# **Supplementary Digital Content**

**Box S1. Equation forms of the two models fitted for this report**

Model 1:

where ’s are coefficients, and is the error (residual) term

Model 2:

where ’s are coefficients, and is the error (residual) term )

**Table S1. Overall and stage-specific age-standardised incidence rates in England in 1996 and 2015, and related change**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Population** | **Stage** | **Age-standardised incidence rate (cases per 100,000)** | | **Annual increase/decrease (%)\*** | **Increase/decrease during entire study period (%)\*\*** |
|  |  | **1996** | **2015** |  |  |
| **Persons** | ***All*** | *14.0* | *29.4* | *4.0* | *110.4* |
|  | **I** | 8.2 | 20.3 | 4.9 | 147.3 |
|  | **II** | 3.5 | 5.9 | 2.8 | 67.5 |
|  | **III/IV** | 2.3 | 3.3 | 1.9 | 43.7 |
| **Women** | ***All*** | *15.0* | *27.6* | *3.2* | *83.4* |
|  | **I** | 9.8 | 20.2 | 3.9 | 106.7 |
|  | **II** | 2.8 | 5.4 | 3.5 | 92.2 |
|  | **III/IV** | 2.4 | 2.0 | -1.2 | -19.9 |
| **Men** | ***All*** | *13.3* | *32.5* | *4.8* | *144.8* |
|  | **I** | 6.7 | 21.0 | 6.2 | 214.1 |
|  | **II** | 4.4 | 6.6 | 2.2 | 50.7 |
|  | **III/IV** | 2.2 | 4.9 | 4.3 | 121.8 |

For 493 patients with missing values on stage (5% of the entire sample), these values were imputed as described under main text (Methods).

\*Calculated as (exp(ln(ASR2015/ASR1996)/19)-1)\*100, using ASRs to five decimal places

\*\*Calculated as (ASR2015-ASR1996)/ASR1996\*100, using ASRs to five decimal places

**Figure S1. Smoothed age-standardised incidence of melanoma (including imputed stage and not), by stage at diagnosis for a) Women and b) Men**

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Smoothed rates are ’lowess’ (locally weighted scatterplot smoothed) (i.e., the average of each observed yearly rate and rates in nearby years; in this case the bandwidth was set at 0.2). Imputed: For 493 patients with missing values on stage (5% of the entire sample), these values were imputed as described under ‘Multiple imputation’. CCA = Complete Case Analysis (analyses carried out on only patients with non-missing values on stage).

**Table S2. Coefficient estimates of Model 2\***

| **Variables** | **Coefficient to 2 dp** | **(95% CI)** | **p-value**† | **% change from coefficient in CCA**‡ |
| --- | --- | --- | --- | --- |
| *Sex (ref female)* |  |  |  |  |
| Male | -0.65 | (-0.87, -0.44) | <0.0001 | -2.5 |
| *Age-group (ref 15-49y)* |  |  |  |  |
| 50-69 | 0.57 | (0.38, 0.76) | <0.0001 | -1.8 |
| 70+ | 0.24 | (0.02, 0.46) | 0.045 | -11.5 |
| *Deprivation (ref least deprived)* |  |  |  |  |
| 2nd to 4th quintiles | -0.17 | (-0.22, -0.12) | <0.0001 | 5.0 |
| Most deprived | -0.66 | (-0.76, -0.56) | <0.0001 | -0.3 |
| *Stage at diagnosis (ref 1)* |  |  |  |  |
| 2 to 4 | -1.46 | (-1.75, -1.16) | <0.0001 | -33.8 |
| *Year of diagnosis* | 0.02 | (0.01, 0.03) | 0.0015 | -6.2 |
| Interactions, not with year: |  |  |  |  |
| *Sex:Age-group* |  |  |  |  |
| Male, 50-69y | 0.38 | (0.09, 0.67) | 0.022 | 5.1 |
| Male, 70+y | 0.64 | (0.30, 0.98) | 0.0002 | -1.4 |
| *Sex:Stage* |  |  |  |  |
| Male, Stage 2-4 | 0.60 | (0.17, 1.02) | 0.012 | -6.1 |
| *Age-group:Stage* |  |  |  |  |
| 50-69y, Stage 2-4 | 0.68 | (0.30, 1.06) | 0.0008 | -2.0 |
| 70+y, Stage 2-4 | 1.87 | (1.49, 2.26) | <0.0001 | -0.3 |
| *Sex:Age-group:Stage* |  |  |  |  |
| Male, 50-69y, Stage 2-4 | 0.11 | (-0.43, 0.64) | 0.50 | 3.9 |
| Male, 70+y, Stage 2-4 | -0.34 | (-0.90, 0.21) | 0.23 | 2.4 |
| Interactions, with year: |  |  |  |  |
| *Sex:Year* |  |  |  |  |
| Male | 0.01 | (-0.01, 0.03) | 0.54 | -4.7 |
| *Age-group:Year* |  |  |  |  |
| 50-69y | 0.03 | (0.01, 0.04) | 0.0027 | 3.7 |
| 70+y | 0.06 | (0.04, 0.08) | <0.0001 | 8.2 |
| *Stage:Year* |  |  |  |  |
| Stage 2-4 | -0.02 | (-0.04, 0.01) | 0.21 | 29.2 |
| *Sex:Age-group:Year* |  |  |  |  |
| Male, 50-69y | 0.01 | (-0.02, 0.03) | 0.44 | -20.9 |
| Male, 70+y | 0.01 | (0.00, 0.04) | 0.38 | 0.3 |
| *Age-group:Stage:Year* |  |  |  |  |
| 50-69y, Stage 2-4 | -0.01 | (-0.04, 0.02) | 0.74 | -30.2 |
| 70+y, Stage 2-4 | -0.04 | (-0.07, 0.00) | 0.036 | -10.6 |
| *Sex:Age-group:Stage:Year* |  |  |  |  |
| Male, 50-69y, Stage 2-4 | -0.02 | (-0.06, 0.03) | 0.32 | 3.4 |
| Male, 70+y, Stage 2-4 | 0.00 | (-0.05, 0.05) | 0.97 | -50.7 |

CI = Confidence Interval; dp = decimal places; ref = reference category

Pseudo-R2 of Model 2 = 30%, AIC = 3567

\*Model form provided in Supplementary Box S1. For 493 patients with missing values on stage (5% of the entire sample), these values were imputed as described under ‘Multiple imputation’.

†Null hypothesis: Coefficient = 0. Presented up to 4 decimal points and up to two significant figures.

‡Median % change in coefficient: -1.6%, interquartile range: -7.3% to 3.5%