National Cancer Registry Ireland

CANCER IN IRELAND 1994-2020

ANNUAL STATISTICAL REPORT 2022

2022

ANNUAL STATISTICAL REPORT OF THE NATIONAL CANCER REGISTRY

www.ncri.ie

ABBREVIATIONS	
95% CI	95% confidence interval
APC	Annual percentage change
ASR	Age-standardised rate
CIN	Cervical intraepithelial neoplasia
CLL	Chronic lymphocytic leukaemia
CNS	Central nervous system
CSO	Central Statistics Office
ESP	European Standard Population
HPV	Human papillomavirus
IARC	International Agency for Research on Cancer
ICD-10	International Statistical Classification of Diseases and Related Health Problems: Tenth Revision
ICD-O-3	International Classification of Diseases for Oncology: Third Edition
NCCP	National Cancer Control Programme
NCRI	National Cancer Registry Ireland
NHL	Non-Hodgkin lymphoma
NMSC	Non-melanoma skin cancer
NOS	Not otherwise specified
TNM	Tumour, node, metastasis (stage)
WHO	World Health Organisation

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About the National Cancer Registry

The National Cancer Registry was established by the Minister for Health in 1991. It has been collecting comprehensive cancer information for the population of the Republic of Ireland since 1994. This information is used in research into the causes of cancer, in education and information programmes, and in the planning and management of cancer services to deliver the best cancer care to the whole population.

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Acknowledgments

- This work uses data provided by patients and collected by the health service as part of their care and support.
- The Central Statistics Office and the General Register Office provided access to population and death certificate data.
- The National Cancer Registry is funded by the Department of Health.
- Drafts of this report were circulated to: the Department of Health's Cancer, Blood & Organs Policy Unit; the Health Service Executive's National Cancer Control Programme; and the Board, Advisory Council, and Senior Management Team of the National Cancer Registry.

FOREWORD

The National Cancer Registry of Ireland is now in its 29th year of data collection, and in our 2022 annual statistical report, we summarise cancer data collected up to diagnosis year 2020. In additional to the more regular reporting of incidence, mortality and survival figures, this year we again provide additional focus on impacts of the COVID-19 pandemic on numbers of cancers diagnosed.

One notable milestone we report this year is that, by the end of 2020, for the first time, the number of people living after an invasive cancer diagnosis had exceeded the 200,000 mark to reach 207,000. This is equivalent to 4.2% of the population, or about 1 in 24 persons in Ireland, a >50% increase in numbers of cancer survivors compared with one decade ago. This reflects both an increase in the number of people being diagnosed with cancer every year and ongoing improvements in cancer survival, as also reported here.

This year's report presents the median age at diagnosis and death, which vary markedly across cancer types. Median age at diagnosis for all invasive cancers combined (excluding non-melanoma skin cancers) was 69 years in men and 67 years in women during 2018-2020, with little change over time. The median age at death for the same cancers was 74 years in both men and women, an increase compared with the median of 72 years in both men and women during 1994-1998, consistent with improved cancer survival.

About 30% of deaths occurring annually in Ireland are attributable to cancer, with on average 9,493 deaths per year from invasive cancer, or 9,751 deaths per year from any tumour type, during 2018-2020. Lung cancer was still the leading cause of cancer death, followed by breast and bowel cancer in females and prostate and bowel cancer in males. Bowel cancer was the 2nd most common cancer among male deaths for many years (consistently from 2005 to 2017), but during 2018-2020 its ranking has fallen to 3rd behind lung and prostate cancers.

This year's report is the first in which we have primarily reported age-standardised incidence and mortality rates based on the 'newer', 2013 European Standard Population (ESP), while still retaining equivalent figures using the older 1976 standard in the appendices for continuity. Age-standardisation is one of the key methods to control for different age distributions among populations or over time, to help ensure valid comparisons between countries, regions or periods. This change is necessary to ensure such valid comparisons but one consequence of using a different standard is that the rates based on the 2013 standard are higher than those based on the 1976 standard. This does not imply any 'real' change in rates or risk and, in fact, overall rates of cancer incidence (allowing for population growth and ageing) have been stable or falling over the last decade.

Cancer registration is a dynamic process and NCRI's registration of incident cases for 2020 is now deemed to be essentially complete at the time of writing, although some late accruals are still expected as it takes up to five years after the end of a given calendar year before 100% of each element of cancer data is received, checked and validated. Preliminary analysis of COVID-19 impacts on cancer diagnosis presented in last year's report and a related analysis of NCRI data on microscopically verified cancers suggested an overall shortfall in 2020 of between 10% and 14% of the numbers anticipated for 2020. This year we present equivalent analyses based on a more complete data set. Comparing with the estimates of the likely cancer burden for 2020, our most up-to-date estimate of the shortfall is in the range 10% (based on all cancers) to 11% (based on

microscopically verified cancers). Further NCRI analysis to provide preliminary estimates of COVID-19 impacts on 2021 case numbers, and on other aspects of cancer diagnosis and outcomes (including stage) is underway, for publication in 2023.

Professor Deirdre Murray
Director,
National Cancer Registry

CONTENTS

REPORT AT A GLANCE

Who are we, and what do we do?

The National Cancer Registry of Ireland (NCRI) works on behalf of the Department of Health and collects information from all hospitals in Ireland on the number of persons diagnosed with cancer and the types of cancer they have. NCRI also follows up the numbers dying from their cancer or from other causes. All patient personal and private information are removed before summary cancer statistics are prepared and made available to the public and health professionals through our annual cancer report and other reports on our website.

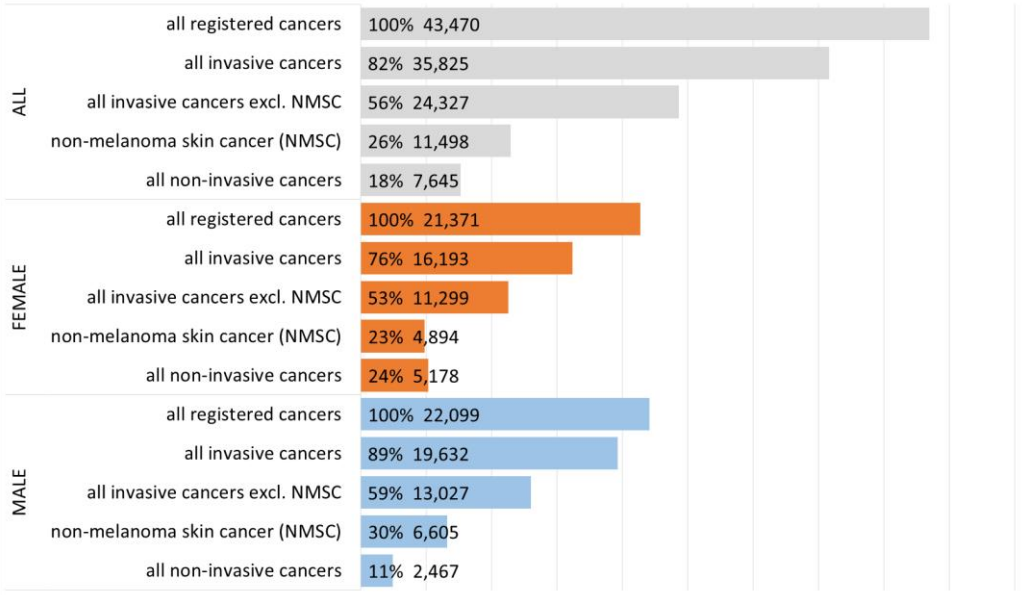
How are the numbers reported?

Collecting and checking all of this information is performed by a combination of manual and electronic processes. Our staff collect cancer diagnosis information and then use an agreed system of coding (The International Classification of Diseases) to group the cancers into different types.

After a process of collating diverse information from Irish hospitals and validation for accuracy, the annual cancer report is published following analysis of de-identified data.

What have we found?

Over the years 2018-2020 the average number of 'registered tumours' in males and females is estimated at 43,470 per year. Just over 1 in 2 (24,327 excluding non-invasive tumours and non-melanoma skin cancers) are life-changing invasive cancers which often require extensive treatment.



Cancer cases: Annual average 2018-2020

Percentages represent the proportion of 'all registered tumours'.

For example, non-melanoma skin cancer made up 23% (almost 1 in 4) of all registered tumours in females and 30% (almost 1 in 3) in males

How many people were diagnosed with cancer?

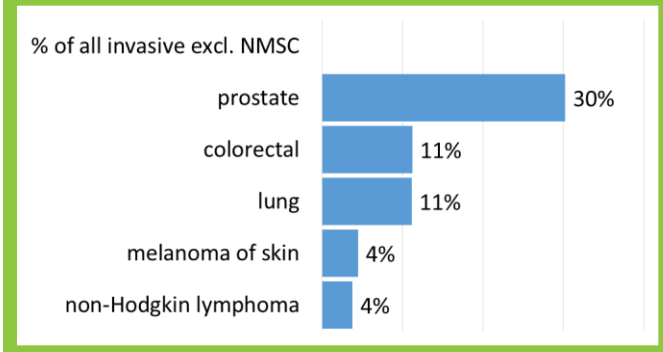
- On average, 43,470 cancers or related tumours were diagnosed each year during 2018-2020.
- The figure most often quoted in international comparisons ('all invasive cancer, excluding NMSC') averaged 24,327 cases (13,027 males and 11,299 females) diagnosed annually during 2018-2020, or 56% (about 1 in 2) of all registered tumours.
- Invasive cancers (including NMSC) averaged 35,825 cases per year during 2018-2020.
- 26% (just over 1 in 4) were non-melanoma skin cancers.
- Approximately 18% (almost 1 in 5) of these were non-invasive neoplasms (in situ carcinomas, tumours of uncertain behaviour and benign brain and CNS tumours).

What are the most common cancers?

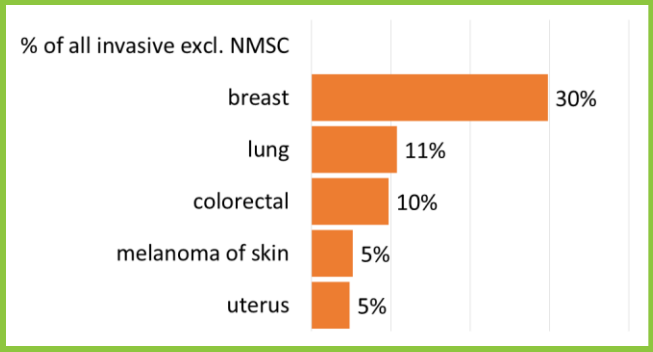
- Excluding non-melanoma skin cancer (NMSC), prostate and female breast cancer were the most commonly diagnosed invasive cancers overall, and each comprised almost one-third of all invasive cancers in men and women respectively during the period 2018-2020.
- Colorectal (bowel) cancer, lung cancer, melanoma of skin and NHL were the 2nd, 3rd, 4th and 5th most common cancers in males, respectively.
- Lung cancer, colorectal cancer, melanoma of skin, and uterine cancer (corpus uteri) were the 2nd, 3rd, 4th and 5th most common cancers in females respectively

Top five most common incident cancers during 2018-2020

Males



Females



How many people died of cancer?

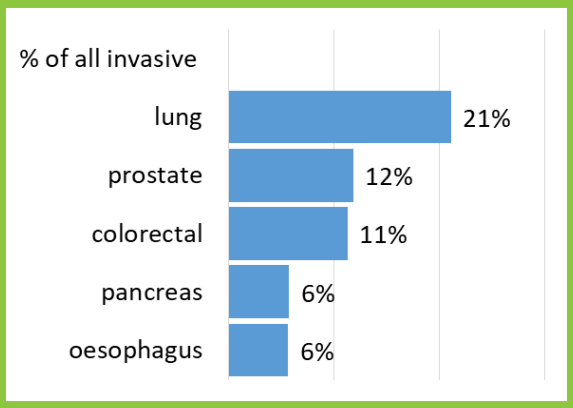
- Of all deaths occurring in 2020 in Ireland, 30% (almost 1 in 3) were attributable to cancer. Another 27% and 10% were attributable to diseases of the circulatory and respiratory systems respectively.
- On average during 2018-2020 there were 9,493 deaths per year from invasive cancer (5,101 in males, 4,392 in females) during the period 2018-2020, or 9,751 deaths per year across all tumour types.

What are the most common cancers causing death?

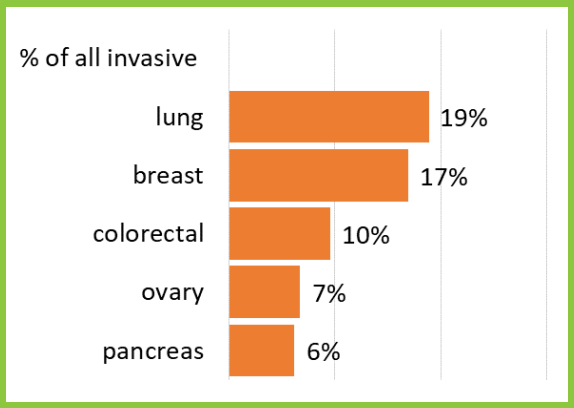
- Lung cancer was the leading cause of cancer death in both sexes during 2018-2020.
- In males, cancer of the prostate, colorectal (bowel), pancreas and oesophagus were the 2nd, 3rd, 4th and 5th most common categories of cancer deaths, respectively. Colorectal (bowel) cancer was the 2nd most common cancer death in males during 2016-2018, but dropped to 3rd behind prostate cancer during 2018-2020.
- In females, cancer of the breast, colorectal (bowel), ovary and pancreas were the 2nd, 3rd, 4th and 5th most common categories of cancer deaths, respectively.

Top five most common causes of cancer death during 2018-2020

Males



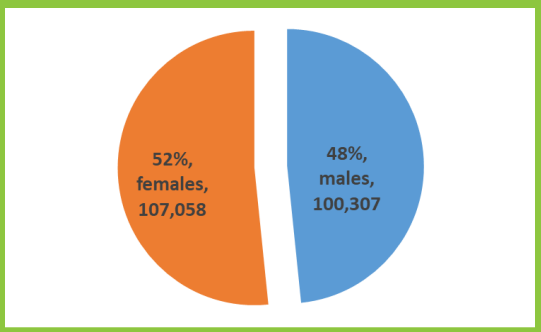
Females



How many previously diagnosed cancer patients are still alive?

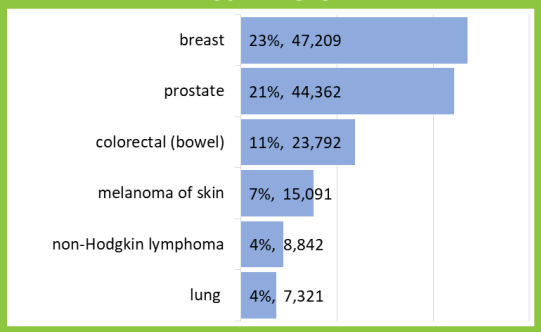
- About 207,000 cancer patients or former cancer patients were alive in Ireland at the end of 2020 (about 4.2% or 1 in 24 of the Irish population).
- The top six most common cancers among survivors were: breast cancer (23% of all cancer survivors), prostate cancer (21%), colorectal (bowel) cancer (11%) and skin melanoma (7%), non-Hodgkin lymphoma (4%) and lung cancer (4%) which together account for 70% of all cancer survivors.
- These figures exclude non-melanoma skin cancers, which are rarely fatal.

Number of cancer survivors



Total=207,365 (100%)

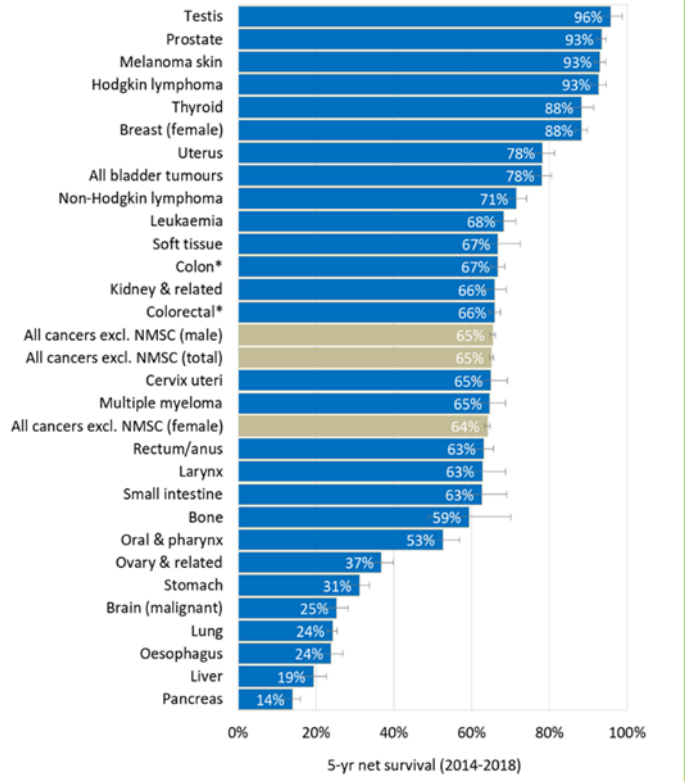
The six most common cancers among cancer survivors



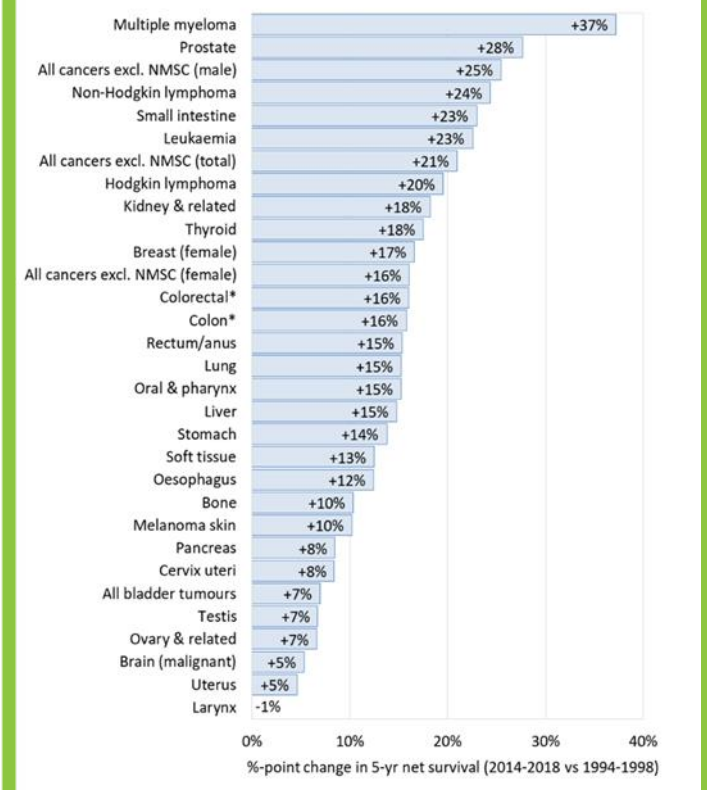
Is cancer survival improving?

- For invasive cancers as a whole (excluding non-melanoma skin cancers), five-year net survival averaged 65% for patients diagnosed during 2014-2018, compared with only 48% for those diagnosed during 1994-1998: a very substantial increase.
- Major improvements in survival have also been seen for most forms of cancer, though survival still varies markedly by cancer type (see below).
- Although the cancers with the poorest average prognosis may not have shown 'absolute' increases in survival as high as seen for some cancers, relative increases in survival have still been substantial, including more than a doubling of survival for oesophageal, pancreatic, liver and lung cancer since the 1990s.

5-year net survival: 2014-2018



Change (%) in 5-year net survival: 1994-1998 vs. 2014-2018



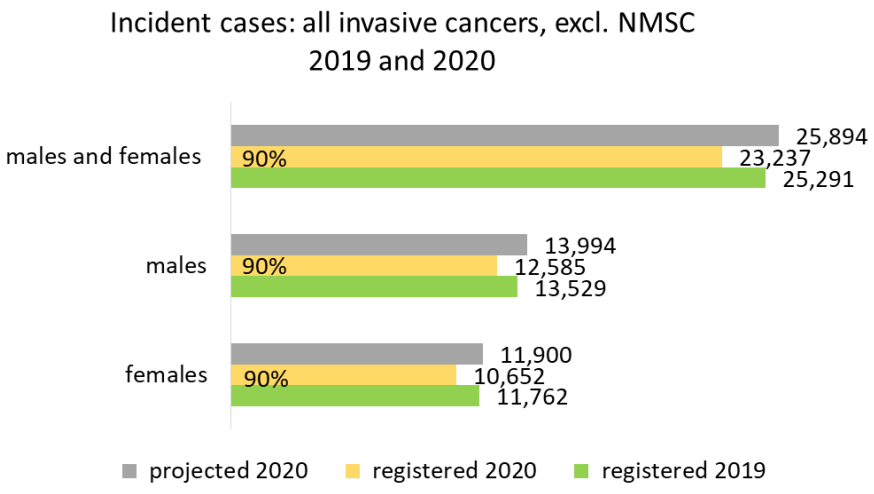
Net survival is based on the observed survival of patients compared with survival in the general population of the same age and sex (expressed as a percentage), e.g. for breast cancer, 5-year net survival was 88% of that expected for the general population of females of the same age during 2014-2018.

*Colorectal and colon cancer survival figures exclude carcinoid tumours of the appendix

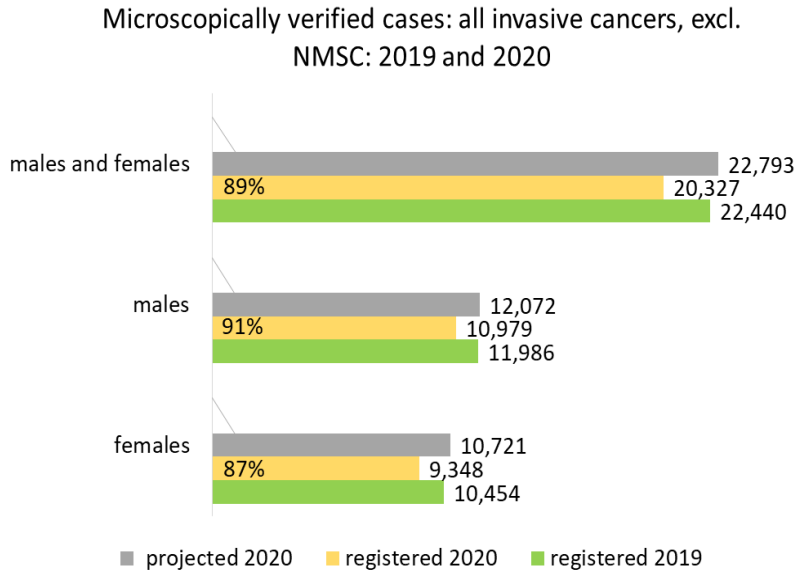
What are the cancer figures for the most recent year for which registration is complete?

- We employ cancer data registrars embedded in the hospital system. Using active case-finding and electronic records, it normally takes up to two years before complete details of a case are fully registered.
- Cancer registration of incident cases for 2020 is now essentially complete. However, some *late registrations* are still expected as it takes up to five years, after the end of a given calendar year before 100% of each element of cancer data is received, checked and validated.
- Using projections we are able to estimate the numbers of cases that would have been expected for 2020 assuming that the cancer trends for the years up to 2019 still applied, i.e. as if the COVID-19 pandemic had not occurred in 2020.

- The graph on the right shows the registered and projected cases in 2020 for males and females.
- Overall, 90% of the cases that were projected for 2020 have been registered to date (October 2022),
- *i.e. 10% shortfall for males and females and for both combined.*



- The graph on the right shows the subset of registered **microscopically verified (MV)** cases and projected MV cases in 2020 for males and females.
- Overall, 89% of the cases that were projected for 2020 have been registered to date (October 2022),
- *i.e. 11% shortfall for males and females combined; 9% for males; 13% for females.*



Effect of COVID-19 pandemic on cancer diagnoses

In last year's annual report we estimated that the shortfall of cancer diagnoses in 2020 was no greater than 14%. After one further year of cancer registration we are now more confident that registration is complete for 2020 and that the shortfall in cancer diagnoses for 2020 is in the range of **10%** (based on all cancers) to **11%** (based on microscopically verified cancers). In other words, due to the circumstances of the COVID-19 pandemic, it appears that about one in ten of the cancer cases expected in 2020 were not diagnosed.

Further NCRI analysis to provide preliminary estimates of COVID-19 impacts on 2021 case numbers, and on other aspects of cancer diagnosis and outcomes (including stage), is underway, for publication in 2023.

CANCER INCIDENCE 2018-2020

- On average, 43,470 cancers or other (non-invasive) tumours were diagnosed annually during the period 2018-2020 (Table 2-1).
- Approximately 18% of these were non-invasive tumours *(in situ* carcinomas, tumours of uncertain behaviour and benign brain and CNS tumours) and 26% were invasive non-melanoma skin cancers (NMSC, estimated 11,498 cases per year) (Table 2-1).
- Invasive cancers (incl. NMSC) averaged 35,825 cases per year during 2018-2020, or an age-standardised rate of 1,097 male and 790 female cases per 100,000 per year.
- For all invasive cancers excluding NMSC, the figures most often quoted in international comparisons, 24,327 cases (13,027 males and 11,299 females) were diagnosed annually during 2018-2020, or 56% of all invasive cases.
- This is equivalent to an incidence rate of 716 cases per 100,000 males and 456 cases per 100,000 females per year, based on the 2013 European population standard.
- This newer standard gives greater weight to older age-groups (Figure 2-2). In comparison, age-standardised incidence rates based on the previous (1976) European standard population were 474 invasive cancers per 100,000 males and 386 per 100,000 females per year (see comparative details of both standards in Figure 2-3 and Appendix II, and next subsection for an explanation of age-standardisation).
- The annual average number of invasive cancers excluding NMSC during 2018-2020 was double the average for 1994-1996 (12,270 – 6,350 male and 5,920 female).
- The cumulative risk (to age 75 years) of being diagnosed with an invasive cancer other than NMSC was approximately 1 in 3 for men and 1 in 4 for women.
- The cumulative lifetime risk of being diagnosed with an invasive cancer other than NMSC was approximately 1 in 2 for both men (probability=51%) and women (probability=45%).
- These rate and risk statistics are based on the Irish population estimates/projections available at the time of writing [1].
- The median age at diagnosis for all cancer combined (excluding non-melanoma skin cancers) was 69 years in men and 67 years in women during 2018-2020, with little change over time. In general, testicular cancer, Hodgkin lymphoma and cervical cancer occur in younger people, whereas cancers of the bladder, pancreas, lung and stomach, NMSC and multiple myeloma tend to occur in older people. For example the median age at diagnosis for testicular cancer was 37 years compared to 75 years for bladder cancer during 2018-2020.

TABLE 2-1 ANNUAL AVERAGE INCIDENCE, MEDIAN AGE AT DIAGNOSIS, RATE AND CUMULATIVE RISK OF THE MOST COMMON CANCERS: 2018-2020

	case count			median age at diagnosis (1994-1996) vs. 2018-2020		rate ‡ * per 100,00		risk # 1 in... to age 75		risk # 1 in... lifetime	
	male	female	all ●	male	female	male	female	male	female	male	female
C00-96 all invasive cancers**	19,632	16,193	35,825	(70) 70	(69) 68	1,097.0	789.9				
C00-43, C45-96 all invasive excl. NMSC	13,027	11,299	24,327	(70) 69	(68) 67	715.5	546.0	3	4	2	2
C00-D48 all registered tumours	22,099	21,371	43,470	(70) 70	(67) 65	1,234.7	1,019.9				
D00-48 all non-invasive tumours	2,467	5,178	7,645	(67) 71	(44) 49	137.7	230.1	18	7	9	5
C01-14 mouth & pharynx	375	161	536	(65) 64	(70) 64	19.4	7.8	94	236	67	147
C15 oesophagus	342	173	515	(70) 69	(75) 75	18.9	9.0	111	288	63	106
C16 stomach	348	209	557	(71) 72	(74) 73	20.1	10.6	129	242	58	94
C18-20 colorectal	1,467	1,095	2,562	(70) 70	(72) 71	83.0	54.5	29	41	14	19
C22 liver	236	109	344	(69) 71	(74) 74	13.4	5.5	174	451	87	176
C25 pancreas	313	311	624	(72) 72	(74) 74	18.0	15.8	138	163	64	60
C34 lung	1,457	1,214	2,672	(70) 72	(72) 71	84.4	62.0	29	34	14	17
C43 melanoma of skin	584	586	1,170	(63) 68	(59) 63	32.1	27.6	72	69	37	39
C44 other skin	6,605	4,894	11,498	(71) 72	(72) 71	381.5	243.9	8	10	4	5
C50 breast	29	3,363	3,392	(68.5) 71	(60) 60	1.7	157.2	1,331	11	710	7
C53 cervix		253	253		(46) 46		10.7		139		119
C54 corpus uteri		538	538		(64) 65		26.2		64		44
C56 ovary		401	401		(64) 65		19.3		95		57
C61 prostate	3,941		3,941	(74) 68		211.4		8		6	
C62 testis	162		162	(32) 37		6.5		213		206	
C64 kidney	424	243	667	(65) 66	(70) 67	22.4	11.8	88	159	55	91
C67 bladder	374	149	523	(72) 75	(73) 75	22.7	7.6	137	365	50	124
C70-72,D32-33,D42-43 meninges, brain & CNS	387	436	823	(55) 61	(58) 62	19.4	20.2	94	90	63	54
C71-72 brain & CNS	262	203	464	(56) 62	(60) 63	13.2	9.4	137	190	94	115
C70-72 meninges, brain & CNS	266	212	478	(56) 62	(60) 63	13.5	9.9	135	182	92	110
D32-33 benign brain & CNS	77	176	253	(56) 64.5	(56) 65	4.0	8.3	512	229	298	131
D42-43 uncertain brain & CNS	44	48	92	(19) 44.5	(35) 45	1.9	2.0	779	743	641	557
C73 thyroid gland	84	209	293	(63) 56	(54) 48	3.9	9.0	400	167	336	139
C81 Hodgkin lymphoma	79	70	149	(38) 44	(31) 40.5	3.5	3.0	448	534	355	376
C82-85 non-Hodgkin lymphoma	496	358	854	(62) 68	(66) 70	26.6	17.7	82	116	45	60
C90 multiple myeloma	226	158	384	(71) 70	(73) 72	12.7	8.0	185	269	93	127
C91-95 leukaemia	364	219	583	(67) 68	(69) 68.5	19.6	10.5	112	189	60	98

‡ Average age-standardised rates for 2018-2020, the most recent years for which case registration is complete.

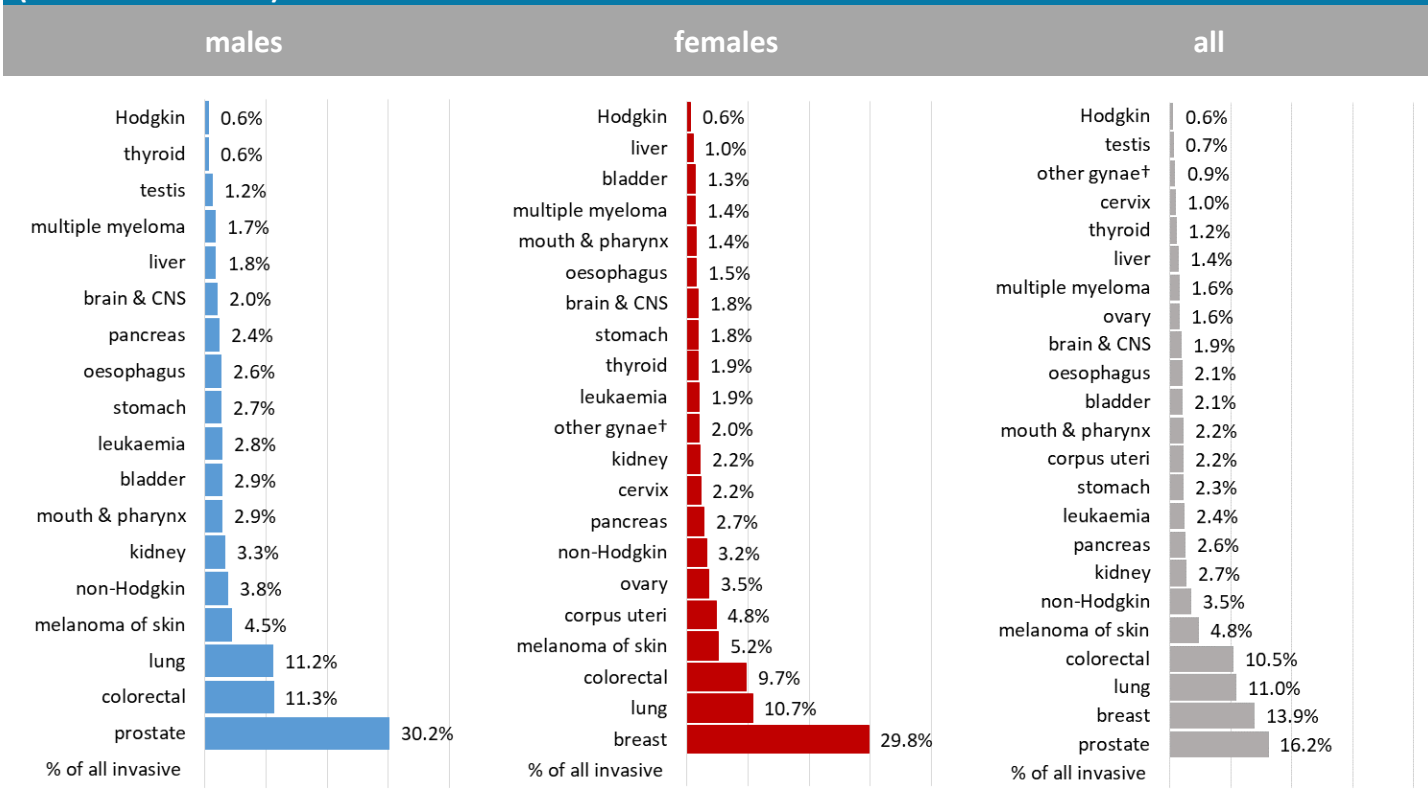
● Male + female case counts ('all') are subject to rounding.

* Rates are weighted according to the 2013 European standard population (ESP), therefore caution is advised if comparing these rates to rates in previous NCRI reports; see Appendix II for rates standardised to the 1976 ESP (which has previously been used for the main tabulations in previous annual reports).

** Invasive cancers included all tumours classified as behaviour 3 in ICD-O-3 classification, including some neoplasms previously classified as uncertain behaviour, e.g. polycythaemia vera.

Cumulative risk of developing a type of cancer before age 75 and full lifetime risk (both adjusted for population mortality), expressed as a proportion, e.g. lifetime risk of developing an invasive cancer. (excluding NMSC) was approximately 1 in 2 in men (probability=51%) and 1 in 2 in women (probability=45%), applying current probability method [2, 3].

FIGURE 2-1
ESTIMATED PERCENTAGES AND RANK OF THE MOST COMMONLY DIAGNOSED INVASIVE CANCER (EXCLUDING NMSC): ANNUAL AVERAGE 2018-2020



Low-incidence invasive cancers are not shown (c.10%), therefore percentages do not sum to 100%.
†Other gynaecological cancers: vulva, vagina, uterus (NOS) and placenta.

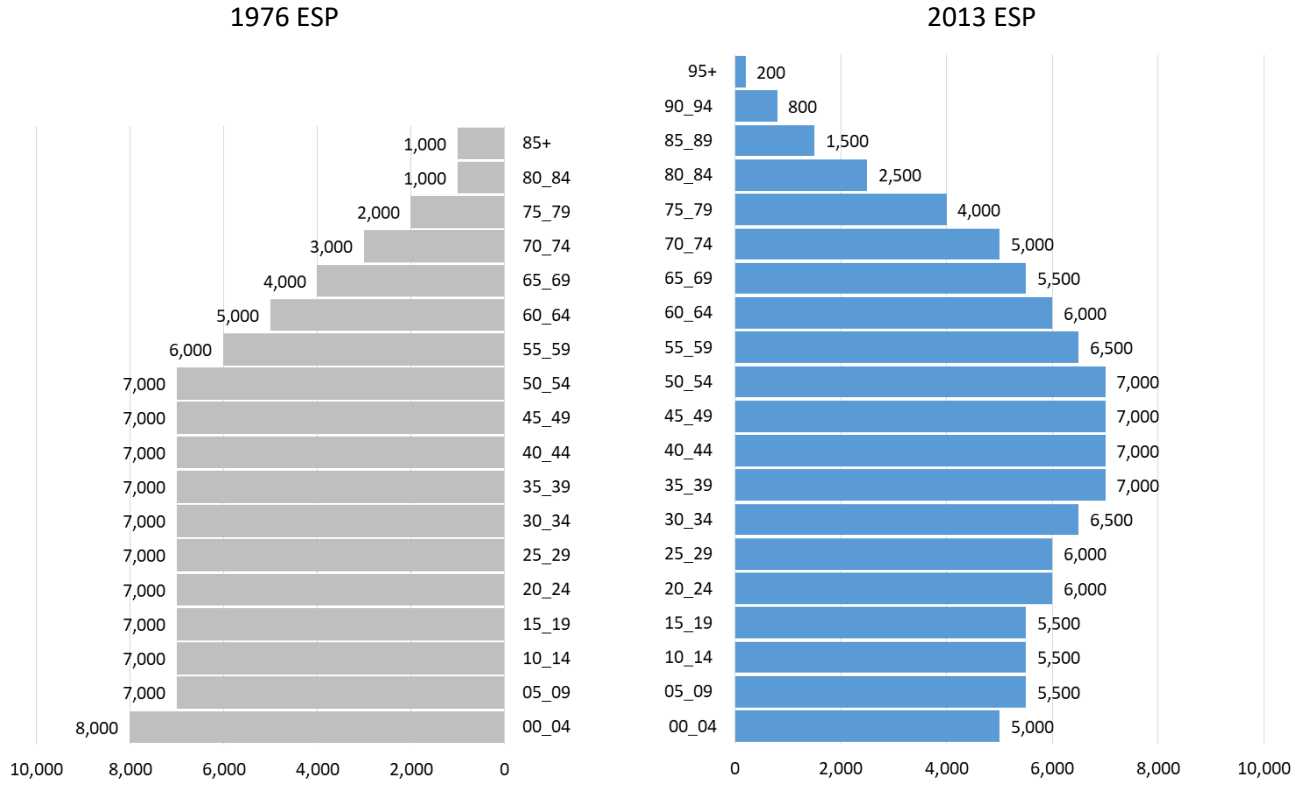
- If NMSC cases are excluded, prostate and female breast cancer were the most commonly diagnosed invasive cancers overall, each comprising almost one-third of all invasive cancers in men and women respectively, during the period 2018-2020 (Figure 2-1).
- Colorectal cancer, lung cancer, melanoma of skin and non-Hodgkin lymphoma were the 2nd, 3rd, 4th and 5th most common cancers in males respectively.
- Lung cancer, colorectal cancer, melanoma of skin, and uterine cancer (corpus uteri) were the 2nd, 3rd, 4th and 5th most common cancers in females respectively.

A more detailed breakdown of incidence statistics by cancer site is given in Appendix I & II.

Cancer rate trends and age weights

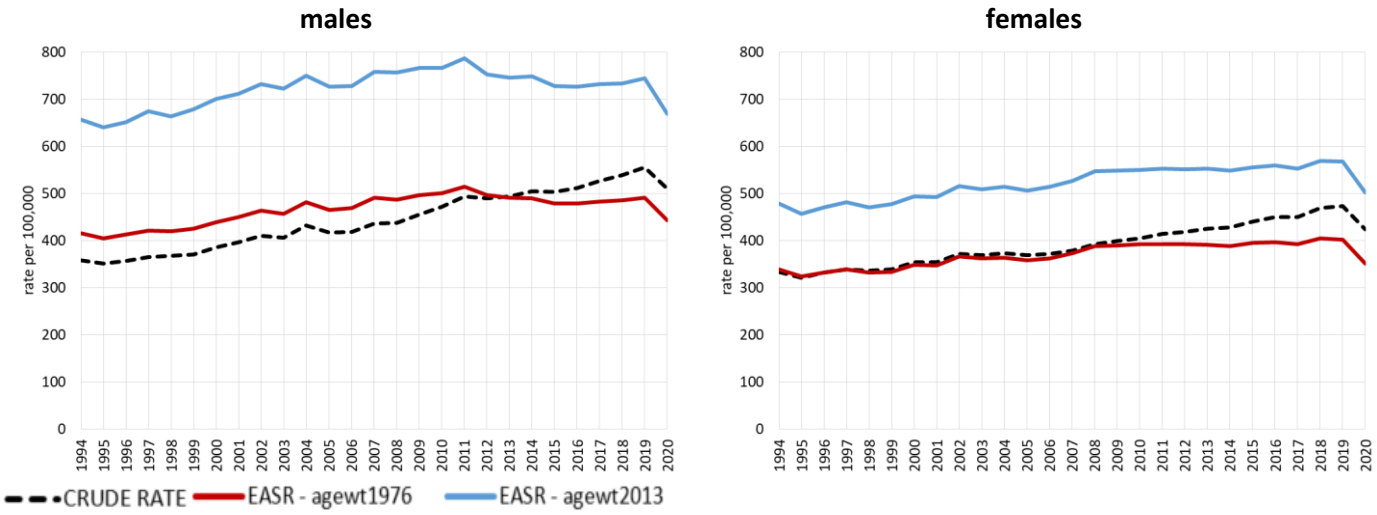
Age-standardisation is one of the key methods to control for different age distributions among populations or over time. When comparing cancer incidence or mortality patterns between countries, regions or periods, variation in age and sex distribution can be misleading when looking at crude rates or case counts, and age-standardisation is recommended. The European population is ageing and Eurostat projections from 2008 to 2060 suggest that the age distribution will show a progressive shift to the older ages [4]; the share of the population aged 65 and over is expected to increase in all countries and in particular the population aged 80 and over. A task force for the revision of European Standard Population (ESP) (first published in 1976) recommended a more appropriate ESP for dissemination of public health statistics in the EU27, i.e. the '2013 ESP'. Prior to this year's annual statistical report the NCRI routinely quoted cancer incidence and mortality rates using the 1976 ESP age weights in the main body of text, while quoting equivalent figures weighted by the 2013 ESP in appendices. This year, the situation is reversed. For the first time, we quote rates adjusted using the 2013 ESP age weights in the main text while still retaining equivalent figures using the 1976 ESP in the appendices for continuity.

FIGURE 2-2
EUROPEAN STANDARD POPULATION (ESP):
AGE WEIGHTS FOR CALCULATING AGE-STANDARDISED CANCER INCIDENCE AND MORTALITY RATES



When applying 2013 ESP age weights relatively more weight is given to older age groups, which are more prone to developing cancer (the median age at diagnosis for all cancers combined, excluding NMSC, was 69 in males and 67 in females in Ireland during 2018-2020). This results in an upward shift in age-standardised rates, compared with rates based on the 1976 ESP (Figure 2-3).

FIGURE 2-3
CANCER INCIDENCE 1994-2020: *C00-43, C45-96 ALL INVASIVE CANCERS EXCL. NMSC* IN MALES AND FEMALES: COMPARISON OF EUROPEAN AGE-STANDARDISED RATES (EASR) APPLYING 1976 AND 2013 AGE WEIGHTS AND CRUDE RATE (UNSTANDARDISED)



The 2013 age weights are deemed more appropriate to allow consistent rate comparison across EU member states and over time [4]. The graphs above show that rates calculated for Ireland using the 2013 age weights are substantially higher and do not track the crude rate as closely the 1976 age weights. However, trends using either age weights tended to match or run parallel to each other during the period 1994-2019.

CANCER MORTALITY 2018-2020

- Of deaths occurring in 2019, 73% were attributed to three main chapters in the ICD-10 classification: II (C00-D48) neoplasms (32%), IX (I00-I99) diseases of the circulatory system (29%), and X (J00-J99) diseases of the respiratory system (13%) [5].
- Of deaths occurring in 2020, 67% were attributed to three main chapters in the ICD-10 classification: II (C00-D48) neoplasms (30%), IX (I00-I99) diseases of the circulatory system (27%) and X (J00-J99) diseases of the respiratory system (10%), with a further 6% of deaths attributed to COVID-19 [6].
- An annual average of 9,493 deaths from invasive cancer occurred during the period 2018-2020 (5,101 in males, 4,392 in females), or 9,751 deaths from any neoplasm (Table 3-1).
- This represents an estimated age-standardised mortality rate of 222 invasive cancer deaths per 100,000 females and 317 deaths per 100,000 males per year, based on the newer (2013) European Standard Population (Table 3-1). This newer standard gives greater weight to older age-groups.
- In comparison, age-standardised mortality rates for the same period but based on the previous (1976) European population standard were 133 invasive cancer deaths per 100,000 females and 177 deaths per 100,000 males per year (see comparative data using both standards in Table 3-2 and Appendix IV, and an explanation of age-standardisation and age weights in under CANCER INCIDENCE 2018-2020).

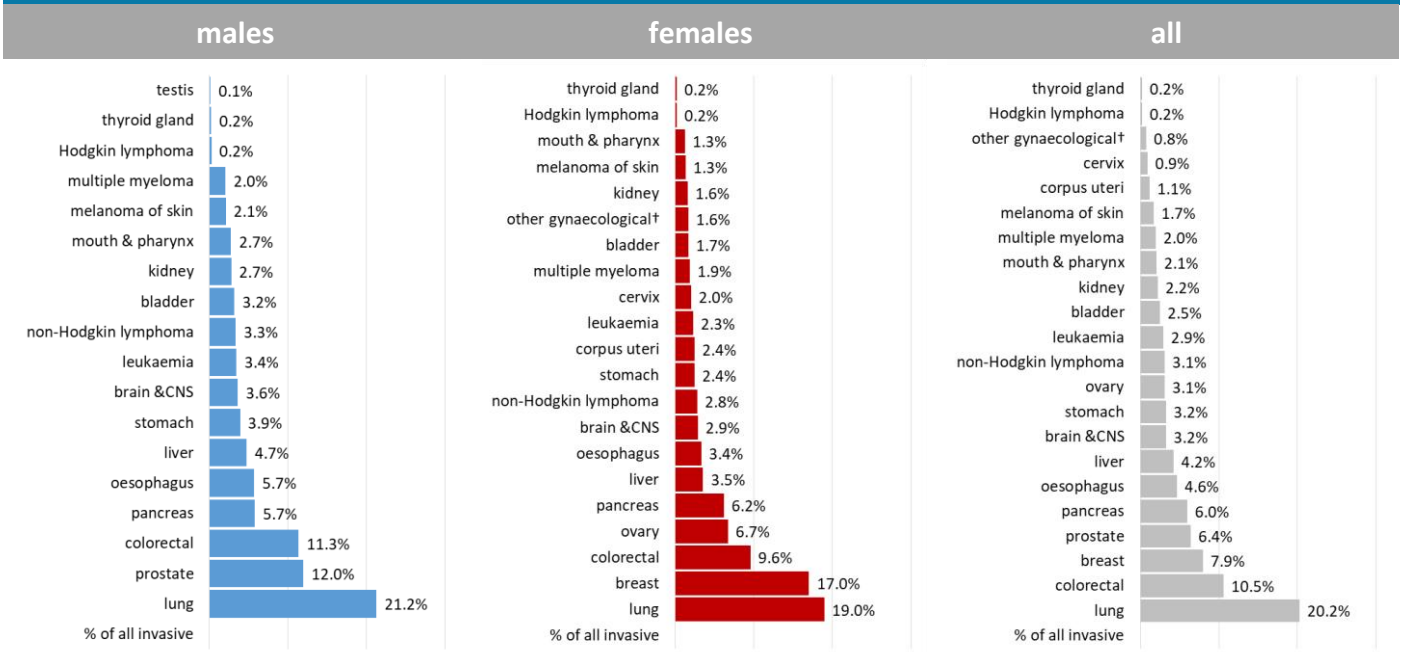
TABLE 3-1
ANNUAL AVERAGE MORTALITY ATTRIBUTABLE TO CANCER: 2018-2020

	deaths			median age at death (1994-1996) vs. 2018-2020		rate*/100,000		risk # 1 in… to age 75	
	males	females	all●	males	females	males	females	males	female
All neoplasms	5,237	4,514	9,751	(72) 74	(72) 75	326.3	228.1	9	11
C00-96 all invasive cancers	5,101	4,392	9,493	(72) 74	(72) 74	316.8	221.8	9	11
C01-14 mouth & pharynx	140	55	195	(68) 68	(74) 72	7.8	2.8	232	766
C15 oesophagus	291	148	438	(71) 71	(75) 78	17.0	7.6	129	386
C16 stomach	199	108	306	(71) 75	(75) 76	12.1	5.4	239	513
C18-20 colorectum	579	423	1,001	(71) 74	(75) 76	36.1	21.4	77	126
C22 liver	242	155	398	(71) 71	(75) 75	14.3	8.0	152	316
C25 pancreas	294	271	565	(71) 73	(76) 76	17.4	13.9	131	182
C34 lung	1,083	833	1,916	(71) 73	(72) 73	64.9	42.8	36	50
C43 melanoma of skin	106	56	162	(67) 73.5	(70.5) 73	6.5	2.8	401	839
C50 breast	6	748	754	(69) 76	(67) 72	0.4	36.8	7,386	62
C53 cervix		89	89		(57.5) 60		4.1		399
C54 corpus uteri		107	107		(70) 73		5.4		396
C56 ovary		295	295		(68) 72		14.9		138
C61 prostate	605		605	(78) 82		43.8		136	
C62 testis	5		5	(45) 48.5		0.2		8,898	
C64 kidney	140	68	209	(69) 72	(72) 79	8.4	3.5	290	926
C67 bladder	161	74	235	(76) 79	(78) 81	11.1	3.7	385	1,111
C71-72 brain & CNS	183	125	308	(61) 66	(66) 67	9.7	6.1	178	290
C73 thyroid	10	10	20	(74) 76	(72) 79	0.6	0.5	5,096	6,300
C81 Hodgkin lymphoma	12	10	22	(57) 74	(68) 77.5	0.7	0.5	3,872	6,150
C82-85 non-Hodgkin lymphoma	169	123	291	(67) 76	(72) 78	10.5	6.4	293	507
C90 multiple myeloma	104	82	186	(72) 77	(74) 79	6.7	4.3	517	762
C91-95 leukaemia	173	101	274	(71) 76	(73) 79	11.1	5.2	288	586

Source of data: Central Statistics Office, Ireland.
●male and female total are subject to rounding.
*Rates are standardised to the 2013 European Standard Population (ESP), see Appendix II for rates standardised to 1976 ESP.
Cumulative risk of dying of cancer before 75th birthday calculated using method as described [7], expressed as a proportion, e.g. 1 in 9.
See Appendix III for mortality statistics of other cancers.

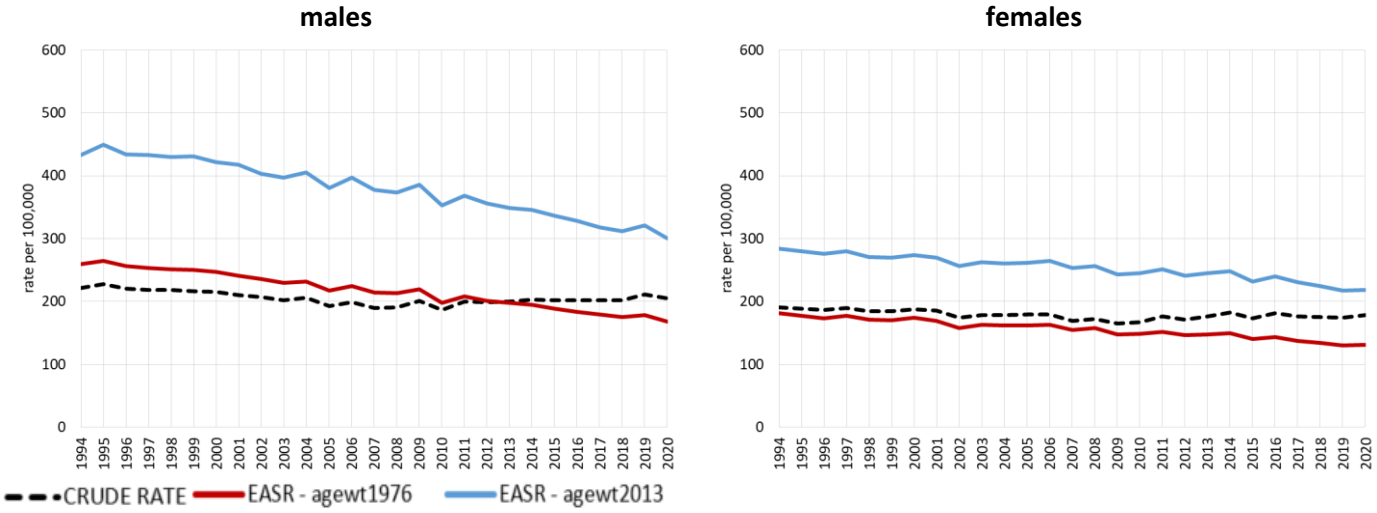
- The estimated cumulative risk of dying from invasive cancer before 75th birthday was approximately 1 in 9 for men and 1 in 11 for women.
- For those that die of their cancers, the median age at death varied by type of cancer. For all invasive cancers combined (C00-96) the median age at death was 74 in both men and women, an increase compared with the median of 72 years in both men and women during 1994-1998. During 2018-2020, the youngest median age at death was 48.5 for testicular cancer and 60 for cervical cancer, followed by cancer of the brain (M 66; F 67). The oldest median age at death was 82 for prostate cancer followed by bladder cancer (M 79; F 81).
- Lung cancer was the leading cause of cancer death in both sexes, with an average of 1,916 deaths per year or 19% of cancer deaths in women and 21% of cancer deaths in men during the period 2016-2018 (Table 3-1, Figure 3-1).
- Colorectal cancer was the 2nd most common cause of cancer death overall (but 3rd most common in females and in males), with an average of 1,001 deaths per year or 11% of cancer deaths in males and 10% of cancer deaths in females.
- Deaths from lung, colorectal, breast and prostate cancers combined made up almost half (45%) of all deaths from cancer during this period compared to 46% the period 2016-2018 [8]. Since 2016-2018 prostate cancer has moved ahead of colorectal cancer in the relative ranking of cancer deaths in males (colorectal cancer accounted for 12.2%, prostate cancer for 11.5% of male cancer deaths during 2016-2018, and colorectal cancer deaths outnumbered prostate cancer deaths each year during 2005-2017).
- Deaths from cancers of the pancreas, oesophagus and liver in males ranked 4th, 5th and 6th respectively, and comprised 16% of all cancer deaths in males. Mortality rankings for these high-fatality cancers were much higher than their incidence rankings (Figure 3-1).
- Deaths from cancers of the ovary and pancreas ranked 4th and 5th respectively in female and comprised 13% of cancer deaths in women, again much higher than the incidences ranking for these high fatality cancers (Fig. 3-1). A more detailed breakdown of mortality statistics is given in Appendix III.

FIGURE 3-1
PERCENTAGES AND RANK OF THE MOST COMMON CANCER DEATHS: ANNUAL AVERAGE 2018-2020



Cancers accounting for smaller percentages of cancer deaths (c.10% in total) are not shown, therefore percentages do not sum to 100%.
†Other gynaecological malignancies: vulva, vagina, uterus (NOS) and placenta.
Mortality data were provided by the Central Statistics Office (CSO).

FIGURE 3-2
CANCER MORTALITY 1994-2020: *C00-96 ALL INVASIVE CANCERS* IN MALES AND FEMALES: COMPARISON OF EUROPEAN AGE-STANDARDISED RATES (EASR) APPLYING 1976 AND 2013 AGE WEIGHTS AND CRUDE RATE (UNSTANDARDISED)



The 2013 age weights are deemed more appropriate to allow consistent rate comparison across EU member states over time [4]. The graphs above show that, as also seen for incidence rates, mortality rates calculated for Ireland using the 2013 age weights are substantially higher and do not track the crude rate as closely the 1976 age weights. However, trends using either age weights tended to match or run parallel to each other during the period 1994-2020.

PREVALENCE

Complete cancer prevalence is defined as the number of persons surviving with, or following a diagnosis of, cancer in a given population at a particular point in time, the index date. For a cancer registry, fixed-duration prevalence is the number of cancer survivors calculated directly from observed data collected by the cancer registry since it was established. The NCRI began national collation of cancer registration in 1994 and it currently holds 27 years of complete or near-complete incidence and follow-up information on cancer cases, up to the end of 2020. However, there remains a subset of cancer patients alive at the end of 2020 who are not included in NCRI data because they were diagnosed before 1994. The size of this hidden subset was estimated [9]. The sum of the fixed-duration cancer survivor population (1994-2020) and estimated numbers of survivors from the hidden cancer subset (pre-1994) gives an estimate of complete prevalence, presented below (Table 4-1).

TABLE 4-1.
FIXED DURATION AND ESTIMATED COMPLETE PREVALENCE BY SEX: NUMBER OF CANCER SURVIVORS* AT END OF 2020.

sex	Fixed duration (1994-2019)	%	Complete prevalence	%
all	193,173	100%	207,364	100%
males	95,410	49%	100,307	48%
females	97,763	51%	107,058	52%

*survivors of any invasive cancer other than non-melanoma skin cancer (ICD-10 C00-96 excluding C44); Only the first invasive cancer was counted per patient ignoring any subsequent cancers in other body sites.

The figure reported for complete cancer prevalence (up to 31/12/2019) in last year's annual report was 199,554 [8]. For this report (up to 31/12/2020) the same figure was estimated at 207,364 (Table 4-1) which comprised c.4.2% of the Irish population in 2020. These figures include patients still undergoing active treatment or palliative treatment at the end of 2020, in addition to longer-term survivors (either cured or potentially at risk of recurrence or relapse).

TABLE 4-2
FIXED DURATION AND ESTIMATED COMPLETE PREVALENCE, BY CANCER TYPE: NUMBER OF CANCER SURVIVORS AT THE END OF 2020

	Fixed duration (1994-2020)	Complete to end of 2020	%*
C50 breast	43,565	47,209	22.8%
C61 prostate	43,848	44,362	21.4%
C18-20 colorectal	22,316	23,792	11.5%
C43 melanoma of skin	13,864	15,091	7.3%
C82-85 non-Hodgkin lymphoma	8,231	8,842	4.3%
C33-34 lung	7,230	7,321	3.5%
C54 corpus uteri	5,936	6,455	3.1%
C91-95 leukaemia	5,645	6,266	3.0%
C64 kidney	5,810	6,049	2.9%
C62 testis	3,663	5,118	2.5%
C53 cervix uteri	4,067	5,066	2.4%
C67 bladder	3,488	4,300	2.1%
C73 thyroid	3,619	3,778	1.8%
C01-14 mouth & pharynx	3,561	3,686	1.8%
C56 ovary	2,847	3,327	1.6%
C81 Hodgkin lymphoma	2,417	3,088	1.5%
C16 stomach	2,378	2,461	1.2%
C71-72 brain and CNS	1,901	2,351	1.1%
C90 multiple myeloma	2,192	2,208	1.1%
C15 oesophagus	1,536	1,571	0.8%
C51-52, C55, C57, C58 other gynaecological†	1,226	1,303	0.6%
C25 pancreas	1,028	1,044	0.5%
C22 liver	783	794	0.4%

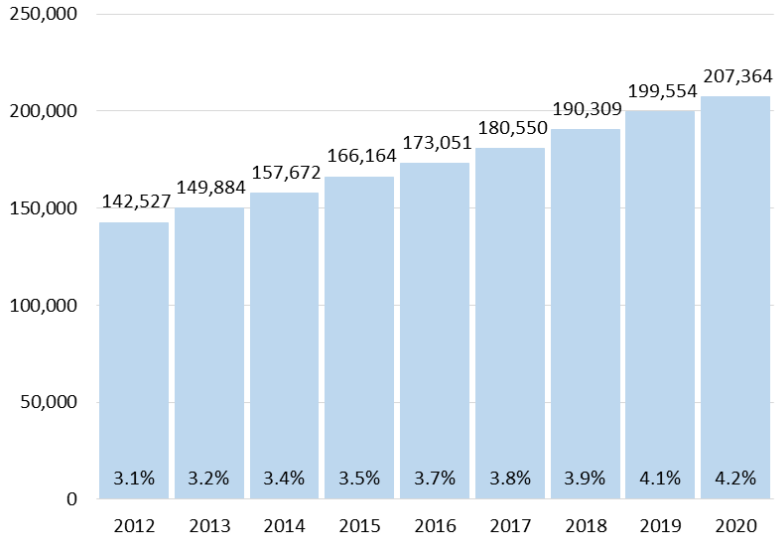
†Other gynaecological malignancies: vulva, vagina, uterus (NOS) and placenta.

*Percentage of all cancer survivors (complete prevalent cancers, C00-43, C45-96)

The number of survivors of a given cancer type is related to its incidence rate, median age at diagnosis and survival prospects. Rare, high-fatality cancers diagnosed in elderly patients comprise only a small proportion of cancer survivors. Conversely, common cancers with good survival prospects diagnosed in younger persons will tend to predominate in the prevalent cancer population.

Overall, the top most common cancers in the prevalent cancer population were: breast cancer (23% of all cancer survivors), prostate cancer (21%), colorectal cancer (12%) and skin melanoma (7%) (Table 4-2). These percentages are not mutually exclusive (i.e. they do not add up to 100% of the 'all cancer' set displayed in Table 4-1), as some cancer survivors had been diagnosed with more than one type of cancer. In some cases the patient's first cancer may have been of a rarer type not listed in Table 4-2.
Lung cancer, a common but high-fatality cancer accounted for only <4% of survivors, and less common, high-fatality cancers such as liver, pancreatic, oesophageal cancers and multiple myeloma comprised <3% of cancer survivors combined.

FIGURE 4-1
ESTIMATED COMPLETE CANCER PREVALENCE IN IRELAND UP TO END OF 2020



The numbers above the bars show the numbers living with a cancer diagnosis at the end of the year on the x-axis.
Percentages represent the proportion of the Irish population living with a cancer diagnosis.
Figures for 2020 are based on the latest available complete data at the time of writing this report.

CANCER SURVIVAL 1994-2018

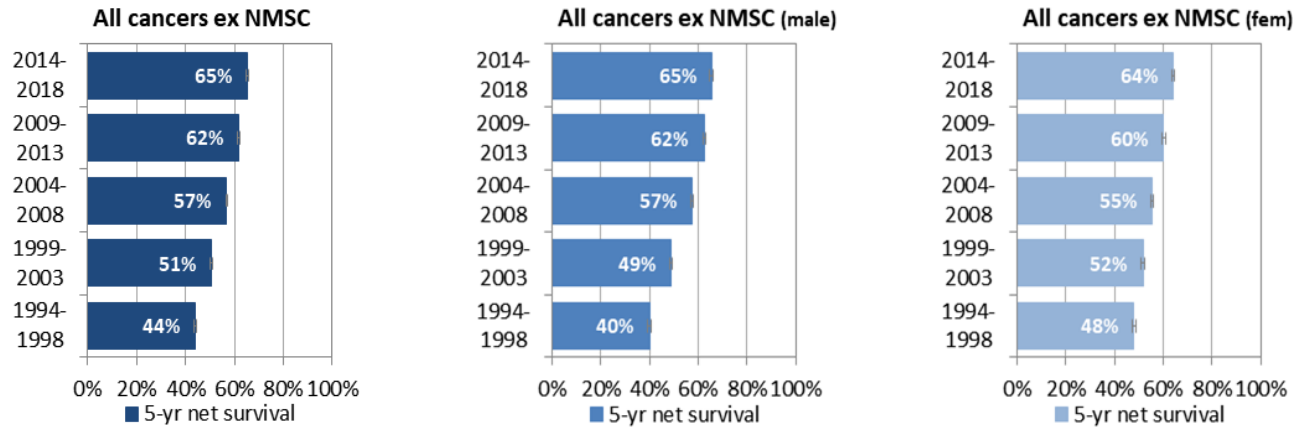
Five-year net survival for patients diagnosed during 1994-2018

Revised five-year net survival statistics are presented below for the most commonly diagnosed cancers, comparing survival of Irish cancer patients across five diagnosis periods from 1994-1998 to 2014-2018 (Figures 5-1 & 5-2). The revision mainly affects survival estimates for earlier periods, which were slightly underestimated in last year's report [8] as a result of a date-format error affecting identification of the 'first significant malignancy' used for survival calculations for patients diagnosed with more than one potentially fatal malignancy. Net survival is the expected survival in the hypothetical situation in which cancer is the only cause of death, thus it is similar to actual survival in younger patients but higher than actual survival in older patients. It measures an outcome that is broadly equivalent to cause-specific survival, without requiring cause-of-death information.

Survival is not presented for non-melanoma skin cancer (NMSC) as 5-year net survival averages close to 100% (although is lower for some subtypes). Site definitions (in terms of ICD-10 codes but updated to ICD-O-3 tumour-behaviour definitions) are mainly those used in the EUROCARE international survival collaboration – for details, see: https://www.ncri.ie/data/survival-statistics.

All estimates are age-standardised i.e. survival for all ages 15-99 (15-64 for testicular cancer, 20-99 for bone cancer) was standardised to recommended population age weights [10]. The age-groups used differ for prostate cancer, and greater weighting is given to younger patients for some cancers (melanoma, bone, cervix, testis, brain and thyroid), reflecting difference in typical age at diagnosis for these cancers. Survival statistics for paediatric cases are not presented but were published by NCRI in 2017 [11].

FIGURE 5-1
AGE-STANDARDISED 5-YEAR NET SURVIVAL OF CANCER PATIENTS IN IRELAND, BY DIAGNOSIS PERIOD



- Average five-year net survival has increased markedly over time (Figure 5-1), reflecting improvements in survival for specific cancers but also, to some extent an increased predominance of cancers with more favourable prognoses.
- Survival estimates are presented by individual cancer type or grouping in Figure 5-2 below, and compared over time in Figure 5-3.

FIGURE 5-2
AGE-STANDARDISED 5-YEAR NET SURVIVAL OF CANCER PATIENTS IN IRELAND, BY DIAGNOSIS PERIOD AND CANCER TYPE

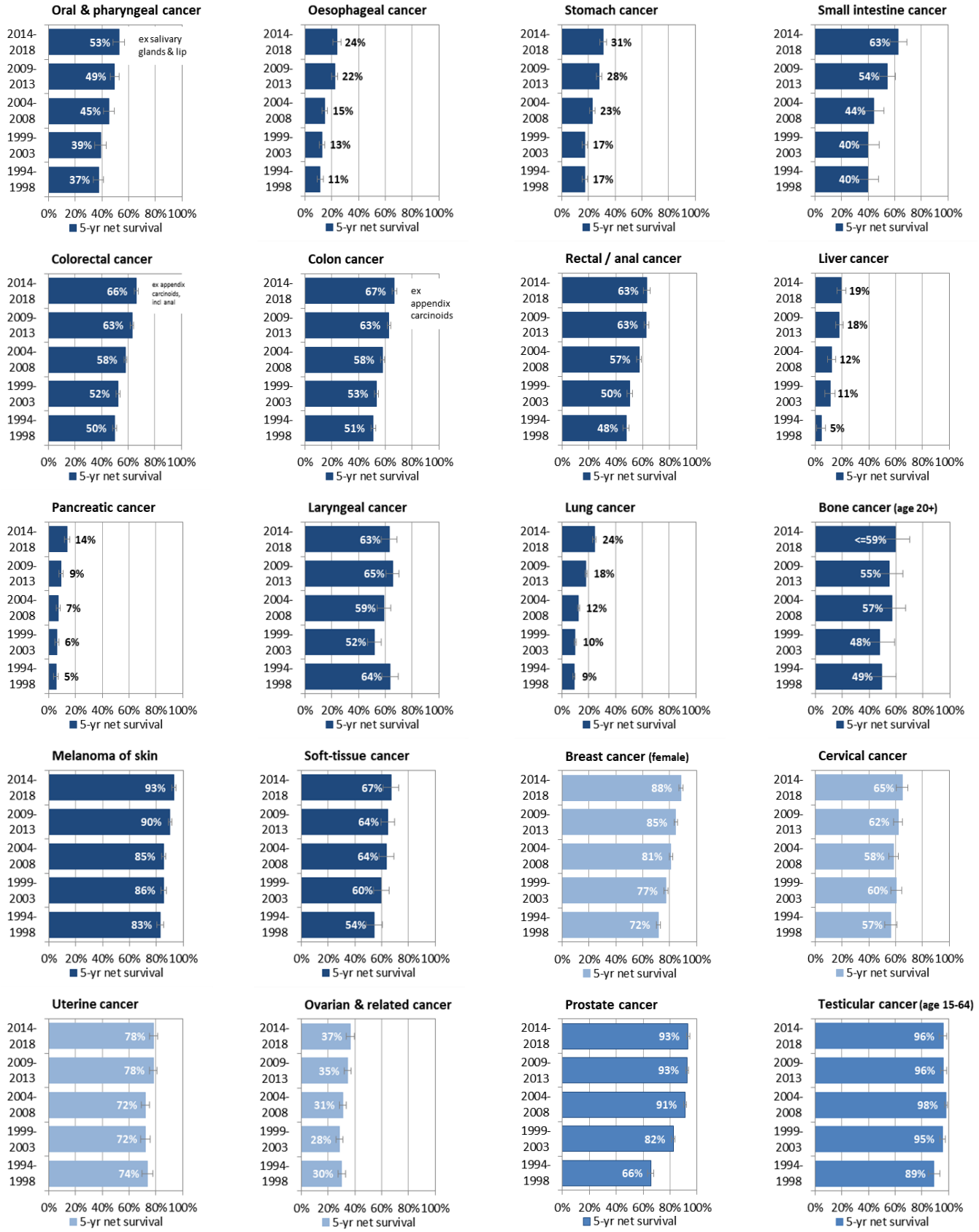
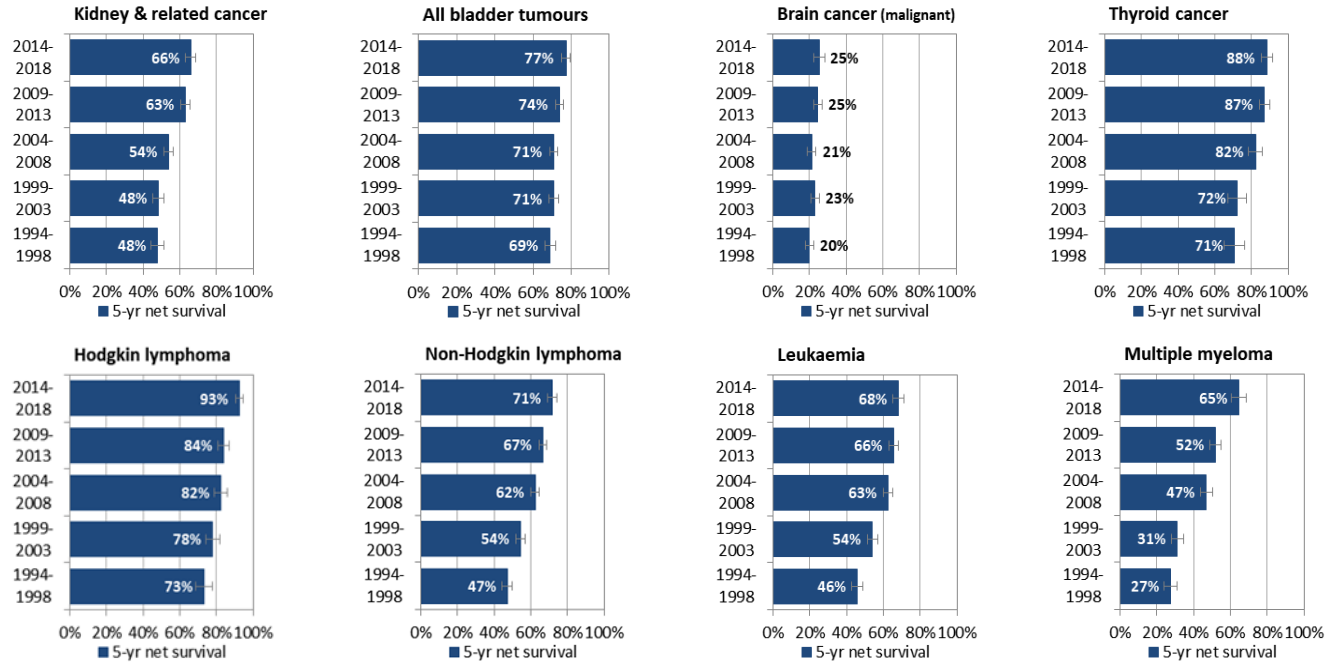


FIGURE 5-2
AGE-STANDARDISED 5-YEAR NET SURVIVAL OF CANCER PATIENTS IN IRELAND, BY DIAGNOSIS PERIOD AND CANCER TYPE

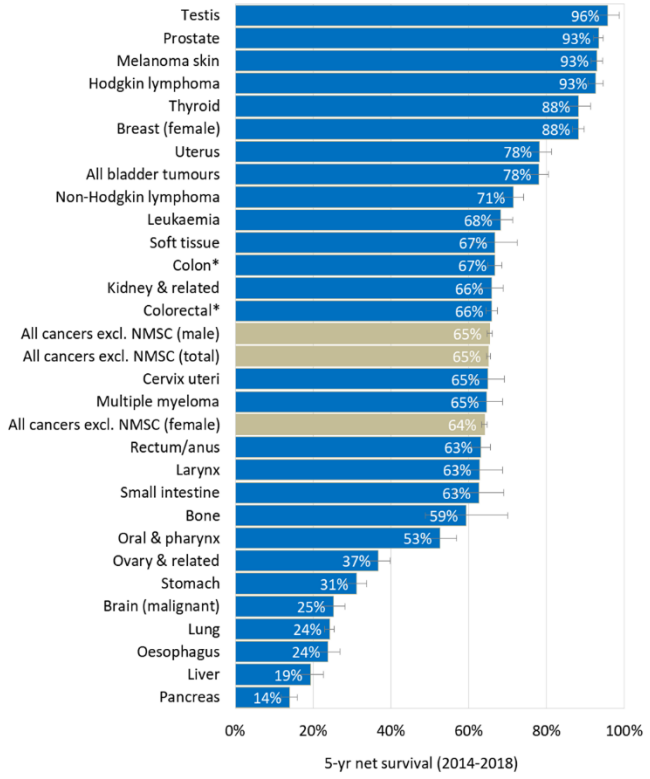


‡Survival for all ages 15-99 (15-64 for testicular cancer, 20-99 for bone cancer) is standardised to the standard populations recommended by Corazziari et al. (2004) [10]. 95% confidence intervals are shown.

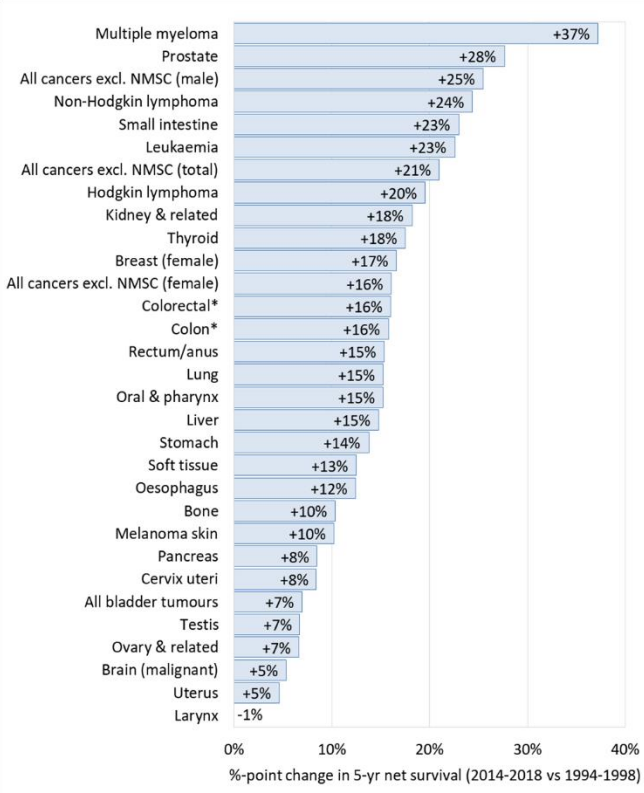
*Colon & colorectal cancer survival excludes carcinoids of the appendix.

FIGURE 5-3
RANKING OF CANCERS IN IRELAND BY FIVE-YEAR NET SURVIVAL

(A) Age-standardised 5-year net survival, 2014-2018 diagnosis period



(B) Change in 5-year net survival: 1994-1998 to 2014-2018



*survival figures for colorectal and colon cancer exclude carcinoid tumours of appendix

- Five-year net survival of patients diagnosed during 2014-2018 varied widely by cancer type, from only 14% for pancreatic cancer, 19% for liver, 24% for oesophageal and lung cancers, and 25% for brain cancer, to 88% for thyroid and female breast cancer, 93% for melanoma, Hodgkin lymphoma and prostate cancer and 96% for testicular cancer (Figure 5-3A).
- Improvements in average five-year net survival, expressed as absolute (percentage-point) gains comparing diagnosis period 1994-1998 with 2014-2018, were highest for multiple myeloma (+37 % points), prostate cancer (+28%), non-Hodgkin lymphoma (+24%), small intestinal cancer (+23%) leukaemia (+23%); and lowest for laryngeal (-1%), uterine (+5%), brain (+5%), ovarian and related cancers (+7%) and testicular cancers (+7%) and bladder tumours (+7%) (Figure 5-3B).
- Absolute changes in survival since 1994-1998 do not convey the full picture, however, as modest percentage-point improvements for high-fatality cancers may also represent substantial improvements in relative terms: most notably, more than a doubling of survival seen for cancers of the oesophagus (from 11% to 24%), pancreas (from 5% to 14%), liver (from 5% to 19%) and lung (from 9% to 24%) (Figure 5-2).

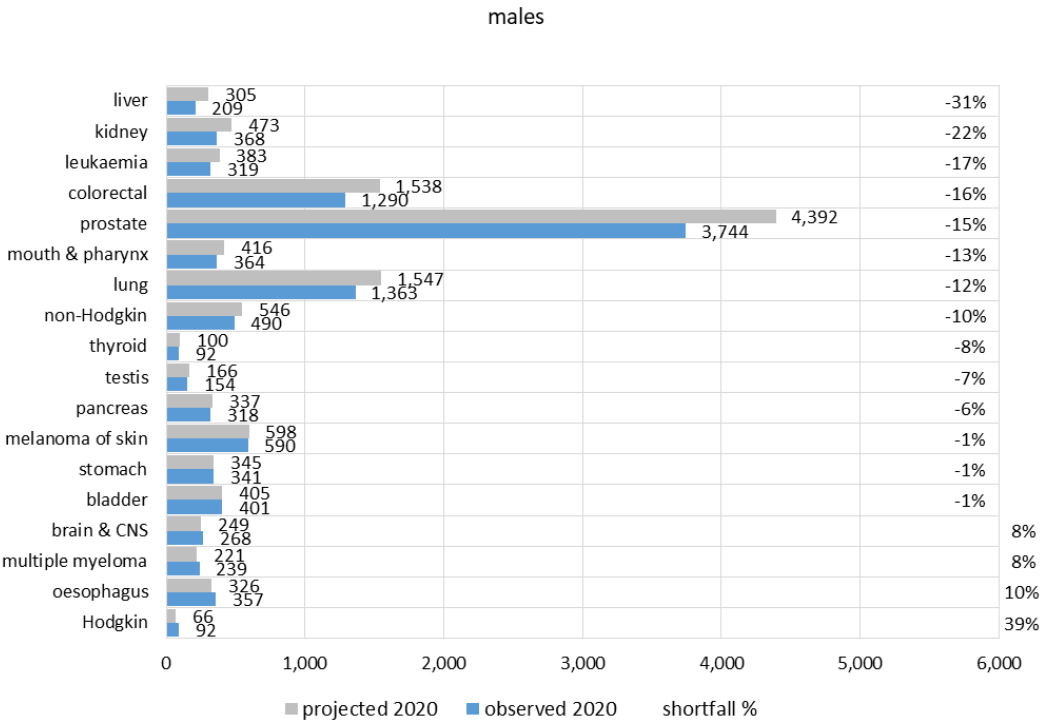
COVID-19 IMPACTS ON CANCER CASE NUMBERS DIAGNOSED IN 2020

All registered cases

To assess the impact of COVID-19 on numbers of cancers diagnosed in Ireland in 2020, the most recent stable trend for number of cases per year over the period 1994-2019 was projected to 2020 using Joinpoint regression [12]. The projected numbers therefore represent expected numbers of cancers diagnosed in 2020 if the COVID-19 pandemic had not occurred. 95% prediction intervals were calculated over the most recent stable trend and projected numbers were compared to observed numbers of cancers diagnosed in 2020 (Appendix VI).

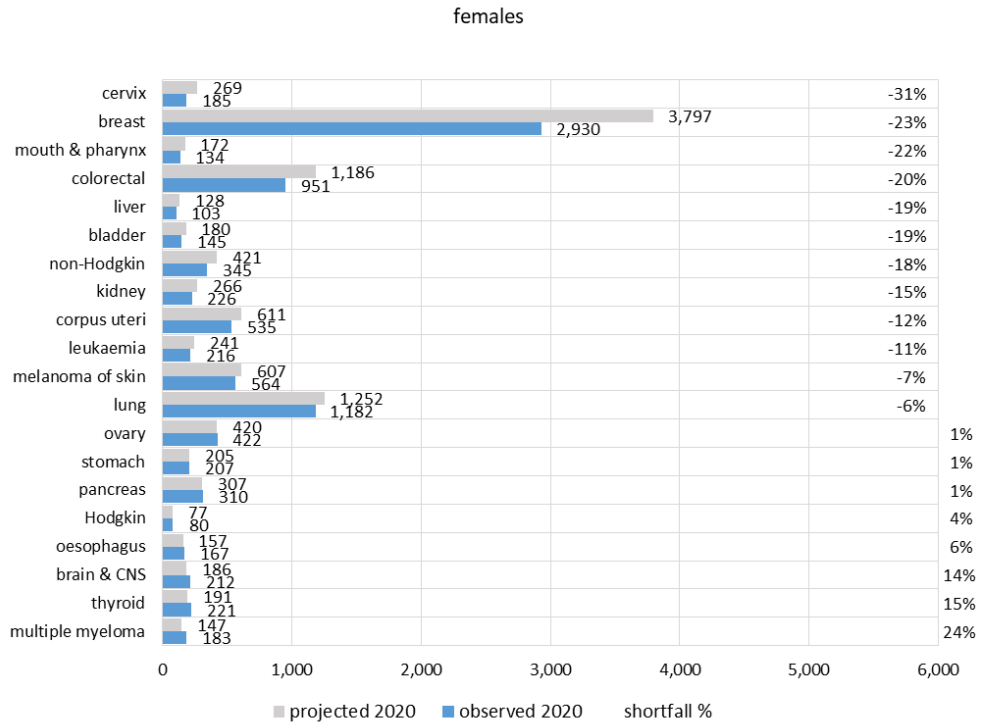
For cancers as a whole, and most specific cancer types, numbers of cases registered for 2020, up to October 2022, fall below the lower limit of the prediction interval (Appendix VI). Overall, 90% of the cases that were projected for 2020 have been registered to date (90% respectively for males and females). This is equivalent to 92% of the numbers registered for 2019 (93% for males, 91% for females) (Appendix VI). The largest shortfalls in cancer affecting both sexes (combined) were observed in liver (-28%), kidney (-20%) and colorectal (-18%) cancers. In females, the largest shortfalls were in cervical (-31%), breast (-23%), and mouth and pharynx (-22%) cancers. In males, the largest shortfalls were in liver cancer (-31%), kidney cancer (-22%) and leukaemia (-17%) (Figure 6-1).

FIGURE 6-1
GRAPHICAL DISPLAY OF OBSERVED (REGISTERED) CASE COUNT IN *VS.* PROJECTED CASE COUNT FOR 2020: SORTED ON PERCENTAGE SHORTFALL

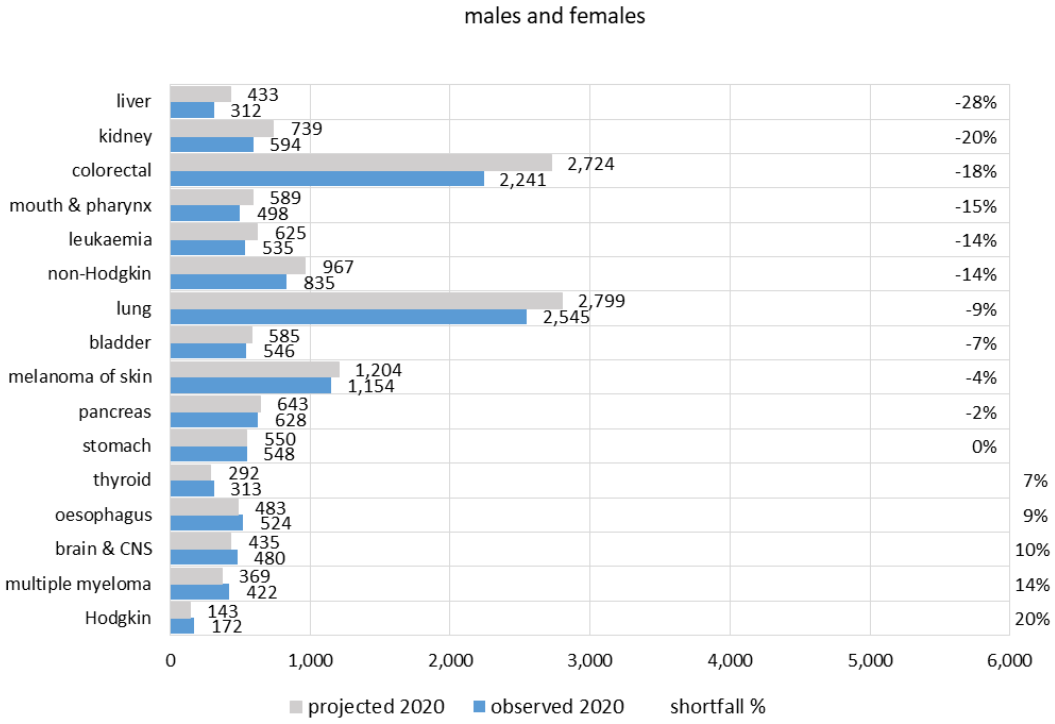


- In males, in 2020, 4,392 prostate cancer cases were projected, compared with 3,744 registered (15% shortfall).
- 1,538 male cases of colorectal (bowel) cancer were projected, compared with 1,290 registered (16% shortfall).
- 1,547 male cases of lung cancer were projected, compared with 1,363 registered (12% shortfall).
- Column of percentages on the right represent the % change in number of registered cases relative to projected cases for 2020.

FIGURE 6-1
GRAPHICAL DISPLAY OF OBSERVED (REGISTERED) CASE COUNT IN *VS.* PROJECTED CASE COUNT FOR 2020: SORTED ON PERCENTAGE SHORTFALL



- In females, in 2020, 3,797 cases of breast cancer were projected, compared with 2,930 registered (23% shortfall).
- 1,186 female cases of bowel cancer were projected, compared with 951 registered (20% shortfall)
- 1,252 female cases of lung cancer were projected, compared with 1,182 registered (6% shortfall).
- Column of percentages on the right represent the % change in number of registered cases relative to projected cases for 2020.

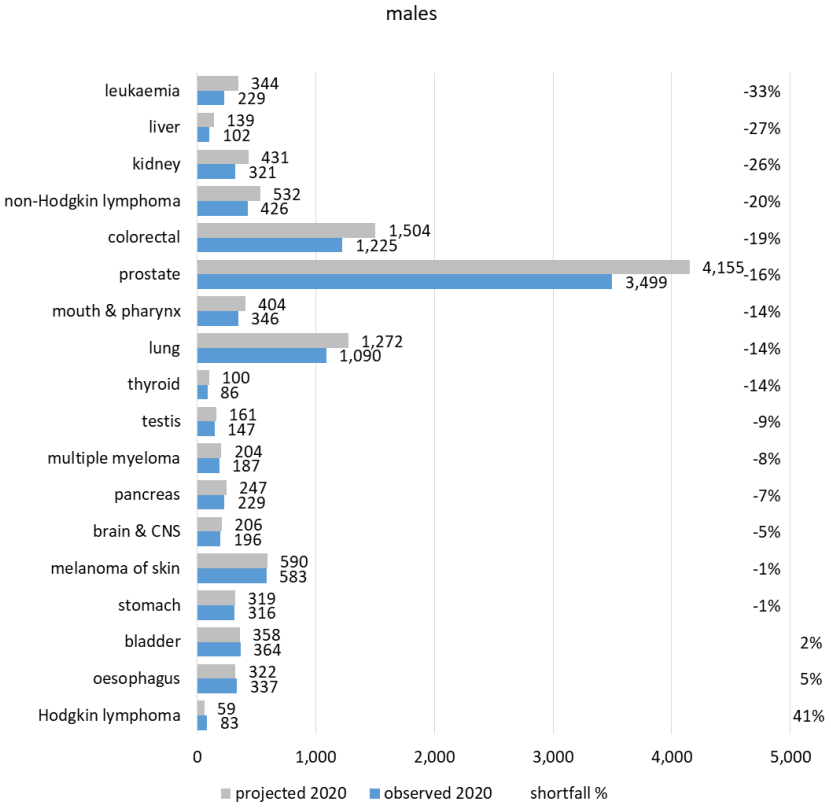


- Overall in 2020, 2,724 cases of bowel cancer were projected, compared with 2,241 registered (18% shortfall)
- 2,799 cases of lung cancer were projected, compared with 2,545 registered (9% shortfall).
- 550 cases of stomach cancer were projected, compared with 548 registered (0% or negligible shortfall).

Subset analysis: cases with microscopically-verified cancers

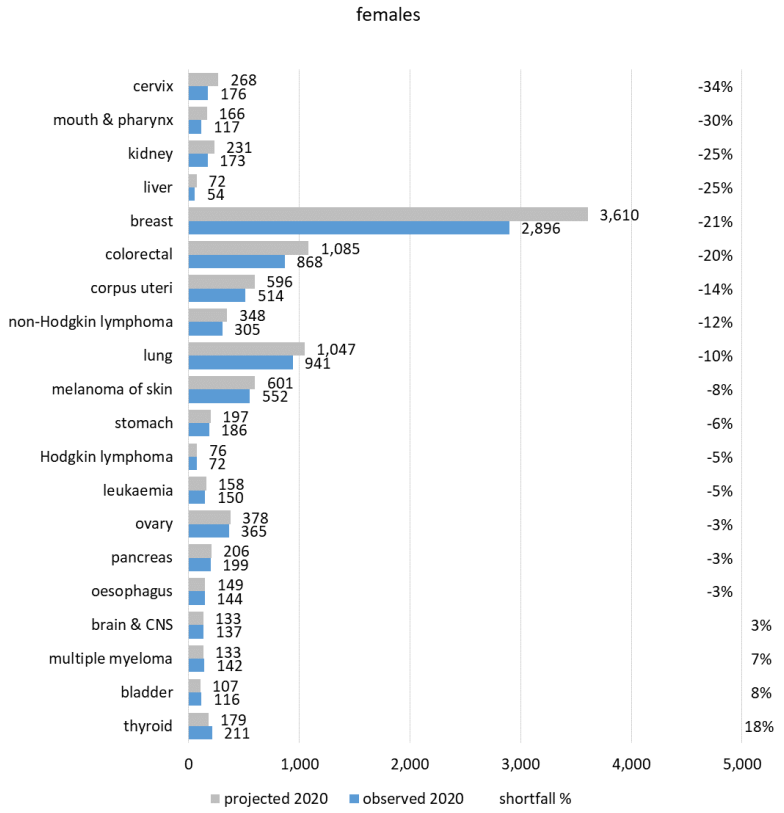
An additional, related analysis compared the observed numbers of microscopically-verified cancers diagnosed in 2020 to projected numbers of microscopically-verified cancers (Figure 6-2), using the same methodology described above. An overall shortfall of 11% was observed for microscopically verified cancers in 2020 (9% for males and 13% for females) (Appendix VII). A similar estimate of 10-13% for the reduction in microscopically verified cancers diagnosed in 2020 was reported last year in an analysis of NCRI data [14]. Of the cancers affecting both sexes, liver cancers (-26%), leukaemia (-25%) and kidney cancers (-25%) had the largest total shortfall in microscopically-verified cancer cases from projected numbers. In females, the largest shortfalls in microscopically-verified cancer cases were in cervical (-34%) and mouth and pharynx (-30%) cancers. Based on numbers of microscopically-verified cases, numbers of breast cancers in females were 21% lower than projected. In men, similarly to overall cancer cases, the largest shortfalls in microscopically-verified cancer cases were observed in leukaemia (-33%), liver (-27%) and kidney cancers (-26%) (Figure 6-2).

FIGURE 6-2
GRAPHICAL DISPLAY OF OBSERVED (REGISTERED) MICROSCOPICALLY VERIFIED CASE COUNT *VS.* PROJECTED CASE COUNT FOR 2020: SORTED ON PERCENTAGE SHORTFALL

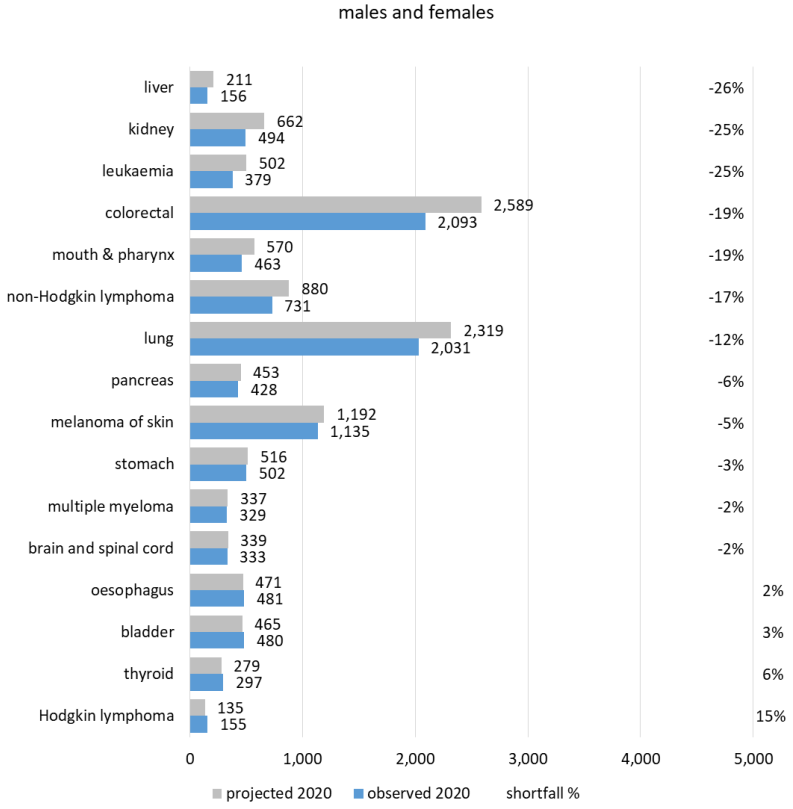


- In males, in 2020, 4,155 prostate cancer cases were projected, compared with 3,499 registered (16% shortfall).
- Column of percentages on the right represent the % change in number of registered cases relative to projected cases for 2020.

FIGURE 6-2
GRAPHICAL DISPLAY OF OBSERVED (REGISTERED) MICROSCOPICALLY VERIFIED CASE COUNT *VS.* PROJECTED CASE COUNT FOR 2020: SORTED ON PERCENTAGE SHORTFALL



- In females, in 2020, 3,610 cases of breast cancer were projected, compared with 2,896 registered (21% shortfall).



- Overall in 2020, 2,589 cases of bowel cancer were projected, compared with 2,093 registered (19% shortfall)

Conclusion: COVID-19 impact on 2020 case numbers

The overall shortfall of 10% in registered cancer cases for 2020, coupled with the shortfall of 11% in microscopically verified cases, indicate a reduction in cancer diagnoses during 2020 in the region of 10-11%. There is still a possibility that the true shortfall may be slightly higher (if some preliminary case-registrations for 2020 prove not to be new cases after further validation). This reduction in cancer diagnoses is likely a result of pandemic-related impacts on health-seeking behaviour among the public and disruptions to cancer control services [15]. Further work is underway to investigate the impact of COVID-19 on numbers of cancers diagnosed in 2021 and across the cancer care pathway in Ireland.

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APPENDIX I: INCIDENT CANCER CASES

3-year annual average 2018-2020: cases, risk of developing cancer before 75th birthday and lifetime risk

	case count			risk # to age 75 1 in …		lifetime risk # 1 in …	
cancer	males	females	all †	males	females	males	females
C00-96 all invasive cancers *	19,632	16,193	35,825				
C00-43 C45-96 all invasive cancers excl. NMSC	13,027	11,299	24,327	3	4	2	2
C00-D48 all registered neoplasms	22,099	21,371	43,470				
D00-48 all non-invasive neoplasms **	2,467	5,178	7,645				
C00 lip	19	6	24	2,081	6,995	1,219	3,473
C01 base of tongue	31	10	42	1,014	2,894	825	2,561
C02 other and unspecified parts of tongue	66	33	99	527	1,242	364	673
C03 gum	12	8	20	3,463	5,342	1,870	2,507
C04 floor of mouth	29	13	42	1,095	2,772	931	1,789
C05 palate	17	9	26	2,106	3,176	1,452	2,763
C06 other and unspecified parts of mouth	25	20	45	1,272	2,205	945	1,001
C07 parotid gland	34	16	51	1,397	2,640	565	1,437
C08 other and unspecified major salivary glands	7	6	13	6,612	6,865	2,965	3,296
C09 tonsil	70	19	88	445	1,817	394	1,344
C10 oropharynx ***	22	8	30	1,436	3,714	1,136	3,463
C11 nasopharynx	14	5	19	2,707	5,607	1,975	5,607
C12 pyriform sinus	15	3	18	2,112	10,796	1,640	6,234
C13 hypopharynx	21	5	26	1,874	6,491	1,085	4,336
C14 other and ill-defined sites in the lip, oral cavity and pharynx	12	5	18	2,699	6,295	1,849	4,228
C01-14 mouth & pharynx	375	161	536	94	236	67	147
C00-14 lip oral cavity and pharynx	394	166	560	90	229	63	141
C15 oesophagus	342	173	515	111	288	63	106
C16 stomach	348	209	557	129	242	58	94
C17 small intestine	67	55	122	516	716	343	382
C18 colon	934	784	1,719	48	60	22	25
C19 rectosigmoid junction	93	65	158	420	690	234	297
C20 rectum	440	246	686	89	159	49	89
C21 anus	30	51	81	1,248	749	783	451
C19-20 rectosigmoid junction and rectum	533	311	844	73	129	41	68
C19-21 rectum and anus	563	362	925	70	110	39	59
C18-20 colorectum	1,467	1,095	2,562	29	41	14	19
C18-21 colorectum and anus	1,497	1,146	2,643	29	39	14	18
C17-21 intestine	1,564	1,202	2,766	27	37	14	17
C22 liver and intrahepatic bile ducts	236	109	344	174	451	87	176
C23 gallbladder	16	44	60	2,256	1,275	1,280	413
C24 other and unspecified parts of biliary tract	109	93	201	395	497	186	204
C23-24 gallbladder and biliary tract	125	136	261	336	358	163	137
C22-24 liver gall bladder and biliary	360	245	605	115	200	57	77
C25 pancreas	313	311	624	138	163	64	60
C26 other and ill-defined digestive organs	48	37	85	1,019	1,367	395	520
C30 nasal cavity and middle ear	13	8	22	3,169	5,369	1,690	2,437
C31 accessory sinuses	7	4	11	5,124	14,301	3,523	4,513
C32 larynx	159	34	193	217	1,031	145	686
C00-14 C30-32 all head and neck	573	213	786	63	180	43	109
C00-15 C32 lip oral pharynx larynx oesophagus	895	373	1,268	41	115	26	56
C33 trachea	2	2	3	17,972	29,195	17,972	13,445
C34 bronchus and lung	1,456	1,213	2,668	29	34	14	17
C33-34 lung and trachea	1,457	1,214	2,672	29	34	14	17
C37 thymus	6	4	10	6,269	8,493	4,633	6,354
C38 heart, mediastinum and pleura	8	7	15	6,725	7,465	2,223	3,160
C39 other and ill-defined respiratory and intrathoracic	1	1	1	64,744	43,576	64,744	43,576
C40 bone and articular cartilage of limbs	13	10	23	2,864	3,328	2,149	2,915
C41 bone and articular cartilage of other and unspecified	24	14	38	1,587	2,403	1,024	1,795
C40-41 bone and articular and unspecified	13	10	23	2,864	3,328	2,149	2,915
C43 melanoma of skin	584	586	1,170	72	69	37	39
C44 other skin	6,605	4,894	11,498	8	10	4	5
C45 mesothelioma	34	10	44	1,962	3,912	533	1,949
C46 Kaposi sarcoma	8	0	8	3,810		3,810	
C47 peripheral nerves and autonomic nervous system	3	2	5	11,942	19,185	9,858	13,412
C48 retroperitoneum and peritoneum	14	24	37	3,342	2,025	1,542	841
C49 other connective and soft tissue	112	78	190	406	502	192	308
C50 breast	29	3,363	3,392	1,331	11	710	7
C51 vulva		72	72		670		288
C52 vagina		17	17		2,360		1,365
C53 cervix uteri (adenocarcinoma)		53	53		661		567
C53 cervix uteri (squamous cell carcinoma)		185	185		188		164
C53 cervix uteri (all morphologies)		253	253		139		119
C54 corpus uteri		538	538		64		44

3-year annual average 2018-2020: cases, risk of developing cancer before 75th birthday and lifetime risk

	case count			risk # to age 75 1 in …		lifetime risk # 1 in …	
cancer	males	females	all †	males	females	males	females
C55 uterus, part unspecified		41	41		920		563
C56 ovary		401	401		95		57
C57 other and unspecified female genital organs		89	89		425		238
C58 placenta		3	3		13,263		13,263
C51-52 C55 C57 C58 other malignant gynaecological neoplasms		222	222		185		98
C60 penis	48		48	866		450	
C61 prostate	3,941		3,941	8		6	
C62 testis	162		162	213		206	
C63 other and unspecified male genital organs	8		8	5,517		3,115	
C64 kidney, except renal pelvis	424	243	667	88	159	55	91
C65 renal pelvis	17	12	28	2,878	4,023	1,147	1,641
C66 ureter	20	13	33	2,888	2,982	908	1,544
C64-66 kidney incl. renal pelvis and ureter	461	267	728	83	146	50	81
C67 bladder	374	149	523	137	365	50	124
C68 other and unspecified urinary organs	11	5	17	3,872	10,160	1,673	3,691
C69 eye and adnexa	38	21	58	906	1,621	691	1,228
C70 meninges	5	9	14	7,116	4,789	4,869	2,323
C71 brain	250	194	445	144	197	98	119
C72 spinal cord, cranial nerves and other parts of CNS	11	8	20	2,898	4,543	2,452	3,163
C71-72 brain and spinal cord	262	203	464	137	190	94	115
C70-72 malignant meninges brain and spinal cord	266	212	478	135	182	92	110
C70-72 D32-33 D42-43 all meninges brain and CNS	387	436	823	94	90	63	54
C73 thyroid gland	84	209	293	400	167	336	139
C74 adrenal gland	13	13	26	2,777	2,587	2,040	2,116
C75 other endocrine glands and related structures	19	13	32	1,918	2,814	1,408	1,826
C76 other and ill-defined sites	23	20	44	1,868	3,278	827	854
C80 neoplasm without specification of site	306	254	559	157	218	62	72
C81 Hodgkin lymphoma	79	70	149	448	534	355	376
C82 follicular nodular non-Hodgkin lymphoma	103	92	195	348	403	240	253
C83 diffuse non-Hodgkin lymphoma	244	164	409	170	252	88	127
C84 peripheral and cutaneous T-cell lymphomas	55	28	83	699	1,406	427	799
C85 other and unspecified types of non-Hodgkin lymphoma	94	74	168	442	635	224	269
C82-85 all non-Hodgkin lymphoma	496	358	854	82	116	45	60
C81-85 lymphoma (total)	576	428	1,003	69	95	40	52
C88 immunoproliferative diseases	13	6	19	3,025	6,611	1,600	3,592
C90 multiple myeloma	226	158	384	185	269	93	127
C88-90 multiple myeloma and immunoproliferative	239	164	403	174	259	88	123
C911 leukaemia CLL	130	73	202	319	519	160	283
C91 lymphoid leukaemia	198	106	304	197	342	115	212
C92 myeloid leukaemia	135	88	222	307	491	161	248
C93 monocytic leukaemia	2	1	3	15,149	33,855	9,236	18,032
C94 other leukaemias of specified cell type	4	2	7	7,262	20,369	6,391	8,171
C95 leukaemia of unspecified cell type	25	22	47	2,270	3,334	676	763
C91-95 leukaemia	364	219	583	112	189	60	98
C96 other and unspecified lymphoid haematopoietic	253	210	463	185	211	80	98
C910 acute lymphoblastic leukaemia (ALL)	41	23	65	831	1,388	738	1,299
C911 chronic lymphocytic leukaemia (CLL)	130	73	202	319	519	160	283
C920 acute myeloblastic leukaemia (AML)	81	56	138	518	766	258	376
C921 chronic myeloid leukaemia (CML)	41	22	63	1,027	1,881	539	1,018
D00 carcinoma in situ of oral cavity, oesophagus and stomach	14	21	35				
D01 carcinoma in situ of other and unspecified digestive organs	13	13	25				
D02 carcinoma in situ of middle ear and respiratory system	25	13	37				
D03 melanoma in situ	399	423	822				
D04 carcinoma in situ of skin	1,038	1,180	2,218				
D05 carcinoma in situ of breast	1	366	367				
D06 carcinoma in situ of cervix uteri		2,239	2,239				
D07 carcinoma in situ of other and unspecified genital organs	75	58	132				
D09 carcinoma in situ of other and unspecified sites	158	48	206				
D32 benign meninges	48	141	189				
D33 benign brain and other parts of CNS	28	35	64				
D32-33 benign meninges, brain & CNS	77	176	253				
D35 benign other and unspecified endocrine glands	57	57	114				
D37 uncertain or unknown of oral cavity and digestive organs	63	75	137				
D38 uncertain or unknown of middle ear and respiratory intrathoracic	14	11	26				
D39 uncertain or unknown of female genital organs		100	100				
D40 uncertain or unknown of male genital organs	7		7				
D41 uncertain or unknown of urinary organs	193	75	269				
D42 uncertain or unknown of meninges	11	19	30				
D43 uncertain or unknown of brain and CNS	33	29	62				
D42-43 uncertain meninges, brain & CNS	44	48	92				
D44 uncertain or unknown of endocrine glands	21	45	66				

3-year annual average 2018-2020: cases, risk of developing cancer before 75th birthday and lifetime risk

	case count			risk # to age 75 1 in …		lifetime risk # 1 in …	
cancer	males	females	all †	males	females	males	females
D47 other uncertain or unknown of lymphoid and haematopoietic	77	69	145				
D48 uncertain or unknown of other and unspecified sites	189	161	350				
HAEMACARE HAEMATOPOIETIC CANCER CATEGORIES							
H01 lymphoma NOS	33	27	61	1,323	1,653	626	741
H02 non-Hodgkin lymphoma NOS	59	45	103	698	1,089	360	436
H03 composite Hodgkin and Non-Hodgkin	1	1	1	45,932	62,242	45,932	62,242
H04 Hodgkin lymphoma nodular lymphocyte predominance	8	1	9	4,087	25,143	3,754	25,143
H05 classical Hodgkin lymphoma	72	69	140	504	545	393	381
H06 chronic lymphocytic leukaemia/small lymphocytic lymphoma	138	76	214	301	503	149	272
H07 immunoproliferative diseases	21	12	33	2,044	3,832	936	1,700
H08 mantle cell/centrocytic lymphoma	34	9	43	1,249	4,317	623	2,263
H09 follicular B-cell lymphoma	82	72	154	439	500	302	324
H10 diffuse B-cell lymphoma	178	141	318	234	294	120	148
H11 Burkitt lymphoma	14	4	17	2,731	9,254	2,061	6,537
H12 marginal zone lymphoma	23	23	45	1,523	1,750	1,070	1,018
H13 T-cell lymphoma cutaneous	22	10	32	1,689	3,508	1,049	2,165
H14 other T cell lymphomas	39	22	61	995	1,773	610	1,027
H15 lymphoblastic lymphoma/acute precursor cell lymphatic lymphoma	42	24	66	802	1,340	727	1,257
H16 plasma cell neoplasms	229	159	388	182	269	92	126
H18 mature B-cell leukaemia, hairy cell	18	3	22	1,875	11,538	1,460	7,740
H19 lymphatic leukaemia NOS	3	2	5	18,610	26,294	8,114	12,530
H20 leukaemia NOS	25	22	47	2,270	3,334	676	763
H21 myeloid leukaemia NOS	3	3	6	13,420	18,706	6,713	6,357
H22 acute myeloid leukaemia	97	66	164	411	648	223	324
H23 myeloproliferative neoplasms	154	145	299	251	269	153	157
H24 myelodysplastic syndrome	119	75	193	533	817	147	235
H25 myelodysplastic, myeloproliferative neoplasm	16	7	23	2,878	6,255	1,157	2,696

*Incidence figures for C00-C96 where C96 presented in this report include polycythaemia vera, myelodysplastic syndromes and chronic myeloproliferative disease, considered malignant in ICDO3 but previously classed as uncertain behaviour (and previously coded under ICD10 codes D45-D47).

** D00-D48 tumours in this report exclude polycythaemia vera, myelodysplastic syndromes and chronic myeloproliferative disease (see note above).

*** The ICD-10 definition C10 “Malignant neoplasm of oropharynx” is not equivalent to (and is narrower than) the definition of “oropharyngeal” used to categorise sites/subsites for purposes of identifying cancers where HPV-associated cancers may be involved. The broader, HPV-relevant definition includes the whole of C01 (base of tongue), C09 (tonsil) and C10 (oropharynx *sensu stricto*) and selected subsites within C02 (other/unspecified parts of tongue), C05 (palate) and C14 (other/ill-defined sites of lip, oral cavity & pharynx), further characterized by cell-type (squamous cell carcinoma).

† 3-year annual averages: male and female totals are subject to rounding.

Cumulative risk of developing cancer was calculated using the current probability method [2], [3]. The lifetime risk (and risk to age 75) probabilities in this report were obtained by applying the cancer incidence and the all-cause mortality rates at different ages in a particular year as if they were to apply to a cohort as they aged. Calculating the lifetime risk for an actual cohort requires an estimate of incidence and mortality for the whole lifetime of individuals in a birth cohort using age-period-cohort modelling [16]. The risk figures (e.g. 1 in 10) presented here should be viewed as approximations; they assume that age-specific cancer rates and all-cause mortality rates were stable over the short-term (which may not be the case over the long-term).

APPENDIX II: INCIDENT CANCER RATES

Age-standardised rate (ASR, per 100,000): annual average for 2018-2020. Incidence rate was calculated using two different age weights: 1976 and 2013 European standard populations (ESP).

Age-standardisation is one of the key methods to control for different age distributions among populations or over time. When comparing cancer incidence or mortality patterns between countries, regions or periods, variation in age and sex distribution can be misleading when looking at crude rates or case counts, and age-standardisation is recommended. The European population is ageing and Eurostat projections from 2008 to 2060 suggest that the age distribution will show a progressive shift to the older ages; the share of the population aged 65 and over is expected to increase in all countries and in particular the population aged 80 and over [4]. A task force for the revision of European Standard Population (ESP) (first published in 1976) recommended a more appropriate ESP for dissemination of public health statistics in the EU27, i.e. the '2013 ESP' [4]. Prior to this year's annual statistical report the NCRI routinely quoted cancer incidence and mortality rates using the 1976 ESP age weights in the main body of text, while quoting equivalent figures weighted by the 2013 ESP in appendices. This year, the situation is reversed. For the first time, we quote rates adjusted using the 2013 ESP age weights in the main text while still retaining equivalent figures using the 1976 ESP in the appendices for continuity.

AGE-STANDARDISED INCIDENCE RATE (ASR, PER 100,000): ANNUAL AVERAGE FOR 2018-2020

	ESP 1976			ESP 2013		
	male	female	all	male	female	all
C00-96 all invasive cancers	707.1	543.3	619.9	1,097.0	789.9	931.9
C00-43 C45-96 all invasive cancers excl. NMSC	473.6	385.7	427.0	715.5	546.0	625.0
C00-C96, D00-D48 all registered neoplasms	795.3	738.1	761.7	1,234.7	1,019.9	1,115.7
D00-48 all non-invasive neoplasms	88.2	194.8	141.8	137.7	230.1	183.8
C00 lip	0.7	0.2	0.4	1.0	0.3	0.6
C01 base of tongue	1.2	0.4	0.8	1.6	0.5	1.0
C02 other and unspecified parts of tongue	2.5	1.1	1.8	3.4	1.6	2.5
C03 gum	0.4	0.2	0.3	0.7	0.4	0.5
C04 floor of mouth	1.1	0.4	0.8	1.4	0.6	1.0
C05 palate	0.6	0.3	0.5	0.9	0.4	0.6
C06 other and unspecified parts of mouth	1.0	0.6	0.8	1.3	1.0	1.2
C07 parotid gland	1.2	0.6	0.9	2.0	0.8	1.3
C08 other and unspecified major salivary glands	0.2	0.2	0.2	0.4	0.3	0.3
C09 tonsil	2.7	0.7	1.7	3.4	0.9	2.1
C10 oropharynx	0.8	0.3	0.6	1.1	0.4	0.7
C11 nasopharynx	0.5	0.2	0.4	0.7	0.2	0.4
C12 pyriform sinus	0.6	0.1	0.3	0.8	0.2	0.5
C13 hypopharynx	0.8	0.2	0.5	1.1	0.3	0.7
C14 other and ill-defined sites in the lip, oral cavity and pharynx	0.5	0.2	0.3	0.7	0.3	0.5
C01-14 mouth & pharynx	14.2	5.7	9.8	19.4	7.8	13.4
C00-14 lip oral cavity and pharynx	14.8	5.8	10.2	20.4	8.0	14.0
C15 oesophagus	12.4	5.2	8.7	18.9	9.0	13.8
C16 stomach	12.3	6.5	9.3	20.1	10.6	15.0
C17 small intestine	2.5	1.8	2.1	3.6	2.8	3.2
C18 colon	33.2	24.9	28.8	53.7	39.3	45.9
C19 rectosigmoid junction	3.4	2.0	2.7	5.1	3.2	4.2
C20 rectum	16.0	8.4	12.0	24.2	12.0	17.7
C21 anus	1.1	1.8	1.4	1.6	2.4	2.0
C19-20 rectosigmoid junction and rectum	19.4	10.4	14.7	29.3	15.2	21.9
C19-21 rectum and anus	20.5	12.2	16.2	30.9	17.6	23.9
C18-20 colorectum	52.6	35.3	43.5	83.0	54.5	67.8
C18-21 colorectum and anus	53.7	37.1	45.0	84.5	56.9	69.9
C17-21 intestine	56.2	38.9	47.1	88.1	59.7	73.0
C22 liver and intrahepatic bile ducts	8.3	3.4	5.7	13.4	5.5	9.2
C23 gallbladder	0.6	1.3	1.0	0.9	2.2	1.7
C24 other and unspecified parts of biliary tract	3.8	2.8	3.3	6.2	4.7	5.4
C23-24 gallbladder and biliary tract	4.4	4.1	4.3	7.2	6.9	7.1
C22-24 liver gall bladder and biliary	12.8	7.5	10.0	20.5	12.4	16.3
C25 pancreas	11.0	9.4	10.2	18.0	15.8	17.0
C26 other and ill-defined digestive organs	1.7	1.1	1.4	2.9	1.8	2.3
C30 nasal cavity and middle ear	0.5	0.3	0.4	0.7	0.4	0.6
C31 accessory sinuses	0.3	0.1	0.2	0.4	0.2	0.3

AGE-STANDARDISED INCIDENCE RATE (ASR, PER 100,000): ANNUAL AVERAGE FOR 2018-2020

	ESP 1976			ESP 2013		
	male	female	all	male	female	all
C32 larynx	5.8	1.2	3.4	8.5	1.7	4.9
C00-14 C30-32 all head and neck	21.4	7.4	14.2	30.0	10.3	19.8
C00-15 C32 lip oral pharynx larynx oesophagus	33.1	12.3	22.4	47.8	18.6	32.7
C33 trachea	0.1	0.1	0.1	0.1	0.1	0.1
C34 bronchus and lung	51.2	39.2	44.7	84.3	62.0	72.0
C33-34 lung and trachea	51.3	39.3	44.8	84.4	62.0	72.1
C37 thymus	0.2	0.2	0.2	0.3	0.2	0.2
C38 heart, mediastinum and pleura	0.3	0.2	0.3	0.5	0.3	0.4
C40 bone and articular cartilage of limbs	0.5	0.4	0.4	0.6	0.4	0.5
C41 bone and articular cartilage of other and unspecified	0.9	0.5	0.7	1.2	0.6	0.9
C40-41 bone and articular and unspecified	0.5	0.4	0.4	0.6	0.4	0.5
C43 melanoma of skin	21.3	20.3	20.6	32.1	27.6	29.4
C44 other skin	233.5	157.5	192.9	381.5	243.9	306.9
C45 mesothelioma	1.1	0.3	0.7	2.1	0.5	1.2
C46 Kaposi sarcoma	0.3	-	0.2	0.4	-	0.2
C47 peripheral nerves and autonomic nervous system	0.1	0.1	0.1	0.1	0.1	0.1
C48 retroperitoneum and peritoneum	0.5	0.8	0.6	0.8	1.2	1.0
C49 other connective and soft tissue	4.1	2.8	3.4	6.1	3.6	4.7
C50 breast	1.1	121.1	62.6	1.7	157.2	82.3
C51 vulva		2.3	1.2		3.5	1.9
C52 vagina		0.6	0.3		0.8	0.4
C53 cervix (adenocarcinoma)		2.1	1.0		2.2	1.1
C53 cervix (squamous cell carcinoma)		7.1	3.6		7.8	4.0
C53 cervix (all morphologies)		9.7	5.0		10.7	5.5
C54 corpus uteri		19.1	9.8		26.2	13.6
C55 uterus, part unspecified		1.4	0.7		2.0	1.0
C56 ovary		14.0	7.2		19.3	10.0
C57 other and unspecified female genital organs		2.9	1.5		4.4	2.3
C58 placenta		0.1	0.1		0.1	0.1
C51-52 C55 C57 C58 other malignant gynae neoplasms		7.4	3.8		10.8	5.7
C60 penis	1.7		0.8	2.6		1.3
C61 prostate	145.2		70.6	211.4		101.8
C62 testis	6.7		3.3	6.5		3.2
C63 other and unspecified male genital organs	0.3		0.1	0.4		0.2
C64 kidney, except renal pelvis	15.8	8.3	11.9	22.4	11.8	16.9
C65 renal pelvis	0.6	0.4	0.5	1.0	0.6	0.8
C66 ureter	0.7	0.4	0.5	1.2	0.7	0.9
C64-66 kidney incl. renal pelvis and ureter	17.1	9.1	12.9	24.7	13.1	18.6
C67 bladder	12.8	4.5	8.4	22.7	7.6	14.5
C68 other and unspecified urinary organs	0.4	0.2	0.3	0.7	0.3	0.5
C69 eye and adnexa	1.5	0.8	1.1	1.8	0.9	1.4
C70 meninges	0.2	0.3	0.3	0.3	0.4	0.3
C71 brain	9.6	6.9	8.2	12.7	9.1	10.8
C72 spinal cord, cranial nerves and other parts of CNS	0.4	0.3	0.4	0.5	0.4	0.4
C71-72 brain and spinal cord	10.0	7.2	8.6	13.2	9.4	11.2
C70-72 malignant meninges brain and spinal cord	10.2	7.5	8.8	13.5	9.9	11.6
C70-72 D32-33 D42-43 all meninges brain and CNS	14.8	15.5	15.1	19.4	20.2	19.8
C73 thyroid gland	3.2	8.1	5.7	3.9	9.0	6.5
C74 adrenal gland	0.6	0.5	0.5	0.6	0.6	0.6
C75 other endocrine glands and related structures	0.7	0.5	0.6	0.9	0.6	0.7
C76 other and ill-defined sites	0.8	0.6	0.7	1.4	1.0	1.2
C80 neoplasm without specification of site	10.6	7.6	9.0	18.3	12.8	15.3
C81 Hodgkin lymphoma	3.2	2.7	2.9	3.5	3.0	3.3
C82 follicular nodular non-Hodgkin lymphoma	3.9	3.2	3.5	5.2	4.5	4.8
C83 diffuse non-Hodgkin lymphoma	8.7	5.4	7.0	13.4	8.2	10.7
C84 peripheral and cutaneous T-cell lymphomas	2.1	1.0	1.5	2.8	1.3	2.0
C85 other and unspecified types of non-Hodgkin lymphoma	3.4	2.3	2.8	5.2	3.7	4.4
C82-85 all non-Hodgkin lymphoma	18.0	11.9	14.8	26.6	17.7	22.0
C81-85 lymphoma (total)	21.2	14.6	17.8	30.1	20.8	25.2
C88 immunoproliferative diseases	0.5	0.2	0.3	0.7	0.3	0.5
C90 multiple myeloma	8.1	5.1	6.5	12.7	8.0	10.2
C88-90 multiple myeloma and immunoproliferative	8.5	5.3	6.8	13.4	8.3	10.7
C911 leukaemia CLL	4.7	2.4	3.4	7.4	3.7	5.4
C91 lymphoid leukaemia	7.5	3.8	5.5	10.3	5.0	7.5
C92 myeloid leukaemia	4.9	2.9	3.9	7.3	4.2	5.6
C93 monocytic leukaemia	0.1	-	0.1	0.1	-	0.1
C94 other leukaemias of specified cell type	0.2	0.1	0.1	0.2	0.1	0.2
C95 leukaemia of unspecified cell type	0.9	0.6	0.7	1.6	1.1	1.3
C91-95 leukaemia	13.5	7.4	10.3	19.6	10.5	14.7
C96 other and unspecified lymphoid haematopoietic	9.1	6.9	7.9	14.4	10.4	12.2
C910 acute lymphoblastic leukaemia (ALL)	1.8	1.0	1.4	1.5	0.9	1.2
C911 chronic lymphocytic leukaemia (CLL)	4.7	2.4	3.4	7.4	3.7	5.4

AGE-STANDARDISED INCIDENCE RATE (ASR, PER 100,000): ANNUAL AVERAGE FOR 2018-2020

	ESP 1976			ESP 2013		
	male	female	all	male	female	all
C920 acute myeloblastic leukaemia (AML)	3.0	1.9	2.4	4.5	2.7	3.5
C921 chronic myeloid leukaemia (CML)	1.5	0.8	1.1	2.2	1.0	1.6
D00 carcinoma in situ of oral cavity, oesophagus and stomach	0.5	0.7	0.6	0.8	1.0	0.9
D01 carcinoma in situ of other and unspecified digestive organs	0.5	0.4	0.5	0.6	0.6	0.6
D02 carcinoma in situ of middle ear and respiratory system	0.9	0.4	0.6	1.3	0.6	1.0
D03 melanoma in situ	14.6	14.9	14.7	21.6	20.2	20.7
D04 carcinoma in situ of skin	36.0	35.9	36.0	60.6	61.1	60.9
D05 carcinoma in situ of breast	0.1	14.4	7.3	0.1	16.5	8.4
D06 carcinoma in situ of cervix uteri		94.8	48.0		87.6	44.4
D07 carcinoma in situ of other and unspecified genital organs	2.9	2.2	2.5	3.7	2.5	3.1
D09 carcinoma in situ of other and unspecified sites	5.5	1.6	3.5	8.8	2.4	5.4
D32 benign meninges	1.7	4.7	3.3	2.7	6.8	4.8
D33 benign brain and other parts of CNS	1.1	1.4	1.2	1.3	1.5	1.4
D32-33 benign meninges, brain & CNS	2.9	6.1	4.5	4.0	8.3	6.2
D35 benign other and unspecified endocrine glands	2.2	2.2	2.2	2.7	2.5	2.6
D37 uncertain or unknown of oral cavity and digestive organs	2.3	2.6	2.4	3.3	3.5	3.4
D38 uncertain or unknown of middle ear and respiratory intrathoracic	0.5	0.4	0.4	0.8	0.5	0.6
D39 uncertain or unknown of female genital organs		3.9	2.0		4.3	2.2
D40 uncertain or unknown of male genital organs	0.3		0.1	0.3		0.2
D41 uncertain or unknown of urinary organs	6.9	2.5	4.6	11.2	3.8	7.2
D42 uncertain or unknown of meninges	0.4	0.7	0.5	0.6	0.9	0.7
D43 uncertain or unknown of brain and CNS	1.3	1.2	1.2	1.4	1.2	1.3
D42-43 uncertain meninges, brain & CNS	1.7	1.8	1.8	1.9	2.0	2.0
D44 uncertain or unknown of endocrine glands	0.8	1.7	1.3	1.0	1.9	1.5
D47 other uncertain or unknown of lymphoid and haematopoietic	2.7	2.2	2.5	4.4	3.5	3.9
D48 uncertain or unknown of other and unspecified sites	6.8	5.9	6.2	10.3	7.2	8.5
HAEMACARE HAEMATOPOIETIC CANCER CATEGORIES						
H01 lymphoma NOS	1.2	0.9	1.0	1.8	1.4	1.6
H02 non-Hodgkin lymphoma NOS	2.1	1.4	1.7	3.2	2.3	2.7
H03 composite Hodgkin and Non-Hodgkin	-	-	-	-	-	-
H04 Hodgkin lymphoma nodular lymphocyte predominance	0.3	0.1	0.2	0.3	-	0.2
H05 classical Hodgkin lymphoma	2.9	2.6	2.7	3.2	3.0	3.1
H06 chronic lymphocytic leukaemia/small lymphocytic lymphoma	4.9	2.5	3.6	7.9	3.8	5.7
H07 immunoproliferative diseases	0.7	0.4	0.5	1.2	0.6	0.9
H08 mantle cell/centrocytic lymphoma	1.2	0.3	0.7	1.9	0.5	1.1
H09 follicular B-cell lymphoma	3.1	2.5	2.8	4.2	3.5	3.8
H10 diffuse B-cell lymphoma	6.3	4.6	5.4	9.8	7.0	8.3
H11 Burkitt lymphoma	0.5	0.1	0.3	0.6	0.2	0.4
H12 marginal zone lymphoma	0.8	0.8	0.8	1.1	1.1	1.1
H13 T-cell lymphoma cutaneous	0.8	0.3	0.6	1.1	0.5	0.8
H14 other T cell lymphomas	1.4	0.8	1.1	2.0	1.1	1.5
H15 lymphoblastic lymphoma/acute precursor cell lymphatic lymphoma	1.8	1.1	1.4	1.6	0.9	1.2
H16 plasma cell neoplasms	8.2	5.1	6.6	12.8	8.0	10.3
H18 mature B-cell leukaemia, hairy cell	0.7	0.1	0.4	0.9	0.2	0.5
H19 lymphatic leukaemia NOS	0.1	0.1	0.1	0.2	0.1	0.1
H20 leukaemia NOS	0.9	0.6	0.7	1.6	1.1	1.3
H21 myeloid leukaemia NOS	0.1	0.1	0.1	0.2	0.2	0.2
H22 acute myeloid leukaemia	3.6	2.2	2.9	5.3	3.2	4.2
H23 myeloproliferative neoplasms	5.8	5.0	5.4	8.0	6.9	7.5
H24 myelodysplastic syndrome	4.0	2.2	3.0	7.4	3.9	5.4
H25 myelodysplastic, myeloproliferative neoplasm	0.6	0.2	0.4	1.0	0.4	0.7

APPENDIX III: MORTALITY

Source of data: Central Statistics Office, Ireland (by year of death)

3-YEAR ANNUAL AVERAGE DEATHS (2018-2020) AND RISK OF DYING OF CANCER BEFORE 75TH BIRTHDAY

	deaths			# risk of cancer death before 75th birthday	
cancer	male	female	all	male	female
C00-D48 all registered neoplasm deaths	5,237	4,514	9,751	9	11
C00-96 all invasive cancer deaths	5,101	4,392	9,493	9	11
C00-14 lip oral cavity and pharynx	141	55	196	232	766
C15 oesophagus	291	148	438	129	386
C16 stomach	199	108	306	239	513
C18-21 colorectum and anus	587	428	1,015	76	124
C17-21 intestine	605	441	1,046	73	121
C22 liver and intrahepatic bile ducts	242	155	398	152	316
C23-24 gallbladder and biliary tract	24	38	63	1,972	1,686
C22-24 liver gall bladder and biliary	267	194	460	141	266
C25 pancreas	294	271	565	131	182
C32 larynx	55	11	66	628	3,576
C00-14 C30-32 all head and neck	203	70	273	165	606
C00-15 C32 lip oral pharynx larynx oesophagus	487	214	701	74	240
C33-34 lung and trachea	1,084	833	1,917	36	50
C43 melanoma of skin	106	56	162	401	839
C50 breast	6	748	754	7,386	62
C53 cervix uteri		89	89		399
C54 corpus uteri		107	107		396
C56 ovary		295	295		138
C61 prostate	605		605	136	
C62 testis	5		5	8,898	
C64 kidney, except renal pelvis	140	68	209	290	926
C64-66 kidney incl. renal pelvis and ureter	145	71	216	286	884
C67 bladder	161	74	235	385	1,111
C71-72 brain and spinal cord	183	125	308	178	290
C70-72 malignant meninges brain and spinal cord	183	126	309	178	286
D32-33 benign meninges, brain & CNS	8	11	19	4,525	6,649
D42-43 uncertain meninges, brain & CNS	17	17	34	3,628	3,703
C70-72 D32-33 D42-43 all meninges brain and CNS	208	154	362	163	255
C73 thyroid gland	10	10	20	5,096	6,300
C81 Hodgkin lymphoma	12	10	22	3,872	6,150
C82-85 all non-Hodgkin lymphoma	169	123	291	293	507
C88-90 multiple myeloma and immunoproliferative	108	86	194	517	722
C91-95 leukaemia	173	101	274	288	586

● 3-year annual averages: (i.e. male + female) deaths are subject to rounding

risk of dying of cancer before 75th birthday calculated using the cumulative risk method [7]: 1 in [...], e.g. 1 in 10

APPENDIX IV: MORTALITY RATES

Age-standardised rate (ASR, per 100,000): annual average for 2018-2020. Mortality rate was calculated using two different age weights: 1976 and 2013 European Standard Populations (ESP) [4].

Source of data: Central Statistics Office, Ireland (by year of death)

AGE-STANDARDISED MORTALITY RATE (ASR PER 100,000): ANNUAL AVERAGE 2018-2020				
	ESP 1976		ESP 2013	
cancer	males	females	males	females
C00-D48 all registered cancers	181.2	135.7	326.3	228.1
C00-96 all invasive cancers	176.6	132.5	316.8	221.8
C00-14 lip oral cavity and pharynx	5.2	1.7	7.9	2.8
C15 oesophagus	10.4	4.2	17.0	7.6
C16 stomach	6.9	3.2	12.1	5.4
C18-21 colorectum and anus	20.3	12.5	36.5	21.7
C17-21 intestine	20.9	12.8	37.6	22.3
C22 liver and intrahepatic bile ducts	8.5	4.6	14.3	8.0
C23-24 gallbladder and biliary tract	0.8	1.1	1.5	2.0
C22-24 liver gall bladder and biliary	9.3	5.7	15.8	9.9
C25 pancreas	10.2	7.9	17.4	13.9
C32 larynx	1.9	0.3	3.1	0.6
C00-14, C30-32 all head and neck	7.4	2.2	11.3	3.6
C00-15, C32 lip oral pharynx larynx oesophagus	17.5	6.3	28.0	10.9
C33-34 lung and trachea	37.6	25.6	64.9	42.8
C43 melanoma of skin	3.7	1.7	6.5	2.8
C50 breast	0.2	23.5	0.4	36.8
C53 cervix uteri		3.2		4.1
C54 corpus uteri		3.3		5.4
C56 ovary		9.3		14.9
C61 prostate	20.1		43.8	
C62 testis	0.2		0.2	
C64 kidney, except renal pelvis	4.9	1.9	8.4	3.5
C64-66 kidney incl. renal pelvis and ureter	5.1	2.0	8.7	3.6
C67 bladder	5.4	1.9	11.1	3.7
C71-72 brain and spinal cord	6.8	4.3	9.7	6.1
C70-72 malignant meninges brain and spinal cord	6.8	4.3	9.7	6.1
D32-33 benign meninges, brain & CNS	0.3	0.3	0.5	0.6
D42-43 uncertain meninges, brain & CNS	0.6	0.5	1.1	0.9
C70-72, D32-33, D42-43 all meninges brain and CNS	7.6	5.1	11.3	7.5
C73 thyroid gland	0.3	0.3	0.6	0.5
C81 Hodgkin lymphoma	0.4	0.3	0.7	0.5
C82-85 all non-Hodgkin lymphoma	5.7	3.4	10.5	6.4
C88-90 multiple myeloma and immunoproliferative	3.6	2.4	7.0	4.5
C91-95 leukaemia	6.0	2.8	11.1	5.2

APPENDIX V: PREVALENCE

ESTIMATED COMPLETE PREVALENCE BY CANCER SITE, SEX AND AGE: NUMBER OF CANCER SURVIVORS ON 31/12/2020

cancer	females			males			males and females		
	<50	**50+**	**all***	**<50**	**50+**	**all***	**<50**	**50+**	**all***
C00-43 C45-96 all invasive cancers excl. NMSC	16,503	90,555	107,058	10,634	89,672	100,307	27,137	180,227	207,364
C01-14 mouth & pharynx	183	1,135	1,319	278	2,090	2,367	461	3,225	3,686
C15 oesophagus	19	513	532	48	991	1,039	67	1,504	1,571
C16 stomach	95	862	957	88	1,416	1,504	183	2,278	2,461
C18-20 colorectum	958	9,816	10,774	739	12,278	13,018	1,697	22,095	23,792
C22 liver	46	173	219	75	500	575	121	673	794
C25 pancreas	69	474	543	47	453	500	116	927	1,044
C33-34 lung and trachea	196	3,603	3,799	145	3,377	3,522	341	6,980	7,321
C43 melanoma of skin	1,866	7,165	9,031	926	5,134	6,060	2,792	12,299	15,091
C50 breast	5,004	41,937	46,941	13	255	268	5,017	42,192	47,209
C53 cervix uteri	1,735	3,331	5,066				1,735	3,331	5,066
C54 corpus uteri	251	6,203	6,455				251	6,203	6,455
C56 ovary	504	2,822	3,327				504	2,822	3,327
C51-52 C55 C57 C58 other gynaecological	198	1,105	1,303				198	1,105	1,303
C61 prostate				337	44,025	44,362	337	44,025	44,362
C62 testis				2,518	2,600	5,118	2,518	2,600	5,118
C64 kidney	344	2,001	2,345	453	3,251	3,704	797	5,252	6,049
C67 bladder	34	1,270	1,304	62	2,934	2,996	97	4,204	4,300
C71-72 brain &CNS	564	540	1,105	638	609	1,247	1,202	1,149	2,351
C73 thyroid gland	1,234	1,652	2,886	286	605	891	1,520	2,258	3,778
C81 Hodgkin lymphoma	793	641	1,435	813	841	1,654	1,606	1,482	3,088
C82-85 non-Hodgkin lymphoma	523	3,577	4,100	796	3,946	4,742	1,319	7,523	8,842
C90 multiple myeloma	55	853	908	77	1,223	1,300	132	2,076	2,208
C91-95 leukaemia	862	1,715	2,577	968	2,722	3,689	1,830	4,437	6,266

* Figures subject to rounding

APPENDIX VI: OBSERVED VS. PROJECTED CANCER INCIDENCE, 2020

sex	cancer	observed 2019	observed 2020	projected 2020	95%PI	obs 2020/ obs 2019 %	obs 2020/ proj 2020 %	shortfall %
M	**C00-43 C45-96 all invasive cancers excl. NMSC**	**13,529**	**12,585**	**13,994**	**[13,676, 14,313]**	**93%**	**90%**	**-10%**
M	C22 liver	251	209	305	[266, 344]	83%	69%	-31%
M	C64 kidney	473	368	473	[410, 536]	78%	78%	-22%
M	C91-95 leukaemia	373	319	383	[338, 429]	86%	83%	-17%
M	C18-20 colorectal	1,549	1,290	1,538	[1464, 1612]	83%	84%	-16%
M	C61 prostate	4,139	3,744	4,392	[4290, 4494]	90%	85%	-15%
M	C01-14 mouth & pharynx	388	364	416	[381, 452]	94%	87%	-13%
M	C33-34 lung	1,522	1,363	1,547	[1478, 1616]	90%	88%	-12%
M	C82-85 non-Hodgkin lymphoma	528	490	546	[505, 586]	93%	90%	-10%
M	C73 thyroid	87	92	100	[77, 123]	106%	92%	-8%
M	C62 testis	158	154	166	[144, 188]	97%	93%	-7%
M	C25 pancreas	303	318	337	[296, 378]	105%	94%	-6%
M	C43 melanoma of skin	611	590	598	[483, 712]	97%	99%	-1%
M	C16 stomach	378	341	345	[252, 438]	90%	99%	-1%
M	C67 bladder	379	401	405	[314, 496]	106%	99%	-1%
M	C71-72 brain & CNS	273	268	249	[218, 280]	98%	108%	8%
M	C90 multiple myeloma	221	239	221	[187, 255]	108%	108%	8%
M	C15 oesophagus	344	357	326	[280, 372]	104%	110%	10%
M	C81 Hodgkin lymphoma	66	92	66	[26, 107]	139%	139%	39%
sex	**cancer**	**observed 2019**	**observed 2020**	**projected 2020**	**95%PI**	**obs 2020/ obs 2019 %**	**obs 2020/ proj 2020 %**	**shortfall %**
F	**C00-43 C45-96 all invasive cancers excl. NMSC**	**11,762**	**10,652**	**11,900**	**[11,518, 12,281]**	**91%**	**90%**	**-10%**
F	C53 cervix	272	185	269	[205, 332]	68%	69%	-31%
F	C50 breast	3,561	2,930	3,797	[3544, 4050]	82%	77%	-23%
F	C01-14 mouth & pharynx	176	134	172	[141, 204]	76%	78%	-22%
F	C18-20 colorectal	1,162	951	1,186	[1118, 1254]	82%	80%	-20%
F	C22 liver	113	103	128	[110, 146]	91%	81%	-19%
F	C67 bladder	156	145	180	[134, 226]	93%	81%	-19%
F	C82-85 non-Hodgkin lymphoma	376	345	421	[373, 469]	92%	82%	-18%
F	C64 kidney	257	226	266	[231, 300]	88%	85%	-15%
F	C54 corpus uteri	544	535	611	[551, 670]	98%	88%	-12%
F	C91-95 leukaemia	217	216	241	[198, 284]	100%	89%	-11%
F	C43 melanoma of skin	617	564	607	[490, 724]	91%	93%	-7%
F	C33-34 lung	1,247	1,182	1,252	[1115, 1388]	95%	94%	-6%
F	C56 ovary	385	422	420	[375, 464]	110%	101%	1%
F	C16 stomach	204	207	205	[173, 237]	101%	101%	1%
F	C25 pancreas	326	310	307	[272, 342]	95%	101%	1%
F	C81 Hodgkin lymphoma	62	80	77	[60, 93]	129%	104%	4%
F	C15 oesophagus	171	167	157	[130, 184]	98%	106%	6%
F	C71-72 brain & CNS	202	212	186	[153, 219]	105%	114%	14%
F	C73 thyroid	229	221	191	[112, 271]	97%	115%	15%
F	C90 multiple myeloma	165	183	147	[115, 180]	111%	124%	24%
sex	**cancer**	**observed 2019**	**observed 2020**	**projected 2020**	**95%PI**	**obs 2020/ obs 2019 %**	**obs 2020/ proj 2020 %**	**shortfall %**
ALL	**C00-43 C45-96 all invasive cancers excl. NMSC**	**25,291**	**23,237**	**25,894**	**[25,194, 26,594]**	**92%**	**90%**	**-10%**
M&F	C22 liver	364	312	433	[376, 490]	86%	72%	-28%
M&F	C64 kidney	730	594	739	[641, 836]	81%	80%	-20%
M&F	C18-20 colorectal	2,711	2,241	2,724	[2582, 2866]	83%	82%	-18%
M&F	C01-14 mouth & pharynx	564	498	589	[522, 656]	88%	85%	-15%
M&F	C91-95 leukaemia	590	535	625	[536, 713]	91%	86%	-14%
M&F	C82-85 non-Hodgkin lymphoma	904	835	967	[878, 1055]	92%	86%	-14%
M&F	C33-34 lung	2,769	2,545	2,799	[2593, 3004]	92%	91%	-9%
M&F	C67 bladder	535	546	585	[448, 722]	102%	93%	-7%
M&F	C43 melanoma of skin	1,228	1,154	1,204	[973, 1436]	94%	96%	-4%
M&F	C25 pancreas	629	628	643	[568, 720]	100%	98%	-2%
M&F	C16 stomach	582	548	550	[425, 675]	94%	100%	0%
M&F	C73 thyroid	316	313	292	[189, 394]	99%	107%	7%
M&F	C15 oesophagus	515	524	483	[410, 556]	102%	109%	9%
M&F	C71-72 brain & CNS	475	480	435	[371, 499]	101%	110%	10%
M&F	C90 multiple myeloma	386	422	369	[302, 435]	109%	114%	14%
M&F	C81 Hodgkin lymphoma	128	172	143	[86, 200]	134%	120%	20%

Interpretation of Appendix VI table (above): Based on the last stable trend in incident cases for each cancer type the projected number of cases was calculated for 2020 (ignoring the effect of the COVID-19 pandemic). The last column (*'shortfall %'*) represents the complement of the number of observed cases in 2020 expressed as a percentage of projected number of cases for 2020, i.e. [(observed cases 2020/projected cases 2020)-1]*100. For *all invasive cancers excluding NMSC*, for males, females and both sexes combined, the estimated *shortfall* in expected cases for 2020 was 10%.

APPENDIX VII: MICROSCOPICALLY CONFIRMED VS. PROJECTED CANCER INCIDENCE

sex	cancer	observed 2019	observed 2020	projected 2020	95%PI	obs 2020/ obs 2019%	obs 2020/ proj 2020%	shortfall %
M	**C00-C43, C45-C96 all invasive cancers, excluding NMSC**	**11,986**	**10,979**	**12,072**	**[11,631, 12,513]**	**92%**	**91%**	**-9%**
M	C91-95 leukaemia	315	229	344	[294, 393]	73%	67%	-33%
M	C22 liver	128	102	139	[109, 169]	80%	73%	-27%
M	C64 kidney	399	321	431	[391, 472]	80%	74%	-26%
M	C82-85 non-Hodgkin lymphoma	497	426	532	[495, 569]	86%	80%	-20%
M	C18-20 colorectal	1,472	1,225	1,504	[1409, 1598]	83%	81%	-19%
M	C61 prostate	3,913	3,499	4,155	[4038, 4272]	89%	84%	-16%
M	C01-14 mouth & pharynx	365	346	404	[369, 440]	95%	86%	-14%
M	C33-34 lung	1,257	1,090	1,272	[1192, 1351]	87%	86%	-14%
M	C73 thyroid	83	86	100	[77, 122]	104%	86%	-14%
M	C62 testis	147	147	161	[137, 186]	100%	91%	-9%
M	C90 multiple myeloma	173	187	204	[175, 232]	108%	92%	-8%
M	C25 pancreas	220	229	247	[195, 299]	104%	93%	-7%
M	C71-72 brain & CNS	204	196	206	[182, 230]	96%	95%	-5%
M	C43 melanoma of skin	603	583	590	[488, 692]	97%	99%	-1%
M	C16 stomach	354	316	319	[227, 411]	89%	99%	-1%
M	C67 bladder	331	364	358	[276, 441]	110%	102%	2%
M	C15 oesophagus	329	337	322	[281, 362]	102%	105%	5%
M	C81 Hodgkin lymphoma	56	83	59	[0, 117]	148%	141%	41%
sex	**cancer**	**observed 2019**	**observed 2020**	**projected 2020**	**95%PI**	**obs 2020/ obs 2019%**	**obs 2020/ proj 2020%**	**shortfall %**
F	**C00-C43, C45-C96 all invasive cancers, excluding NMSC**	**10,454**	**9,348**	**10,721**	**[10,515, 10,927]**	**89%**	**87%**	**-13%**
F	C53 cervix	267	176	268	[204, 331]	66%	66%	-34%
F	C01-C14 mouth & pharynx	160	117	166	[137, 195]	73%	70%	-30%
F	C64 kidney	217	173	231	[206, 256]	80%	75%	-25%
F	C22 liver	56	54	72	[61, 83]	96%	75%	-25%
F	C50 breast	3,527	2,896	3,610	[3346, 3874]	81%	79%	-21%
F	C18-20 colorectal	1,087	868	1,085	[1015, 1154]	80%	80%	-20%
F	C54 corpus uteri	525	514	596	[538, 653]	98%	86%	-14%
F	C82-C85 non-Hodgkin lymphoma	344	305	348	[275, 422]	89%	88%	-12%
F	C33-34 lung	1,023	941	1,047	[945, 1149]	92%	90%	-10%
F	C43 melanoma of skin	610	552	601	[488, 713]	90%	92%	-8%
F	C16 stomach	181	186	197	[166, 229]	103%	94%	-6%
F	C81 Hodgkin lymphoma	58	72	76	[59, 93]	124%	95%	-5%
F	C91-95 leukaemia	178	150	158	[96, 220]	84%	95%	-5%
F	C56 ovary	332	365	378	[330, 425]	110%	97%	-3%
F	C25 pancreas	206	199	206	[171, 242]	97%	97%	-3%
F	C15 oesophagus	150	144	149	[123, 175]	96%	97%	-3%
F	C71-C72 brain & CNS	129	137	133	[107, 158]	106%	103%	3%
F	C90 multiple myeloma	120	142	133	[105, 161]	118%	107%	7%
F	C67 bladder	131	116	107	[77, 136]	89%	108%	8%
F	C73 thyroid	213	211	179	[112, 245]	99%	118%	18%
sex	**cancer**	**observed 2019**	**observed 2020**	**projected 2020**	**95%PI**	**obs 2020/ obs 2019%**	**obs 2020/ proj 2020%**	**shortfall %**
M&F	**C00-C43, C45-C96 all invasive cancers, excluding NMSC**	**22,440**	**20,327**	**22,793**	**[22,146, 23,440]**	**91%**	**89%**	**-11%**
M&F	C22 liver	184	156	211	[170, 252]	85%	74%	-26%
M&F	C64 kidney	616	494	662	[597, 728]	80%	75%	-25%
M&F	C91-95 Leukaemia	493	379	502	[390, 613]	77%	75%	-25%
M&F	C18-20 colorectal	2,559	2,093	2,589	[2424, 2752]	82%	81%	-19%
M&F	C01-C14 mouth & pharynx	525	463	570	[506, 635]	88%	81%	-19%
M&F	C82-C85 non-Hodgkin lymphoma	841	731	880	[770, 991]	87%	83%	-17%
M&F	C33-34 lung	2,280	2,031	2,319	[2137, 2500]	89%	88%	-12%
M&F	C25 pancreas	426	428	453	[366, 541]	100%	94%	-6%
M&F	C43 melanoma of skin	1,213	1,135	1,192	[1013, 1371]	94%	95%	-5%
M&F	C16 stomach	535	502	516	[393, 640]	94%	97%	-3%
M&F	C90 multiple myeloma	293	329	337	[280, 393]	112%	98%	-2%
M&F	C71-C72 brain & CNS	333	333	339	[289, 388]	100%	98%	-2%
M&F	C15 oesophagus	479	481	471	[404, 537]	100%	102%	2%
M&F	C67 bladder	462	480	465	[353, 577]	104%	103%	3%
M&F	C73 thyroid	296	297	279	[189, 367]	100%	106%	6%
M&F	C81 Hodgkin lymphoma	114	155	135	[59, 210]	136%	115%	15%

Interpretation of Appendix VII table (above): Based on the last stable trend in microscopically confirmed incident cases for each cancer type the projected number of cases was calculated for 2020 (ignoring the effect of the COVID-19 pandemic). The last column ('shortfall %') represents the complement of the number of observed cases in 2020 expressed as a percentage of projected number of cases for 2020, i.e. [(observed cases 2020/projected cases 2020)-1]*100. For all invasive cancers excluding NMSC, the estimated shortfall in expected cases for 2020 was 9% for males, 13% for females and 11% for males and females combined.