe your feelings about stop-smoking help that you work through on your own (self-help)? **Please tick all that apply**

- I would miss having personal contact with a health professional
- It is too much effort to work through this type of support on my own
- It would be too difficult for me to understand this type of support
- I don't have the time to work through this type of support on my own
- I don't think this type of support would be much help with quitting smoking
- I think this type of support would be boring
- I would not read/work through this type of support if I received it
- I prefer to receive support from a health professional
- None of the above

YOUR HEALTH

All respondents should complete this section

D1 During the past month, have you often been bothered by feeling down, depressed or hopeless?

Yes

No

D2 During the past month, have you often been bothered by having little interest or pleasure in doing things?

Yes

No

D3 Please answer each of the following questions by circling the appropriate number. **Please circle one number per question.**

	Never	Almost never	Sometimes	Fairly often	Very often
<i>In the last month, how often have you felt...</i>					
...that you were unable to control the important things in your life?	1	2	3	4	5
...confident about your ability to handle your personal problems?	1	2	3	4	5
...that things were going your way?	1	2	3	4	5
...difficulties were piling up so high that you could not overcome them?	1	2	3	4	5

D4 Please answer each of the following questions by circling the appropriate number. **Please circle one number per question.**

	Never	Almost never	Sometimes	Fairly often	Very often
How often do you smoke in your home nowadays?	1	2	3	4	5
How often do other people smoke in your home nowadays?	1	2	3	4	5

D5 Please indicate how much you **agree** with each statement below. **Please circle one number per question.**

	Not at all	A little	Moderately	Very much	Extremely
If my baby regularly breathes in people's tobacco smoke, it can seriously harm him/her	1	2	3	4	5
Smoking in the home can seriously harm babies (under 1 year old)	1	2	3	4	5
Smoking in the home can seriously harm children (over 1 year old)	1	2	3	4	5
Smoking in the home but not in the same room as a baby can seriously harm him/her	1	2	3	4	5
Smoking in the home makes my house smell unpleasant	1	2	3	4	5

D6 How old was your baby when he/she last had breast milk?

- Never took breast milk
- Less than one week
- Less than one month
- Over one month but stopped breastfeeding
- Still breastfeeding

The next questions are about the different sorts of feelings parents might have when caring for young children. This includes their relationship with the baby, confidence in their parenting ability and their family routine. For each one please say which is closest to how **you** feel.

D7 When you are caring for your baby, how often do you feel annoyed or irritated?

- Almost all the time Occasionally
 Very frequently Rarely
 Frequently Never

D8 When you are caring for your baby, do you feel that you are...

- Very unskilled and lacking in confidence?
 Fairly unskilled and lacking in confidence?
 Fairly skilled and confident?
 Very skilled and confident?

D9 When you think about the things that you have had to give up because of your baby do you find that you...

- resent / dislike this a lot?
 resent / dislike this a fair amount?
 resent / dislike this a bit?
 don't resent / dislike this at all?

D10 How often do you have enough of the following things in your family? **Please circle one number per question.**

	Never enough	Rarely enough	Sometimes enough	Usually enough	Almost always enough
Money to pay monthly bills	1	2	3	4	5
Use of a car (either your own or someone else's)	1	2	3	4	5
Money to buy things for yourself	1	2	3	4	5
Money to save	1	2	3	4	5

D11 The following questions are about your day-to-day life and routines

Do you usually eat at least one meal a day at home with family or friends?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have a diary or a calendar for keeping track of appointments?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you plan your spending money or make a budget for yourself?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you regularly care for anybody who has either a long-term illness or a problem with alcohol or drugs?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have people living with you that you often wish weren't there?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Thank you for completing the questionnaire.

Please return **within the next 2 weeks** in the envelope provided (no stamp required)



Researcher's use only

Participant ID number / Initials

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	/	<input type="text"/>	<input type="text"/>	<input type="text"/>
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Researcher's initials

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BASELINE QUESTIONNAIRE
 Final Version number: 2.4
 Version date: 19th October 2011

Dear Madam,

We are looking at ways to improve the health and lifestyle of pregnant women and their babies. We are therefore inviting ALL women who come to the antenatal clinic to answer a few questions.

Your answers will be used in our research but are totally confidential and will only be seen by researchers from the University of Nottingham

Thank you for reading this and for your help.

Best wishes

Dr Tim Coleman
 Division of Primary Care, University of Nottingham
 QMC Medical School, Nottingham NG7 2RD

SCREENING QUESTIONS

Your answers to the questions on this page will determine whether you should complete the rest of the questionnaire. Please read the instructions carefully. Thank you.

S1 Have you completed this questionnaire before? (e.g. on a previous visit to the antenatal clinic or for a scan)

Yes

No

Don't know

If you ticked **Yes**, please **hand back the questionnaire** - you are finished – thank you. Otherwise please continue

S2 Approximately, how many weeks pregnant are you?

--	--

weeks

Don't know

S3 How old are you?

--	--

Years of age

S4 Please tick the box below next to the statement that best describes your smoking right now

- 1 I have never smoked (if you have ticked this box please hand back the questionnaire – you are finished)
- 2 I completely stopped smoking **more than** 3 months before finding out I was pregnant (if you have ticked this box please hand back the questionnaire – you are finished)
- 3 I completely stopped smoking at some time **in** the 3 months before finding out I was pregnant
- 4 I completely stopped smoking after I found out I was pregnant
- 5 I smoke occasionally, but not every day now I am pregnant
- 6 I smoke every day, but have cut down during my pregnancy
- 7 I smoke every day, about the same as before my pregnancy
- 8 I smoke every day, and I tend to smoke more than before my pregnancy

If you ticked one of the boxes 3-8, **and** you are between **8 and 26 weeks pregnant** (or don't know), **and** are **16 years old or over**, then please read the **NEXT PAGE**. Otherwise please **hand back the questionnaire** - you are finished – thank you.

(If you are not sure whether you should be filling in the rest of the questionnaire please ask the researcher)

Your answers mean that we are interested in finding out more about your views on smoking and pregnancy. We would be very grateful if you could read the following information that gives full details of the study.

If you want to ask any questions either before or after you read this then please ask to speak to our researcher who is in the clinic waiting area.

Once you have read this, if you are happy to continue, you can complete the longer questionnaire and once you have finished this we will give you a £5 gift voucher to thank you for your effort.



The University of
Nottingham

UNITED KINGDOM · CHINA · MALAYSIA

Nottingham University Hospitals



NHS Trust

INFORMATION ABOUT THE RESEARCH

Study title: *Pregnancy Lifestyle Survey*

Name of Researchers: Tim Coleman, Sue Cooper, Jo Leonardi-Bee, Jim Thornton, John Britton, Stephen Sutton, Felix Naughton, Michael Ussher and Kate Pickett

We are inviting you to take part in a questionnaire research study by the University of Nottingham. The information below is to help you understand why we are doing the research and what it involves. We will also answer any questions you have so that you can decide if you want to join the study.

What is the purpose of the study?

We want to find out about the times in their pregnancy that women smoke, when they might try to stop, plus your opinion on different types of support that could help with this. We also want to know how accurately GPs record when women smoke during their pregnancy.

Why have I been chosen?

We are asking you to take part because you have told us that either you smoke now, or you have smoked at some point since becoming pregnant or in the three months before this.

Do I have to take part?

No, this is entirely up to you. If you decide to take part then we will ask you to sign a consent form. Even if you sign this, you are free to leave the study at any time without giving a reason, and it would not affect the care you receive.

What will happen to me if I take part? What will I have to do?

There are three questionnaires altogether. There is one for you to complete today and then we will then send you two further questionnaires. We will send you the first of these when you are around 34 weeks pregnant and the second 3 months after

1
2
3 your baby is born. If we don't get them back then we will call you to ask if you would
4 answer the questions over the phone. If you prefer, we can send them to you by
5 email or you can fill them in on a special webpage. As we know that filling in the
6 questionnaires takes some of your time, we will give you a £5 voucher for each one
7 that you complete and return to us. If you take part in the study, a researcher will
8 check your hospital antenatal records to ensure all is well with you and your baby
9 before we send the questionnaires, but we will not use this information for any other
10 reason.
11

12
13 As well as giving us your own contact details, we will also ask you for contact details
14 of another family member. You don't have to give us these, but if you do we will also
15 keep them strictly confidential and we will only use them to help us get in touch with
16 you if you move or change your contact details.
17

18
19 Later, we want to see how accurately GPs record smoking in pregnancy. To do this
20 we need your permission to look in your GP medical records to compare the
21 information on smoking held there with what you tell us in the survey. We would keep
22 your personal information for no longer than 7 years to allow us to do this (at the
23 moment we don't have any funding to do this part of the study). You can indicate on
24 the consent form if you are happy for us to do this.
25
26

27 **Will my taking part in this study be kept confidential?**

28 Yes. We will keep all information that is collected about you during the research
29 strictly confidential. The questionnaires will not have your name and address on
30 them, only a code. Only the researchers and people allowed to check that the
31 research is carried out correctly could have access to your personal information.
32
33

34 After this study has started, researchers may think up important research questions
35 that you could help them to answer. Therefore, we would like you to agree to allow
36 other researchers based at the University of Nottingham to contact you to ask for
37 your help with other studies. They would not do this unless a research ethics
38 committee agreed to let them. You could ignore any contact letter about other
39 research projects if you are not interested in taking part. You can indicate on the
40 consent form if you are happy with this.
41
42

43 **What are the possible disadvantages and risks of taking part?**

44 Filling in the questionnaires will take a little of your time. Each one should take about
45 10 or 20 minutes to fill in.
46
47

48 **What are the possible benefits of taking part?**

49 We cannot promise the study will help you but the information we get from this study
50 may help us to improve the help offered to women who want to try to stop smoking
51 when they are pregnant. If, during the study, you decide that you want help to stop
52 smoking, please tell us and we will let you know how you can receive NHS support
53 with this.
54
55

56 **What will happen if I don't want to carry on with the study?**

57 Although we would like you to return the questionnaires, whether or not you do so is
58 up to you. If you change your mind and don't want us to send you any more
59 questionnaires, you can let us know by phone, text or email, or you can return the
60 Freepost card we will give you. However, we wouldn't be able to erase the

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2
3 information you had already given us and we may still use this in the study. This does
4 not affect your legal rights.

6 **What will happen to the results of the research study?**

7 We will publish the study results but you will not be identified in any report. Findings
8 will help the NHS decide how and when to offer smoking cessation support in
9 pregnancy. You will be able to see a summary of study findings on the UK Centre for
10 Tobacco Control Studies website at: <http://www.nottingham.ac.uk/ukctcs/index.aspx>

13 **Who is organising and funding the research?**

14 NHS National Institute for Health Research is funding the research. It is organised by
15 the University of Nottingham.

18 **Who has reviewed the research?**

19 To protect your interests, an independent group of people, called a Research Ethics
20 Committee, looks at all research in the NHS. Derbyshire Research Ethics
21 Proportionate Review Sub-Committee have reviewed and approved this study.

24 **What if there is a problem or you need further information**

25 If you have any concerns about the study then please speak to the researchers or
26 contact the project manager (contact details below). If you remain unhappy and wish
27 to complain formally, you can do this by contacting NHS Complaints. Details can be
28 obtained from your hospital.

30
31 You can also contact the researchers below if you need more information or would
32 like to give feedback.

35 **Dr Sue Cooper**

36 *Smoking in Pregnancy Project Manager*
37 Tel 0115 823 1898
38 Email sue.cooper@nottingham.ac.uk

40 **Dr Tim Coleman (Chief Investigator)**

41 Tel 0115 823 0204
42 Email tim.coleman@nottingham.ac.uk

35 **Katharine Bowker (Research Fellow)**

36 Tel 0115 7484040
37 Email katharine.bowker@nottingham.ac.uk

40 **Sophie Orton (Research Fellow)**

41 Tel 0115 7484043
42 Email sophie.orton@nottingham.ac.uk

43
44 Smoking and Pregnancy Research Office
45 Division of Primary Care,
46 Room 1406, Tower Building
47 University of Nottingham
48 NG7 2RD

51 **This information sheet is for you to keep.**

52
53 **Thank you very much for your time and help – we are very grateful for this.**

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For peer review only

Researcher's use only

Participant ID number / Initials

				/			
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Date returned

		/			/		
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Researcher's initials

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 **Pregnancy
lifestyle survey**

YOUR HEALTH AND YOUR PREGNANCY

A1 How would you describe your health generally?

- 1 Excellent
 2 Good
 3 Fair
 4 Poor

A2 Do you have a long standing physical or mental illness or disability? By longstanding I mean anything that has troubled you over a period of time or that is likely to affect you for some time into the future?

- Yes No

If Yes, does this illness or disability limit your activities in any ways?

- Yes No

A3 During the past month, have you often been bothered by feeling down, depressed or hopeless?

- Yes No

A4 During the past month, have you often been bothered by having little interest or pleasure in doing things?

- Yes No

A5 Please answer each of the following questions by circling the appropriate number. **Please circle one number per question.**

	Never	Almost never	Sometimes	Fairly often	Very often
<i>In the last month, how often have you felt...</i>					
...that you were unable to control the important things in your life?	1	2	3	4	5
...confident about your ability to handle your personal problems?	1	2	3	4	5
...that things were going your way?	1	2	3	4	5
...difficulties were piling up so high that you could not overcome them?	1	2	3	4	5

A6 Have you been pregnant before?

- Yes No

If Yes, did you smoke at all after finding out you were pregnant during your last pregnancy?

- Yes No I don't remember

A7 This time, were you planning to get pregnant or was it a surprise?

- Planning Was a surprise

YOUR SMOKING BEHAVIOUR AND BELIEFS

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10 B1 When did you last smoke any cigarettes or tobacco (even a puff)?

- 11 In the last 24 hours 1-2 months ago
12 1-6 days ago 2-3 months ago
13 7-30 days ago More than 3 months ago
14
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20 B2 If you have a partner, do they smoke tobacco?

- 21 Yes No I don't have a partner
22
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24
25

26
27 B3 Does anyone who lives with you smoke tobacco in the home?

- 28 Yes No
29
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31
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33
34 B4 How much of the time have you felt the urge to smoke in the past 24 hours?

- 35
36 Not at all Almost all of the time
37 A little of the time All the time
38 Some of the time Don't know
39 A lot of the time
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46 B5 How strong have the urges been in the past 24 hours?

- 47 No urges Very strong
48 Slight Extremely strong
49 Moderate Don't know
50 Strong
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B6 If you are planning on stopping smoking, or have already stopped, how long do you intend to stop for?

- Permanently/for good
- Until the birth of your baby/babies
- Unsure
- I am not planning on stopping smoking

B7 Please answer each of the following questions by circling the appropriate number. **Please circle one number per question.**

	Not at all	A little	Moderately	Very much	Extremely
How determined are you to stop smoking until your baby is born?	1	2	3	4	5
How confident are you that you can stop smoking until your baby is born?	1	2	3	4	5
How determined are you to stop smoking for good?	1	2	3	4	5
How confident are you that you can stop smoking for good?	1	2	3	4	5
How confident are you that you can stop smoking/remain stopped on your own (i.e. without help from a health professional)?	1	2	3	4	5
How confident are you that you can stop smoking/remain stopped with help from a health professional?	1	2	3	4	5

B8 Please indicate how much you agree with each statement below. **Please circle one number per question.**

	Not at all	A little	Moderately	Very much	Extremely
Smoking during pregnancy can cause serious harm to my baby	1	2	3	4	5
Smoking in pregnancy makes me feel uncomfortable or embarrassed	1	2	3	4	5
People I know continued to smoke when they were pregnant	1	2	3	4	5
I have support from my family or friends to help me stop smoking	1	2	3	4	5
People who are important to me think I should avoid smoking	1	2	3	4	5
Asking for professional support to help me stop smoking in pregnancy would make me feel uncomfortable or embarrassed	1	2	3	4	5

If you **SMOKE EVERY NOW & AGAIN** or **MORE OFTEN** continue to question C1 on the next page.

If you **DO NOT SMOKE AT THE MOMENT** go to question D1 on page 9

YOUR CURRENT SMOKING BEHAVIOUR

Please complete this section if you **SMOKE EVERY NOW & AGAIN** or **MORE OFTEN THAN THIS**

C1 Approximately how many cigarettes do you smoke each day?

- | | |
|--------------------------------|-------------------------------------|
| <input type="checkbox"/> 0-5 | <input type="checkbox"/> 16-20 |
| <input type="checkbox"/> 6-10 | <input type="checkbox"/> 21-30 |
| <input type="checkbox"/> 11-15 | <input type="checkbox"/> 31 or more |

C2 How soon after waking do you smoke your first cigarette of the day?

- | | |
|---|---|
| <input type="checkbox"/> Within 5 minutes | <input type="checkbox"/> 31-60 minutes |
| <input type="checkbox"/> 6-30 minutes | <input type="checkbox"/> After 60 minutes |

C3 Since finding out you were pregnant, have you tried to stop smoking?

- Yes No

If yes, please write in how many times you managed to stop smoking **completely** for at least 24 hours

times

C4 Since you found out you were pregnant, what was the longest you managed to remain stopped?

- | | |
|---|---|
| <input type="checkbox"/> I have not tried to stop smoking | <input type="checkbox"/> 1-2 months |
| <input type="checkbox"/> Less than 24 hours | <input type="checkbox"/> 2-3 months |
| <input type="checkbox"/> 1-6 days | <input type="checkbox"/> More than 3 months |
| <input type="checkbox"/> 7-30 days | |

C5 Are you seriously planning to quit?:

- Within the next 2 weeks
- Within the next 30 days
- Within the next 3 months
- No I am not seriously planning to quit

YOUR INTEREST IN GETTING HELP TO STOP SMOKING

All respondents should complete this section

D1 Since you found out you were pregnant, have you tried any of the following to help you stop smoking? (**Please tick all that apply**)

- Talked to your GP or a nurse about giving up smoking
- Talked to your midwife about giving up smoking
- Attended a NHS stop smoking service group session
- Attended a solo/individual NHS stop smoking service session (i.e. not with other people)
- Called a stop smoking telephone helpline
- Used Nicotine Replacement Therapy (e.g. nicotine patches or gum)
- Set a quit date
- Other. Please state: _____
- None of the above

D2 Currently, how interested are you in receiving help with stopping smoking?

- Not at all
- A little
- Moderately
- Very much
- Extremely

D3 How **interested** would you be in the following types of help to stop smoking/stay stopped? Please answer by circling the appropriate number.
Please circle one number per question.

	Not at all	A little	Moderately	Very much	Extremely
<i>How interested would you be in stop-smoking help from a health professional who offered you...</i>					
...a telephone helpline	1	2	3	4	5
...group sessions	1	2	3	4	5
...one-to-one sessions	1	2	3	4	5
<i>How interested would you be in stop-smoking help that you can work through on your own (self-help) if we gave you...</i>					
...a booklet	1	2	3	4	5
...a DVD	1	2	3	4	5
...a website	1	2	3	4	5
... text messages	1	2	3	4	5
...email	1	2	3	4	5
...an application on your mobile phone/device	1	2	3	4	5

D4 Please answer each of the following questions by circling the appropriate number. **Please circle one number per question.**

	Not at all	A little	Moderately	Very much	Extremely
<i>How useful do you think the following ways would be to help you to stop smoking/stay stopped?</i>					
A telephone helpline	1	2	3	4	5
Group sessions with a health professional	1	2	3	4	5
One-to-one sessions with a health professional	1	2	3	4	5
A self-help booklet	1	2	3	4	5
A DVD	1	2	3	4	5
A self-help website	1	2	3	4	5
Self-help mobile phone text messages	1	2	3	4	5
Self-help emails	1	2	3	4	5
A self-help application on your mobile phone/device	1	2	3	4	5
<i>If it were available, how difficult do you think it would be for you to use the following types of stop-smoking help?</i>					
A telephone helpline	1	2	3	4	5
Group sessions with a health professional	1	2	3	4	5
One-to-one sessions with a health professional	1	2	3	4	5
A self-help booklet	1	2	3	4	5
A DVD	1	2	3	4	5
A self-help website	1	2	3	4	5
Self-help mobile phone text messages	1	2	3	4	5
Self-help emails	1	2	3	4	5
A self-help application on your mobile phone/device	1	2	3	4	5

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5 D5 Do any of the following describe your feelings about stop-smoking help that
6 you work through on your own (ie, self-help)? **Please tick all that apply**
7

- 8
9 I would miss having personal contact with a health professional
10 It is too much effort to work through this type of support on my own
11 It would be too difficult for me to understand this type of support
12 I don't have the time to work through this type of support on my own
13 I don't think this type of support would be much help with quitting smoking
14 I think this type of support would be boring
15 I would not read/work through this type of support if I received it
16 I prefer to receive support from a health professional
17 None of the above
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26 D6 Which of the following applies to you? (**Please select one option per line**)
27

28 I own a mobile phone	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't know
29 I get free text messages as part of my 30 tariff/package	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't know
31 I can install applications on my mobile phone	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't know
32 I have regular access to the internet/emails via 33 my mobile phone	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't know
34 I have regular access to the internet/emails via 35 a computer	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't know
36 I have an email account	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't know
37 I have a DVD player	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't know

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ABOUT YOU

E1 At what age did you leave/finish full time education?

Years of age

I am still in education

E2 Which of the following qualifications do you have?

None

GCSEs or similar (e.g. level 1 diploma or NVQ level 1/2)

A-levels/AS-levels or similar (e.g. level 2 diploma or NVQ level 3)

Degree or similar (e.g. diploma in higher education or NVQ level 4)

Other

E3 Do you own or rent your home?

Own

Rent

Other

E4 Are there any cars or vans available for use in your household?

Yes

No

E5 Which of the following applies to you? **(Please tick all that apply)**

I am in paid work at the moment

I'm a homemaker/full time parent

I'm unemployed

Other

I'm a full-time student

E6 Please describe your current or most recent paid job. Please leave blank if you have not previously been in paid work.

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E7 Is your usual occupation manual or non-manual?

Manual Non-manual Don't know Not applicable

E8 How would you describe your ethnic group?

- White - British
 White - Irish
 Other white background
 Mixed - white and black Caribbean
 Mixed - white and Asian
 Other mixed background
 Asian or Asian British - Indian
 Asian or Asian British - Pakistani
 Asian or Asian British - Bangladeshi
 Other Asian background
 Black or black British - Caribbean
 Black or black British - African
 Other black background
 Chinese
 Other. Please specify: _____

Thank you for completing the questionnaire.

Please hand this to our researcher in clinic who will give you a £5 voucher and may talk with you about the rest of the study.

If you can't find the researcher, then please speak to one of the reception staff in clinic who will, if necessary, take your contact details so that the researcher can get in touch with you later.

If you haven't had time to complete the entire questionnaire today, or if you want some more time to think about it, then please ask the researcher or reception staff for a return envelope. Once you have decided, you can return the questionnaire along with your completed details on the attached sheet, and the researcher will contact you.

Thank you for your time today. We are very grateful for your help.

Pregnancy lifestyle survey

CONTACT DETAILS

If you would like to take part in the study or you would to discuss this further, then please complete your personal details below.
The researcher will contact you as soon as possible

Name	
Address	
Telephone	Day: <input type="text"/> Evening: <input type="text"/>
	Mobile: <input type="text"/>
Best time to contact	
Email address	



Researcher's use only

Participant ID number / Initials

				/			
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Date returned

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Researcher's initials

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FOLLOW UP QUESTIONNAIRE 1
 Final Version number: 2.3
 Version date: 19th October 2011

Please complete this questionnaire **within the next two weeks** and then return it in the envelope provided (no stamp required).

The information you give us will be confidential and only used by the Pregnancy Lifestyle Survey researchers.

If you have any questions or concerns about this questionnaire, please call the Smoking and Pregnancy Research Office on 0115 823 1899.

Thank you for your help

Today's date:

YOUR SMOKING BEHAVIOUR AND BELIEFS

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7 A1 Please tick the box below next to the statement that best describes your
8 smoking right now

- 9
10 I don't smoke at all
11 I smoke occasionally, but not every day
12 I smoke every day, but have cut down during my pregnancy
13 I smoke every day, about the same as before my pregnancy
14 I smoke every day, and I tend to smoke more than before my pregnancy
15
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20
21 A2 If you have a partner, do they smoke tobacco?
22

- 23 Yes No I don't have a partner
24
25
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27

28
29 A3 Does anyone who lives with you smoke tobacco in the home?
30

- 31 Yes No
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35
36 A4 How much of the time have you felt the urge to smoke in the past 24 hours?
37

- 38 Not at all Almost all of the time
39 A little of the time All the time
40 Some of the time Don't know
41 A lot of the time
42
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44
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47 A5 How strong have the urges been in the past 24 hours?
48

- 49 No urges Very strong
50 Slight Extremely strong
51 Moderate Don't know
52 Strong
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A6 If you are planning on stopping smoking, or have already stopped, how long do you intend to stop for?

- Permanently/for good
 Until the birth of your baby/babies
 Unsure
 I am not planning on stopping smoking

A7 Please answer each of the following questions by circling the appropriate number. **Please circle one number per question.**

	Not at all	A little	Moderately	Very much	Extremely
How determined are you to stop smoking until your baby is born?	1	2	3	4	5
How confident are you that you can stop smoking until your baby is born?	1	2	3	4	5
How determined are you to stop smoking for good?	1	2	3	4	5
How confident are you that you can stop smoking for good?	1	2	3	4	5
How confident are you that you can stop smoking/remain stopped on your own (i.e. without help from a health professional)?	1	2	3	4	5
How confident are you that you can stop smoking/remain stopped with help from a health professional?	1	2	3	4	5

A8 Please indicate how much you agree with each statement below. **Please circle one number per question.**

	Not at all	A little	Moderately	Very much	Extremely
Smoking during pregnancy can cause serious harm to my baby	1	2	3	4	5
Smoking in pregnancy makes me feel uncomfortable or embarrassed	1	2	3	4	5
If I breathe in other people's smoke regularly it can seriously harm my unborn baby	1	2	3	4	5
People I know continued to smoke when they were pregnant	1	2	3	4	5
I have support from my family or friends to help me stop smoking	1	2	3	4	5
People who are important to me think I should avoid smoking	1	2	3	4	5
Asking for professional support to help me stop smoking in pregnancy would make me feel uncomfortable or embarrassed	1	2	3	4	5

A9 How concerned are you about putting on weight as a result of stopping smoking?

Not at all

Very much

A little

Extremely

Moderately

If you **SMOKE EVERY NOW & AGAIN** or **MORE OFTEN** continue to question B1 on the next page. If you **DO NOT SMOKE AT THE MOMENT** go to C1 on page 6

YOUR CURRENT SMOKING BEHAVIOUR

Please complete this section if you **SMOKE EVERY NOW & AGAIN or MORE OFTEN THAN THIS**

B1 Approximately how many cigarettes do you smoke each day?

0-5

16-20

6-10

21-30

11-15

31 or more

B2 How soon after waking do you smoke your first cigarette of the day?

Within 5 minutes

31-60 minutes

6-30 minutes

After 60 minutes

B3 Since completing the first study questionnaire, have you tried to stop smoking?

Yes

No

If yes, please write in how many times during this period you managed to stop smoking **completely** for at least 24 hours

times

B4 Are you seriously planning to quit?:

Within the next 2 weeks

Within the next 30 days

Within the next 3 months

No I am not seriously planning to quit

YOUR INTEREST IN GETTING HELP TO STOP SMOKING

All respondents should complete this section

C1 Since you completed the first study questionnaire, have you tried any of the following to help you stop smoking? **(Please tick all that apply)**

- Talked to your GP or a nurse about giving up smoking
- Talked to your midwife about giving up smoking
- Attended a NHS stop smoking service group session
- Attended a solo/individual NHS stop smoking service session (i.e. not with other people)
- Called a stop smoking telephone helpline
- Used Nicotine Replacement Therapy (e.g. nicotine patches or gum)
- Set a quit date
- Other. Please state: _____
- None of the above

C2 Currently, how interested are you in receiving help with stopping smoking?

- Not at all
- A little
- Moderately
- Very much
- Extremely

C3 How **interested** would you be in the following types of help to stop smoking/stay stopped? Please answer by circling the appropriate number.
Please circle one number per question.

	Not at all	A little	Moderately	Very much	Extremely
<i>How interested would you be in stop-smoking help from a health professional who offered you...</i>					
...a telephone helpline	1	2	3	4	5
...group sessions	1	2	3	4	5
...one-to-one sessions	1	2	3	4	5
<i>How interested would you be in stop-smoking help that you can work through on your own (self-help) if we gave you...</i>					
...a booklet	1	2	3	4	5
...a DVD	1	2	3	4	5
...a website	1	2	3	4	5
... text messages	1	2	3	4	5
...email	1	2	3	4	5
...an application on your mobile phone/device	1	2	3	4	5

C4 Please answer each of the following questions by circling the appropriate number. **Please circle one number per question.**

	Not at all	A little	Moderately	Very much	Extremely
<i>How useful do you think the ways would be to help you to stop smoking/stay stopped?</i>					
A telephone helpline	1	2	3	4	5
Group sessions with a health professional	1	2	3	4	5
One-to-one sessions with a health professional	1	2	3	4	5
A self-help booklet	1	2	3	4	5
A DVD	1	2	3	4	5
A self-help website	1	2	3	4	5
Self-help mobile phone text messages	1	2	3	4	5
Self-help emails	1	2	3	4	5
A self-help application on your mobile phone/device	1	2	3	4	5
<i>If it were available, how difficult do you think it would be for you to use the following types of stop-smoking help?</i>					
A telephone helpline	1	2	3	4	5
Group sessions with a health professional	1	2	3	4	5
One-to-one sessions with a health professional	1	2	3	4	5
A self-help booklet	1	2	3	4	5
A DVD	1	2	3	4	5
A self-help website	1	2	3	4	5
Self-help mobile phone text messages	1	2	3	4	5
Self-help emails	1	2	3	4	5
A self-help application on your mobile phone/device	1	2	3	4	5

1
2 C5 Do any of the following describe your feelings about stop-smoking help that
3 you work through on your own (self-help)? **Please tick all that apply**
4

- 5
6 I would miss having personal contact with a health professional
7 It is too much effort to work through this type of support on my own
8 It would be too difficult for me to understand this type of support
9 I don't have the time to work through this type of support on my own
10 I don't think this type of support would be much help with quitting smoking
11 I think this type of support would be boring
12 I would not read/work through this type of support if I received it
13 I prefer to receive support from a health professional
14 None of the above
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24 Please turn over the page for the final section of questions



YOUR HEALTH AND YOUR PREGNANCY

All respondents should complete this section

D1 During the past month, have you often been bothered by feeling down, depressed or hopeless?

Yes

No

D2 During the past month, have you often been bothered by having little interest or pleasure in doing things?

Yes

No

D3 Please answer each of the following questions by circling the appropriate number. **Please circle one number per question.**

	Never	Almost never	Sometimes	Fairly often	Very often
<i>In the last month, how often have you felt...</i>					
...that you were unable to control the important things in your life?	1	2	3	4	5
...confident about your ability to handle your personal problems?	1	2	3	4	5
...that things were going your way?	1	2	3	4	5
...difficulties were piling up so high that you could not overcome them?	1	2	3	4	5

D4 How much have you had any of the following **during your pregnancy?**
Please circle one number per question.

	Not at all	A little	Moderately	Very much	Extremely
I have felt nauseous or sick	1	2	3	4	5
I have vomited	1	2	3	4	5

Thank you for completing the questionnaire

Please return **within the next 2 weeks** in the envelope provided (no stamp required)

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cohort studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	6
		(b) For matched studies, give matching criteria and number of exposed and unexposed	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6-7
Bias	9	Describe any efforts to address potential sources of bias	7-8
Study size	10	Explain how the study size was arrived at	Previously described in methods paper
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-8
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	7-8
		(b) Describe any methods used to examine subgroups and interactions	n/a
		(c) Explain how missing data were addressed	8
		(d) If applicable, explain how loss to follow-up was addressed	8
		(e) Describe any sensitivity analyses	n/a

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	9 & Figure 1
		(b) Give reasons for non-participation at each stage	Figure 1
		(c) Consider use of a flow diagram	Figure 1
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9, Table 1, Appendix Table S1
		(b) Indicate number of participants with missing data for each variable of interest	Appendix Table S1
		(c) Summarise follow-up time (eg, average and total amount)	n/a
Outcome data	15*	Report numbers of outcome events or summary measures over time	
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Throughout
		(b) Report category boundaries when continuous variables were categorized	Throughout
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	17
Limitations			
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	18-21
Generalisability	21	Discuss the generalisability (external validity) of the study results	18
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	24

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.