CRUK analysis brief

Smoking-attributable cancer cases in the UK, 2003-2023

October 2024

CANCER RESEARCH UK

Together we are beating cancer

Contents

About this document

Reference

This report should be referred to as follows:

Cancer Research UK, 2024. CRUK analysis brief: Smoking-attributable cancer cases in the UK, 2003-2023.

Authors

Lucy Clark, Karis Betts, Nadine Zakkak, Magda Mikolajczyk, Sofia Migues, Sam Finnegan, Katrina Brown, for the Cancer Intelligence Team at Cancer Research UK.

Acknowledgements

We are grateful to the many organisations across the UK which collect, analyse, and share the data which we use, and to the patients and public who consent for their data to be used. Find out more about the sources which are essential for our statistics here https://www.cancerresearchuk.org/health-professional/cancer-statistics/cancer-stats-explained/data-collection-implications.

About Cancer Research UK

We're the world's leading cancer charity dedicated to saving and improving lives through research. We fund research into the prevention, detection and treatment of more than 200 types of cancer through the work of over 4,000 scientists, doctors and nurses. In the last 50 years, we've helped double cancer survival in the UK and our research has played a role in around half of the world's essential cancer drugs. Our vision is a world where everybody lives longer, better lives, free from the fear of cancer.

Abstract

Background

Smoking is the biggest cause of cancer and death in the UK. It causes at least 16 types of cancer. Smoking prevalence in the UK has been falling for decades; however, the pace of change has varied by sex and age (among other characteristics), and people who used to smoke also have elevated cancer risk compared with people who have never smoked.

Method

The number and proportion of smoking-attributable cancer cases in the UK in 2003, 2013, and 2023 were calculated using the well-established population attributable fractions (PAFs) method. The analysis dataset was compiled from gold-standard cancer registration data, representative population surveys of self-reported smoking and smoke exposure, and meta- or pooled analyses examining the relative risk of cancer in people who currently smoke, used to smoke, or have been exposed to other people's smoke, versus people who have never smoked or been exposed. Analysis was split by cancer site, sex, age-band, and UK nation, and combined to obtain UK-wide figures.

Results

The estimated proportion of UK cancer cases attributable to smoking has decreased over the past two decades, from 17% in 2003 to 14% in 2023. The estimated number of smoking-attributable cases has increased over this period, from around 48,900 in 2003 to around 57,700 in 2023. The estimated proportion of cancer cases attributable to smoking in 2023 was higher in males (16%) than females (13%), and highest within the UK nations in Scotland. Almost 6 in 10 (57%) UK smoking-attributable cancer cases in 2023 were lung cancer (around 33,100).

Discussion

The burden of smoking-attributable cancer in the UK is larger today than it was two decades ago, despite falling smoking prevalence. This is due to population growth and ageing, as the proportion of cancer cases attributable to smoking has steadily fallen. These figures are estimates and though the PAF method is the best available for estimating population burden, it has some limitations. However, the trend aspect of these calculations is reliable because the relevant data inputs were held constant across all three timepoints.

Note: These figures were revised in November 2024. The revised results are presented in this analysis brief.

Introduction

Smoking is the biggest cause of cancer and death in the UK, estimated to account for almost three times as many cancer cases as the next-biggest risk factor (overweight and obesity) in the UK in 2015, and tobacco caused around 75,800 all-cause deaths in the UK in 2021.[1,2]

Smoking prevalence in the UK has been falling for decades, from the early 1970s when around 51% of men and 41% of women smoked, to the latest data for 2023 when smoking rates were 14% and 10% in men and women respectively.[3,4] Smoking prevalence reached higher levels, but started to fall earlier, in males than females.[5,3] Despite this progress, there are still 6 million people who smoke in the UK.

Smoking causes at least 16 types of cancer.[6,2] Cancer risk is elevated compared with people who have never smoked for both people who currently smoke and people who used to smoke (see Methods section for details). Because of this, reductions in smoking prevalence may not translate to reductions of the same magnitude in smoking-attributable cancer cases.

Estimates of the population-level burden of smoking-attributable cancer are useful to galvanise policymakers to try to reduce smoking rates.

Aims and objectives

1. To calculate the proportion and number of smoking-attributable cancer cases in the UK over three time periods (2003, 2013, 2023).

Methods

The population attributable fraction (PAF) method was used to estimate number and proportion of smoking-attributable cancer cases in the UK in 2003, 2013, and 2023. The PAF method is well-established and has been described in detail elsewhere.[1,7,8,9] It combines risk factor prevalence, relative risk (RR) of cancer in exposed versus unexposed populations, and cancer incidence.

Because it takes some time for cancer to develop following risk factor exposure, a ten-year lag was built into the analysis (e.g. cancer incidence in 2003 was related to smoking prevalence in 1993); the true lag time for smoking and cancer may be longer than this and may vary between cancer sites.

The multiple components of the PAF calculation inherently create multiple sources of possible bias that could not all be accounted for in a traditional confidence interval calculation. Therefore, confidence intervals are not presented for this work so as not to imply precision. All comparisons made between cancer sites, time periods, nations and sexes are based on point estimates only.

Analysis was carried out in R version 4.3.1.

Cancer incidence and included sites

Cancer sites classified by the Internation Agency for Research on Cancer (IARC)[6] as having 'sufficient' evidence of a causal association with smoking were included: oral cavity, pharynx, nasopharynx, oesophagus adenocarcinoma (AC), oesophagus squamous cell carcinoma (SCC), stomach, colon, rectum, liver, pancreas, lung (also causal association with secondhand smoke exposure), breast, cervix, mucinous ovarian, bladder, kidney, acute myeloid leukaemia. Breast cancer was also included due to growing evidence of a causal association since the last IARC review, and in line with more recent reviews by Global Burden of Disease (GBD) and World Cancer Research Fund (WCRF).[2,10,11] International Classification of Diseases version 10 (ICD-10) codes for all included sites are in Table 2.

Incidence data for the above-named sites, and for all cancers combined excluding non-melanoma skin cancer (C00-C97, excl. C44) for 2003 and 2013 were obtained by sex and 5-year age-band for England, Scotland, Wales, and Northern Ireland from NHS England, Public Health Scotland, Public Health Wales, and the Northern Ireland Cancer Registry.[12,13,14,15]

Incidence data for 2023 were projected using trend data from the same sources, using an age-period-cohort modelling approach with attenuation.[16]

For subsites or specific morphological types of cancer associated with tobacco, incidence was estimated based on the last available observed ratio between the incidence of the subtype and the broader cancer site, applied to the observed (2003, 2013) or projected (2023) incidence of the broader cancer site. For acute myeloid leukaemia, observed data was used for 2003 and 2013. For 2023, the ratio between acute myeloid leukaemia incidence and all leukaemia incidence in 2017-2019 was calculated by age and sex and applied to the all leukaemia projected incidence data for 2023.

Total incidence counts for 2023 are presented in Table 1 and Table 2. All analyses were conducted by cancer site, nation, age-band, sex, and year; granular incidence counts are available on request.

Risk factor prevalence

Smoking prevalence data in the UK is collected in large-scale representative self-report surveys managed by each constituent nation.[17,18,19,20,21] Data input sources for the current analysis are shown in Table S1 (Appendix A). Where data were not available, estimates were produced based on the closest available data. Prevalence data were collected by sex and 10-year age-band.

Relative risks

RR values used in the calculations were obtained from a systematic literature review of published, peer-reviewed, meta- or pooled analyses. The search was conducted using PubMed and specific RRs were extracted for cancers of the lung,[22,23] larynx,[24] bladder,[25] pharynx,[26] oesophagus,[27,28,29] liver,[30] cervix,[31] nasopharynx,[32] pancreas,[33] stomach,[34] oral cavity,[35] kidney,[36] bowel,[37] leukaemia,[38] breast,[39] and ovary.[40] For all cancer sites, a separate RR was extracted for current smoking, and for former smoking. For lung cancer, a third RR was extracted for secondhand smoking.

When more than one potential source was identified, we prioritised selection based on research characteristics such as the inclusion of cohort studies, recency of the analyses, follow-up time, sample size, adjustment for potential confounders, relevance of the population to the UK, and the availability of sex breakdowns where relevant. Where the selected source provided multiple RRs, we prioritised the most relevant, high-quality breakdown.

RR values used in the calculations are presented in Table S2 (Appendix A).

Results

The estimated proportion of UK cancer cases attributable to smoking has decreased over the past two decades, from 17% in 2003 to 14% in 2023. However, due to population growth and ageing, the estimated number of smoking-attributable cases has increased over this period, from around 48,900 in 2003 to around 57,700 in 2023. Figure 1 shows the trend of smoking-attributable cancer in 2003, 2013 and 2023. In 2023, there were around 160 cancer cases attributable to smoking diagnosed every day in the UK.

The estimated proportion of cancer cases attributable to smoking in 2023 in the UK was higher in males (16%) than females (13%), and highest in Scotland (17%) of the UK nations. Almost 6 in 10 (57%) UK smoking-attributable cancer cases in 2023 were lung cancer (around 33,100).

Table 1 presents the breakdown by nation for all cancers combined in 2023. Table 2 presents a summary by cancer site for the UK in 2023. Further breakdowns by site, sex and nation are available on request.

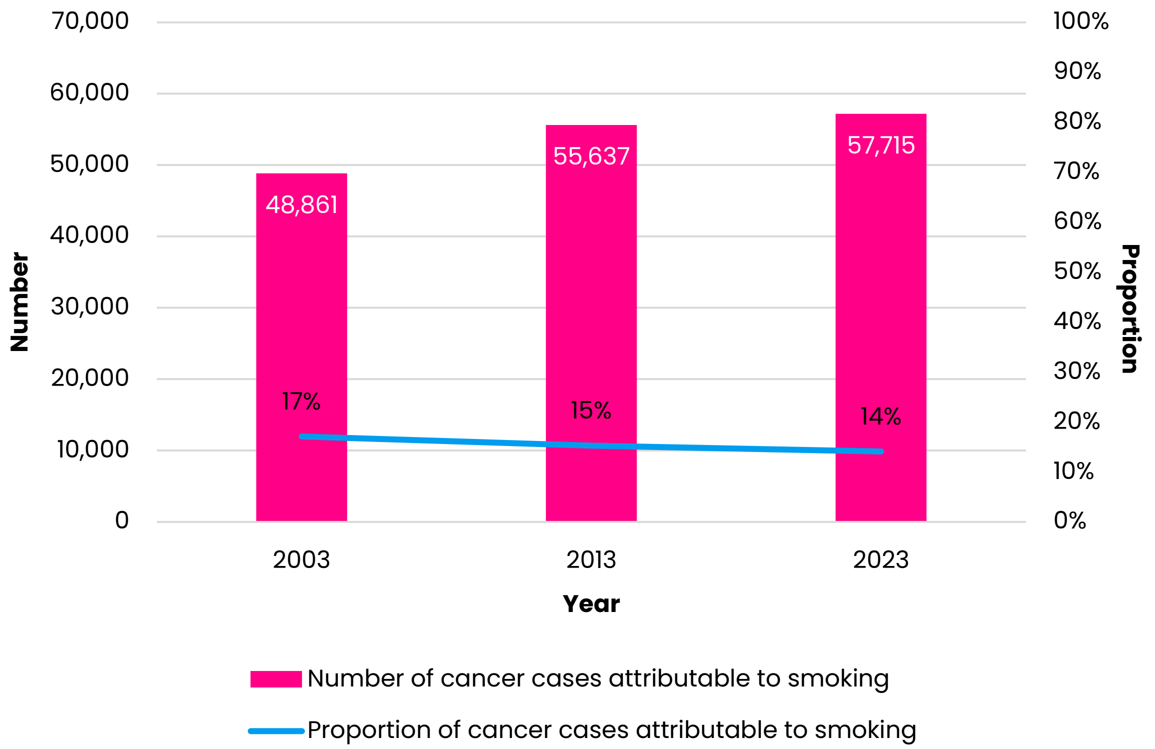

Figure 1. The number and proportion of cancer cases (ICD-10 C00-C97, excl. C44) attributable to smoking in the UK in 2003, 2013 and 2023

NATION	NUMBER OF SMOKING-ATTRIBUTABLE CASES	PROPORTION OF CASES ATTRIBUTABLE TO SMOKING (PAF)	TOTAL NUMBER OF CANCER CASES
ENGLAND	47,262	14%	340,278
SCOTLAND	5,859	17%	34,886
WALES	3,095	15%	21,048
NORTHERN IRELAND	1,500	14%	10,874
UNITED KINGDOM	57,715	14%	407,087

Table 1. The number and proportion of cancer cases (ICD-10 C00-C97, excl. C44) attributable to smoking in England, Scotland, Wales, Northern Ireland and the UK, 2023

CANCER SITE (ICD-10 CODES)	NUMBER OF SMOKING-ATTRIBUTABLE CASES	PROPORTION OF CASES ATTRIBUTABLE TO SMOKING (PAF)	TOTAL NUMBER OF CANCER CASES
LUNG (C33-C34)	33,139	63%	52,415
LARYNX (C32)	1,396	62%	2,270
BLADDER (C67)	4,525	42%	10,697
PHARYNX (C09-C10, C12-C14)	1,263	34%	3,763
OESOPHAGUS (C15)	3,094	31%	9,852
LIVER (C22)	1,642	22%	7,343
CERVIX (C53)	634	19%	3,392
NASOPHARYNX (C11)	47	18%	262
PANCREAS (C25)	2,077	17%	11,976
STOMACH (C16)	961	16%	6,198
ORAL CAVITY (C00-C06)	907	15%	6,132
KIDNEY (C64-C66, C68)	2,162	14%	15,048
BOWEL (C18-C20)	3,094	7%	42,587
LEUKAEMIA (C91-C95)	603	5%	11,455
BREAST (C50)	2,155	4%	59,288
OVARY (C56-C57.4)	17	<1%	7,774
ALL CANCERS COMBINED EXCLUDING NON-MELANOMA SKIN CANCER (C00-C97 EXCL. C44)	57,715	14%	407,087

Table 2. The number and proportion of cancer cases attributable to smoking by cancer site in the UK, 2023

Discussion

Summary of results

The burden of smoking-attributable cancer in the UK is larger today than it was two decades ago, despite falling smoking prevalence. This is due to population growth and ageing, as the proportion of cancer cases attributable to smoking has steadily fallen. This fall has not been as pronounced as that of smoking prevalence, because people who used to smoke are also at increased risk of cancer compared with those who have never smoked.

The proportion of cancer cases attributable to smoking is higher in men than in women, and the highest in Scotland compared to the other constituent nations of the UK. Most of the cancer cases attributable to smoking are lung cancer.

Strengths and limitations

PAFs were calculated using the widely-accepted and validated PAF formula, as previously described.[7,8,9] Calculations were performed at the granular level; by age-band, sex, nation and cancer site, and included a built-in 10-year lag from exposure to incidence. Methods and relevant data inputs across the three time points were held constant, meaning the trend aspect of the calculations is reliable.

The PAF method is the best available for estimating population burden. However, the estimates should be interpreted with the limitations of the source data in mind. The RRs used were chosen based on characteristics such as inclusion of UK-relevant populations, and adjustment for potential confounding. However, each of the selected values carry their own methodological strengths and limitations. It should be noted that the output would be different if different RRs were selected. Exposure prevalence data used in these calculations is naturally subject to self-report bias, and some further estimation was required to fill gaps where data were unavailable.

The multiple components of the PAF calculation inherently create multiple sources of possible bias that could not all be accounted for in a traditional confidence interval calculation. Therefore, confidence intervals are not presented for this work so as not to imply precision. All comparisons made between cancer sites, time periods, nations and sexes are based on point estimates only.

The 10-year lag may underestimate the full impact of smoking, if the true gap from tobacco exposure to the development of cancer is longer. However, the availability of relative risk estimates with long and complete follow-up limits the possibility of extending the lag: most of the relative risk sources used here included a follow-up of around ten years. The relative risk and exposure prevalence elements of the calculations are therefore well-matched. A previous iteration of this study found that using a 20-year lag for smoking produces only a 1 percentage point increase in the PAF compared with the 10-year lag.[1]

Our calculations include an estimate for the number of lung cancer cases caused by secondhand smoking. This calculation assumes that lung cancer risk associated with secondhand smoking is only present in never-smokers, and we have applied no such risk to people who currently smoke or people who used to smoke. It is likely in reality that there would be some multiplicative effect for people exposed to active smoking as well as secondhand smoking,[23] so our calculations are likely to produce an underestimate of the true total number of cancer cases caused by smoking.

For some of the nations and years included, there were no reliable estimates available for the explicit proportion of never-smokers exposed to secondhand smoking. In these instances, we have assumed that exposure to secondhand smoke is constant across groups of different smoking status (currently smoke, used to smoke, never smoked). This is likely to overestimate exposure to secondhand smoking in never-smokers. However, due to our assumptions about risk detailed above, we expect that our analysis still gives conservative estimates overall.

References

[1] Brown KF, Rumgay H, Dunlop C, et al. The fraction of cancer attributable to modifiable risk factors in England, Wales, Northern Ireland and the United Kingdom in 2015. Br J Cancer 2018, 118(8).

[2] Global Health Data Exchange. Global Burden of Disease (GBD) Results Tool, 2021. Available from https://vizhub.healthdata.org/gbd-results/. Accessed October 2024.

[3] Office for National Statistics. Adult smoking habits in the UK: 2023. Annual Population Survey. Available from https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/drugusealcoholandsmoking/datasets/adultsmokinghabitsingreatbritain Accessed October 2024.

[4] Office for National Statistics. Adult smoking habits in the UK: 2023. Smoking habits in the UK and its constituent countries. Available from https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandlifeexpectancies/datasets/smokinghabitsintheukanditsconstituentcountries. Accessed October 2024.

[5] PN Lee, International Smoking Statistics. Available from http://www.pnlee.co.uk/ISS.htm - Manufactured cigarettes/frequency unspecified. Accessed November 2023

[6] International Agency for Research on Cancer (IARC). Personal Habits and Indoor Combustions IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Volume 100E. IARC: Lyon; 2012

[7] Parkin, D. M. et al. The fraction of cancer attributable to lifestyle and environmental factors in the UK in 2010. Br. J. Cancer 2011, 105, Si–S81.

[8] Whiteman, D. C. et al. Cancers in Australia in 2010 attributable to modifiable factors: introduction and overview. Aust. NZ J. Public Health 2015, 39, 403–407.

[9] Brenner, Darren R., et al. Estimating the current and future cancer burden in Canada: methodological framework of the Canadian population attributable risk of cancer (ComPARe) study. BMJ open 2018, 8(7), e022378.

[10] World Cancer Research Fund UK, Smoking and cancer risk. Available from: https://www.wcrf-uk.org/preventing-cancer/what-can-increase-your-risk-of-cancer/smoking-and-cancer-risk/. Accessed October 2024.

[11] Cancer Research UK, Breast cancer and smoking: What's the link? Available from: https://news.cancerresearchuk.org/2024/07/09/breast-cancer-smoking-link/ Accessed October 2024.

[12] England data were provided by the National Cancer Registration and Analysis Service (NCRAS), part of the National Disease Registration Service (NDRS) in NHS England, on request through the Office for Data Release, January 2023. Similar data can be found here: https://www.cancerdata.nhs.uk/

[13] Scotland data were provided by the Scottish Cancer Registry, Public Health Scotland (PHS) on request, May 2021. Similar data can be found here: https://publichealthscotland.scot/publications/show-all-releases?id=20468

[14] Welsh data were published by the Welsh Cancer Intelligence and Surveillance Unit (WCISU), Health Intelligence Division, Public Health Wales https://phw.nhs.wales/services-and-teams/welsh-cancer-intelligence-and-surveillance-unit-wcisu/cancer-reporting-tool-official-statistics/ June 2022.

[15] Northern Ireland data were provided by the Northern Ireland Cancer Registry (NICR) on request, October 2021. Similar data can be found here: https://www.qub.ac.uk/research-centres/nicr/

[16] Cancer Research UK, Our calculations explained: Age-period cohort models for projecting cancer incidence and mortality. Available from: https://www.cancerresearchuk.org/health-professional/cancer-statistics/cancer-stats-explained/our-calculations-explained#heading-Zero

[17] NHS England, Health Survey for England. Available from: https://digital.nhs.uk/data-and-information/areas-of-interest/public-health/health-survey-for-england---health-social-care-and-lifestyles#survey-dataset and https://ukdataservice.ac.uk/

[18] Scottish Government, Scottish Health Survey. Available from: https://www.gov.scot/collections/scottish-health-survey/

[19] Welsh Government, Welsh Health Survey. Available from: https://webarchive.nationalarchives.gov.uk/ukgwa/20180412105518/http://gov.wales/statistics-and-research/welsh-health-survey/?tab=previous&lang=en

[20]Northern Ireland Statistics and Research Agency (NISRA), Continuous Household Survey. Available from: https://www.nisra.gov.uk/publications/chs-smoking and

https://ukdataservice.ac.uk/

[21] Department of Health, Health Survey Northern Ireland. Available from: https://www.health-ni.gov.uk/topics/doh-statistics-and-research/health-survey-northern-ireland and https://ukdataservice.ac.uk/

[22] O'Keeffe, Linda M., et al. Smoking as a risk factor for lung cancer in women and men: a systematic review and meta-analysis. BMJ open 2018, 8(10), e021611.

[23] Kim, Claire H., et al. Exposure to secondhand tobacco smoke and lung cancer by histological type: a pooled analysis of the International Lung Cancer Consortium (ILCCO). International journal of cancer 2014, 135(8), 1918-1930.

[24] Zuo, Jing-Jing, et al. Characteristics of cigarette smoking without alcohol consumption and laryngeal cancer: overall and time-risk relation. A meta-analysis of observational studies. European Archives of Oto-Rhino-Laryngology, 2017, 274, 1617-1631.

[25] van Osch, Frits HM, et al. Quantified relations between exposure to tobacco smoking and bladder cancer risk: a meta-analysis of 89 observational studies. International journal of epidemiology 2016, 45(3), 857-870.

[26] Gandini, Sara, et al. Tobacco smoking and cancer: a meta-analysis. International journal of cancer 2008, 122(1), 155-164.

[27] Tramacere, Irene, Carlo La Vecchia, and Eva Negri. Tobacco smoking and esophageal and gastric cardia adenocarcinoma: a meta-analysis. Epidemiology 2011, 22(3), 344-349.

[28] Prabhu, A., K. O. Obi, and J. H. Rubenstein. Systematic review with meta-analysis: race-specific effects of alcohol and tobacco on the risk of oesophageal squamous cell carcinoma. Alimentary pharmacology & therapeutics 2013, 38(10), 1145-1155.

[29] Pandeya, Nirmala, et al. Associations of duration, intensity, and quantity of smoking with adenocarcinoma and squamous cell carcinoma of the esophagus. American journal of epidemiology 2008, 168(1), 105-114.

[30] Abdel-Rahman, Omar, et al. Cigarette smoking as a risk factor for the development of and mortality from hepatocellular carcinoma: an updated systematic review of 81 epidemiological studies. Journal of Evidence-Based Medicine 2017, 10(4), 245-254.

[31] Malevolti, Maria Chiara, et al. Dose-risk relationships between cigarette smoking and cervical cancer: a systematic review and meta-analysis. European Journal of Cancer Prevention 2023, 32(2), 171-183.

[32] Long, Mengjuan, et al. Cigarette smoking and the risk of nasopharyngeal carcinoma: a meta-analysis of epidemiological studies. BMJ open 2017, 7(10), e016582.

[33] Lugo, Alessandra, et al. Strong excess risk of pancreatic cancer for low frequency and duration of cigarette smoking: A comprehensive review and meta-analysis. European Journal of Cancer 2018, 104, 117-126.

[34] Li, Wen-Ya, et al. Smoking status and subsequent gastric cancer risk in men compared with women: a meta-analysis of prospective observational studies. BMC cancer 2019, 19, 1-12.

[35] Maasland, Denise HE, et al. Alcohol consumption, cigarette smoking and the risk of subtypes of head-neck cancer: results from the Netherlands Cohort Study. BMC cancer 2014, 14, 1-14.

[36] Liu, Xiaoqiu, et al. Dose-response relationships between cigarette smoking and kidney cancer: a systematic review and meta-analysis. Critical Reviews in Oncology/Hematology 2019, 142, 86-93.

[37] Cheng, Jiemin, et al. Meta-analysis of prospective cohort studies of cigarette smoking and the incidence of colon and rectal cancers. European Journal of Cancer Prevention 2015, 24(1), 6-15.

[38] Colamesta, Vittoria, et al. Do the smoking intensity and duration, the years since quitting, the methodological quality and the year of publication of the studies affect the results of the meta-analysis on cigarette smoking and Acute Myeloid Leukemia (AML) in adults?. Critical reviews in oncology/hematology 2016, 99, 376-388.

[39] Scala, Marco, et al. Dose-response relationships between cigarette smoking and breast cancer risk: a systematic review and meta-analysis. Journal of Epidemiology 2023, 33(12), 640-648.

[40] Santucci, Claudia, et al. Dose–risk relationships between cigarette smoking and ovarian cancer histotypes: a comprehensive meta-analysis. Cancer Causes & Control 2019, 30, 1023-1032.

Appendix

Appendix A: Methodology supplement

		CURRENT & FORMER SMOKING	SECONDHAND SMOKING
ENGLAND PREVALENCE[17]	**1993**	Health Survey for England 1993	*Estimated based on ratio to Scotland data**
	2003	Health Survey for England 2003	
	2013	Health Survey for England 2013	
SCOTLAND PREVALENCE[18]	**1993**	Scottish Health Survey 1995 (1993 not available)	
	2003	Scottish Health Survey 2003	
	2013	Scottish Health Survey 2013	
WALES PREVALENCE[19]	**1993**	*Estimated based on ratio to England data***	*Estimated based on ratio to Scotland data**
	2003	Welsh Health Survey 2003/04	
	2013	Welsh Health Survey 2013	
NORTHERN IRELAND PREVALENCE[20,21]	**1993**	Continuous Household Survey 1992/93	*Scotland data used as a proxy*
	2003	Continuous Household Survey 2003/04	*Estimated based on ratio to GB data**
	2013	Health Survey Northern Ireland 2013/14	*Estimated based on ratio to GB data**

Table S1. Exposure prevalence data input sources – current smoking, former smoking, secondhand smoking 10 years prior to incidence

**Estimated figures for secondhand smoking were produced by taking the observed ratio of current smoking to secondhand smoking for the closest available nation/year, and applying the ratio to observed current smoking for the estimated nation/year. Where a GB ratio was used, this refers to the average of the ratios for England, Scotland and Wales.*

***Estimated current and former smoker figures for Wales are based on the ratio between observed Wales data to observed England data for the closest available year, applied to England data for the estimated year.*

CANCER SITE (ICD-10 CODES)	RR – CURRENT SMOKING		RR – FORMER SMOKING		RR – SECONDHAND SMOKING	
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
LUNG (C33-C34)[22,23]	7.33	6.99	3.13	3.14	1.27	1.27
LARYNX (C32)[24]	7.01	7.01	2.37	2.37	-	-
BLADDER (C67)[25]	3.44	3.56	1.92	2.04	-	-
PHARYNX (C09-C10, C12-C14)[26]	3.43	3.43	1.00*	1.00*	-	-
OESOPHAGUS (C15)						
OESOPHAGUS AC[27]	2.32	2.32	1.62	1.62	-	-
OESOPHAGUS SCC[28,29]	4.21	4.21	2.18	2.18	-	-
LIVER (C22)[30]	1.66	1.66	1.51	1.51	-	-
CERVIX (C53)[31]	-	1.80	-	1.41	-	-
NASOPHARYNX (C11)[32]	1.59	1.59	1.36	1.36	-	-
PANCREAS (C25)[33]	1.90	1.90	1.20	1.20	-	-
STOMACH (C16)[34]	1.63	1.30	1.42	1.00*	-	-
ORAL CAVITY (C00-C06)[35]	1.91	1.91	1.00*	1.00*	-	-
KIDNEY (C64-C66, C68)[36]	1.57	1.27	1.29	1.20	-	-
BOWEL (C18-C20)						
COLON (C18)[37]	1.11	1.11	1.15	1.15	-	-
RECTUM (C20)[37]	1.44	1.44	1.11	1.11	-	-
LEUKAEMIA (C91-C95)[38]	1.52	1.52	1.45	1.45	-	-
BREAST (C50)[39]	1.00*	1.80	1.00*	1.41	-	-
OVARY (C56-C57.4)[40]	-	1.44	-	1.00*	-	-

Table S2. Relative risk values used in calculations

**Where RR values were non-significant, they were inputted into calculations as 1 (i.e. no elevated risk)*

Appendix B: Additional calculations

Cancer Research UK uses the smoking-attributable cancer cases estimates presented here, in a range of further calculations. Details of these calculations are presented below.

The number of cancer cases attributable to smoking in 100 days

Note: The figures in this analysis brief have been revised. The figures shown below were calculated from the unrevised total.

The 2023 number of smoking-attributable cases was used to estimate the number of cancer cases attributable to smoking in 100 days:

$$\frac{57{,}202}{365} \times 100 = 15{,}672 \sim \mathit{Around}\ 15{,}700$$

The estimate assumes that the same number of cancer cases were caused by smoking in 2024 as in 2023, and that the distribution of cancer cases caused by smoking is constant across the year.

The figure does **not** claim that these cases could have been prevented by policy change today, as the estimated cancer cases in 2023 are reflective of smoking in 2013.