Appendix 3: SES data and scenario development

A brief literature review was conducted to identify published references including estimates for each stage of each scenario, stratified by NS-SEC group or a comparable socio-economic measure which could be collapsed to be approximately equivalent to the groups used in this study. The literature review was conducted using PubMed and a snowball approach based on references already included in the study or identified through the search. References which provided useful information were identified for stages 1, 3 and 4, but not for stages 2 or 4.

Identification of estimates

Stage 1

One reference reported estimates for GP attendance among people who smoke by a measure of social grade (1), however the measure of social grade was not the NS-SEC, rather the British National Readership Survey Social-Grade Classification Tool (2). This tool is similar to the NS-SEC categorisation of occupations and was approximately converted to match NS-SEC categories used in this study as shown in Table **1**, in lieu of any other references presenting estimates stratified by NS-SEC.

Stage 3

The same reference as for stage 1 reported the receipt of smoking cessation interventions stratified by socio-economic group, with the measure of social grade converted to NS-SEC groups as for stage 1 (Table **1**). The reference reported estimates only for receipt of brief interventions which do not exactly match the scenarios included in this study but represent the closest alternative identified during the literature search.

Table 1. Conversion of social grade categories reported by Angus et al. to NS-SEC groups

Source groups (social grade)	**Simulation groups (NS-SEC)**
AB (A-higher managerial, administrative or professional, B-intermediate managerial, administrative or professional)	1 - Managerial and professional
C1 (supervisory or clerical and junior managerial administrative or professional)	2 - Intermediate occupations
C2 (skilled manual workers)	3 - Routine and manual occupations
D (semiskilled and unskilled manual workers)	3 - Routine and manual occupations
E (causal or lowest grade workers, pensioners and others who depend on the welfare state for their income)	Never worked and long-term unemployed

Stage 4

Two references reported estimates stratified by socio-economic measure matching or similar to NS-SEC groups, for quit rates at four weeks following receipt of a smoking cessation intervention (3,4). Of these two sets of estimates, Hiscock et al. was selected as the reference directly reported NS-SEC groups as opposed to the second set of estimates, NHS Statistics from Stop Smoking Services in England, which reported very similar but not exactly corresponding socio-economic groups.

Redistribution and final estimates

All socio-economic estimates were from different sources than the overall estimates used for each stage of the simulation. As a result, the non-stratified estimates for each stage from these references did not match those included in the microsimulation. All socio-economic estimates were therefore adjusted to match the overall estimates included for each stage by applying the socio-economic distribution for each stage to the overall estimates included previously. This was done by calculating a 'redistribution fraction' by dividing each socio-economic estimate by the overall estimate from the publication for each stage and applying this fraction to the overall estimates for each stage and scenario that were used in the microsimulation. The original estimates and final redistributed estimates can be seen in Table **2**.

Table 2. Redistribution of socio-economic estimates to match stage and scenario overall estimates included in microsimulation

	NS-SEC reference estimate from literature	**Redistribution fraction**	**Scenario 2 "VBA + referral"**	**Scenario 3 "VBA + prescription"**	**Scenario 4 "Ottawa"**	
(i)						
Overall estimate	54.9%			75%[19]		
NS-SEC group						
1 - Managerial and professional	58%	1.05		79%		
2 - Intermediate occupations	56%	1.01		76%		
3 - Routine and manual occupations	52%	0.94		70%		
Never worked and long-term unemployed	63%	1.14		86%		
(ii)						
Overall estimate	-	-				75%
NS-SEC group			Not available			
(iii)						
Overall estimate	48.3%		39.66%	47.54%		40%
NS-SEC group						
1 - Managerial and professional	46%	0.95	38%	45%		38%
2 - Intermediate occupations	47%	0.97	39%	46%		39%
3 - Routine and manual occupations	48%	0.99	39%	47%		40%
Never worked and long-term unemployed	54%	1.12	44%	53%		45%
(iv)						
Overall estimate	34.4%		21.50%[12]	15%[12]	27%	15%
NS-SEC group						
1 - Managerial and professional	40%	1.16	25%	17%	31%	17%
2 - Intermediate occupations	38%	1.09	24%	16%	30%	16%
3 - Routine and manual occupations	37%	1.08	23%	16%	29%	16%
Never worked and long-term unemployed	30%	0.87	19%	13%	23%	13%

(v)						
Overall estimate	-	-	30%	30%	30%	30%
NS-SEC group	Not available					

Scenario data by SES

The overall scenario-specific estimates for each stage used in Corbould et al. (5) were redistributed according to the socioeconomic estimates identified for each stage. For step (i), Corbould et al. assumed that 75% of people who smoke attend primary care at least once a year, based on data from Information Services Division (ISD) Scotland (6). This figure was redistributed across the NS-SEC groups based on data from Angus et al. resulting in 79%, 76%, 70% and 86% annual attendance to a GP for NS-SEC 1-4, respectively.

For step (ii), we assume that the intervention is delivered to 75% of people who smoke attending general practice, as in Corbould et al. This represents a hypothetical but achievable increase on current practice that captures the majority of people who smoke attending their GP receiving a smoking cessation intervention.

For step (iii), Corbould et al. assumed 39.66% and 47.54% uptake in the VBA with referral and VBA with prescription scenarios, respectively, based on data from the Smoking Toolkit Study (7). These were redistributed across the NS-SEC groups based on data from Census 2011 and weighted by 2019 ONS age-sex distributions, such that uptake rates for VBA with referral were 38%, 39%, 39% and 44% for NS-SEC 1-4, respectively, and that uptake rates for VBA with prescription were 45%, 46%, 47% and 53% for NS-SEC 1-4, respectively. In the Ottawa Model scenario, Corbould et al. assumed 40% uptake of prescription, of which 74% attend counselling, based on data from OMSC. This study redistributed the former statistic across NS-SEC groups such that prescription uptake rates were 38%, 39%, 40% and 45% for NS-SEC 1-4, respectively.

For step (iv), Corbould et al. assumed 21.5% and 15% quit rates for VBA with referral and VBA with prescription, respectively, based on estimates from West (2017). These were redistributed across the NS-SEC groups such that quit rates for VBA with referral were 25%, 24%, 23% and 19% for NS-SEC 1-4, respectively, and that uptake rates for VBA with prescription were 17%, 16%, 16% and 13% for NS-SEC 1-4, respectively. In the Ottawa Model scenario, Corbould et al. assumed a 27% quit rate for those who used pharmacotherapy and attended counselling, and a 15% quit rate for those who only used pharmacotherapy. These were redistributed across the NS-SEC groups, such that quit rates for the former were 31%, 30%, 29% and 23% for NS-SEC 1-4, respectively, and that quit rates for the latter were 17%, 16%, 16% and 13% for NS-SEC 1-4, respectively.

For step (v), Corbould et al. assumed 30% reuptake across all scenarios, based on data from Stapleton et al. (1998). Due to lack of evidence of a socioeconomic gradient of reuptake in the literature, this model also assumed a universal reuptake rate of 30% across NS-SEC groups.

Table 3. Socioeconomic group (NS-SEC) estimates used for each scenario included in simulation

	NS-SEC published estimates	Scenario 2 "VBA + referral"	Scenario 3 "VBA + prescription"	Scenario 4 "Ottawa"	
		Scenario estimates redistributed by NS-SEC data			
(i)		75% of people who smoke attend primary care at least once a year (ISD, 2013) (5)			
NS-SEC group					
1 - Managerial and professional	58%	79%			
2 - Intermediate occupations	56%	76%			
3 - Routine and manual occupations	52%	70%			
Never worked/long-term unemployed	63%	86%			
(ii)		75% referred to specialist SSS	75% offered prescription with brief advice	75% of patients who smoke given advice	
NS-SEC group	Not available				
(iii)		39.66% referred used a referral service in the last serious quit attempt (6)	47.54% who use prescription NRT and non-nicotine meds as part of last serious quit attempt and had been given GP prescription (6)	40% prescription, referral to counsellor + advice (7)	
NS-SEC group					
1 - Managerial and professional	46%	38%	45%	38%	
2 - Intermediate occupations	47%	39%	46%	39%	
3 - Routine and manual occupations	48%	39%	47%	40%	
Never worked/long-term unemployed	54%	44%	53%	45%	
				74% attend counselling (7)	26% do not attend counselling (7)
(iv)		21.5% quit rate (8)	15% quit rate (8)	27% quit rate (7)	15% quit rate (8)
NS-SEC group					
1 - Managerial and professional	40%	25%	17%	31%	17%
2 - Intermediate occupations	38%	24%	16%	30%	16%
3 - Routine and manual occupations	37%	23%	16%	29%	16%
Never worked/long-term unemployed	30%	19%	13%	23%	13%

(v)	30% reuptake (9)
NS-SEC group	Not available

References

1 Angus C, Brown J, Beard E, Gillespie D, Buykx P, Kaner EFS, Michie S, Meier P. Socioeconomic inequalities in the delivery of brief interventions for smoking and excessive drinking: findings from a cross-sectional household survey in England. BMJ Open. 2019; 9 (4).

2 National Readership Survey. Social Grade. Available at: http://www.nrs.co.uk/nrs-print/lifestyle-and-classification-data/social-grade/

3 Hiscock R, Dobbie F, Bauld L. Smoking Cessation and Socioeconomic Status: An Update of Existing Evidence from a National Evaluation of English Stop Smoking Services. Biomed Res Int. 2015.

4 NHS Digital. Statistics on Smoking, England - 2019 [Internet]. 2019. Available from: https://digital.nhs.uk/data-and-information/publications/statistical/statistics-on smoking/statistics-on-smoking-england-2019

5 Corbould E, Coker T, Bullock S, Vohra J, Xu M, Webber L. Making Conversations Count: A case for improving smoking cessation support in primary care. 2020.

6 Information Services Divison Scotland. GP Consultations / Practice Team Information (PTI) [Internet]. 2013. Available from: https://www.isdscotland.org/Health-Topics/General-Practice/GP-Consultations/

7 Brown (Smoking Toolkit Study). Personal communication. 2019

8 West R. Tobacco smoking: Health impact, prevalence, correlates and interventions. Psychol Heal. 2017;32(8):1018–36.

9 Stapleton JA, Sutherland G, Russell MAH. How much does relapse after one year erode effectiveness of smoking cessation treatments? Long term follow up of randomised trial of nicotine nasal spray. BMJ. 1998;316(7134):830–1.