

## INTRODUCTION

Smoking is a modifiable risk factor and effective tobacco control measures can reduce the prevalence of smoking in the population. Survey data has shown that inequalities in smoking prevalence exist across many characteristics and there is a clear gradient by socio-economic deprivation<sup>1</sup>.

The Annual Population Survey<sup>2</sup> (APS) is a large continuous household survey run by the Office for National Statistics, questioning around 320,000 people (160,000 in England) per year. The range of questions in the survey allows us to examine if the observed difference in smoking prevalence by deprivation can be attributed to the personal characteristics of those in each group, or if deprivation remains a strong predictor of smoking prevalence.

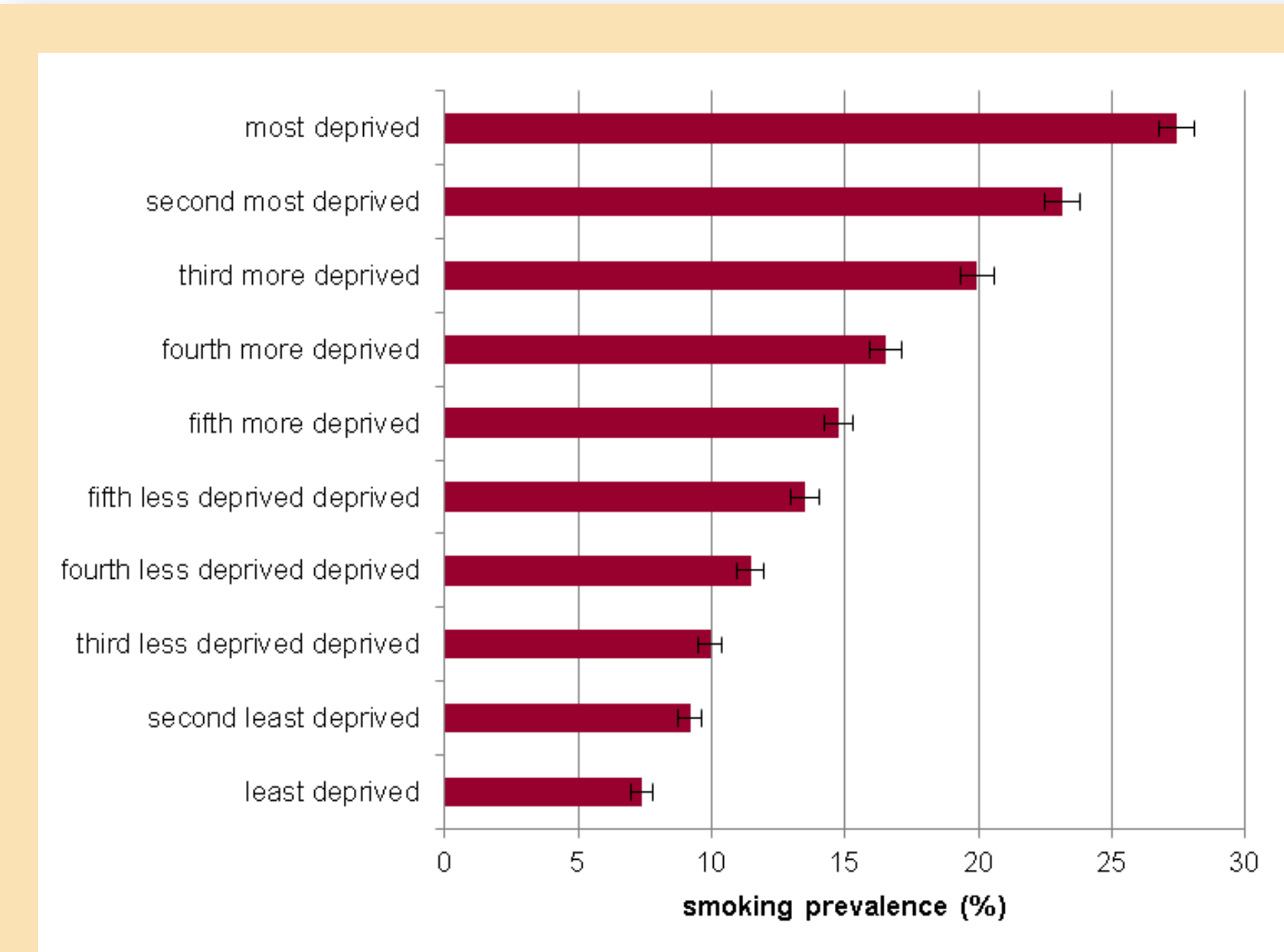


Figure 1. Smoking prevalence (current smokers) and corresponding 95% confidence intervals, by deprivation decile (derived from LSOA of residence)

## METHODS

We analysed responses to the question 'Do you smoke cigarettes at all nowadays?' from the APS (2016) for England residents aged 18 and over, and assigned each respondent to a deprivation decile based on their lower super output area of residence.

Responses were excluded where the age was less than 18, the respondent did not live in England, or no valid response was recorded for smoking status. After exclusions 157,558 respondents were included in the analysis.

We tabulated the weighted mean averages of respondents in each group for smokers and corresponding 95% confidence intervals calculated using the normal approximation.

Then we used simple logistic regression to explore the differences between groups within each variable, using the largest group as the reference (Odds ratio = 1).

Finally, we explored whether personal characteristics of the respondents (as listed in table 1) accounted for any of the differences observed using multiple logistic models in Stata.

## RESULTS

Variable	Group	Smoking prevalence		Sample size	
		%	95% CI		
Age	65+	8.5	( 8.2 - 8.8 )	41,193	
	55-64	15.0	( 14.5 - 15.4 )	26,440	
	45-54	17.5	( 17.1 - 18 )	28,404	
	35-44	17.7	( 17.3 - 18.2 )	25,479	
	25-34	21.1	( 20.5 - 21.6 )	22,627	
	18-24	19.2	( 18.6 - 19.9 )	13,415	
Sex	Female	14.1	( 13.8 - 14.3 )	82,653	
	Male	16.9	( 16.7 - 17.2 )	74,905	
Ethnicity	White	16.1	( 15.9 - 16.2 )	138,762	
	Mixed/Multiple Ethnic Groups	21.7	( 19.6 - 23.9 )	1,385	
	Asian/Asian British	9.1	( 8.6 - 9.7 )	10,025	
	Black/African/Caribbean/Black British	9.7	( 8.8 - 10.6 )	4,191	
	Chinese	7.3	( 5.5 - 9.2 )	803	
	Arab	15.1	( 12 - 18.2 )	515	
Religion	Other Ethnic Group	14.9	( 13.3 - 16.6 )	1,793	
	Christian	13.9	( 13.7 - 14.1 )	94,507	
	No religion	19.7	( 19.3 - 20 )	48,142	
	Buddhist	14.6	( 12.1 - 17.2 )	717	
	Hindu	6.0	( 5.1 - 7 )	2,374	
	Jewish	9.4	( 7.3 - 11.6 )	720	
	Muslim	11.9	( 11.2 - 12.7 )	6,907	
	Sikh	5.5	( 4.2 - 6.8 )	1,142	
	Other religion	15.9	( 14.5 - 17.3 )	2,781	
	Occupation	Managerial and professional	9.8	( 9.6 - 10.1 )	47,777
		Intermediate	15.7	( 15.3 - 16.1 )	27,844
Routine and manual		24.6	( 24.2 - 25.1 )	37,059	
Never worked and long term unemployed		13.6	( 13.3 - 13.9 )	44,878	
Marital status		Married	10.1	( 9.9 - 10.3 )	84,132
	Single	22.7	( 22.2 - 23.2 )	30,227	
	Cohabiting	23.7	( 23.1 - 24.4 )	18,135	
	Divorced/separated	23.8	( 23.1 - 24.5 )	14,081	
	Widowed	11.0	( 10.4 - 11.6 )	10,066	
	Other	20.0	( 17.4 - 22.5 )	917	
Sexual identity	Heterosexual/Straight	15.5	( 15.3 - 15.7 )	104,479	
	Gay or Lesbian	22.9	( 20.5 - 25.3 )	1,176	
	Bisexual	22.3	( 18.9 - 25.7 )	569	
	Other	18.4	( 15.2 - 21.6 )	561	
	General health status	Very good or good health	13.9	( 13.7 - 14.1 )	113,683
Fair health		19.7	( 19.2 - 20.2 )	26,983	
Bad or very bad health		26.2	( 25.4 - 27.1 )	11,017	
Disability status	Activity not limited at all	13.1	( 12.6 - 13.5 )	21,776	
	Activity limited a little	17.2	( 16.7 - 17.7 )	19,824	
	Activity limited a lot	24.2	( 23.5 - 24.9 )	15,597	
Education	Qualifications	15.7	( 15.5 - 15.9 )	117,006	
	No qualifications	27.9	( 27.1 - 28.7 )	13,016	
Housing	Living in other accommodation	10.0	( 9.8 - 10.2 )	110,180	
	Living in rented accommodation	28.0	( 27.6 - 28.5 )	47,314	
Benefits status	Not receiving benefits	15.3	( 15 - 15.5 )	81,060	
	Receiving benefits	19.8	( 19.5 - 20.1 )	50,980	

Table 1. Smoking prevalence in adults (current smokers) and corresponding 95% confidence intervals, by respondent characteristics

The sample used demonstrated the well-known variation in smoking prevalence between groups, for example males have higher smoking rates than females (16.9% vs. 14.1% respectively), younger people higher than older people (ranging from 21.1% in those aged 25-24 years to 8.5% in those age over 65 years) and routine and manual workers higher than other occupations (24.6% compared with the lowest rate of 9.8% in managerial and professional).

Other variables we explored showed that smoking prevalence for married couples was less than half that of some other groups (10.1% for married compared with around 23% for single, cohabiting and divorced) and gay or lesbian and bisexual groups had higher smoking prevalence than heterosexual (22.9%, 22.3% and 15.5% respectively). Furthermore, people living in rented accommodation were more likely to smoke (28.0% compared with 10.0% of those living in other housing types).

People in bad or very bad health had almost twice the proportion or current smokers compared with those in very good or good health (26.2% vs. 13.9% respectively) and similarly those with very limited activity had higher smoking prevalence than those whose activity was not limited at all (24.2% vs. 13.1%).

Looking at the logistic regression results by deprivation (Figure 2), unadjusted odds ratios (OR) showed that the odds of smoking increased significantly with increased deprivation and the odds of someone living the most deprived decile being a smoker was almost 5 times that of someone in the least deprived decile (OR=4.74, 95% CI 4.42-5.08). In fact people living in the five most deprived deciles (i.e. most deprived half of the country) had at least twice the odds of smoking compared with the least deprived decile.

When the other variables (described in table 1) were added in to the model, these characteristics accounted for more than half of the difference between the most deprived and least deprived deciles (OR reduced to 2.00, 95% CI 1.86-2.14).

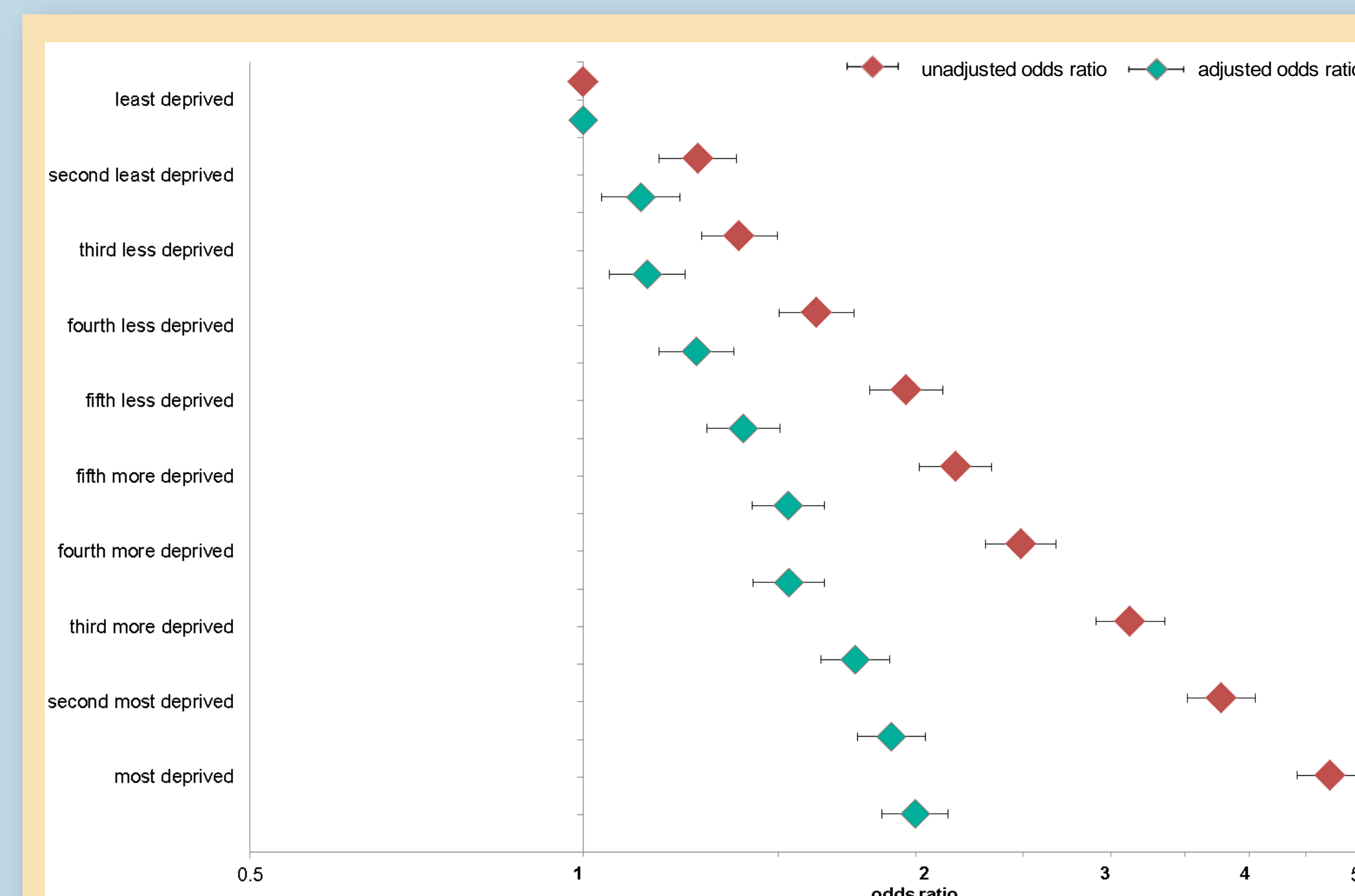


Figure 2. Odds of smoking by deprivation – Unadjusted odds ratios and odds ratios adjusted for age, sex, ethnicity, religion, occupation, marital status, sexual identity, general health, disability, qualifications, housing type and benefits status

## DISCUSSION

Smoking is the biggest single cause of preventable death and ill-health within England<sup>3</sup>, accounting for 1 in 6 of all deaths in England, and accounting for around 5.5% of the NHS budget.

There exist huge inequalities in smoking related deaths and hospital admissions: areas with the highest death rates from smoking are about three times as high than areas with the lowest death rates attributable to smoking. Furthermore smoking attributable hospital admissions are almost twice as high in the most deprived areas compared with the least deprived (2,224 per 100,000 age 35+ compared with 1,241 per 100,000 age 35+).<sup>1</sup> The Tobacco Control Plan (2017)<sup>4</sup> highlights the importance of reducing these inequalities in smoking prevalence and helping smokers in all groups to quit.

While some of the difference between the rates of current smokers across deprivation deciles can be explained by the personal characteristics of the respondents in each group, some variation remains after accounting for them, highlighting an important health inequity in England.

Further investigation would include investigating interactions between variables for example sex and ethnicity, sex and religion, sex and sexual identity where we have previously noted that smoking prevalence varies greatly in some cases between males and females, as this may provide a better fitting model for the dataset and help to explain the differences by deprivation further.

## CONCLUSIONS

- Smoking prevalence is highest in the most deprived areas in England.
- Individual characteristics can somewhat explain the differences in smoking prevalence between the deprivation deciles.
- Further investigation would allow us to explore whether particular combinations of inequalities require targeted intervention in order to reduce smoking prevalence overall.

## REFERENCES

1. Local Tobacco Control Profiles <https://fingertips.phe.org.uk/profile/tobacco-control/data#page/7/gid/1938132886/pat/6/par/E12000004/ati/102/are/E06000015>
2. Annual Population Survey, 2016 <https://fingertips.phe.org.uk/profile/tobacco-control/data#page/7/gid/1938132886/pat/6/par/E12000004/ati/102/are/E06000015/iid/92443/age/168/sex/4>
3. World Health Organization Report on the Global Tobacco Epidemic 2009 <http://www.who.int/tobacco/mpower/2009/en/index.html>
4. Towards a Smokefree Generation: A Tobacco Control Plan for England <https://www.gov.uk/government/publications/towards-a-smoke-free-generation-tobacco-control-plan-for-england>