Scottish Burden of Disease

Future prevalence and burden of colorectal cancer

A Management information release for Scotland

Publication date: 24 June 2025

Translations | **Easy read** | **BSL** | **Audio** | **Large print** | **Braille**

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Contents

Context

Scotland is expected to see a rapidly ageing population, within the context of a slight overall decrease in population, over the next two decades.[1] Public Health Scotland's Scottish Burden of Disease (SBoD) study has recently been adapted to forecast how these demographic and population health trends are expected to combine, to anticipate the extent of future public health challenges. Initial work focused on the impact of the changing demographic situation only and found that, despite a projected 1.2% decrease in the Scottish population, the combined annual disease burden from all causes of disease and injury is forecast to increase 21% in the next 20 years.[2] Absolute increases in annual disease burdens are forecast to be largest for cardiovascular diseases, cancers, and neurological diseases – together accounting for approximately two-thirds of the total increase in forecasted disease burden.

These findings are set alongside the context of a projected reduction in working-age population over that same time period with an old-age dependency ratio projected to increase from 57% in 2022 to 64% in 2042.[1] These changes will have important implications for public health and the health and social care system. To address these challenges, alongside financial constraints and sustainability, decision makers need to consider both more effective approaches to prevention and different models of care. In doing so, alongside demographic change, consideration of epidemiological changes is needed as these have the potential to either ease or add to the pressure within an already stretched system..

Please note, a version of this 'Scottish Burden of Disease - Future prevalence and burden of colorectal cancer' was published temporarily in error on 27 May 2025 and some figures may have changed following final quality assurance checks.

Background

Disease prevalence is a measure of the overall occurrence of a disease at a point in time. It is a helpful metric as it outlines the scale of population-level health demands that are likely to arise from living with a disease. This in turn can inform discussions over how best to meet these health needs through health and social care service provision, and over how these needs could be reduced through public health interventions.

Cancer prevalence is influenced by two epidemiological factors:

- The rate of new cases (incidence)

- Case fatality:

  o Rate of remission/cure

  o Survival rate of prevalent cases

The prevalence of cancer is largely influenced through two main pathways: the incidence, and the case fatality rate of those diagnosed with cancer. Case fatality comprises two states: the rate of remission and cure, and the survival rate. Survival from cancer varies from person to person, and by cancer type, and is influenced by the stage of cancer at diagnosis, treatment and previous health status. In addition, earlier detection of specific cancers may also increase prevalence rates, including through improved survival. Successful prevention of many cancers can reduce incidence rates and prevalence of cancer.

In this report, we project the prevalence of colorectal cancer over the next two decades by incorporating information on historic trends in the prevalence of colorectal cancer, alongside projected changes in the Scottish population. The SBoD 2019 study found colorectal cancer was the 18th leading cause of disease burden in Scotland, with an estimated 41,000 disability-adjusted life years (DALYs). Colorectal cancer also exhibits absolute and relative inequalities, with 21% of DALYs estimated to be attributable to inequalities in multiple deprivation.[3]

Methodology

Data

Estimates of the number of people living with colorectal cancer in Scotland were calculated for each year from 2000 to 2019. Individual cases of colorectal cancer were identified from the Scottish Cancer Registry and a 20-year lookback period applied.[4] In records from 1997, ICD-10 coding was applied in Scotland, and prior to 1997 ICD-9 was applied.[5,6] Cases were then linked to the NRS Register of Deaths using the Community Health Index (CHI) to exclude those who were no longer alive at the end of the year of interest. [7,8] In addition, cases were excluded if they were recorded in the Scottish Cancer Registry as no longer living in Scotland in the year of interest.

A full list of ICD codes used to define colorectal cancer can be found in **Appendix 1**. Please note, the SBoD study applies models and definitions outlined by the Global Burden of Disease (GBD) and a slightly broader definition of colorectal cancer is used, compared to PHS. Therefore estimates of prevalence for colorectal cancer reported here may differ to other published estimates of prevalence in Scotland.

Analyses

Future estimates of prevalence were projected using age-period-cohort (APC) regression models. APC models allow the independent effects of age, period and birth cohorts to be included in the model, as well as a linear trend. There are several advantages to this approach, the main one being that period and cohort effects serve as proxies for events such as risk factors, public health and medical interventions, which are often difficult to measure directly.

APC models were fitted to sex-specific data and the best fitting model, based on goodness-of-fit criteria, were selected. In addition, where the linear period trend was included in the model, either the full trend (from 2000-2019) was used or the more recent trend only (from 2010-2019). The period trend was selected based on whether a significant change was estimated between the two time periods. Following

selection of the best-fit model, these resulting age and sex specific prevalence estimates were combined with Office for National Statistics (ONS) 2020-based interim national population projections for each year, recommended for use by the NRS, to generate future estimates of prevalence.[9]

For both the male and female models, a full age-period-cohort model was identified as the best fitting model. In addition, the linear trend for the two most recent time periods (2010-2019) was applied. As it's unlikely current trends will continue at the same rate throughout the projection period, the linear trend parameter was cut by 0%, 25% and 50% in the first, second and third 5-year period, respectively, to decrease the effect of current trends.

As a comparator, future estimates of prevalence incorporating demographic changes only were calculated. Here, the sex-specific colorectal cancer prevalence for 2019 was calculated by five-year age group. These age and sex-specific estimates were then applied to population projections to generate future estimates. These estimates assume that prevalence remains constant over the forecast period. That is, all future changes would be due to the changing demographics in Scotland ignoring the time trends identified in APC models. Estimates included in this report are those which include the impacts of projected demographic changes and historic epidemiological trends, unless stated.

Finally, these estimates of future prevalence were then used to calculate estimates of the future burden of colorectal cancer due to morbidity. The SBoD study follows the Global Burden of Disease (GBD) methodology which relies on severity distributions to quantify the proportion of the prevalent population in a particular health state and disability weights to take account of the consequences of both the condition and the health state.[10] Prevalence forecasts were distributed to each severity level according to the fixed proportions developed for use in the GBD 2016 study.[11] The burden due to morbidity was calculated by applying the disability weight to the number of prevalent cases in each severity level and adjusting for comorbidity. Severity strata and disability weights for colorectal cancer can be found in **Appendix 1.**

Main points

- The number of people with colorectal cancer in Scotland is estimated to increase by 44% from 2019 to 2044, from 29,000 prevalent cases to 41,700. This equates to an additional 12,700 people living with colorectal cancer in 2044, compared to 2019.

- Absolute and relative changes differ between the age groups. The largest absolute change in prevalence is projected for females aged 65 to 84 years. The largest relative increases are projected for males aged 85 years and over and females aged 45 to 64 years.

- Due to projected increases in the number of prevalent cases, unless mitigated by reductions in disease severity, the non-fatal burden of colorectal cancer will increase between 2019 and 2044.

- These projected increases in prevalence and burden of colorectal cancer are not inevitable - effective prevention can contribute to reducing the number of people being diagnosed with colorectal cancer.

Results and commentary

Results

From 2000 to 2019, the number of people living with a diagnosis of colorectal cancer increased from 17,900 to 29,000; an increase of 55% (Figure 1). Through incorporating the impact of projected population changes (age-effects) from 2019 onwards and assuming the underlying prevalence rate remains the same as it was in 2019, we estimate the number of people with colorectal cancer could rise from 29,000 to 38,400 from 2019 to 2044; an increase of 32% (Figure 1 and Table 1). Refining these estimates further by incorporating historical pre-pandemic age, period- and cohort-effects identified in underlying historic data, we estimate that the number of people with colorectal cancer would increase from 29,000 in 2019 to 41,700 in 2044; an increase of 44% (Figure 1 and Table 1)

Figure 1: Trend in the number of people with colorectal cancer (2000 to 2019) with projections to 2044 (mean value per five-year period)
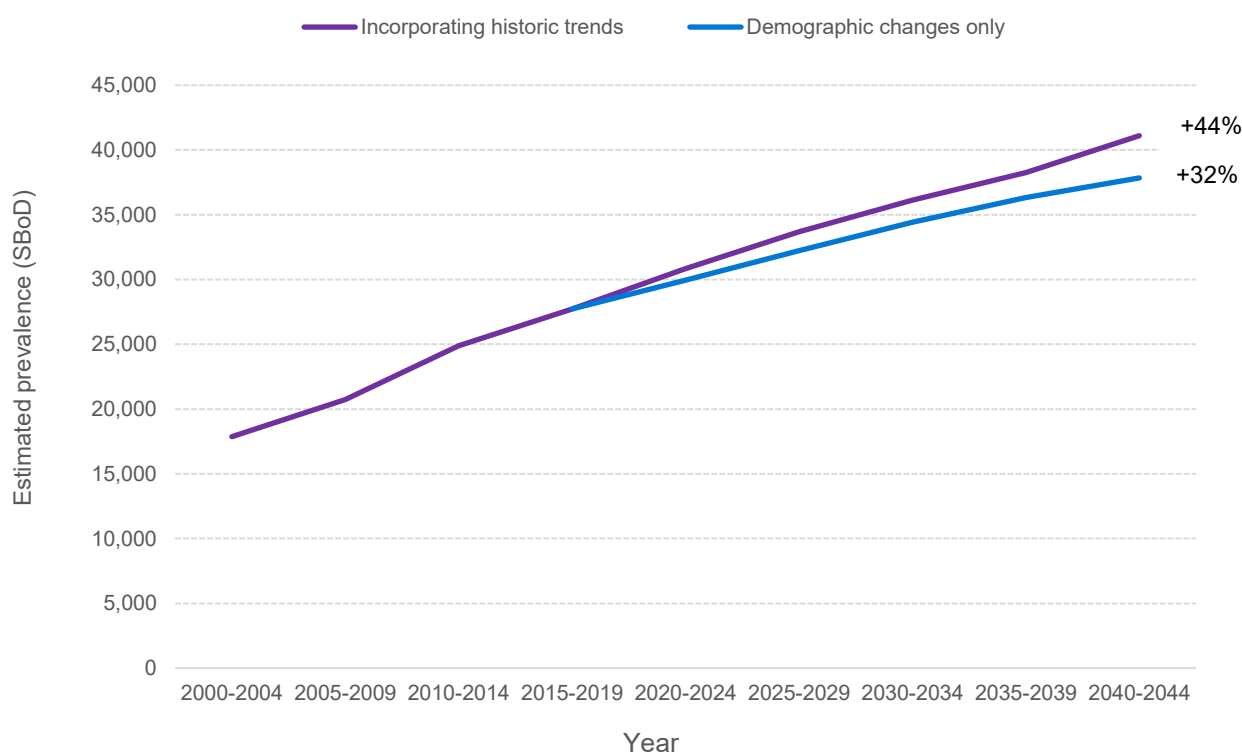
Table 1: Estimated number of females with colorectal cancer in Scotland using two different methods (selected years) with projections to 2044

| Method	2019	2024	2029	2034	2039	2044	Change (n) (2019 to 2044)	Change (%) (2019 to 2044)
Demographic changes only	28,984	30,867	33,153	35,258	36,991	38,350	9,366	32.3%
Incorporating historic trends and demographic changes	28,984	31,797	34,668	36,997	38,933	41,671	12,687	43.8%

In the full model, incorporating historic trends and demographic changes, the largest absolute and relative increases in prevalence are expected to be seen for females. For females, an increase of 50% is projected, representing an absolute increase of 6,800 prevalent cases (Table 2). For males, there is projected to be a 38% increase in prevalence, representing an absolute increase of 5,800 prevalent cases.

Table 2: Estimated number of people with colorectal cancer incorporating historic trends with projections to 2044, by sex (selected years)

Sex	2019	2024	2029	2034	2039	2044	Change (n) (2019 to 2044)	Change (%) (2019 to 2044)
Male	15,312	16,808	18,130	19,158	20,001	21,152	5,840	38.1%
Female	13,672	14,988	16,538	17,838	18,931	20,519	6,847	50.1%
Persons	**28,984**	**31,797**	**34,668**	**36,997**	**38,933**	**41,671**	**12,687**	**43.8%**

In addition to sex-specific differences, estimated future prevalence is projected to vary across age groups (Figure 2, Table 3).

Figure 2: Percentage change (2019-2044) in the estimated number of people with colorectal cancer by sex and age group
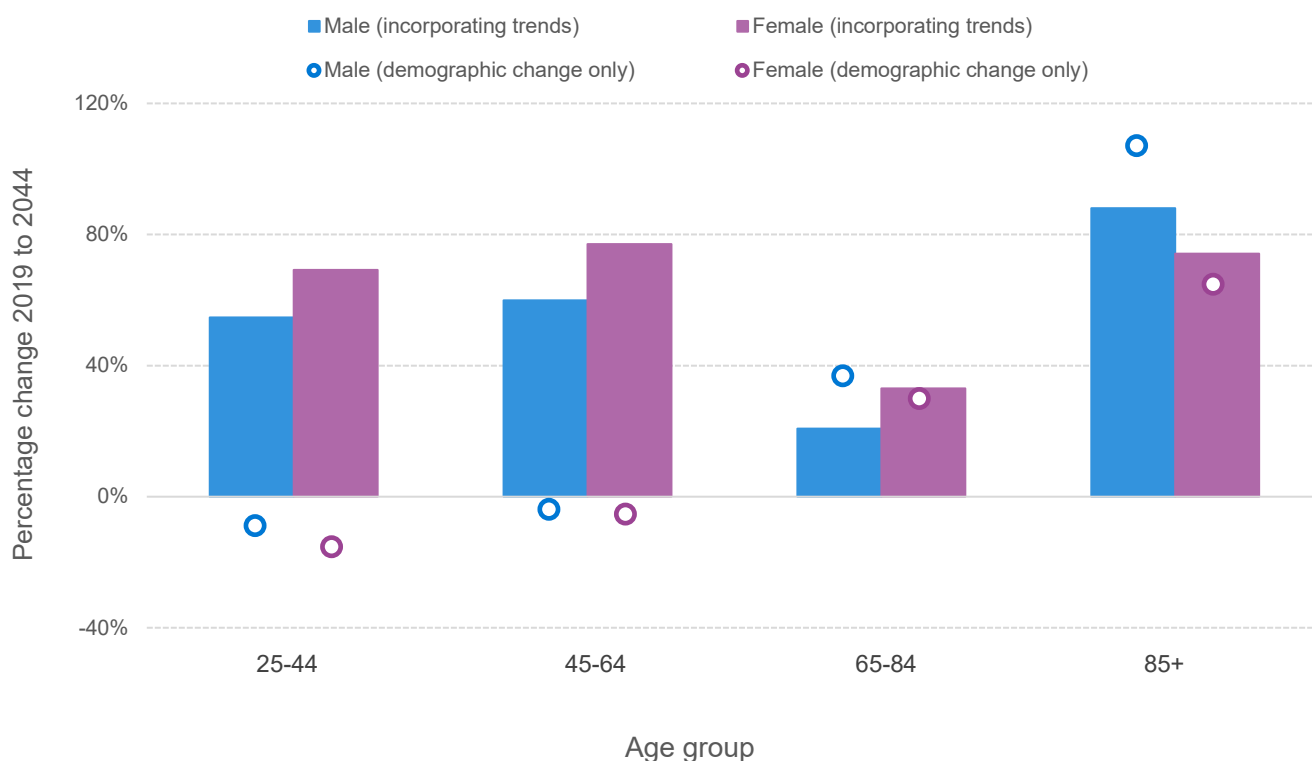
In the model incorporating historic changes, the largest absolute increases are projected in the 65 to 84 years age group. For males aged 65 to 84 years an absolute increase of 2,048 prevalent cases is projected from 2019 to 2044, representing a relative increase of 21%. For females aged 65 to 84 years an absolute increase of 2,659 prevalent cases is projected from 2019 to 2044, representing a relative increase of 33%. For males, the largest relative increase – 88% - is projected in the 85 years and over age group, representing an absolute increase of 1,783 prevalent cases from 2019 to 2044. Whilst a large relative increase of 74% is also projected for females aged 85 and over, the largest relative increase is projected in the 45 to 64 years age group. Here, an increase of 77% and representing an increase of 2,251 prevalent cases is projected from 2019 to 2044.

Differences between the model incorporating historic changes and the demographic change only model are driven by younger age groups. Relative increases in prevalence ranging from 55% to 77% are projected for age groups 25 to 44 years and 45 to 64 years in the full model, whereas decreases in prevalence are projected when considering demographic changes only. In older age groups, 65 to 84 years and 85 years and over, projections resulting from the demographic only model are similar to those projected in the full model.

Table 3: Percentage change (2019-2044) in the estimated number of people with colorectal cancer by sex and age group

Sex	Agegroup	Demographic changes only % (n)*	Incorporating historic changes % (n)*
Male	25 to 44 years	-8.9% (-24)	54.7% (146)
	45 to 64 years	-3.9% (-121)	59.9% (1,876)
	65 to 84 years	36.9% (3,636)	20.8% (2,048)
	85 years and over	107.1% (2,170)	88.0% (1,783)
Female	25 to 44 years	-15.3% (-48)	69.2% (219)
	45 to 64 years	-5.3% (-154)	77.1% (2,251)
	65 to 84 years	29.9% (2,406)	33.0% (2,659)
	85 years and over	64.8% (1,520)	74.2% (1,740)

* Change in numbers denoted in brackets

** Small differences in total values due to rounding

In burden of disease studies, prevalence is used to calculate the non-fatal burden [years lived with disability (YLD)] of a condition, along with estimates of the severity and disability associated with the disease. Applying burden of disease methodology to the projected values of prevalence, we estimate that the non-fatal burden due to colorectal cancer is also projected to increase. YLD is projected to be approximately 5,300 YLD in 2044, up from 3,600 in 2019, representing an absolute increase of

1,700 YLD and a relative increase of 48%. Considering age group stratification, the projected increases in YLD follow the same trends as seen in prevalence.

Overall burden (DALYs) is a composite measure incorporating both non-fatal and fatal burden. This projected increase in non-fatal burden will not necessarily lead to a similar change in the overall burden, as the latter will also be influenced by projected changes in mortality and fatal burden for a disease. Further work by the SBoD team is focussed on future projections of mortality and fatal burden, in order to develop forecasts of the overall burden of colorectal cancer in Scotland.

Summary

Both the prevalence and non-fatal burden of colorectal cancer are projected to increase over the next 20 years for males and females.

The number of people living with colorectal cancer in Scotland is estimated to increase by 44% from 2019 to 2044, representing an additional 12,700 people living with colorectal cancer.

The largest absolute increases in prevalence count are projected to be in those aged 65 to 84 years old, whereas the largest relative increases in prevalence count are projected in those aged 85 years and over.

Projections of bowel cancer incidence by Cancer Research UK and Public Health Scotland forecast limited changes in the incidence count from 2020 to 2040. [12] Published data shows that, from 2010 to 2019, increases were observed in both the count and crude rate of mortality from colorectal cancer (16% and 12% respectively).[13] This suggests that the factors influencing the projected increases in prevalence reported here are likely to be complex.

Any projected increases in prevalence and burden are likely to impact the sustainability of services in the future. However, these projected increases are not inevitable. We need to continue to invest in prevention at all levels and continue to tackle inequalities in the update of screening services in Scotland.

Limitations

Projections, by definition, are unstable and become less robust the longer the forecast period. External events, changes to population projections and limitations in the original models can all impact the robustness of projections. For example, the use of pre-pandemic period time trends in colorectal cancer prevalence do not take into account any changes in incidence and mortality from 2020 to 2023. Future SBoD iterations will incorporate sensitivity analyses to examine the robustness of the projections presented here.

Projections, by definition, are unstable and become less robust the longer the forecast period. The projections presented here are dependent on population projections, so any revision of these population projections is likely to have a considerable impact on the robustness of the projections of colorectal prevalence. For consistency with previous publications in this series, the ONS 2020-based interim national population projections for each year were used to calculate future prevalence. Application of the recently published NRS Projected Population of Scotland: 2022-based is likely to have an impact on results described here. [14]

In these projections, as well as technical uncertainties, there may also be uncertainties in the calculation of future burden. When estimating the future non-fatal burden of colorectal cancer using YLD, these projections assume the distribution across severity levels will remain constant over time. This may not be the case, particularly when decreased mortality rates may cause people to live longer and develop further complications from colorectal cancer. Any changes to the distribution of prevalence across the severity levels throughout the projection period will affect YLD estimates.

For the most recently published SBoD estimates of burden - SBoD2019 - we estimated YLD at national level by applying the SBoD 2016 age-sex-deprivation rates of YLD to the relevant NRS mid-year population estimates. For this report, YLD has been calculated by applying the severity distribution seen in SBoD2016 to 2019 observed prevalence and modelled prevalence from 2020 onwards. Therefore observed YLD for 2019 published here differs from previously published YLD.

Conclusion and next steps

The estimated increase in the prevalence of colorectal cancer disease over the next two decades is not inevitable. Change is possible through investing in prevention. Tackling the underlying mechanisms and modifiable risk factors which increase the risk of colorectal cancer - primary prevention - can reduce the number of new cases which occur.

Improving the wider determinants of health can have an impact on the number of new cases which occur. Risk factors such as obesity and long-term smoking show clear deprivation gradients. Data from the Scottish Health Survey 2022 reported that the proportion of adults living with obesity increased as area deprivation increased, with 19% of adults in the least deprived areas living with obesity but 36% of adults in the most deprived areas living with obesity.[15] Scottish Government policy, outlined in *A Healthier Future: Scotland's Diet and Healthy Weight Delivery Plan*, aims, amongst other policies, to reduce all diet-related health inequalities.[16]

Continued early detection of malignant cancers can help to ensure those living with colorectal cancer live longer lives in better health.[17] In the most recent reporting period, for invitations from May 2021 to April 2023, uptake of 66% was reported, however, again, there continues to be a clear deprivation gradient with those from the most deprived area less likely to take up the screening offered. [18]

This publication is part of a growing body of work from Public Health Scotland's Population Health Monitoring programme, which aims to deliver high-quality population health insight and evidence to guide equitable action, inform decision-making, and protect population wellbeing. As part of this programme, the SBoD study are doing further work on the future projections of mortality and fatal burden, in order to develop forecasts of the overall burden of colorectal cancer in Scotland. They are also working to build upon these projections to explore how forecasts may be influenced by various scenarios. In addition, the SBoD team are working with the Whole Systems Modelling team at PHS to determine how these various projections and scenarios are likely to impact service provision in the health and social care systems over the next 20 years.

Glossary

Burden of disease (and injury)

The quantified impact of a disease or injury on a population using the disability-adjusted life years (DALY) measure.

DALY (disability-adjusted life year)

A standardised metric that can be used to quantify the health loss due to dying prematurely or to living with the health consequences of diseases, injuries or risk factors. DALYs are a summary metric of population health. DALYs are an absolute measure of health loss; they count how many years of healthy life are lost due to death and non-fatal illness or impairment. They reflect the number of individuals who are ill or die in each age-sex group and location.

Disability

In burden of disease studies, this is synonymous for "loss of health", or any, short or long term, departure from full health.

Disability weight

Numerical representations of the severity of health loss associated with a health state. Disability weights are numbers between 0 and 1 that are multiplied by the time spent living with a health loss to determine the years lived with disability associated with the cause of that loss. In the GBD, disability weights are derived from a worldwide, cross-cultural study to compare the relative severity of health problem.

Early death

The burden from dying prematurely. Often used synonymously with **years of life lost**.

Fatal burden

The burden from dying prematurely as measured by years of life lost. Often used synonymously with **years of life lost**.

Health loss

The total burden from early death and ill-health. Often used synonymously with **disability adjusted life year (DALY).**

Health states

The consequences of diseases and injuries or their risk factors. Health state refers to an individual's levels of functioning within a set of health domains such as mobility, cognition, pain, emotional functioning, self-care, etc. Health states do not refer to general well-being (which is a broader construct) or to aspects of participating in society, although they clearly affect these other aspects of life and may be affected by them.

Ill-health

Often used synonymously with **years lived with disability**.

Life expectancy

The average number of years of life expected to be lived by individuals who survive to a specific age.

Non-fatal burden

The burden from living with ill-health as measured by years lived with disability. Often used synonymously with **years lived with disability**.

Sequelae

Consequences of diseases and injuries for which epidemiological estimates and YLD calculations are made. It encompasses not only the traditional clinical meaning, but also a broader categorization of health outcomes such as severity levels for a particular disease, injury or impairment.

Severity distribution

Severity distributions are a means of summarising the range of health loss suffered to disease which enables estimates of disease occurrence to be paired with disability weights to estimate Years Lost to Disability in burden of disease studies.

YLD (Years of Life lived with a Disability)

In burden of disease studies this is also referred to as 'ill-health'. YLDs are computed as the prevalence of different disease-sequelae and injury-sequelae multiplied by the disability weight for that sequela. Disability weights are selected on the basis of surveys of the general population about the loss of health associated with the health state related to a disease sequela.

YLL (Years of Life Lost due to premature mortality)

YLLs are computed by multiplying the number of deaths at each age x by a standard life expectancy at age x. In SBoD we use an aspirational world life expectancy table developed for the Global Burden of Disease study.

Contact

Acknowledgements

Further information

Further information and data for this publication are available from the **publication page** on our website.

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Let us know what you think about this publication via. the link at the bottom of this **publication page** on the PHS website.

Appendices

Appendix 1 – Background information

Table A1: ICD-10 codes

IC10 code	Description
C18-	Malignant neoplasm of colon
C19-	Malignant neoplasm of rectosigmoid junction
C20-	Malignant neoplasm of rectum
C21-	Malignant neoplasm of anus and anal canal

Table A2: ICD-9 codes

IC10 code	Description
153-	Malignant neoplasm of colon
154-	Malignant neoplasm of rectum rectosigmoid junction and anus

Table A3: Severity levels and corresponding disability weights

Severity level / health state	Description	Disability weight
Diagnosis and primary therapy	Has pain, nausea, fatigue, weight loss and high anxiety.	0.288
Controlled phase	Has a chronic disease that requires medication every day and causes some worry but minimal interference with daily activities	0.049
Metastatic phase	Has severe pain, extreme fatigue, weight loss and high anxiety.	0.451
Terminal phase	Has lost a lot of weight and regularly uses strong medication to avoid constant pain. The person has no appetite, feels nauseous, and needs to spend most of the day in bed.	0.540

Appendix 2 – Publication metadata

Publication title

Scottish Burden of Disease: Future prevalence and burden of colorectal cancer

Description

Release of Scottish Burden of disease prevalence estimates for colorectal cancer for 2020-2044.

Theme

Population health and forecasts

Topic

Burden of disease

Format

PDF

Data source(s)

Please see methodology section for full data sources and time periods.

Date that data are acquired

Please see methodology section for full data sources and time periods.

Release date

24/06/2025

Frequency

Ad hoc

Timeframe of data and timeliness

The basis for the publication is SMR data from 2000 to 2019.

Continuity of data

Please see methodology section for information on continuity of data and coding.

Revisions statement

Revisions relevant to this publication

Concepts and definitions

Please see **Glossary**

Relevance and key uses of the statistics

Population health surveillance; service planning and sustainability; quality improvement and assurance.

Accuracy

The report contains projections of the prevalence of disease in Scotland to 2044. Projections and forecasts, by definition, are unstable and become less robust the longer the forecast period. Please see **Limitations** section for full details.

Completeness

Please see methodology section for information on completeness of data.

Comparability

The prevalence described in this report is estimated following the disease models and definitions outlined by the SBoD study and therefore may not be directly comparable to other estimates of prevalence.

Accessibility

It is the policy of Public Health Scotland to make its websites and products accessible according to published guidelines. More information on accessibility can be found on the **PHS website**.

Coherence and clarity

Measures to enhance coherence and clarity within this report include: explanatory chart/table notes, minimal use of abbreviations/abbreviations explained in the text, comprehensive notes on background and methodology.

Value type and unit of measurement

Figures are shown as absolute number, percentages and relative change. Units of measurement are disability-adjusted life years (DALYs); years lived with disability

(YLDs) and years of life lost (YLL) and prevalence of disease. Please see **Glossary** for further details.

Disclosure

The PHS protocol on Statistical Disclosure Protocol is followed.

Official statistics accreditation

Management information.

UK Statistics Authority assessment

Not put forward for assessment.

Last published

First publication.

Next published

To be confirmed.

Date of first publication

Not applicable.

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Date form completed

16 June 2025

Appendix 3 – Early access details

Pre-release access

Under terms of the 'Pre-release Access to Official Statistics (Scotland) Order 2008', PHS is obliged to publish information on those receiving pre-release access ('pre-release access' refers to statistics in their final form prior to publication). The standard maximum pre-release access is five working days. Shown below are details of those receiving standard pre-release access.

Standard pre-release access:

Scottish Government Department of Health and Social Care (DHSC)

NHS board chief executives

NHS board communication leads

Early access for management information

These statistics will also have been made available to those who needed access to 'management information', i.e. as part of the delivery of health and care:

Early access for quality assurance

These statistics will also have been made available to those who needed access to help quality assure the publication:

Appendix 4 – PHS and official statistics

About Public Health Scotland (PHS)

PHS is a knowledge-based and intelligence driven organisation with a critical reliance on data and information to enable it to be an independent voice for the public's health, leading collaboratively and effectively across the Scottish public health system, accountable at local and national levels, and providing leadership and focus for achieving better health and wellbeing outcomes for the population. Our statistics comply with the **Code of Practice for Statistics** in terms of trustworthiness, high quality and public value. This also means that we keep data secure at all stages, through collection, processing, analysis and output production, and adhere to the Office for National Statistics '**Five Safes**' of data privacy.

References

1   National Records of Scotland. Projected Population of Scotland (2020-based). Available at: **https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-projections/population-projections-scotland/2020-based**

2   Public Health Scotland. Forecasting the future burden of disease: Incorporating the impact of demographic transition over the next 20 years. Available at: **https://www.scotpho.org.uk/comparative-health/burden-of-disease/overview**

3   Grant I, Chalmers N, Fletcher E, Lakha F, McCartney G, Stockton D, Wyper GMA. Prepandemic inequalities in the burden of disease in Scotland due to multiple deprivation: a retrospective study. BMJ Public Health. 2023;1:e000191. doi: **https://doi.org/10.1136/bmjph-2023-000191**.

4   Public Health Scotland. Scottish Cancer Registry. Available at: https://publichealthscotland.scot/population-health/conditions-and-diseases/disease-registration/cancer-registration/overview/

5   World Health Organization. ICD-10: international statistical classification of diseases and related health problems: tenth revision, 2nd ed. World Health Organization. Available at: **https://iris.who.int/handle/10665/42980**

6   World Health Organization. International classification of diseases: [9th] ninth revision, basic tabulation list with alphabetic index. Available at: **https://iris.who.int/handle/10665/39473**.

7   National Records of Scotland. Vital events - Deaths. Available at: **https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/vital-events/deaths**.

8   Public Health Scotland. Data Dictionary. Available at: **https://publichealthscotland.scot/services/national-data-catalogue/data-dictionary/a-to-z-of-data-dictionary-terms/chi-number/**.

9 Office for National Statistics. 2020-based interim national population projections: year ending June 2022 estimated international migration variant. Available at:

https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/2020basedinterimnationalpopulationprojectionsyearendingjune2022estimatedinternationalmigrationvariant

10 The Institute for Health Metrics and Evaluation. The Global Burden of Disease study. Available at:

https://www.healthdata.org/research-analysis/gbd

11 Global Burden of Disease Study 2016 (GBD 2016) Data Resources. Available at:

https://ghdx.healthdata.org/gbd-2016

12 Public Health Scotland. Cancer incidence projections for Scotland; Cancer Research UK. Available at:

https://www.publichealthscotland.scot/publications/cancer-incidence-projections-for-scotland/cancer-incidence-projections-for-scotland-2019-2040-cancer-research-uk/

13 Public Health. Cancer Mortality Annual update to 2021. Available at:

https://publichealthscotland.scot/publications/cancer-mortality/cancer-mortality-in-scotland-annual-update-to-2021/

14 National Records of Scotland. Projected Population of Scotland: 2022-based. Published 28th January 2025. Available at:

https://www.nrscotland.gov.uk/publications/projected-population-of-scotland-2022-based/

15 Scottish Government. The Scottish Health Survey, 2022 Edition. December 2023. Available at:

https://www.gov.scot/publications/scottish-health-survey-2022-volume-1-main-report/pages/0/

16 Scottish Government. A healthier future: Scotland's diet and healthy weight delivery plan. July 2018. Available at:

https://www.gov.scot/publications/healthier-future-scotlands-diet-healthy-weight-delivery-plan/

[17] The Scottish Government. Cancer Strategy for Scotland 2023-2033. June 2023. Available at: https://www.gov.scot/publications/cancer-strategy-scotland-2023-2033/documents/

[18] Public Health Scotland. Scottish Bowel Screening Programme Statistics For the period of invitations from May 2021 to April 2023. Available at: https://publichealthscotland.scot/media/25862/2024-03-05-bowel-screening-publication-report.pdf