

The societal and economic costs of preventable cancers in the UK

Published September 2023

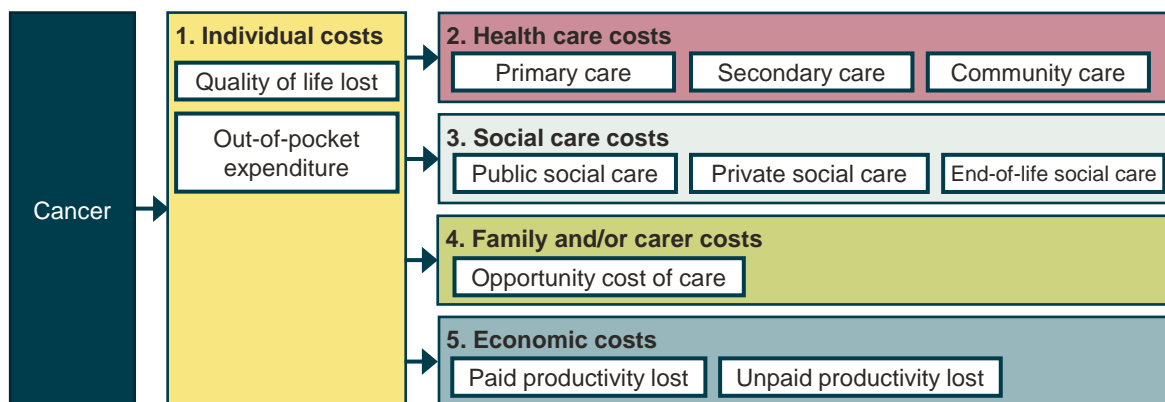
Revised January 2024

Executive summary (1/2)

Aims and approach

Preventable cancers are a material proportion of cancer cases in the UK. Research suggests that nearly 40% of cancer cases are preventable, i.e. due to modifiable risk factors.¹ These modifiable risk factors include tobacco use, obesity and UV radiation. In 2023, around 184,000 new cancer cases may be preventable. This work aims to estimate **the societal and economic cost of preventable cancers in the UK from 2023 to 2040**. The modelling estimates the cost for all preventable cancers, with a particular focus on lung, bowel, melanoma and breast cancer due to their high incidence among preventable cancers.

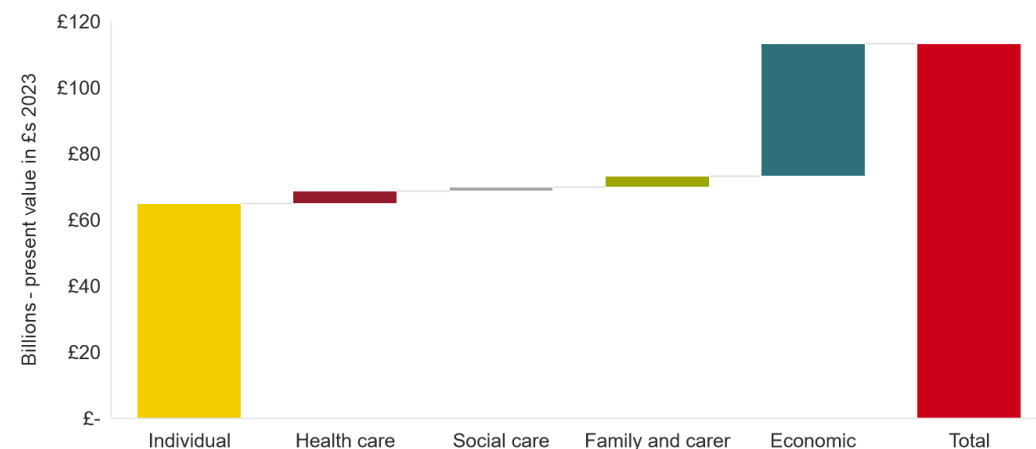
Drawing on a rapid evidence review, this study uses the **framework** below to estimate the costs associated with preventable cancers. The framework includes costs across five areas. These costs go **beyond direct health care costs** and include **indirect costs** such as the impact of a cancer diagnosis on the **quality of life of an individual**.



Results – present value of new preventable cases diagnosed in 2023

We estimate it will cost UK society **£113 billion** for the **184,000 new preventable cancer cases diagnosed in 2023**, corresponding to **5.07% of annual GDP**. This figure represents the present value of the total cost of individuals diagnosed with preventable cancers in 2023. It includes costs incurred from 2023 up to 2031.

The analysis considers **five cost areas: individual, health care, social care, family and carer, and productivity**. The largest contributors to costs are **individual costs at £65 billion**, driven by high costs from the quality of life lost due to mortality, and **productivity lost at £40 billion**, driven by unpaid productivity lost due to mortality.



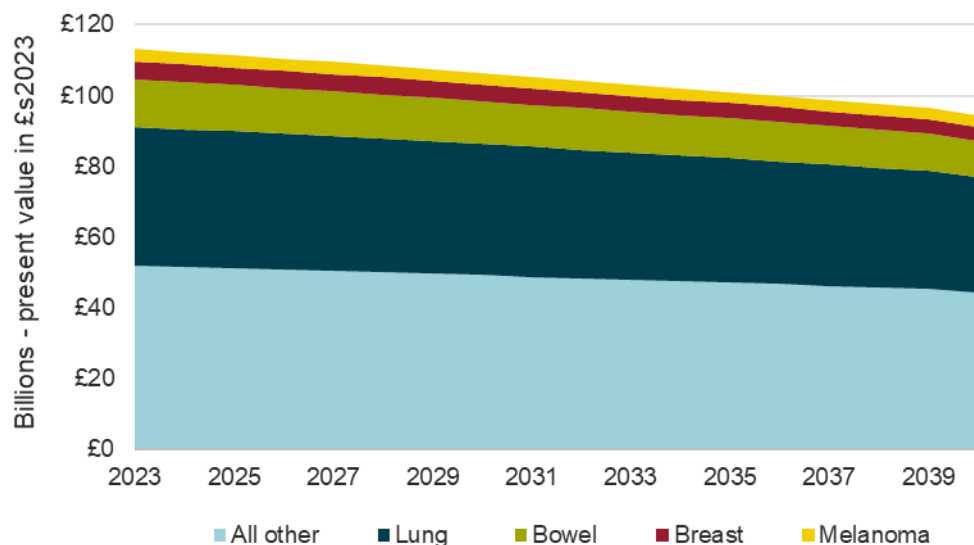
We find that the cost per case is highest for lung cancer (~£916,000 per case), similar for bowel, breast and other cancers (between ~£350,000 to £600,000 per case) and lowest for melanoma (~£194,000 per case).

Executive summary (2/2)

Results - forecasting costs from 2023-2040

The **incidence of preventable cancers increases over time**, largely due to population increases rather than changes in cancer incidence rates. We expect that in 2040, there will be approximately **226,000 new preventable cancer cases** (from 184,000 in 2023). Between 2023 and 2040, we estimate there will be 3.7 million new preventable cancer cases.

We estimate the cost of new preventable cancer cases diagnosed in the UK between **2023 and 2040 to be £1.88 trillion.*** The annual cost of new preventable cancer cases is at least **£94 billion in each year to 2040 (in real, discounted 2023£).**



Limitations

Estimating the cost of preventable cancers in the UK is **complex**: it involves a large range of both direct and indirect costs and is subject to uncertainty. The modelling presented in the report uses **best practice methods and peer-reviewed evidence**. However, there are inevitable limitations and gaps in the analysis. These limitations include for example, assumptions that the percentage of cancers that are preventable and survival rates are constant between 2023 and 2040. Technological changes, shifts in smoking and obesity rates, and other behavioural changes mean these assumptions may not reflect the future. They also represent opportunities to reduce future costs.

Future opportunities

This analysis shows the significant size of the societal and economic costs of preventable cancers in the UK. The cost is expected to remain significant over time without effective and well-targeted intervention. There are a number of potential opportunities for further work to help determine effective interventions and the scope of such interventions. This includes:

- Exploring how **exposures to risk factors and changes in preventable cancer diagnosis change over time**; and
- Exploring the **potential impact of interventions**, e.g. by mapping the pathways, how interventions affect the modifiable behavioural factors, the population that is affected, the potential reduction in cancer diagnosis and the stage of the cancer diagnosis, and the consequent impacts on costs.

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We estimate the societal and economic costs of preventable cancers in the UK

Aim and scope of the analysis

Preventable cancers are a material proportion of cancer cases in the UK. Research shows that nearly 40% of cancer cases are preventable, i.e. due to modifiable risk factors.² These modifiable risk factors include tobacco use, obesity and exposure to UV radiation. In 2023, we estimate that around 184,000 new cancer cases will be preventable. Our analysis aims to estimate **the societal and economic cost of preventable cancers in the UK from 2023 to 2040**.

We calculate an initial estimate of societal and economic cost for all cancers but include specific modelling tailored to **lung, bowel, melanoma and breast cancer**. These cancers have the highest number of preventable cancer cases.

Cancer type	Total estimated new cases in the UK in 2023	Preventable %	Estimated preventable cases in the UK in 2023	Top risk factors (Population attributable fractions*)
Lung	~54,500	78.9%	~43,000	Tobacco (72.2%), Occupation (13.2%)
Bowel	~42,500	54.3%	~23,000	Insufficient fibre (28%), Processed meat (12.8%), Overweight & obesity (11.5%)
Melanoma	~20,500	86.5%	~17,500	UV radiation (86.5%)
Breast	~61,500	23.0%	~14,000	Overweight & obesity (8.3%), Alcohol (8.0%)
All other cancers	~235,000	36.8%	~86,500	Tobacco (15.1%), Overweight & obesity (6.3%)

* The reduction in diagnosis that would occur if exposure to the risk was eliminated

Table source: Brown et al (2018), The fraction of cancer attributable to modifiable risk factors in England, Wales, Scotland, Northern Ireland, and the United Kingdom in 2015, <https://pubmed.ncbi.nlm.nih.gov/29567982/>

This unpaid study has been undertaken using published evidence and in line with UK government appraisal guidance

Approach adopted

We have adopted a five-step methodology in order to calculate the cost of preventable cancers. The approach is outlined below. This study was undertaken over a period of around 4 weeks in August 2023. It is intended to highlight this issue and invite more detailed discussion, debate and analysis. It is not intended to be a comprehensive analysis of the economic impact of preventable cancers. It was unpaid and represents part of Frontier's ongoing contribution to important health, care and economic debates.



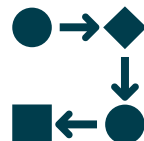
Develop framework

Articulating the channels that led to economic and societal costs from a cancer diagnosis.



Evidence review

Review published evidence on costs associated with cancer diagnosis and associated data.



Model development

Develop the model and refine modelling assumptions.



Quality assurance checks

Incorporate input from internal and external quality assurance processes, including expert input on modelling assumptions.



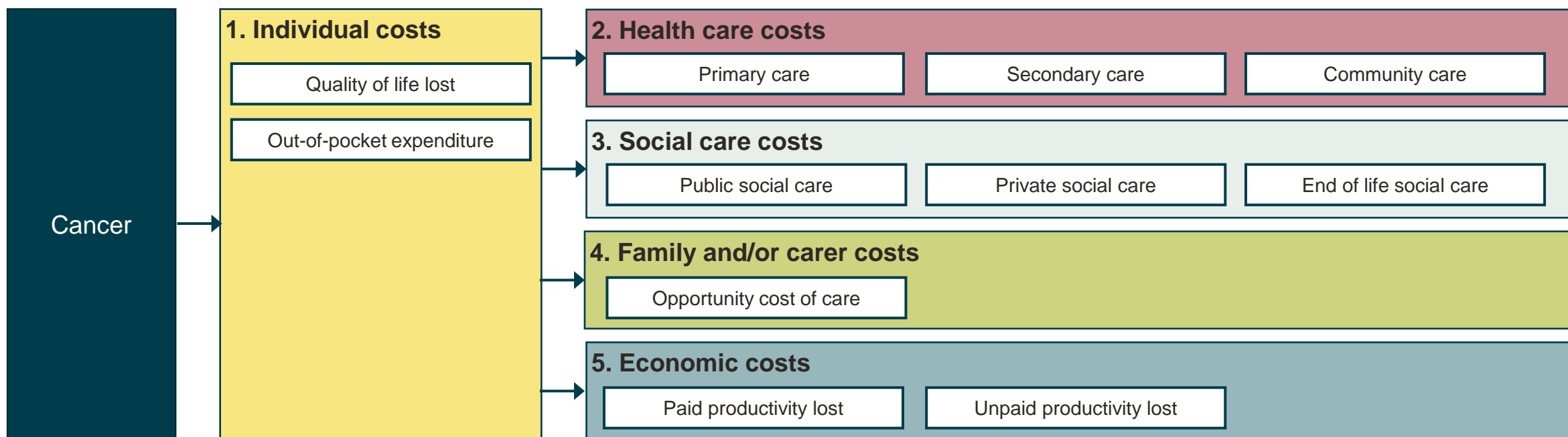
Next steps

Highlight limitations of the modelling approach, discuss policy recommendations and opportunities for future work.

The economic framework shows how preventable cancer cases can lead to costs across five areas

The economic framework aims to articulate how a cancer diagnosis impacts different individuals, organisations and wider society. Informed by the rapid evidence review, the **economic framework** for the analysis is shown below. Our framework groups costs from preventable cancers into **five separate areas**. The impacts to individuals, organisations and wider society highlighted in each area are the costs that are estimated as part of our modelling. These costs are not limited to **direct costs** (e.g. costs to the health care system) and include **indirect costs** (e.g. quality of life lost, productivity lost).

The framework does *not* include all costs that will result from preventable cancer. For example, costs to family and carers' well-being are not included due to limited available evidence. Our framework is, therefore, an **initial pragmatic representation** of the costs of preventable cancers to UK society.



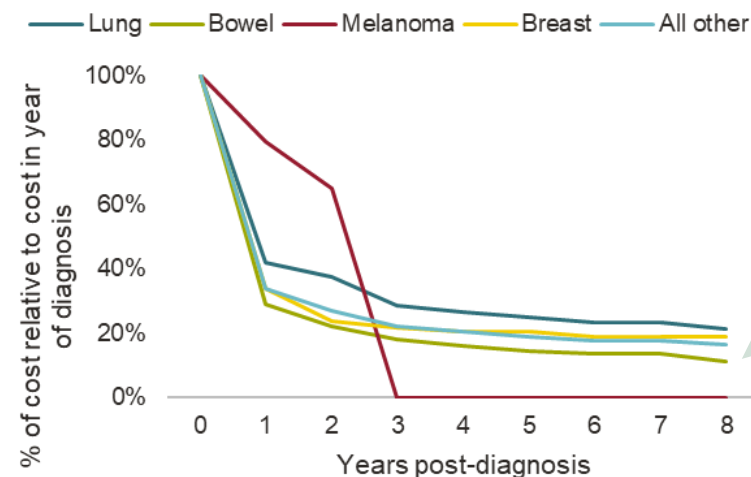
We adopt a number of assumptions in order to develop our cost estimates

Modelling assumptions

We have made a **number of assumptions** to estimate the societal cost of preventable cancers. These assumptions have been **tested and refined** with expert input. The key assumptions are highlighted below.

- **Cancer incidence:** our modelling includes individuals with a **new cancer diagnosis between 2023-40**. We use Cancer Research UK incidence estimates³ and apply percentage estimates on the fraction of preventable cancers⁴ to estimate the number of individuals with a preventable cancer diagnosis. We discount all values back to real 2023£, using 3.5% discount rate for all costs except QALYs lost, where we use a 1.5% discount rate (as recommended in HM Treasury guidance).
- **Percentage of preventable cancers:** we assume the **percentage of cancers that are preventable stays the same from 2023-2040**. For example, this implies that smoking is attributed to 72.4% of lung cancer diagnoses in 2023 and 2040. Given current trends, we expect that there will be decreases in smoking and increases in obesity in the future, which will influence the percentages of preventable cancers versus all cancers. We have **not included such changes** due to high uncertainty, complexity, and difficulty isolating behavioural changes from anticipated policy changes.
- **Survival rates:** we assume **constant survival rates**. That is, survival rates for those diagnosed with cancer in 2023 are the same as those in 2040. If we included improvements to survival over time, we expect that most cost estimates would increase but costs due to mortality would decrease. In practice, we expect there will be changes to survival rates over time. For example, technological changes such as the recent introduction of CT scans for smokers are expected to shift the stage of lung cancer diagnosis, thereby improving survival rates.

- **Time horizon of costs:** we include costs for an individual with a preventable cancer diagnosis for **eight years post-diagnosis** due to evidence availability. This means that for an individual diagnosed in 2023, we include costs up to the end of 2031.
- **Profile of costs:** our evidence review found that many cost estimates available are 'static', i.e. they represent the cost in the first year an individual has cancer. Our analysis aims to calculate the *total* cost of preventable cancer. We therefore developed a **cost profile showing how we expect costs to evolve throughout the eight years post-diagnosis** (see graph). These cost profiles are based on secondary care costs available for eight years post-diagnosis and were refined with expert input.⁵
- **Modelling by years:** our modelling is in year intervals. We assume that a yearly cost applies to a patient if they are alive at the beginning of the year.



For example, if an individual's out-of-pocket expenditure increases due to a bowel cancer diagnosis by £400 in the year following the diagnosis, we estimate that eight years post-diagnosis, the cost will be, on average, £44 (11% of the cost in the year of diagnosis)

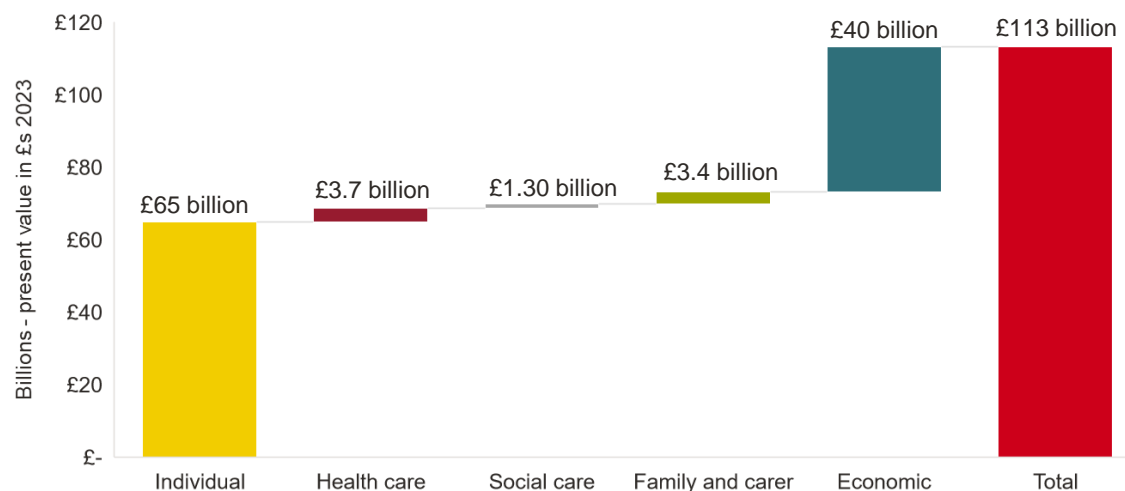
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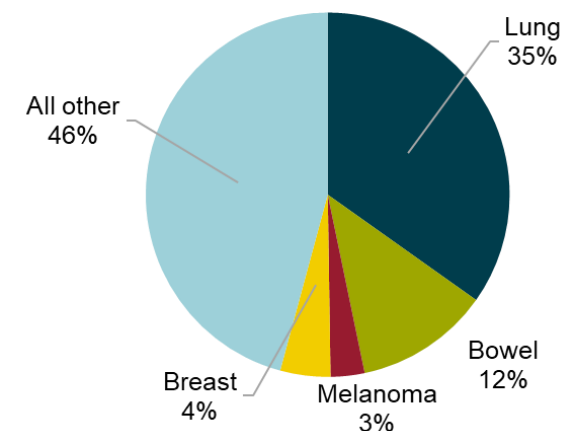
The total societal and economic cost of new preventable cancer diagnosed in 2023 is £113 billion

- We estimate it will cost **£113 billion to UK society** for the 184,000 new preventable cancer diagnosed cases in 2023, corresponding to **5.07% of GDP**. This figure represents the total cost of individuals diagnosed with preventable cancers in 2023. It includes costs incurred beyond 2023 (up to 2031), such as ongoing health care costs.
- The analysis considers five cost areas: individual, health care, social care, family and carer and productivity. The largest contributors to the estimated costs are **individual costs** at **£65 billion**, driven by high costs from the **quality of life lost due to mortality**, and productivity lost at **£40 billion**, driven by **unpaid productivity lost due to mortality**. This highlights the importance of survival rates to the societal cost of cancer.
- The modelling estimates the cost for all preventable cancers, with a particular focus on lung, bowel, melanoma and breast cancer. For the specific cancers modelled, total costs are highest for lung cancer at £39 billion (35% of total costs) and lowest for melanoma at £3.4 billion (3% of total costs). Cost per case is also highest for lung cancer (~£916,000 per case), similar for bowel, breast and all other cancers (between ~£350,000 to £600,000 per case) and lowest for melanoma (~£194,000 per case).
- The following slides outline the results for each of the five cost areas included and present a forecast of the incidence of preventable cancers and associated costs up to 2040.

Societal cost of preventable cancer cases diagnosed in 2023



Proportion of costs for new preventable cancer cases diagnosed in 2023



New preventable cancer diagnoses in 2023 cost £65 billion to individuals

Modelling approach

- **Quality of life:** we measure quality of life changes from a cancer diagnosis through changes in **quality-adjusted life years** (QALYs). These are calculated for both years of life lost due to cancer (i.e. **mortality**) and **morbidity**. We use NHS data on **years of life lost**⁶ and the NHS cancer quality of life survey⁷, which provides an EQ-5D score 18 months post-diagnosis.* Each QALY lost is valued via HM Treasury's Green Book valuation of £70,000.^{8 **}
- **Out-of-pocket expenditure:** these are **direct financial costs** to individuals with a cancer diagnosis and include travel to and from appointments, parking costs, changes in day-to-day costs (e.g. food), changes in household bills, clothing and equipment modifications. Costs are based on Macmillan survey evidence on costs incurred by cancer patients.⁹

Results (present value costs for individuals diagnosed with cancer in 2023 in £2023)

- We estimate new preventable cancer cases result in a cost of **£65 billion to individuals**. These costs are **predominantly indirect quality of life costs** rather than out-of-pocket costs directly incurred by individuals.
- **QALYs lost**, specifically from **mortality**, are a significant proportion of costs to individuals at **£60.1 billion** for all preventable cancers diagnosed in 2023. It is important to note that we expect that our results for QALYs lost from morbidity are conservative and likely underestimate the cost.*
- QALYs lost from mortality are materially **highest for lung cancer**, driven by its comparably low survival rates and relatively high incidence.

Cost (£s 2023)		Lung	Bowel	Melanoma	Breast	All other	Total (all cancers)
Total cost	QALYs lost - mortality	£20,688,500,000	£7,572,900,000	£1,752,700,000	£2,872,900,000	£27,752,000,000	£60,639,000,000
	QALYs lost - morbidity	£1,628,200,000	£411,000,000	£127,300,000	£365,900,000	£1,740,900,000	£4,273,300,000
	Out of pocket expenditure	£26,100,000	£15,800,000	£15,500,000	£12,500,000	£65,200,000	£135,100,000
Cost per case	QALYs lost - mortality	£481,100	£327,000	£99,700	£203,200	£320,800	-
	QALYs lost - morbidity	£37,900	£17,700	£7,200	£25,900	£20,100	-
	Out of pocket expenditure	£600	£700	£900	£900	£800	-

Direct health care costs total £3.7 billion for preventable cancer diagnoses in 2023

Modelling approach

- **Primary care:** we use NHS cancer survey evidence on the number of visits for diagnosis¹⁰ and literature on the number of visits in the last year of life for an individual with terminal cancer¹¹ to estimate the direct cost of preventable cancer to primary care. Due to a lack of available evidence, we have not included the cost of primary care post-diagnosis for non-terminal cancer.
- **Secondary care:** we use academic estimates for secondary care costs for lung, bowel and breast cancer for eight years post-diagnosis.¹² We average these estimates to calculate an estimate for 'all other' cancers. For melanoma, expert input suggested that costs only apply in the first three years post-diagnosis. We estimate costs for these three years from existing academic cost estimates.¹³
- **Community care:** we have used NHS reference costs¹⁴ to calculate a top-down estimate for

community care. NHS reference costs only provide costs for community nursing, and we expect additional community care costs.

Results *(present value costs for individuals diagnosed with cancer in 2023 in £2023)*

- We estimate new preventable cancer cases diagnosed in 2023 cost the health care system **£3.7 billion**.
- The most significant contributor to health care system costs is the cost of **secondary care**, which accounts for over 95% of costs. However, we expect this is partly due to the limitations of our modelling approach in estimating primary and community care costs. We expect there are **material costs for both that have not been included** in the analysis due to limited available evidence.

Cost (£s 2023)		Lung	Bowel	Melanoma	Breast	All other	Total (all cancers)
Total cost	Primary care	£29,900,000	£4,400,000	£1,300,000	£1,100,000	£17,400,000	£54,100,000
	Secondary care	£668,200,000	£638,000,000	£42,400,000	£314,800,000	£1,973,900,000	£3,637,300,000
	Community care*	£800,000	£500,000	£400,000	£400,000	£1,900,000	£4,000,000
Cost per case	Primary care	£700	£200	£100	£100	£200	-
	Secondary care	£15,500	£27,500	£2,400	£22,300	£22,800	-
	Community care*	-	-	-	-	-	-

* We expect that our estimates for community care to be an underestimate. We were not able to obtain an accurate estimation of community care costs due to limited data availability. We have therefore not reported the cost per case.

New preventable cancer diagnoses result in **£1.3 billion of social care costs**

Modelling approach

- **Ongoing social care:** we use Nuffield Trust estimates for the average cost of local authority social care.¹⁵ We assume that the cost of private sector care is proportional to the ratio of at-home public social care to at-home private social care, i.e. for every £1 spent in public social care, £0.47 is spent in private social care.¹⁶ This is a conservative estimate of private social care costs, which we expect to have higher costs per case than public sector care.
- **End-of-life social care:** we use NHS survival statistics¹⁷ and Nuffield Trust estimates on end-of-life cancer social care (an average of £1,600 for the final 12 months of life)¹⁸ to calculate an estimate of end-of-life social care.
- Social care cost estimates are **unavailable by cancer type** for ongoing and end-of-life social care. As a result, an estimate for all cancers is used. In practice, we expect that social care

use will vary by cancer type; e.g. we expect higher total costs for social care for cancers with an older age profile.

Results *(present value costs for individuals diagnosed with cancer in 2023 in £2023)*

- We estimate new preventable cancer cases diagnosed in 2023 cost the social care system **approximately £1.3 billion.**
- Social care costs are mainly from ongoing social care (both public and private) rather than end-of-life social care.
- **Lung and bowel** cancer are the highest contributing cancers to social care costs, approximately **£233 million** and **£176 million, respectively.**

Cost (£s 2023)		Lung	Bowel	Melanoma	Breast	All other	Total (all cancers)
Total cost	Ongoing social care (public)	£107,000,000	£105,200,000	£42,000,000	£82,400,000	£390,500,000	£727,100,000
	Ongoing social care (private)	£50,000,000	£49,200,000	£19,600,000	£38,500,000	£182,400,000	£339,700,000
	End-of-life social care	£76,400,000	£21,500,000	£4,200,000	£6,300,000	£82,900,000	£191,300,000
Cost per case	Ongoing social care (public)	£2,500	£4,500	£2,400	£5,800	£4,500	-
	Ongoing social care (private)	£1,200	£2,100	£1,100	£2,700	£2,100	-
	End-of-life social care	£1,800	£900	£200	£400	£1,000	-

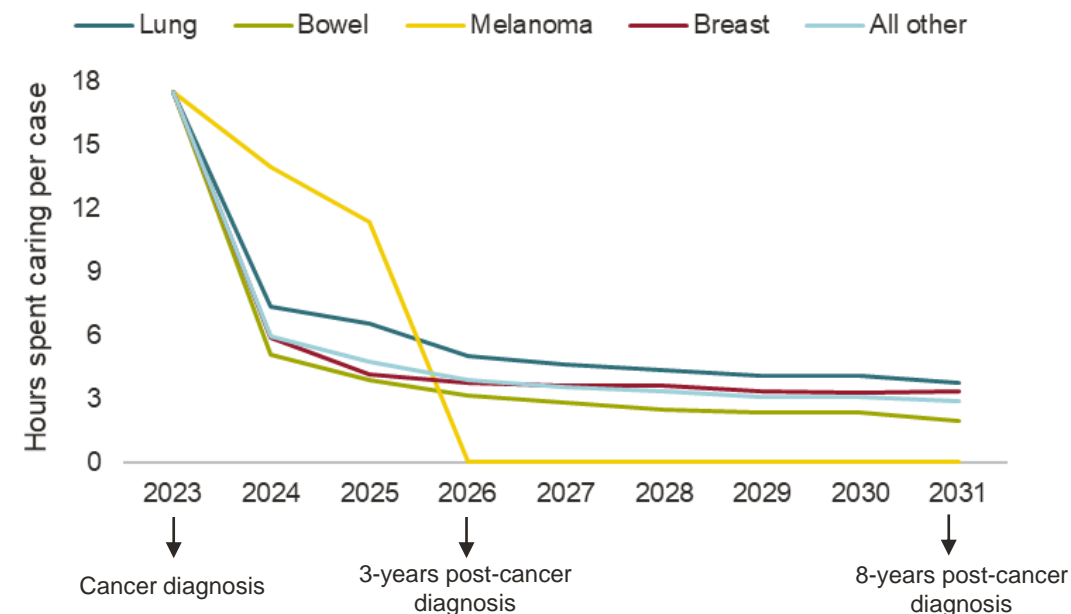
Family and carers provide new preventable cancer cases with care worth £3.4 billion

Modelling approach

- **Opportunity cost of care provided:** this represents an indirect cost of the value of the time provided by family and carers to an individual with a preventable cancer. We use Macmillan estimates on caring hours to develop a profile of caring hours over time (see graph).¹⁹ We value hours spent caring by the national living wage.²⁰
- We assume that there are no caring hours for melanoma from three years post-diagnosis. This assumption is based on expert input suggesting that melanoma cases are often fully cured or terminal within three years post-diagnosis.

Results (present value costs for individuals diagnosed with cancer in 2023 in £2023)

- We estimate new preventable cancer cases diagnosed in 2023 result in a total opportunity cost of care provided of **£3.4 billion**.
- The **total cost is highest for lung cancer at £652 million** due to the high incidence rates of preventable lung cancer diagnosis. However, lung cancer has the lowest cost per case due to its low survival rates.



Cost (£s 2023)		Lung	Bowel	Melanoma	Breast	All other	Total (all cancers)
Total cost	Opportunity cost of care provided	£652,300,000	£393,800,000	£386,200,000	£312,200,000	£1,627,600,000	£3,372,100,000
Cost per case	Opportunity cost of care provided	£15,200	£17,000	£22,000	£22,100	£18,800	-

Productivity losses from new preventable cancer diagnoses total £40 billion

Modelling approach

- **Paid productivity:** this represents the direct cost of decreased levels of paid employment following a cancer diagnosis, e.g. through sick leave or reduced working hours.
- **Unpaid productivity:** this represents the indirect cost of lost productivity from unpaid labour such as domestic work and volunteering.
- We use **NICE modelling guidance**²¹ to estimate paid and unpaid productivity losses from mortality and morbidity. The value of productivity paid or unpaid by someone with cancer is compared to someone in good health in the same age bracket to estimate the productivity loss.

Results (present value costs for individuals diagnosed with cancer in 2023 in £2023)

- We estimate productivity losses from new preventable cancer cases diagnosed in 2023 to be approximately **£40 billion**.
- The productivity loss is higher for unpaid than paid productivity and higher for mortality than morbidity. This highlights the importance of survival rates in contributing to the cost of preventable cancer cases.
- The **cost per case is highest for lung cancer at £360,000** due to its relatively low survival rates.

Cost	Lung	Bowel	Melanoma	Breast	All other	Total (all cancers)	
Total cost	Paid productivity lost from morbidity	£310,200,000	£65,900,000	£39,300,000	£68,600,000	£322,400,000	£806,400,000
	Paid productivity lost from mortality	£1,419,800,000	£388,400,000	£75,900,000	£80,500,000	£1,578,100,000	£3,542,700,000
	Unpaid productivity lost from morbidity	£3,447,000,000	£1,064,800,000	£498,300,000	£477,000,000	£4,431,300,000	£9,918,400,000
	Unpaid productivity lost from mortality	£10,324,800,000	£2,792,200,000	£428,800,000	£430,200,000	£11,740,300,000	£25,716,300,000
Cost per case	Paid productivity lost from morbidity	£7,200	£2,800	£2,200	£4,900	£3,700	-
	Paid productivity lost from mortality	£33,000	£16,800	£4,300	£5,700	£18,200	-
	Unpaid productivity lost from morbidity	£80,200	£46,000	£28,300	£33,700	£51,200	-
	Unpaid productivity lost from mortality	£240,100	£120,600	£24,400	£30,400	£135,700	-

New preventable cancer cases diagnosed between 2023-2040 will cost £1.88 trillion

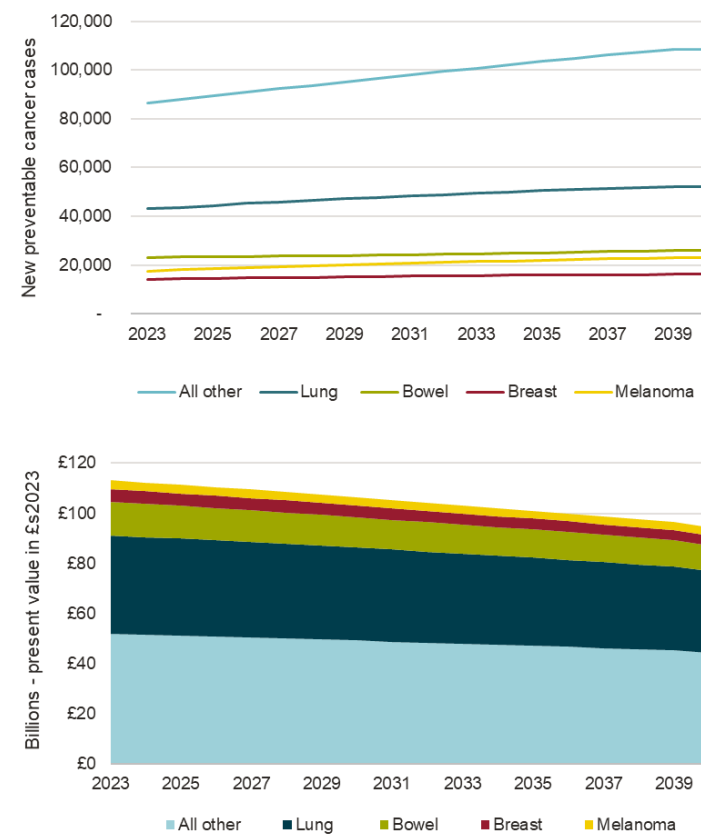
Number of preventable cancer cases over time

- The incidence of preventable cancers increases over time, largely due to population increases rather than changes in cancer incidence rates. We expect that **in 2040**, there will be approximately **226,000 new cases of preventable cancer diagnosis** (from 184,000 in 2023). Between 2023 and 2040, we estimate there will be a total of 3.7 million new preventable cancer cases.

Societal and economic costs over time

- We estimate that the **cost of new preventable cancer cases diagnosed between 2023 and 2040 is £1.88 trillion** for the UK. This figure represents the present value of the cost of new preventable cancer cases diagnosed between 2023 and 2040. As a result, the figure includes costs outside 2023 to 2040 as we include costs up to eight years post-diagnosis.
- The overall costs of new preventable cancer cases decrease over time, largely due to the approach to economic modelling. We expect the total cost of new preventable cancer diagnoses to decrease from **£113 billion in 2023** to **£94 billion in 2040**. The change in costs over time is driven by the following:
 - **Discounting rates** applied (as per HMT Green Book guidance) result in the present value of costs decreasing over time.
 - An **increase in preventable cancer** cases over time. This increases costs over time. However, this increase is smaller than the decrease due to discounting.
 - We assume that survival rates and fraction of cancers attributable to modifiable risk factors (i.e. preventable cancers) are constant (see slide 9). Therefore, neither of these factors contributes to the changes in costs.

The relative contributions of lung, bowel, breast, melanoma and all other cancers to the total cost are expected to stay similar between 2023-2040. Therefore, the 2023 results presented in previous slides provide a representative snapshot of the distribution of costs for the different cancers modelled.



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Estimating the cost of preventable cancers to the UK is complex and subject to uncertainty

Estimating the cost of preventable cancers in the UK is complex: it involves a large range of both direct and indirect costs and is subject to uncertainty. The modelling presented in the report uses best practice methods and peer-reviewed evidence.

However, there are inevitable limitations and gaps in the analysis. The main limitations are reported below. These are important to bear in mind when interpreting the results.

- **Evidence gaps.** The analysis uses the best available evidence to estimate the magnitude of the costs of preventable cancers. However, in some areas, we have made assumptions that we expect to be conservative (i.e., in practice, costs are higher) and included costs that we expect do not account for the whole cost incurred. The main areas where we expect this to occur are listed below.
 - To calculate QALYs lost from morbidity, we used NHS data on EQ-5D scores for cancer patients 18 months post-diagnosis. We do not expect that this represents a good measure of quality of life for years three to eight after diagnosis. Therefore, we only include an estimate of QALYs lost from morbidity for two years post-diagnosis rather than the standard eight years used in the modelling.
 - The evidence available for primary care and community care was incomplete and omits costs that will be incurred. For example, our primary care estimate does not include GP appointments for non-terminal cancers after cancer diagnosis.
- The cost estimates available are not all specific to particular cancer types. As a result, for some costs, we have applied data that is an average cost for all cancers to a specific cancer. For example, we do not have data on the end-of-life social care costs by cancer type and have assumed that the end-of-life social care costs are the same for all cancers. There is likely to be in-practice variation across different cancer types.
- **Potential missing costs.** The analysis provides an **initial estimate** of the cost of preventable cancers in the UK. We expect there to be **costs incurred that we have not included in the analysis**. For example, we have not included any impacts on comorbidities (it may be the case that the presence of other conditions increases the cost of treating preventable cancer) and on family and carers' well-being. These are not included due to **limited available evidence**.
- **Future uncertainty.** Looking forward, we expect that some of the assumptions we have made may **not be an accurate reflection of preventable cancers in the future**. For example, we assume the percentage of cancers that are preventable and survival rates are constant between 2023 and 2040. Technological changes and shifts in smoking and obesity rates and other behavioural changes mean that these assumptions may not be reflective of the future. However, we have not included such changes due to **high uncertainty** and **complexity**. They also represent an opportunity: if action can be taken to change behaviours, the costs modelled would not materialise.

Opportunities for further work

This analysis shows the significant size of the societal and economic costs of preventable cancers in the UK. Without effective and well-targeted interventions, the costs will remain significant over time. There are a number of potential opportunities for further work to help determine potential effective interventions and the scope of such interventions. A number of these opportunities are listed below.

- **Development of a long list of potential interventions.** This analysis highlights a broad range of costs incurred and potential savings from preventable cancers. Interventions that unlock these savings will likely require coordination across various government bodies and beyond. Developing a long list of potential interventions that target the modifiable behavioural factors that increase cancer incidence could act as a means to identify where the most coordination is required and what the key barriers and enablers are in creating this coordination. Drawing on research from behavioural economics, psychology and elsewhere would help to develop interventions.
- **Explore the geographic distribution of costs.** We expect the distribution of costs from preventable cancers to be spread unequally in the UK. Further, the most effective interventions may differ for different communities. Understanding the geographic distribution of costs and the impact of interventions would help understand the balance between locally tailored policy proposals that reflect local population needs and population-level interventions.
- **Explore how exposures to risk factors and changes in preventable cancer diagnosis change over time.** Our analysis assumes that the percentage of preventable cancers stays the same from 2023-2040. Given current trends, we expect that there will be decreases in smoking and increases in obesity in the future, which will influence the percentages of preventable cancers versus all cancers.

An analysis could be conducted that explores the changes in risk factors and how they are expected to translate to changes in the percentage of cancers diagnosed. This would allow for a more accurate understanding of where the highest costs incurred from preventable cancers will be in the future.

- **Explore the potential impact of interventions.** By developing a list of interventions that target particular modifiable behavioural factors, an analysis could be conducted on the potential impact of the interventions, allowing a detailed comparison. The analysis could include mapping the pathways through which the intervention affects risk factors, the affected population, the potential reduction in cancer diagnosis and the stage of the cancer diagnosis, and the consequent impacts on costs.

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