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Health of women before and during pregnancy: health behaviours, risk factors and inequalities

An updated analysis of the maternity services dataset antenatal booking data

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Executive summary

Good health both before a woman conceives and while she is pregnant improves outcomes for mother and baby, the benefits of which continue well beyond birth. Understanding patterns in health before and during pregnancy is important if we are to narrow the health gap for those who are most vulnerable. Inequalities in maternal and infant outcomes exist, with poorer outcomes experienced by certain groups of women and their babies.

This report gives a detailed picture of the distribution of risk factors present when a woman attends her first appointment with a midwife (booking appointment). The report contains 3 pieces of analysis.

The first section of the report presents an analysis based on twelve months' data for pregnancy booking (January to December 2017) from the Maternity Services Dataset (MSDS). This section of the report builds on the [analyses presented in 2018](#) and investigates risk factors in pregnancy which are associated with poorer outcomes. These factors are experienced at higher levels by particular groups of women and their babies. Following improvements in data quality, an analysis of substance misuse has also been included.

The second section of the report compares women booking for their first pregnancy with those booking for a subsequent pregnancy. It focusses on how prepared a woman is for a healthy pregnancy in terms of lifestyle factors such as smoking, obesity and taking a folic acid supplement which can be altered by changes in behaviour or, in other words, are modifiable.

The third section compares the maternal population in MSDS to the general female population using data from the Health Survey for England (HSE) and the Office for National Statistics (ONS) with particular focus on the proportions of women smoking and who are obese.

Main findings

There are some gaps in the records (see Table 2 for detailed breakdown) for example smoking status may not be recorded in some instances. These gaps predominantly originate from individual provider trusts and are distributed across all subgroups (such as age, deprivation and ethnicity, as shown in table 2a) such that the data is still a representative sample. Due to the limitations of the data, statistical tests for differences were not performed but the distributions for mother's age, mother's ethnicity and deprivation decile were tested to ensure the patterns were consistent for both valid and missing or non- useful data such as 'unknown'. The large number of women included

(644,030) in the sample means that even when some of the records have missing or non-useful data, meaningful conclusions can still be drawn about the likely prevalence of the different behaviours in the population overall.

Smoking in pregnancy

Where a known smoking status was available, 56.8% women reported that they had never smoked; 23.8% had stopped before becoming pregnant; 6.7% stopped when they found out they were pregnant; and 12.7% reported that they were current smokers at their booking appointment (table A5).

Younger women were more likely to smoke at the time of their booking appointment, with almost 1 in 4 women (24.8%) aged under 25 smoking compared to 7.1% of women aged 35 and over (table A5a).

Rates of smoking in pregnancy in the most deprived areas of England were nearly 6 times those in the least deprived areas (24.7% and 4.1% respectively) (table A8b).

Women of white (15.9%) and mixed (13.9%) ethnicity were most likely to smoke when compared to women from other ethnic groups (table A11b).

Nearly a third of women aged under 18 continue to smoke in their first pregnancy, rising to almost 40% for those booking for a subsequent pregnancy in the same age group (table A32a).

A higher proportion of women aged 16 to 19 smoked while pregnant (32.7%) when compared to the general population of women of the same age (14.1%) (table A36a). there was no smoking status recorded for 12.2% of records in MSDS (table 2).

Folic acid

Of the women for whom the folic acid supplement use was known, 28.2% of women took a folic acid supplement in preparation for pregnancy (table A14).

Young women were the least likely to be taking a folic acid supplement in preparation for pregnancy; 6.5% of women aged under 18 and 14.0% of women aged 18 to 24 had taken a folic acid supplement in preparation for pregnancy (table A14b).

Folic acid supplement use in early pregnancy varied by the level of deprivation, with more women in the least deprived areas taking supplements (42.5%) in comparison to those in the most deprived areas (15.2%) (table A15b).

There is variation by ethnic group, 17.6% of with women of black ethnicity had taken a folic acid supplement in preparation for pregnancy in comparison to 34.4% of women with Chinese ethnicity. (table A16b).

Women were more likely to take a folic acid supplement for their first than subsequent pregnancies; 30% of women booking for a first pregnancy took a folic acid supplement in preparation for their pregnancy compared to 26% for those booking for a subsequent pregnancy (A31a).

In more than a third of records in MSDS (34.5%), information on folic acid supplement use was missing (table 2).

Maternal body mass index

For women with a known body mass index (BMI), 27.4% of women were overweight, 18.3% were obese and 3.3% were severely obese when they attended their first booking appointment. There were also 4.5% of women who were underweight and 46.5% with a healthy weight. (table A17).

The proportion of women who were overweight or obese during pregnancy increases with age, with the highest proportion being among those aged 40 or over (55.4%) (table A17b).

The proportion of women who were overweight or obese in early pregnancy rises as the levels of area deprivation increase (table A18b).

When looking at different ethnic groups, black women were the most likely to be overweight or obese (66.6%) in early pregnancy (table A19b).

The highest proportions of women who were obese were seen in women aged 40 or over (21% first pregnancy, 26% subsequent pregnancy) (table A30b).

A higher proportion of women booking for a subsequent pregnancy (23%) were obese than those booking for their first pregnancy (18%) (table A30b).

Higher proportions of pregnant women aged under 25 were obese (16.3% aged 16 to 19, 23.5% aged 20 to 24) when compared to non-pregnant women of the same age (11.9% aged 16 to 19, 17.8% aged 20 to 24) (table A39a).

Around 19% of women did not have their BMI recorded on MSDS (table 2).

Alcohol and substance misuse

Very few women reported that they drank more than a unit of alcohol a week in pregnancy (2.9% of women for whom alcohol usage was known), although the fact that this is self-reported means that it may be an underestimate. Most women (97.1%) reported that they drank little to no alcohol a week (1 unit or fewer). (table A20).

older women were more likely to drink as well as to drink higher volumes in pregnancy than other age groups. The highest proportions of women who drank alcohol in pregnancy were seen in women aged 35 to 39 (3.6%) and aged 40 or over (3.4%) (table A20b). Women aged 35 to 39 also drank the most units of alcohol with 16.0% of women who drank reporting that they consumed more than 8 units per week (table A20c) .

around 1.2% of women reported that they were currently misusing illicit drugs, solvents or medicines and over 3.3% described themselves as previously misusing these substances. The majority of women (95.5%) reported that they had never taken drugs. (table A21).

substance misuse was more common in women in the most deprived areas, with 2.5% reporting misusing illicit drugs, solvents or medicines compared to 0.5% of women in the least deprived areas (table A23b).

nearly a third of records (29.5%) were reported as 'unknown' or 'not stated' when looking at data on substance misuse (table 2). There was an 'unknown' number of alcohol units drunk in the week for 43.1% of women when they attended their booking appointment (table 2).

Antenatal booking within 10 weeks of pregnancy

More than half (53.9%) of pregnant women attend their booking appointment within 10 weeks (table A27).

Where women are not booking for antenatal care within the recommended 10 weeks, 28.7% booked between 10 and 12 weeks and 9.3% between 13 and 20 weeks. For 8.1% of pregnant women, their first appointment with a midwife comes when they are over half way through their pregnancy (the baby or babies have a gestational age of 20 weeks or more). Data was nearly universally known for gestational age with only 0.1% of women having data recorded as 'unknown' (table A27).

Pregnant women aged under 25 attend antenatal care at a later stage than older women, with a fifth of women attending when they are 13 weeks or more (table A27b).

Women in their mid-twenties and early thirties were most likely to attend their antenatal booking appointment within 10 weeks of their pregnancy (55.7%) when compared to other age groups (table A27b).

Booking after 10 weeks is also more likely for women living in the most deprived areas (48.9%) when compared to areas with lower levels of deprivation (table A28b).

Black women (61.5%) and women whose ethnicity is given as 'other' (58.6%) were the ethnic groups most likely to book after 10 weeks (table A29b).

This report provides additional analyses and reinforces findings from the [report](#) published in 2018. The comparisons made between the MSDS data and other established data sources suggests that at the time of analysis the dataset was reaching a point where data was being recorded for the vast majority of women in England using maternity services. It can, therefore, be used to provide information about the risk factors which are associated with poorer outcomes and how those risks are distributed within different groups of women. The dataset is still classed as experimental as it is undergoing evaluation so this analysis should be interpreted with care due to known but improving issues with data quality and coverage (table 2). While data quality is variable, the findings are in accordance with what is known from the literature. For this reason, this analysis can be used by commissioners and service leaders to increase their understanding of their local population's demographics and risk factors of women using services as well as analyse variation between providers.

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Introduction

Good health both before a woman conceives and while she is pregnant improves outcomes for mother and baby, the benefits of which continue well beyond birth. Understanding patterns in health before and during pregnancy is important if we are to narrow the health gap for those who are most vulnerable. Inequalities in maternal and infant outcomes exist, with poorer outcomes experienced by certain groups of women and their babies. Based on such analysis, services can be designed across care pathways which encourage changes in behaviour to improve the health of everyone of reproductive age so that when women do conceive they are fit and well with the best possible chance of a healthy conception and pregnancy.

A woman's maternity booking appointment should take place within the first 10 weeks of pregnancy. It is the point at which the woman meets a midwife for the first time to discuss antenatal care. During the booking appointment a range of information is collected about the mother and her family's health, her social support and her pregnancy and tests, such as screening for sickle cell disease and thalassaemia, which need to be done before 10 weeks, are scheduled. It is also the opportunity to discuss the best way to ensure a healthy pregnancy including information and recommendations on diet and the need to take folic acid supplements, smoking and antenatal screening.

Many factors affect a woman's health in pregnancy. The extent to which these can be altered or modified varies. For example, once a woman is pregnant, factors such as the age at which she will become a mother cannot be altered. There are, however, less healthy behaviours which are often established well before pregnancy. This is the case for dietary and exercise habits, smoking, alcohol and substance misuse and many other factors. Effective action to reduce these risk factors before and during pregnancy can improve outcomes for mothers, babies and their families. As with many aspects of public health, inequalities in maternal and infant outcomes exist, with poorer outcomes experienced by certain groups of women and their babies. These risk factors and their unequal distribution are the focus of this report.

Maternal age is an important factor for pregnancy outcomes, with a maternal age of 35 or above associated with higher rates of stillbirth (1-4), caesarean section (5) and congenital abnormalities (6) when compared to younger women.

Younger women can also be at higher risk. For example, they are less likely to take a folic acid supplement (7) which protects against the risk of neural tube defects such as spina bifida (8). Women are advised to take daily folic acid supplements of 400µg before conception and throughout the first 12 weeks of pregnancy (9).

Babies born to women aged under 20 also have around a 20% higher risk of low birthweight (10) which can be partly explained by higher smoking rates in pregnancy in this age group than the national average. Women are advised not to smoke before conception and while pregnant as smoking in pregnancy is generally associated with higher risk of stillbirth and infant mortality (11) and is the single largest modifiable risk factor for poor birth outcomes (12).

Social factors can also play a role. Women in routine and manual occupations have higher smoking rates (13) and, in the general population, rates of smoking are higher in more deprived areas (14). When considering area-based deprivation, babies living in the most deprived areas have a higher rate of congenital anomalies as well as neonatal mortality associated with congenital anomalies (15).

A woman's weight can have a bearing on outcomes in pregnancy. Women who are overweight or obese are more likely to have a stillbirth (16) as well as complications in pregnancy and labour which place themselves and their babies at greater risk of harm (17). At the other end of the spectrum, women who are underweight are also more likely to experience poor outcomes. Women are encouraged to maintain a healthy weight before, during and after pregnancy.

Recent reviews have shown that the risks of low birthweight, preterm birth, and being small for gestational age may all be increased in mothers drinking above 1-2 units per day during pregnancy (18). The consumption of alcohol in pregnancy also carries the risk of a baby developing fetal alcohol spectrum disorders or fetal alcohol syndrome (18). These conditions can result in physical, mental and behavioural problems including learning disabilities which can have lifelong effects (18). For these reasons, encouraging women to abstain from alcohol in pregnancy is important. UK chief medical officers' advice to pregnant women is that the safest approach is not to drink alcohol at all, to keep risks to the baby to a minimum (18). Illicit drugs, medicines or solvents also should not be misused during pregnancy due to the risk of clinical and neonatal complications, including increased risk of death, and the risk of poor behavioural and developmental outcomes in drug-exposed children (depending on the drug(s) misused).

Methodology

The Maternity Services Dataset (MSDS) is a national dataset which collects and reports information on maternity care in England. It has been implemented by all maternity services in England, including acute trusts, foundation trusts and private services commissioned by the NHS. The dataset is currently classed as experimental, published in order to involve stakeholders in its development. More information about the dataset is available from [NHS Digital](#).

Maternity care providers began submitting data for activity from April 2015. There has however been variation in how quickly and how successfully providers have managed to flow their data to the national dataset. For the latest month in the period covered in this analysis (December 2017), 123 providers successfully submitted data to the dataset. This included 122 of the 132 providers identified as providers of maternity services based on hospital delivery data. Data for a limited subset of the overall MSDS relating to information collected at pregnancy booking appointments has been made available in an anonymised form through NHS Digital's [iViewPlus tool](#).

This report analyses data from all maternities in England during early pregnancy: antenatal booking data from the MSDS. It presents information on the mother's health, lifestyle and risks in early pregnancy as well as her age, ethnicity and the level of deprivation of the area in which she lives.

At the booking appointment many questions are asked about a woman's health and lifestyle including her smoking habits and history. Ex-smokers at their booking appointment were asked when they had quit – in advance of pregnancy or shortly after discovering they were pregnant.

Women are weighed and their height is measured in order to calculate their body mass index (BMI) and if required advice given around how weight related risks can be minimised and any additional care the woman may require if she has weight problems. Women are also asked if they took a folic acid supplement either before conception or since their pregnancy has been confirmed.

Questions are also asked about how many units of alcohol the women have drunk in the last week and whether or not they have used or are misusing illicit drugs, solvents or medicines. If a woman says that she has drunk alcohol; is using illicit drugs such as cocaine, crack, heroin, cannabis and new psychoactive substances (NPS); is misusing medicines such as morphine or other prescribed opioids; or is misusing

solvents such as glue or aerosols, this is recorded¹. If a mother misuses alcohol, illicit drugs, solvents or medicines this can place her baby at greater risk of poorer outcomes.

The midwife also identifies whether complex social factors are present and this is recorded in the MSDS. Complex social factors include women aged under 20, women who experience domestic abuse, women who are recent migrants, asylum seekers or refugees, or who have difficulty reading or speaking English or women who misuse substances including alcohol. Women in these groups may have additional needs which should be considered when planning services (22). For example, women aged under 20 may be reluctant to use antenatal services because they feel uncomfortable when most of the other women attending are older or encounter practical difficulties with getting to such services (22).

Limitations and data quality

To assess the quality of the MSDS data and its suitability for further analysis, the number of records for booking appointments for January to December 2017 were compared to other data sources for associated time periods (appendix 1.1). Results showed that there were more records in the MSDS maternity booking system than birth registrations from the Office for National Statistics (ONS). The ONS data however only includes maternities where live or stillbirth were the outcome; women who have terminated their pregnancy or lost their baby before 24 weeks are not included in the ONS maternity figures.

There were also more records in MSDS than appear in PHE-reported health visitor antenatal contacts (appendix 1), which only cover live births and also exclude admissions to neonatal care. Comparing the MSDS data to other established data sources suggests that the dataset is reaching a point where data was being recorded for the vast majority of women in England using maternity services (table 1). As the dataset is recently established, not all data items are flowing successfully from all providers. The results should therefore be interpreted with caution, and alongside the data quality assessments (table 2).

Maternal age and residence (allowing deprivation decile to be calculated) were well populated within the dataset. Ethnicity was less well populated, with approximately 14% of records having no recorded ethnicity (table 2). This data quality is similar to other, more established data sources such as Hospital Episode Statistics.

¹ Tobacco and alcohol are recorded as separate data items and so are not included in the analysis of 'substance misuse.' Prescribed medication is also excluded.

When looking at the details of when known ex-smokers quit there were a significant number of missing records (more than 40%). Nearly a third of records (29.5%) were reported as ‘unknown’ or ‘not stated’ when looking at data on substance misuse. 43.1% of women had an ‘unknown’ number of alcohol units drunk in the week they attended their booking appointment.

Table 1: Maternity booking records in the MSDS compared to other sources of pregnancy-related counts

Data source	Number of records
ONS maternities 2017	638,629
NHS Digital Maternity booking appointments 2017 (MSDS)	644,030
NHS Digital Hospital Deliveries 2017/18 (HES)	626,203

Table 2: Data quality summary for maternal demographics and risk factors used in analysis from MSDS

	Data quality			
	Overall	Mother's age	Mother's ethnicity	Deprivation decile
Overall	Dataset likely to be nearly 100% complete (table 1).	<1% of records with missing maternal age	14% of records with missing maternal ethnicity	<2% of records which cannot be assigned to a decile (based on residence)
Smoking status	12.2% of records with missing smoking status.	Approximately 12% of records in each age group with missing smoking status – no suggestion this varies by age.	Around 11% to 12% of records for each ethnicity had missing smoking status. Records with ethnicity not known or stated have poorest recording of smoking.	11% of records in the least deprived decile with missing smoking status, rising to 13% in the most deprived decile.
Ex-smokers: point of quitting	46.0% of records with missing point of quitting information.	39% to 49% of records with missing point of quitting information. No clear pattern by mother's age.	76% of records for women with Asian ethnicity recorded as ex-smokers do not contain information about point of quitting. This is 44% for white women.	No clear pattern by deprivation decile, although highest proportion of missing records in most deprived decile (53%).
Folic acid supplement use	34.5% of records with missing folic acid supplement use.	Around 34% to 35% of records in each age group with missing folic acid supplement use. Slightly more missing records in younger age groups.	34% to 39% of records in each group with missing folic acid supplement use. Records with ethnicity not known or stated also have poor recording of folic acid.	No clear pattern by deprivation decile.
Maternal BMI	18.7% of records with missing BMI information.	22% of records for young women aged under 18 with missing BMI information – 18% to 20% of missing records in older age groups.	Around 14% to 20% of records in each group with missing BMI information. Records with ethnicity not known or stated have poor recording of BMI.	No clear pattern by deprivation decile.
Alcohol use	97.1% of records with known status have lowest alcohol use (<1 unit per	Around 42% to 44% records contain unknown	Around 42% to 50% of records in each group with unknown alcohol information	No clear pattern by deprivation decile.

Data quality				
	Overall	Mother's age	Mother's ethnicity	Deprivation decile
	week) recorded. 43.1% have missing information.	alcohol information for all age groups.		
Substance misuse	29.5% of records with missing substance misuse data.	Around 29% to 30% records contain missing substance misuse data for all age groups.	Around 28% to 31% records contain missing substance misuse data for all ethnic groups.	No clear pattern by deprivation decile.
Antenatal booking	<1% of records with unknown date of antenatal booking in all groups.			

The distribution of appointments by various inequality factors (age of mother, ethnicity, deprivation decile) were compared, where possible, to these other data sources (appendix 1). With one exception (maternal ethnicity, where the proportion of white women was slightly lower than would be expected), the distributions of the records in the MSDS in each group were similar to the distributions in these other datasets. On this basis, the MSDS can be considered a reliable source of inequality information for these factors. Behavioural risk factors were then analysed by these inequalities for the twelve-month period January to December 2017 (as improvements in data quality were so rapid that this data is likely to be more complete than data from 2016). At all stages, data quality was assessed and noted.

The literature suggests that risk and inequality factors are interrelated with little known about associations between individual factors and outcomes, independent of other factors. The findings within this report must therefore be interpreted with this limitation in mind.

Table 2a: Distribution of data quality for maternal demographics and risk factors used in analysis from MSDS

	Percentage in each category					
	Smoking		Folic acid		BMI	
	Valid data	Missing data	Valid data	Missing data	Valid data	Missing data
Mother's age						
Under 18	1.0%	1.1%	1.0%	1.0%	1.0%	1.2%
18-24	18.0%	18.8%	18.1%	18.2%	17.9%	19.0%
25-29	28.7%	28.9%	28.8%	28.6%	28.8%	28.7%
30-34	31.3%	30.4%	31.3%	31.1%	31.4%	30.6%
35-39	17.0%	16.7%	16.9%	17.1%	17.1%	16.6%
40+	3.9%	4.1%	3.9%	3.9%	3.9%	3.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Deprivation decile						
Most deprived 10%	13.7%	15.4%	13.4%	14.8%	13.9%	14.0%
2	12.6%	13.4%	12.4%	13.2%	12.7%	12.6%
3	11.7%	12.1%	12.0%	11.3%	11.8%	11.5%
4	10.9%	10.3%	11.5%	9.6%	10.9%	10.6%
5	9.8%	9.6%	10.1%	9.2%	9.7%	9.8%
6	9.4%	9.0%	9.6%	8.8%	9.4%	9.2%
7	8.7%	8.3%	8.7%	8.6%	8.7%	8.6%
8	8.5%	7.7%	8.3%	8.7%	8.4%	8.4%
9	7.8%	7.8%	7.6%	8.2%	7.7%	8.4%
Least deprived 10%	6.9%	6.3%	6.5%	7.4%	6.8%	6.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Mother's ethnicity						
Asian	11.4%	10.3%	11.0%	12.0%	11.8%	9.1%
Black	4.8%	5.1%	4.7%	5.2%	4.8%	5.1%
Other	4.0%	4.2%	4.1%	4.0%	3.9%	4.6%
Mixed	2.0%	2.0%	1.9%	2.2%	2.0%	2.1%
Chinese	0.7%	0.7%	0.7%	0.8%	0.7%	0.7%
White	77.0%	77.7%	77.8%	75.8%	76.7%	78.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

	Percentage in each category					
	Alcohol		Substance misuse		Gestational age	
	Valid data	Missing data	Valid data	Missing data	Valid data	Missing data
Mother's age						
Under 18	1.0%	1.1%	1.0%	1.0%	0.9%	0.0%
18-24	18.1%	18.1%	18.1%	18.2%	18.2%	17.6%
25-29	28.9%	28.5%	28.7%	28.7%	28.9%	33.6%
30-34	31.3%	31.2%	31.3%	31.2%	31.4%	31.2%
35-39	16.9%	17.1%	17.0%	16.9%	17.0%	16.0%
40+	3.8%	4.0%	3.9%	3.9%	3.6%	1.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Deprivation decile						
Most deprived 10%	12.6%	15.7%	13.8%	14.2%	13.9%	19.8%
2	13.0%	12.2%	12.8%	12.4%	12.7%	12.7%
3	12.2%	11.3%	12.0%	11.2%	11.7%	13.5%
4	11.3%	10.1%	11.4%	9.4%	10.8%	9.5%
5	9.7%	9.8%	9.9%	9.4%	9.8%	8.7%
6	9.4%	9.2%	9.4%	9.0%	9.3%	9.5%
7	8.6%	8.8%	8.6%	8.9%	8.7%	5.6%
8	8.6%	8.1%	8.2%	9.0%	8.4%	5.6%
9	7.8%	7.8%	7.5%	8.5%	7.8%	8.7%
Least deprived 10%	6.7%	6.9%	6.3%	7.9%	6.8%	6.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Mother's ethnicity						
Asian	10.0%	13.0%	11.2%	11.5%	11.3%	10.5%
Black	4.6%	5.1%	4.8%	4.9%	4.8%	2.9%
Other	3.8%	4.3%	4.1%	3.9%	4.0%	2.9%
Mixed	1.9%	2.1%	2.0%	2.2%	1.8%	0.0%
Chinese	0.6%	0.8%	0.7%	0.7%	0.6%	0.0%
White	79.0%	74.6%	77.2%	76.8%	77.5%	83.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Missing data comprises those women for whom the value is 'unknown', 'reported unknown' or 'not stated'.

Analysis of risk factors

The following summaries relate to analysis of the data within the MSDS for the 12 month period January to December 2017. In many cases the findings confirm what is already known, but in some cases further investigation is required. Detailed findings for each risk factor can be found in Appendix 2.

Smoking at time of booking

Women are advised not to smoke before conception and while pregnant as smoking in pregnancy is associated with a higher risk of stillbirth and of infant mortality (11). Data about whether a woman was smoking at the time of booking was analysed by the mother's age, ethnicity and deprivation (based on residence) (see appendix 2.1). Overall 586,695 women had information recorded about their smoking status, representing 87.8% of all records.

When looking at records with a known status, there were 333,430 (56.8%) women with a known smoking status who reported that they had never smoked; 139,465 (23.8%) had stopped before becoming pregnant; 39,285 (6.7%) stopped when they found out they were pregnant; and 74,515 (12.7%) reported that they were current smokers at their booking appointment (table A5).

The percentage of women smoking at delivery in 2017/18, taken from the NHS Digital return on smoking status at time of delivery (SATOD) return was 10.8%, indicates that around 2% of all pregnant women (approximately 11,000) and around 15% of women who were smoking at booking may have successfully quit smoking during pregnancy. While recognising that these are different cohorts of women, the analysis indicates what will be possible in the future when the data will allow the same woman to be tracked through pregnancy from booking to delivery and such comparisons made.

Younger women were more likely to smoke during pregnancy. Around 51,000 women who smoked at the start of their pregnancy were aged under 30, representing almost 70% of all women smoking at their booking appointment (table A5a). The highest proportion of smokers were aged under 25, with nearly 1 in 4 young women (24.8%) smoking at their booking appointment. This is consistent with the existing literature (11).

Women living in more deprived areas were more likely to smoke. Around 33,000 women who smoked at their booking appointments lived in areas within the 2 nationally most deprived deciles (table A8a). These 2 deciles accounted for over 40% of all women smoking at their booking appointment. Rates of smoking in the most deprived decile were nearly 6-times higher than those in the least deprived decile (24.7% and 4.1% respectively), with a clear gradient evident across the deciles (table A8b).

Looking at ethnicity, the largest proportion of smokers was among women with white ethnicity (15.9%, 62,730 women). Women of mixed ethnicity (13.9%, 1,435 women) or whose ethnicity was recorded as 'other' (7.0%, 1,445 women) were also more likely to smoke than other ethnic groups. The proportion of smokers was also high in the group of women whose ethnicity was not recorded (21.1%, 7,710 women) (tables A11a and A11b). Analysis suggests this is likely to include a large proportion of white women (figure A4). One in fifty women with Asian ethnicity (2.0%) and fewer than one in fifty women with Chinese ethnicity (1.4%) were smokers at their booking appointment.

The dataset contains a number of records with unknown smoking status (12.2%) (table 2). It is possible that some of these women may be smokers, meaning that the proportion of women who smoke may be underestimated, and true values may be higher than the 12.7% reported at the time of analysis. There is no evidence that recording of this data item varies by age range but it does vary by deprivation, with women in the more deprived areas being less likely to have their smoking status recorded at their booking appointment. Even without taking into account this potential under-reporting of women in deprived areas who smoke, the proportion of known smokers in the most deprived decile (24.7%) is still higher than the proportion of known smokers and the proportion of unknowns added together in the least deprived decile (15.0%). Even in the hypothetical case that all the 'unknowns' in the least deprived decile were smokers, women in the most deprived decile would still be more likely to smoke in pregnancy than those in the least deprived decile.

Former smokers

Older women were considerably more likely to give up smoking before becoming pregnant. One in 5 (20.1%) of the young women aged under 18 classed as ex-smokers had quit before pregnancy, compared to almost 2 in 5 of those in their late thirties and forties (38.0% aged 35 to 39, 39.9% aged 40 or over) (table A7b). The lowest proportion of women who quit smoking before pregnancy was seen in the most deprived decile (24.3%) (table A10b). A third of women (33.1%) with white ethnicity quit smoking before conceiving (table A13b).

Across all age categories, 65.5% of those smoking at conception were still smoking at their booking appointment. While overall most women had not quit during this period, a significant number of women had managed to quit (around 1 in 3 (29.1%) younger women aged under 18 and more than one third (36.6%) of women in their late twenties and thirties) (table A6b).

Women from more deprived backgrounds were less likely to give up smoking when pregnant, potentially adding to the inequalities which coming from a less affluent background already carry. A gradient is apparent by deprivation, with over half of women who smoked up to pregnancy in the least deprived decile quitting before their

booking appointment (57.1%), compared to 1 in 5 in the most deprived decile (20.4%) (table A9b).

More women from ethnic minorities gave up smoking in pregnancy than those with white ethnicity. Slightly under half of women with Asian (43.7%, 915 women) and black ethnicity (42.6%, 760 women) who smoked at the time they became pregnant had quit before their booking appointment, with smaller proportions of women in other ethnic groups managing to quit. Almost a third (32.9%) of white women who were smoking when they became pregnant had quit by the time they attended their booking appointment (tables A12a and A12b).

Folic acid

Women who are trying to conceive should be advised to take a folic acid supplement of 400µg each day. This can help to prevent birth defects known as neural tube defects, including spina bifida (7-8). For this reason, folic acid supplement use in preparation for pregnancy was analysed by mother's age, ethnicity and deprivation (see appendix 2.2).

Information was available for 440,445 women (65.5%) about whether they were taking folic acid supplements. Where women supplied information on their folic acid supplement use, 28.2% (124,060 women) stated that they took a folic acid supplement in preparation for pregnancy (table A14). The level of uptake is consistent with a 2014 regional study where approximately 28% of women were found to be taking supplements before pregnancy (8).

Young women aged under 18 were least likely to be taking a folic acid supplement in preparation for pregnancy: 6.5% of women aged under 18 and 14.0% women aged 18 to 24 had taken a folic acid supplement prior to pregnancy compared to 37.7% women aged 40 or over. For women in their thirties and above, over 30% of women reported they were taking a folic acid supplement in preparation for pregnancy. There is no strong evidence that the missing data varies by maternal age; approximately the same percentage of records across age groups have information about folic acid supplement use as 'unknown' (between 34.3% and 35.0%). (table A14a).

Whether or not a woman takes a folic acid supplement is associated with deprivation. For women living in the most deprived decile, 15.2% were recorded as taking folic acid supplements in preparation for pregnancy; this rises to 42.5% in the least deprived decile (table A15b).

There is also variation between ethnic groups. Women with Chinese (34.4%) and white (29.6%) ethnicity were most likely to be recorded as taking a folic acid supplement in advance of pregnancy, compared to 17.6% of women with black or 21.8% of women with Asian ethnicity (table A16b).

Over a third of women do not have their folic acid supplement use recorded (34.5%) meaning that there could be under or over-reporting for the uptake of folic acid supplements.

Maternal body mass index

Women are encouraged to maintain a healthy weight before, during and after pregnancy as this will result in better birth outcomes for both mother and baby. Data from the MSDS was analysed by the mother's age, ethnicity and deprivation (see appendix 2.3). Body mass index (BMI) is a weight-for-height index that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of their height in metres (kg/m^2) (19). If a person's BMI is:

- below 18.5kg/m^2 they are classified as underweight
- between 18.5kg/m^2 and 24.9kg/m^2 they are classified as a healthy weight
- between 25kg/m^2 and 29.9kg/m^2 they are classified as being overweight
- 30kg/m^2 and above are classified as obese
- above 40kg/m^2 are classified as severely obese

Overall 540,630 of women had information recorded about their BMI, representing 81.3% of all records. Nearly half of women where the BMI was recorded (46.5%, 251,475) were classed as having a healthy weight at their booking appointment. 24,365 (4.5%) women were underweight, 148,265 (27.4%) were overweight, 98,760 (18.3%) were obese and 17,765 (3.3%) were severely obese (table A17).

There is a correlation between a woman's age and her BMI status, with the likelihood of her being overweight or obese increasing as she gets older. Younger women were more likely to be underweight at their booking appointment, with 1 in 8 (12.0%) young women aged under 18 underweight at their booking appointment. Almost a third (31.3%) of pregnant women aged under 18 were classified as overweight or obese (including those categorised as severely obese) in early pregnancy, rising gradually with age to over a half of pregnant women (55.4%) aged 40 or over being overweight or obese (table A17b). When looking at women classified as obese or severely obese, the highest proportion were aged 40 or over where 21.5% were classified as obese and a further 3.4% of women were classified as severely obese, closely followed by women aged 25 to 29 where 18.9% were classified as obese and 3.6% were severely obese.

Being overweight or obese at the booking appointment is more prevalent in areas of higher deprivation. A clear inequality gradient can be seen: 56.1% of women living in the most deprived decile were overweight or obese at their booking appointment, in comparison with 40.5% of women in the least deprived areas. When focusing on women classified as obese, 28.4% women in the most deprived decile were classified as obese or severely obese (5.1% were severely obese). This figure is almost halved

for those living in the least deprived decile with 14.4% women being classified as obese or severely obese (1.8% were severely obese) (table A18b).

Variation between ethnic groups is noticeable when looking at BMI status. Two-thirds (66.6%) of black women were overweight or obese, compared to 22.8% of women with Chinese ethnicity. Women of Asian (51.8%), mixed (51.2%) and white (48.6%) ethnicities also had high rates of being overweight and obese. A slightly higher proportion of women with Chinese ethnicity (8.5%) were underweight at their booking appointment when compared to other ethnic groups (table A19b).

Around 19% of women did not have their BMI recorded (table 2). This figure is similar for all levels of deprivation and for all age groups.

Alcohol

UK chief medical officers' advice to pregnant women is that the safest approach is not to drink alcohol at all, to keep risks to the baby to a minimum (18). Analysis of data from the MSDS helps us to look at the extent to which public health advice is being heeded (appendix 2.4).

Overall 379,600 of women had information recorded about their drinking habits, representing 56.9% of all records. A small proportion (2.9%) of women where alcohol status was recorded reported that they drank more than one unit of alcohol per week during pregnancy (table A20). This may be an underestimate as 287,275 (43.1%) women did not have their levels of alcohol use recorded (table 2). Anecdotally it is thought that people often tell their GP (or, in this case, midwife) that they drink less than they do. It is therefore possible that pregnant women may report that they are drinking less than they are in reality.

The highest proportions of women who drank alcohol in pregnancy were those aged 35 to 39 (3.6%) and 40 or over (3.4%) (table A20b). Women aged 35 to 39 also drank the most units of alcohol with 310 (16.0%) of women in this age group who drank reporting that they consumed more than 8 units per week (table A20c).

The data on alcohol in the MSDS is poorly completed (43.1% of women have unknown values) which suggests that either questions on alcohol were not being asked or not recorded, potentially leading to under-reporting.

Substance misuse

Illicit drugs, solvents or medicines also should not be misused during pregnancy due to the risk of clinical and neonatal complications, including increased risk of mortality, and the risk of poor behavioural and developmental outcomes in drug-exposed children

(depending on the drug(s) misused). Analysing this data from the MSDS allows us to look at substance misuse in terms of illicit drug, solvent and medicine misuse by mother's age, deprivation and ethnicity. Detailed analyses are shown in appendix 2.5.

Overall 470,415 of women had information recorded about substance misuse, representing 70.5% of all records. Most women for whom substance misuse status was recorded (95.5%) reported at their booking appointment that they had never misused illicit drugs, solvents or medicines. Around 5,500 women (1.2%) reported that they were currently misusing illicit drugs, solvents or medicines; and over 15,000 women (3.3%) reported previously misusing these substances (table A21).

Substance misuse was most common in women aged under 25 with nearly 1,500 women (1.6%) reporting currently using and around 5,800 (6.4%) stating that they had misused illicit drugs, solvents or medicines in the past (table A21a). For those living in the most deprived areas, 2.5% said they were currently misusing illicit drugs, solvents or medicines and 4.1% reported previously misusing these substances (table A23b). Women with mixed ethnicity reported the highest usage when compared to other ethnic groups, with 2.4% of women with mixed ethnicity reporting that they were currently misusing substances and 4.5% that they had a previous history of substance misuse (table A25b). Nearly a third of records (29.5%) were reported as 'unknown' or 'not stated' when looking at data on substance misuse which could mean that the actual numbers of people who misuse substances may be higher than currently reported (table 2).

Antenatal booking within 10 weeks of pregnancy

It is recommended that women have their first appointment before 10 weeks of pregnancy in order to obtain the information they need to have a healthy pregnancy and that tests, such as screening for sickle cell disease and thalassaemia, which are important to be done early, are offered. Booking within 10 completed weeks of pregnancy was analysed by mother's age, ethnicity and deprivation. The detail is shown in appendix 2.6.

Overall 679,095 women had information recorded which allows the calculation of the point in their pregnancy at which they attended their booking appointment, representing 99.9% of all records. Over half of pregnant women (53.9%) attended their booking appointment within 10 weeks, a further 28.7% were seen before 13 weeks, 9.3% were seen between 13 and 20 weeks and 8.1% were seen when they were over 20 weeks of gestational age (table A27).

A higher proportion of pregnant women aged under 25 attended the booking appointment at a later stage than older women, with 20.4% women in this age group attending their appointment when they were over 13 weeks gestation compared to 16.1% of women aged 25 or over (table A27a). This is consistent with existing

knowledge. Women in their mid-twenties and early thirties were more likely than other age groups to book 'in time', with around 55% attending their antenatal booking appointment within 10 completed weeks of becoming pregnant.

Women from deprived areas were more likely to book later than those from the least deprived populations. There is a clear correlation across the deprivation deciles, with 48.9% of women living in the most deprived decile booking after 10 weeks, in comparison with 41.1% of women in the least deprived areas (table A28b).

Black women and those whose ethnicity was recorded as 'other' were most likely to book after 10 weeks, with 61.5% women with black ethnicity and 58.6% women with other ethnicity booking after 10 weeks of pregnancy. Women of mixed, Asian or Chinese ethnicity were least likely to book late, although nearly half of women still did not book within 10 completed weeks of pregnancy (table A29b).

Data for when antenatal care began is well recorded, with fewer than 1% of records missing an antenatal booking appointment date (table 2).

Conclusions on risk factors

Although still in its early stages, the dataset is reaching a point where data was being recorded for the vast majority of women in England using maternity services and it is clear that the MSDS is a valuable new source of information about the health behaviours of and risk factors for pregnant women. It allows analysis of those risk factors which are associated with poorer outcomes and how those risks are distributed across different sub-groups of women.

While data quality is variable, mothers' demographics as well as topics such as smoking and early booking appear reasonably complete and reliable. The large overall size of the dataset means that the data available is still substantial, with any records where information is 'unknown' being reasonably evenly divided across subcategories. There are, however, a few instances where it appears that the recording of data items could be influenced by the mother's demographics. Data is poorly recorded in the following areas compared with the dataset overall:

- smoking status for women living in more deprived areas (13.5% of records for women are 'unknown' which is a significant difference when compared with 11.3% in the most affluent area)
- point of quitting smoking details for women classed as ex-smokers (45% of records are 'unknown')
- BMI status for young women (22.3% of records for those under 18 are 'unknown' which is a significant difference when compared with 18.7% for women aged 40 and over)

- alcohol consumption in general (43.1% of records are 'unknown')
- substance misuse in general (29.5% of records are 'unknown')
- folic acid supplement use in general (34.5% of records are 'unknown')

Despite this, the analysis and presentation of the data supports conclusions which are in line with those from existing literature. It is also consistent with existing datasets (appendix 1).

First and subsequent pregnancies

Comparison of first and subsequent pregnancies gives an insight into whether public health messages are getting through to their target audience and being understood and acted upon when women plan for their first pregnancy or go on to have further children (appendix 3).

Methodology

Comparisons between first and subsequent pregnancies were made by using the fields within the MSDS which showed the number of previous births and miscarriages.

First pregnancy

This is defined as the women booking who have had no previous live birth, stillbirth, termination or miscarriage before 24 weeks. In 2017 there were 186,330 women in this category.

Subsequent pregnancy

This is defined as all women booking in 2017 (644,030) excluding those women identified as having a first pregnancy (186,330) and those for whom the status is not known for the number of live births, stillbirths, terminations or miscarriages before 24 weeks (103,565). More than half of all bookings recorded in 2017 were for a subsequent pregnancy (354,135).

Data for mothers' preparedness for pregnancy was considered by looking at modifiable behavioural factors such as the proportion of women who had given up smoking, whether folic acid supplements were taken and levels of maternal obesity at the time of booking. In addition to this, general background factors such as the age of the mother, deprivation and whether complex social factors were present were also compared.

Data limitations occur when comparing first and subsequent pregnancies as the cohorts are different. In other words, we are not comparing the same women between their pregnancies. There were also 103,565 women for whom it was not possible to determine if this was a booking for a first or subsequent pregnancy due to missing information about gravidity.

Age of mother

A number of comparisons can be made which show differences between those having their first pregnancies and those having subsequent pregnancies. In 2% of mothers, they were recorded as having a subsequent pregnancy before reaching the age of 20 and 7% of first pregnancies were under 20. As would be expected a higher proportion (58%) of women aged 30 and over were booking for a subsequent pregnancy than for a first pregnancy (42%) (table A30a).

Deprivation

When looking at women of all ages, 23% of first pregnancies were to women living in the most deprived quintile, compared to 28% of mothers booking for a subsequent pregnancy. The highest proportions of women living in the most deprived quintiles were seen in the younger mothers aged under 18 (46% first time pregnancies and 48% subsequent pregnancies). The proportions declined steadily as age increased (table A30b).

Complex social factors

Just under 77% of women had data recorded about complex social factors. Of these 12% of women were recorded as having complex social factors. The majority (79%) of women for whom there is data about complex social factors were aged under 20.

As being a teenage mother is considered to be one of the social risk factors, a higher proportion of younger mothers might be expected to be recorded as having complex social factors. This proves to be the case in the data where around 80% of women aged under 20 were classified in this way. Lower proportions of women booking for a first pregnancy had complex social factors than those booking for a subsequent pregnancy. As age increases, however, this position changes and a slightly higher proportion of mothers aged 25 and over were identified as having complex social factors when booking for a subsequent pregnancy compared to a first pregnancy.

These complex social factors will not relate to age (as all are over 20 where the assignment is not automatic) and therefore is made up of women who experience domestic abuse, women who are recent migrants, asylum seekers or refugees, or who have difficulty reading or speaking English or women who misuse substances including alcohol.

Smoking in pregnancy

While giving up smoking is encouraged for all ages, it is particularly important that any woman looking to have a baby quits before getting pregnant. This reduces the chances of a stillbirth or the child dying in infancy (11). Public health messages and smoking

cessation services for the general population play an important role in encouraging women to give up smoking as part of pregnancy planning. Analysis of the data shows that potentially around a fifth of first time mothers (19%) and those booking for a subsequent pregnancy (21%) who smoke take on board this advice and quit smoking before becoming pregnant (table A32a).

As women get older, they were more likely to give up smoking before getting pregnant with 22% of women who smoked aged 35 and over quitting before having either a first or subsequent pregnancy compared to 14% of first time mothers aged under 18 who smoked and 17% of mothers who smoked of the same age booking for a subsequent pregnancy. The proportion of mothers who smoked and who quit before becoming pregnant gradually increased with age for both first time mothers and those booking for a subsequent pregnancy (table A32a).

Further opportunities arise to encourage women to give up smoking through their interactions with health services once they become pregnant. When looking at those who gave up smoking when their pregnancy was confirmed, a higher proportion of first-time mothers who smoked (8%) quit compared to those who smoked at booking for a subsequent pregnancy (6%). Younger women were more likely to stop smoking once their pregnancy was confirmed (16% first pregnancy, 12% subsequent pregnancy). The proportion of women who smoked and who quit once their pregnancy was confirmed decreased as women got older and was between 4% and 5% in those aged 30 and over (table A32a).

Given that pregnancy offers an excellent opportunity for women to receive information about the benefits of quitting smoking and support to do so, these benefits do not always seem to carry forward into subsequent pregnancies, particularly in younger women. Despite the known risks of smoking in pregnancy, more women continued to smoke at the time of booking during a subsequent pregnancy (14% compared to 10% of women with a first pregnancy). The highest proportion of smokers is in the younger age groups, particularly in women aged under 18 (31% of women with first pregnancies and 39% with subsequent pregnancies were smoking at the time of booking in this age group). The percentage of women who continued to smoke at the time of booking decreased with age, declining to 4% of first time mothers and 8% of subsequent pregnancies for those women aged 35 and over (table A32a). While some women give up smoking because of pregnancy, the data suggests that for others, particularly younger women, smoking in pregnancy can become entrenched.

Folic acid

As is the case for a first pregnancy, the majority of women were not taking the recommended daily 400µg folic acid supplement in preparation for pregnancy when having subsequent children. More women booking for a first pregnancy (30%) reported

that they took a folic acid supplement in preparation for their pregnancy than when booking for a subsequent pregnancy (26%). The proportion of women taking a folic acid supplement in preparation for pregnancy increased with age for both first time and subsequent pregnancies.

Mothers aged 30 and above reported they took a folic acid supplement before they became pregnant, with over 40% of women in their first pregnancies and around 30% of women in their subsequent pregnancies reporting that they had taken folic acid supplements in preparation for pregnancy.

Women aged 20 and over were more likely (10%) to not have taken a folic acid supplement in preparation for a subsequent pregnancy than a first pregnancy (6%). However, mothers aged under 20 were more likely to have taken a folic acid supplement before a subsequent pregnancy (10% than a first pregnancy (7%) (table A31a).

While the reasons need further investigation, it appears that women are less likely to be taking folic acid supplements at the time they conceive a subsequent child than when conceiving their first (7% of first time mothers compared to 10% of mothers booking for a successive pregnancy did not take folic acid supplements). This was particularly common in younger women, with the highest percentage of women who did not take folic acid supplements seen in mothers aged under 25 (13.7% first pregnancy, 18.2% subsequent pregnancy) and nearly a quarter (24% first pregnancy, 25% subsequent pregnancy) of those aged under 18 were not taking it (table A31a).

Obesity

Planning for pregnancy is beneficial to make sure that a woman is as healthy as possible before conceiving. This includes considering weight status, as being a healthy weight will not only improve a woman's long-term health but improve the likelihood of healthy outcomes for her and her baby in pregnancy and early life. The data shows that 18% of women were obese at the time of booking for their first pregnancy compared to a subsequent pregnancy, when levels of obesity rise to 23%. There is an increase in levels of obesity across all age groups when comparing first and subsequent pregnancies. However, the largest difference (7%) is observed for women aged between 25 and 34 with 18% of women booking for a first pregnancy compared to 25% booking for a subsequent pregnancy being obese. (table A30b).

The highest percentages of obese women were seen in the age groups 20 to 24 and those aged 40 or over. A fifth of first time mothers (20%) and around a quarter (25%) of women booking for a subsequent pregnancy aged 20 to 24 were obese. The highest proportions of women who were obese were seen in women aged 40 or over (21% first pregnancy, 26% subsequent pregnancy) (table A30b).

Conclusions on first and subsequent pregnancies

A higher proportion of women aged 25 and over booking for a subsequent pregnancy had complex social factors not attributable to age than women booking for their first pregnancy.

Despite the known risks of smoking in pregnancy some women continue to smoke, with higher proportions of women smoking at the time of booking for a subsequent pregnancy than for a first pregnancy, particularly in the younger age groups. A greater proportion of women reported they were taking a folic acid supplement in preparation for their first pregnancy than for a subsequent pregnancy. Around a quarter of women aged under 20 did not take a folic acid supplement for their subsequent pregnancy. 23% women booking for a subsequent pregnancy were obese compared to 18% booking for the first time. This suggests that further work by health visitors, maternity staff and public health specialists might be valuable to ascertain and address the reasons why some women are becoming more obese between pregnancies and why some of the younger women do not take folic acid supplements and others continue to smoke.

The health of all women

Methodology

Comparisons were made between data from the 2017 MSDS, the Health Survey for England (HSE) and Office for National Statistics (ONS) to see how the health status and health behaviours of pregnant women compared to the general female population of childbearing age. It should be noted that in the HSE height and weight measurements were not taken for women who said they were pregnant so that the comparison for maternal obesity is to the non-pregnant female population. For smoking the comparison to HSE is the whole female population of the same age group. Particular attention was paid to how smoking status and BMI status compared. To ensure that data was comparable 'females aged 16 to 44' were used in all datasets and 3 years of data (2014, 2015 and 2016) were used for the HSE to increase the sample size (appendix 4). Percentages were calculated based on those with a known smoking or BMI status for women who were smokers and women who were obese.

Characteristics of the datasets

The characteristics can be viewed in table A33a. The HSE and ONS data had a more even population spread across the age groups with a higher percentage of women aged 16 to 19 and 40 to 44. The MSDS had a higher percentage of women aged 25 to 29 (28.8%) and 30 to 34 (31.4%) which would be expected as this is the most likely age range in which women have children.

When comparing by quintile of deprivation (based on residence), there were lower proportions of women living in the most affluent quintile (14.3%) and similar proportions of women residing in the second highest deprivation quintile (22.3%) when compared to ONS (22.8%). Both MSDS and HSE had higher proportions of women in the most deprived quintile than ONS (26.0% or higher compared to 23.1%).

A higher proportion of women in the MSDS had an unknown ethnicity (14.3% compared to 0.2%) or classified their ethnicity as 'other' (3.5% compared to 1.4%) and the MSDS contained a lower proportion of women with white ethnicity when compared to the HSE dataset (65.9% compared to 81.7%).

MSDS and HSE both contained similar proportions of non-smokers but the balance between women with an unknown smoking status and women who smoked was very different. This may indicate that there could be a high proportion of women with an unknown smoking status in the MSDS who were actually smokers. The introduction of

carbon monoxide testing at the booking appointment will enable more accurate recording of smoking status in pregnancy.

When looking at the BMI of the women, a similar pattern is apparent in both datasets with 37.8% of women aged 16 to 44 being a healthy weight, 22.3% overweight and 17.5% obese. Both MSDS and HSE will be using height and weight measurements which are more objective than some of the self-reported measures.

Women who were smokers

The proportion of pregnant women aged 16 to 44 who reported that they were smokers at the time of booking in the MSDS was 11.2%, considerably lower than 20.3% within the general female population for this age group. The MSDS, however, had a higher proportion of women for whom an 'unknown' smoking status was reported compared to the HSE (12.2% compared to 1.2%), but a similar level of non-smokers was seen in both datasets. Due to these data quality issues, it is not possible to say whether any true differences exist in the numbers of women aged 16 to 44 who smoke as it is possible that a large proportion of women in this 'unknown' smoking status category were actually smokers.

A higher proportion of women aged 16 to 19 smoked while pregnant according to the MSDS (32.7%) when compared to the general population of women of the same age reported in the HSE (14.1%) (table A36a). When looking at the distribution across quintiles of deprivation a lower proportion of pregnant women in all quintiles were smokers when compared to the general population of women of the same age. However, when looking at quintile of deprivation and age together, pregnant women aged 16 to 19 are more likely to smoke when compared to the general female population of this age living in equally deprived areas. Lower than average proportions of pregnant women aged 30 and older were smokers compared to the general female population, regardless of where they lived (table A37b).

When looking at the ethnic group of the women, lower proportions were seen in all ethnic groups (table A38a). The numbers in each ethnic group became too small within the HSE data to be able to compare smokers in each ethnic group by age or deprivation.

Women who were obese

The proportion of pregnant women aged 16 to 44 who were obese at the time of booking was 17.5%. This is similar to the general non-pregnant female population (18.6%). Higher proportions of pregnant women aged under 25 were obese (16.3% aged 16 to 19 and 23.5% aged 20 to 24) when compared to the general non-pregnant female population (11.9% aged 16 to 19 and 17.8% aged 20 to 24), but a lower

proportion of pregnant women aged 30 to 34 were obese when compared to the general non-pregnant female population of the same age (20.2% compared to 24.4%) (figure A39a). When looking at the distribution by deprivation, similar patterns exist across all levels of deprivation when compared to the general non-pregnant female population in these areas (table A40a).

When considering ethnic group of women, a smaller proportion of pregnant women from black ethnic groups (33.7% compared to 43.3%) were obese compared to the general non-pregnant female population. There were no other significant differences between other ethnic groups (table A41a).

Conclusions on comparison to health of all women

The MSDS and the HSE data showed that the proportions of women who smoked and the proportion who were obese increased as levels of deprivation increased. There were some notable differences in the proportion of women who smoked and those who were obese. A higher proportion of pregnant women aged 16 to 19 smoked when compared to the same age group within the general population. The proportion of women who were obese was greater in pregnant women aged under 25 than in the non-pregnant female population for the same age group. As the data in MSDS is only supplied in aggregate format there were limitations to the level of analysis possible and therefore only simple analyses were carried out which could have missed some important differences. Once the record level data is made available, a more sophisticated multivariate analysis based on a larger sample of HSE data could be used to look in more detail at how the datasets compare.

Care should be taken when comparing these 2 datasets as sample sizes were substantially different. This can be seen by the large 95% confidence limits on the HSE data. There was also data missing within the MSDS. The percentage of women with no smoking status recorded in the MSDS was 12.2% and 18.7% of records had missing BMI information. This may cause under-representation within the MSDS for the proportion of women who smoked and for the proportion of women who were obese, potentially leading to misinterpretation.

Next steps

This information can be used by commissioners and local service leaders to investigate these risk factors in the [Health of women before and during pregnancy: demographic and risk factor investigation tool](#) published alongside this report. This allows commissioners and other decision makers to improve their understanding of the demographics and risk factors of women using maternity services in their area, and analyse and address variation between providers. It will also highlight local data quality issues which can be raised and addressed directly.

In conjunction with the [Making the case for preconception report](#), both the national inequalities report and data in the [tool](#) can be used to identify local needs for the population in the preconception phase in a local area (where 'preconception' relates to the health of women or couples of reproductive age before pregnancy).

The MSDS data will continue to be monitored and analysed, with national and subnational indicators of maternal health developed as this becomes possible. This analysis of inequalities will be updated once more when data quality has improved in order to begin to monitor changes to maternal health behaviours and risk factors. Data from the MSDS will increasingly be used, as appropriate, to inform national policy.

Glossary

Antenatal	Before birth; during or relating to pregnancy.
Body mass index	Body mass index (BMI) is a weight-for-height index that is commonly used to classify weight status in adults. It is defined as a person's weight in kilograms divided by the square of their height in metres (kg/m^2). If a person's BMI is below $18.5\text{kg}/\text{m}^2$ they are classified as underweight; between $18.5\text{kg}/\text{m}^2$ and $24.9\text{kg}/\text{m}^2$ they are classified as a healthy weight; between $25\text{kg}/\text{m}^2$ and $29.9\text{kg}/\text{m}^2$ they are classified as being overweight, those with a BMI of $30\text{kg}/\text{m}^2$ and above are classified as obese and those with a BMI of $40\text{kg}/\text{m}^2$ are classified as severe obese.
Booking appointment	The first official antenatal appointment where contact with a midwife is made. It is recommended that this is within the first 10 weeks of pregnancy but can be later depending on when a woman makes contact with health services.
Complex social factors	These include women aged under 20, women who experience domestic abuse, women who are recent migrants, asylum seekers or refugees, or who have difficulty reading or speaking English or women who misuse substances including alcohol.
Deprivation decile	Deprivation deciles are based on the Index of Multiple Deprivation 2015 (IMD15), which is the official measure of relative deprivation. Decile one represents the most deprived and decile 10 represents the least deprived. Those people living in the most deprived decile are, therefore, living in the most deprived 10% of the population.
Deprivation quintile	When looking at inequalities, the population is sometimes divided into 5 'quintiles.' Those people living in the most deprived quintile are, therefore, living in the most deprived 20% of the population.
Episode of care	Describes the various interactions between a patient and health services related to the same condition or health problem. Different outpatient appointments, A&E attendances and inpatient stays can all related to one 'episode of care' where a patient's underlying health issue is the same.

Gestation	The length of time the woman has been pregnant and is initially calculated from the first day of last menstrual period, sometimes it is amended following the dating scan
Gravidity	The number of times a female is or has been pregnant
Health behaviour	Healthy behaviours include: a healthy diet, regular physical activity and promoting emotional wellbeing, taking folic acid supplements, as well as ensuring immunisations, sexual health checks and smear tests are up to date.
Maternity	Describes a service for pregnant women, both while they are pregnant and when giving birth. It can also be used to describe the episode of care related to a woman's pregnancy. In such instances it can appear as the plural 'maternities.'
Maternity Services Data Set (MSDS)	A patient-level data set that captures key information at each stage of the maternity care pathway including mother's demographics, booking appointments, admissions and re-admissions, screening tests, labour and delivery along with baby's demographics, admissions, diagnoses and screening tests.
Risk factor	A health behaviour which is harmful to health eg smoking, drinking, substance and alcohol misuse, being overweight.

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Appendix 1: data comparisons

Comparison of the number of MSDS booking records to other data sources

Figure A1: All maternity booking appointments in 2017 (MSDS), compared to conceptions, health visitor antenatal contacts, hospital deliveries and maternities

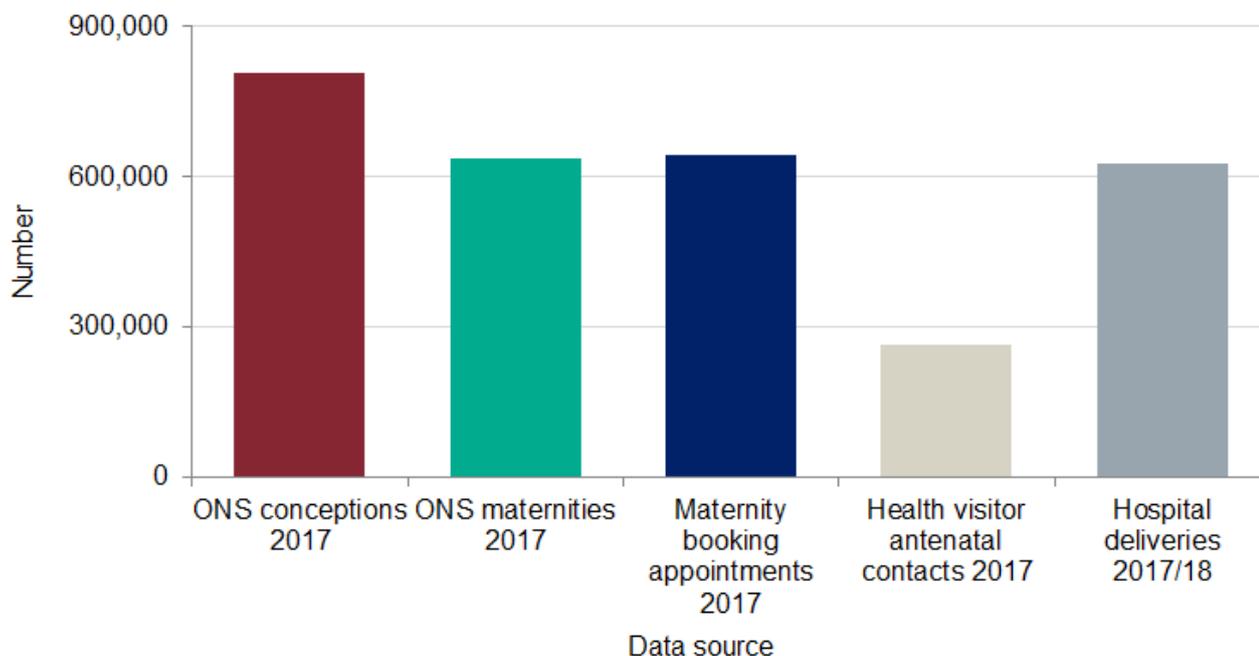


Table A1: All maternity booking appointments in 2017, compared to conceptions, health visitor antenatal contacts, hospital deliveries and maternities

Data source	Number of women
ONS conceptions January to December 2017	807,245
ONS maternities January to December 2017	638,629
NHS Digital maternity booking appointments January to December 2017 From the Maternity Services Data Set (MSDS)	644,030
Health visitor antenatal contacts (PHE) January to December 2017	266,074
NHS Digital hospital deliveries (HES) April 2017 to March 2018	626,203

Figure A1 and Table A1 show the booking appointments from the MSDS compared with ONS data showing conceptions and maternities, health visitor antenatal appointments, and data from Hospital Episode Statistics showing number of women giving birth (deliveries). There are known limitations with these comparisons:

1. All are measuring different events; this will be discussed further below.
2. The data in the MSDS in 2017 is likely to be an improvement on any older data and therefore the assumption has been made that using the latest full year from MSDS (rather than trying to align the periods to other data sources) is likely to provide the best basis for comparison.
3. Figures from the Maternity Services Dataset are rounded to the nearest 5 in the tool used to extract them. This may result in fluctuations from actual when these are added together to report on groups.
4. There are slight differences in the geographical application of each data source; ONS conceptions and ONS maternities apply to residents of England. The maternity booking appointments and hospital deliveries data relate to providers of services in England but may include (and exclude) residents just outside or inside the English border.

For the purposes of assessing the suitability of the MSDS for examining health inequalities in women at the start of their pregnancy, the limitations above are not considered critical.

Figure A1 and Table A1 show that according to ONS, there were around 807,000 conceptions in 2017, and about 640,000 maternities (pregnancies that resulted in a birth). While these 2 cannot be directly compared within one calendar year, the figures are broadly consistent with the fact that around 23% of conceptions end in termination of pregnancy (20).

There were about 644,000 booking appointment records for 2017 within the MSDS. As of the December MSDS monthly report², 122 maternity providers of an estimated 132 successfully submitted booking appointment information to the MSDS. This equates to about 92%. We can conclude that providers who were submitting, were recording the majority of the booking appointments in the system.

A woman's engagement with maternity services enables a referral to be made to the local health visiting service so they can offer an antenatal face-to-face visit in the home. It seems that less than half of pregnancies are receiving an antenatal visit, and there is therefore a missed opportunity to provide support and health promotion advice to parents before the baby is born.

² www.content.digital.nhs.uk/catalogue/PUB23944

The number of deliveries is then slightly lower than the number of original pregnancies (just under 95%). Some pregnancies will result in later pregnancy loss or termination, and as described earlier, the 2 numbers are not drawn from the same period and are therefore not directly comparable. The number of deliveries therefore seems highly accurate in comparison with pregnancies.

Comparison of the distribution of MSDS booking records across inequality factors to other data sources

Figure A2: Maternity booking appointments in 2017, compared to conceptions, hospital deliveries (2017/18) and maternities, by age of mother

Note: age categories are not mutually exclusive but relate to available data groupings – missing bars do not represent missing data

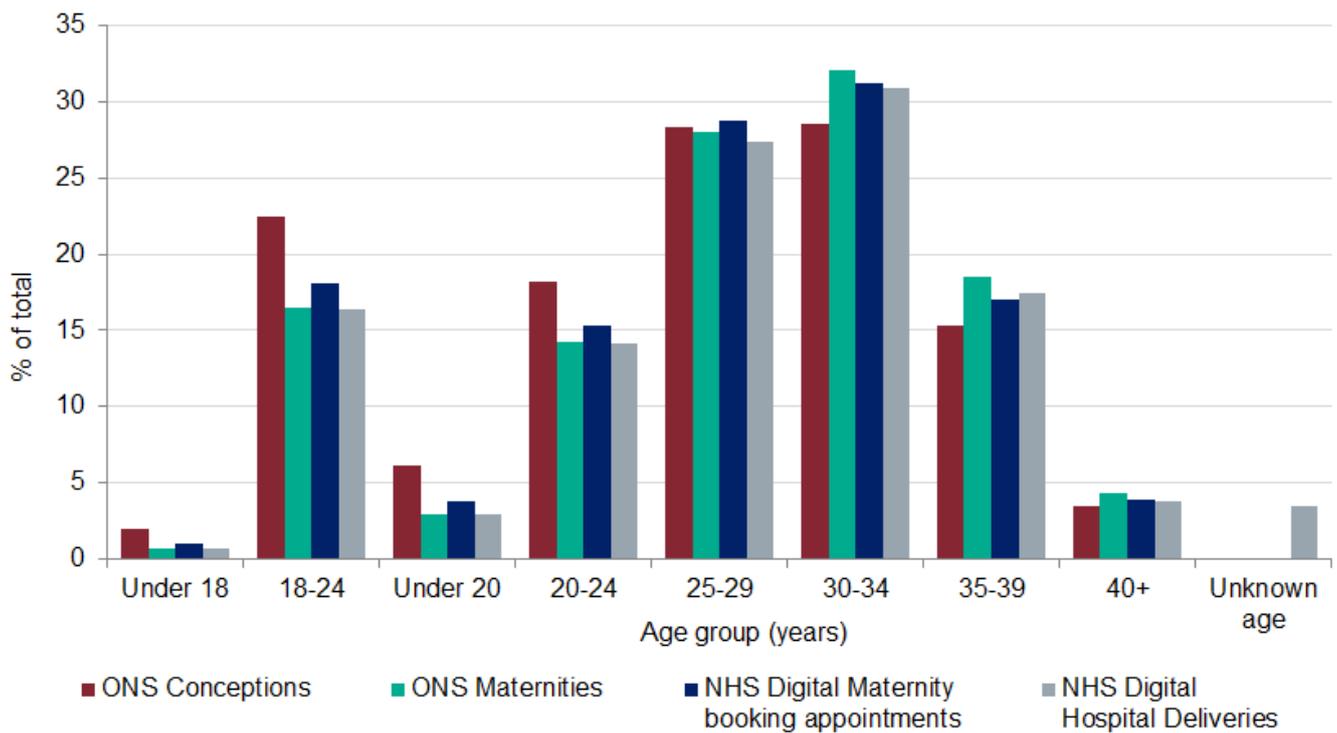


Table A2: All maternity booking appointments in 2017, compared to conceptions, hospital deliveries (2017/18) and maternities, by age of mother

Note: age categories are not mutually exclusive

Age	ONS conceptions	%	ONS maternities	%	NHS Digital maternity booking appointments (MSDS)	%	NHS Digital hospital deliveries (HES)	%
Under 18	15,748	2.0	4,452	0.7	6,645	1.0	4,278	0.7
18 to 24	180,997	22.4	105,518	16.5	117,810	18.1	102,786	16.4
Under 20	49,864	6.2	18,901	3.0	25,045	3.8	18,532	3.0
20 to 24	146,881	18.2	91,069	14.3	99,410	15.3	88,516	14.1
25 to 29	228,259	28.3	178,525	28.0	187,065	28.7	171,154	27.3
30 to 34	230,538	28.6	204,398	32.0	203,595	31.3	193,243	30.9
35 to 39	123,826	15.3	118,177	18.5	110,785	17.0	109,210	17.4
40+	27,785	3.4	27,559	4.3	25,480	3.9	24,062	3.8
Unknown	N/A	N/A	N/A	N/A	60	0.0	21,470	3.4

Figure A2 and Table A2 show booking appointments from MSDS compared with conceptions, pregnancies and deliveries as before, all split by age with the proportion of the total in each age band shown (so for example 28.0% of all ONS maternities were to women aged 25 to 29).

Publications varied in how they grouped the ages into age bands and therefore all the available options are shown. Where a bar is not shown for an age band it indicates this split was not available for that data source (and should not be interpreted as zero). This data is subject to the same limitations described above; however, comparisons of proportions (rather than counts) by age band will help to reduce the effects of different magnitudes, with specifics described below.

overall, the 'age profile' of each data source look visually similar to one another, with proportionately more conceptions than booking appointments in the younger age bands (and correspondingly lower in the older age groups), and this reflects the higher rates of termination of pregnancy in younger age groups. In comparison with the deliveries data source, the proportion of records with unknown age in the MSDS was low (the maternity booking appointment is the point at which the mother's demographic and socio-economic details are usually collected and recorded, so this is as expected).

As data from the MSDS shows a similar age profile to other, well-established data sources, and as the number of records where the mother's age is unknown is low,

maternal age in the MSDS is therefore suitable to be used as a demographic factor for further analysis of health inequalities using the MSDS.

The woman’s postcode allows the small administrative area in which she lives (lower layer super output area (LSOA)) to be assigned. Each has a deprivation score based on the **Indices of Multiple Deprivation for England 2015**. This allows LSOAs to be divided into 10, based on their relative scores, and assigned to a decile.

Figure A3: All maternity booking appointments in 2017, compared to hospital deliveries (2017/18) by decile of deprivation of the area in which the mother lives

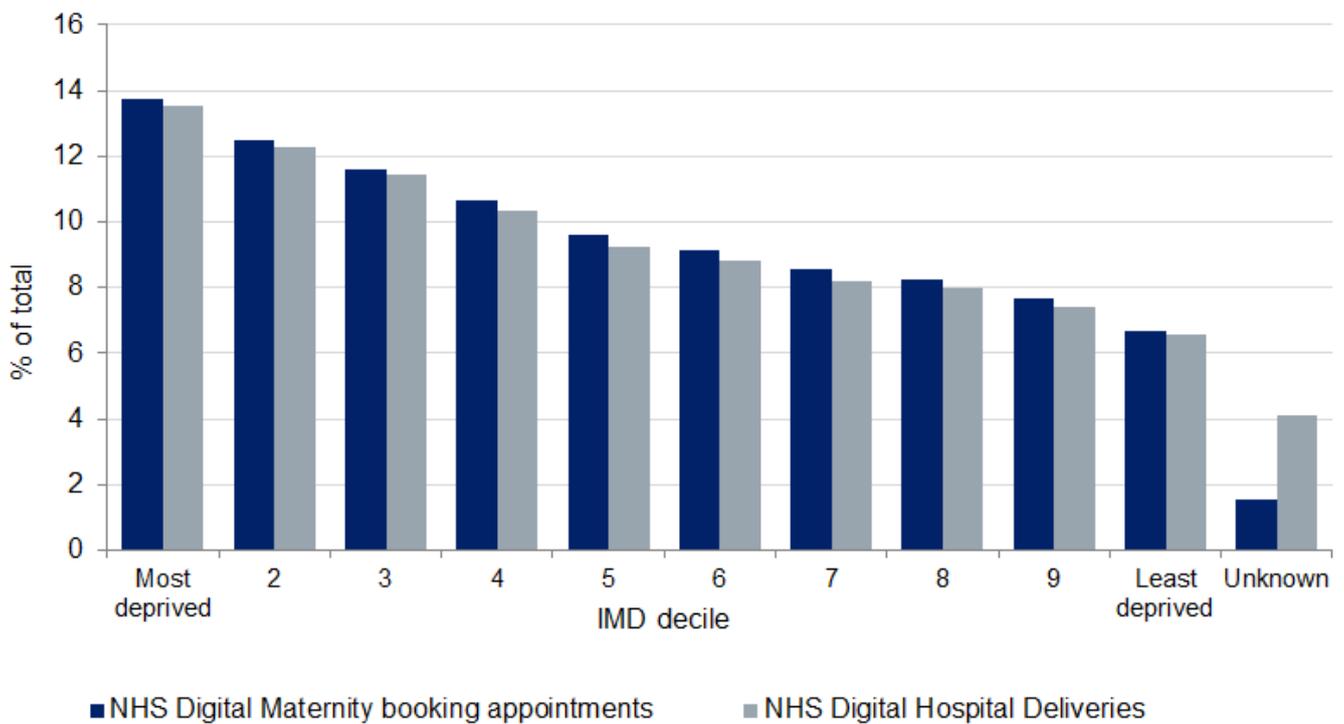


Table A3: All maternity booking appointments in 2017, compared to hospital deliveries (2017/18) by decile of deprivation of the area in which the mother lives

	NHS Digital Maternity booking appointments (MSDS)	%	NHS Digital Hospital Deliveries (HES)	%
Most deprived	90,030	13.7	84,662	13.5
2	81,870	12.5	77,002	12.3
3	76,045	11.6	71,514	11.4
4	69,910	10.7	64,789	10.3
5	63,045	9.6	57,986	9.3
6	60,030	9.2	55,246	8.8
7	55,955	8.5	51,418	8.2
8	54,120	8.3	49,959	8.0
9	50,145	7.7	46,564	7.4
Least deprived	43,670	6.7	41,168	6.6
Unknown	10,250	1.6	25,895	4.1

Figure A3 and Table A3 show booking appointments from MSDS compared with hospital deliveries as before, all split by deprivation decile with the proportion of the total in each deprivation decile. Information about deprivation is not available for other data sources.

The 'deprivation profile' of the 2 data sources are visually similar to one another, with proportionately more booking appointments than deliveries for women living in the most deprived areas of the country. The biggest difference is in the 'unknowns' (which would include women whose postcode is unknown), with the MSDS having far fewer unknowns than the hospital data. Again, this is likely to be due to the structure and purpose of the booking appointment, which is to record the mother's information, including residence.

Deprivation decile in the MSDS is therefore suitable to be used as a demographic factor for further analysis of health inequalities using the MSDS.

Figure A4: All maternity booking appointments in 2017, compared to hospital deliveries (2017/18) by mother's ethnicity

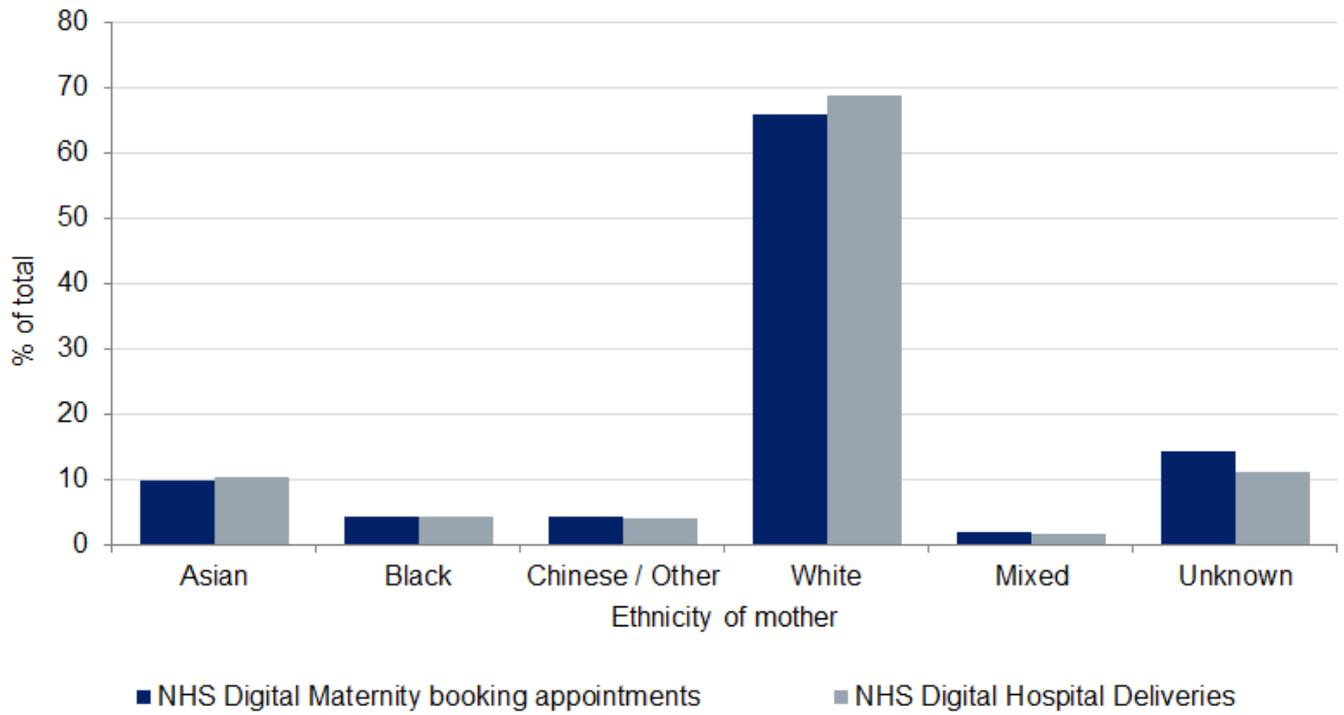


Table A4: All maternity booking appointments in 2017, compared to hospital deliveries (2017/18) by mother's ethnicity

	NHS Digital Maternity booking appointments (MSDS)	%	NHS Digital Hospital Deliveries (HES)	%
Asian	64,805	9.8	63,648	10.2
Black	27,835	4.2	27,279	4.4
Chinese / Other	27,345	4.1	25,354	4.0
White	436,120	65.9	430,626	68.8
Mixed	11,635	1.8	10,531	1.7
Unknown	94,485	14.3	68,765	11.0

Figure A4 and Table A4 show booking appointments from MSDS compared with hospital deliveries as before, all split by ethnicity with the proportion of the total in each group. Information about ethnicity is not available from other data sources.

The ethnicity profiles of the 2 data sources are visually similar to one another, other than the proportionately fewer booking appointments than deliveries for white women. In this instance there are proportionately more 'unknown' values in the MSDS than in the deliveries data (this category includes 'not stated'), and it seems likely, based on the similarity to the hospital deliveries that these mostly relate to people whose ethnicity is white. Ethnicity is therefore suitable for use as a demographic factor for further analysis of health inequalities using the MSDS, with caution around interpretation of the group of women whose ethnicity is identified as white.

Appendix 2: detailed analysis

Appendix 2.1: Smoking

Table A5. Smoking status at booking

	Number with known smoking status	Number with unknown smoking status	% where smoking status known	% of all women (known plus unknown)
Mother's self-reported smoking status at the booking appointment	586,695	81,425		87.8
Never smoked	333,430		56.8	49.9
Stopped prior to pregnancy	139,465		23.8	20.9
Stopped once pregnant	39,285		6.7	5.9
Current smoker	74,515		12.7	11.2

Figure A5a: Smoking status at booking by age of mother, maternity booking appointments January to December 2017

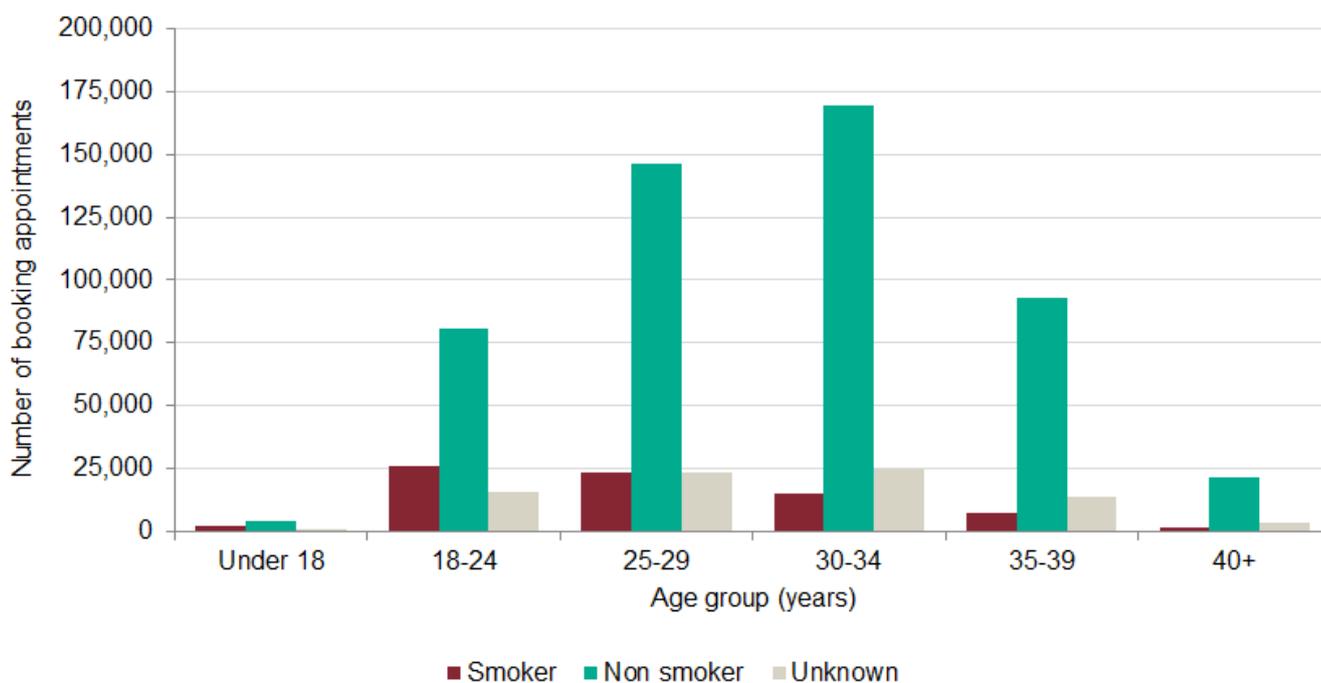


Table A5a: Smoking status at booking by age of mother, maternity booking appointments January to December 2017

Age	Smoker	Non-smoker	Unknown
Under 18	1,975	3,960	900
18 to 24	25,905	80,495	15,315
25 to 29	23,120	146,310	23,535
30 to 34	15,210	169,650	24,765
35 to 39	7,110	93,145	13,630
40+	1,600	21,195	3,325

Figure A5b: Known smoking status at booking by age of mother, maternity booking appointments January to December 2017 (smoking status by proportion of total in age range)

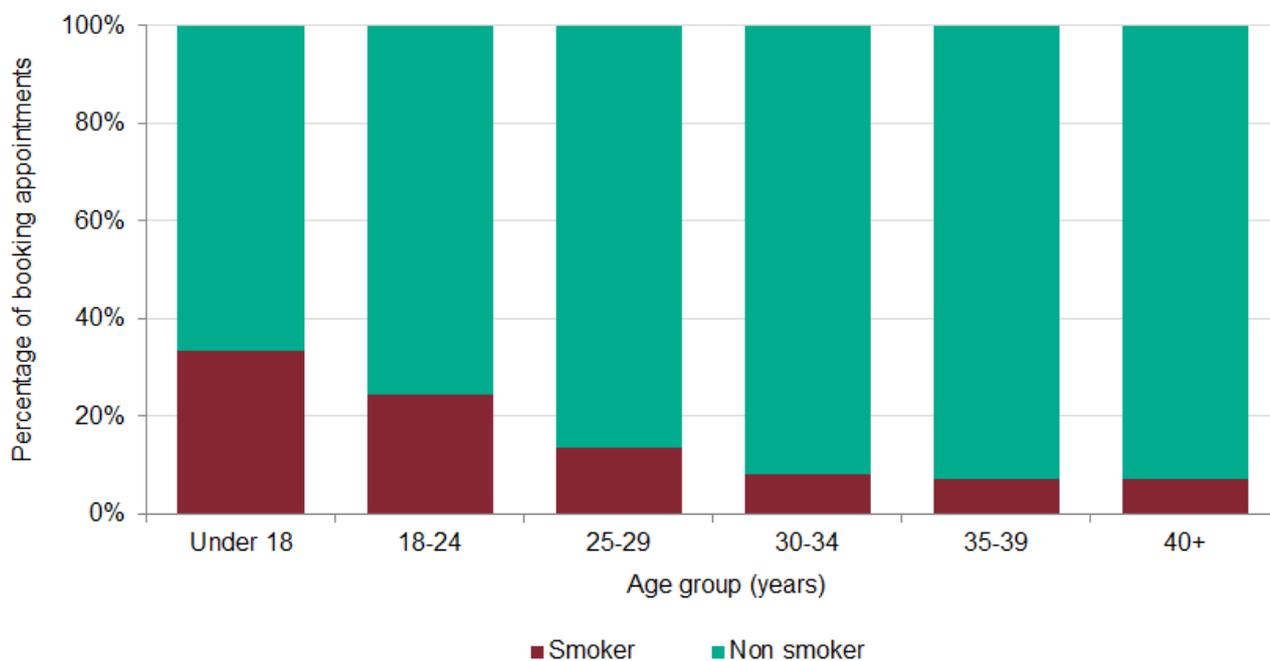


Table A5b: Known smoking status at booking by age of mother, maternity booking appointments January to December 2017 (smoking status by proportion of total in age range)

Age	Smoker	Non-smoker	All known smoking status
Under 18	33.3%	66.7%	100%
18 to 24	24.3%	75.7%	100%
25 to 29	13.6%	86.4%	100%
30 to 34	8.2%	91.8%	100%
35 to 39	7.1%	92.9%	100%
40+	7.0%	93.0%	100%

Figure A6a: Known smokers at start of pregnancy by age of mother, maternity booking appointments January to December 2017

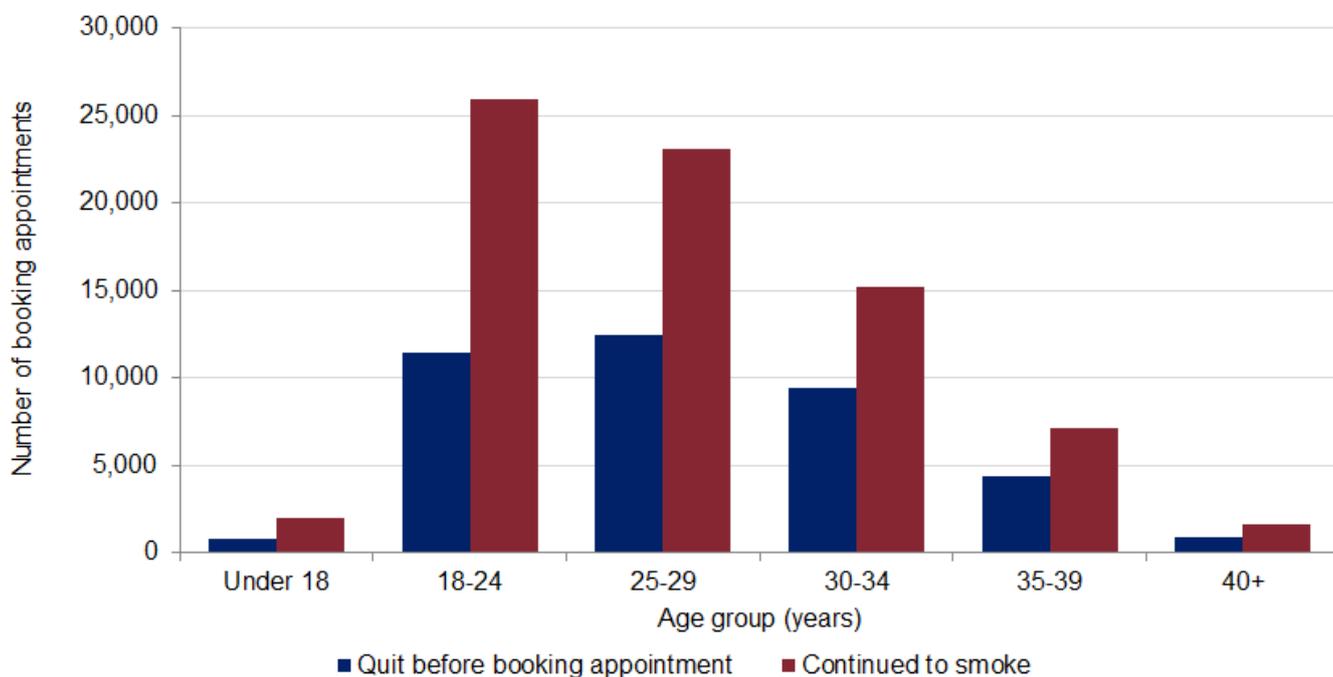


Table A6a: Known smokers at start of pregnancy by age of mother, maternity booking appointments January to December 2017

Age	Quit before booking appointment	Continued to smoke
Under 18	810	1,975
18 to 24	11,395	25,905
25 to 29	12,460	23,120
30 to 34	9,425	15,210
35 to 39	4,400	7,110
40+	860	1,600

Figure A6b: Known smokers at start of pregnancy by age of mother, maternity booking appointments January to December 2017 (smoking continuation status by proportion of total in age range)

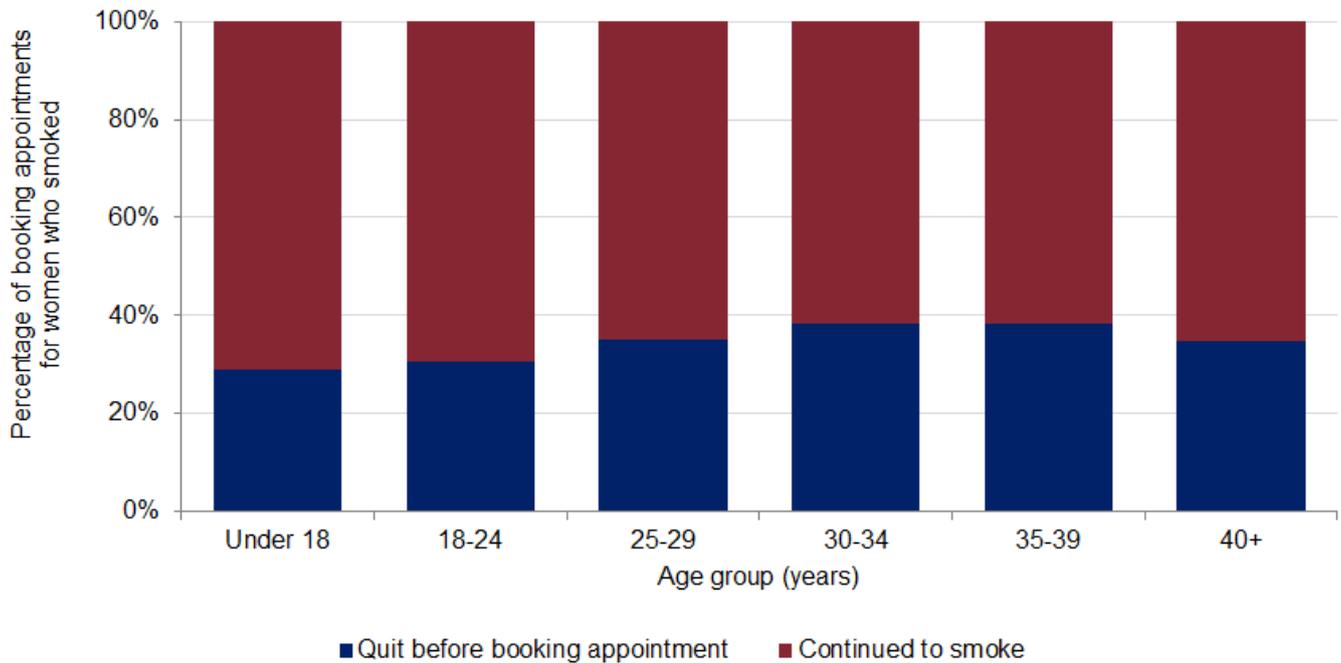


Table A6b: Known smokers at start of pregnancy by age of mother, maternity booking appointments January to December 2017 (smoking continuation status by proportion of total in age range)

Age	Quit before booking appointment	Continued to smoke	All known quitting status
Under 18	29.1%	70.9%	100%
18 to 24	30.5%	69.5%	100%
25 to 29	35.0%	65.0%	100%
30 to 34	38.3%	61.7%	100%
35 to 39	38.2%	61.8%	100%
40+	35.0%	65.0%	100%

Figure A7a: Ex-smokers at booking by age of mother, maternity booking appointments January to December 2017

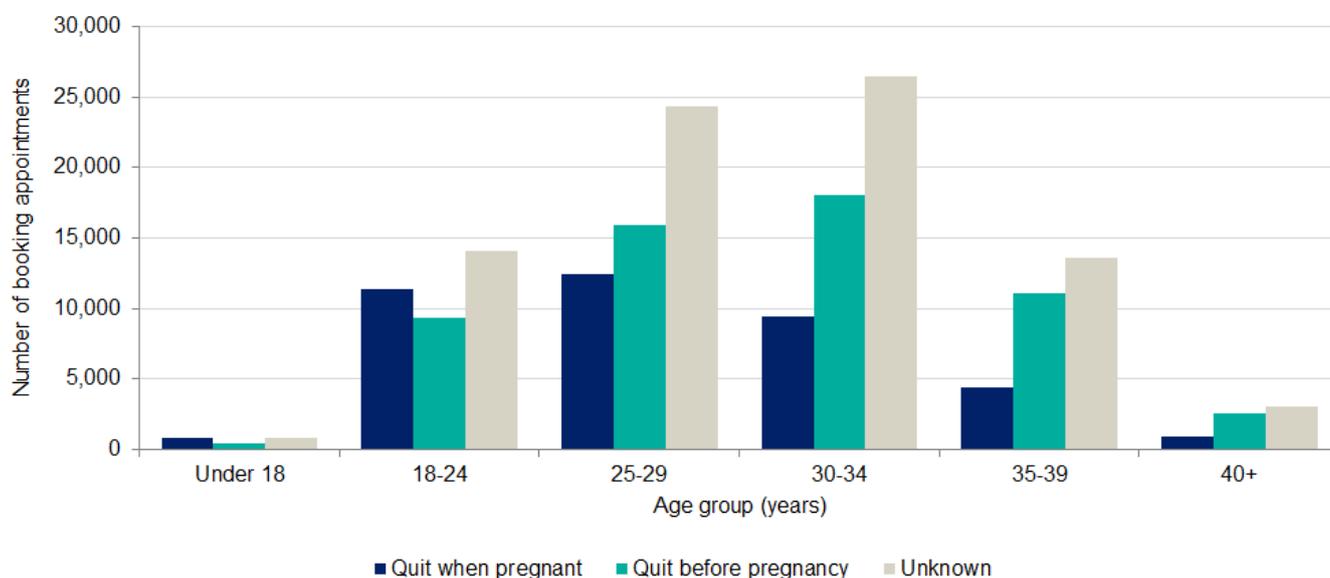


Table A7a: Ex-smokers at booking by age of mother, maternity booking appointments January to December 2017

Age	Quit when pregnant	Quit before pregnancy	Unknown
Under 18	810	395	760
18 to 24	11,395	9,330	14,035
25 to 29	12,460	15,885	24,340
30 to 34	9,425	18,075	26,500
35 to 39	4,400	11,060	13,630
40+	860	2,575	3,020

Figure A7b: Ex-smokers at booking by age of mother, maternity booking appointments January to December 2017 (point of quitting by proportion of total in age range)

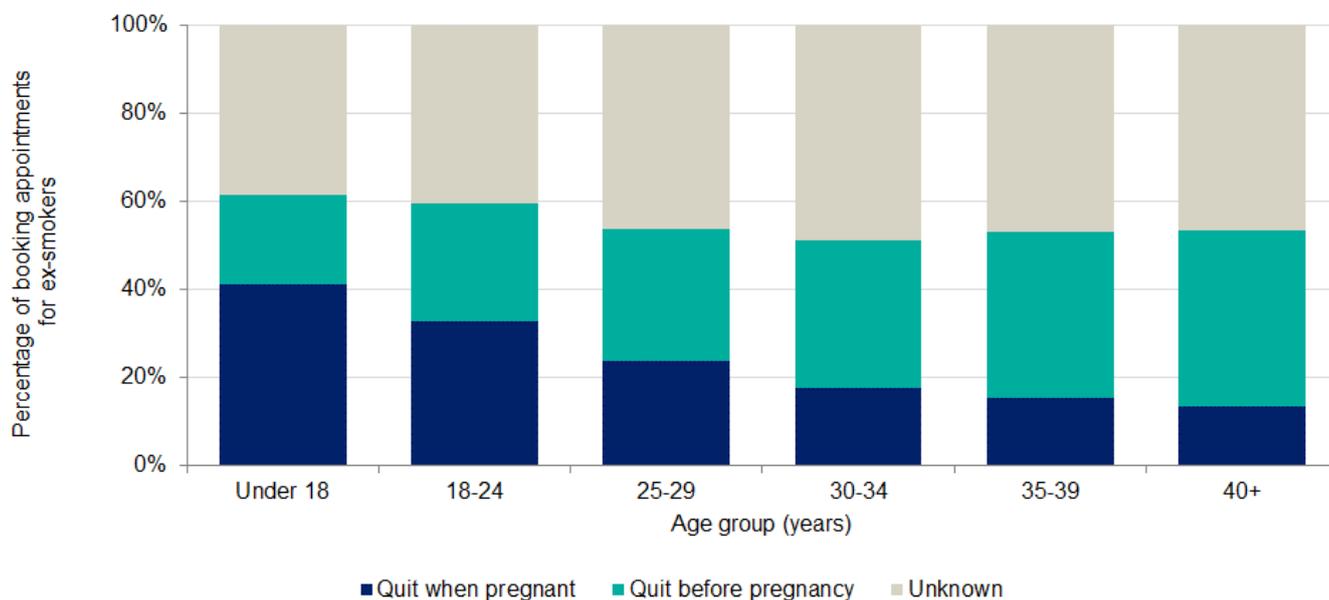


Table A7b: Ex-smokers at booking appointment by age of mother, maternity booking appointments January to December 2017 (point of quitting by proportion of total in age range)

Age	Quit when pregnant	Quit before pregnancy	Unknown	All smoking status
Under 18	41.2%	20.1%	38.7%	100%
18 to 24	32.8%	26.8%	40.4%	100%
25 to 29	23.6%	30.2%	46.2%	100%
30 to 34	17.5%	33.5%	49.1%	100%
35 to 39	15.1%	38.0%	46.9%	100%
40+	13.3%	39.9%	46.8%	100%

Figure A8a: Smoking status at booking by decile of deprivation of mother’s residence, maternity booking appointments January to December 2017

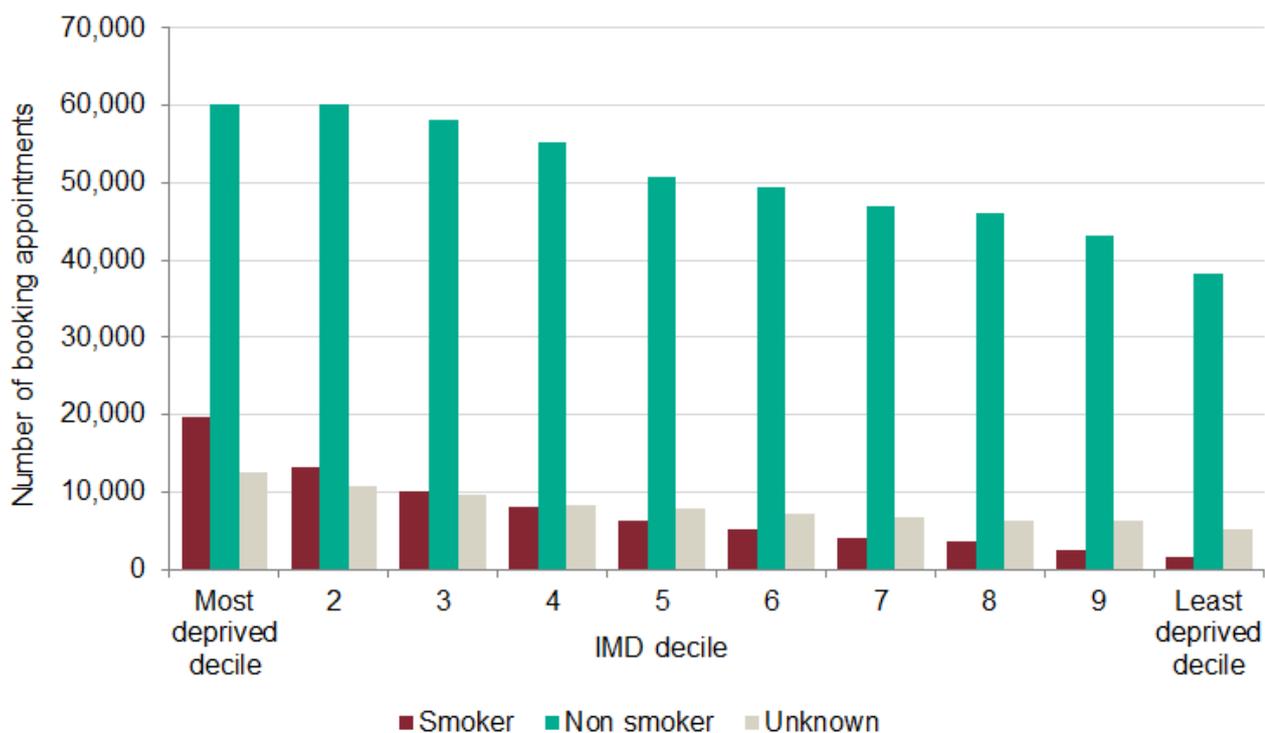


Table A8a Smoking status at booking by decile of deprivation of mother’s residence, maternity booking appointments January to December 2017

Deprivation decile	Smoker	Non-smoker	Unknown
Most deprived	19,685	60,140	12,455
2	13,140	60,085	10,775
3	10,185	58,120	9,730
4	8,110	55,310	8,310
5	6,340	50,690	7,750
6	5,165	49,400	7,275
7	4,050	46,910	6,705
8	3,595	45,965	6,250
9	2,565	43,085	6,315
Least deprived	1,660	38,350	5,095

Figure A8b: Known smoking status at booking by decile of deprivation of mother’s residence, maternity booking appointments January to December 2017 (smoking status by proportion of total in decile)

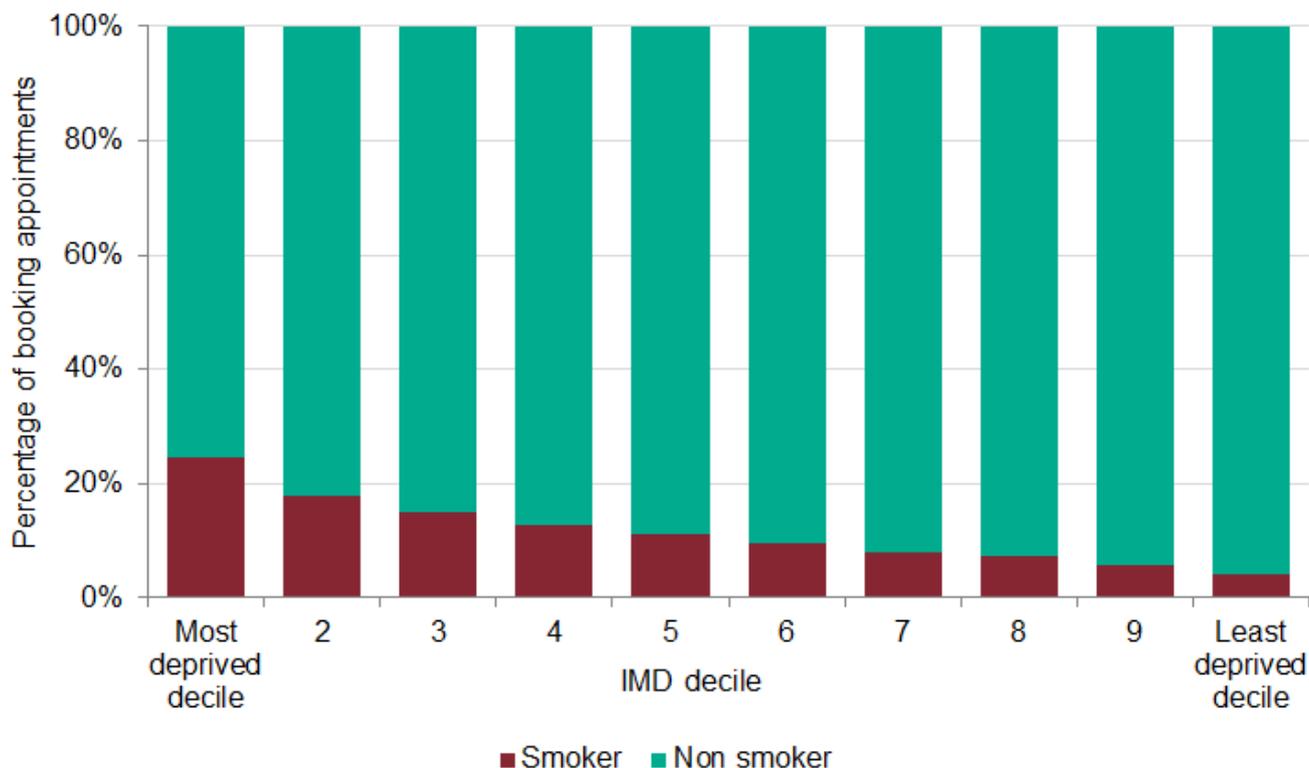


Table A8b: Known smoking status at booking by decile of deprivation of mother’s residence, maternity booking appointments January to December 2017 (smoking status by proportion of total in decile)

Deprivation decile	Smoker	Non-smoker	All known smoking status
Most deprived	24.7%	75.3%	100%
2	17.9%	82.1%	100%
3	14.9%	85.1%	100%
4	12.8%	87.2%	100%
5	11.1%	88.9%	100%
6	9.5%	90.5%	100%
7	7.9%	92.1%	100%
8	7.3%	92.7%	100%
9	5.6%	94.4%	100%
Least deprived	4.1%	95.9%	100%

Figure A9a: Known smokers at start of pregnancy by decile of deprivation of mother's residence, maternity booking appointments January to December 2017

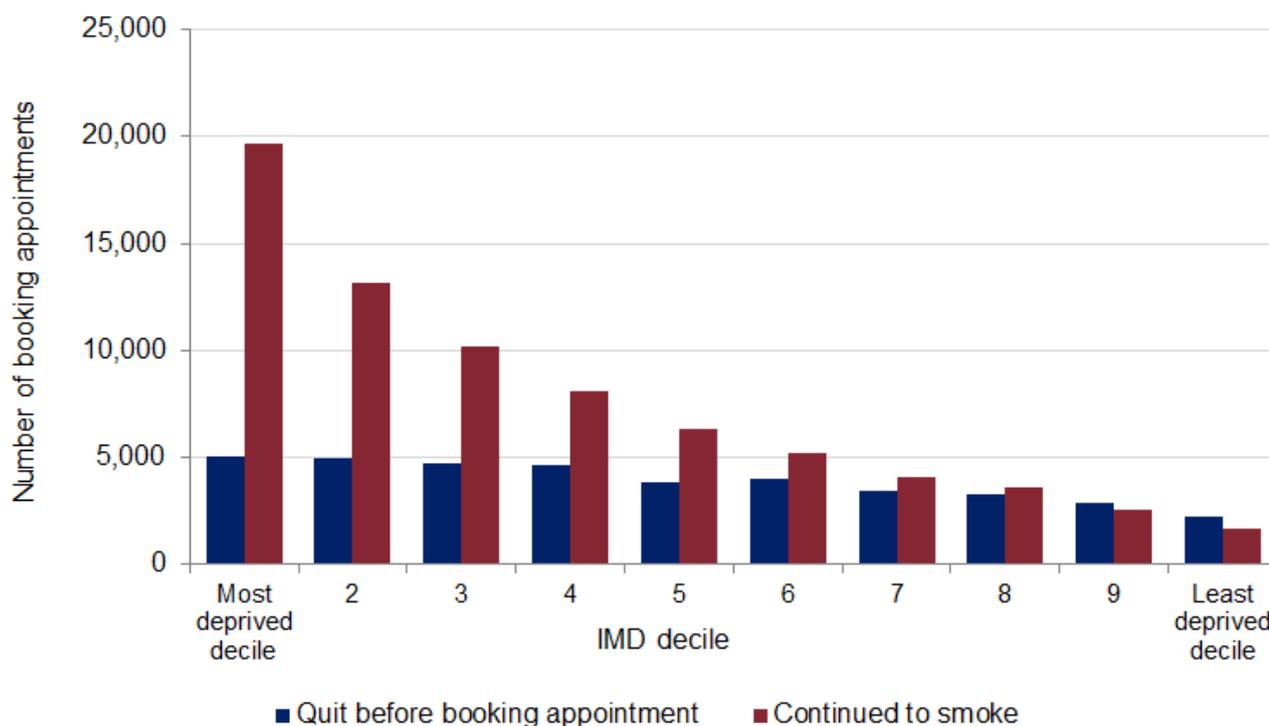


Table A9a: Known smokers at start of pregnancy by decile of deprivation of mother's residence, maternity booking appointments January to December 2017

Age	Quit before booking appointment	Continued to smoke
Most deprived	5,035	19,685
2	4,985	13,140
3	4,675	10,185
4	4,610	8,110
5	3,810	6,340
6	3,970	5,165
7	3,405	4,050
8	3,255	3,595
9	2,845	2,565
Least deprived	2,210	1,660

Figure A9b: Known smokers at start of pregnancy by decile of deprivation of mother's residence, maternity booking appointments January to December 2017 (smoking continuation status by proportion of total in decile)

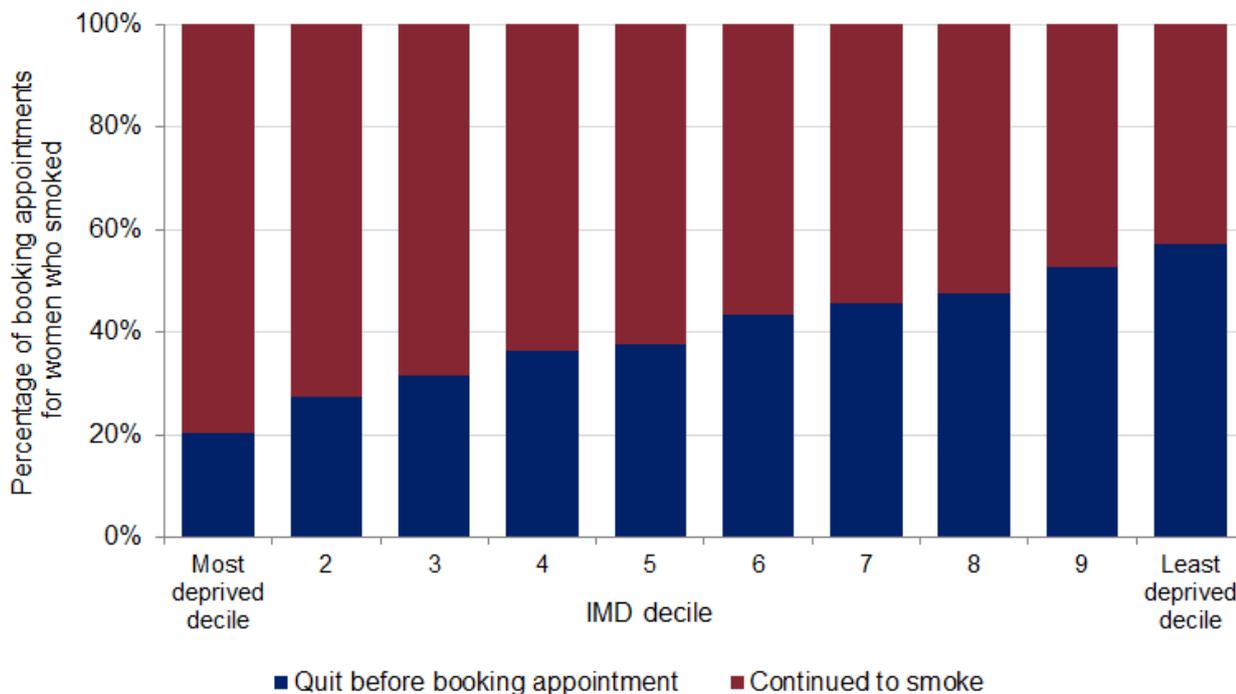


Table A9b: Known smokers at start of pregnancy by decile of deprivation of mother's residence, maternity booking appointments January to December 2017 (smoking continuation status by proportion of total in decile)

Age	Quit before booking appointment	Continued to smoke	All quitting status
Most deprived	20.4%	79.6%	100%
2	27.5%	72.5%	100%
3	31.5%	68.5%	100%
4	36.2%	63.8%	100%
5	37.5%	62.5%	100%
6	43.5%	56.5%	100%
7	45.7%	54.3%	100%
8	47.5%	52.5%	100%
9	52.6%	47.4%	100%
Least deprived	57.1%	42.9%	100%

Figure A10a: Ex-smokers at booking by decile of deprivation of mother’s residence, maternity booking appointments January to December 2017

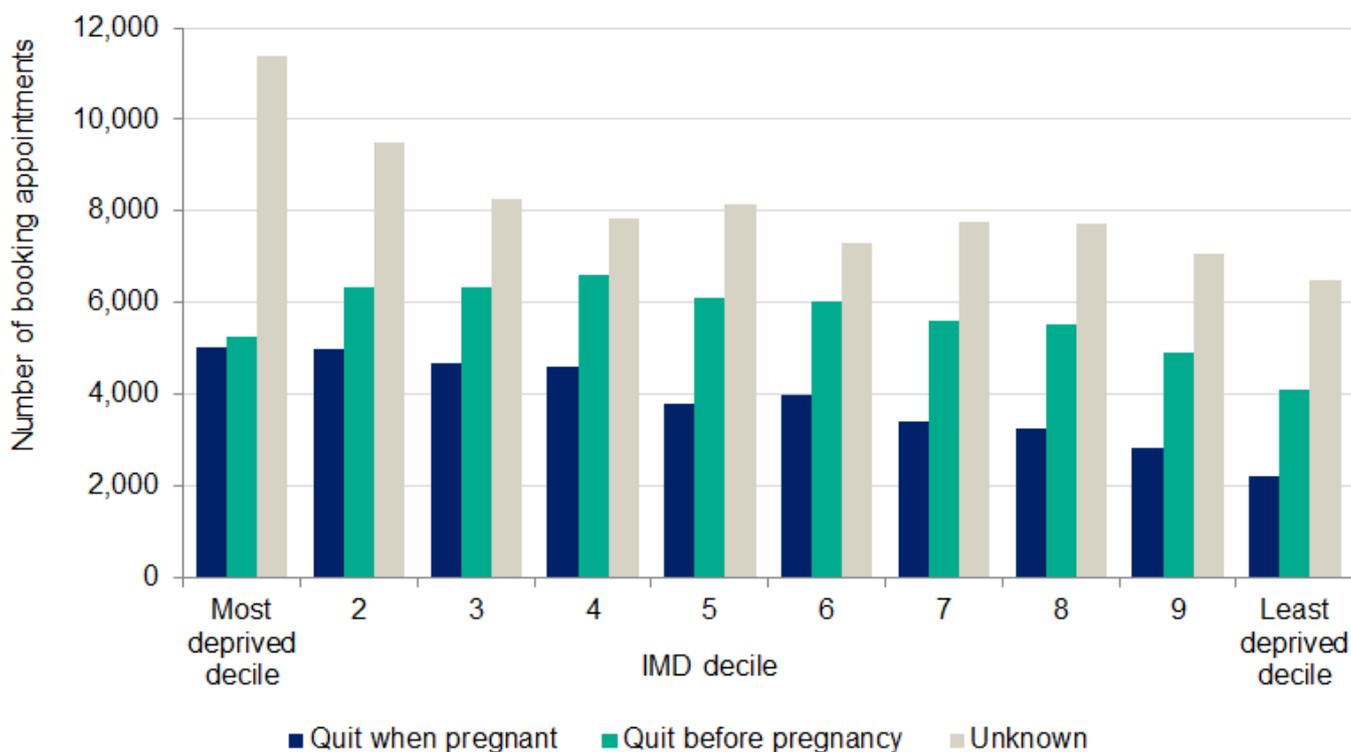


Table A10a: Ex-smokers at booking by decile of deprivation of mother’s residence, maternity booking appointments January to December 2017

Deprivation decile	Quit when pregnant	Quit before pregnancy	Unknown
Most deprived	5,035	5,260	11,385
2	4,985	6,325	9,490
3	4,675	6,345	8,265
4	4,610	6,610	7,850
5	3,810	6,095	8,130
6	3,970	6,040	7,310
7	3,405	5,595	7,780
8	3,255	5,510	7,715
9	2,845	4,915	7,060
Least deprived	2,210	4,120	6,485

Figure A10b: Ex-smokers at booking by decile of deprivation of mother’s residence, maternity booking appointments January to December 2017 (point of quitting by proportion of total in decile)

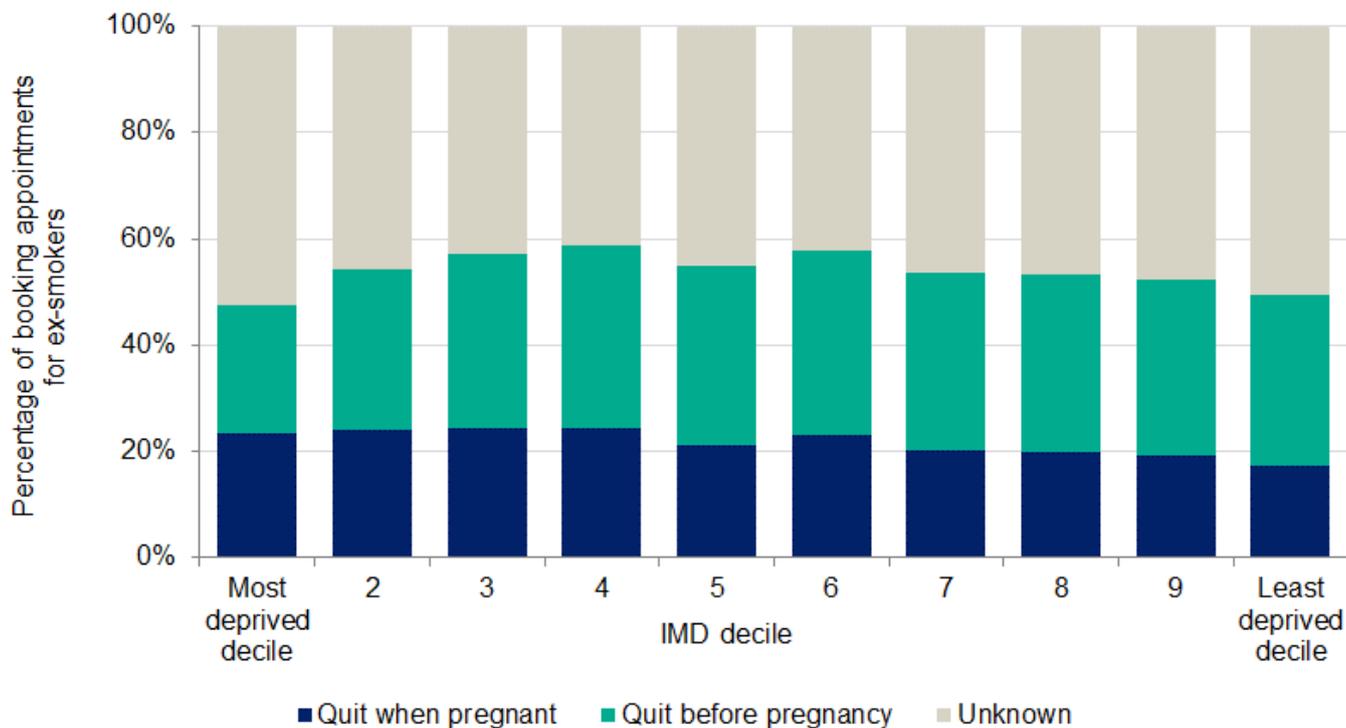


Table A10b: Ex-smokers at booking by decile of deprivation of mother’s residence, maternity booking appointments January to December 2017 (point of quitting by proportion of total in decile)

Deprivation decile	Quit when pregnant	Quit before pregnancy	Unknown	All ex-smoking status
Most deprived	23.2%	24.3%	52.5%	100%
2	24.0%	30.4%	45.6%	100%
3	24.2%	32.9%	42.9%	100%
4	24.2%	34.7%	41.2%	100%
5	21.1%	33.8%	45.1%	100%
6	22.9%	34.9%	42.2%	100%
7	20.3%	33.3%	46.4%	100%
8	19.8%	33.4%	46.8%	100%
9	19.2%	33.2%	47.6%	100%
Least deprived	17.2%	32.1%	50.6%	100%

Figure A11a: Smoking status at booking by ethnicity of mother (excluding White for ease of interpretation), maternity booking appointments January to December 2017

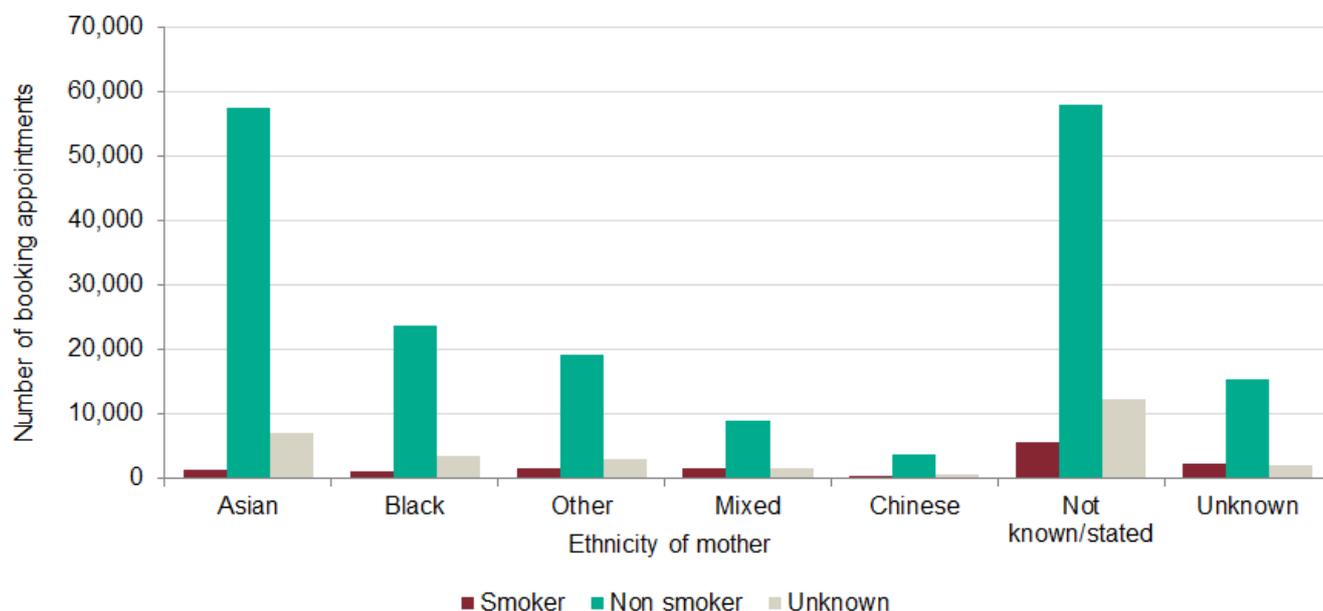


Table A11a: Smoking status at booking by ethnicity of mother, maternity booking appointments January to December 2017

Ethnicity	Smoker	Non-smoker	Unknown
Asian	1,180	57,545	6,940
Black	1,025	23,690	3,470
Other	1,445	19,205	2,825
Mixed	1,435	8,910	1,375
Chinese	50	3,540	455
Not known/stated	5,555	57,910	12,315
Unknown	2,155	15,260	1,855
White ¹	62,730	332,545	52,495

¹ not shown on chart

Figure A11b: Known smoking status at booking by ethnicity of mother, maternity booking appointments January to December 2017 (smoking status by proportion of total in ethnic group)

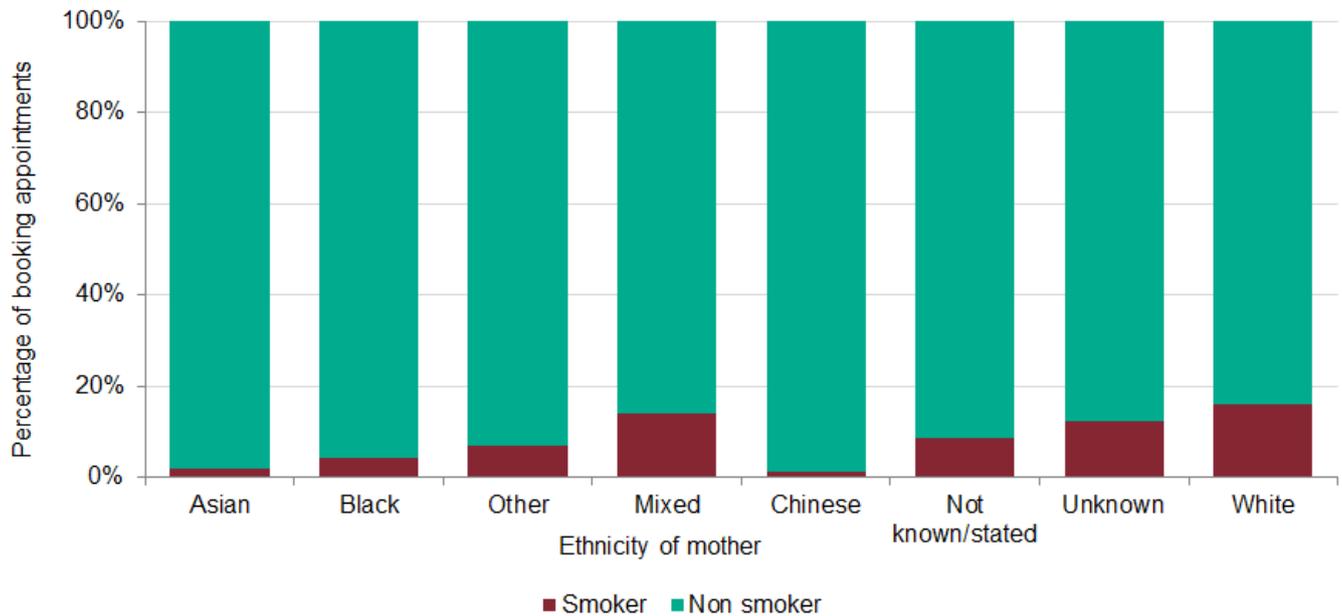


Table A11b: Known smoking status at booking by ethnicity of mother, maternity booking appointments January to December 2017 (smoking status by proportion of total in ethnic group)

Ethnicity	Smoker	Non-smoker	All known smoking status
Asian	2.0%	98.0%	100%
Black	4.1%	95.9%	100%
Other	7.0%	93.0%	100%
Mixed	13.9%	86.1%	100%
Chinese	1.4%	98.6%	100%
Not known/stated	8.8%	91.2%	100%
Unknown	12.4%	87.6%	100%
White	15.9%	84.1%	100%

Figure A12a: Known smokers at start of pregnancy by ethnicity of mother (excluding White for ease of interpretation), maternity booking appointments January to December 2017

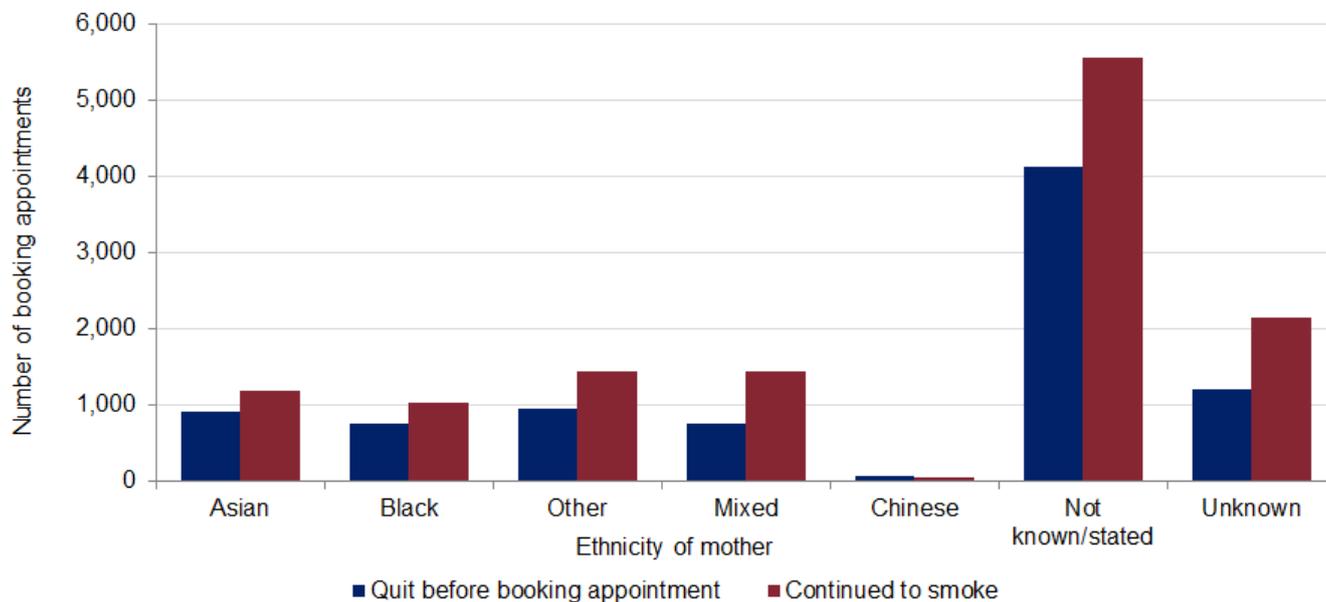


Table A12a: Known smokers at start of pregnancy by ethnicity of mother, maternity booking appointments January to December 2017

Ethnicity	Quit before booking appointment	Continued to smoke
Asian	915	1,180
Black	760	1,025
Other	955	1,445
Mixed	760	1,435
Chinese	70	50
Not known/stated	4,115	5,555
Unknown	1,215	2,155
White ¹	30,705	62,730

¹ not shown on chart

Figure A12b: Known smokers at start of pregnancy by ethnicity of mother, maternity booking appointments January to December 2017 (smoking continuation status by proportion of total in ethnic group)

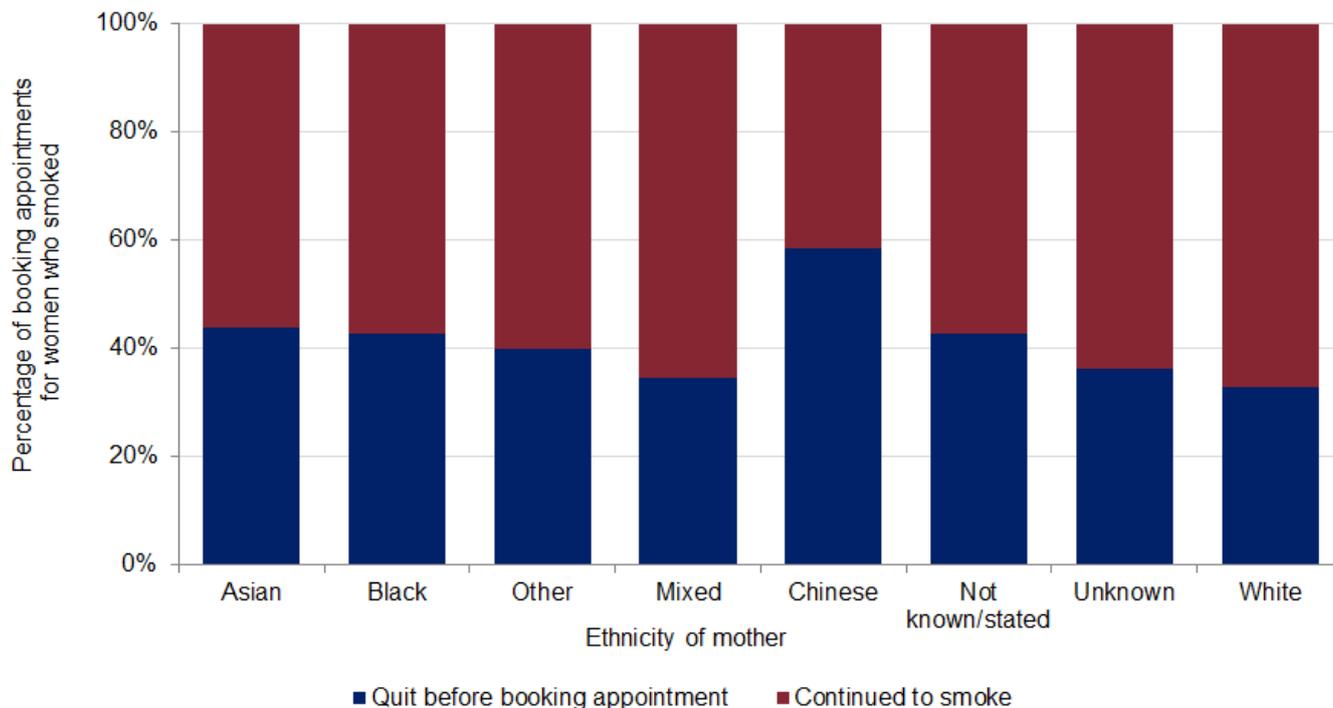


Table A12b: Known smokers at start of pregnancy by ethnicity of mother, maternity booking appointments January to December 2017 (smoking continuation status by proportion of total in ethnic group)

Ethnicity	Quit before booking appointment	Continued to smoke	All quitting status
Asian	43.7%	56.3%	100%
Black	42.6%	57.4%	100%
Other	39.8%	60.2%	100%
Mixed	34.6%	65.4%	100%
Chinese	58.3%	41.7%	100%
Not known/stated	42.6%	57.4%	100%
Unknown	36.1%	63.9%	100%
White	32.9%	67.1%	100%

Figure A13a: Ex-smokers at booking by ethnicity of mother (excluding White for ease of interpretation), maternity booking appointments January to December 2017

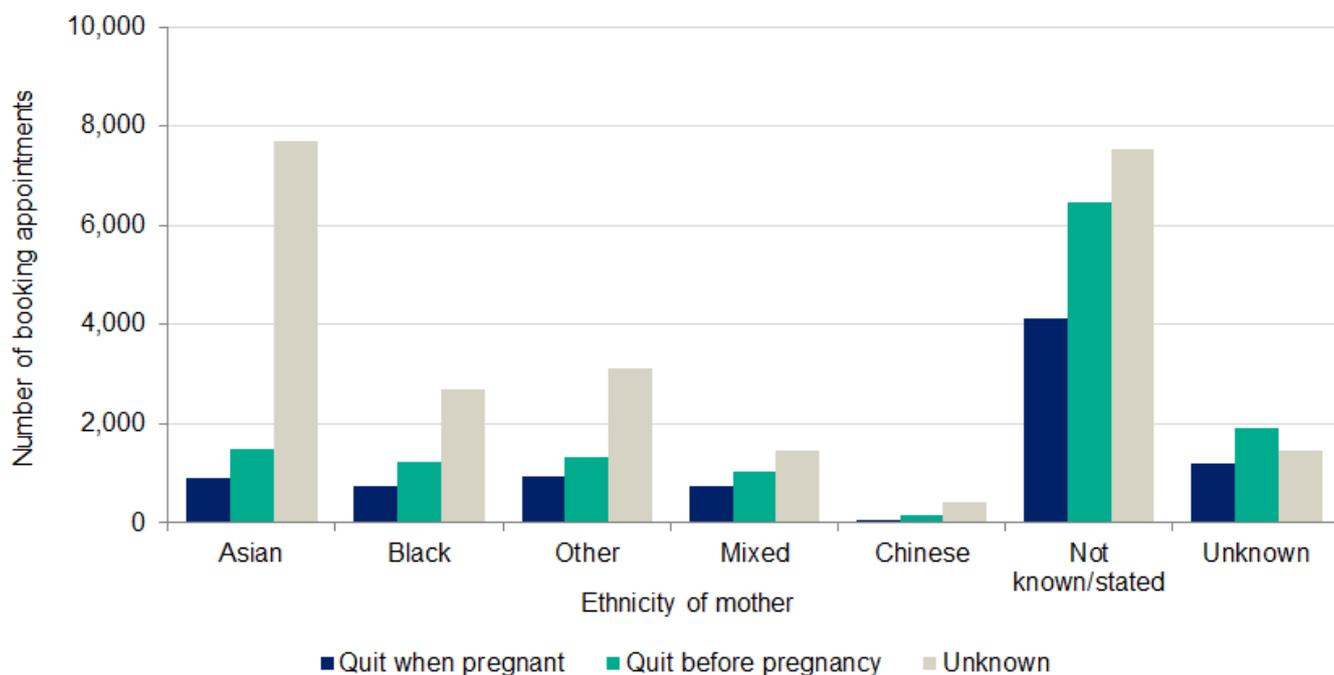


Table A13a: Ex-smokers at booking by ethnicity of mother, maternity booking appointments January to December 2017

Ethnicity	Quit when pregnant	Quit before pregnancy	Unknown
Asian	915	1,495	7,700
Black	760	1,240	2,690
Other	955	1,325	3,130
Mixed	760	1,040	1,450
Chinese	70	175	435
Not known/stated	4,115	6,450	7,540
Unknown	1,215	1,905	1,460
White ¹	30,705	43,880	58,055

¹ not shown on chart

Figure A13b: Ex-smokers at booking by age of mother, maternity booking appointments January to December 2017 (point of quitting by proportion of total in ethnic group)

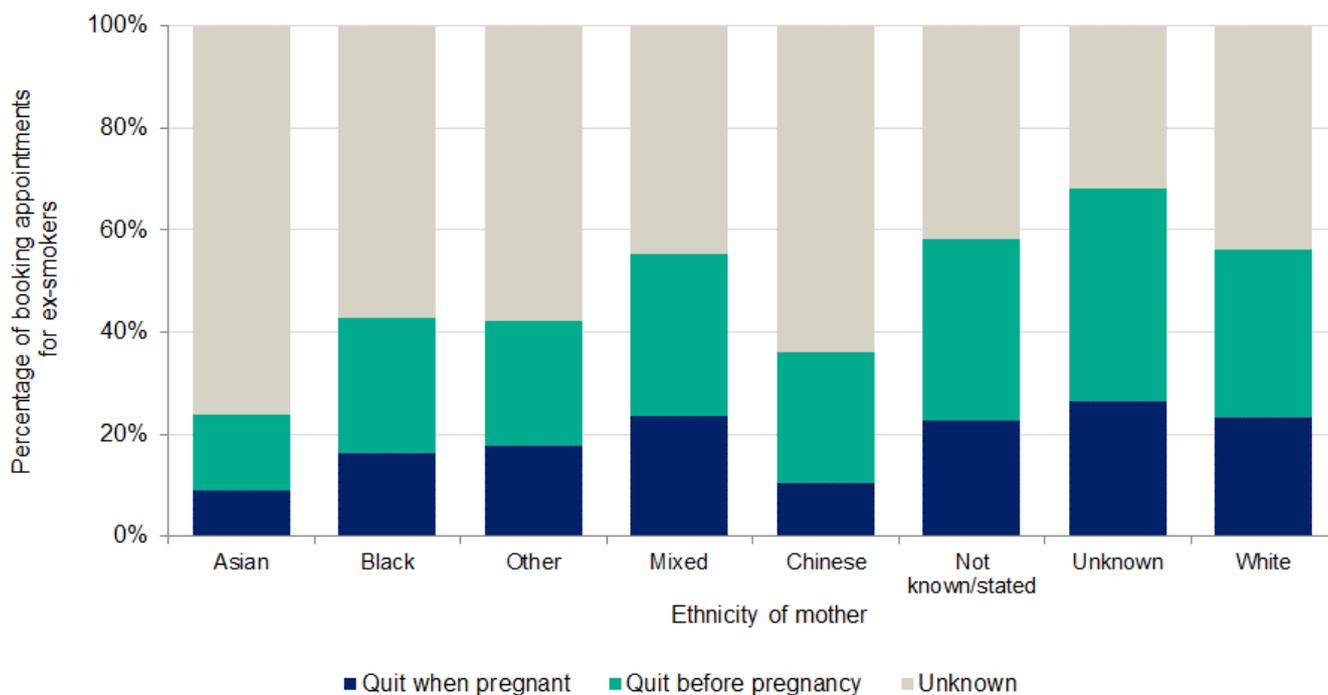


Table A13b: Ex-smokers at booking appointment by ethnicity of mother, maternity booking appointments January to December 2017 (point of quitting by proportion of total in ethnic group)

Ethnicity	Quit when pregnant	Quit before pregnancy	Unknown	All ex-smoking status
Asian	9.1%	14.8%	76.2%	100%
Black	16.2%	26.4%	57.4%	100%
Other	17.7%	24.5%	57.9%	100%
Mixed	23.4%	32.0%	44.6%	100%
Chinese	10.3%	25.7%	64.0%	100%
Not known/stated	22.7%	35.6%	41.6%	100%
Unknown	26.5%	41.6%	31.9%	100%
White	23.1%	33.1%	43.8%	100%

Appendix 2.2: Folic acid

Table A14. Folic acid supplement use at booking

	Number with known folic acid supplement use	Number with unknown folic acid supplement use	% where folic acid supplement use is known	% of all women (known plus unknown)
Whether the woman has been taking folic acid supplements, as identified at first contact or booking appointment	440,445	231,800		65.5
Has been taking prior to becoming pregnant	124,060		28.2	18.5
Started taking once pregnancy confirmed	276,925		62.9	41.2
Not taking folic acid supplement	39,460		9.0	5.9

Figure A14a: Folic acid supplement use at booking by age of mother, maternity booking appointments January to December 2017

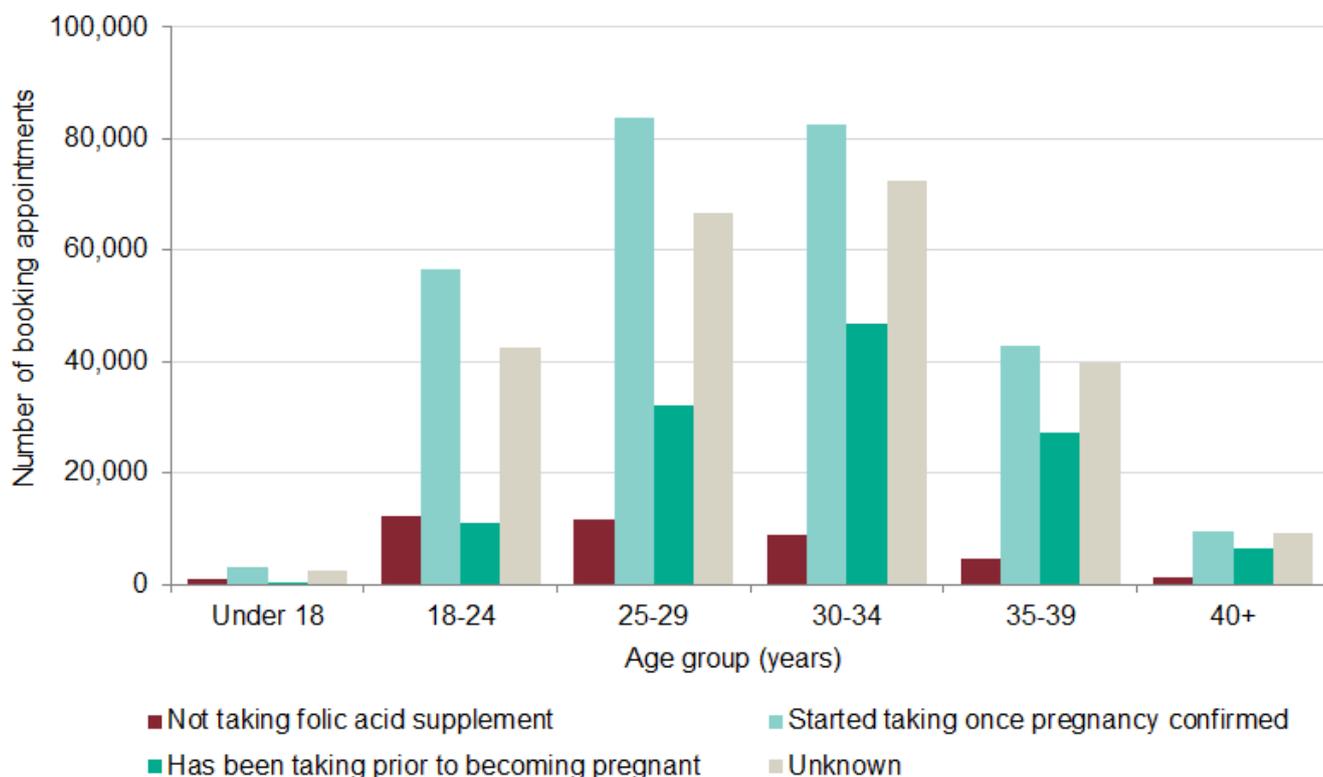


Table A14a: Folic acid supplement use at booking by age of mother, maternity booking appointments January to December 2017

Age	Not taking folic acid supplement	Started taking once pregnancy confirmed	Has been taking prior to becoming pregnant	Unknown
Under 18	1,075	3,120	290	2,420
18 to 24	12,175	56,525	11,155	42,435
25 to 29	11,550	83,660	32,210	66,620
30 to 34	8,905	82,475	46,895	72,505
35 to 39	4,580	42,720	27,375	39,865
40+	1,210	9,460	6,465	9,125

Figure A14b: Known folic acid supplement use at booking by age of mother, maternity booking appointments January to December 2017 (folic acid supplement use by proportion of total in age range)

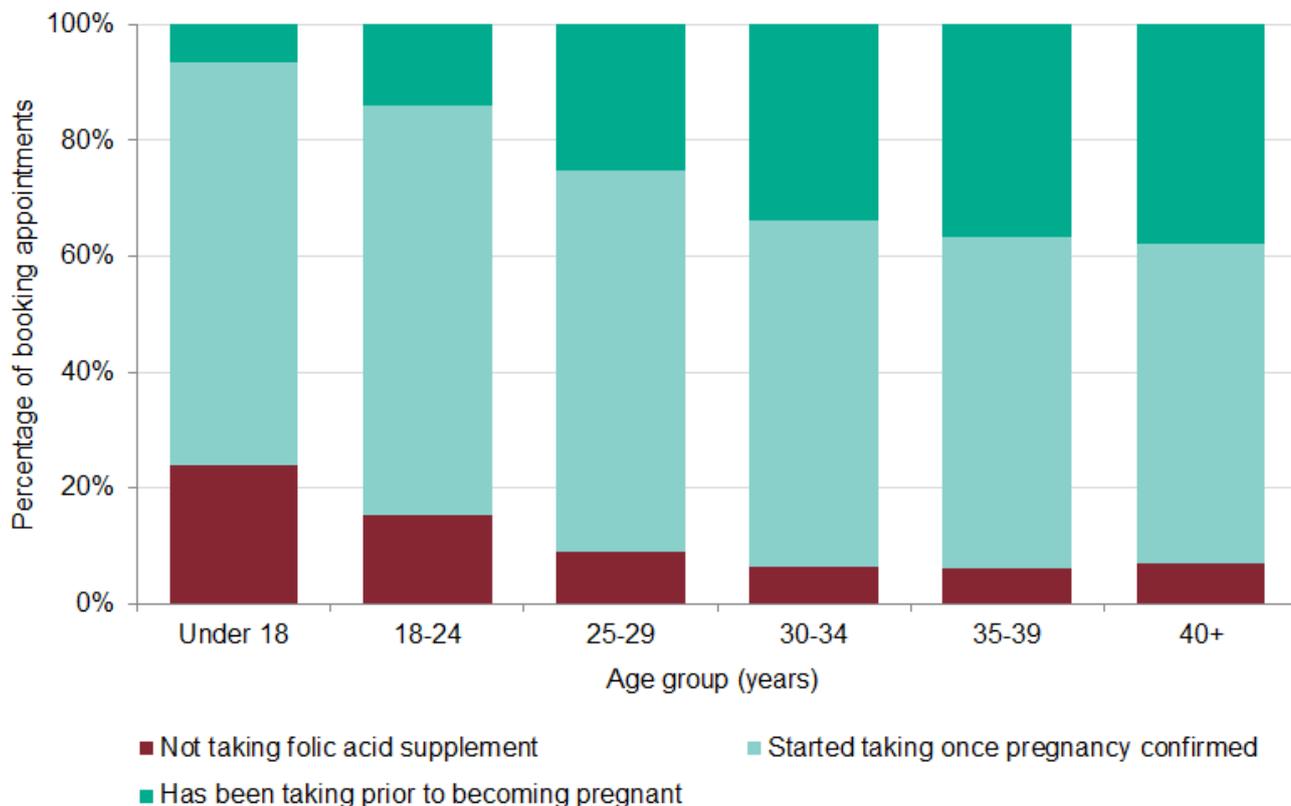


Table A14b: Known folic acid supplement use at booking by age of mother, maternity booking appointments January to December 2017 (folic acid supplement use by proportion of total in age range)

Age	Not taking folic acid supplement	Started taking once pregnancy confirmed	Has been taking prior to becoming pregnant	All known folic acid supplement use
Under 18	24.0%	69.6%	6.5%	100%
18 to 24	15.2%	70.8%	14.0%	100%
25 to 29	9.1%	65.7%	25.3%	100%
30 to 34	6.4%	59.6%	33.9%	100%
35 to 39	6.1%	57.2%	36.7%	100%
40+	7.1%	55.2%	37.7%	100%

Figure A15a: Folic acid supplement use at booking by decile of deprivation of mother's residence, maternity booking appointments January to December 2017

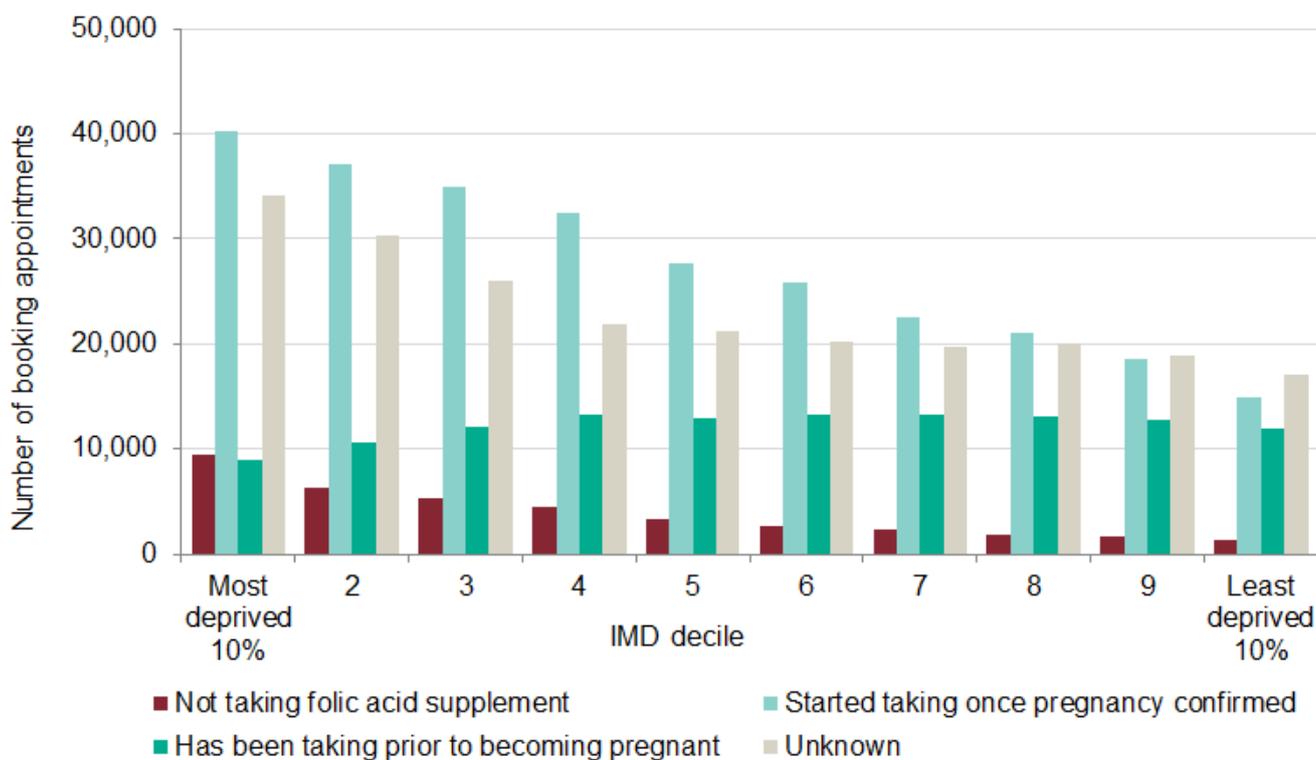


Table A15a: Folic acid supplement use at booking by decile of deprivation of mother's residence, maternity booking appointments January to December 2017

Deprivation decile	Not taking folic acid supplement	Started taking once pregnancy confirmed	Has been taking prior to becoming pregnant	Unknown
Most deprived	9,475	40,280	8,940	34,065
2	6,365	37,110	10,600	30,345
3	5,380	35,025	12,025	26,005
4	4,460	32,380	13,245	21,915
5	3,390	27,650	12,875	21,160
6	2,735	25,900	13,250	20,275
7	2,385	22,575	13,240	19,695
8	1,890	21,120	13,065	20,015
9	1,750	18,610	12,825	18,915
Least deprived	1,340	14,885	11,995	17,035

Figure A15b: Known folic acid supplement use at booking by decile of deprivation of mother’s residence, maternity booking appointments January to December 2017 (folic acid supplement use by proportion of total in decile)

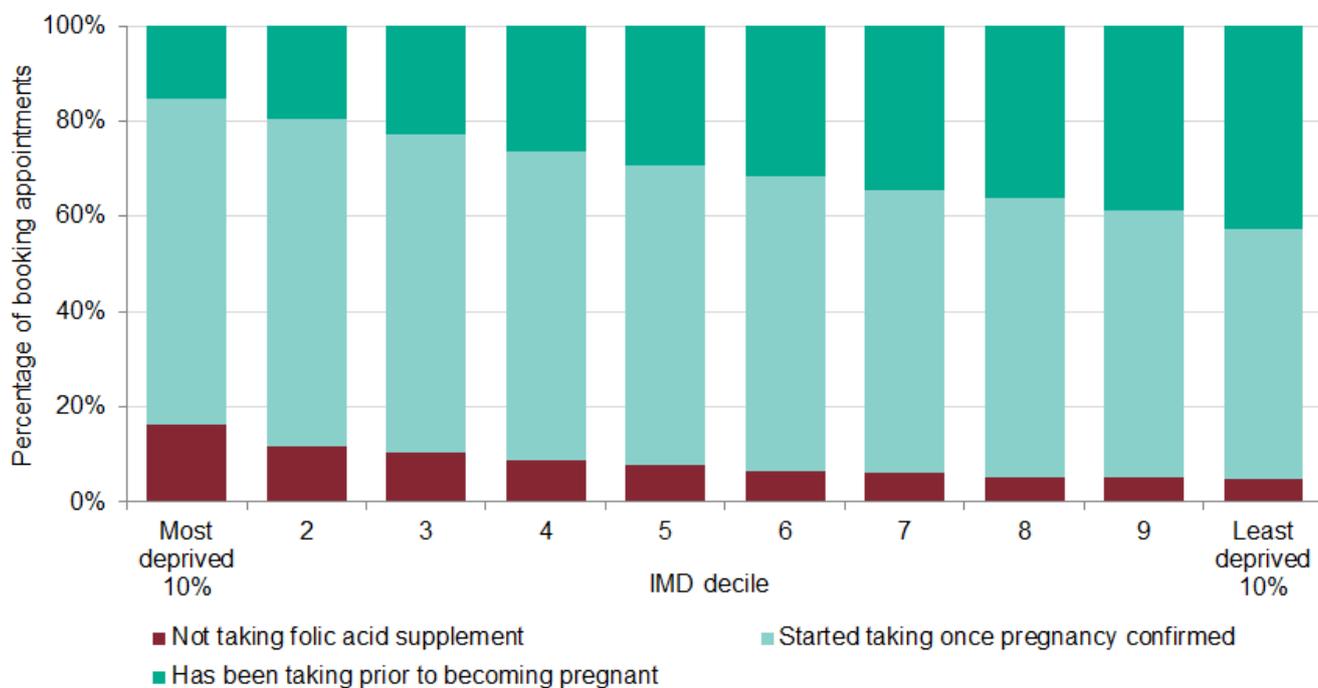


Table A15b: Known folic acid supplement use at booking by decile of deprivation of mother’s residence, maternity booking appointments January to December 2017 (folic acid supplement use by proportion of total in decile)

Deprivation decile	Not taking folic acid supplement	Started taking once pregnancy confirmed	Has been taking prior to becoming pregnant	All known folic acid supplement use
Most deprived	16.1%	68.6%	15.2%	100%
2	11.8%	68.6%	19.6%	100%
3	10.3%	66.8%	22.9%	100%
4	8.9%	64.7%	26.4%	100%
5	7.7%	63.0%	29.3%	100%
6	6.5%	61.8%	31.6%	100%
7	6.2%	59.1%	34.7%	100%
8	5.2%	58.5%	36.2%	100%
9	5.3%	56.1%	38.6%	100%
Least deprived	4.7%	52.7%	42.5%	100%

Figure A16a: Folic acid supplement use at booking by ethnicity of mother (excluding White for ease of interpretation), maternity booking appointments January to December 2017

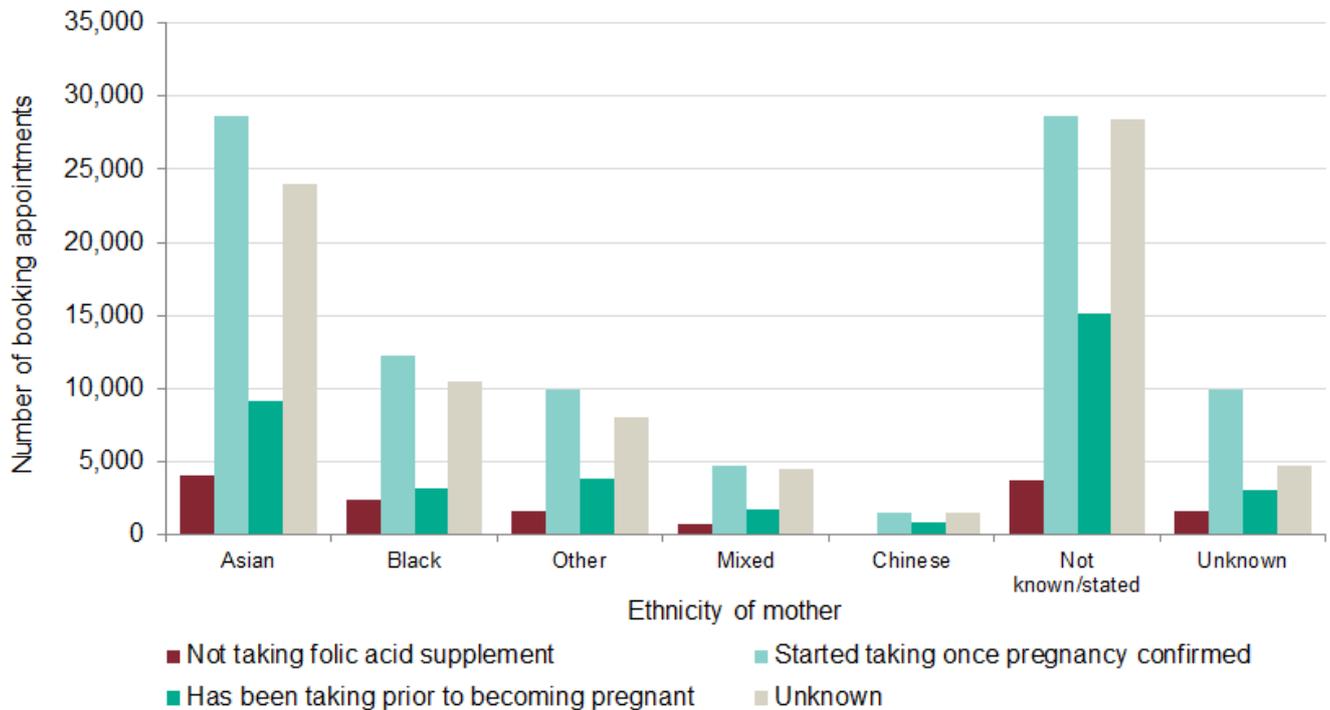


Table A16a: Folic acid supplement use at booking by ethnicity of mother, maternity booking appointments January to December 2017

Ethnicity	Not taking folic acid supplement	Started taking once pregnancy confirmed	Has been taking prior to becoming pregnant	Unknown
Asian	4,060	28,655	9,125	24,045
Black	2,445	12,270	3,145	10,440
Other	1,670	9,935	3,865	8,050
Mixed	755	4,695	1,775	4,500
Chinese	135	1,505	860	1,575
Not known/stated	3,735	28,665	15,180	28,400
Unknown	1,600	9,900	3,090	4,685
White ¹	25,190	183,710	87,845	152,555

¹ not shown on chart

Figure A16b: Known folic acid supplement use at booking by ethnicity of mother, maternity booking appointments January to December 2017 (folic acid supplement use by proportion of total in ethnic group)

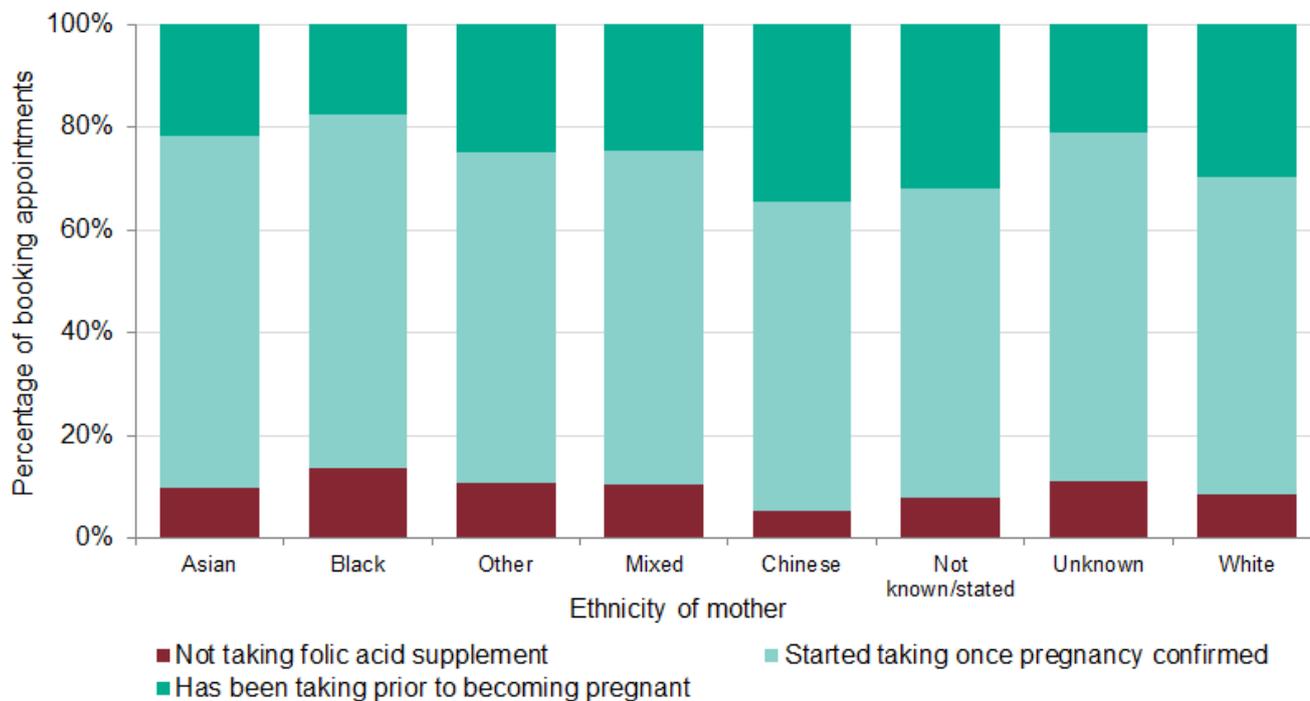


Table A16b: Known folic acid supplement use at booking by ethnicity of mother, maternity booking appointments January to December 2017 (folic acid supplement use by proportion of total in ethnic group)

Ethnicity	Not taking folic acid supplement	Started taking once pregnancy confirmed	Has been taking prior to becoming pregnant	All known folic acid supplement use
Asian	9.7%	68.5%	21.8%	100%
Black	13.7%	68.7%	17.6%	100%
Other	10.8%	64.2%	25.0%	100%
Mixed	10.4%	65.0%	24.6%	100%
Chinese	5.4%	60.2%	34.4%	100%
Not known/stated	7.8%	60.2%	31.9%	100%
Unknown	11.0%	67.9%	21.2%	100%
White	8.5%	61.9%	29.6%	100%

Appendix 2.3: Maternal body mass index (BMI)

BMI is calculated as weight / height², and the following groupings were applied:

- Underweight: BMI < 18.5 (kg/m²)
- Healthy weight: BMI ≥18.5 (kg/m²) and BMI < 25 (kg/m²)
- Overweight: BMI ≥ 25 (kg/m²) and BMI < 30 (kg/m²)
- Obese: BMI ≥ 30 (kg/m²) and BMI < 40 (kg/m²)
- Severely obese: BMI ≥ 40 (kg/m²)

Table A17: Maternal BMI

	Number with known BMI	Number with unknown BMI	% where BMI known	% of all women (known plus unknown)
Mother's BMI calculated at booking appointment	540,630	124,620		81.3
Underweight	24,365		4.5	3.7
Healthy weight	251,475		46.5	37.8
Overweight	148,265		27.4	22.3
Obese	98,760		18.3	14.8
Severely obese	17,765		3.3	2.7

Figure A17a: Maternal BMI by age of mother, maternity booking appointments January to December 2017

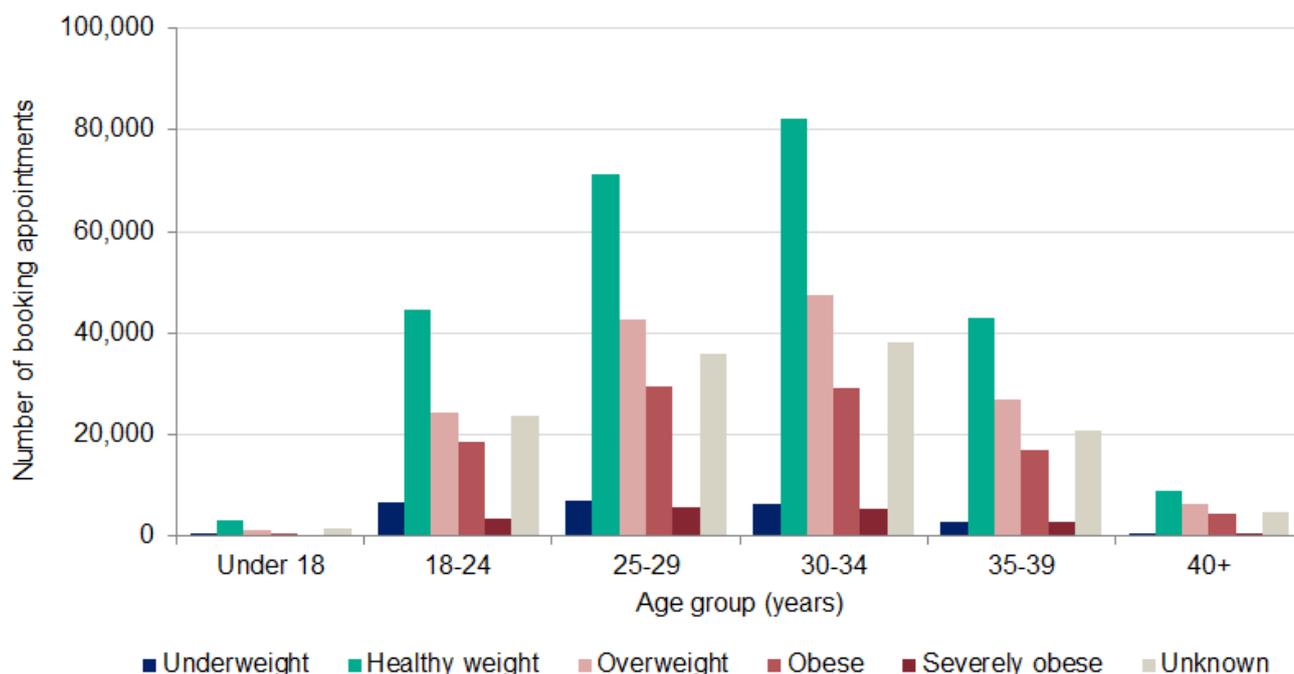


Table A17a: Maternal BMI by age of mother, maternity booking appointments January to December 2017

Age	Under weight	Healthy weight	Over weight	Obese	Severely obese	Unknown
Under 18	635	3,015	1,055	530	75	1,525
18 to 24	6,730	44,505	24,300	18,620	3,310	23,780
25 to 29	7,055	71,340	42,770	29,535	5,680	35,940
30 to 34	6,505	82,330	47,620	29,105	5,230	38,205
35 to 39	2,940	43,090	26,895	17,025	2,845	20,700
40+	605	8,850	6,460	4,555	715	4,860

Figure A17b: Known maternal BMI by age of mother, maternity booking appointments January to December 2017 (BMI category by proportion of total in age range)

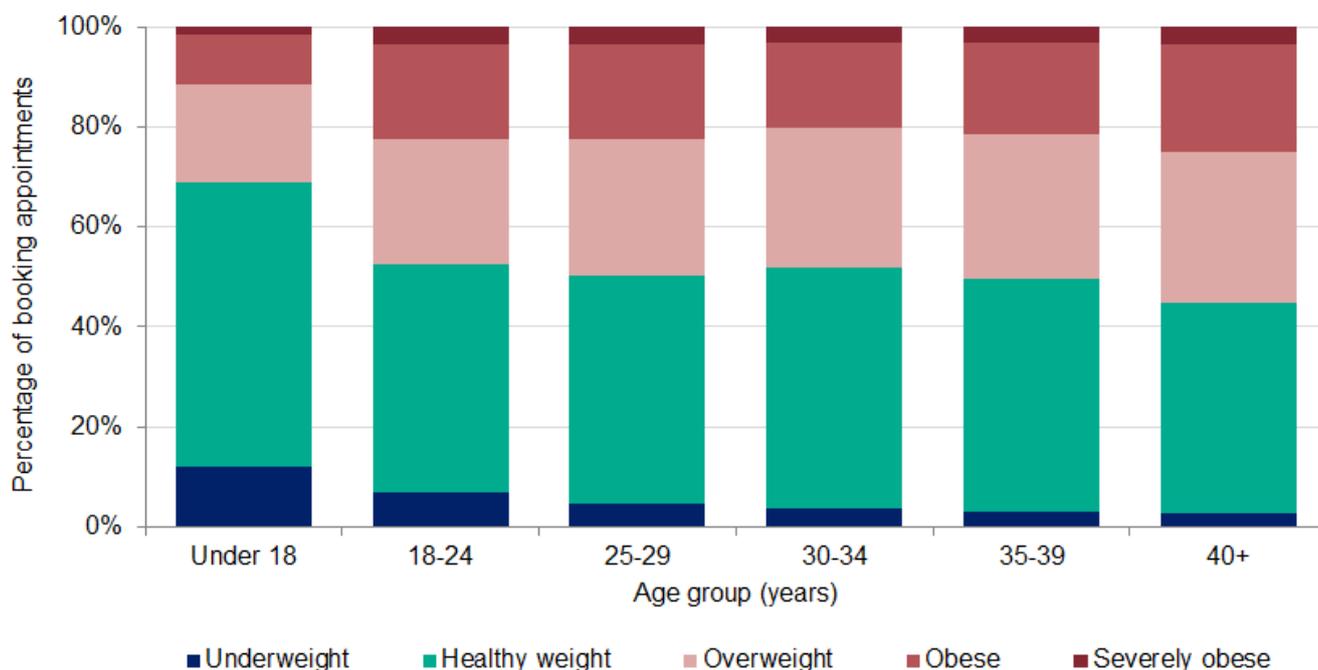


Table A17b: Known maternal BMI by age of mother, maternity booking appointments January to December 2017 (BMI category by proportion of total in age range)

Age	Under weight	Healthy weight	Over weight	Obese	Severely obese	All known BMI categories
Under 18	12.0%	56.8%	19.9%	10.0%	1.4%	100%
18 to 24	6.9%	45.7%	24.9%	19.1%	3.4%	100%
25 to 29	4.5%	45.6%	27.4%	18.9%	3.6%	100%
30 to 34	3.8%	48.2%	27.9%	17.0%	3.1%	100%
35 to 39	3.2%	46.4%	29.0%	18.3%	3.1%	100%
40+	2.9%	41.8%	30.5%	21.5%	3.4%	100%

Figure A18a: Maternal BMI at booking by decile of deprivation of mother’s residence, maternity booking appointments January to December 2017

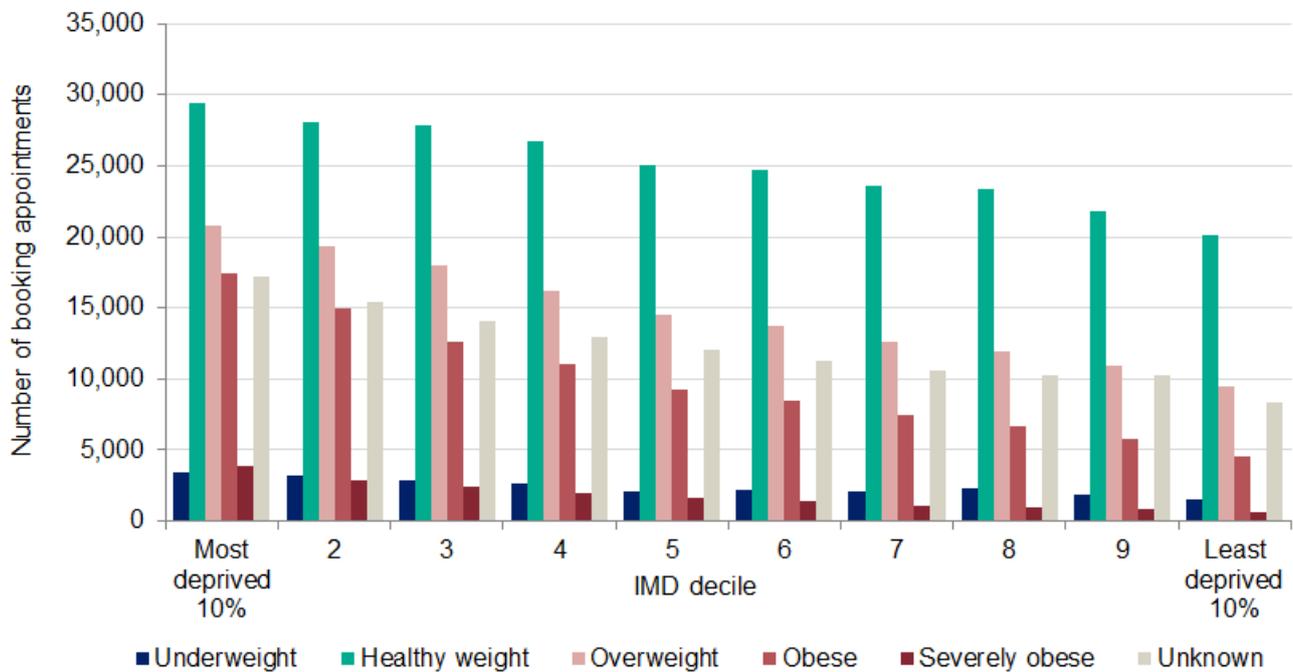


Table A18a: Maternal BMI at booking by decile of deprivation of mother’s residence, maternity booking appointments January to December 2017

Deprivation decile	Under weight	Healthy weight	Over weight	Obese	Severely obese	Unknown
Most deprived	3,480	29,445	20,740	17,445	3,835	17,175
2	3,175	28,060	19,375	14,920	2,920	15,435
3	2,825	27,835	17,995	12,670	2,420	14,070
4	2,610	26,720	16,230	11,085	1,920	12,925
5	2,120	25,000	14,490	9,230	1,595	12,045
6	2,170	24,705	13,680	8,475	1,390	11,270
7	2,060	23,550	12,640	7,445	1,130	10,575
8	2,335	23,415	11,940	6,695	990	10,250
9	1,855	21,795	10,930	5,830	875	10,255
Least deprived	1,540	20,170	9,530	4,605	645	8,390

Figure A18b: Known maternal BMI at booking by decile of deprivation of mother's residence, maternity booking appointments January to December 2017 (BMI category by proportion of total in decile)

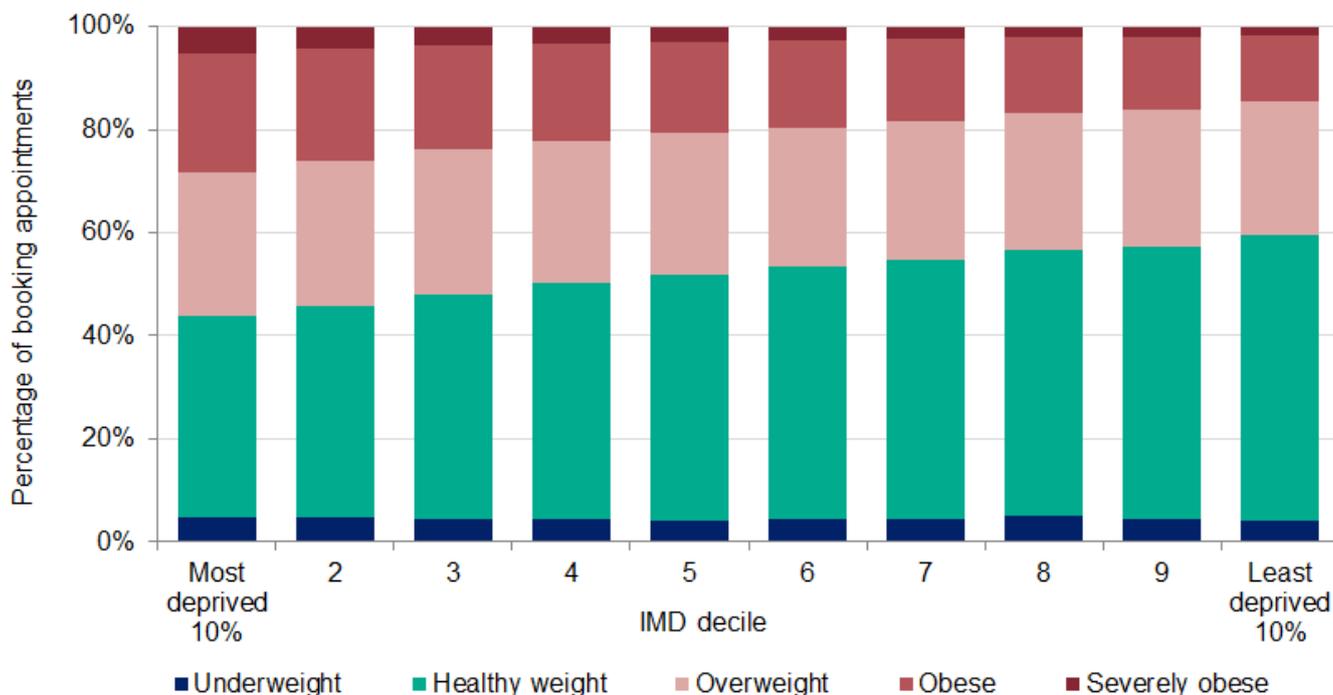


Table A18b: Known maternal BMI at booking by decile of deprivation of mother's residence, maternity booking appointments January to December 2017 (BMI category by proportion of total in decile)

Deprivation decile	Under weight	Healthy weight	Over weight	Obese	Severely obese	All known BMI categories
Most deprived	4.6%	39.3%	27.7%	23.3%	5.1%	100%
2	4.6%	41.0%	28.3%	21.8%	4.3%	100%
3	4.4%	43.7%	28.2%	19.9%	3.8%	100%
4	4.5%	45.6%	27.7%	18.9%	3.3%	100%
5	4.0%	47.7%	27.6%	17.6%	3.0%	100%
6	4.3%	49.0%	27.1%	16.8%	2.8%	100%
7	4.4%	50.3%	27.0%	15.9%	2.4%	100%
8	5.1%	51.6%	26.3%	14.8%	2.2%	100%
9	4.5%	52.8%	26.5%	14.1%	2.1%	100%
Least deprived	4.2%	55.3%	26.1%	12.6%	1.8%	100%

Figure A19a: Maternal BMI at booking by ethnicity of mother (excluding White for ease of interpretation), maternity booking appointments January to December 2017

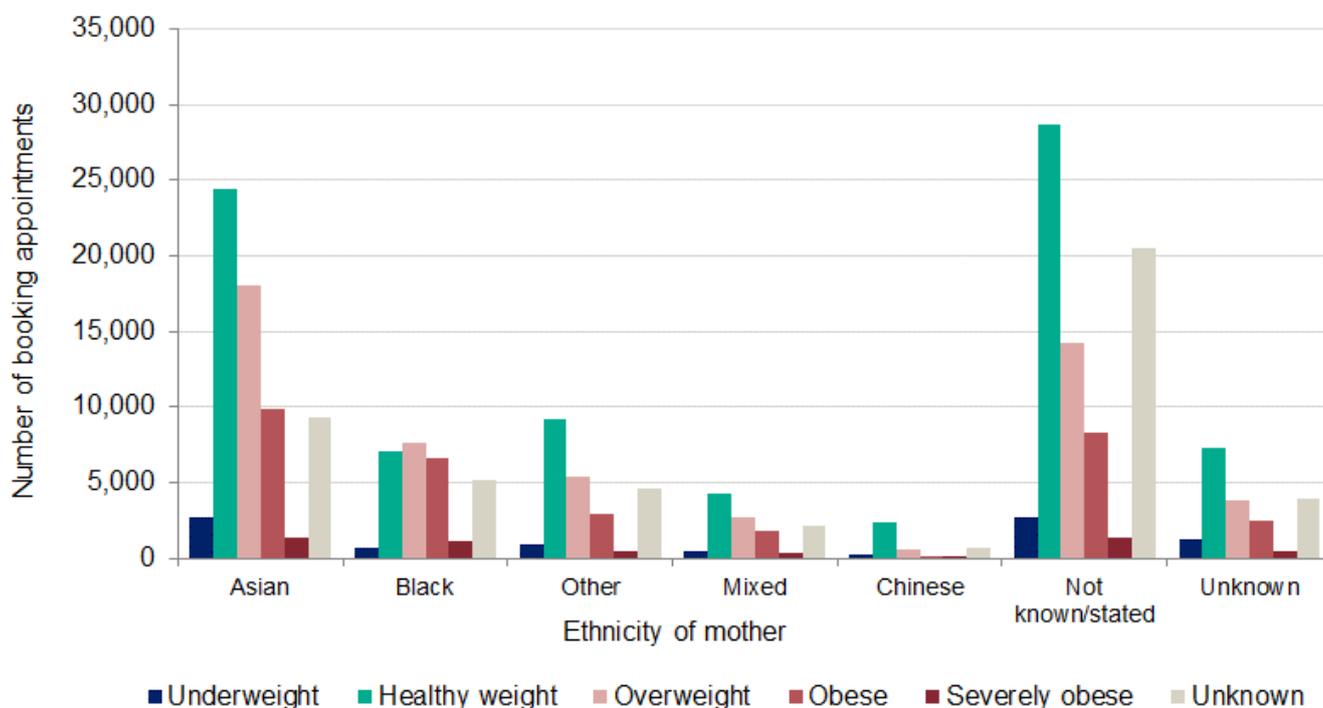


Table A19a: Maternal BMI at booking by ethnicity of mother (excluding white for ease of interpretation), maternity booking appointments January to December 2017

Ethnicity	Under weight	Healthy weight	Over weight	Obese	Severely obese	Unknown
Asian	2,665	24,465	18,035	9,830	1,315	9,305
Black	645	7,040	7,605	6,610	1,135	5,155
Other	865	9,230	5,395	2,915	405	4,640
Mixed	420	4,245	2,715	1,840	340	2,130
Chinese	285	2,305	590	145	30	685
Not known/ stated	2,735	28,675	14,240	8,250	1,335	20,460
Unknown	1,275	7,285	3,860	2,510	420	3,900
White ¹	15,680	171,870	97,670	67,885	12,970	79,780

¹ not shown on chart

Figure A19b: Known maternal BMI at booking by ethnicity of mother, maternity booking appointments January to December 2017 (BMI category by proportion of total in ethnic group)

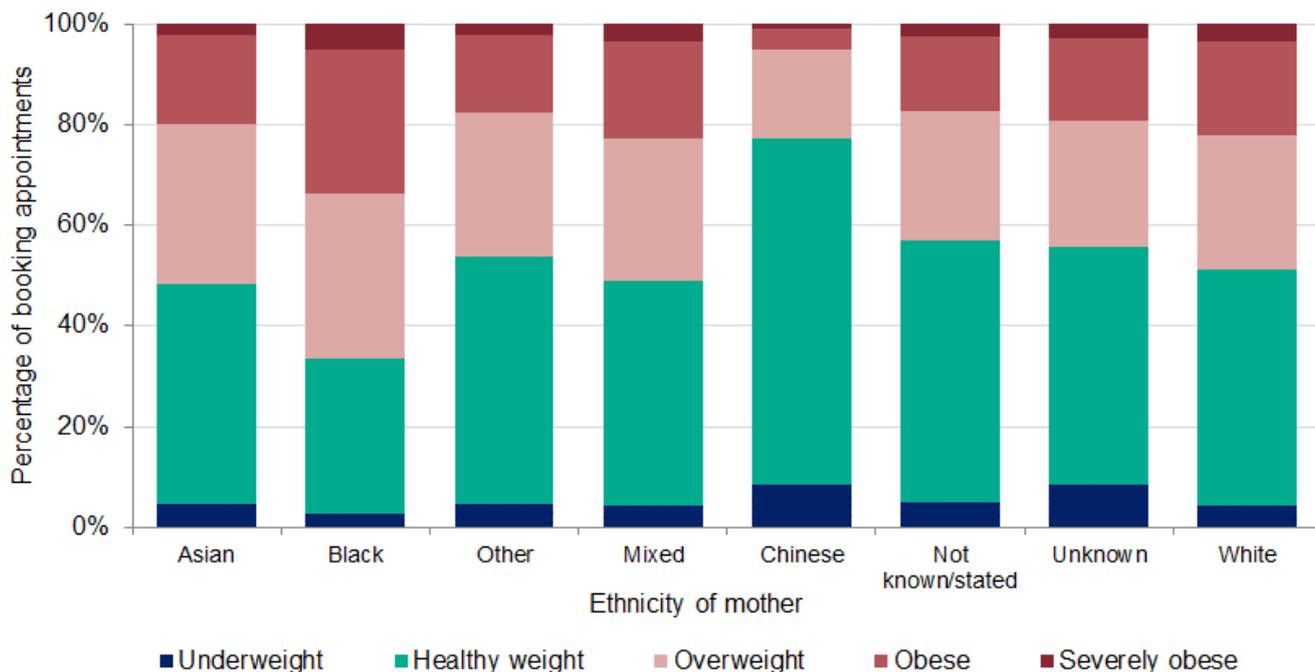


Table A19b: Known maternal BMI at booking by ethnicity of mother, maternity booking appointments January to December 2017 (BMI category by proportion of total in ethnic group)

Ethnicity	Under weight	Healthy weight	Over weight	Obese	Severely obese	All known BMI categories
Asian	4.7%	43.4%	32.0%	17.5%	2.3%	100%
Black	2.8%	30.6%	33.0%	28.7%	4.9%	100%
Other	4.6%	49.1%	28.7%	15.5%	2.2%	100%
Mixed	4.4%	44.4%	28.4%	19.2%	3.6%	100%
Chinese	8.5%	68.7%	17.6%	4.3%	0.9%	100%
Not known/stated	5.0%	51.9%	25.8%	14.9%	2.4%	100%
Unknown	8.3%	47.5%	25.1%	16.4%	2.7%	100%
White	4.3%	46.9%	26.7%	18.5%	3.5%	100%

Appendix 2.4: Alcohol

Table A20: Alcohol use

	Number with known drinking status	Number with unknown drinking status	% where drinking status known	% of all women (known plus unknown)
Typical number of units of alcohol the mother drinks, per week, as reported at the booking appointment	379,600	287,275		56.9
Less than 1 unit	368,595		97.1	55.3
1 to 7 units per week	9,355		2.5	1.4
8 to 14 units per week	1,170		0.3	0.2
15 units per week	480		0.1	0.1

Figure A20a: Alcohol use by age of mother, maternity booking appointments January to December 2017

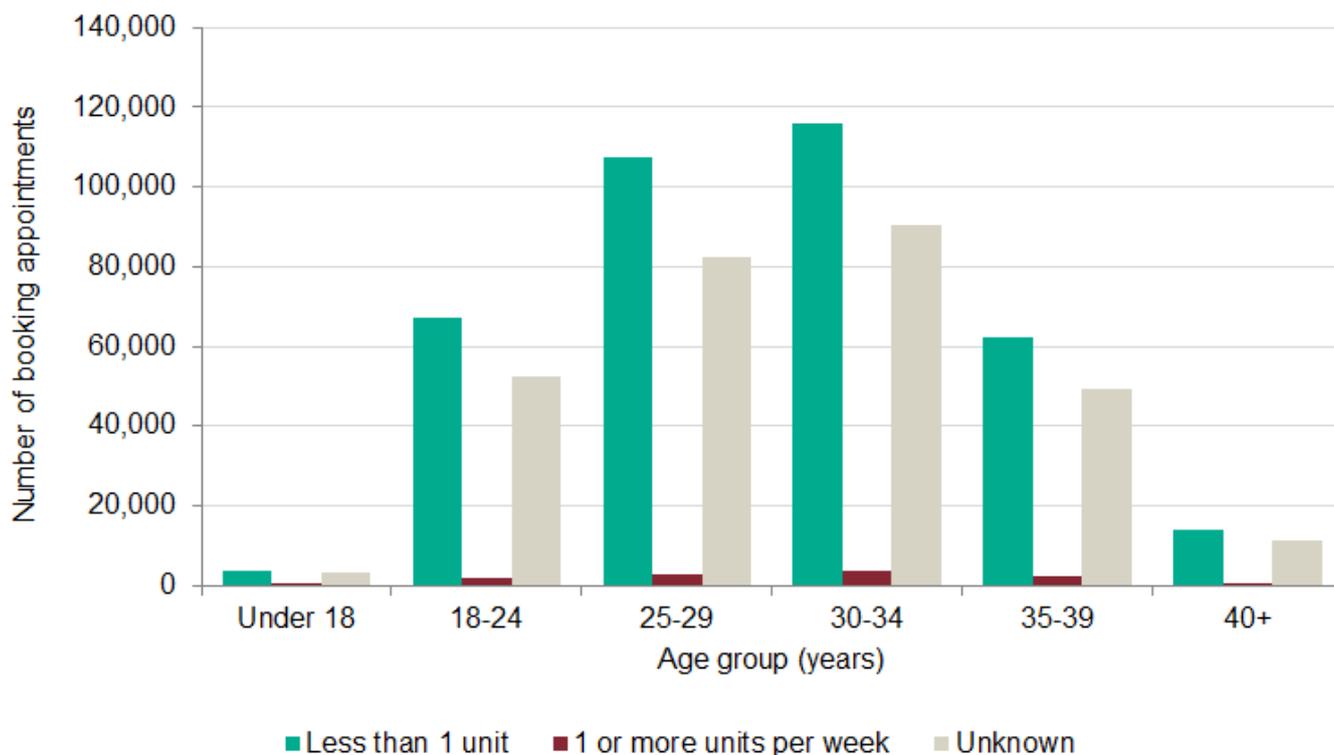


Table A20a: Alcohol use by age of mother, maternity booking appointments January to December 2017

Age	Less than 1 unit	1 or more units per week	Unknown
Under 18	3,730	70	3,050
18-24	67,230	1,790	52,435
25-29	107,575	2,745	82,475
30-34	115,800	3,580	90,250
35-39	62,085	2,310	49,435
40+	14,140	500	11,480

Figure A20b: Known alcohol use by age of mother, maternity booking appointments January to December 2017 (alcohol use by proportion of total in age range)

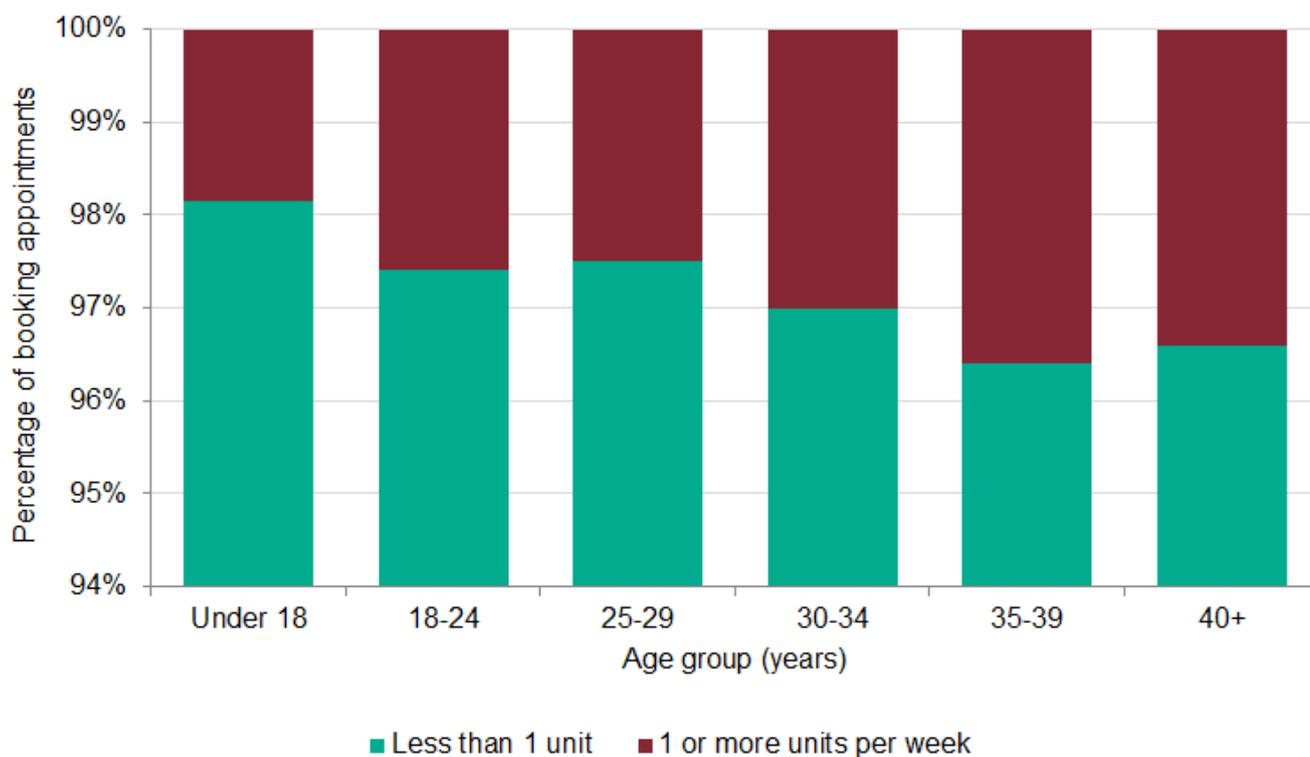


Table A20b: Known alcohol use by age of mother, maternity booking appointments January to December 2017 (alcohol use by proportion of total in age range)

Age	Less than 1 unit	1 or more units per week	All known unit categories
Under 18	98.2%	1.8%	100%
18 to 24	97.4%	2.6%	100%
25 to 29	97.5%	2.5%	100%
30 to 34	97.0%	3.0%	100%
35 to 39	96.4%	3.6%	100%
40+	96.6%	3.4%	100%

Figure A20c: Alcohol use, mothers drinking more than one unit per week, by age of mother, maternity booking appointments January to December 2017 (alcohol use by proportion of total in age range)

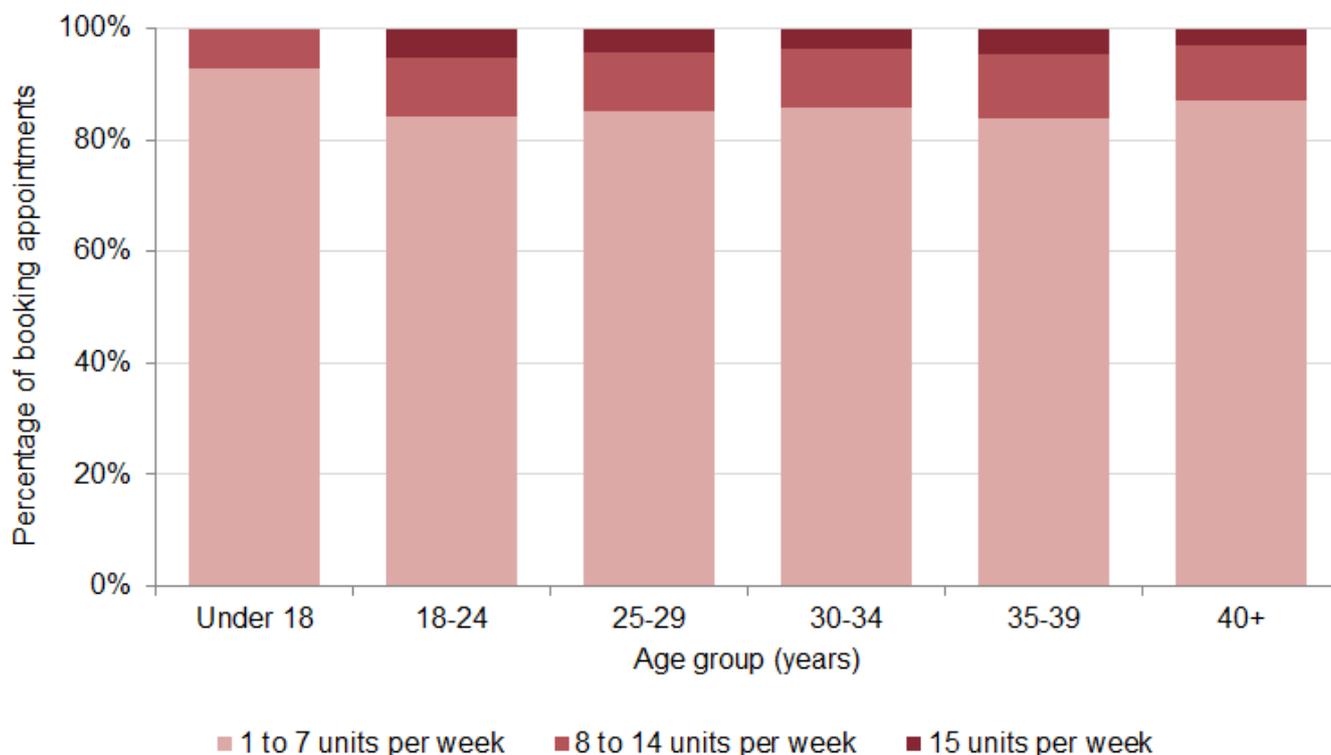


Table A20c: Alcohol use, mothers drinking more than one unit per week, by age of mother, maternity booking appointments January to December 2017 (alcohol use by proportion of total in age range)

Age	1 to 7 units per week	8 to 14 units per week	15 units per week	All unit categories
Under 18	92.9%	7.1%	0.0%	100%
18 to 24	84.1%	10.6%	5.3%	100%
25 to 29	85.2%	10.4%	4.4%	100%
30 to 34	85.9%	10.3%	3.8%	100%
35 to 39	84.0%	11.3%	4.8%	100%
40+	87.0%	10.0%	3.0%	100%

Figure A20d: Alcohol use, mothers drinking more than one unit per week, by decile of deprivation of mother’s residence, maternity booking appointments January to December 2017

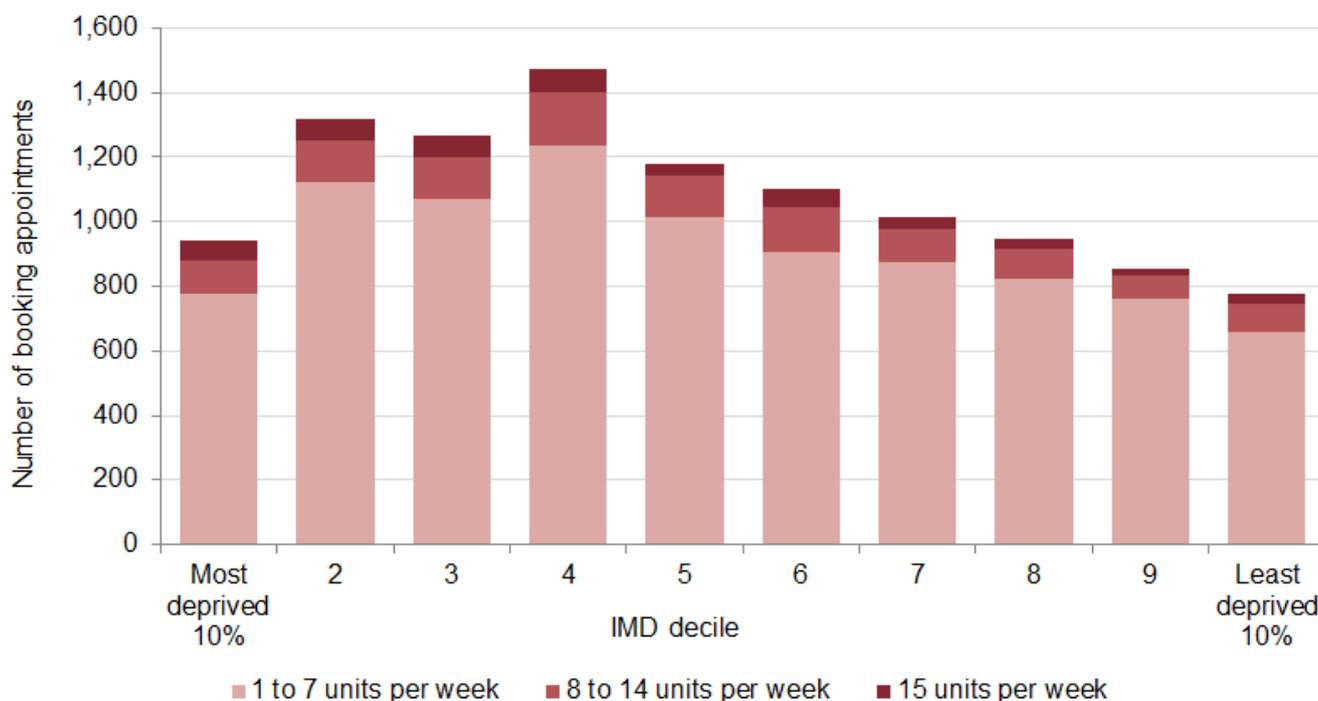


Table A20d: Alcohol use, mothers drinking more than one unit per week, by decile of deprivation of mother’s residence, maternity booking appointments January to December 2017

Deprivation decile	1 to 7 units per week	8 to 14 units per week	15 units per week
Most deprived	775	105	60
2	1,120	130	70
3	1,070	130	65
4	1,235	165	75
5	1,015	130	35
6	905	140	55
7	875	105	35
8	825	90	30
9	760	75	20
Least deprived	660	85	30

Appendix 2.5: Substance misuse

Table A21: Substance use

	Number with known drug misuse status	Number with unknown drug misuse status	% where drug misuse status known	% of all women (known plus unknown)
The mother's self-reported status of whether she has used or is using non-medicinal drugs or other substances at the booking appointment	470,415	197,150		70.5
Never used	449,475		95.5	67.3
Currently using	5,535		1.2	0.8
Previously used	15,405		3.3	2.3

Figure A21a: Substance use by age of mother, maternity booking appointments January to December 2017

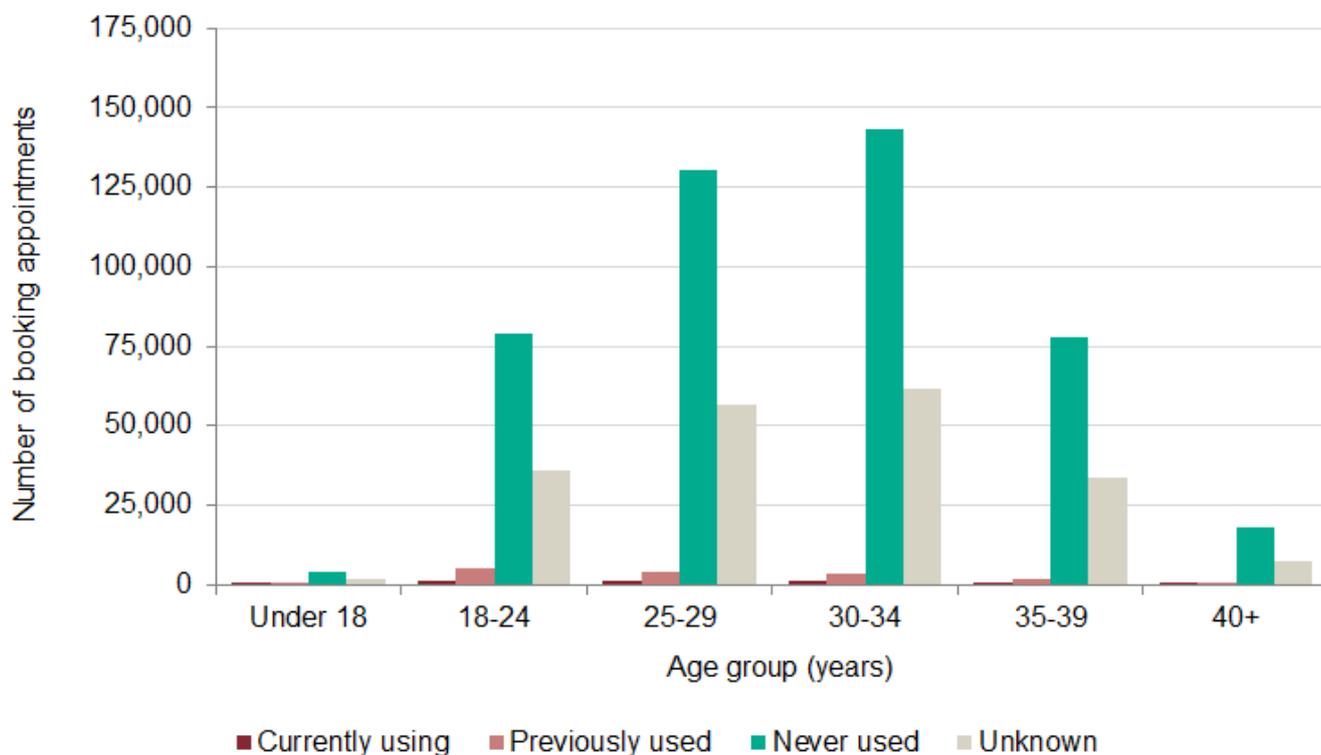


Table A21a: Substance use by age of mother, maternity booking appointments January to December 2017

Age	Currently using	Previously used	Never used	Unknown
Under 18	130	590	4,100	2,060
18 to 24	1,355	5,170	79,120	36,060
25 to 29	1,440	3,995	130,635	56,830
30 to 34	1,485	3,465	143,025	61,720
35 to 39	900	1,865	77,645	33,515
40+	215	370	17,910	7,640

Figure A21b: Known substance use by age of mother, maternity booking appointments January to December 2017 (substance use by proportion of total in age range)

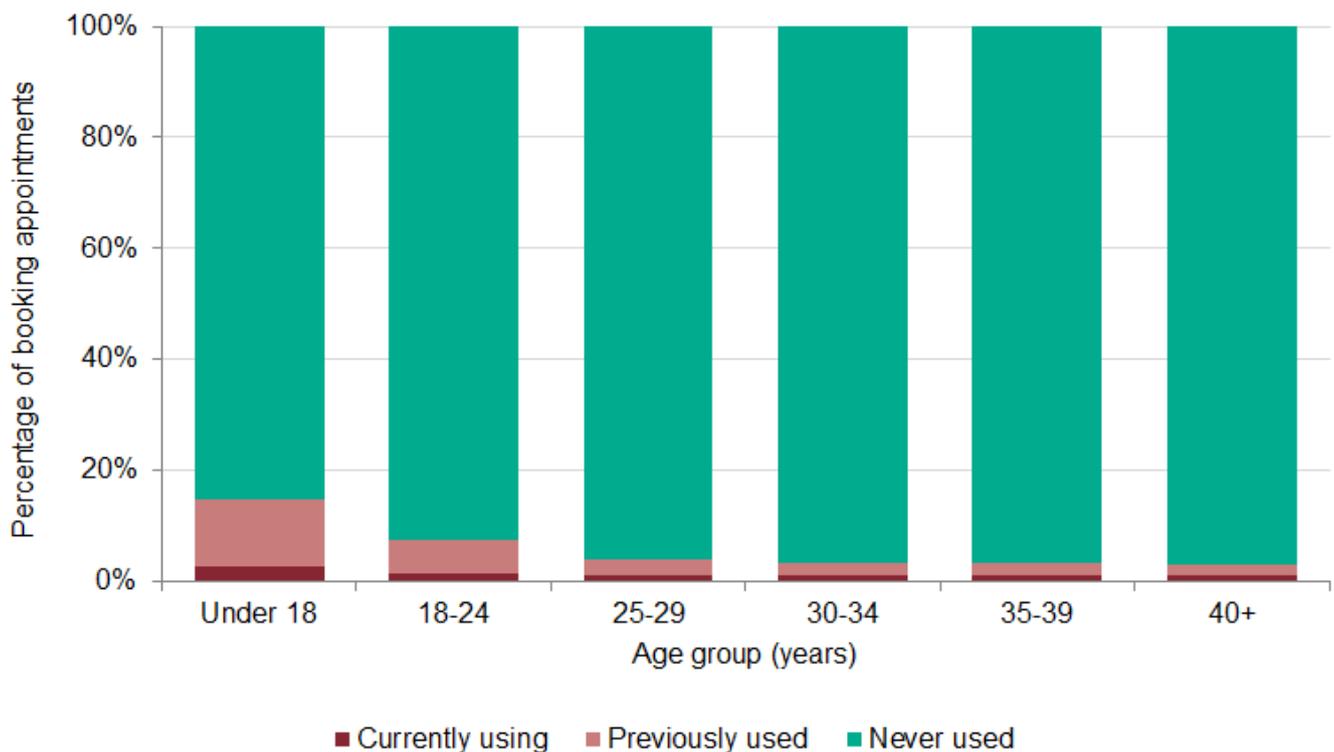


Table A21b: Known substance use by age of mother, maternity booking appointments January to December 2017 (substance use by proportion of total in age range)

Age	Currently using	Previously used	Never used	All known substance use categories
Under 18	2.7%	12.2%	85.1%	100%
18 to 24	1.6%	6.0%	92.4%	100%
25 to 29	1.1%	2.9%	96.0%	100%
30 to 34	1.0%	2.3%	96.7%	100%
35 to 39	1.1%	2.3%	96.6%	100%
40+	1.2%	2.0%	96.8%	100%

Figure A22a: Substance use, mothers currently using or who have previously used, by age, maternity booking appointments January to December 2017

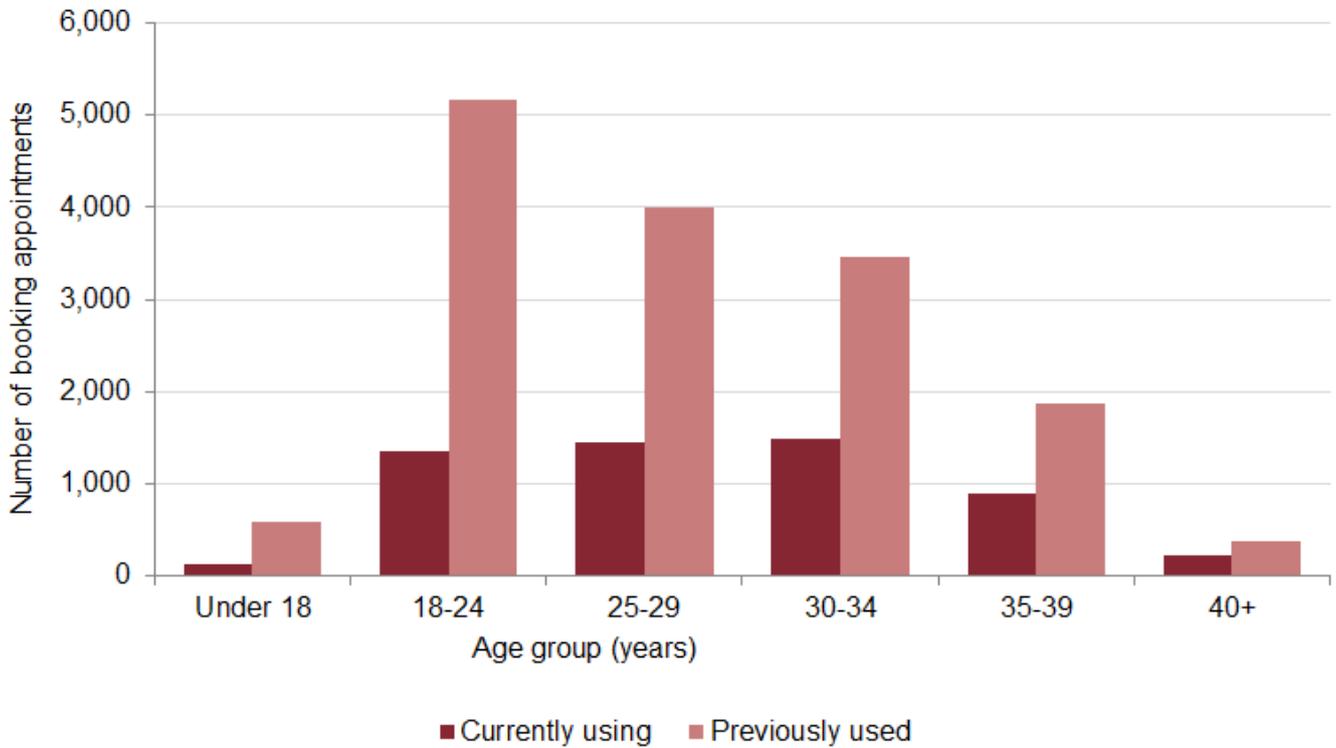


Figure A22b: Known substance use, mothers currently using or who have previously used, by age, maternity booking appointments January to December 2017 (substance use by proportion of total in age range)

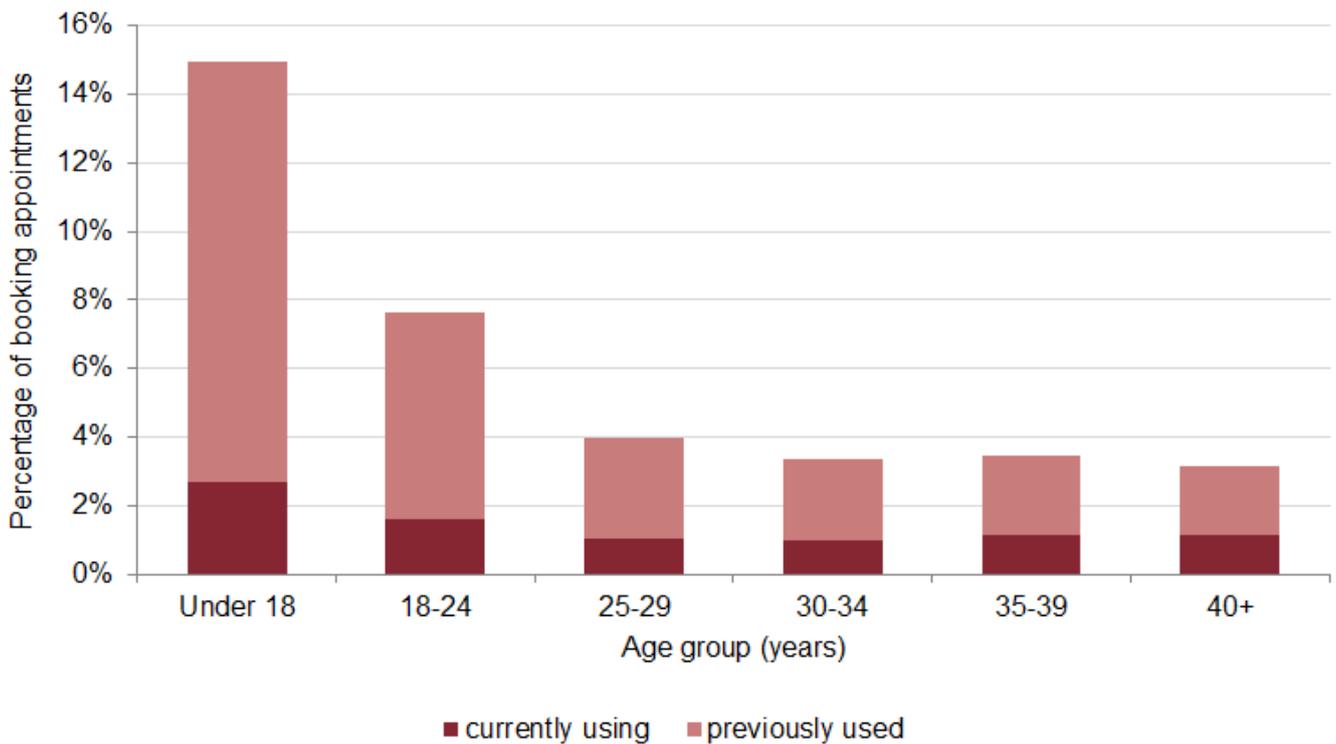


Figure A23a: Substance use by deprivation decile, maternity booking appointments January to December 2017

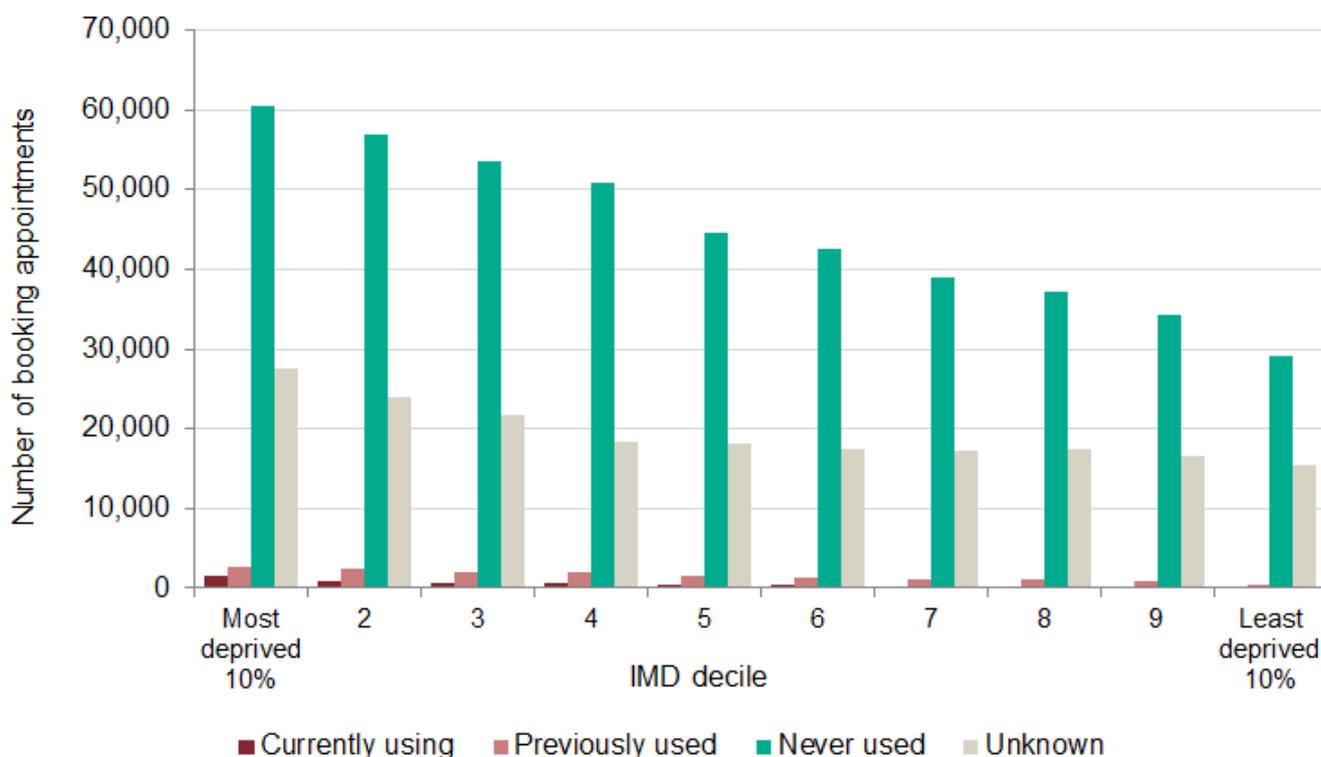


Table A23a: Substance use by deprivation decile, maternity booking appointments January to December 2017

Deprivation decile	Currently using	Previously used	Never used	Unknown
Most deprived	1,630	2,685	60,435	27,530
2	970	2,355	56,790	24,010
3	735	2,080	53,620	21,660
4	655	1,935	50,835	18,270
5	440	1,510	44,670	18,135
6	330	1,375	42,645	17,515
7	260	1,085	38,940	17,280
8	250	1,020	37,215	17,355
9	195	785	34,375	16,500
Least deprived	140	510	29,035	15,340

Figure A23b: Known substance use by deprivation decile, maternity booking appointments January to December 2017, (substance use by proportion of total in deprivation decile)

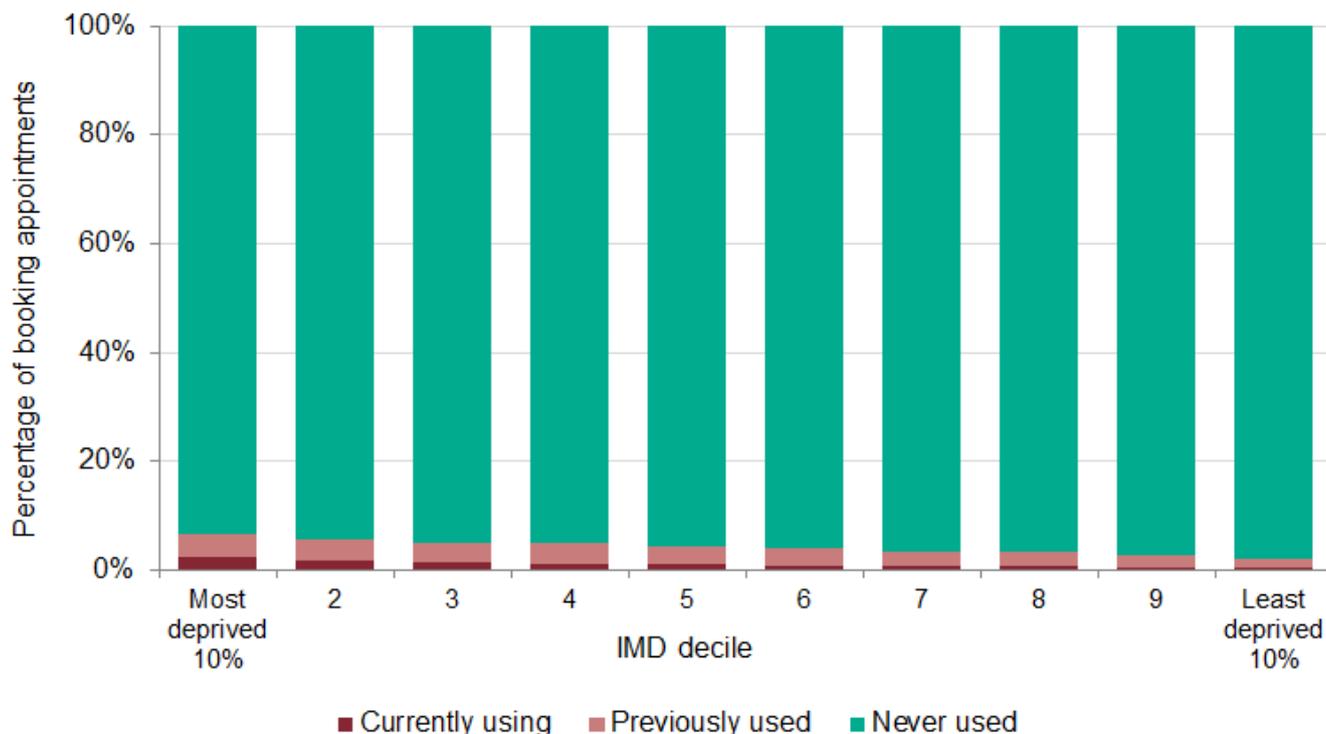


Table A23b: Known substance use by deprivation decile, maternity booking appointments January to December 2017 (substance use by proportion of total in deprivation decile)

Deprivation decile	Currently using	Previously used	Never used	All known substance use categories
Most deprived	2.5%	4.1%	93.3%	100%
2	1.6%	3.9%	94.5%	100%
3	1.3%	3.7%	95.0%	100%
4	1.2%	3.6%	95.2%	100%
5	0.9%	3.2%	95.8%	100%
6	0.7%	3.1%	96.2%	100%
7	0.6%	2.7%	96.7%	100%
8	0.6%	2.7%	96.7%	100%
9	0.6%	2.2%	97.2%	100%
Least deprived	0.5%	1.7%	97.8%	100%

Figure A24a: Known substance use, mothers currently using or who have previously used, by deprivation decile, maternity booking appointments January to December 2017

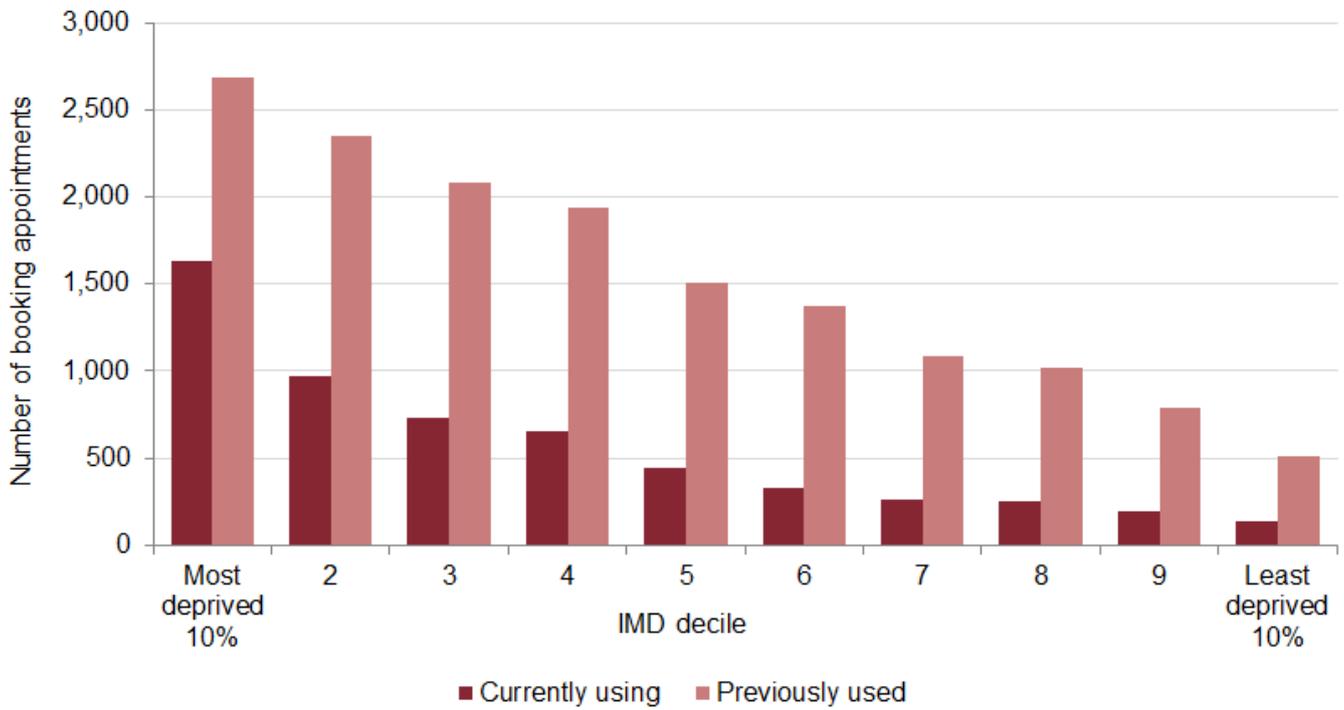


Figure A24b: Known substance use, mothers currently using or who have previously used, by deprivation decile, maternity booking appointments January to December 2017, (substance use by proportion of total in deprivation decile)

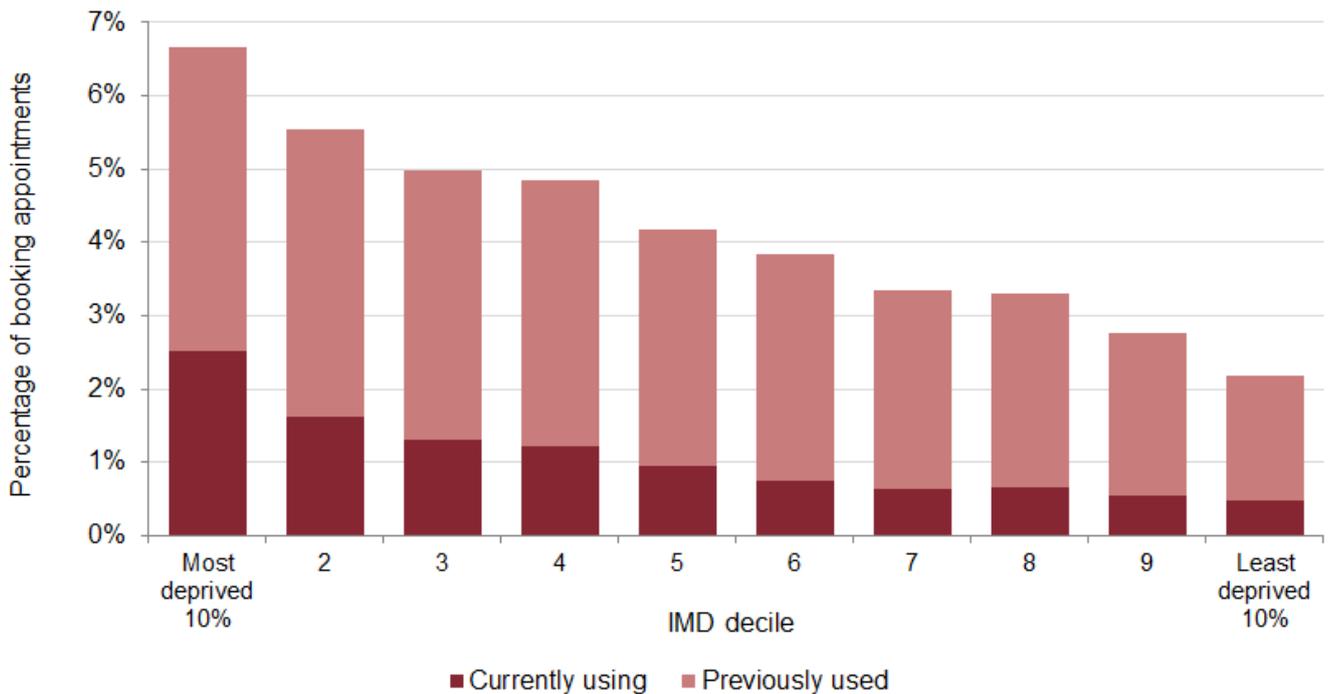


Figure A25a: Substance use by ethnicity, maternity booking appointments January to December 2017

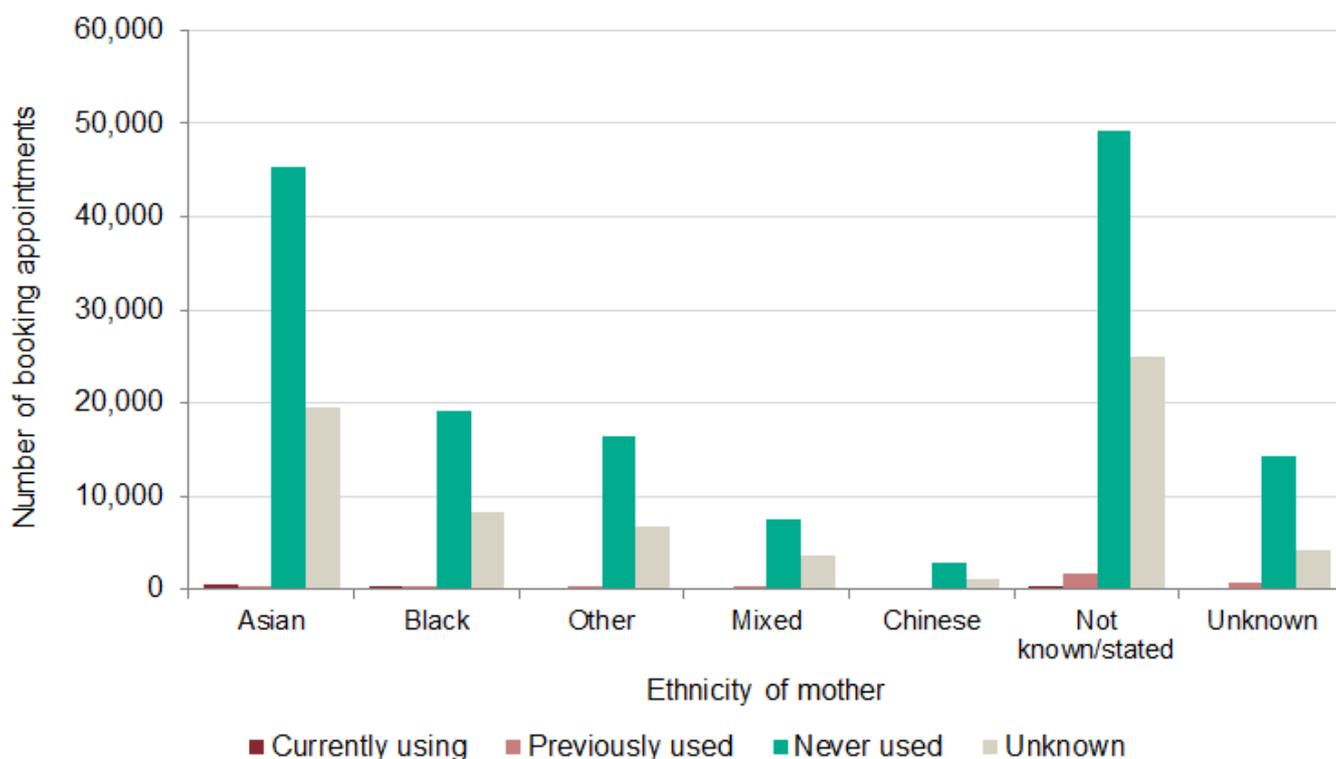


Table A25a: Substance use by ethnicity, maternity booking appointments January to December 2017

Ethnicity	Currently using	Previously used	Never used	Unknown
Asian	560	250	45,375	19,455
Black	360	410	19,120	8,295
Other	115	315	16,375	6,695
Mixed	195	365	7,500	3,670
Chinese	25	20	2,815	1,185
Not known/stated	285	1,685	49,145	24,885
Unknown	115	650	14,235	4,260
White ¹	3,915	11,800	301,415	130,280

¹ not shown on chart

Figure A25b: Known substance use, by ethnicity, maternity booking appointments January to December 2017 (substance use by proportion of total in ethnic group)

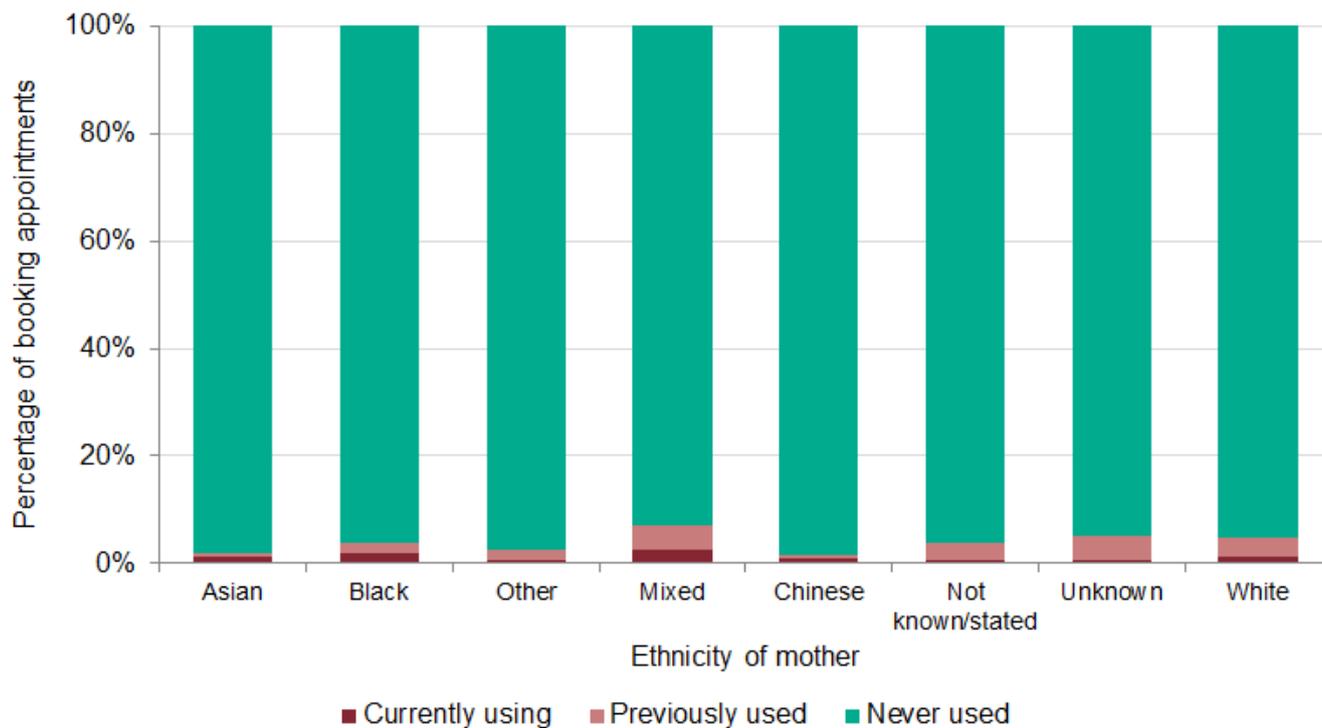


Table A25b: Known substance use by ethnicity, maternity booking appointments January to December 2017 (substance use by proportion of total in ethnic group)

Ethnicity	Currently using	Previously used	Never used	All known substance use categories
Asian	1.2%	0.5%	98.2%	100%
Black	1.8%	2.1%	96.1%	100%
Other	0.7%	1.9%	97.4%	100%
Mixed	2.4%	4.5%	93.1%	100%
Chinese	0.9%	0.7%	98.4%	100%
Not known/stated	0.6%	3.3%	96.1%	100%
Unknown	0.8%	4.3%	94.9%	100%
White ¹	1.2%	3.7%	95.0%	100%

¹ Not shown on chart

Figure A26a: Known substance use, mothers currently using or who have previously used, by ethnicity, maternity booking appointments January to December 2017

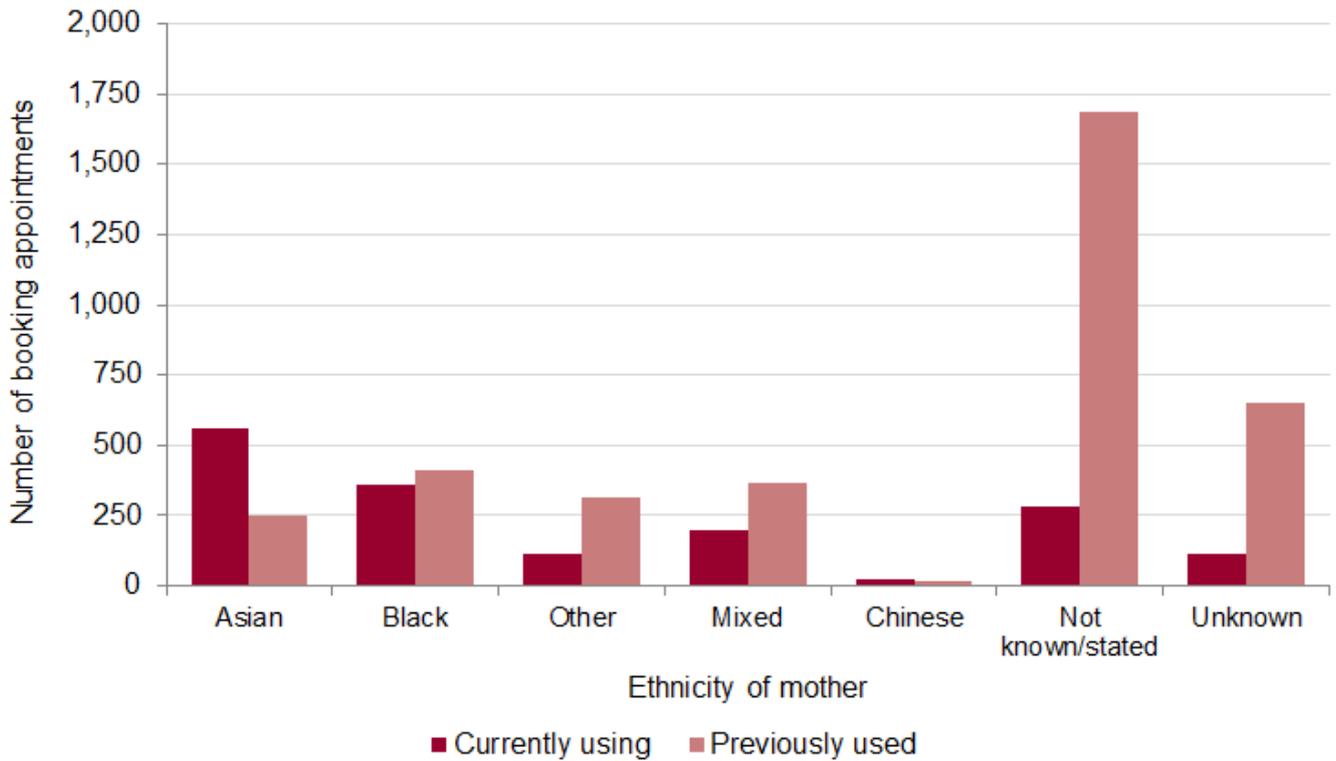
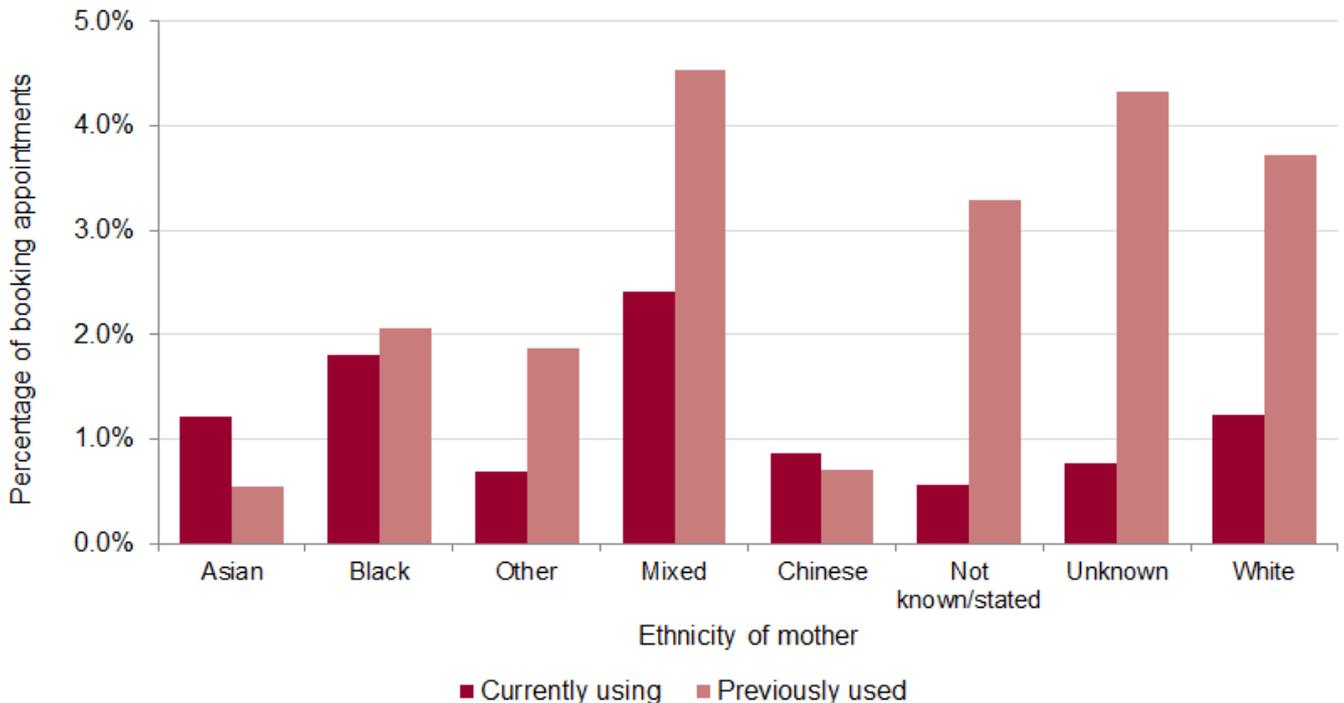


Figure A26b: Known substance use, mothers currently using or who have previously used, by ethnicity, maternity booking appointments January to December 2017 (substance use by proportion of total in ethnic group)



Appendix 2.6: Antenatal booking within 10 weeks of pregnancy

Table A27: Timing of maternity booking appointment

	Number with known gestational age	Number with unknown gestational age	% where gestational age known	% of all women (known plus unknown)
Gestational age at the pregnancy first contact	679,095	640		99.9
Within 10 weeks 0 days	366,095		53.9	53.9
10+1 weeks to 12+6 weeks	195,010		28.7	28.7
13+0 weeks to 20+0 weeks	63,250		9.3	9.3
20+1 weeks and over	54,740		8.1	8.1

Figure A27a: Timing of maternity booking appointment by age of mother, appointments January to December 2017

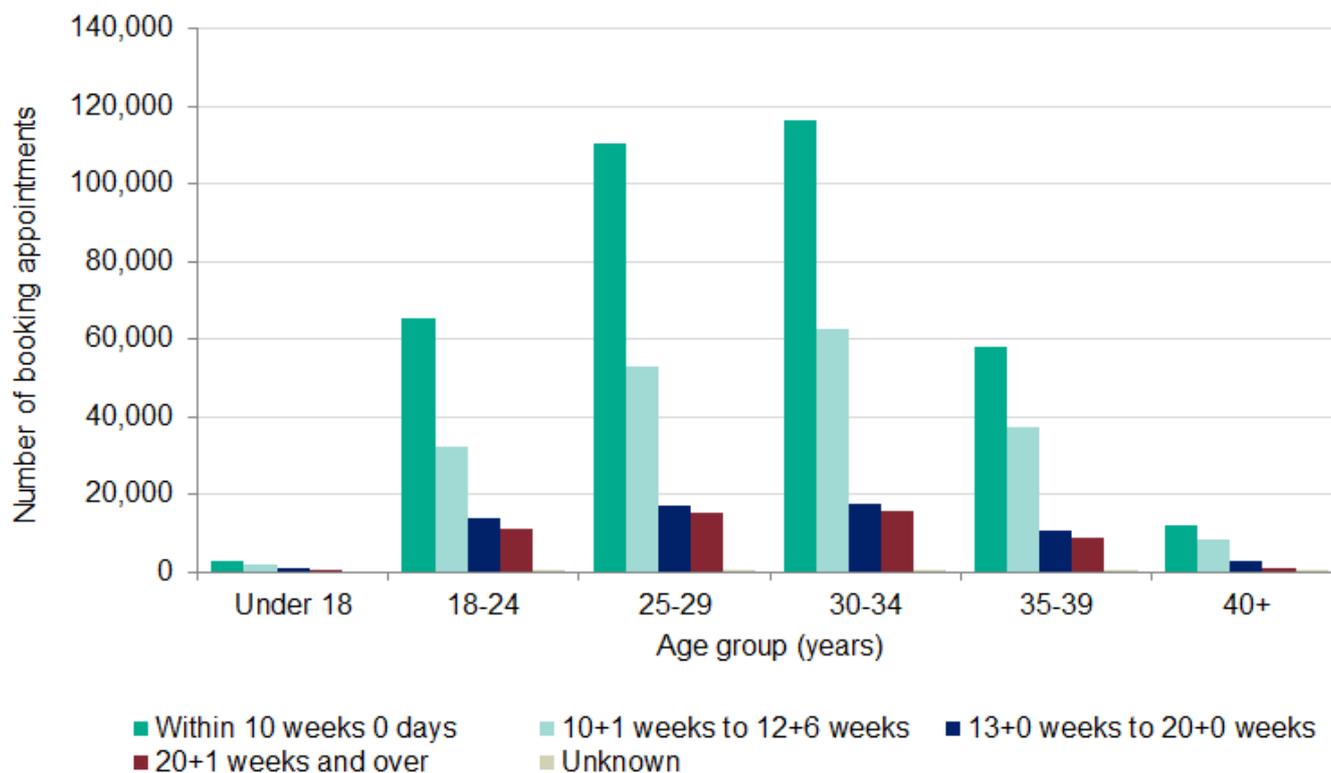


Table A27a: Timing of maternity booking appointment by age of mother, appointments January to December 2017

Age	Within 10 weeks 0 days	10 ⁺¹ weeks to 12 ⁺⁶ weeks	13 ⁺⁰ weeks to 20 ⁺⁰ weeks	20 ⁺¹ weeks and over	Unknown
Under 18	2,940	1,765	945	325	0
18 to 24	65,440	32,085	13,795	11,165	110
25 to 29	110,310	52,760	16,870	15,025	210
30 to 34	116,190	62,575	17,425	15,760	195
35 to 39	57,975	37,310	10,800	8,795	100
40+	12,035	8,320	2,730	1,100	10

Figure A27b: Timing of maternity booking appointment by age of mother, appointments January to December 2017 (as proportion of total in age range)

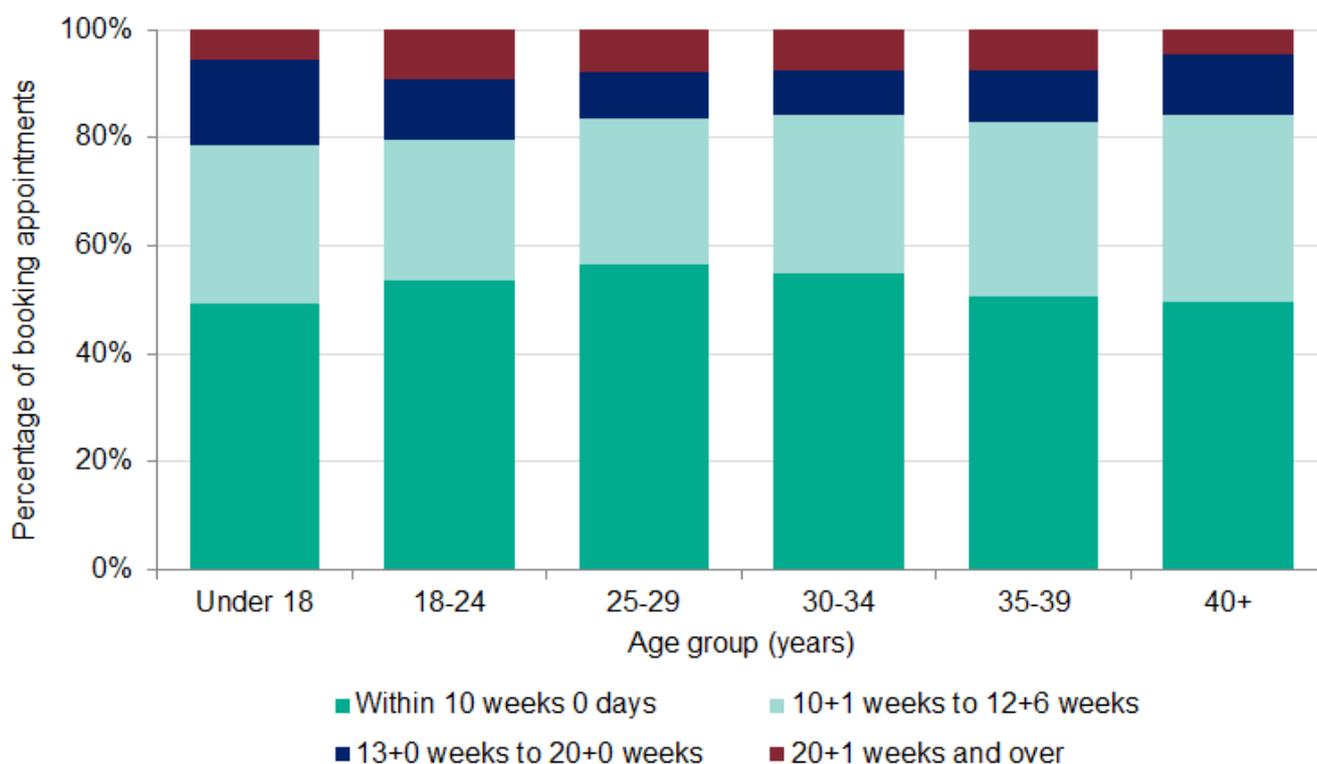


Table A27b: Timing of maternity booking appointment by age of mother, appointments January to December 2017 (as proportion of total in age range)

Age	Within 10 weeks 0 days	10 ⁺¹ weeks to 12 ⁺⁶ weeks	13 ⁺⁰ weeks to 20 ⁺⁰ weeks	20 ⁺¹ weeks and over	All known timing categories
Under 18	49.2%	29.5%	15.8%	5.4%	100%
18 to 24	53.4%	26.2%	11.3%	9.1%	100%
25 to 29	56.6%	27.1%	8.7%	7.7%	100%
30 to 34	54.8%	29.5%	8.2%	7.4%	100%
35 to 39	50.5%	32.5%	9.4%	7.7%	100%
40+	49.8%	34.4%	11.3%	4.5%	100%

Figure A28a: Timing of maternity booking appointment by decile of deprivation of mother’s residence, appointments January to December 2017

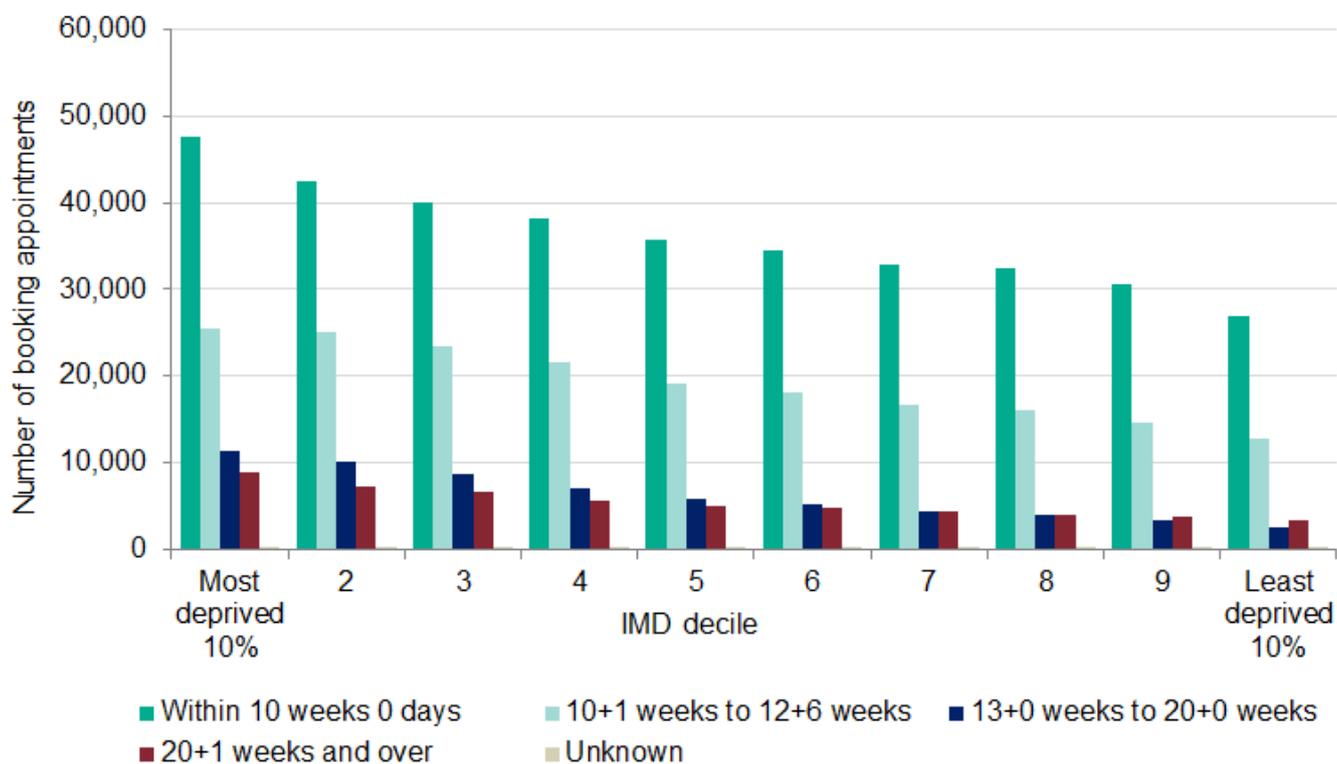


Table A28a: Timing of maternity booking appointment by decile of deprivation of mother’s residence, appointments January to December 2017

Deprivation decile	Within 10 weeks 0 days	10 ⁺¹ weeks to 12 ⁺⁶ weeks	13 ⁺⁰ weeks to 20 ⁺⁰ weeks	20 ⁺¹ weeks and over	Unknown
Most deprived	47,690	25,505	11,340	8,855	125
2	42,465	25,065	10,015	7,265	80
3	39,945	23,435	8,670	6,590	85
4	38,100	21,585	7,040	5,655	60
5	35,705	19,040	5,755	4,940	55
6	34,395	18,015	5,210	4,710	60
7	32,940	16,585	4,385	4,380	35
8	32,380	15,990	4,000	4,050	35
9	30,580	14,630	3,395	3,825	55
Least deprived	26,870	12,840	2,615	3,330	40

Figure A28b: Timing of maternity booking appointment by decile of deprivation of mother’s residence, appointments January to December 2017 (as proportion of total in decile)

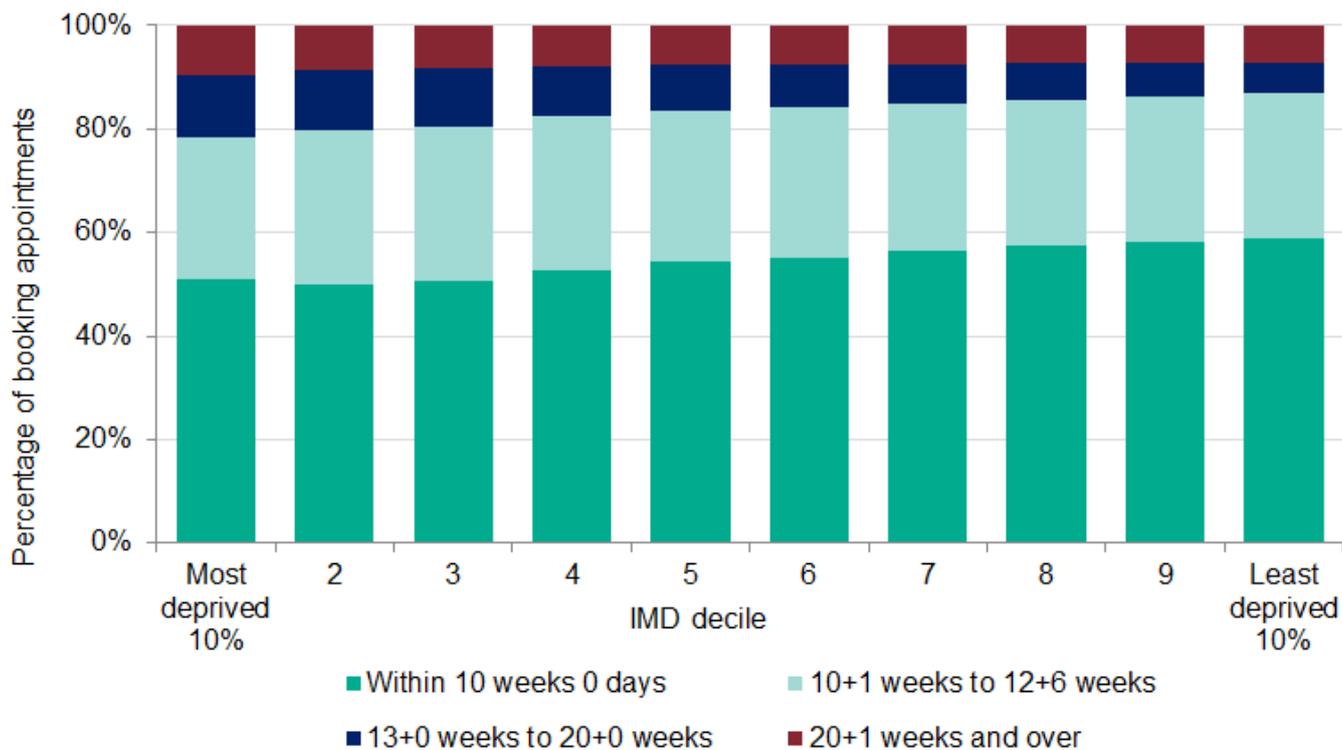


Table A28b: Timing of maternity booking appointment by decile of deprivation of mother’s residence, appointments January to December 2017(as proportion of total in decile)

Deprivation decile	Within 10 weeks 0 days	10 ⁺¹ weeks to 12 ⁺⁶ weeks	13 ⁺⁰ weeks to 20 ⁺⁰ weeks	20 ⁺¹ weeks and over	All known timing categories
Most deprived	51.1%	27.3%	12.1%	9.5%	100%
2	50.1%	29.6%	11.8%	8.6%	100%
3	50.8%	29.8%	11.0%	8.4%	100%
4	52.6%	29.8%	9.7%	7.8%	100%
5	54.6%	29.1%	8.8%	7.5%	100%
6	55.2%	28.9%	8.4%	7.6%	100%
7	56.5%	28.5%	7.5%	7.5%	100%
8	57.4%	28.3%	7.1%	7.2%	100%
9	58.3%	27.9%	6.5%	7.3%	100%
Least deprived	58.9%	28.1%	5.7%	7.3%	100%

Figure A29a: Timing of maternity booking appointment by mother’s ethnicity (excluding White for ease of interpretation), appointments January to December 2017

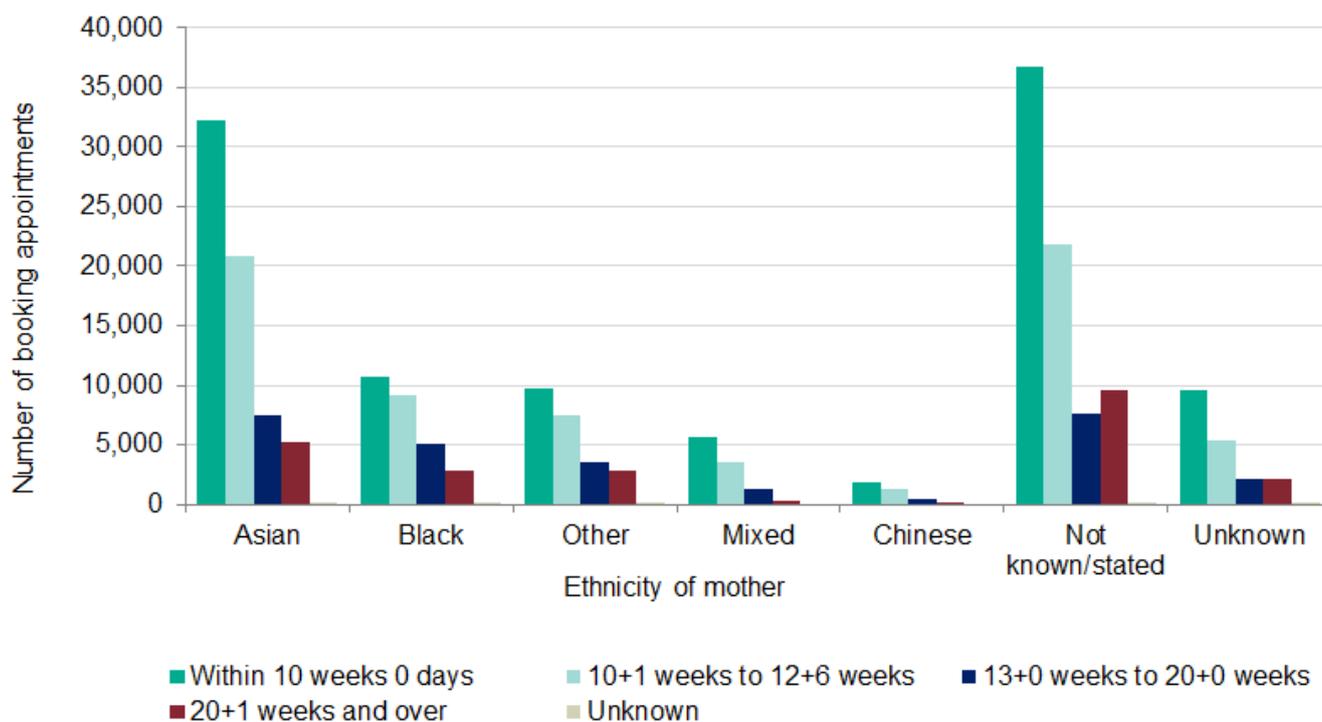


Table A29a: Timing of maternity booking appointment by mother’s ethnicity, appointments January to December 2017

Ethnicity	Within 10 weeks 0 days	10 ⁺¹ weeks to 12 ⁺⁶ weeks	13 ⁺⁰ weeks to 20 ⁺⁰ weeks	20 ⁺¹ weeks and over	Unknown
Asian	32,230	20,795	7,460	5,205	55
Black	10,685	9,190	5,095	2,780	15
Other	9,705	7,465	3,470	2,825	15
Mixed	5,600	3,510	1,235	315	0
Chinese	1,840	1,340	455	150	0
Not known/stated	36,800	21,805	7,655	9,575	70
Unknown	9,615	5,330	2,150	2,160	25
White ¹	260,740	126,090	35,575	29,505	440

¹ Not shown on chart

Figure A29b: Timing of maternity booking appointment by mother’s ethnicity, appointments January to December 2017 (as proportion of total in ethnic group)

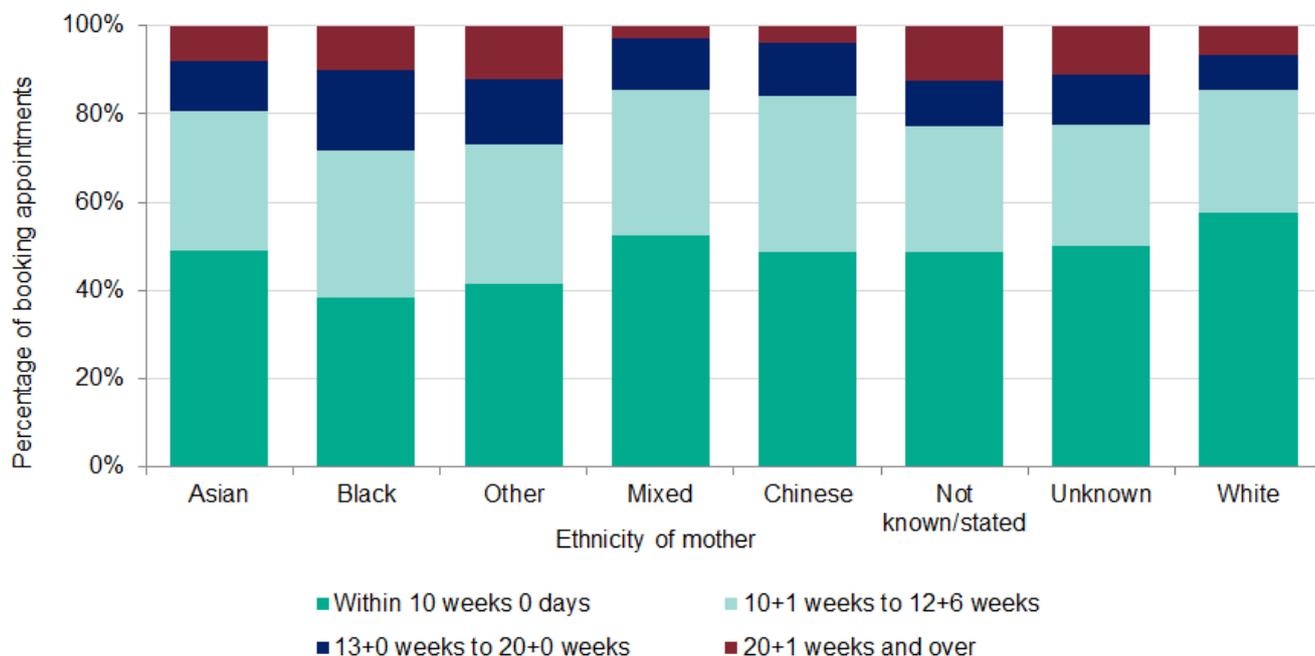


Table A29b: Timing of maternity booking appointment by mother's ethnicity, appointments January to December 2017 (as proportion of total in ethnic group)

Ethnicity	Within 10 weeks 0 days	10 ⁺¹ weeks to 12 ⁺⁶ weeks	13 ⁺⁰ weeks to 20 ⁺⁰ weeks	20 ⁺¹ weeks and over	All known timing categories
Asian	49.1%	31.7%	11.4%	7.9%	100%
Black	38.5%	33.1%	18.4%	10.0%	100%
Other	41.4%	31.8%	14.8%	12.0%	100%
Mixed	52.5%	32.9%	11.6%	3.0%	100%
Chinese	48.6%	35.4%	12.0%	4.0%	100%
Not known/stated	48.5%	28.8%	10.1%	12.6%	100%
Unknown	49.9%	27.7%	11.2%	11.2%	100%
White	57.7%	27.9%	7.9%	6.5%	100%

Appendix 3: First and subsequent pregnancy

Figure A30a: All maternity booking appointments in 2017, first and subsequent pregnancy – age of mother

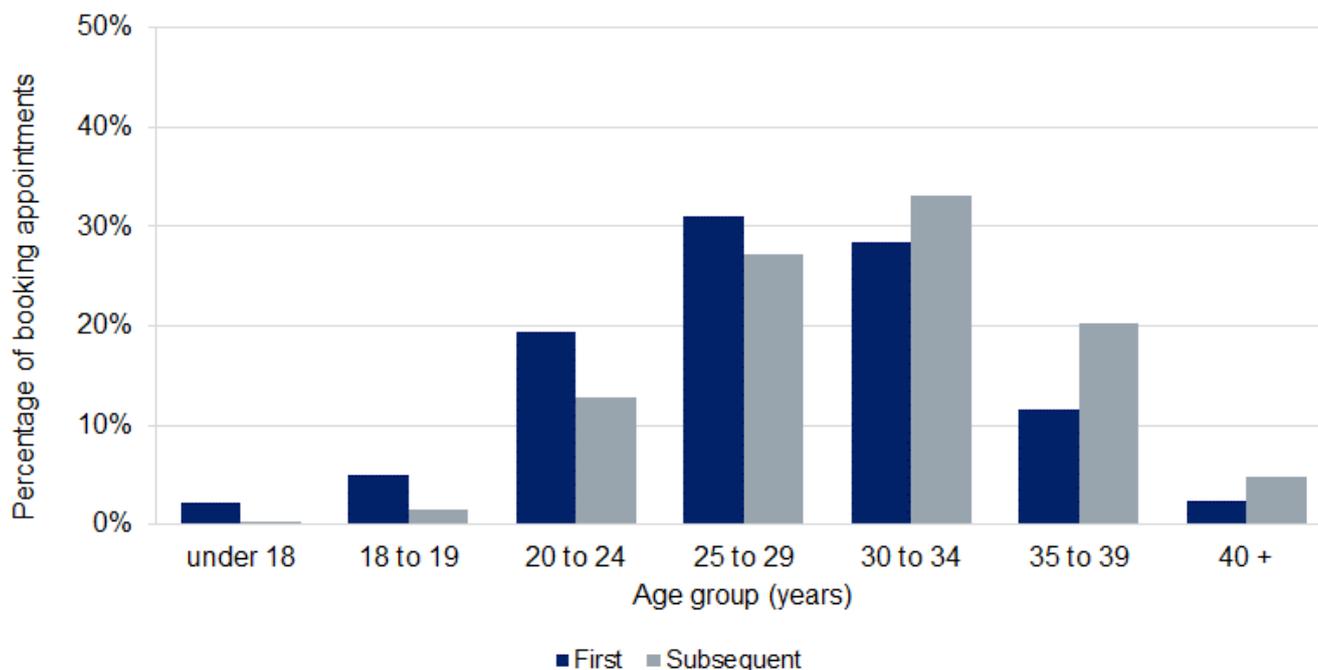


Table A30a: All maternity booking appointments in 2017, first and subsequent pregnancy – age of mother

Pregnancy	Age of mother (years)							Total
	under 18	18 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 +	
First	4,035	9,320	36,240	58,315	53,250	21,870	4,510	187,540
(%)	2%	5%	19%	31%	28%	12%	2%	
Subsequent	1,235	5,570	45,945	97,970	119,020	72,965	17,300	360,005
(%)	0%	2%	13%	27%	33%	20%	5%	

Figure A30b: All maternity booking appointments in 2017, first and subsequent pregnancy – percentage living in most deprived quintile

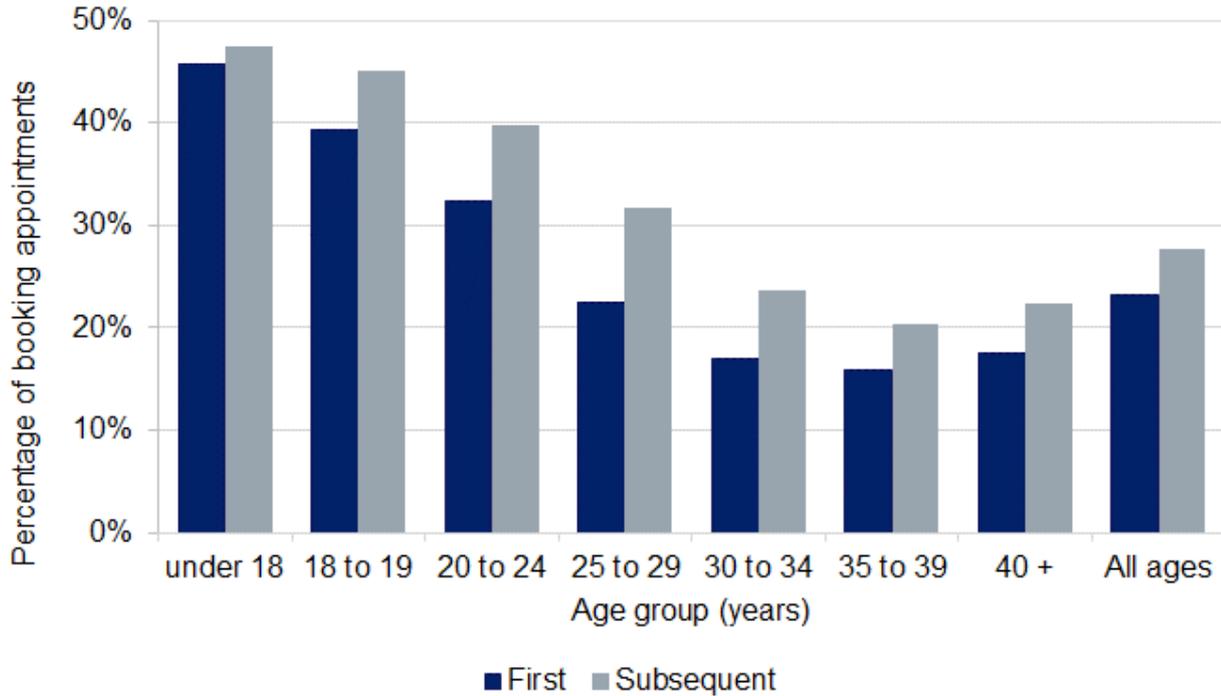


Figure A30c: All maternity booking appointments in 2017, first and subsequent pregnancy – percentage with complex social factors

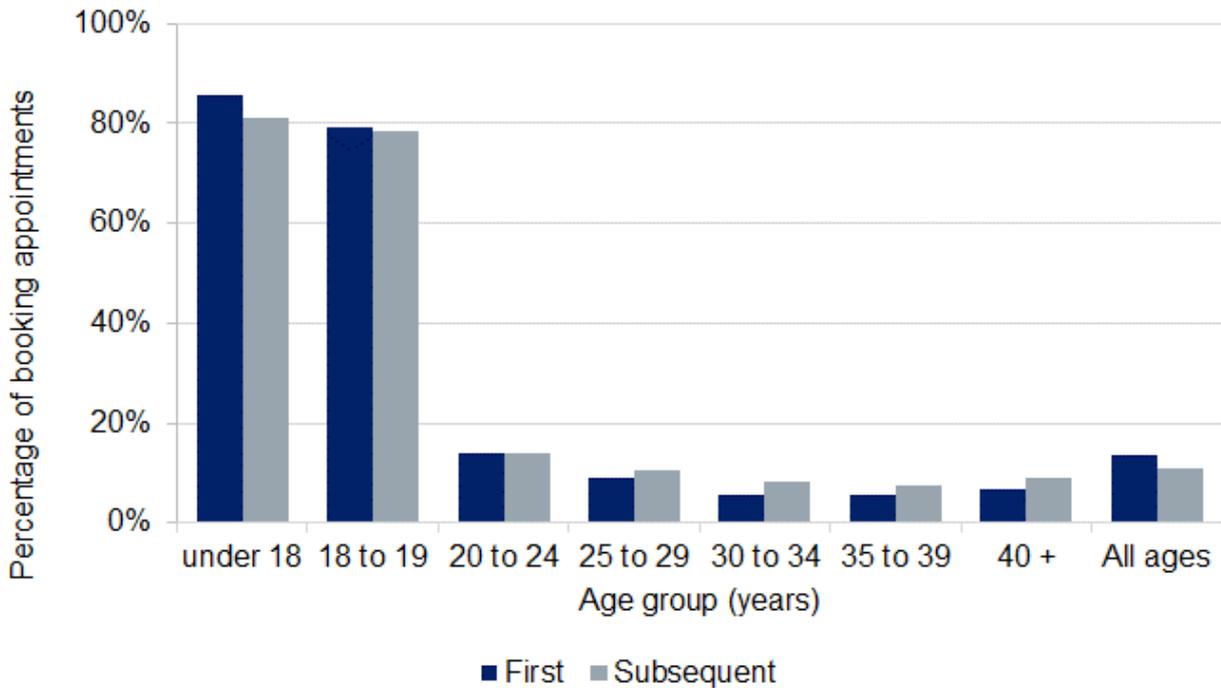


Figure A30d: All maternity booking appointments in 2017, first and subsequent pregnancy – percentage who are obese (BMI>30kg/m²)

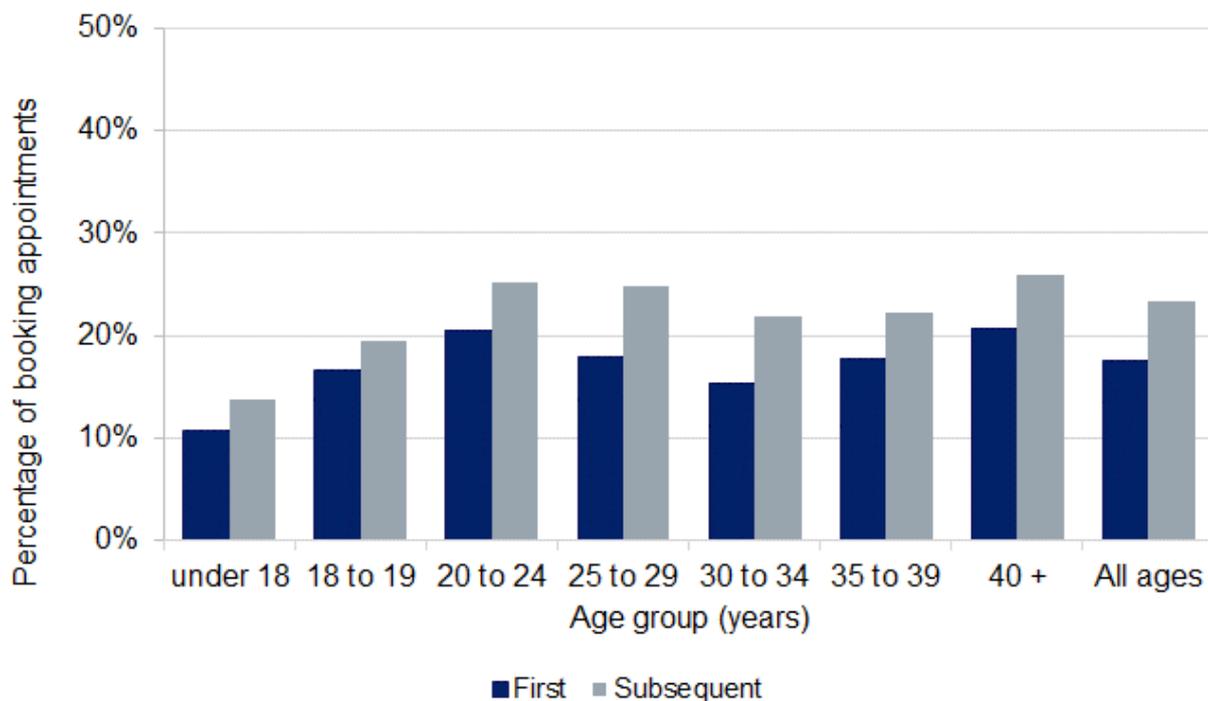


Table A30b: All maternity booking appointments in 2017, first and subsequent pregnancy – background factors (deprivation, social factors, BMI), where status is known

Age group	Background factors where status is known					
	Percentage in most deprived quintile		Percentage with complex social factors		Percentage obese (BMI>30 kg/m ²)	
	First	Subsequent	First	Subsequent	First	Subsequent
under 18	46	48	86	81	11	14
18 to 19	39	45	79	79	17	19
20 to 24	32	40	14	14	20	25
25 to 29	22	32	9	11	18	25
30 to 34	17	24	6	8	15	22
35 to 39	16	20	5	7	18	22
40 +	17	22	7	9	21	26
All ages	23	28	14	11	18	23

Figure A31a: All maternity booking appointments in 2017, first and subsequent pregnancy – women taking folic acid supplements

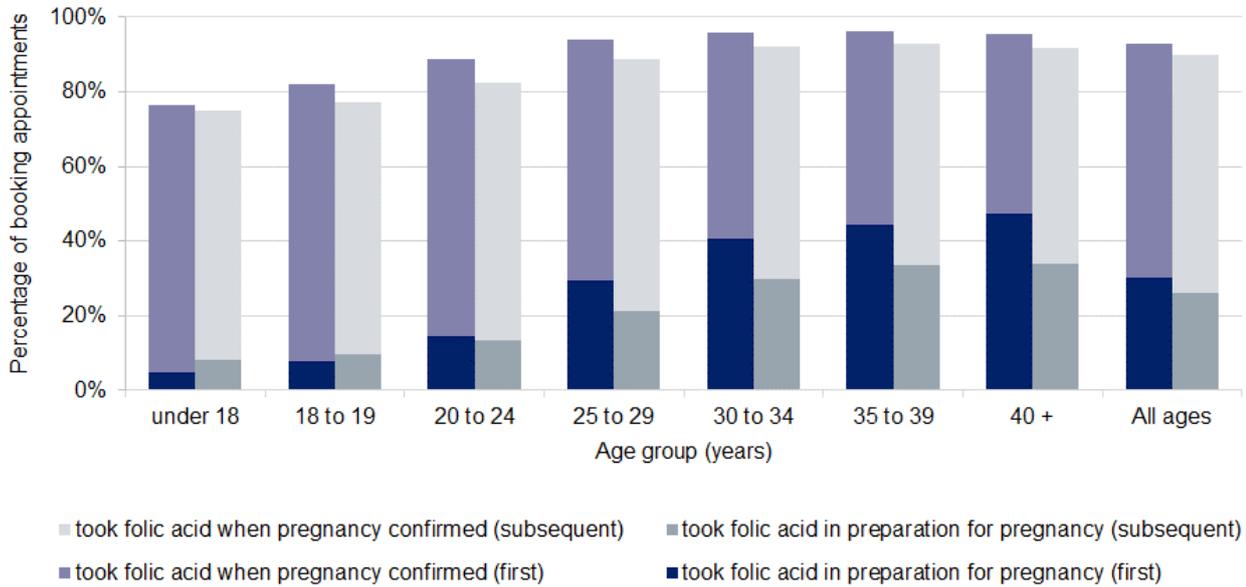


Figure A31b: All maternity booking appointments in 2017, first and subsequent pregnancy – women who did not take folic acid supplements

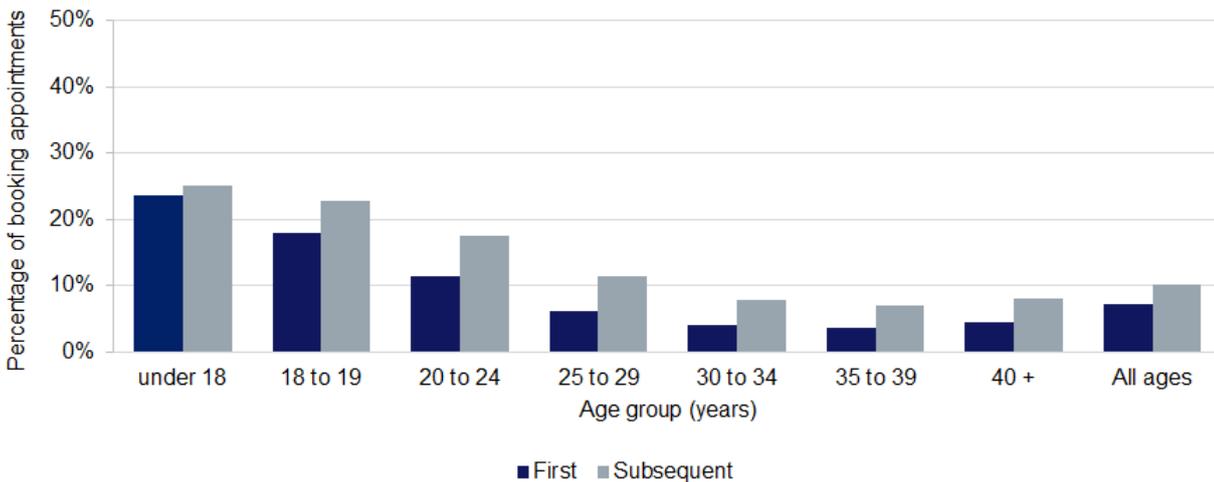


Table A31a: All maternity booking appointments in 2017, first and subsequent pregnancy – folic acid supplements

Age group	Percentage of mothers with a known folic acid supplement use					
	took in preparation for pregnancy		took when pregnancy confirmed		did not take a folic acid supplement	
	First	Subsequent	First	Subsequent	First	Subsequent
under 18	5	8	71	67	24	25
18 to 19	8	10	74	67	18	23
20 to 24	15	13	74	69	11	17
25 to 29	29	21	64	67	6	11
30 to 34	41	30	55	62	4	8
35 to 39	44	34	52	59	4	7
40 +	47	34	48	58	5	8
All ages	30	26	63	64	7	10

Figure A32a: All maternity booking appointments in 2017, first and subsequent pregnancy – women who quit smoking

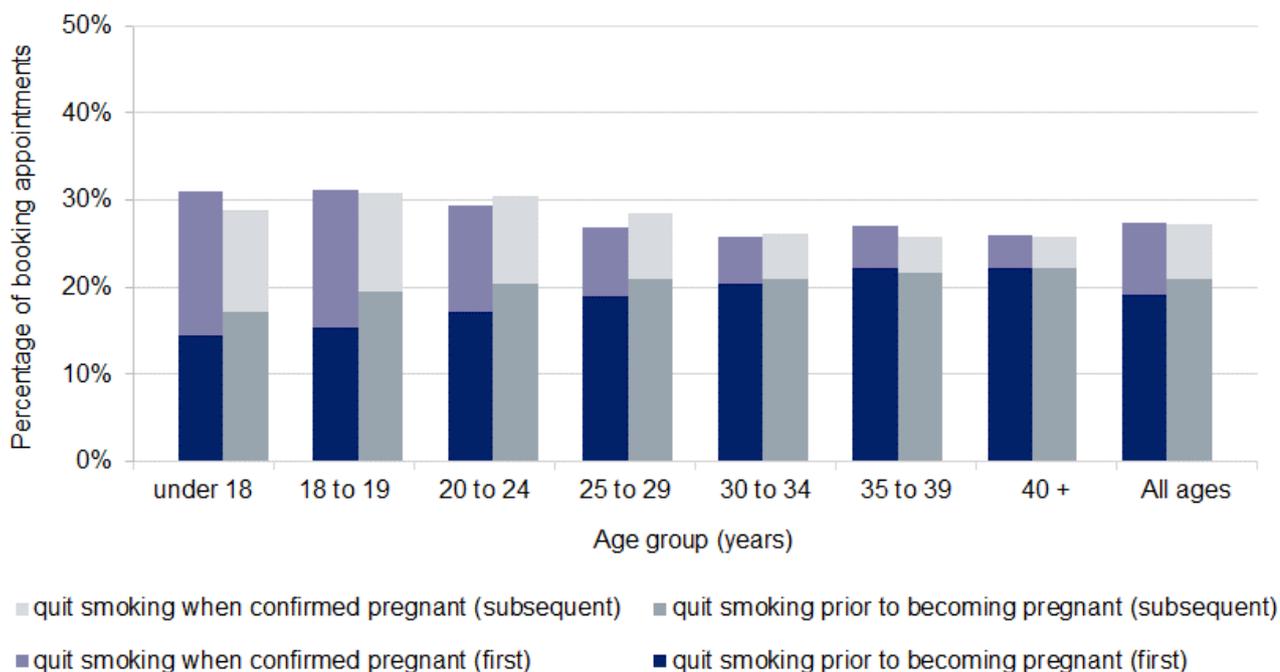


Figure A32b: All maternity booking appointments in 2017, first and subsequent pregnancy – women who continued to smoke

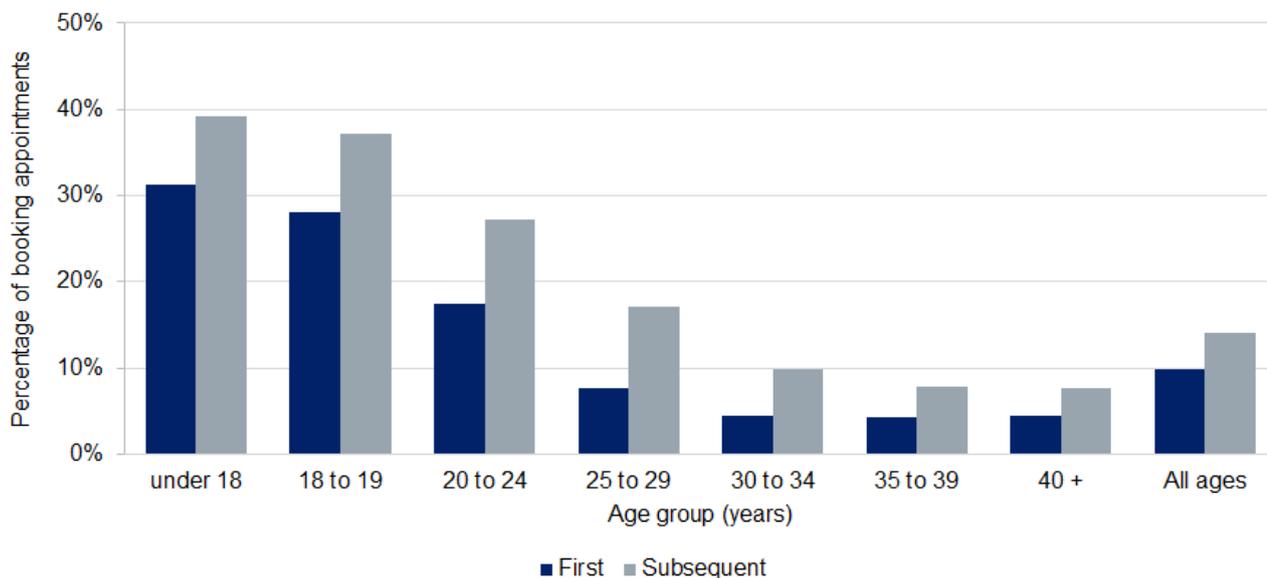


Table A32a: All maternity booking appointments in 2017, first and subsequent pregnancy – smoking status

Age group	Percentage of mothers with a known smoking status					
	quit prior to becoming pregnant		quit when confirmed pregnant		continued to smoke during pregnancy	
	First	Subsequent	First	Subsequent	First	Subsequent
under 18	14	17	16	12	31	39
18 to 19	15	20	16	11	28	37
20 to 24	17	20	12	10	18	27
25 to 29	19	21	8	8	8	17
30 to 34	20	21	5	5	4	10
35 to 39	22	22	5	4	4	8
40 +	22	22	4	4	4	8
All ages	19	21	8	6	10	14

Appendix 4: Comparison to health of all women

Table A33a: Comparison of women aged 16 to 44 in MSDS and HSE

		Number (%)		
		MSDS	HSE	ONS
Sample size		648,650	5,559	10,285,061
Age group (years)	16 to 19	24,335 (3.8)	547 (9.8)	1,231,971 (12.0)
	20 to 24	99,410 (15.3)	666 (12.0)	1,715,727 (16.7)
	25 to 29	187,065 (28.8)	950 (17.1)	1,893,293 (18.4)
	30 to 34	203,595 (31.4)	1,097 (19.7)	1,882,520 (18.3)
	35 to 39	110,785 (17.1)	1,130 (20.3)	1,830,167 (17.8)
	40 to 44	23,460 (3.6)	1,169 (21.0)	1,731,383 (16.8)
IMD quintile	Least deprived	93,410 (14.3)	974 (17.5)	1,685,819 (16.4)
	Second least deprived	109,660 (16.8)	939 (16.9)	1,853,834 (18.0)
	Third most deprived	122,590 (18.8)	1,046 (18.8)	2,025,557 (19.7)
	Second most deprived	145,380 (22.3)	1,152 (20.7)	2,347,745 (22.8)
	Most deprived	171,085 (26.2)	1,448 (26.0)	2,372,106 (23.1)
	Unknown	10,155 (1.6)	0 (0.0)	0 (0.0)
Ethnicity	White	434,435 (65.9)	4,539 (81.7)	Not available
	Black	27,560 (4.2)	225 (4.0)	
	Asian	68,550 (10.4)	578 (10.4)	
	Mixed	11,565 (1.8)	125 (2.2)	
	Other	23,230 (3.5)	80 (1.4)	
	Unknown	94,060 (14.3)	12 (0.2)	
Smoking status	Smoker	74,250 (11.2)	1,126 (20.3)	Not available
	Non-smoker	510,025 (76.7)	4,366 (78.5)	
	Unknown	81,015 (12.2)	67 (1.2)	
BMI	Underweight	24,245 (3.7)	136 (2.4)	Not available
	Healthy weight	250,525 (37.8)	2,187 (39.3)	
	Overweight	147,605 (22.3)	1,284 (23.1)	
	Obese	116,060 (17.5)	1,032 (18.6)	
	Unknown	123,995 (18.7)	920 (16.5)	

Figure A34a: comparison of age group between the datasets

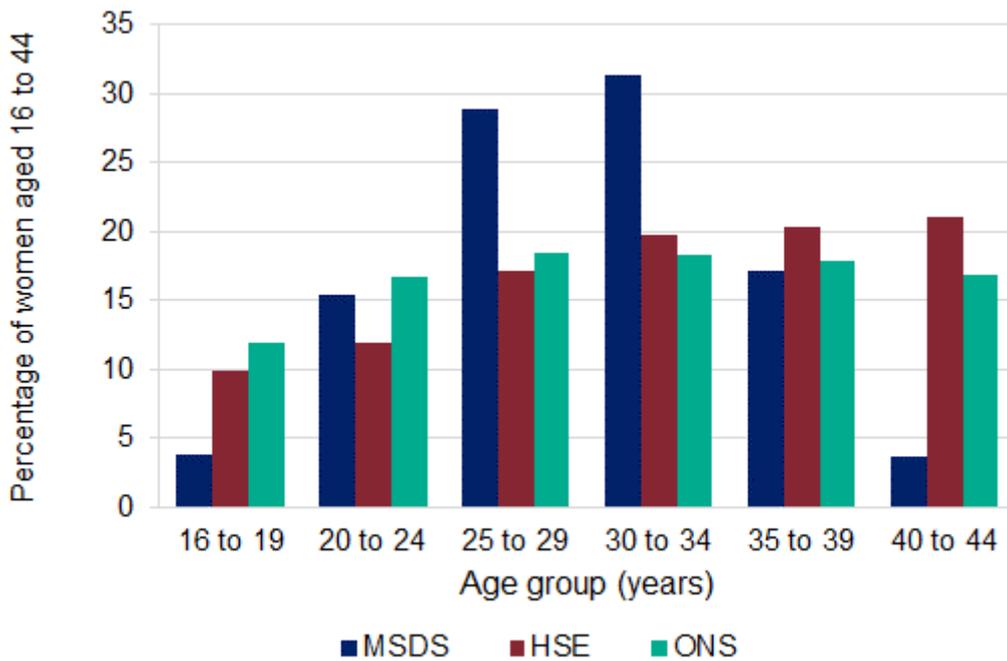


Figure A35a: comparison of deprivation quintiles between the datasets

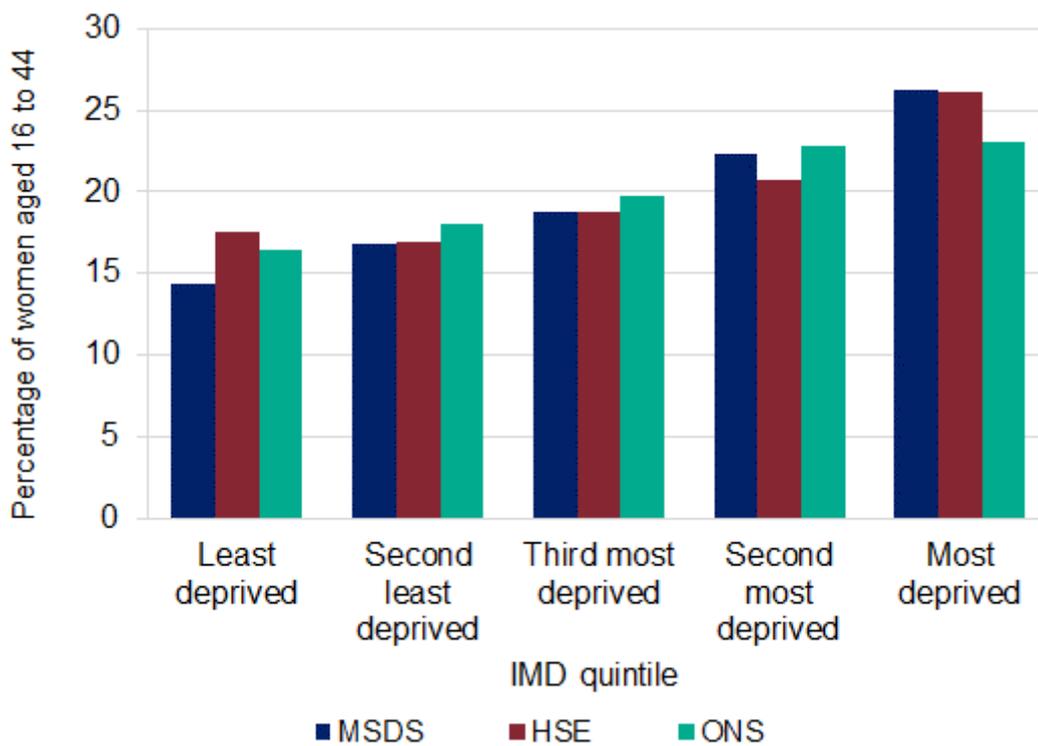


Figure A36a: proportion of women aged 16 to 44 who were smokers by age of mother

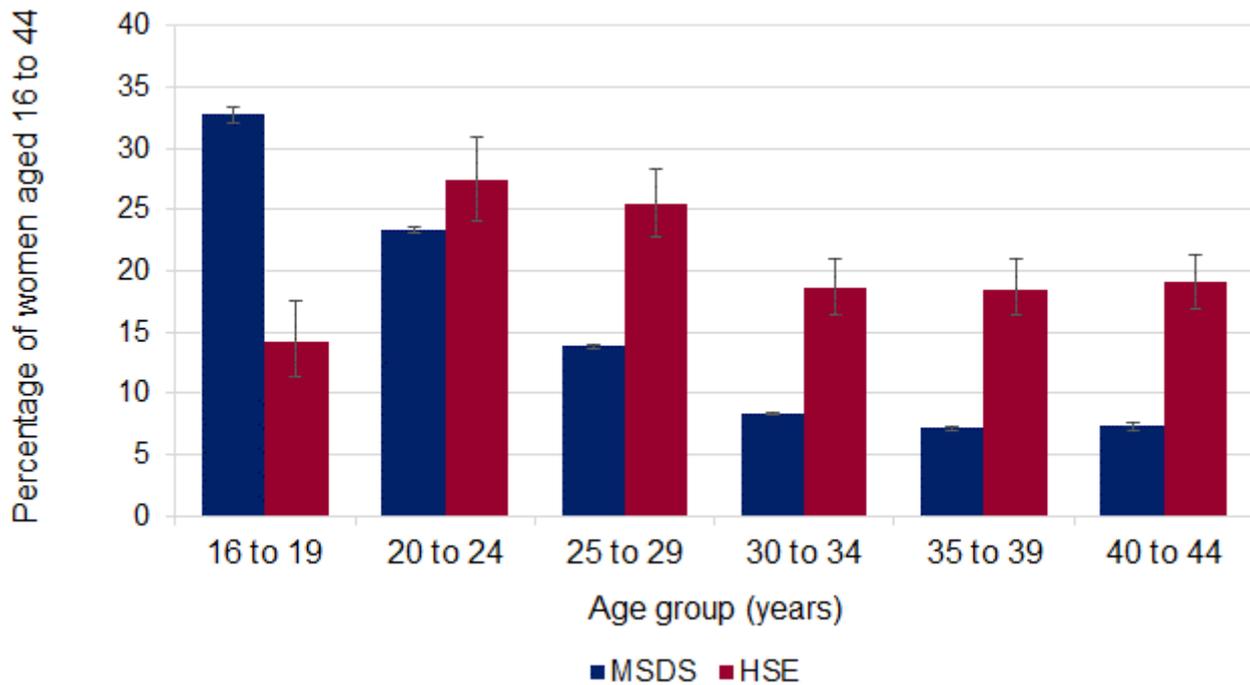


Table A36a: proportion of women aged 16 to 44 who were smokers by age of mother

Dataset	Age group (years)					
	16 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44
MSDS	32.7	23.4	13.8	8.3	7.2	7.3
HSE	14.1	27.4	25.4	18.6	18.5	19.0

Figure A37a: proportion of women aged 16 to 44 who were smokers by deprivation quintile

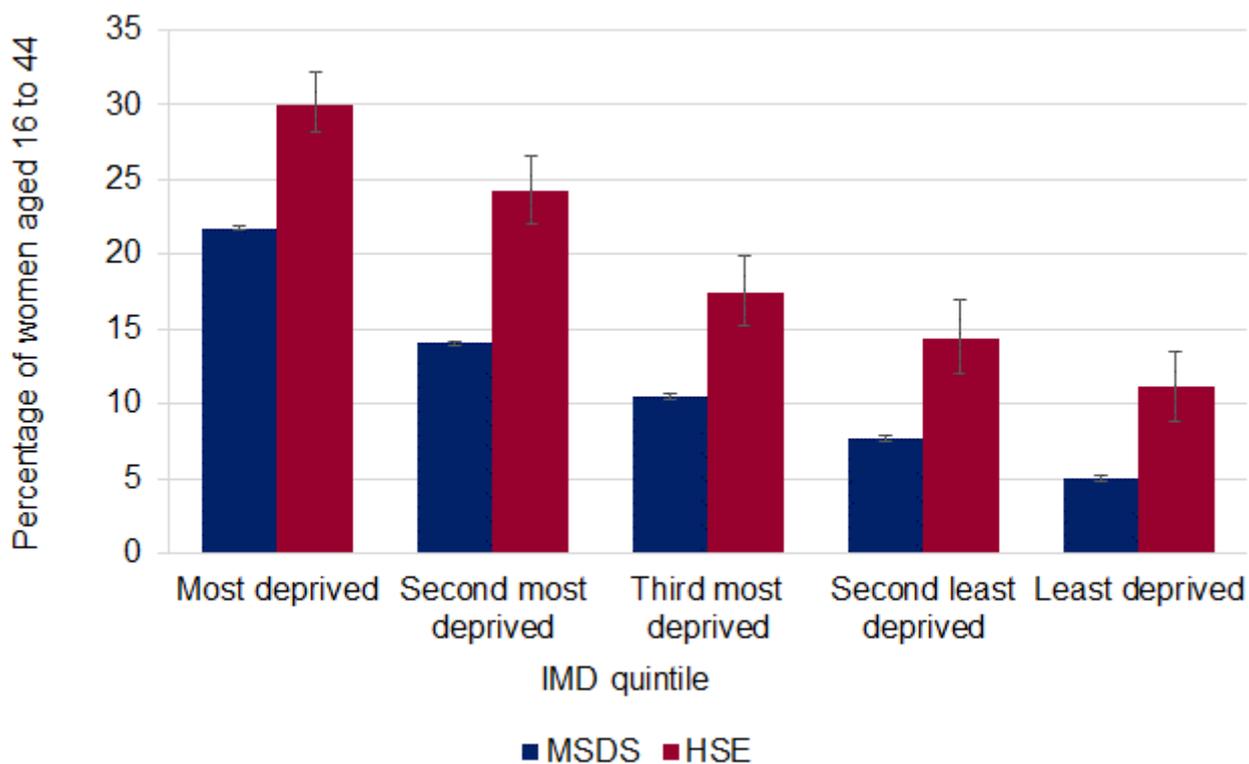


Table A37a: proportion of women aged 16 to 44 who were smokers by deprivation quintile

Dataset	Deprivation quintile				
	Most deprived	Second most deprived	Third most deprived	Second least deprived	Least deprived
MSDS	21.7	14.1	10.4	7.7	5.0
HSE	30.0	24.2	17.5	14.4	11.1

Figure A37b: proportion of women aged 16 to 44 who were smokers by deprivation quintile and age group

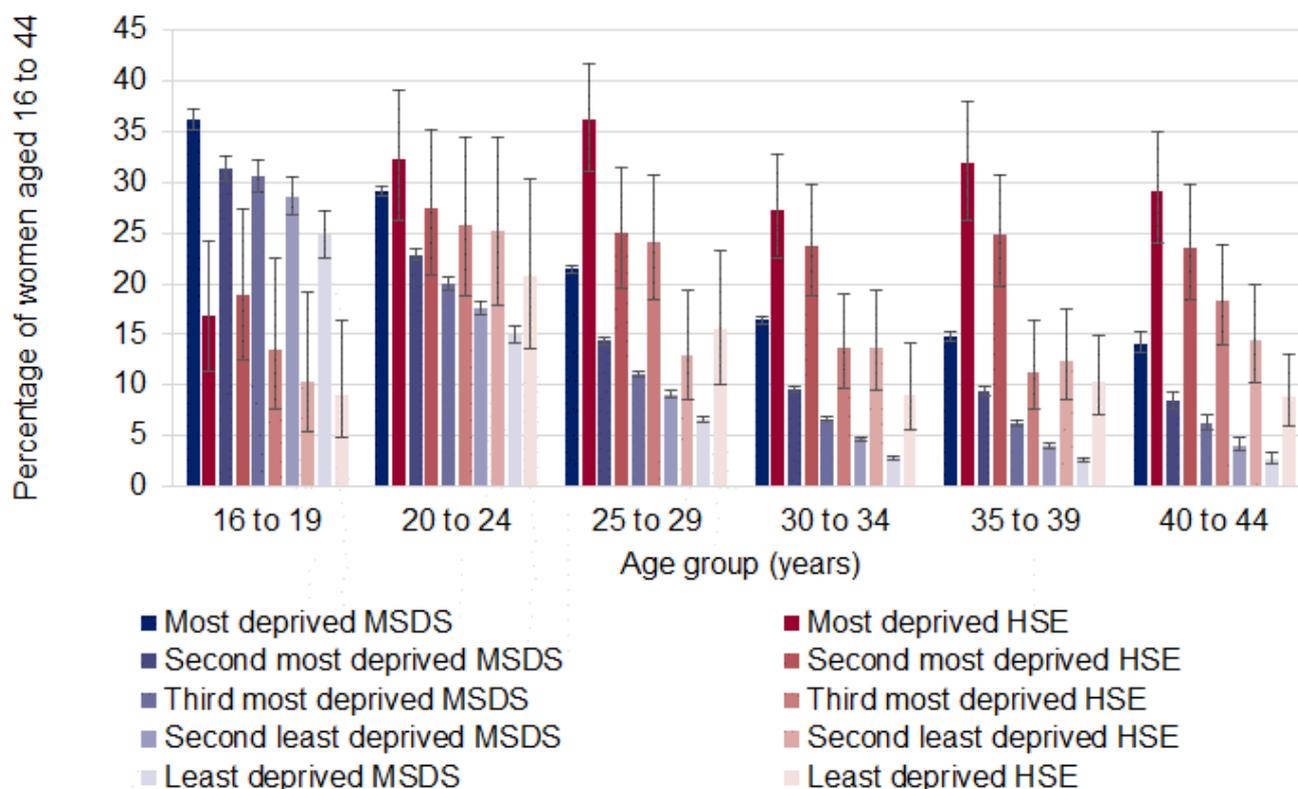


Table A37b: proportion of women aged 16 to 44 who were smokers by deprivation quintile and age group

IMD quintile		Age group (years)					
		16 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44
Most deprived	MSDS	36.2	29.1	21.4	16.5	14.8	14.1
	HSE	16.8	32.3	36.2	27.3	31.8	29.1
Second most deprived	MSDS	31.4	22.8	14.3	9.7	9.4	8.5
	HSE	18.9	27.4	25.0	23.8	24.8	23.6
Third most deprived	MSDS	30.6	19.9	11.1	6.7	6.2	6.3
	HSE	13.4	25.8	24.0	13.7	11.3	18.4
Second least deprived	MSDS	28.6	17.6	9.1	4.7	4.0	4.1
	HSE	10.4	25.2	13.0	13.7	12.3	14.4
Least deprived	MSDS	24.8	15.0	6.6	2.9	2.6	2.8
	HSE	9.1	20.7	15.5	9.0	10.3	8.8

Figure A38a: proportion of women aged 16 to 44 who were smokers by ethnic group

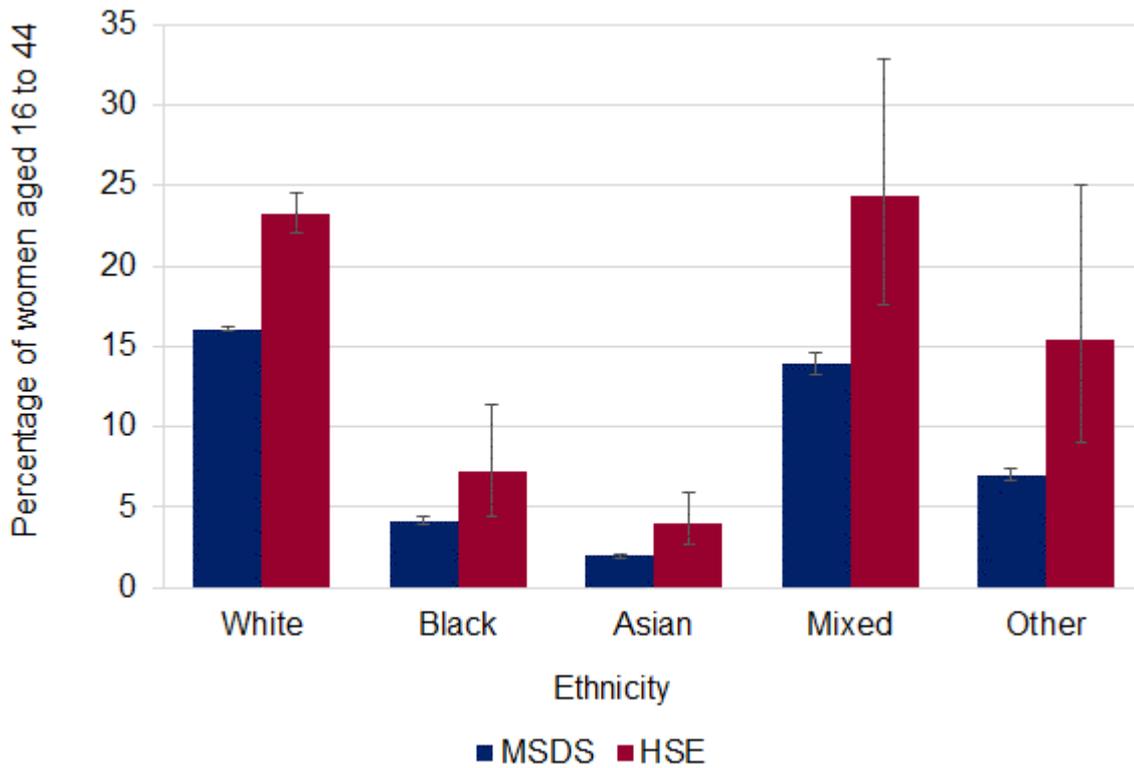


Table A38a: proportion of women aged 16 to 44 who were smokers by ethnic group

Dataset	Ethnic group				
	White	Black	Asian	Mixed	Other
MSDS	16.1	4.2	2.0	13.9	7.0
HSE	23.3	7.2	4.0	24.4	15.4

Figure A39a: proportion of women aged 16 to 44 who were obese by age of mother

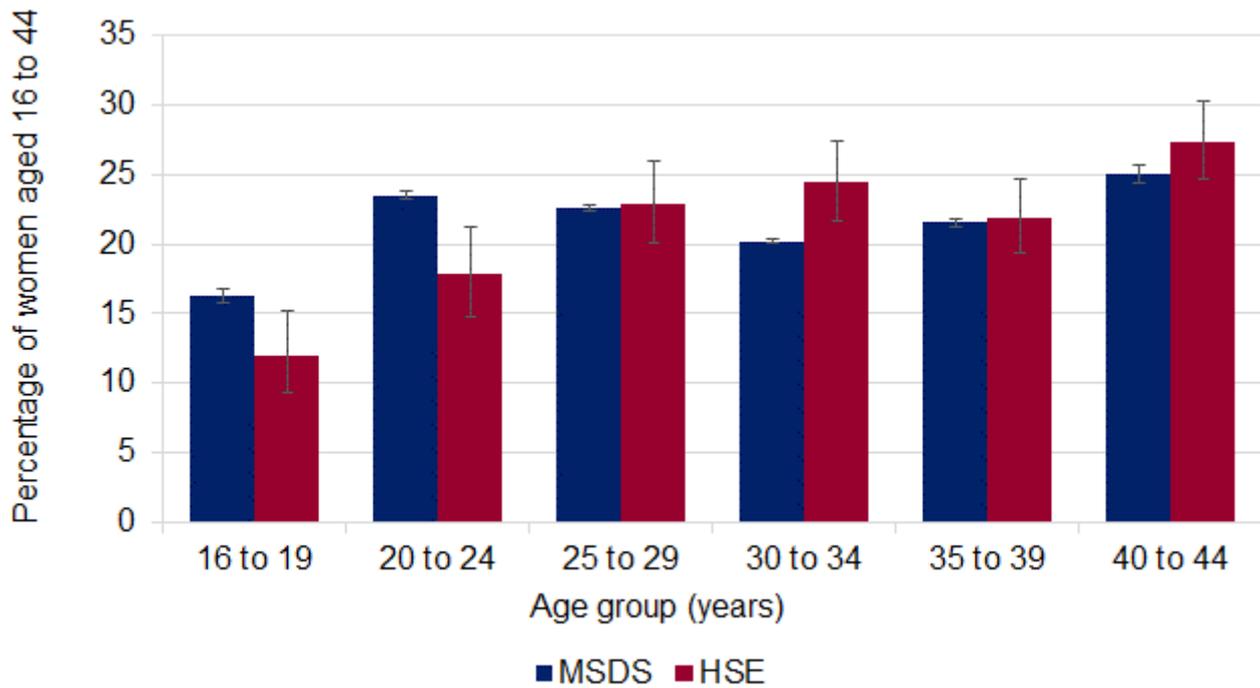


Table A39a: proportion of women aged 16 to 44 who were obese by age of mother

Dataset	Age group (years)					
	16 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44
MSDS	16.3	23.5	22.6	20.2	21.5	25.1
HSE	11.9	17.8	22.9	24.4	21.9	27.4

Figure A40a: proportion of women aged 16 to 44 who were obese by deprivation quintile

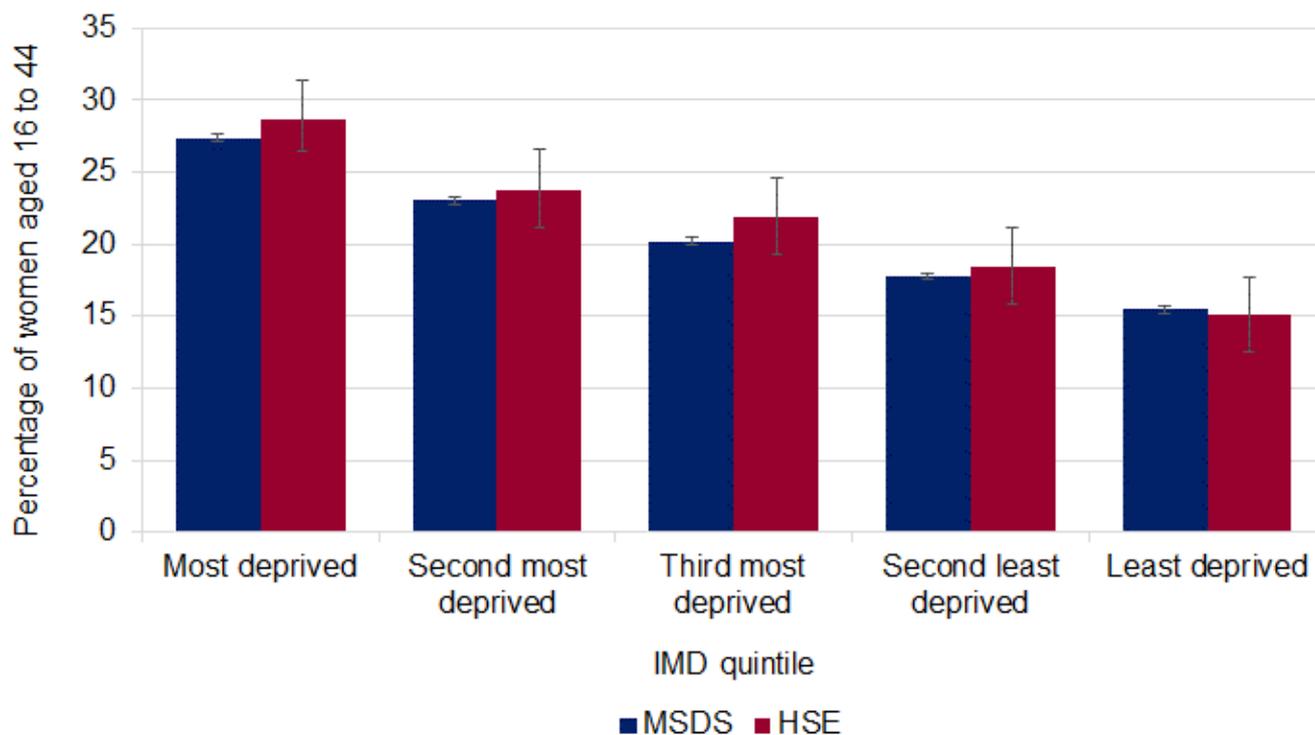


Table A40a: proportion of women aged 16 to 44 who were obese by deprivation quintile

Dataset	Deprivation quintile				
	Most deprived	Second most deprived	Third most deprived	Second least deprived	Least deprived
MSDS	27.4	23.1	20.2	17.8	15.5
HSE	28.7	23.7	21.8	18.4	15.1

Figure A41a: proportion of women aged 16 to 44 who were obese by ethnic group

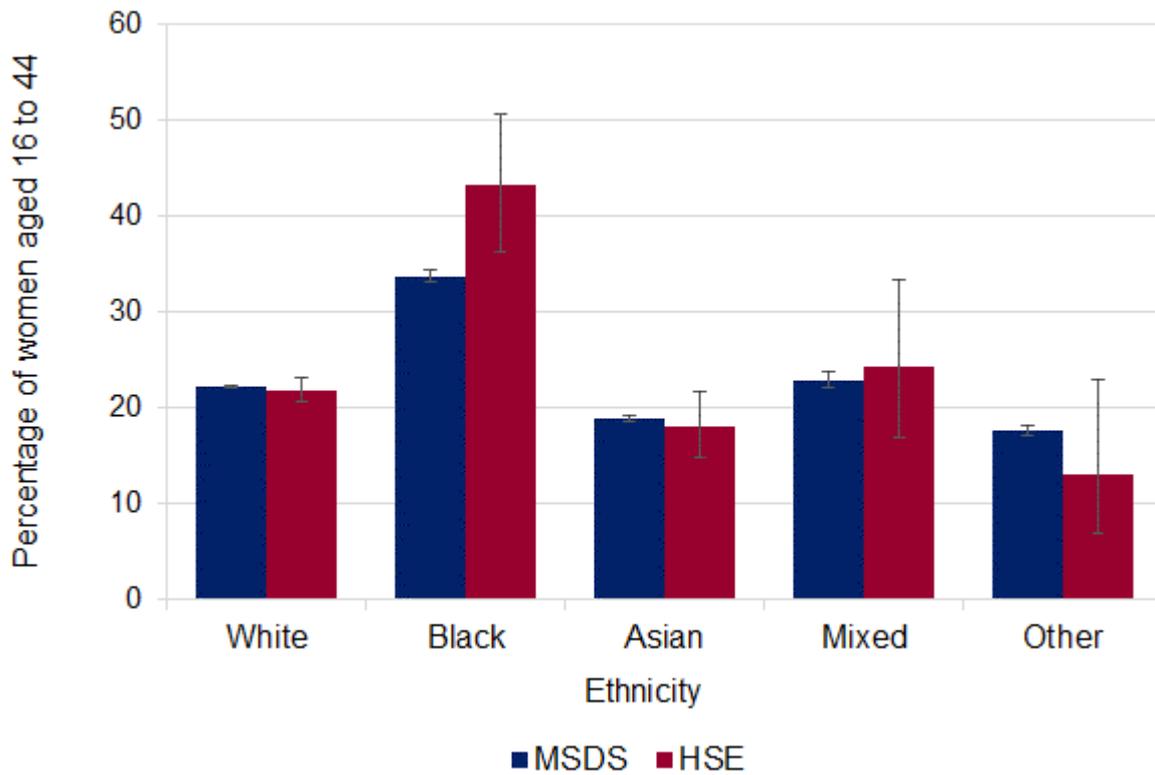


Table A41a: proportion of women aged 16 to 44 who were obese by ethnic group

Dataset	Ethnic group				
	White	Black	Asian	Mixed	Other
MSDS	22.2	33.7	19.0	22.9	17.6
HSE	21.9	43.3	18.1	24.3	13.0