

Health Equity Audit

Smoking in Pregnancy in Nottingham City

November 2016

Authors:

Khai Fam
Helene Denness
Jean Robinson
David Millington
Samad Abdul

Contents

Table of figures	3
Tables of tables	3
Glossary.....	5
1. Background	9
2. Aim and objectives.....	10
3. Literature review.....	11
4. Methodology.....	13
4.1 Data analysis	13
5. Local services	15
6. Data analysis	16
6.1 Age groups and Deprivation Quintiles	17
6.2 Ethnicity	22
6.1.1 New Leaf smoking cessation programme	22
6.1.2 Smoking at time of delivery	23
6.3 New Leaf services distribution	26
6.4 Area and modes of referral.....	29
7. Conclusion.....	32
8. Limitations.....	33
8.1 Data.....	33
8.2 Nottingham Citizen Survey	34
9. Recommendations	34
Appendix 1	35
10. References	37

Table of figures

Figure 1: Health Equity Audit Cycle.....	13
Figure 2: Flowchart of Pregnant Smokers accessing New Leaf services. Percentages estimated from JSNA Pregnancy 2015 and ONS Mid-Year Population Estimates 2014.....	16
Figure 3: Flow chart of pregnant women who did not access New Leaf’s smoking cessation program following referral. Data provided by New Leaf Intelligence (April 2013-March 2015).....	16
Figure 4: Proportion of smokers in each age group (in percentages) among pregnant and non-pregnant women. Source: New Leaf Data April 2013 – March 2015.....	19
Figure 5: 4-week quit rates for pregnant female smokers in different Quintiles (adapted from Table 2 in Appendix) Source: New Leaf Data April 2013 – March 2015.....	19
Figure 6: Average 4-week quit rates (percentage of total) by IMD. Source: New Leaf Data April 2013 – March 2015.....	20
Figure 7: Slope Index comparing Deprivation Score (IMD) and 4-week quit rates of pregnant women. Source: New Leaf Data April 2013 – March 2015.....	21
Figure 8: Referrals from New Leaf that were not accessed broken down by age group (percentage in total). Source New Leaf Data April 2013 – March 2015.....	20
Figure 9: Proportion of white and BME groups in the general population of Nottingham, Non-pregnant female smokers and pregnant female smokers. Source: New Leaf Data April 2013 – March 2015.....	22
Figure 10: Proportion of white British and BME pregnant women within Nottingham CCG, smoking status recorded at delivery. Source: Medway Maternity April 2014 - March 2015.....	22
Figure 11: Graph illustrating breakdown of BME groups within the pregnant smoker population (percentage in total). Source: Medway Maternity April 2014 - March 2015.....	23
Figure 12: Choropleth map of the estimated proportion of female BME population in each ward. Percentages of the BME group who smokes superimposed onto the map for comparison. (Nottingham Citizen’s Survey 2011-2015).....	25
Figure 13: Choropleth map of Pregnant & Non-pregnant Female smokers who accessed New Leaf SSS. New Leaf Centres (in green dots) superimposed onto both maps. Source: New Leaf Data April 2013 – March 2015 ...	Error!
Bookmark not defined.	
Figure 14: Comparison of the number of referral by midwives and self-referrals in Nottingham by area. Source: New Leaf Data April 2013 – March 2015.....	29
Figure 15: 4-week quit outcome and Lost Rates when referred by Midwives. Source: New Leaf Data April 2013 – March 2015.....	30
Figure 16: 4-week quit outcome and Lost Rates when self-referred. Source: New Leaf Data April 2013 – March 2015.....	30
Figure 17: Percentage (in total) of referrals that were not accessed by pregnant women by ward location. Source: New Leaf Data April 2013 – March 2015.....	30
Figure 18: Percentage of the total referrals within each ward location that were not accessed. Source: New Leaf Data April 2013 – March 2015.....	30

Tables of tables

Table 1: Number of pregnant and non-pregnant female smokers in their age groups versus their respective quintile (Nottingham). Source: New Leaf Data April 2013 – March 2015.....	18
Table 2: Table showing breakdown of white and BME groups within the pregnant smoker population (percentage in total). Source: Medway Maternity April 2014 - March 2015.....	24
Table 3: Number of the total referrals within each ward location that were not accessed. Table also shows Percentage of total referrals of each individual ward that resulted in no referral to New Leaf. Source: New Leaf Data April 2013 – March 2015.....	32

Table 4: 4-week Quit Outcomes for Pregnant Women by Age Groups. 35

Glossary

Black and Minority Ethnic (BME): Any minority group who have a shared race. These communities consist of diverse ethnic origins and different nationalities, religions, languages and cultural values. This terminology is normally used to describe people of non-white descent.

Carbon monoxide (CO): A colourless, odourless highly poisonous gas found in tobacco smoke and in the lungs of people who have recently smoked or been exposed to tobacco smoke. It is used for biochemical verification of abstinence.

Clinical Commissioning Groups (CCGs): created following the Health and Social Care Act in 2012, they replaced Primary Care Trusts on 1 April 2013. CCGs are clinically-led statutory NHS bodies responsible for the planning and commissioning of health care services for their local area.

Confidence interval: a range of values for a variable of interest with a specified probability of including the true value of the variable. In this report, 95% confidence intervals are used.

Cumulative: increasing in quantity by successive additions.

Demographics: The statistical characteristics of human populations such as age, gender and/or ethnicity.

Deprived areas: Regions or areas characterised by significantly higher levels of unemployment and lower rates of income per head compared with the national average.

Ethnic group: a group of people whose members identify with each other, through a common heritage that is real or assumed or a group of people differentiated from the rest of the community by racial origins or cultural background.

Citizen Survey: A survey of the Nottingham citizens' perceptions on a variety of subjects including quality of life, health and wellbeing, community cohesion, feelings about Nottingham and satisfaction with Nottingham City Council.

Health equity audit (HEA): An assessment of equity of provision of, and access to, healthcare within a population. For example, whether individuals living within a particular town are more or less likely to have access to cardiac investigations compared to those in a similar, neighbouring town.

Health inequalities: An unjust or inequitable distribution of resources in provision or access to health services, between different social classes and ethnic groups, and between populations in different geographical areas, leading to poorer health outcomes.

Health promotion: Strategies and actions to improve the health of a population, through methods such as education or legislation.

Index of multiple deprivations (IMD): A quantitative measure of deprivation for a specific geographic area, such as a super output area (SOA). The deprivation index is measured in certain 'domains' such as employment deprivation.

Joint Strategic Needs Assessment (JSNA): A legal duty of Health and Wellbeing Boards in England to formally assess needs in health and social care, to instruct commissioning of local services. Introduced into the Commissioning Framework for Health and Wellbeing in 2007.

Live birth: A baby that survives the process of labour and is born alive.

Lost rates: Proportion of New Leaf users lost to follow up.

NHS: The National Health Service, the publicly funded healthcare system in the UK.

Office for National Statistics (ONS): is the executive office of the UK Statistics Authority, a non-ministerial department which reports directly to Parliament. ONS is the UK Government's single largest statistical producer. It produces independent information to improve our understanding of the UK's economy and society.

Opt In: Patients /service users are by default not enrolled or referred into a programme, such as smoking cessation, unless specifically requested by the patient/ client.

Opt Out: Patients /service users, in this case pregnant smokers, are by default enrolled or referred into a programme (smoking cessation) unless explicitly declined.

Performance management: Assessment of the state of completion of pre-specified objectives. In practice, performance management often involves an active role in encouraging completion of the objectives e.g. by setting and monitoring 'targets', rewarding for successful completion, or fining for non-completion

Placental abruption: premature separation of the placenta from the uterine wall.

Placenta praevia: condition where the placenta is positioned over the neck of the cervix.

Postpartum: following childbirth or the birth of young.

Premature birth: is a birth that takes place more than three weeks before the baby is due. In other words, a premature birth is one that occurs before the start of the 37th week of pregnancy.

Prevalence: Prevalence is a statistical concept referring to the number of cases of a disease, or health behaviour such as smoking, that is present in a particular population at a given time.

Primary care: First tier of healthcare provided in the UK, including General Practice, District Nursing, Pharmacists, Dentists and other care providers, usually local to the population served.

Quality & Outcomes Framework (QOF): is a system to remunerate general practices for providing good quality care to their patients, and to encourage further improvement of the quality of health care delivered.

Smoking Status at Time of Delivery (SATOD): refers to the number of known women smokers who continue to smoke at time of delivery (child birth).

Secondary care: Second tier of healthcare provided in the UK, involving emergency and specialist referral and treatment (usually located in hospitals), provided by Acute Trusts.

Significant: Statistically significant at the 95% level of confidence.

Stillbirth: A stillbirth is a baby born dead after 24 completed weeks of pregnancy. If the baby dies before 24 completed weeks, it's known as a miscarriage or late foetal loss.

Sudden infant death syndrome (SIDS): Also known as cot death SIDS is the sudden unexplained death of a child less than one year of age.

Target populations: Groups of people who are the focus of an action or intervention. Groups are often defined based on a combination of characteristics such as race or ethnicity, age, gender, risk factor/behaviour, and geographic location.

1. Background

A Health Equity Audit (HEA) is an important tool to identify health inequity and thus contribute to improving health within and between populations. To understand HEA it is crucial that two terms are understood; equity and audit. Equity is a measure of how fairly resources are being distributed throughout different groups of the population depending on need. Audit is a systematic approach towards quantitatively and/or qualitatively understanding a population, and identifying any gaps or patterns (NHS Wakefield District Tobacco Health Equity Audit 2011).

HEA aims to reduce health inequalities by:

- Describing the current distribution of resources
- Identifying the health needs of cohorts within a population
- Analysing equity of the flow of resources, access and outcome of services
- Redistributing resources according to need and taking actions to reduce these inequalities

It is vital that HEA be incorporated into performance reviews across the NHS, local authorities and local strategic partnerships, as part of a review of key strategies. In summary, HEA is an integral component to review the actual and potential effects of service decisions, and implementation of strategies to improve health outcomes (Health Equity Audit Made Simple 2003).

This HEA presents a range of information on cigarette smoking patterns among pregnant women in Nottingham. Consumption, trends and cessation among different cohorts of the city and geographical areas were explored.

2. Aim and Objectives

Aim

To assess equity of access and outcomes for pregnant women using New Leaf Stop Smoking Services in Nottingham.

Objectives

- To describe the prevalence of smoking in Nottingham in different groups of pregnant smokers
- To analyse the use and success of the Stop Smoking Service (from April 2013 to March 2015) by age, ethnicity, socioeconomic group and consider the influence of the type of referral.
- To compare the differences of smoking prevalence, trends and success in cessation between pregnant and non-pregnant¹ women.
- To identify gaps or barriers in access to the New Leaf service and outcomes of the service.
- To make recommendations as to how the service could address potential inequities.

¹ Non-pregnant: Women accessing the New Leaf who aren't pregnant

3. Literature Review

Pregnant smokers are part of a larger cohort of female smokers of childbearing age. Higher pregnancy rates mirror the geographic distribution of teenage pregnancy and are associated with areas of disadvantage (Bradshaw et al 2005). In addition to this, more deprived areas are also associated with greater prevalence of smoking (ONS 2014).

Smoking initiation rates are high, and cessation rates lowest, among white women in more deprived areas. Younger smokers are often less worried about the long term health implications of smoking and are more vulnerable to the advertising by the tobacco industry which focuses on themes of independence of young women (Waldron et al 1991). A second factor is that some women believe there are positive effects of smoking such as weight management, anxiety management and that smoking is a way of life. Thirdly, many women are burdened with performing competing roles of mother, homemaker and employee and see smoking as a coping mechanism (Mullen et al 1993, Paarlberg et al 1999). All these factors contribute to an increased reliance on smoking.

Younger women who choose to continue smoking in the current anti-smoking climate are a subsection of the population who appear more impervious to smoking cessation messages. Thus better understanding of this cohort is important (Nichter M et al 2007).

Smoking during pregnancy is associated with adverse consequences for the health and wellbeing of the mother and newborn child. Specifically, smoking has detrimental effects on the developmental of the foetus, the baby at birth and throughout the early development of the child. In the UK, smoking in pregnancy accounts for up to 5,000 miscarriages, 300 perinatal deaths and about 2,200 premature births each year (Royal College of Physicians 2010).

Smoking before and during pregnancy is the single most preventable cause of illness and death among mothers and infants. Hence interventions need to be introduced as early as possible once pregnancy has been identified. Women who quit smoking prior to or early in pregnancy have a significantly lower risk of several adverse outcomes (Centres for Disease Control 2007).

Women who smoke during pregnancy are more likely to experience placental abruption, pre-labour rupture of membranes and placenta previa during pregnancy and are twice as likely to have a still birth.

Babies born to women who smoke during pregnancy:

- 30% higher odds of being born prematurely.
- 20% - 70% greater risk of congenital heart defects.
- Weigh an average of 200 grams less than infants born to women who do not smoke.
- Are up to 3 times more likely to die of Sudden Infant Death Syndrome (SIDS).

Women smokers deal with their smoking in different ways when they become pregnant.

Many women who consciously plan to become pregnant are likely to consider stopping smoking before becoming pregnant. Others stop smoking as soon as they learn that they are pregnant.

80-85% of these spontaneous quitters are able to maintain cessation of smoking throughout pregnancy. However, approximately two-thirds relapse back to smoking by six months postpartum (CDC 1998, Quinn et al 1991). Conversely, women who continue to smoke during pregnancy are most often from more deprived areas and are more likely to have multiple and complex problems in addition to nicotine addiction. Smoking to them functions as a relief, including the stress of their pregnancy. This group of women carries the greatest health risk of smoking (Mullen et al 1993, Paarlberg et al 1999).

4. Methodology

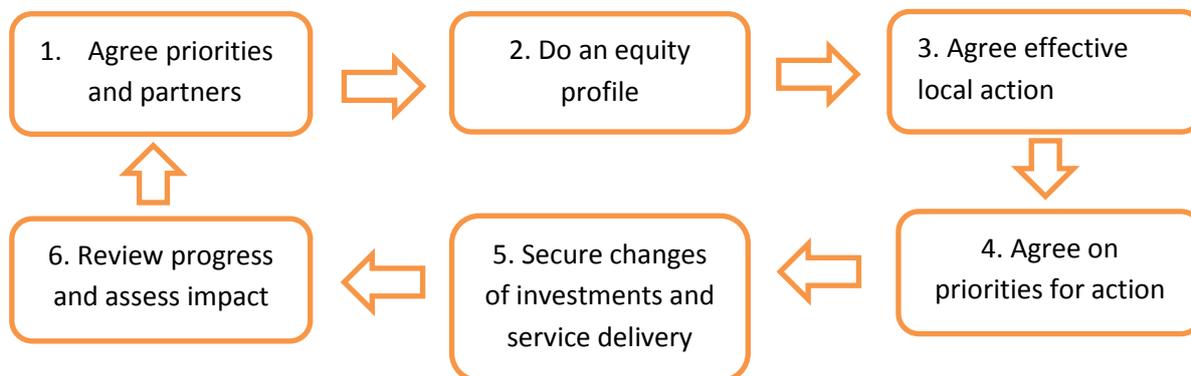


Figure 1: Health Equity Audit Cycle

This HEA will address stages 1 – 2 of the HEA audit cycle (see figure 1). Public health and other commissioners will use this audit to discuss relevant strategies and actions to support women to quit smoking during pregnancy with a focus on those women who are less likely to access stop smoking services and/or successfully quit smoking. In addition, areas for further investigation will be identified. Stage 3, agree effective local action, will be addressed by the Smoking in Pregnancy group led by Nottingham City Council.

4.1 Data analysis

The smoking cessation service provider (New Leaf) collects data for all users who access their services. This includes demographics, index of multiple deprivation (IMD), wards, quit dates, 4-week-quit outcomes and referral source. Data from April 2013 to March 2015 was extracted and shared with the Public Health team in Nottingham City Council for analysis. The four main areas in the measurement of equity, need, access, use and outcomes, were addressed and areas requiring further work were identified.

The mid-year population estimates from ONS 2014 were used to estimate the Nottingham population including proportions of gender, ethnicity and smoking status.

The Nottingham Citizen Survey² was used to:

- Estimate proportions of white versus BME smokers
- Estimate BME smoking prevalence in each ward

Only females aged 15 – 44 years were selected as this age range closely mirrors the ages of the pregnant female smokers audited in this HEA. There was only one pregnant New Leaf user above age 44, and the youngest was 15 years.

Office of National Statistics data was used as reference population to:

- Compare the average age of women at pregnancy in England and Nottingham
- Compare average conception rates for women aged under 18 years
- Compare smoking prevalence versus deprivation

A comprehensive literature review was also undertaken, including references from them. This literature was summarized but not systematically reviewed. Journal archives used include:

- Wolters Kluwer Journals Search (LWW Publishing) – Obstetrics and Gynaecology
- Pubmed
- Ovid Technologies

Search terms: combinations of ‘smoking cessation’, ‘risk at delivery’, ‘risk to pregnancy’, ‘smoking and pregnancy’, ‘tobacco’ and ‘newborn’.

Data on pregnant women who were referred but did not access the smoking cessation program was also provided by New Leaf, from April 2013 to March 2015. Data included age and ward demographics and the reason for not accessing service.

Medway Maternity was used to provide data on the Ethnicity and Smoking Status of pregnant women at delivery for the Nottingham City CCG from April 2014 – May 2015.

² The Citizens' Survey gathers Nottingham citizens' perceptions on a variety of subjects including quality of life, health and wellbeing, community cohesion, feelings about Nottingham and satisfaction with the Council.

5. Local Services

New Leaf Stop Smoking Service

The New Leaf Stop Smoking Service was established in 2000 and is hosted by Nottingham CityCare. It is the sole provider of smoking cessation support for Nottingham City. New Leaf works in partnership with a broad range of stakeholders including Clinical Commissioning Groups (CCGs), General Practices (GP's), Nottingham City Council, Nottingham University Hospital Trust, Nottinghamshire Healthcare Trust, Community Pharmacists, voluntary and third sector and workplaces to promote access to the service (Nottingham City Tobacco Control Strategy 2016).

The service offers a comprehensive package of support including intensive behaviour change support delivered by specialist National Centre for Smoking Cessation and Training (NCSCT) level 2 accredited advisors. Community pharmacies involved also provide direct supply of Nicotine Replacement Therapy and facilitation of Champix (medication to help smoking cessation). Currently, New Leaf does not provide e-cigarettes but will support clients who use e-cigarettes to support them to quit smoking tobacco. Service delivery has been developed and expanded over time to provide support in over 50 local sessions across Nottingham City including evening and weekend provision and dedicated telephone support (Nottingham City Tobacco Control Strategy 2016, New Leaf Brief Intervention Talk). Current data collection does not enable an assessment of what type of tobacco is used as this information is collected in free text.

The New Leaf Nottingham City stop smoking service has two specialist pregnancy advisers with a midwifery background who work with pregnant women. During booking, midwives ascertain smoking status and record exhaled carbon monoxide (CO)³ levels for pregnant women. This is repeated at two further points in pregnancy. Women identified as smokers, or those with a CO reading of 4 or above, are referred to New Leaf on an opt-out basis through a well-established referral pathway. The specialist advisers contact all pregnant smokers within two working days of receiving a referral unless they have specifically asked not to be contacted (opt out). All referrals would receive brief intervention (Pregnancy JSNA Nottingham 2015).

³ Carbon Monoxide is a colorless, odorless gas produced from the incomplete burning of virtually any combustible product. It may accumulate indoors as a result of tobacco smoking, poorly ventilated appliances, and attached garages.

6. Data Analysis

Data on 788 pregnant female users (citizens who accessed New Leaf services between April 2013 and March 2015) was supplied by New Leaf. This comprises Nottingham Quintiles 0 – 5 (0: outside Nottingham, 1: most deprived, 5: most affluent).

In the data analysis Quintile 0 was sifted out as these areas lie outside of Nottingham, leaving only 747 users. Data fields included age, quit dates, 4 week quit outcome, Quintile, Index of Multiple Deprivation, electoral wards, ethnicity and mode of referral. In addition, data on 563 pregnant women who did not access the smoking cessation service was provided by New Leaf Intelligence (from April 2013 to March 2015). Quintile 0 (areas outside Nottingham) was excluded from the data set, leaving 538 referrals that were not accessed. The data included age of referee, postcode with ward location and reason for not accessing the service which are illustrated in the figure below.

The figure below estimates the flow in the proportion of female smokers at each sub-category towards those who accessed the New Leaf Stop Smoking Service in Nottingham.

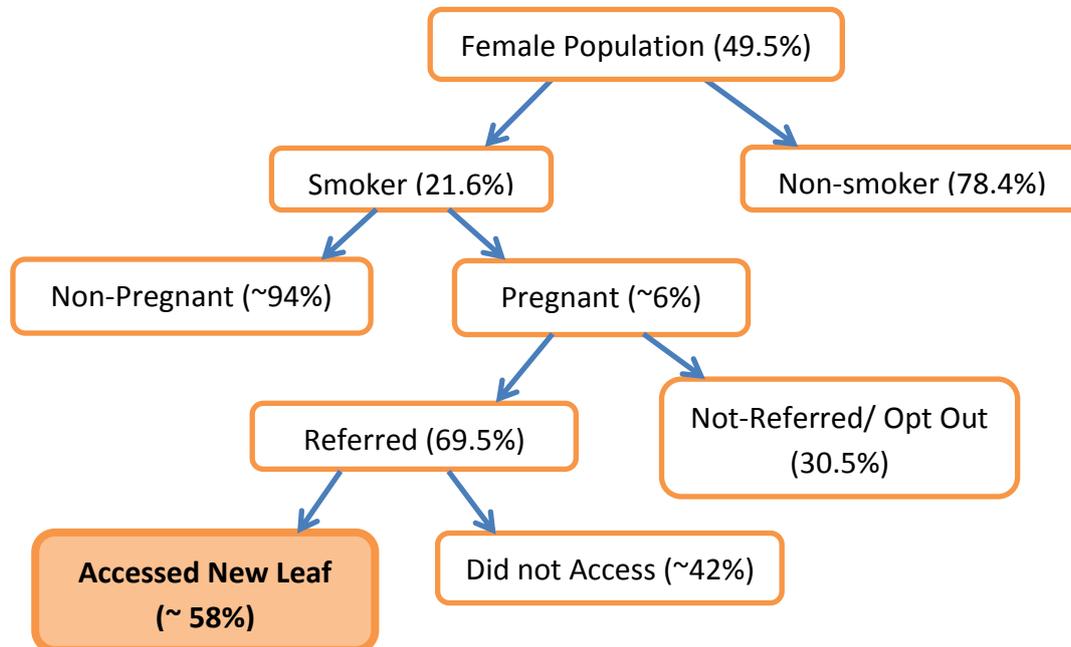


Figure 2: Flowchart of Pregnant Smokers accessing New Leaf services. Percentages estimated from JSNA Pregnancy 2015, New Leaf Intelligence and ONS Mid-Year Population Estimates 2014.

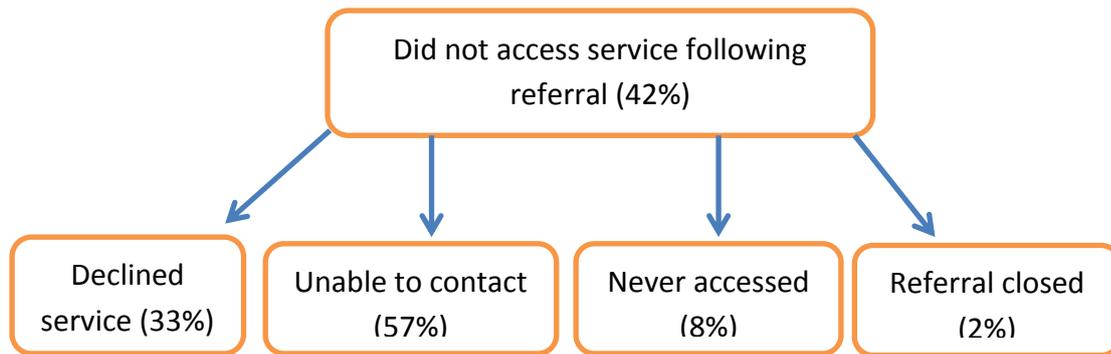


Figure 3: Flow chart of pregnant women who did not access New Leaf’s smoking cessation program following referral. Data provided by New Leaf Intelligence (April 2013-March 2015).

6.1 Age groups and Deprivation Quintiles

The average age of first time mothers in England and Wales was 28.3 years in 2013, compared with 28.1 years in 2012. The average age of all mothers was 30.0 years in 2013, compared with 29.8 years in 2012. In Nottingham, the average birth rates are greatest in the 25- 29 age group (ONS – Live Births 2013). In 2011, the under 18 conception rate for Nottinghamshire was 31.9 per 1000 females aged 15-17 – a decrease from the 2009 rate of 32.9 per 1000. In 2013, the figure rose to 37.5, but was followed by a decrease to 32.7 in 2014 (ONS – Teenage Conception 2014).

Smoking prevalence is measured by Smoking at Time of Delivery (SATOD) rates, which is recorded at the time of birth. In England, 13.3% of mothers were recorded as smokers at the time of delivery in 2013, which continued the steady year-on-year decline with 12.7% in 2014 and 12% in 2015. Conversely, Nottingham displays inconsistent SATOD rates, 18.8% in 2013, to 17.9% in 2014, and 18.5% in 2015 (Public Health England 2013 - 2015).

Quintile	Female Smokers in Nottingham 2013 – 2015 (Age Groups)												Total
	<18		18 - 20		21 - 25		26 - 30		31 - 36		>36		
	P ⁴	NP ⁵	P	NP	P	NP	P	NP	P	NP	P	NP	
1	4	13	34	15	73	79	72	90	35	142	5	609	1171
2	12	10	20	20	58	62	44	73	27	96	2	542	966
3	5	6	20	18	53	62	43	76	20	98	7	479	887
4	4	9	15	10	48	46	44	56	29	82	8	417	768
5	3	1	6	9	18	21	21	12	12	42	5	204	354
Total	28	39	95	72	250	270	224	307	123	460	27	2251	4176

Table 1: Number of pregnant and non-pregnant female smokers in their age groups versus their respective quintile (Nottingham). Source: New Leaf Data April 2013 – March 2015

As Table 1 illustrates the first quintile, most deprived, accounts for 29.9% (183/597) of the total number of pregnant smokers whilst quintile 5, the most affluent, has the lowest number of pregnant smokers comprising of only 8.7% of the cohort. This is consistent with the findings of ONS 2014 where more deprived areas were associated with a greater prevalence of smoking.

To allow for fairer comparison and calculations between the pregnant and non-pregnant group, age limit is set at 36 years. This is because of the lower number of pregnant women due to lower fertility rates; whereas the numbers of non-pregnant smokers extends linearly across all age groups.

Teenage pregnant smokers across all quintiles (under 18) constitute 3.9% of the total number of pregnant smokers under age 36, compared to 3.4% of the non-pregnant group. Notably, there are many more pregnant smokers compared to non-pregnant smokers in the 18 – 20 age group, measuring at 13.2% of the under-36 years age group (95/720) compared to 6.3% (72/1148). The findings follow the national picture, with a greater proportion of smokers in younger age groups coming from more deprived Quintiles (Bradshaw et al 2005, ONS 2014). This is represented in Figure 3.

⁴ Pregnant

⁵ Not pregnant

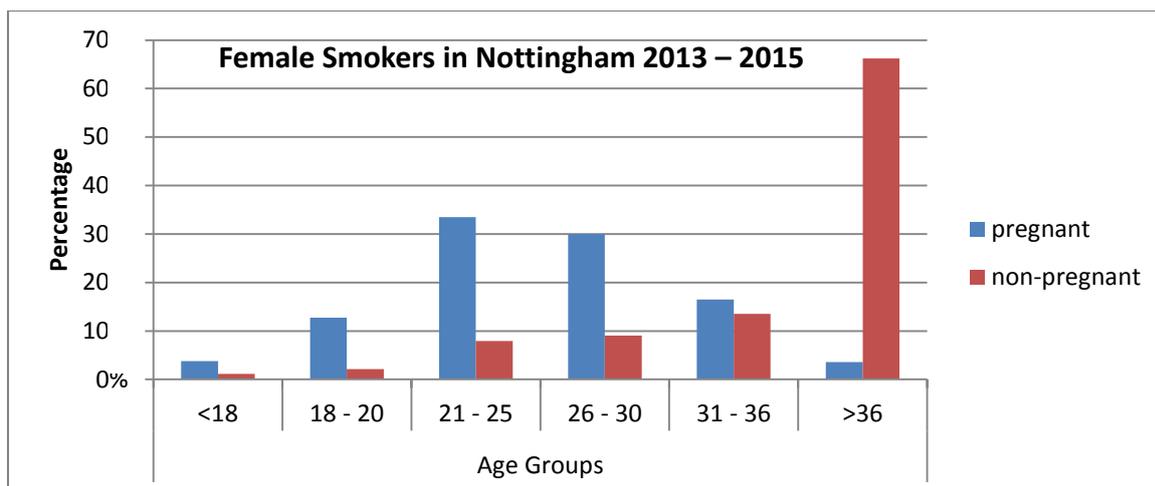


Figure 4: Proportion of smokers in each age group (in percentages) among pregnant and non-pregnant women. Source: New Leaf Data April 2013 – March 2015

In Figure 3, changes in proportion of smokers across age groups for the non-pregnant group are much less exaggerated as numbers extend up to much older ages (80 years old). This also explains the sharp rise for the non-pregnant smokers after age 36 as this is a cumulative value⁶. In other words, percentage difference for the group aged above 36 is insignificant as there is conversely a large decline in the numbers of pregnant women after that. The distribution of pregnant women smokers peaks at age group 21 – 25.

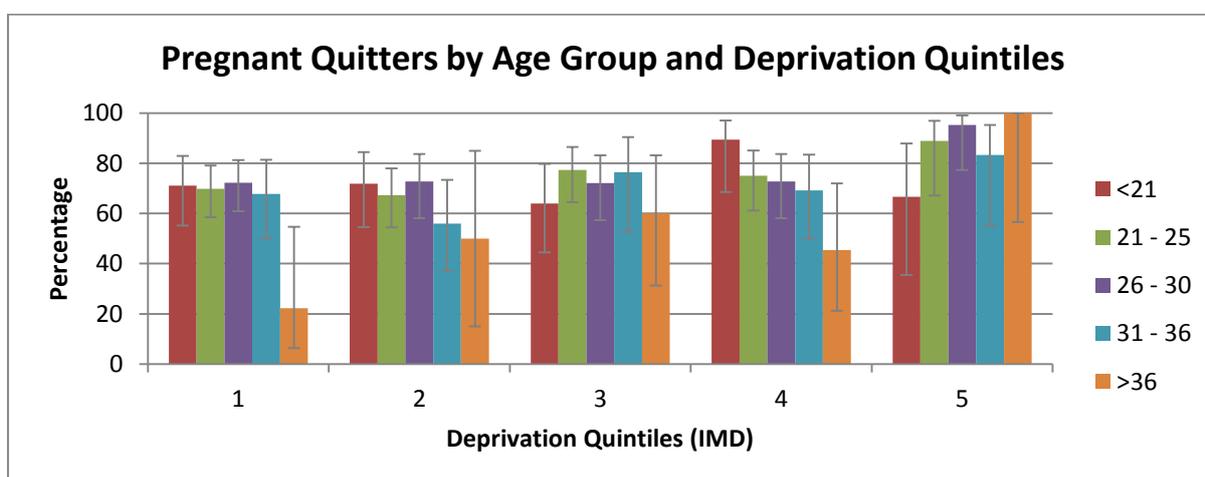


Figure 5: 4-week quit rates for pregnant female smokers in different Quintiles (adapted from Table 2 in Appendix) Source: New Leaf Data April 2013 – March 2015

SATOD rates in England vary according to age. Women who smoke in pregnancy are more likely to be under 20 years old (57%) and the least likely to give up smoking at some point before or during pregnancy (Health and Social Care Information Centre 2014).

⁶ Cumulative: increasing in quantity by successive additions.

Figure 4 compares the 4-week quit rates per age group in different quintiles. Quit rates are relatively uniform at around 70.3% (95%CI 54% - 81%) across age groups under 36 years (this is excluding under 21 years in Quintile 4). This group is excluded as it has an unexpectedly significantly higher quit rate of 89.5% (95%CI 68.6%-97.1%) which may need further work to investigate. Age group >36 years performed poorer in Quintiles 1 – 4 with quit rates averaging at 44.4% (15/34) without any apparent trend, followed by 100% (5/5) quit rate in Quintile 5. Given the low numbers of the age group >36 years, comprising of only 5% of the total numbers, this result should be interpreted with caution.

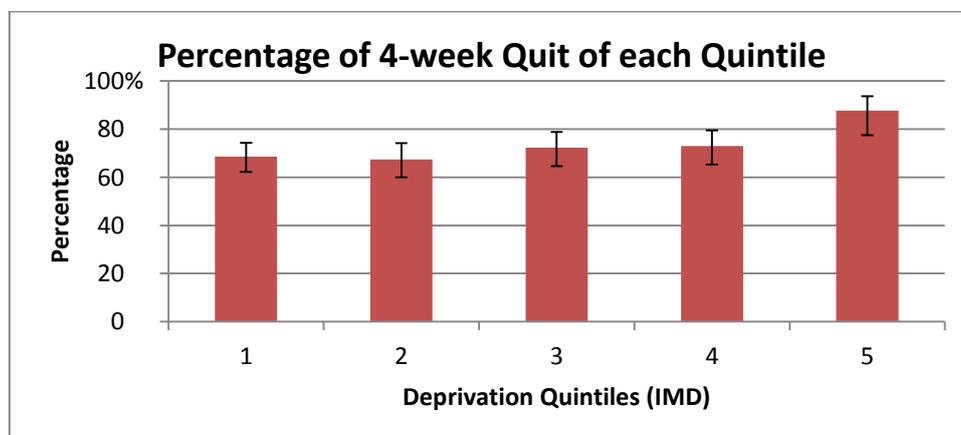


Figure 6: Average 4-week quit rates (percentage of total) by IMD. Source: New Leaf Data April 2013 – March 2015

Figure 5 shows average quit rates by IMD Quintiles. Only a mild trend of improving quit rates was noted between the most deprived and the most affluent. In the break down, quintile 5 appears to have a better quit rate between 77.6% - 93.5% (95%CI), whereas quintiles 1 – 4 have quit rates at 54% - 81% (95%CI).

An inequality calculator was used to measure the relation between deprivation scores (associated with area) and quit rates. The slope index of inequality in Figure 6 shows a very weak association at 0.17.

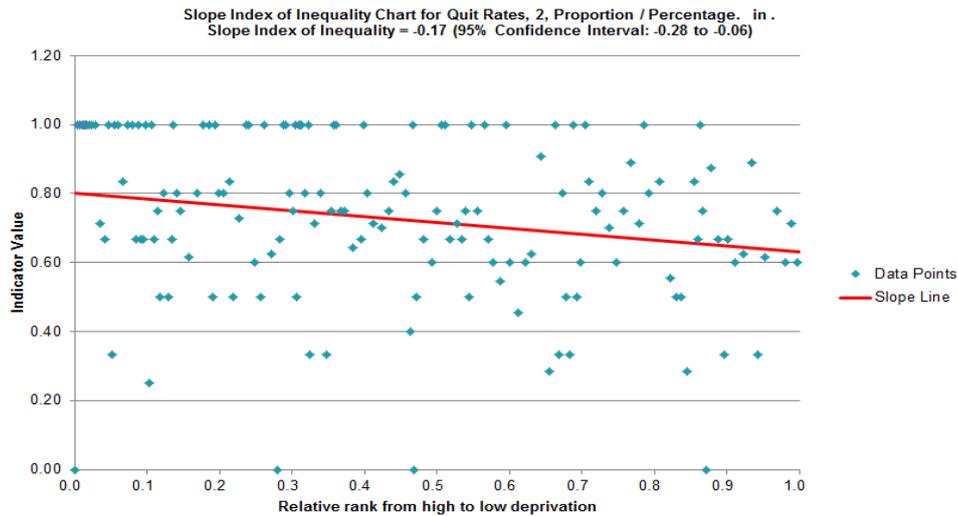


Figure 7: Slope Index of Inequality comparing Deprivation Score (IMD) and 4-week quit rates of pregnant women. Source: New Leaf Data April 2013 – March 2015

Between April 2013 and March 2015 42% (538) of all the referrals that were sent out to pregnant women were not accessed, this was either due to the pregnant smoker declining the service or that New Leaf were not able to contact the pregnant smoker following referral. The figure below illustrates the proportion of pregnant women not accessing service by age-group with the largest number of rejected referrals coming from the 21-25 age band (36%) and the smallest from the 36 and over age band (7%).

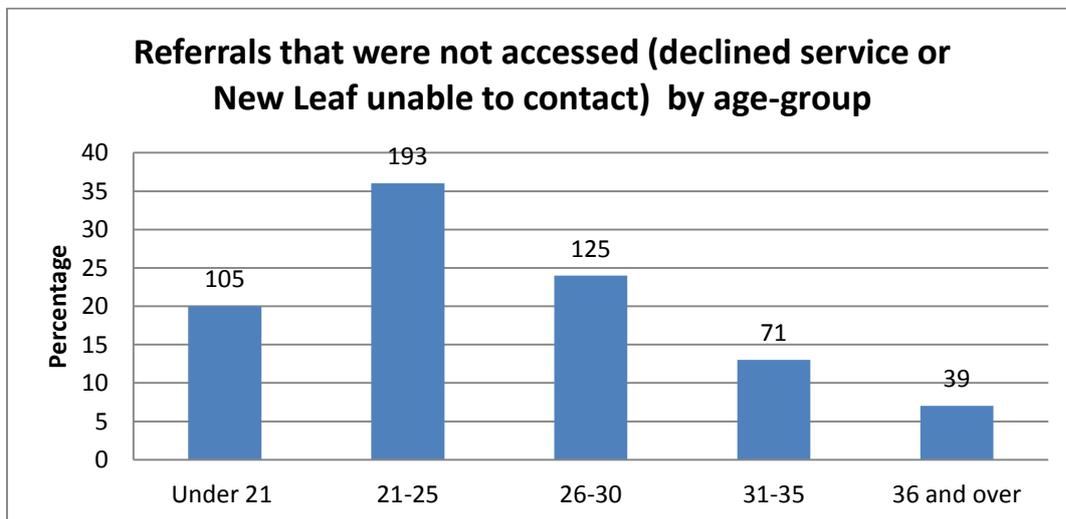


Figure 8: Referrals to New Leaf that were not accessed divided into age groups (percentage in total). Source New Leaf Data April 2013 – March 2015

6.1 Ethnicity

Tobacco smoking is a significant cause of preventable death and ill health in England. Yet evidence with which to establish the smoking rates of people from different ethnic backgrounds and whether these smoking rates are static or changing is sparse.

Nottingham has a population of around 314,300 (ONS Mid-Year Population Estimates 2014). This city is rich in cultural diversity with 35% of its citizens from BME communities, more than twice the UK average of 12.8%. The population is predominantly Pakistani (5.5%), other White (5.1%) and mixed White/Black Caribbean (4.0%) [ONS Mid-Year Population Estimates 2014].

Data provided by Medway Maternity from April 2014-March 2015 showed a slightly lower proportion (30.2%) of pregnant smokers were from the BME groups (see figure 10). 68.1% of pregnant smokers were from a white British background. The largest BME pregnant smoker group was Mixed raced accounting for 16.5% of total pregnant smoker population followed by any other white background (9.1%) (see table 2).

6.1.1 New Leaf smoking cessation Programme

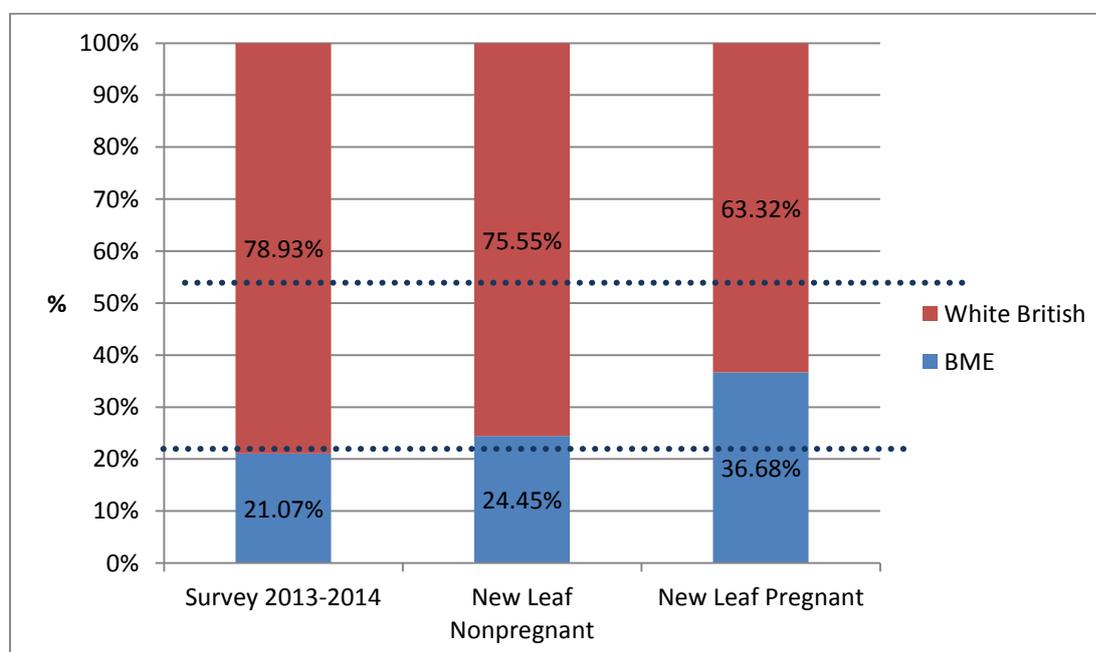


Figure 9: Proportion of white and BME groups in the general population of Nottingham, Non-pregnant female smokers and pregnant female smokers. Source: Nottingham Citizen Survey 2013 and 2014; New Leaf Data April 2013 – March 2015

The number of female smokers aged 15 – 44 years from the 20 wards in Nottingham were selected and grouped based on ethnicity from the Nottingham Citizen Survey in 2013 and 2014. Survey from 2013 – 2014 was chosen as it would have the most similar time period with the New Leaf data (April 2013 to March 2015). When compared to the non-pregnant female New Leaf users, the proportions were very similar with only 3.4% more women from the BME group. However, when compared to the pregnant New Leaf cohort, there are 15.6% more BME women than White women.

Information on the smoking status at time of delivery by ethnicity was poorly recorded. Further investigation would provide a more accurate representation of what proportion of pregnant smokers are from white British or BME groups.

6.1.2 Smoking at time of delivery

Medway maternity data⁷ shows that 53% of all the 4,203 live births recorded over that year were born to ‘any BME’ identifying mothers (including White Other). 45% of live births were to White British mothers; 27% of these births were to British mothers who smoked.



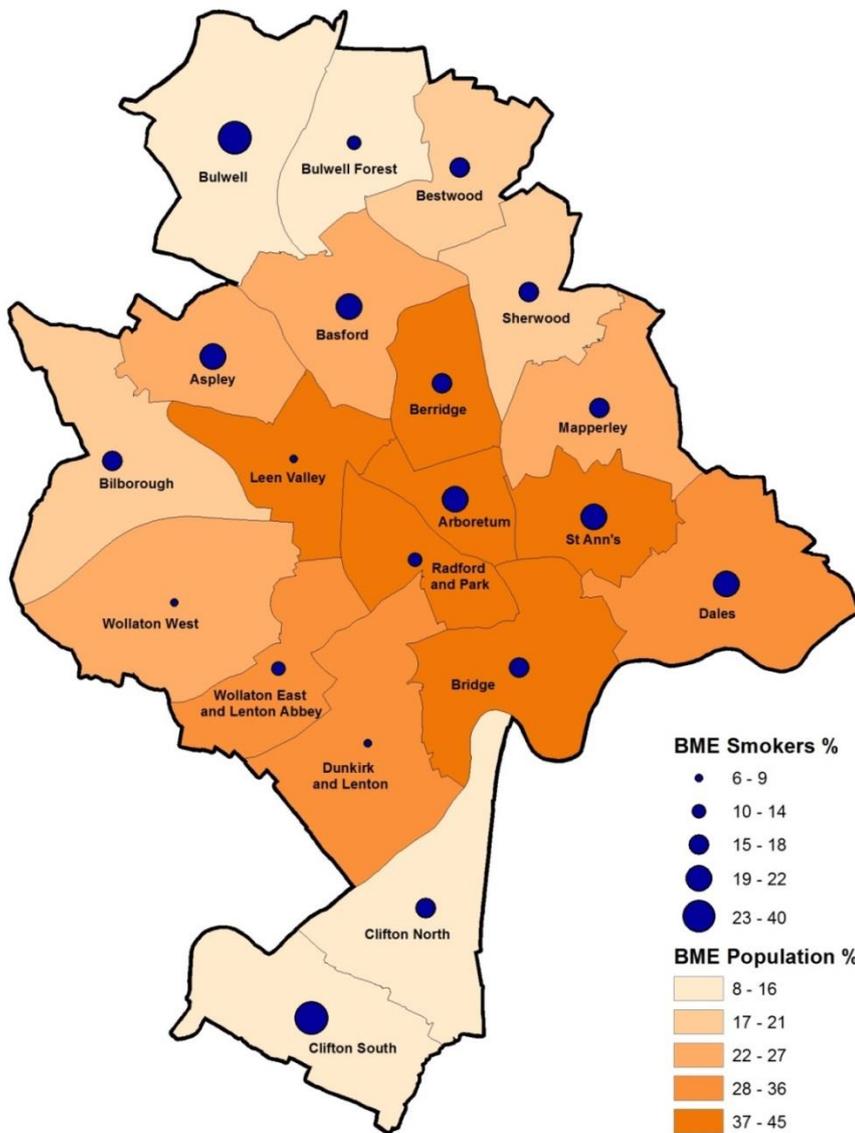
Figure 10: Proportion of white British and BME pregnant women within Nottingham CCG, smoking status recorded at delivery. Source: Medway Maternity April 2014 - March 2015.

⁷ Nottingham University Hospital’s maternity data recording system

Mothers Ethnic Category	% of smokers within the total pregnant smoker population	Number of pregnant smokers within each ethnic group
British	68.1	516
Any other white background	9.1	69
Pakistani	0.8	6
Indian and Bangladeshi	0.00	0
Mixed Background	16.5	125
Chinese and any other Asian background	0.5	4
African	0.3	2
Caribbean	0.5	4
Any other ethnic group	1.6	12
Any other black background	0.1	1
Not Stated/blank	2.4	18

Table 2: Table showing *breakdown of white and BME groups within the pregnant smoker population (percentage in total)*. Source: Medway Maternity April 2014 - March 2015.

Analysing the ethnicity data from both New Leaf and Medway maternity NUH shows that of all the pregnant women referred to the New Leaf programme, the uptake from White British mothers has been the least successful. 68% of mothers who were smokers at the time of delivery were White British but a lower proportion of pregnant smokers (63%) were accessing New Leaf compared to the non-pregnant female population (76%). This evidence suggests more work needs to be carried out to further engage White British pregnant smokers with the New Leaf smoking cessation programme.



© Crown Copyright and database rights [2014]. Ordnance Survey [100019317].
 You are not permitted to copy, sub-license, distribute or sell any of this data to third parties in any form.

Figure 12: Choropleth map of the estimated proportion of female smokers from BME groups in each ward. Percentages of the BME group who smokes superimposed onto the map for comparison (Nottingham Citizen's Survey 2011-2015)

Figure 8 shows that Nottingham's BME population is centralised in Leen Valley, Berridge, Radford and Park, Arboretum, Bridge and St Ann's. The proportion of BME citizens decreases in areas outside the city centre.

The proportion of BME citizens smoking in an area is contrasted with smoking prevalence (superimposed dots). This shows an inverse pattern in its distribution – greater smoking prevalence further away from the city, with Bulwell (40.0%) and Clifton South (30.0%) having the highest proportion of smokers. Further comparison reveals Leen Valley to have the lowest proportion of BME smokers at 5.7%, followed by Dunkirk and Lenton at 7.8%. This is consistent with the trend of greater smoking prevalence in areas of greater deprivation.

In view of the small sample size, these values may not accurately reflect the actual population distribution in these areas. It is also important to take into account potential errors or bias related to Interview Surveys (further discussed in Limitations Chapter), as this may lead to an inaccurate estimation of the ethnic makeup of the total population (Survey Interviewing by Economic and Social Research Council).

6.3 New Leaf Services Distribution

The distribution of pregnant and non-pregnant female BME smokers who accessed the New Leaf Stop Smoking Service is mapped below and shows a pattern of distribution similar to the total population but inverse to that of the actual smoking prevalence.

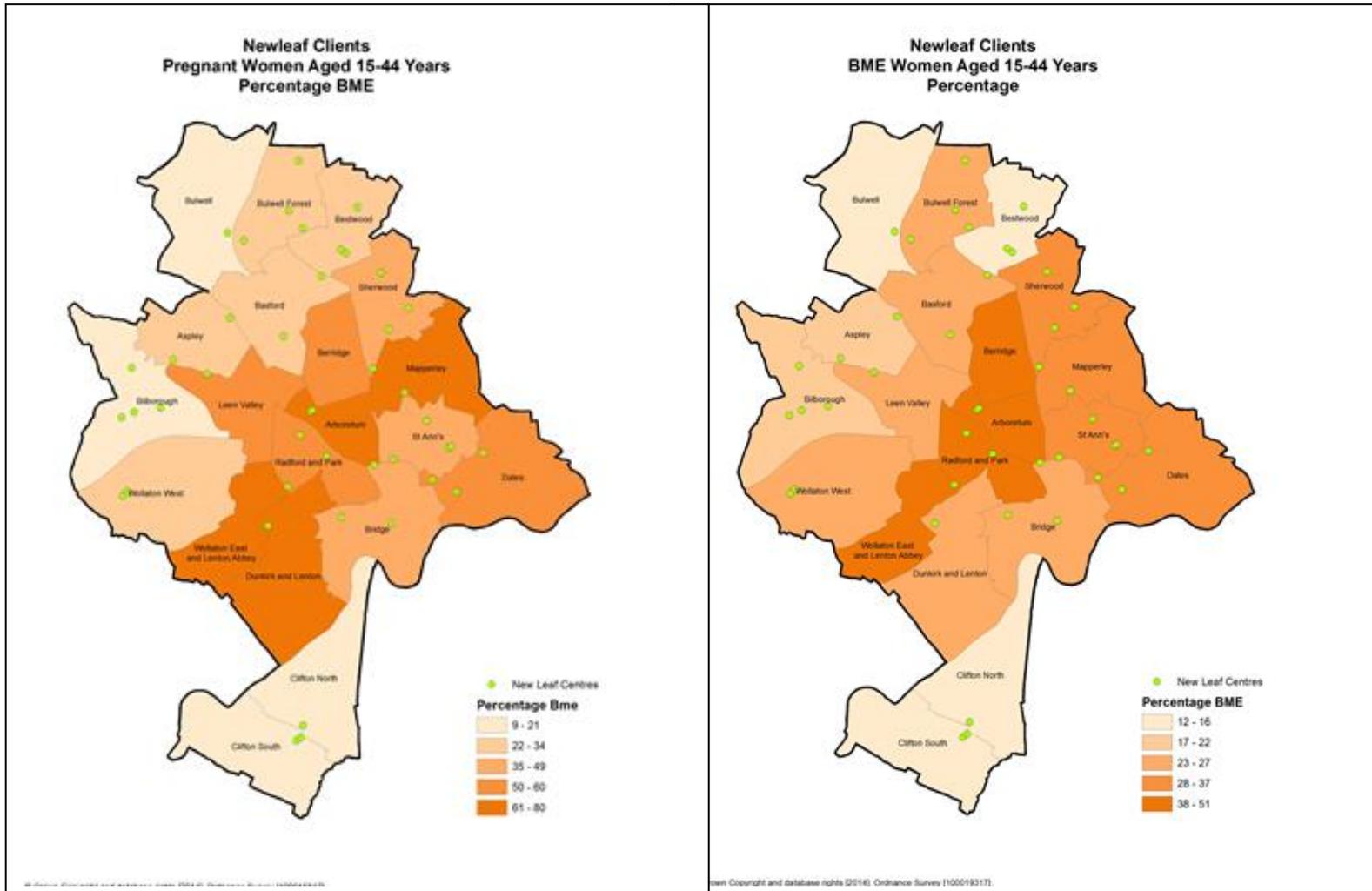


Figure 13: Choropleth map of Pregnant & Non-pregnant Female smokers who accessed New Leaf SSS. New Leaf Centres (in green dots) superimposed onto both maps. Source: New Leaf Data April 2013 – March 2015

The distribution of both pregnant and non-pregnant female BME smokers who accessed the New Leaf Stop Smoking Service were mapped separately as above, which shows a pattern of distribution similar to the total population but inverse to that of the smoking prevalence. In view of this unusual pattern, the distribution of New Leaf centres/ clinics were superimposed for comparison. The clinics (represented as green spots) appear to be evenly distributed across Nottingham, which suggests sufficient coverage. There is however slightly less even spread in Clifton North and South.

This pattern suggests a barrier in accessing the New Leaf services in areas away from the city. Further investigations, including ease of access via public transport, would be useful to find out reasons for the lack of access of New Leaf in those areas.

6.4 Area and Modes of Referral

In Nottingham, people can learn about Stop Smoking Services via various modalities, including newspaper and/or radio adverts, social networks, friends and family or through referral from health care providers. For pregnant women, the majority of referrals comes from midwives (83.8%), followed by self-referrals (13.4%). The remaining referrals (2.8%) are from maternity follow up, Medical Centres or Dental Practices. Complete figures can be found in Appendix 2.

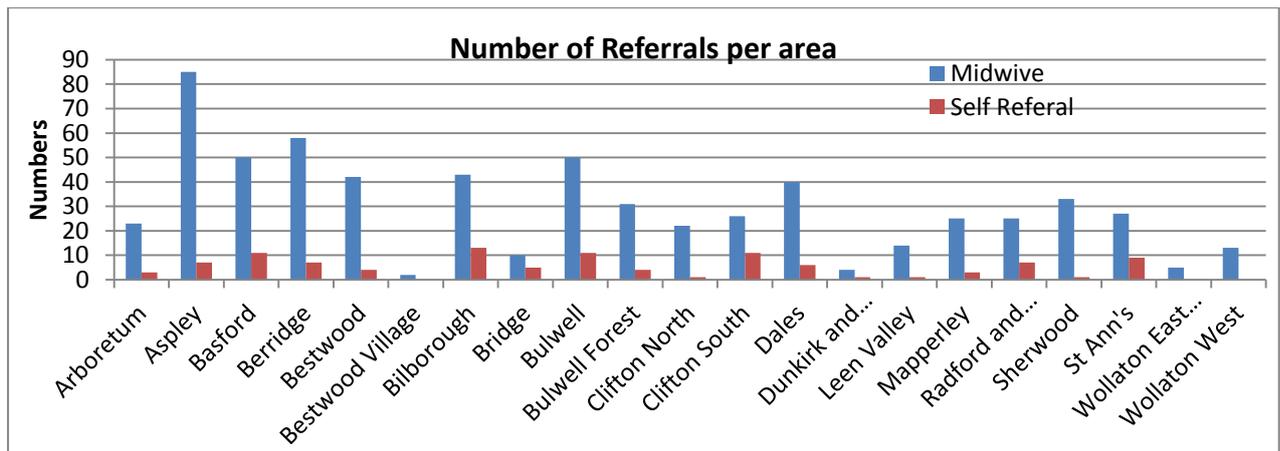


Figure 14: Comparison of the number of referral by midwives and self-referrals in Nottingham by area. Source: New Leaf Data April 2013 – March 2015

Figure 10 shows that the clear majority of referrals are from midwives. In Wollaton East and West this represents 100% of referrals, Sherwood (97%), and Clifton North (95.7%). Areas with the lowest ratio (in ascending order) are: Bridge (66.7%), Clifton South (70.3%), and St Ann's (75%). This could be considered unsurprising as there is an opt-out referral for pregnant smokers in place.

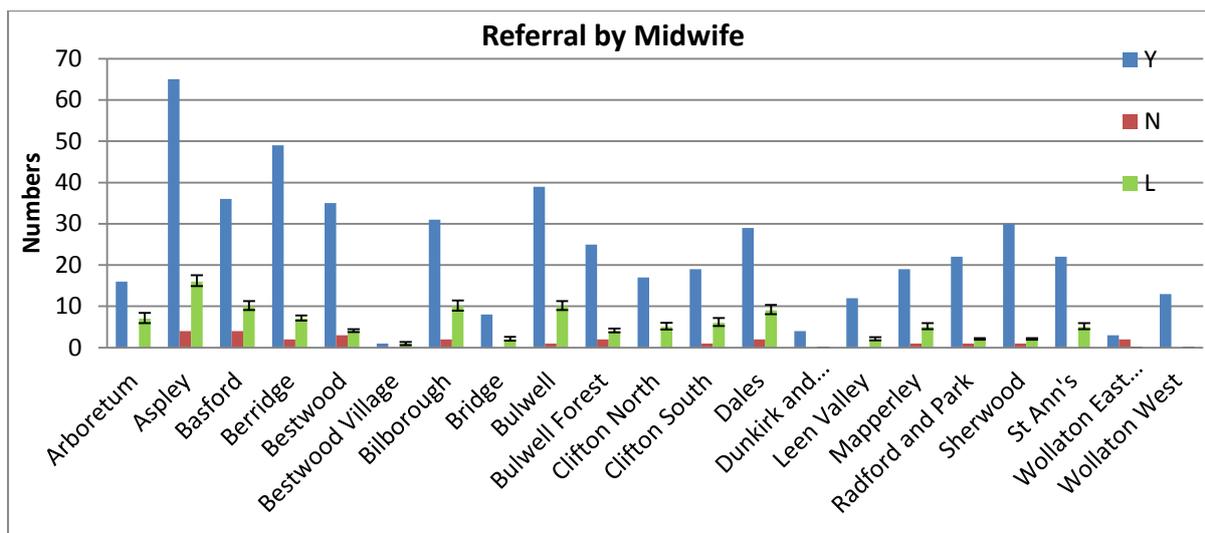


Figure 15: 4-week quit outcome and Lost Rates when referred by Midwives. Source: New Leaf Data April 2013 – March 2015

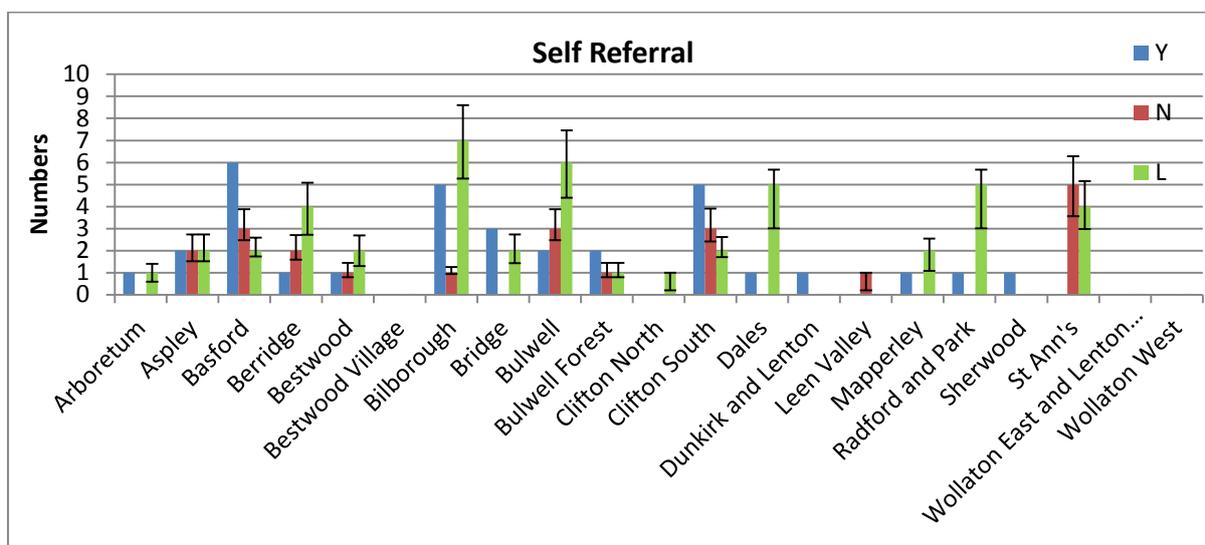


Figure 16: 4-week quit outcome and Lost Rates when self-referred. Source: New Leaf Data April 2013- March 2015

Success rates and lost to follow up rates were compared between referrals by midwives and self referrals. Midwife referrals are associated with higher rates of 4-week quitters with an average of 78.8% (66.2% - 86.3% in the 95%CI) compared to self-referrals at 32.7% (23% - 43.9% in the 95%CI).

Pregnant women referred by midwives have an average lost-to-follow-up rate ⁸ of 16.8% (15.4% - 19.7% in the 95%CI), whereas self-referred pregnant women have an average lost rate of 43.3% (31.5% - 56.9% at the 95%CI). Despite the lower numbers in the self-referral group, this is a

⁸ Lost rate: Proportion lost to follow up.

statistically significant value as the lower limit (of the 95%CI) for lost-to-follow-ups in self-referrals is greater than the upper limit (of the 95%CI) of those referred by midwives.

Pregnant women referred to New Leaf by midwives are 2 – 4 times more likely to have quit smoking at 4 weeks than those who self referred. Conversely, lost rates in the self-referred group is 2.5 times greater than those referred by midwives. New Leaf intelligence reports that of the referrals by midwives, only 3 were from secondary care. Further work should be undertaken to understand why the remaining 16.2% were not referred by midwives, and of the pregnant women smokers who were first admitted or attended Maternity Services or Clinics, how many have yet to be referred to Stop Smoking Services.

42% of the pregnant women referred to New Leaf did not access the smoking cessation service, either due to the pregnant smoker declining the service or that new leaf were not able to contact them following referral. All of the referrals that were not accessed were made by community midwives. Figure 11 shows the majority of 'not accessed' referrals were from Aspley (14.46%) and the area with the least number of 'not accessed' referrals were from Bestwood Village (0.41%). Figure 12 shows the proportion of total referrals that resulted in 'not accessed' referrals with Wollaton West having the highest number (51.85%) and Mapperley having the lowest number of 'not accessed' referrals (30.23%).

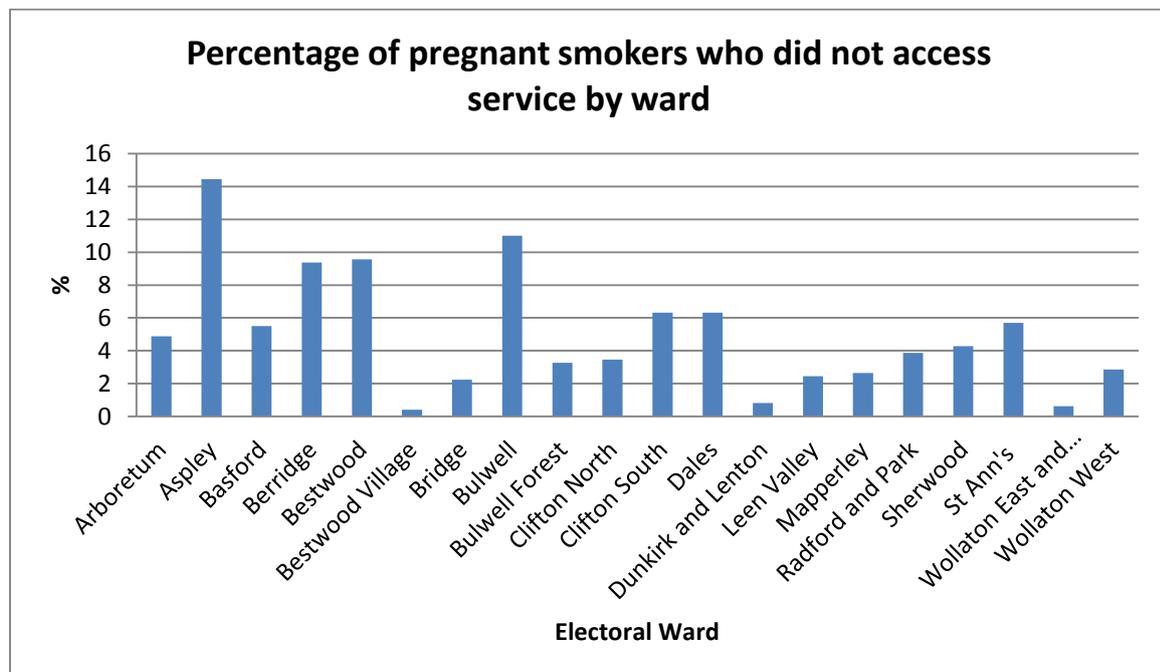


Figure 17: Percentage (in total) of referrals that were not accessed by pregnant women by ward location. Source: New Leaf Data April 2013 – March 2015

Electoral ward	Number of New Leaf referrals that were not accessed (declined service or New Leaf unable to contact)	Percentage of referrals that resulted in no referral (declined service or New Leaf unable to contact)
Arboretum	28	46.2
Aspley	92	43.6
Basford	62	30.3
Berridge	66	41.1
Bestwood	47	50.0
Bestwood Village	2	50.0
Bridge	16	40.7
Bulwell	63	46.2
Bulwell Forest	35	31.4
Clifton North	23	42.5
Clifton South	38	44.9
Dales	48	39.2
Dunkirk and Lenton	6	40.0
Leen Valley	15	44.4
Mapperley	30	30.2
Radford and Park	34	35.8
Sherwood	35	37.5
St Ann's	36	43.8
Wollaton East and Lenton Abbey	5	37.5
Wollaton West	13	51.9

Table 3: Number of the total referrals within each ward location that were not accessed. Table also shows Percentage of total referrals of each individual ward that resulted in no referral to New Leaf. Source: New Leaf Data April 2013 – March 2015

7. Conclusion

Smoking at the Time of Delivery (SATOD) rates in Nottingham fluctuated over the past three years (2013 – 2015), with a large proportion of pregnant smokers in the younger age groups. This is most evident in the more deprived quintiles. Quit rates are relatively consistent at 70% across quintiles 1 - 4 and 87% at Quintile 5 (most affluent). These are well above the average quit rate for pregnant women in England of 47% in 2014 (Health and Social Care Information Centre, 2015). The slope index of inequality calculated indicates very poor correlation between quit rates and index of multiple deprivation for pregnant women in Nottingham.

Nottingham has a high proportion of citizens from BME communities (35%) compared to England (12.8%). Pregnant women smokers comprise an unexpectedly larger proportion of BME group compared to the non-pregnant group. Data provided by Medway maternity suggests that 30.18% of

pregnant smokers within the Nottingham CCG area are from BME groups with Mixed (16.49%) and 'other white' (9.10%) backgrounds being the largest ethnic sub-groups.

Mapping of the New Leaf Services and BME service users suggests a potential barrier in the access of services in the areas away from the city. Further work needs to be undertaken to investigate this including identification of public transport routes and accessibility of these service locations.

The main modes of referral come from midwives or the users themselves. Referral by midwives is associated with high 4-week quit rates and low lost-to-follow-up rates, however the opposite is true for self-referrals. It would be useful to find out more information on reasons for self-referrals as oppose to midwife referrals. This can be accomplished by including questionnaires as part of the registration process for the New Leaf service.

42% the total referrals that were made to the New Leaf cessation program were not accessed by the pregnant women who were referred (either due to the pregnant smoker declining the service or that new leaf were not able to contact them following referral), it is important to identify the barriers preventing the pregnant women from accessing the service. The majority of the referrals that were not followed through were due to New Leaf failing to contact the women post referral (57%). Pregnant smokers aged 21-26 were the largest age demographic that did not access service following referral (36%). Aspley was the electoral ward with the highest number of total referrals (163) therefore it was expected that the ward would have the highest number of declined referrals (71), however the wards with the highest ratio between total referrals made and 'not accessed' referrals were Wollaton west (52%), Bestwood (50%) and Bestwood Village (50%).

8. Limitations

8.1 Data

The New Leaf data set used for this HEA is the same as used for the HEA for Smoking in Nottingham. New Leaf also provided the data on pregnant women smokers who were referred but did not access the New Leaf service. Medway Maternity provided data on smoking at the time of delivery for the Nottingham CCG from April 2014 to March 2015.

During analysis, when the data is spliced into different groups for comparison, some only have very small numbers. Hence any conclusions should be drawn with caution.

8.2 Nottingham Citizen Survey

In 2015, there were 2020 respondents to the Nottingham Citizen Survey. Using this to represent or estimate demographics and health behaviours of the total population of 314,300 may not be entirely accurate. This is because, like all interview surveys, there are errors and bias associated with the survey.

9. Recommendations

- Encourage more complete and accurate data collection during first point of contact with a health care professional. Addition of questions for future registrations:
 - For BME women: migration status, first language
 - Dichotomous question for all: First Pregnancy, Partner smoking status
- Further work to be undertaken to assess standards of smoking cessation advice/ referrals in Secondary care (by Midwives/ Medics/ other Health Care personnel). This could be accomplished by auditing the process or documentations.
- Explore the opportunity for service/ health promotion and improving access to information in the form of phone apps, hospital TV, leaflets, social media, booking form modifications etc. This may be an innovative step towards engaging better with the younger population.
- Encourage engagement with smoking cessation services and compliance via incentives such as a lifetime warranty for electronic cigarette for consistent attenders.
- Consider the introduction of compulsory smoking cessation eLearning modules for midwives.
- Build on existing work in making hospital areas smoke free zones

Appendix 1

Quintiles	4-week Quit Outcomes for Pregnant Women (Age Group)																				
	<21			Total	21-25			Total	26-30			Total	31-35			Total	>36			Total	
	L	N	Y		L	N	Y		L	N	Y		L	N	Y		L	N	Y		
1	10	1	27	38	18	4	51	73	13	7	52	72	9	1	21	31	4	3	2	9	223
2	8	1	23	32	14	5	39	58	8	4	32	44	7	4	14	25	2		2	4	163
3	8	1	16	25	7	5	41	53	9	3	31	43	4		13	17	3	1	6	10	148
4	2		17	19	10	2	36	48	9	3	32	44	7	1	18	26	4	2	5	11	148
5	3		6	9	1	1	16	18		1	20	21	1	1	10	12			5	5	65
Total	31	3	89	123	50	17	183	250	39	18	167	224	28	7	76	111	13	6	20	39	747

Table 4: 4-week Quit Outcomes for Pregnant Women by Age Groups.

Appendix 2

Ward	Mode of Referral								Grand Total
	Midwife				Self				
	Y	N	L	Total	Y	N	L	Total	
Arboretum	16		7	23	1		1	2	25
Aspley	65	4	16	85	2	2	2	6	91
Basford	36	4	10	50	6	3	2	11	61
Berridge	49	2	7	58	1	2	4	7	65
Bestwood	35	3	4	42	1	1	2	4	46
Bestwood Village	1		1	2					2
Bilborough	31	2	10	43	5	1	7	13	56
Bridge	8		2	10	3		2	5	15
Bulwell	39	1	10	50	2	3	6	11	61
Bulwell Forest	25	2	4	31	2	1	1	4	35
Clifton North	17		5	22			1	1	23
Clifton South	19	1	6	26	5	3	2	10	36
Dales	29	2	9	40	1		5	6	46
Dunkirk and Lenton	4			4	1			1	5
Leen Valley	12		2	14		1		1	15
Mapperley	19	1	5	25	1		2	3	28
Radford and Park	22	1	2	25	1		5	6	31
Sherwood	30	1	2	33	1			1	34
St Ann's	22		5	27		5	4	9	36
Wollaton East and Lenton Abbey	3	2		5					5
Wollaton West	13			13					13
Grand Total				628				101	729

Table 4: 4-week-Quit Outcomes of Pregnant Women Smokers by Modes of Referral.

10. References

Bradshaw J, Finch N and Miles J (2005) Deprivation and variations in teenage conceptions and abortions in England. *Journal of Family Planning and Reproductive Health Care* **31(1)**, 15–19.

Census 2011: KS201UK Ethnic group, local authorities in the United Kingdom ONS, Retrieved 21 October 2013.

CDC, 2007. Preventing Smoking and Exposure to Second-hand Smoke Before, During, and After Pregnancy.

<https://www.cdc.gov/nccdphp/publications/factsheets/prevention/pdf/smoking.pdf>

CDC, 2011. Smoking in early pregnancy raises the risk of heart defects in infants. U.S. Centers for Disease Control and Prevention.

http://www.cdc.gov/media/releases/2011/p0228_smokingpregnancy.html

Fiona McAndrew, Jane Thompson, Lydia Fellows, Alice Large, Mark Speed and Mary J. Renfrew (2012) Infant feeding survey 2010. Available at:

<http://www.hscic.gov.uk/catalogue/PUB08694/Infant-Feeding-Survey-2010-Consolidated-Report.pdf>. [Accessed 18.09.15]

Floyd, RL, Rimer, BK, Giovino, GA, Mullen, PD, Sullivan, SE. A review of smoking in pregnancy: Effects on pregnancy outcomes and cessation efforts. *Annu Rev Public Health* 1993;**14**:379–411.

General Lifestyle Survey. Smoking and Drinking Among Adults. London: Office for National Statistics; 2008.

Health Equity Audit Made Simple: A briefing for Primary Care Trusts and Local Strategic Partnerships. Working document January 2003, Health Development Agency

<http://www.nice.org.uk/niceMedia/documents/equityauditfinal.pdf>

Health Equity Audit: A guide for the NHS (2003)

http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4084139.pdf

Health & Social Care Information Centre. (2014). Statistics on Smoking in England. Health & Social Care Information Centre.

Mullen PD, Pollak KI, Groff JY, DiClemente CC. Relations among psychosocial variables, addiction, and self-efficacy in lower and higher income pregnant smokers. Proceedings of the annual meeting of the Society for Research on Nicotine and Tobacco, San Diego, California, 5–7 March, 1999.

National Center for Health Statistics/Center for Disease Control. Smoking during pregnancy, 1990–1996. National Vital Statistics Reports 1998;47:1–12.

National Institute for Health and Care Excellence (2010). PH26 Quitting smoking in pregnancy and following childbirth.

NHS Wakefield District Tobacco Health Equity Audit. <http://www.wakefieldjsna.co.uk/site/wp-content/uploads/Tobacco-Health-Equity-Audit-2011.pdf>

Nichter M et al. Smoking among low-income pregnant women: an ethnographic analysis. Health Education & Behaviour, 2007, 34:748–764.

Nottinghamshire and Nottingham City Public Health. (2013). Equity Audit of stop smoking services Nottingham City and Nottinghamshire County. Unpublished.

Nottingham Citizen Survey 2011 – 2015. <https://nottinghaminsight.org.uk/insight/library/citizens-survey.aspx>

Nottingham City Tobacco Control Strategy.

<http://committee.nottinghamcity.gov.uk/documents/s29949/Enc.%201%20for%20Tobacco%20Control%20Strategy.pdf>

Nottingham Population Analysis 2015.

<https://nottinghaminsight.org.uk/insight/partnerships/voluntary/population.aspx>

ONS Mid-Year Population Estimates 2014

ONS, Statistical bulletin: Live Births in England and Wales by Characteristics of Mother 1, 2013.

Available at: <http://ons.gov.uk/ons/rel/vsob1/characteristics-of-Mother-1--england-and-wales/2013/stb-characteristics-of-mother-1--2013.html>. [Accessed 24.04.15]

ONS Teenage Conception 2014.

<http://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/conceptionandfertilityrates/bulletins/conceptionstatistics/2014>

Paarlberg KM, Vingerhoets JJM, Passchier J, Heinen AGJJ, Dekker GA, Van Geijn HP. Smoking status in pregnancy is associated with daily stressors and low well-being. *Psychology Health* 1999;14:87–96.

Polakowski, LL, et al. 2009. Prenatal smoking cessation and the risk of delivering preterm and small-for-gestational-age newborns. *Obstetrics and Gynecology*. 114 (2):318-5.

http://journals.lww.com/greenjournal/Fulltext/2009/08000/Prenatal_Smoking_Cessation_and_the_Risk_of.18.aspx

Pregnancy JSNA Nottingham 2015. <http://jsna.nottinghamcity.gov.uk/insight/Strategic-Framework/Nottingham-JSNA/Adults/Pregnancy.aspx>

Quinn VP, Mullen PD, Ershoff DH. Women who stop smoking spontaneously prior to prenatal care and predictors of relapse before delivery. *Addictive Behaviors* 1991; 6:153–60.

Royal College of Physicians, Tobacco Advisory Group. Ch 3. Effects of smoking on fetal and reproductive health. In: *Passive smoking and children: A report by the Tobacco Advisory Group of the Royal College of Physicians*. 2010 Mar.

US Department of Health and Human Services. The health consequences of smoking for women. A report of the Surgeon General, 1980. Rockville, Maryland: Office of the Assistant Secretary for Health, Office on Smoking and Health, 1980. (DHHS Publication No (CDC) 90–8416.)

Waldron I. Patterns and causes of gender differences in smoking. *Soc Sci Med* 1991;32:989–1005.

KEY CONTACTS:

Khai Fam, Foundation Year Two Doctor, Nottingham University Hospitals

Khaichun.fam@nhs.net