

Smoking in Pregnancy Challenge Group response to Advancing our Health: Prevention in the 2020s

About the Smoking in Pregnancy Challenge Group

The [Smoking in Pregnancy Challenge Group](#) is coalition of organisations working to reduce rates of smoking in pregnancy. The membership includes Royal Colleges, third sector organisations and academia.

It was established in 2012 in response to a challenge from the then Public Health Minister to produce recommendations on how the smoking in pregnancy ambition contained in the Government's tobacco strategy could be realised. It presented its first report and recommendations in June 2013 and continues to meet annually to review progress.

The Groups' latest report: [Review of the Challenge \(2018\)](#), contains further recommendations for reducing rates of smoking during pregnancy.

The Challenge Group has no direct or indirect links to the tobacco industry.

Introduction

1. Smoking during pregnancy is the leading modifiable risk factor for poor birth outcomes, including stillbirth, miscarriage and pre-term birth.
2. Smoking during pregnancy also increases the risk of children developing a number of respiratory conditions, attention and hyperactivity difficulties, learning difficulties, problems of the ear, nose and throat, obesity, and diabetes.^{1,2,3,4,5,6,7,8,9,10}
3. As well as human costs, there are financial ones. In 2015/16, it's estimated that the cost of maternal smoking during pregnancy over £20 million through 10,032 episodes of admitted patient care.¹¹
4. Given this impact, Challenge Group has welcomed the Government's ambition to reduce rates of smoking at time of delivery (SATOD) to 6% or less by 2022.¹² If this ambition is achieved, analysis shows that in 2022 this would mean that around 30,000 fewer women smoking in pregnancy compared to 2017/18.¹³ We estimate that this would mean from:
 - 45 – 73 fewer babies stillborn
 - 11 – 25 fewer neonatal deaths
 - 7 – 11 fewer sudden infant deaths
 - 482 – 796 fewer preterm babies and
 - 1455 – 2407 fewer babies born at a low birth weight
5. However, rates of smoking in pregnancy have plateaued since 2015, hovering at slightly below 11%.¹⁴ To hit the 6% ambition from the 2018/19 rate of 10.6% would require a rate of decline of roughly 1.54ppt a year until 2022.
6. The 6% ambition will not be met without further dedicated activity to support pregnant women to quit. This includes a national incentive scheme to support women in high smoking prevalence communities and support for women's households and families reducing pregnant women's exposure to secondhand smoke as well as supporting them to quit.

1. Life span to health span: Which health and social care policies should be reviewed to improve the health of: people living in poorer communities, or excluded groups?

7. The Green Paper highlights current geographic differences in smoking at time of delivery (SATOD) rates between Blackpool and Westminster, with variation across the country ranging from 1.6% to 25.7% in 2018/19.¹⁴
8. As in the general population, smoking rates among pregnant women increase with indicators of disadvantage. Booking data from 25,000 pregnant smokers from 2017/18 showed rates of smoking among women in the most deprived decile were five times those in the least deprived decile (19.8% and 3.7% respectively), with a clear gradient across the deciles.¹⁵ Further, younger women are most likely to smoke during pregnancy and are least likely to quit. In 2017/18, 31% of women aged under 20 were current smokers at their booking appointment compared to just 6% of women over the age of 40.¹⁵

Reviewing implementation

9. In order to address this variation, Public Health England (PHE) and NHS England should review maternity services' implementation of NICE Guidance PH26¹⁶ and PH48¹⁷ to assess barriers to local implementation and ensure all women are receiving the best care throughout their pregnancy.
10. Evidence suggests that healthcare practitioners welcome guidance around supporting women to stop smoking, especially guidance on addressing smoking without damaging their therapeutic relationship. However, this must be embedded within clinical teams and have clinical ownership to ensure best practice is maintained.¹⁸
11. An evaluation of the implementation of the Saving Babies' Lives Care Bundle (version 1) across 19 trusts found that implementation of carbon monoxide (CO) monitoring was fairly well accepted and implemented, with the exception of one trust that report never CO monitoring women.¹⁹ However, referrals into stop smoking services were patchy with seven of the 19 trusts reporting to never refer or to refer 'not much of the time'.¹⁹
12. This is illustrative of the variation in practice between trusts and the need for more to be done to monitor and review the implementation of key support for women. Local Maternity Systems (LMSs) have a key role to play in ensuring there are clear pathways of support in place for pregnant women. Implementation of CO monitoring and opt-out referrals to specialist stop smoking support must be key indicators for LMSs to monitor local progress.
13. Further, the publication of Saving Babies' Lives Care Bundle V2²⁰ with the welcome commitment to CO monitor all women at 36 weeks, provides an additional source of data for trusts and LMSs to monitor the smoking rates of women in their care. Recording smoking status at 36 weeks is likely to provide a more accurate picture of maternal smoking than SATOD data, and thus should provide a new and more reliable benchmark for PHE and NHSE to track national progress.

Introducing incentives

14. More intensive, targeted approaches to support women to quit are also needed. A 2019 Cochrane review of the evidence on financial incentives found that they are an effective way of supporting pregnant women to quit smoking during pregnancy and remain quit post-partum, with women receiving incentives more than twice as likely to

quit compared to those in non-incentives groups.²¹ This has immediate impacts, with evidence from Glasgow showing that women who quit smoking with the support of incentives had an average of 145 grams increase in birth weight.²²

15. Significantly, research has found that incentives are effective among heavier smokers who are likely to be the most disadvantaged.²³ This is supported by evidence from a 2013 North West incentive scheme which specifically recruited women who were: living with a smoker, living in an area of high smoking prevalence or deprivation, had smoked throughout a previous pregnancy or were teenagers. Results showed 69% of women receiving incentives were CO validated as quit after 4 weeks compared to 41% of those receiving standard support.²⁴ Incentives are also a highly cost effective intervention with an estimated return on investment of £4 for every £1 invested.²⁵
16. These interventions can also have an impact on women's households with a range of schemes including vouchers for a 'significant other supporter' (SoS) if women remain quit post-partum. These SoS either have to be non-smokers or undertake a quit attempt alongside the woman herself. Evidence suggests that women who engage with the support of a SoS may be more successful at quitting and maintaining that quit attempt compared to women not supported by an SoS.²⁴
17. As part of their 'Making Smoking History' strategy,²⁶ Greater Manchester has implemented an evidence-based incentive scheme targeting disadvantaged pregnant women alongside comprehensive implementation of NICE Guidance to support more women to quit and remain smokefree post-partum. This scheme includes both engagement of a SoS and continues with a post-partum incentive for remaining smokefree. The decision to target the incentive scheme was intended to, and is, accelerating the quit rate across GM and support improved abstinence post-partum. Ultimately this is having a positive impact on local SATOD rates.
18. Greater Manchester's scheme is being evaluated by Stirling University with interim results expected in late 2019. Initial trust results from localities such as Bolton are very encouraging with the maternity unit maintaining an 84% quit rate among pregnant women involved in the scheme over three quarters.
19. Using this evidence of best practice and local examples, the Government should introduce a national incentives scheme focused on supporting women in high prevalence communities.

Supporting families

20. Women's environments have a crucial impact on their smoking. Women who live with a smoker are six times more likely to smoke throughout their pregnancy and for those who do manage to quit, women living with a smoker are more likely to relapse once the baby is born.²⁷ An estimated 20% of women are also exposed to secondhand smoke in the home throughout pregnancy, leading to many of the same adverse birth outcomes that are experienced by women who smoke.²⁷ This makes engagement with women's families and households especially important.
21. National and local government and NHS organisations should seek to better engage a wider group of health and care professionals in reducing rates of smoking in pregnancy. This will require engagement from commissioners to maximise the delivery of very brief advice (VBA) on smoking in pregnancy and ensure professional groups such as Health Visitors are trained to have these conversations. This has the potential to reduce exposure of pregnant women to secondhand smoke as well as

supporting their quit attempts, and ensuring more children are growing-up in smokefree homes. Further pilot programmes to increase the evidence on what works on engaging families are also needed to address this major barrier to progress.

22. The commitment within the NHS Long Term Plan to a dedicated pathway of support for pregnant women and their partners around smoking is especially welcome. Evidence suggests that over three quarters of women who quit smoking during pregnancy relapse post-partum.²⁸ NHS England needs to consider extending the pathway of support offered into the post-partum period to help prevent relapse after birth.

2. Supporting smokers to quit: What ideas should the government consider to raise funds for helping people stop smoking?

23. Tobacco is not like any other consumer product: it is lethal when used as intended. Tobacco manufacturers are highly profitable and can and should be made to pay for the cost of tobacco control.²⁹ The Challenge Group endorses the proposal in the Green Paper for a 'polluter pays' approach to funding tobacco control, using legislative mechanisms set out in the Health Act 2006.

24. Making tobacco manufacturers pay a levy or licence fee to Government for measures to help smokers quit and prevent young people from taking up smoking is supported by 72% of adults in England with only 7% opposed.³⁰

3. Eating a healthy diet: How can we do more to support mothers to breastfeed?

25. Prevalence of breastfeeding is lowest among young mothers and women from lower socioeconomic groups who also have highest smoking rates. Women who have quit smoking for at least a month are more likely to initiate breastfeeding.³¹ In addition, women who quit smoking tend to continue breastfeeding for a longer period of time than those who continue to smoke.^{32,33}

26. Health professionals should therefore combine delivery smoking cessation and relapse prevention advice with lactation counselling to maximise efforts to initiate and maintain breastfeeding.³⁴

4. Prevention in the NHS: Have you got examples or ideas for services or advice that could be delivered by community pharmacies to promote health?

27. Research conducted by ASH shows that just over 40% of local authorities no longer commission a universally accessible stop smoking service.³⁵ While a number of these areas that have closed their universal service have maintained some provision for pregnant women, to reduce maternal smoking it's important to ensure their households and families can access support to quit.

28. To enable households to be smokefree and further protect children from exposure to tobacco smoke, people living with pregnant women should be offered specialist support to quit. Community pharmacies are currently well placed to provide this support to family members and households, both protecting children and reducing the likelihood that children will grow-up with smoking role models.

5. Value for money: How can we make better use of existing assets - across both the public and private sectors - to promote the prevention agenda?

29. There are multiple benefits to having a focus on reducing smoking among parents of young children; it protects children from secondhand smoke and removes smoking role models from the home reducing the likelihood of future smoking uptake among children. It also increases the likelihood that women remain smokefree during future pregnancies. Pregnancy and the first few months of a child's life are a key opportunity for behaviour change. It's estimated that up to 76% of women who quit when they are pregnant relapse after giving birth.²⁸ Tackling this through the role of health visitors and other professional groups could have wide-ranging benefits.
30. Exposure to secondhand smoke is a major cause of childhood illness costing the NHS nearly £12 million a year.¹¹ Professionals working across children's services are well placed to deliver very brief advice to families about quitting and the benefits of keeping a smokefree home. Training on delivering very brief advice is available online (eg from the National Centre for Smoking Cessation and Training³⁶) and would give professionals the skills they need to engage families in these conversations.

6. Local action: What more can we do to help local authorities and NHS bodies work well together?

31. Collaboration between NHS organisations and local authorities is too often dependent upon individuals and personal relationships. Embedding this collaboration into service specifications and operational support for commissioners would ensure that this engagement becomes a routine part of service delivery. All LMSs should have a dedicated prevention lead part of whose role is to support this collaboration across local areas with regard to smoking in pregnancy.
32. The NHS Long Term Plan commits to providing a pathway of stop smoking support for pregnant women and their partners, in addition to the stop smoking services commissioned by local authorities.³⁷ NHS England must ensure that collaboration between NHS and local authority commissioned support is considered in the specifications for this pathway and that the expectations for what this service will look like are clear.
33. To better enable this collaboration, local NHS and local authority public health teams should consider what data sharing options can be put in place to ensure that when women transition from NHS to local authority care their smoking status is known and appropriate support can be provided. This can be especially relevant post-partum for example, data sharing could ensure health visitors are aware of a woman's smoking status in advance of the new birth visit and are able prepare accordingly.

7. Sexual and reproductive health: What are the top 3 things you'd like to see covered in a future strategy on sexual and reproductive health?

34. Research looking at the relationship between smoking and fertility has concluded that tobacco use negatively affects every system involved in the reproductive process.^{38,39}
35. Women who smoke take longer to conceive than women who do not smoke,⁴⁰ and smoking is linked to greater pregnancy complications, including higher rates of ectopic pregnancies.^{41,42} There is evidence to suggest that smoking reduces the success of fertility treatment,⁴³ with studies of women undergoing assisted reproductive treatment demonstrating a significant negative effect associated with smoking.^{44,45,46} One study from the 1990s showed a 50% reduction in implantation rate among smokers compared to women who had never smoked.⁴⁷

36. Men who smoke have a lower sperm count than non-smokers, and their semen contains a higher proportion of malformed sperm.^{48,49,50} Mounting evidence shows a significant association between smoking and male sexual impotence with the association increasing with the number of cigarettes smoked per day.^{51,52,53,54,55} These impacts of smoking and smoke-exposure should be considered within any sexual and reproductive health strategy.
37. Further, women who use the contraceptive pill who smoke are at risk of venous thromboembolism and arterial thrombosis.^{56,57,58} It is therefore important that all women who take the contraceptive pill be advised not to smoke. Reducing rates of smoking among women of childbearing age will be an important step towards decreasing rates of smoking during pregnancy and sexual and reproductive health services can play an important role in this.
38. Where it is known that a woman is trying to conceive, health professionals and others who have contact with her and her partner should identify smoking status, provide very brief advice, and offer referral to stop smoking services.

8. Next steps: What other areas (in addition to those set out in this green paper) would you like future government policy on prevention to cover?

39. The Challenge Group's 2018 report: Review of the Challenge⁵⁹ sets out further recommendations for national action to reduce smoking in pregnancy.
40. In particular the Government should consider recommendations for:
- The Department of Health and Social Care to task the National Screening Committee with including CO monitoring as part of its antenatal screening programme.
 - CCGs and local authorities alongside stop smoking services and NHS trusts to ensure comprehensive implementation of the NICE guidance in relation to training. All midwives, and other health professionals working with women who smoke while pregnant, should have training on smoking cessation that is appropriate to their role.

Age of Sale

41. Young mothers have the highest rates of smoking during pregnancy and are also more likely to smoke throughout their pregnancy.¹⁵ A report by the US Institute of Medicine strongly concluded that increasing the tobacco age to 21 would significantly reduce the number of adolescents and young adults who start smoking; including improving the health of young mothers who would be deterred from smoking as well as health of their children.⁶⁰ This could also impact the number of young mothers exposed to secondhand smoke from partners and their peers.
42. Experimentation with tobacco smoking is rare after age 21. Two thirds of people who experiment with tobacco go on to become regular smokers;⁶¹ but this shift to regular smoking largely happens between 18 and 21. US data highlights that while less than half of adult smokers (46%) become daily smokers before age 18, four out of five do so before they turn 21.⁶²
43. While smoking rates among young people have declined over the past decade, the ratio of those starting before 18, compared to those starting between 18 and 21 has changed, with more young people starting smoking between 18 and 21. Overall, from

between 2007–2011 and 2014–2018 the proportion of young people trying smoking between 18 and 21 compared to under 18 has increased from 30% to 35%.⁶³

44. The previous increase in the age of sale for tobacco from 16 to 18 was associated with reductions in regular smoking among young people and appeared similarly effective across all socioeconomic groups.⁶⁴
45. The Government should consider the evidence for raising the age of sale for tobacco products to 21 as part of efforts to decrease smoking among young people, including young mothers.

-
- 1 Batstra, L., Hadders-Algra, M., and Neeleman, J., [Effect of antenatal exposure to maternal smoking on behavioural problems and academic achievement in childhood: prospective evidence from a Dutch birth cohort](#). *Early Human Development*, 2003, 75: 21-33.
 - 2 Rogers, J.M. [Tobacco and Pregnancy: Overview of Exposures and Effects, Birth Defects Research Part C](#). 2008, 84: 1-16.
 - 3 Castles, A. et al. [Effects of smoking during pregnancy: five meta-analyses](#). *American Journal of Preventive Medicine* 16 (3), 1999: 208-215.
 - 4 Jaddoe, V.W., et al. [Active and passive maternal smoking during pregnancy and the risks of low birthweight and preterm birth: the Generation R Study](#). *Paediatric and perinatal epidemiology*, 2008, 22: 162-171.
 - 5 Roelands, J. et al, [Consequences of smoking during pregnancy on maternal health](#). *Journal of Women's Health*, 2009, 18(6): 867-872.
 - 6 Dietz, P.M et al. [Infant morbidity and mortality attributable to prenatal smoking in the U.S.](#) *American Journal of Preventive Medicine*, 2010, 39(1):45-52.
 - 7 Salihi, H.M. and Wilson, R.E., [Epidemiology of prenatal smoking and perinatal outcomes](#). *Early Human Development*, 2007, 83(11):713-20.
 - 8 Montgomery, S. and Ekblom, A., [Smoking during pregnancy and diabetes mellitus in a British longitudinal birth cohort](#). *British Medical Journal*, 2002, 324:26.
 - 9 Jaakkola, J.J.K. and Gissler, M., [Maternal Smoking in Pregnancy, Fetal Development, and Childhood Asthma](#). *American Journal of Public Health*, 2004, 94(1): 136–140.
 - 10 Button, T.M.M., Maughan, B. and McGuffin, P. [The relationship of maternal smoking to psychological problems in the offspring](#). *Early Human Development*, 2007, 83(11): 727–732.
 - 11 Royal College of Physicians. [Hiding in Plain Sight: Treating tobacco dependency in the NHS](#). 2018
 - 12 Department of Health and Social Care. [Towards a smokefree generation: A tobacco control plan for England](#). 2017.
 - 13 The Lullaby Trust. [Impact of smoking on future rates of stillbirth, neonatal and infant mortality and poor birth outcomes in England](#). 2018.
 - 14 NHS Digital. [Statistics on Women's Smoking Status at Time of Delivery: England 2018-19](#). 2019.
 - 15 NHS Digital. [National Maternity Statistics 2017-18](#). 2018.
 - 16 NICE. [Public Health Guidance 26. Smoking: stopping in smoking and after childbirth](#). 2010.
 - 17 NICE. Public Health Guidance 48. [Smoking: acute, maternity and mental health services](#). 2013
 - 18 Jones S. Hamilton S. Bell R. Araújo-Soares V. Glinianaia S. Milne E. [What helped and hindered implementation of an intervention package to reduce smoking in pregnancy: process evaluation guided by normalization process theory](#). *BMC Health Services Research*. 2019.
 - 19 Widdows K, Roberts SA, Camacho EM, Heazell AEP. [Evaluation of the implementation of the Saving Babies' Lives Care Bundle in early adopter NHS Trusts in England](#). Maternal and Fetal Health Research Centre, University of Manchester, Manchester, UK. 2018.
 - 20 NHS England. [Saving Babies' Lives Version 2: A care bundle for reducing perinatal mortality](#). 2019.
 - 21 Notley C, Gentry S, Livingstone-Banks J, Bauld L, Perera R, Hartmann-Boyce J. [Incentives for smoking cessation \(Review\)](#). *Cochrane Database of Systematic Reviews*. 2019. Issue 7. Art. No.: CD004307.
 - 22 McConnachie A., Haig C., Sinclair L., Bauld L., Tappin D. [Birth weight differences between those offered financial voucher incentives for verified smoking cessation and control participants enrolled in the Cessation in Pregnancy Incentives Trial \(CPIT\), employing an intuitive approach and a Complier Average Causal Effects \(CACE\) analysis](#). *Trials* 2017. 18:337.
 - 23 Tappin D, Bauld L, Purves D, Boyd K, Sinclair L, MacAskill S, et al. [Cessation in Pregnancy Incentives Trial \(CPIT\) team. Financial incentives for smoking cessation in pregnancy: randomised controlled trial](#). *BMJ* 2015; 350: h134
 - 24 Tobacco Free Futures. [Achieving a smokefree pregnancy](#). 2013.
 - 25 Chamberlain C, O'Mara-Eves A, Oliver S, Caird JR, Perlen SM, Eades SJ, Thomas J. [Psychosocial interventions for supporting women to stop smoking in pregnancy](#). *Cochrane Database of Systematic Reviews* 2013, Issue 10. Art. No.: CD001055
 - 26 Greater Manchester Health and Social Care Partnership. [Making Smoking History: A tobacco free Greater Manchester](#). 2017.
 - 27 NHS Digital. [Infant Feeding Survey](#). 2010.
 - 28 Jones, M., Lewis, S., Parrott, S., Wormall, S., & Coleman, T. [Re-starting smoking in the postpartum period after receiving a smoking cessation intervention: A systematic review](#). *Addiction*, 2016, 111(6), 981–990
 - 29 Branston, J. R. and Gilmore, A. [The extreme profitability of the UK tobacco market and the rationale for a new tobacco levy](#). University of Bath. 2015.
 - 30 ASH smokefree England survey 2019. Total sample size in 2019 for England was 10338 adults. Fieldwork was undertaken between 12th February 2019 and 10th March 2019. The surveys are carried out online and the figures have been weighted and are representative of all English adults (aged 18+).
 - 31 Collins BN, DiSantis KI, Nair US. [Longer previous smoking abstinence relates to successful breastfeeding initiation among underserved smokers](#). *Breastfeed Med*. 2011 Dec;6(6):385-91. doi: 10.1089/bfm.2010.0076.

-
- 32 Higgins TM, Higgins S, Heil S, Badger G, Skelly J, Bernstein I, et al. [Effects of cigarette smoking cessation on breastfeeding duration](#). *Nicotine Tob Res*. 2010 May;12(5):483-8. doi: 10.1093/ntr/ntq031.
- 33 Neal M, Hughes E, Holloway A, Foster W. [Sidestream smoking is equally as damaging as mainstream smoking on IVF outcomes](#). *Hum Reprod*. 2005 Sep;20(9):2531-5
- 34 Weiser TM, Lin M, Garikapaty V, Feyerharm RW, Bensyl DM, Zhu BP. [Association of maternal smoking status with breastfeeding practices: Missouri](#). *Pediatrics*. 2009;124(6):1603-10. doi: 10.1542/peds.2008-2711.
- 35 ASH. [A changing landscape: stop smoking services and tobacco control in England](#). 2019.
- 36 NCSCCT. [Very Brief Advice training module](#). Accessed October 2019.
- 37 NHS England. [The NHS Long Term Plan](#). 2019.
- 38 Soares SR, Melo MA. [Cigarette smoking and reproductive function](#). *Curr Opin Obstet Gynecol*. 2008 Jun;20(3):281-91. doi: 10.1097/GCO.0b013e32822fc9c1e.
- 39 Dechanet C et al. [Effects of cigarette smoking on reproduction](#). *Hum Reprod Update*. 2011 JanFeb;17(1):76-95. doi: 10.1093/humupd/dmq033
- 40 Shiverick KT. [Chapter 24 – Cigarette smoking and reproductive and developmental toxicity](#). In: Gupta RC, editor. *Reproductive and Developmental Toxicology* Burlington, MA: Elsevier; 2011. ISBN: 978-0-12- 382032-7.
- 41 Einarson A, Riordan S. [Smoking in pregnancy and lactation: a review of risks and cessation strategies](#). *Eur J Clin Pharmacol*. 2009 Apr;65(4):325-30. doi: 10.1007/s00228-008-0609-0.
- 42 Anderson K, Nisenblat V, Norman R. [Lifestyle factors in people seeking infertility treatment - A review](#). *Aust N Z J Obstet Gynaecol*. 2010 Feb;50(1):8-20. doi: 10.1111/j.1479-828X.2009.01119.x.
- 43 Dechanet C et al. [Effects of cigarette smoking on embryo implantation and placentation and analysis of factors interfering with cigarette smoke effects \(Part II\)](#). *Gynecol Obstet Fertil*. 2011 Oct;39(10):567-74. doi: 10.1016/j.gyobfe.2011.07.023.
- 44 Lintsen A et al. [Effects of subfertility cause, smoking and body weight on the success rates of IVF](#). *Hum Reprod*. 2005 Jul;20(7):1867-75.
- 45 Neal M et al. [Sidestream smoking is equally as damaging as mainstream smoking on IVF outcomes](#). *Hum Reprod*. 2005 Sep;20(9):2531-5
- 46 Waylen A, et al. [Effects of cigarette smoking upon clinical outcomes of assisted reproduction: a meta-analysis](#). *Hum Reprod Update*. 2009 Jan-Feb;15(1):31-44. doi: 10.1093/humupd/dmn046.
- 47 Meeker JD, Benedict MD. [Infertility, pregnancy loss and adverse birth outcomes in relation to maternal secondhand tobacco smoke exposure](#). *Curr Womens Health Rev*. 2013 Feb;9(1):41-49.
- 48 Ramlau-Hansen CH et al. [Is smoking a risk factor for decreased semen quality? A cross-sectional analysis](#). *Hum Reprod*. 2007 Jan;22(1):188-96
- 49 Gaur DS, Talekar M, Pathak VP. [Effect of cigarette smoking on semen quality of infertile men](#). *Singapore Med J*. 2007 Feb;48(2):119-23.
- 50 Schilling K et al. [Prevalence of behaviour-related fertility disorders in a clinical sample: results of a pilot study](#). *Arch Gynecol Obstet*. 2012 Nov;286(5):1307-14. doi: 10.1007/s00404-012-2436-x.
- 51 Millett C et al. [Smoking and erectile dysfunction: findings from a representative sample of Australian men](#). *Tob Control*. 2006 Apr;15(2):136-9.
- 52 Meldrum DR et al. [Lifestyle and metabolic approaches to maximizing erectile and vascular health](#). *Int J Impot Res*. 2012 Mar-Apr;24(2):61-8. doi: 10.1038/ijir.2011.51
- 53 Tostes RC et al. [Cigarette smoking and erectile dysfunction: focus on NO bioavailability and ROS generation](#). *J Sex Med*. 2008. 5(6):1284-95. doi: 10.1111/j.1743-6109.
- 54 Grant P et al. [Erectile dysfunction in general medicine](#). *Clin Med*. 2013 Apr;13(2):136-40. doi: 10.7861/clinmedicine.13-2-136.
- 55 Heidelbaugh JJ. [Management of erectile dysfunction](#). *Am Fam Physician*. 2010 Feb 1;81(3):305-12
- 56 Lalude OO. [Risk of cardiovascular events with hormonal contraception: insights from the Danish cohort study](#). *Curr Cardiol Rep*. 2013 Jul;15(7):374. doi: 10.1007/s11886-013-0374-2.
- 57 Pomp ER, Rosendaal FR, Doggen CJ. [Smoking increases the risk of venous thrombosis and acts synergistically with oral contraceptive use](#). *Am J Hematol*. 2008 Feb;83(2):97-102.
- 58 Shufelt CL, Bairey Merz CN. [Contraceptive hormone use and cardiovascular disease](#). *J Am Coll Cardiol*. 2009;53:221–31.
- 59 Smoking in Pregnancy Challenge Group. [Review of the Challenge 2018](#). 2018.
- 60 Institute of Medicine. [Public health implications of raising the minimum age of legal access to tobacco products](#). Washington, DC: The National Academies Press. 2015.
- 61 Birge M, Duffy S, Miler JA, Hajek P. [What proportion of people who try one cigarette become daily smokers? A meta-analysis of representative surveys](#). *Nicotine Tob Res*. 2018 Nov 15;20(12):1427-1433. doi: 10.1093/ntr/ntx243
- 62 Campaign for Tobacco Free Kids. [Raising the tobacco age to 21](#). 2018. [Accessed October 2019].
- 63 Analysis of Smoking Toolkit Study data for ASH. Monthly household surveys of representative samples of approximately 1800 adults (16+ years old) in England. University College London. [www.smokinginengland.info](#)
- 64 Millett C, Lee JT, Gibbons DC, Glantz SA. [Increasing the age for the legal purchase of tobacco in England: impacts on socio-economic disparities in youth smoking](#). *Thorax*. 2011;66(10):862-865. doi:10.1136/thx.2010.154963.