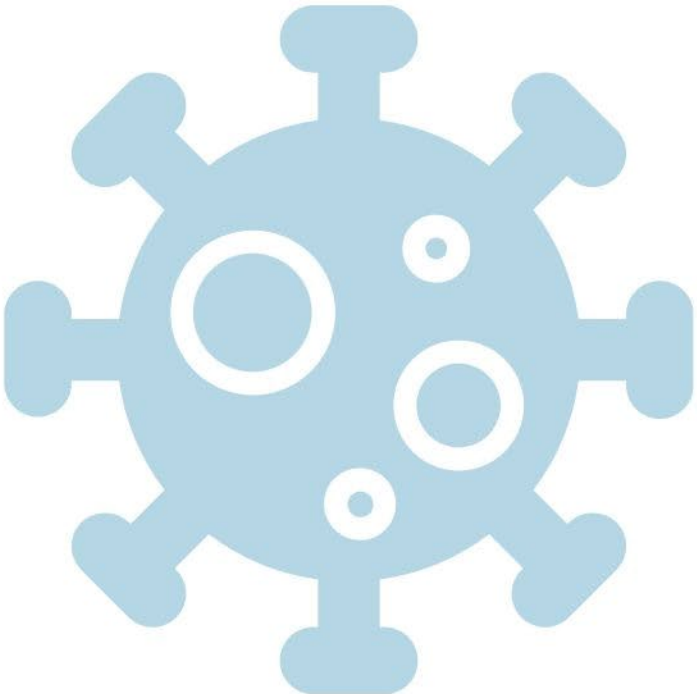
National Cancer Registry Ireland

COVID-19 IMPACT ON CANCER INCIDENCE IN IRELAND IN 2021

A PRELIMINARY ANALYSIS



THE NATIONAL CANCER REGISTRY

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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.

This report should be cited as:
Tierney P, McDevitt J, Brennan A, Walsh PM. (2023) COVID-19 impact on cancer incidence in Ireland in 2021: a preliminary analysis. NCRI, Cork, Ireland.

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- The core work of 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 National Screening Service; the Board, Senior Management Team and Cancer Intelligence Team of the National Cancer Registry; RCSI University of Medicine and Health Sciences; and the Irish Cancer Society.

RCSI UNIVERSITY OF MEDICINE AND HEALTH SCIENCES

Irish Cancer Society

An Roinn Sláinte
Department of Health

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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 on the numbers dying from their cancer or from other causes. All patient personal and private information is 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?

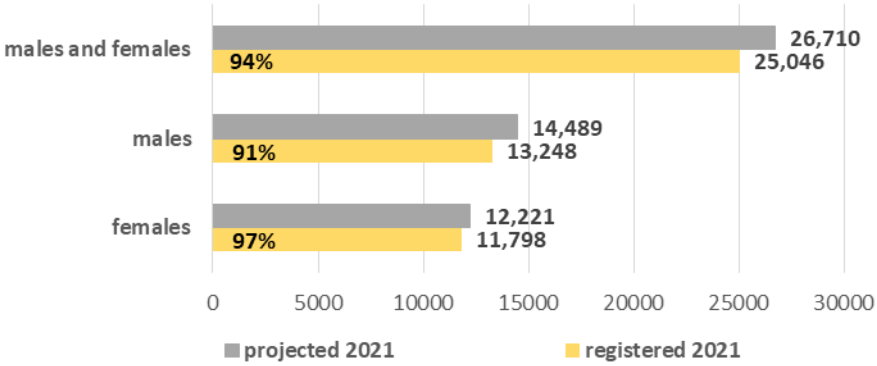
Collecting and checking all of this information is performed by a combination of manual and electronic processes. Our staff collect cancer diagnosis information and use an agreed system of coding (The International Classification of Diseases) to group the cancers into different types.

After a process of collating diverse information from Irish hospitals, and checking and validation for accuracy, an annual statistical report and other reports are published based on analysis of de-identified data.

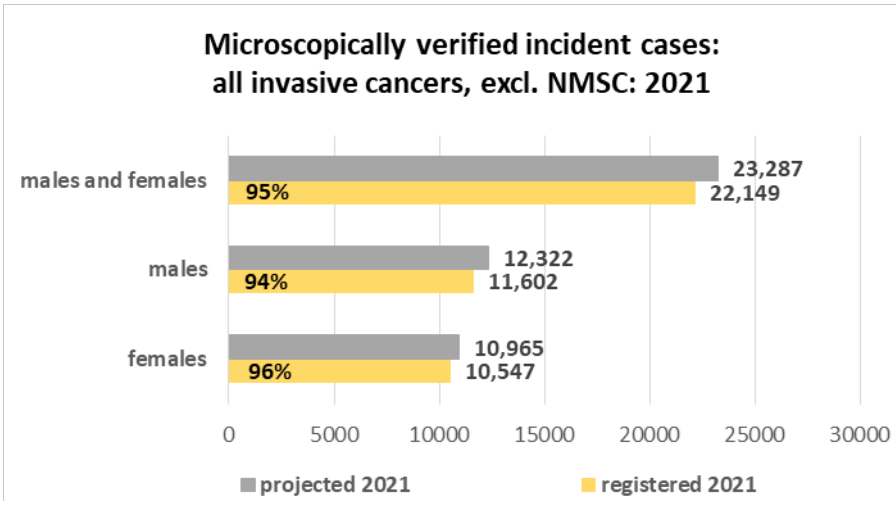
What are the cancer figures for the most recent year for which registration is complete?

- We employ cancer data registrars embedded in the hospital system to register the cancer information on individual patients. 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, but numbers for 2021 are still preliminary. 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 registration data is received, checked and validated.
- Using projections we are able to estimate the numbers of cases that would have been expected for 2020 and for 2021 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.
- All figures presented here refer to invasive cancers excluding non-melanoma skin cancers (NMSC).

- The graph on the right shows the registered and projected cases in 2021 for males and females.
- Overall, 94% of the cases that were projected for 2021 have been registered for 2021 to date (March 2023), *i.e. a 6% shortfall for males and females combined (9% for males, 3% for females).*



- The graph on the right shows equivalent figures for the subset of **microscopically verified*** cases.
- Overall, 95% of the cases that were projected for 2021 have been registered, *i.e. a 5% shortfall for males and females combined (6% for males, 4% for females).*



*Microscopically verified cases are those for with pathologically or haematologically confirmed diagnoses, accounting for just under 90% of all cancer cases and typically collated more quickly

These preliminary findings indicate a smaller shortfall (relative to projected numbers of diagnosed cases) than in 2020, when the registered number of cases was 10% lower than expected for all invasive cancers, or 11% lower than expected for microscopically verified cases. However, numbers of cases diagnosed in 2021 still appear to be lower than expected – equivalent to 1664 fewer cases than projected.

The shortfall in 2021 appeared to be most marked for certain cancers:

- For both sexes combined, the largest shortfalls were seen for cancers of the liver (36% fewer cases than projected), pancreas (26%) and kidney (20%).
- In females, the largest shortfalls were seen for cancers of the pancreas (30% fewer), liver (29%) and kidney (26%); in males, for cancers of the liver (39% fewer), thyroid (27%) and pancreas (22%).

Overall, combining numbers of cases diagnosed in 2020 and 2021, there was an 8% shortfall in registered invasive cancer cases compared to the projected number (7% shortfall for females and 9% shortfall for males).

NCRI plans to publish a more definitive update on 2021 case numbers later this year, taking account of ongoing data-collation and checking. Additional work is ongoing in collaboration with the RCSI University of Medicine and Health Sciences and other collaborators to assess further impacts of COVID-19 disruptions on cancer services and outcomes in Ireland.

1. Introduction

This report is intended as a supplement to the analyses of COVID-19 impacts on numbers of diagnosed cancers in 2020 published in the most recent National Cancer Registry (NCRI) annual statistical report in 2022 [1]. The current report provides provisional figures for case numbers of all invasive cancer cases excluding non-melanoma skin cancer (NMSC) diagnosed in 2021 in Ireland, and for selected cancer types, in females, males and both sexes. We also present provisional figures for microscopically verified cancer cases. The report aims to provide a preliminary assessment of the continued impact of the COVID-19 pandemic on cancer case numbers diagnosed in Ireland in 2021. NCRI plans to publish a more definitive update on 2021 case numbers later this year, taking account of ongoing data-collation and checking.

Cancer services in 2021 were also impacted to some extent by the cyberattack on Health Service Executive systems in May 2021, but it is not considered to have influenced the completeness of cancer incidence data collected by NCRI.

2. Methodology

Projections of cancer cases for 2020 and 2021

The methodology for these analyses is as described in the NCRI annual statistical report for 2022 [1]. We conducted a joinpoint analysis on case numbers of invasive cancer (ICD10 codes C00-43, C45-96), excluding NMSC, diagnosed in Ireland from 1994 to 2019, using Joinpoint Version 4.9.1.0 [2]. From this analysis, we identified the last stable trend in cancer case numbers up to 2019. We used ordinary least squares regression to extrapolate the last stable trend to provide projected case numbers for the years 2020 and 2021. These projected numbers represent the numbers of invasive cancer cases expected to have been diagnosed had the COVID-19 pandemic not occurred (i.e. if pre-2020 trends had continued unchanged).

95% prediction intervals (95%PI) were calculated for the projected numbers. The projected case numbers were then compared to the numbers of cases registered (observed case counts), for cancer cases as a whole and for selected specific cancer types. In summary graphs presented below, case numbers falling outside the 95% PI are flagged as higher or lower than projected, those falling within the 95%PI as “expected”.

Source data

This report calculated observed case counts in 2021 using data available in the NCRI database up to 2nd March 2023. Projected case numbers for 2021 were modelled using data on cancers diagnosed in Ireland from 1994 to 2019 available in the NCRI database up to October 2022. The figures for cancers diagnosed in 2021 are provisional at the time of writing as some cancer registration for 2021 is still ongoing and figures will be updated near end of year 2023. Figures from the NCRI annual statistical report for 2022 [1] (provided in this report for comparison) for case numbers up to and including 2020 were calculated using data available in the NCRI database up to October 2022.

Analysis of microscopically verified cases

An additional analysis was conducted only on cases where the cancer was microscopically verified (i.e. cases based on pathological or haematological samples). The microscopically verified cases represent a subset of all cancer cases included in this report. Registration of microscopically verified cases is typically completed more rapidly than cases diagnosed without pathological samples and, thus, analysis of microscopically verified cases is useful for giving an early indication of patterns in cancer cases. The purpose of including microscopically verified cases as a separate analysis in this report is to give an indication of the robustness

of the patterns observed in the analysis of all cancers. There are limitations to the use of microscopically verified cases as an indicator of all cancer cases; for example, cancers that have higher proportions of cases diagnosed clinically rather than pathologically will be underrepresented in counts of microscopically verified cases.

Analysis of combined 2020 and 2021 cancer cases

In addition to analyses specific to 2021, numbers of cases registered in 2020 and 2021 were summed and compared to the sum of projected cases for 2020 and 2021 to assess the impact of COVID-19 on cumulative cancer case numbers over two years. An analysis of combined 2020 and 2021 data was conducted for all registered cases (excluding NMSC) and for microscopically verified cases only (excluding NMSC).

Data analyses were conducted using Stata version 15.1 [3] and R version 4.1.2 [4].

3. Preliminary numbers of cancer cases diagnosed in 2021

3.1 All registered cases

For all invasive cancer types combined (excluding NMSC), numbers registered for 2021 up to March 2023 fall below the lower limit of the prediction interval (Figures 3.1, Appendix I). Overall, 94% of cancer cases projected for 2021 have been registered to date, i.e. a 6% shortfall (equivalent to 1,664 fewer cases than expected).

Broken down by sex, 97% of cases projected for females in 2021 have been registered (3% shortfall or 423 fewer cases than expected) and 91% of cases projected for males (9% shortfall or 1,241 fewer cases than expected).

The largest shortfalls in cancers affecting both sexes in 2021 were observed in liver (-36%), pancreatic (-26%) and kidney (-20%) cancers, involving 167, 170 and 153 fewer cases than expected, respectively.

In females in 2021, the largest shortfalls were in pancreatic (-30%), liver (-29%) and kidney (-26%) cancers, or 74, 40 and 70 fewer cases than expected, respectively. In males in 2021, the largest shortfalls were in liver (-39%), thyroid (-27%) and pancreatic (-22%) cancers, or 127, 21 and 76 fewer cases than expected, respectively.

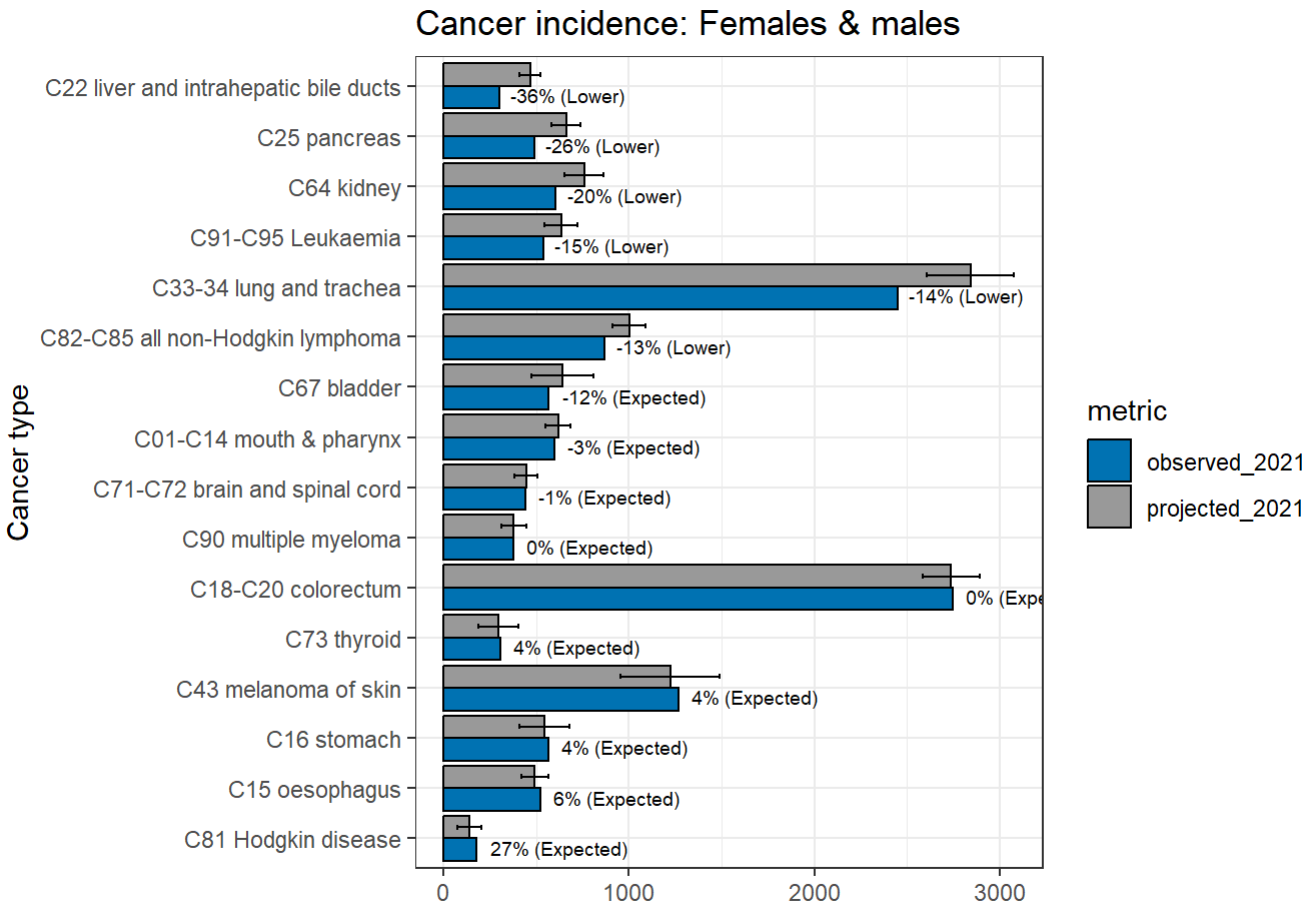
Comparison of shortfalls in 2021 case counts with shortfalls seen in 2020

For comparison, the overall shortfall for both sexes in 2020 was 10% (10% respectively for males and females) (Appendix V) [1].

The largest relative shortfalls in cancers diagnosed in 2020 in both sexes were observed in liver (-28%), kidney (-20%) and colorectal (-18%) cancers.

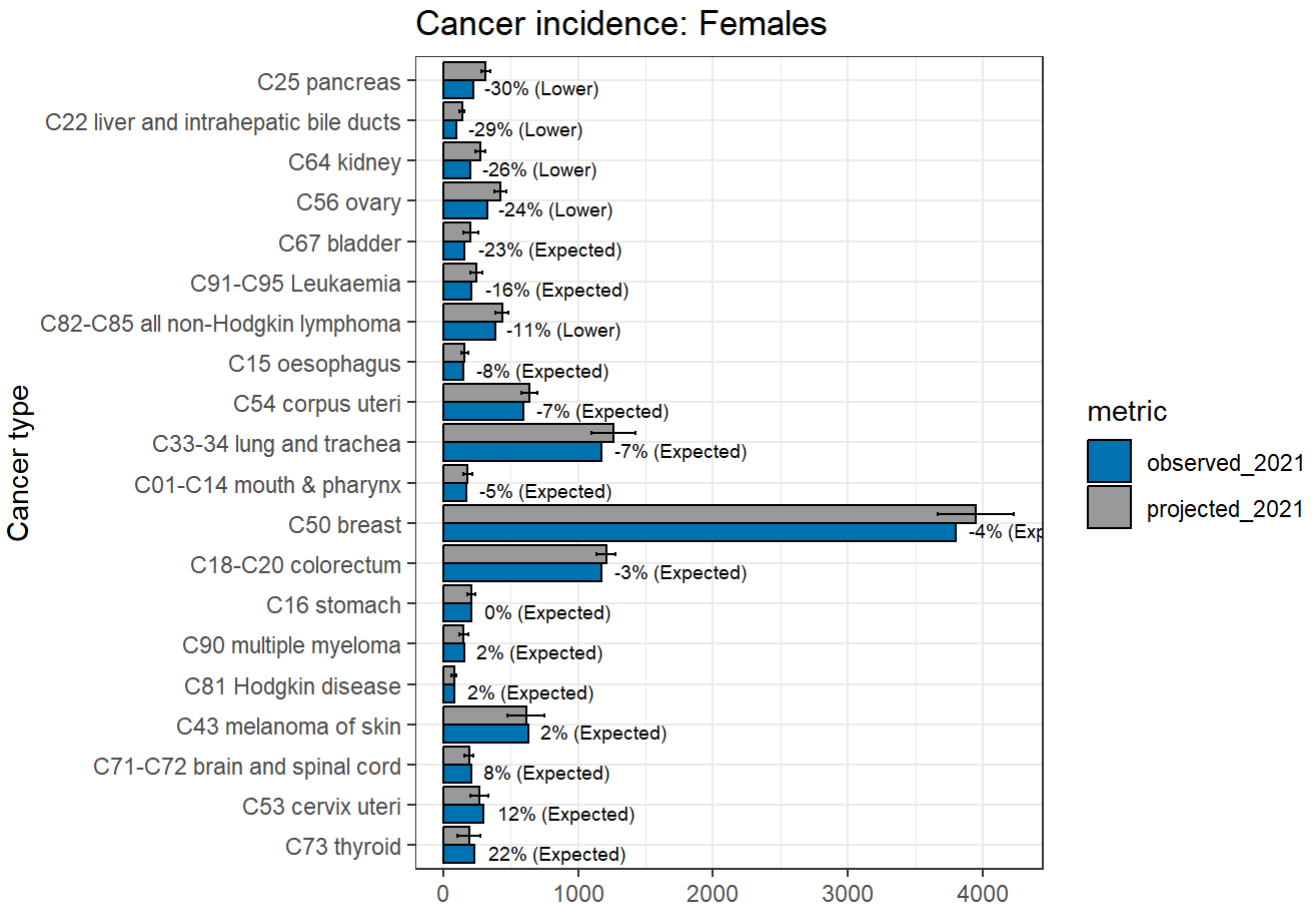
In females in 2020, the largest shortfalls were in cervical (-31%), breast (-23%) and mouth/pharynx (-22%) cancers. In males in 2020, the largest shortfalls were in liver cancer (-31%), kidney cancer (-22%), and leukaemia (-17%) (Appendix V) [1].

FIGURE 3.1. GRAPHICAL DISPLAY OF OBSERVED (REGISTERED) *VS.* PROJECTED CASE NUMBERS FOR 2021: SORTED ON PERCENTAGE SHORTFALL



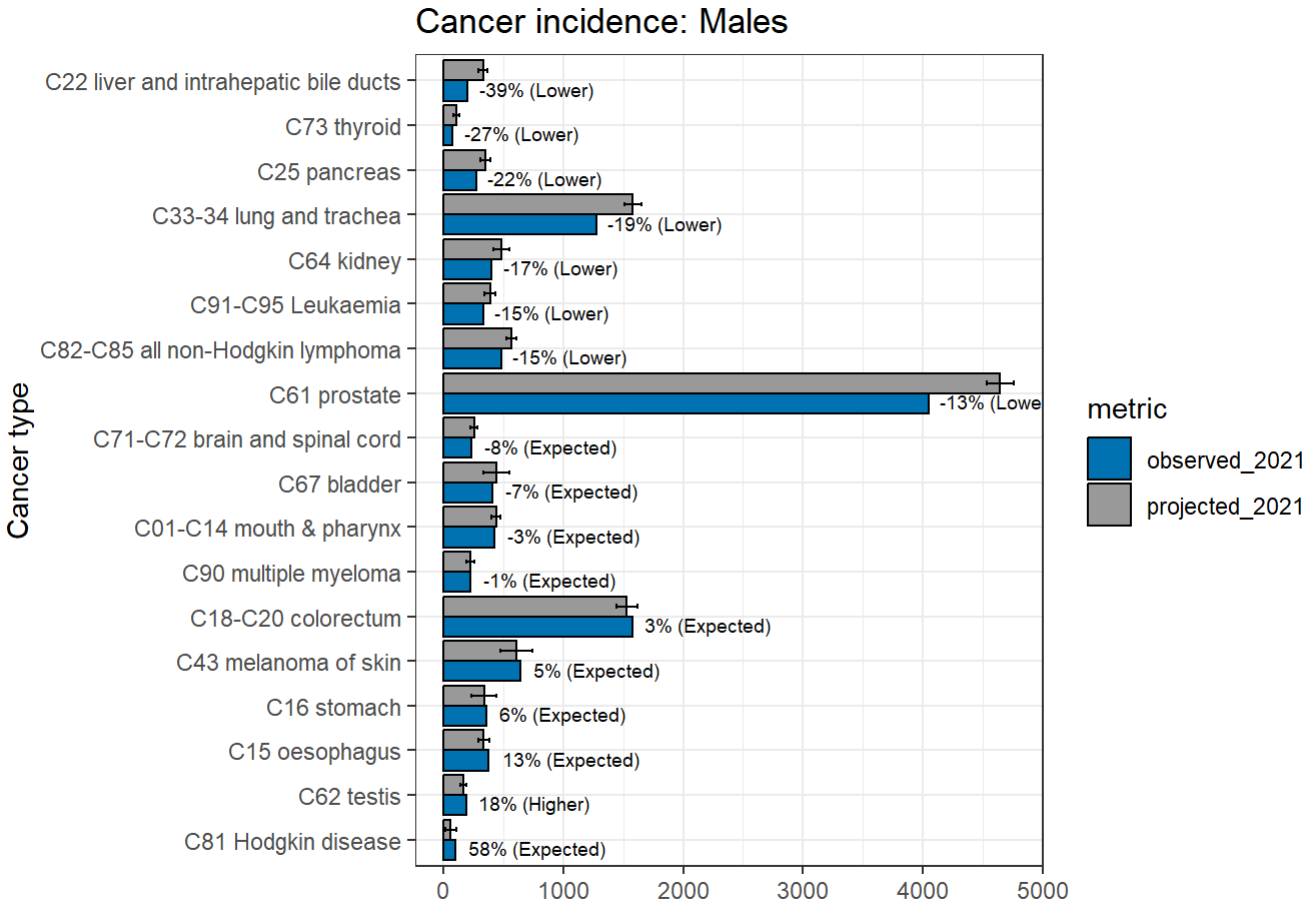
Data labels show the percentage change from projected cases for 2021 to registered (observed) cases in 2021. Whether the observed number was higher, lower or within the predicted range of the projected number is shown in brackets as "Higher", "Lower" or "Expected".

- In both sexes combined in 2021, observed case counts of 6 out of the 16 cancer types examined were lower than projected based on pre-2020 trends. These were liver, pancreatic and kidney cancers, leukaemia, lung cancer, and non-Hodgkin lymphoma.
- The largest shortfall from expected numbers of cancer cases were in liver (-36%), pancreatic (-26%) and kidney (-20%) cancers, equivalent to 167, 170 and 153 fewer cases than expected, respectively.
- 2,738 cases of colorectal (bowel) cancer were projected, compared with 2,748 registered (0% difference).
- 2,841 cases of lung cancer were projected, compared with 2,447 registered (14% lower).



Data labels show the percentage change from projected cases for 2021 to registered (observed) cases in 2021. Whether the observed number was higher, lower or within the predicted range of the projected number is shown in brackets as “Higher”, “Lower” or “Expected”.

- In females in 2021, observed case counts of 5 out of the 20 cancer types examined were lower than projected based on pre-2020 trends. These were pancreatic, liver, kidney and ovarian cancers, and non-Hodgkin lymphoma.
- The largest shortfalls from expected numbers of female cancer cases were in pancreatic (-30%), liver (-29%), and kidney (-26%) cancers, equivalent to 74, 40 and 70 fewer cases than expected, respectively.
- For the three most common cancers in females (excluding NMSC):
- 3,951 cases of breast cancer were projected, compared with 3,797 registered (4% lower but within prediction interval limits).
- 1,261 cases of lung cancer were projected, compared with 1,169 registered (7% lower but within prediction interval limits).
- 1,206 cases of colorectal (bowel) cancer were projected, compared with 1,172 registered (3% lower but within prediction interval limits).



Data labels show the percentage change from projected cases for 2021 to registered (observed) cases in 2021. Whether the observed number was higher, lower or within the predicted range of the projected number is shown in brackets as “Higher”, “Lower” or “Expected”.

- In males in 2021, observed case counts of 8 out of the 18 cancer types examined were lower than projected based on pre-2020 trends. These were liver, thyroid, pancreatic, lung and kidney cancers, leukaemia, non-Hodgkin lymphoma, and prostate cancer.
- The largest shortfalls from expected numbers of male cancer cases were in liver (-39%), thyroid (-27%) and pancreatic (-22%) cancers, equivalent to 127, 21 and 76 fewer cases than expected, respectively.
- For the three most common cancers in males (excluding NMSC):
- 4,646 prostate cancer cases were projected in 2021, compared with 4,048 registered (13% lower).
- 1,580 cases of lung cancer were projected, compared with 1,278 registered (19% lower).
- 1,532 cases of colorectal (bowel) cancer were projected, compared with 1,576 registered (3% higher but within prediction interval limits).

3.2 Subset analysis: Microscopically verified (MV) cases

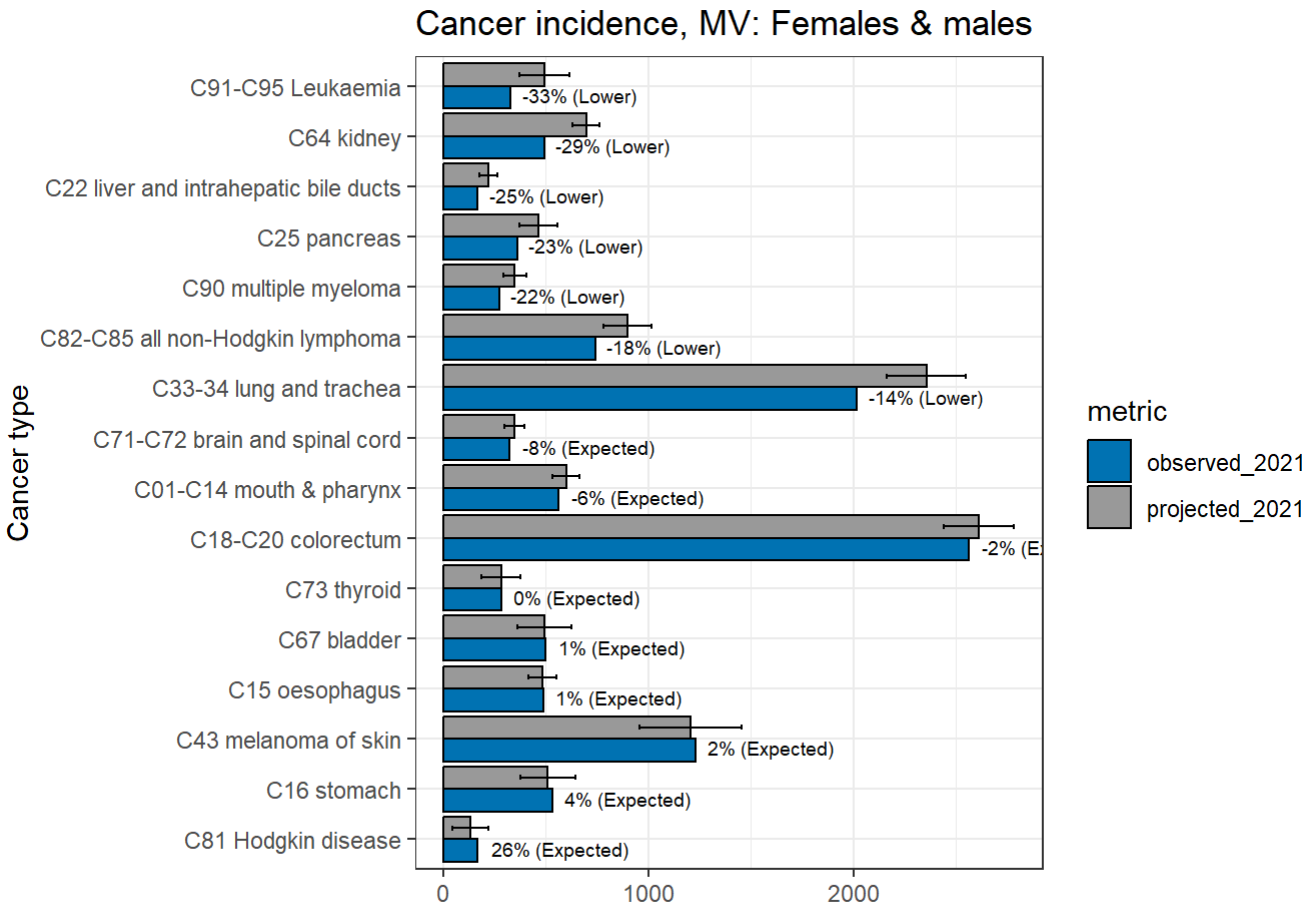
Microscopically verified cases are those with pathologically or haematologically confirmed diagnoses, accounting for just under 90% of all cancer cases and typically collated more quickly by NCRI than cases based on radiological or clinical findings only. For the cases involved, an earlier indication of changes over time may be obtained, although the findings may be less relevant or generalizable for cancer types for which a higher proportion of cases are typically diagnosed clinically or radiologically.

Overall, numbers of microscopically verified cancers in 2021 were 5% lower than projected and fell below the lower limit of the prediction interval (Figure 3.2, Appendix II). In males in 2021, numbers of microscopically verified cancers were 6% lower than projected and in females, numbers of microscopically verified cancers were 4% lower than projected.

Of the cancers affecting both sexes, leukaemia (-33%), kidney cancer (-29%) and liver cancer (-25%) had the largest total shortfall in microscopically verified cases. In females, the largest relative shortfalls in microscopically verified cases were in kidney (-34%), liver (-28%) and ovarian (-25%) cancers. In males, the largest shortfalls in microscopically verified cases were observed in leukaemia (-40%), thyroid cancer (-28%), and kidney cancer (-27%).

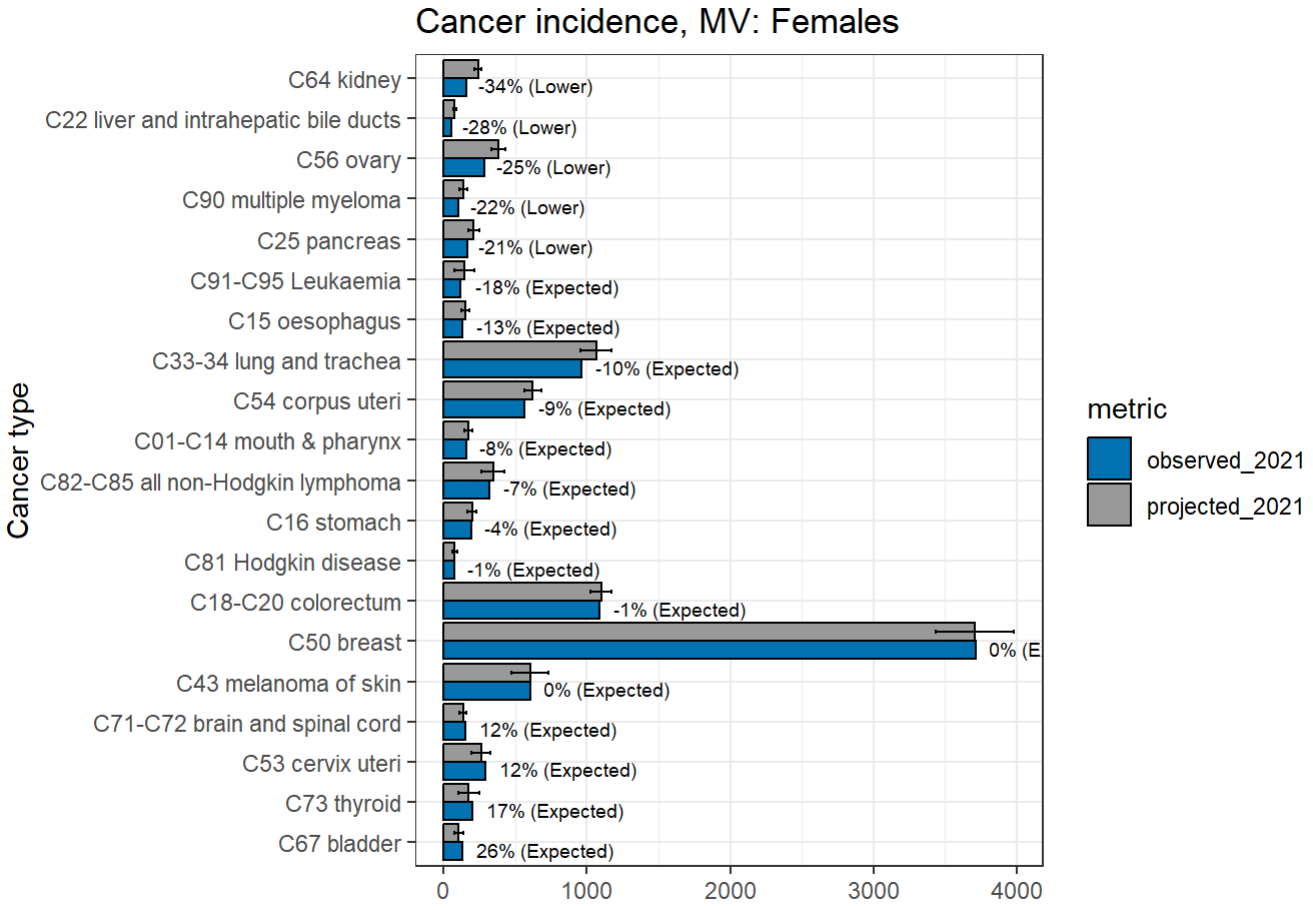
The findings for MV cases were broadly consistent with or supportive of the patterns seen for all incident cases (section 3.1 above), but with some differences with regard to specific cancer types.

FIGURE 3.2. GRAPHICAL DISPLAY OF OBSERVED (REGISTERED) *VS.* PROJECTED MICROSCOPICALLY VERIFIED CASE NUMBERS FOR 2021: SORTED ON PERCENTAGE SHORTFALL



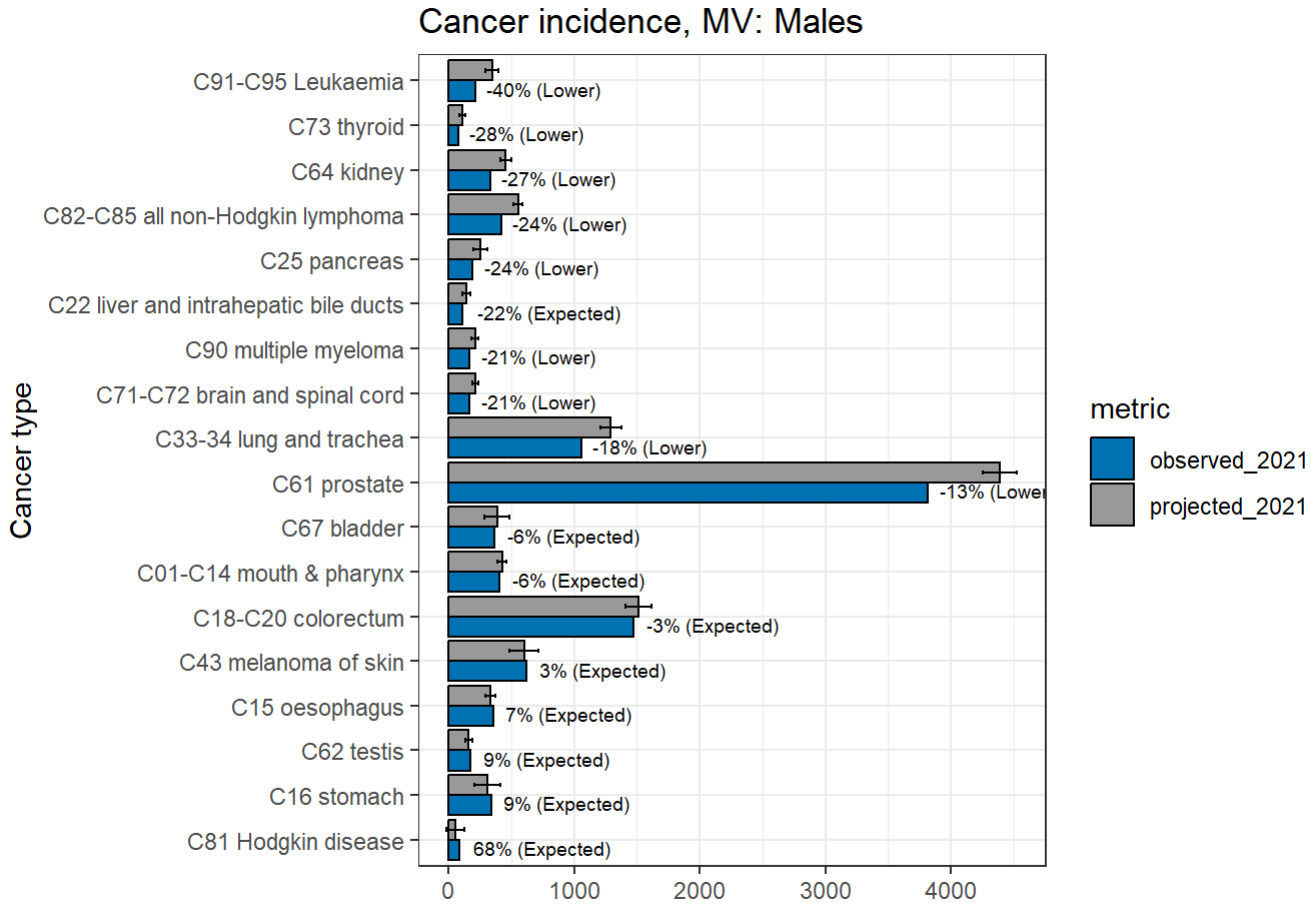
Data labels show the percentage change from projected cases for 2021 to registered (observed) cases in 2021. Whether the observed number was higher, lower or within the predicted range of the projected number is shown in brackets as “Higher”, “Lower” or “Expected”.

- In both sexes combined in 2021, observed case counts of 7 out of the 16 cancer types examined were lower than projected based on pre-2020 trends. These were leukaemia, kidney, liver and pancreatic cancers, multiple myeloma, non-Hodgkin lymphoma, and lung cancer.
- 2,613 microscopically verified cases of colorectal (bowel) cancer were projected, compared with 2,565 registered (2% lower but within expected range).



Data labels show the percentage change from projected cases for 2021 to registered (observed) cases in 2021. Whether the observed number was higher, lower or within the predicted range of the projected number is shown in brackets as “Higher”, “Lower” or “Expected”.

- In females in 2021, numbers of microscopically verified cases of 5 out of the 20 cancer types examined were lower than projected based on pre-2020 trends. These were kidney, liver and ovarian cancers, multiple myeloma, and pancreatic cancer.
- 3,708 microscopically verified cases of breast cancer were projected, compared with 3,714 registered (0% change).



Data labels show the percentage change from projected cases for 2021 to registered (observed) cases in 2021. Whether the observed number was higher, lower or within the predicted range of the projected number is shown in brackets as “Higher”, “Lower” or “Expected”.

- In males in 2021, numbers of microscopically verified cases of 9 out of the 18 cancer types examined were lower than projected based on pre-2020 trends. These were leukaemia, thyroid cancer, kidney cancer, non-Hodgkin lymphoma, pancreatic cancer, multiple myeloma, and brain/CNS, lung and prostate cancers.
- 4,394 microscopically verified cases of prostate cancer were projected, compared with 3,819 registered (13% lower).

4. Combined numbers of cancer cases diagnosed in 2020 and 2021 (preliminary 2021 case counts)

Overall, when case numbers for 2020 and 2021 were combined, there was an 8% shortfall in registered invasive cancer cases (excluding NMSC) compared to the projected number (Appendix III), equivalent to 4,321 fewer cases than expected. There was a 7% shortfall for females (1,167 fewer cases) and a 9% shortfall for males (2,650 fewer cases).

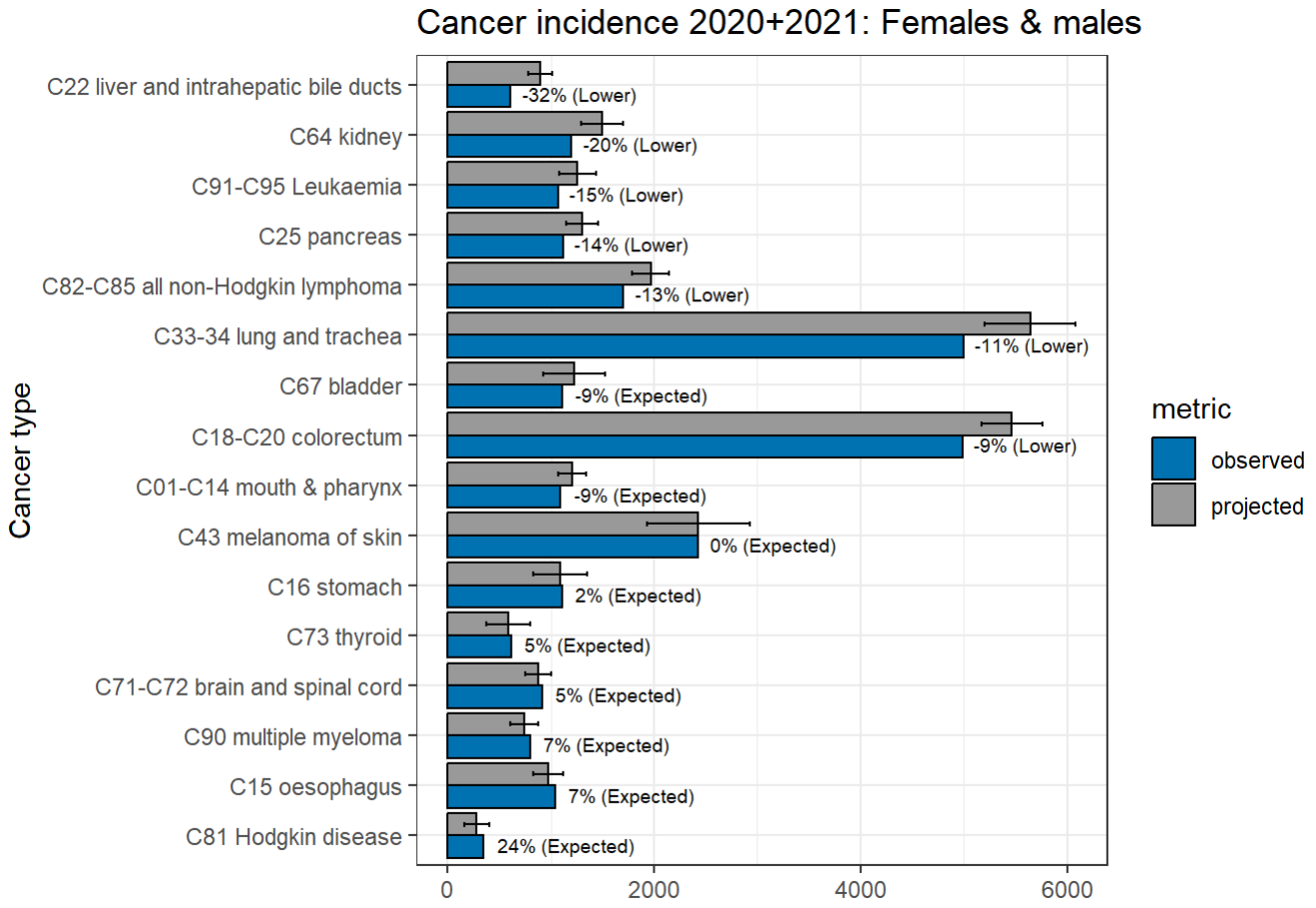
For microscopically verified cases, the overall shortfall was also 8%, with an 8% shortfall for females and a 7% shortfall for males (Appendix IV).

These figures, and equivalent figures for individual cancers, may help provide an indication of the extent to which shortfalls in 2020 may have been compensated for by any recovery in numbers diagnosed in 2021.

For 2020 and 2021 in total, liver cancer, kidney cancer and leukaemia showed the largest shortfalls among cancers in males and females combined; liver, bladder and kidney cancers the largest shortfalls among cancers in females; and liver, kidney and thyroid cancers the largest shortfalls among cancers in males (Figures 4.1, 4.2).

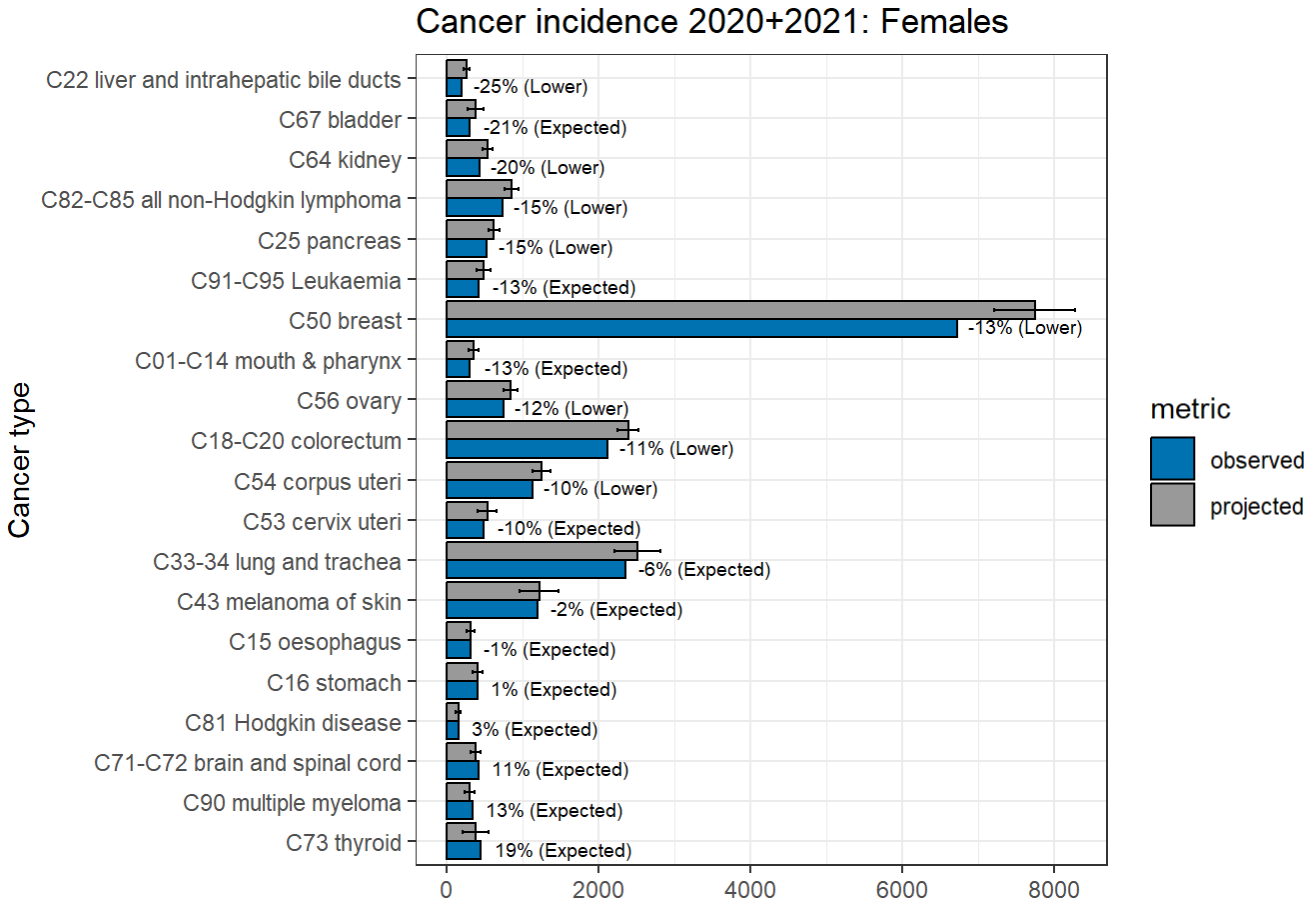
Among the four most common cancers (other than NMSC), prostate and female breast cancers had respective shortfalls of 14% and 13%, respectively, for 2020 and 2021 combined. Lung cancer case numbers were 16% lower than expected over the two years in males but within prediction interval limits in females (overall 11% lower for both sexes). Colorectal cancer had a shortfall of 11% in females and 7% in males, amounting to a total shortfall of 9% in both sexes over years 2020 and 2021 (Figure 4.1, Appendix III).

FIGURE 4.1. GRAPHICAL DISPLAY OF OBSERVED (REGISTERED) *VS.* PROJECTED CASE NUMBERS FOR 2020 AND 2021 COMBINED: SORTED ON PERCENTAGE SHORTFALL



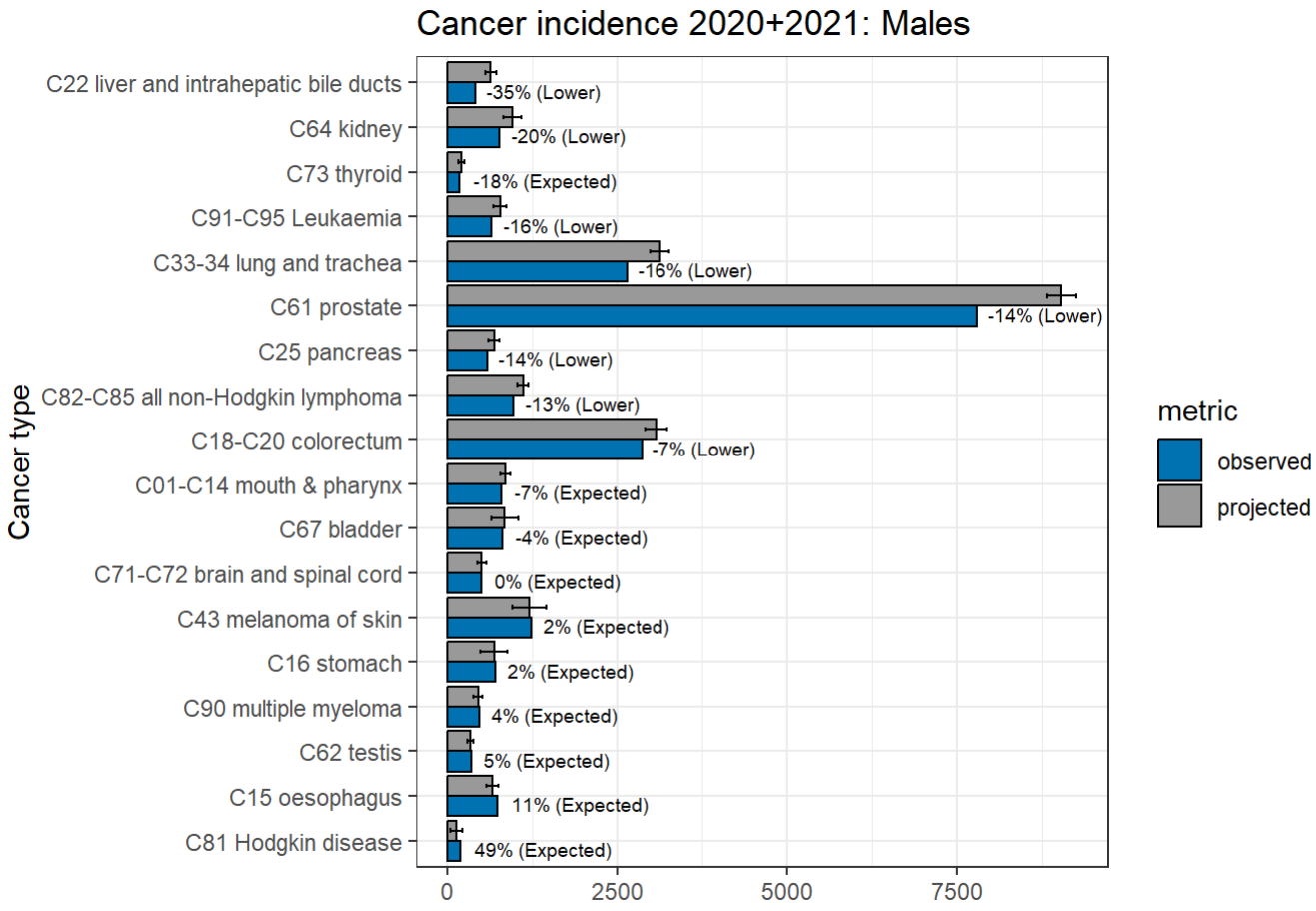
Data labels show the percentage change from the sum of projected cases for 2020 and 2021 to the sum of registered (observed) cases in 2020 and 2021. Whether the observed number was higher, lower or within the predicted range of the projected number is shown in brackets as “Higher”, “Lower” or “Expected”.

- In both sexes combined in 2020 and 2021, observed case numbers of 7 out of the 16 cancer types examined were lower than projected based on pre-2020 trends. These were liver and kidney cancers, leukaemia, pancreatic cancer, non-Hodgkin lymphoma, and lung and colorectal cancers.



Data labels show the percentage change from the sum of projected cases for 2020 and 2021 to the sum of registered (observed) cases in 2020 and 2021. Whether the observed number was higher, lower or within the predicted range of the projected number is shown in brackets as “Higher”, “Lower” or “Expected”.

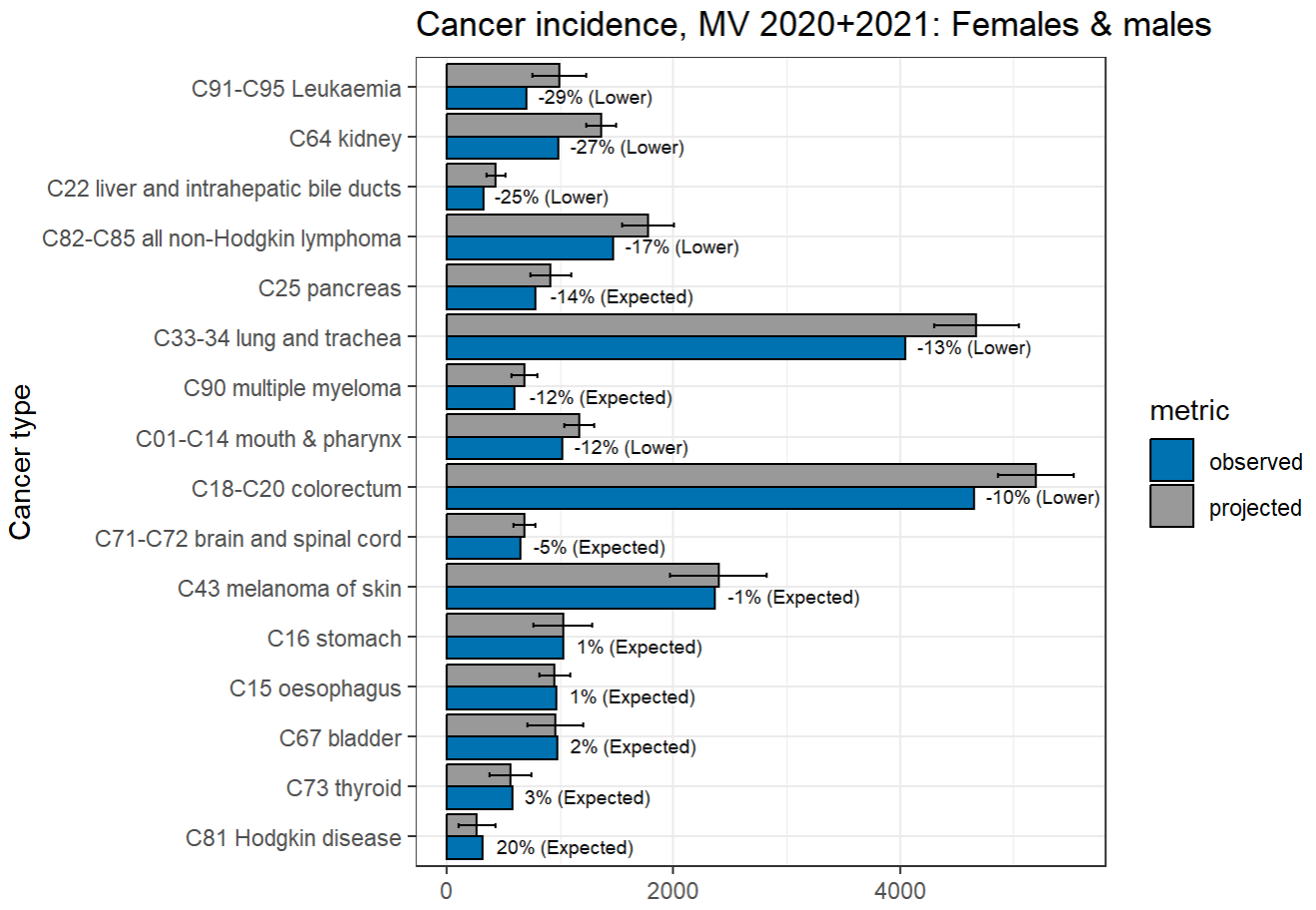
- In females, in 2020 and 2021 combined, case numbers of 8 out of the 20 cancer types examined were lower than projected based on pre-2020 trends. These were liver and kidney cancers, non-Hodgkin lymphoma, pancreatic, breast, ovarian, colorectal and uterine cancers.



Data labels show the percentage change from the sum of projected cases for 2020 and 2021 to the sum of registered (observed) cases in 2020 and 2021. Whether the observed number was higher, lower or within the predicted range of the projected number is shown in brackets as “Higher”, “Lower” or “Expected”.

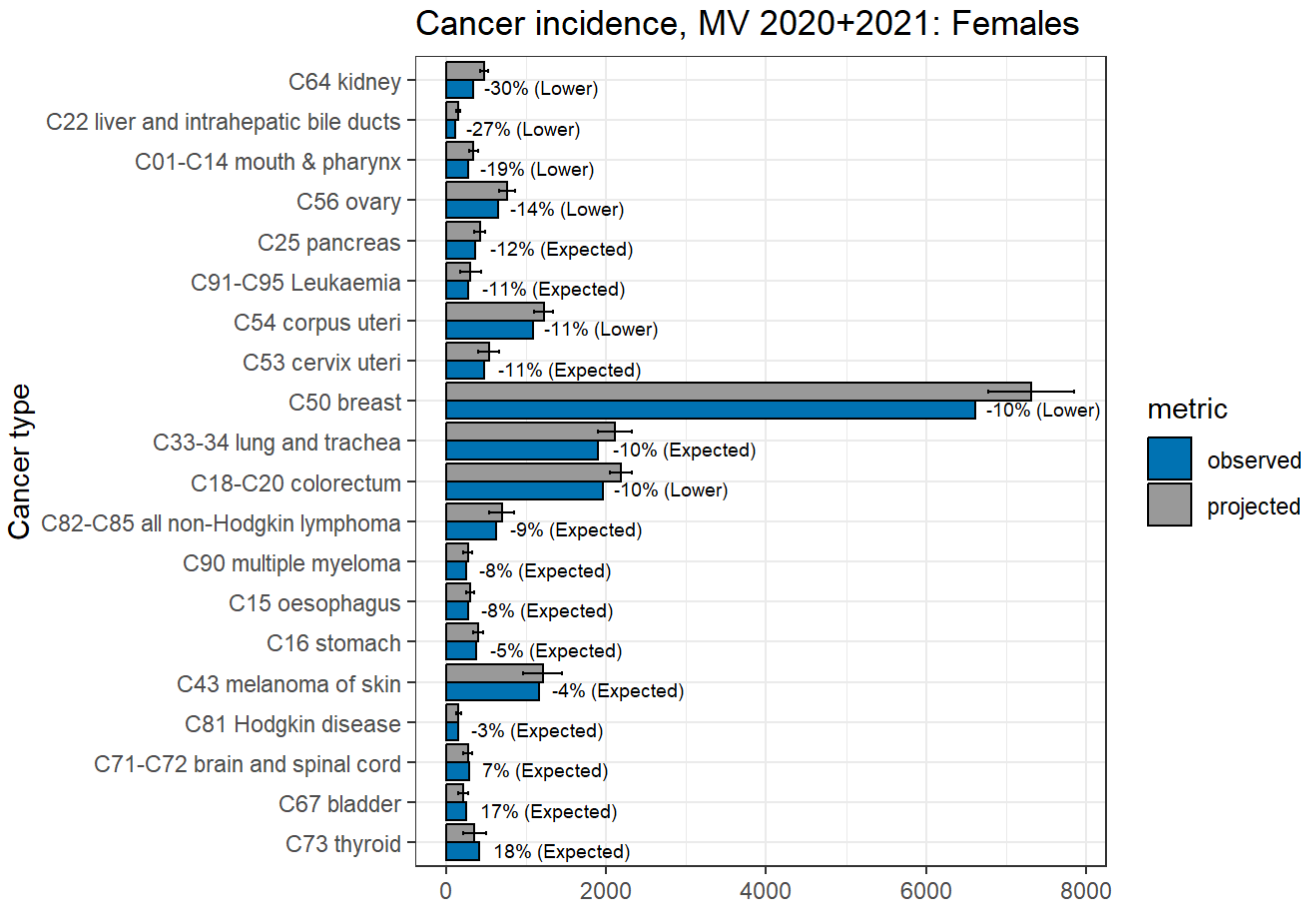
- In males, in 2020 and 2021 combined, case numbers of 10 out of the 20 cancer types examined were lower than projected based on pre-2020 trends. These were liver and kidney cancers, leukaemia, lung, prostate and pancreatic cancers, non-Hodgkin lymphoma, and colorectal cancer.

FIGURE 4.2. GRAPHICAL DISPLAY OF OBSERVED (REGISTERED) MICROSCOPICALLY VERIFIED CASE COUNT *VS.* PROJECTED CASE COUNT FOR 2020 AND 2021 COMBINED: SORTED ON PERCENTAGE SHORTFALL



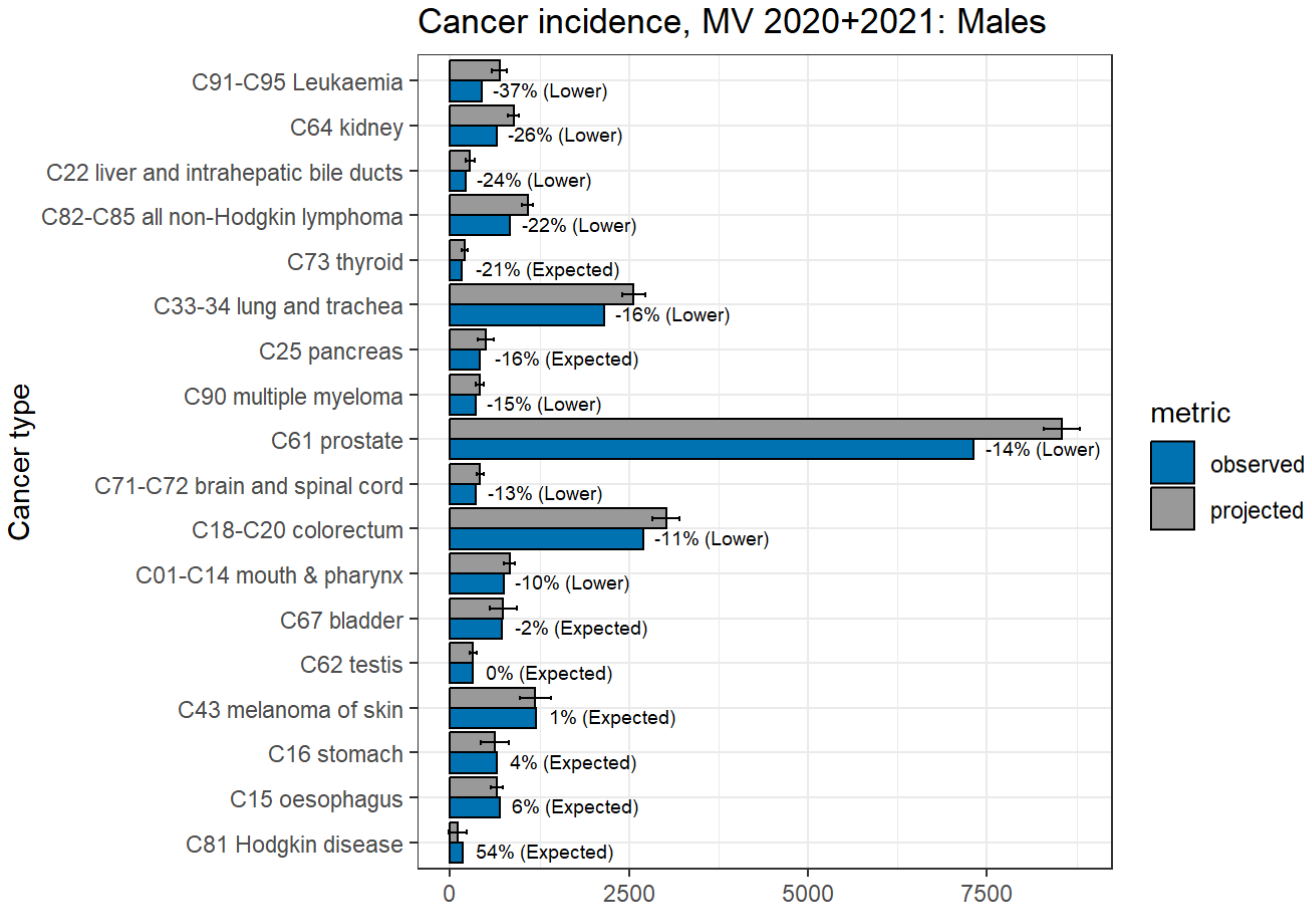
Number of microscopically verified (MV) cancer cases diagnosed in 2020 and 2021 combined. Data labels show the percentage change from the sum of projected microscopically verified cases for 2020 and 2021 to the sum of registered (observed) microscopically verified cases in 2020 and 2021. Whether the observed number was higher, lower or within the predicted range of the projected number is shown in brackets as “Higher”, “Lower” or “Expected”.

- In both sexes combined in 2020 and 2021, numbers of microscopically verified cases of 7 out of the 16 cancer types examined were lower than projected based on pre-2020 trends. These were leukaemia, kidney and liver cancers, non-Hodgkin lymphoma, and lung, mouth/pharynx and colorectal cancers.



Number of microscopically verified (MV) cancer cases diagnosed in 2020 and 2021 combined. Data labels show the percentage change from the sum of projected microscopically verified cases for 2020 and 2021 to the sum of registered (observed) microscopically verified cases in 2020 and 2021. Whether the observed number was higher, lower or within the predicted range of the projected number is shown in brackets as “Higher”, “Lower” or “Expected”.

- In females, in 2020 and 2021 combined, numbers of microscopically verified cases of 7 out of the 20 cancer types examined were lower than projected based on pre-2020 trends. These were liver, kidney, mouth/ pharynx, ovarian, uterine, breast and colorectal cancers.



Number of microscopically verified (MV) cancer cases diagnosed in 2020 and 2021 combined. Data labels show the percentage change from the sum of projected microscopically verified cases for 2020 and 2021 to the sum of registered (observed) microscopically verified cases in 2020 and 2021. Whether the observed number was higher, lower or within the predicted range of the projected number is shown in brackets as “Higher”, “Lower” or “Expected”.

- In males, in 2020 and 2021 combined, numbers of microscopically verified cases of 10 out of the 20 cancer types examined were lower than projected based on pre-2020 trends. These were leukaemia, kidney and liver cancers, non-Hodgkin lymphoma, lung cancer, multiple myeloma, prostate, brain/CNS, colorectal and mouth/pharynx cancers.

5. Conclusions

The overall shortfall of 6% in provisional numbers of total registered cancer cases in 2021, and a similar shortfall of 5% in microscopically verified cases, indicate a continued impact of the COVID-19 pandemic on numbers of new cancer diagnoses. Numbers in 2021 represented 1664 fewer cases than expected. However, the shortfall in cancer registrations in 2021 was lower than the shortfall of 10% observed for cancers diagnosed in 2020 [1].

Numbers of certain cancers which were severely impacted by the COVID-19 pandemic in 2020 (e.g. female breast cancer which had a shortfall of 23% and colorectal cancer which had a shortfall of 18% in 2020) returned to within prediction interval limits in 2021. In contrast, numbers of some other cancers such as leukaemia, liver, pancreatic, and kidney cancers appear to remain impacted by the disruptions that occurred as a result of COVID-19. The patterns (and variation between 2020 and 2021) seen for many specific cancers cannot at present be readily explained, unlike cancers influenced by pandemic-related pausing and subsequent restoration of screening services.

Although the cyberattack on Health Service Executive systems in May 2021 caused some further disruption to cancer services, we do not, at this point, consider it likely that this substantially impacted the numbers of cancers diagnosed in 2021. We also believe, based on current assessment of NCRI data, that the cyberattack has not significantly impacted the completeness of the 2021 incidence figures reported here.

Overall, based on data available for this report, we estimate that about 4,320 fewer cancer cases than expected were diagnosed in the years 2020 and 2021 combined. Some of these 'missing' cancers might be accounted for by COVID-related deaths among older persons who might (in the absence of the pandemic) have gone on to be diagnosed with cancer. However, there are concerns that substantial numbers of 'missed' cancers might subsequently present at a more advanced stage, requiring more complex treatments (where treatable) and having poorer survival outcomes.

Additional NCRI work is ongoing in collaboration with the RCSI University of Medicine and Health Sciences and other collaborators to assess further implications of COVID-19 disruptions on cancer services and outcomes (including stage and survival) in Ireland. Tracking the potential longer-term impacts of these disruptions on cancer outcomes will remain an important task over the coming years.

6. References

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APPENDIX I: OBSERVED VS. PROJECTED CANCER INCIDENCE, 2021

Sex	Cancer	Observed 2021	Projected 2021	95%PI	% change	Obs. relative to PI
M	**C00-43 C45-96, all invasive cancers excl. NMSC**	13248	14489	14127-14851	-9%	Lower
M	C01-C14 mouth & pharynx	427	438	402-475	-3%	Expected
M	C15 oesophagus	377	334	288-381	13%	Expected
M	C16 stomach	360	339	235-443	6%	Expected
M	C18-C20 colorectum	1576	1532	1446-1617	3%	Expected
M	C22 liver and intrahepatic bile ducts	203	330	291-370	-39%	Lower
M	C25 pancreas	271	347	305-388	-22%	Lower
M	C33-34 lung and trachea	1278	1580	1510-1650	-19%	Lower
M	C43 melanoma of skin	642	610	479-742	5%	Expected
M	C61 prostate	4048	4646	4531-4762	-13%	Lower
M	C62 testis	195	165	143-188	18%	Higher
M	C64 kidney	403	486	419-553	-17%	Lower
M	C67 bladder	410	440	329-550	-7%	Expected
M	C71-C72 brain and spinal cord	234	255	224-286	-8%	Expected
M	C73 thyroid	78	107	84-130	-27%	Lower
M	C81 Hodgkin disease	97	61	12-111	58%	Expected
M	C82-C85 all non-Hodgkin lymphoma	483	567	526-608	-15%	Lower
M	C90 multiple myeloma	226	228	194-262	-1%	Expected
M	C91-C95 Leukaemia	332	389	342-436	-15%	Lower
Sex	**Cancer**	**Observed 2021**	**Projected 2021**	**95%PI**	**% change**	**Obs. relative to PI**
F	**C00-43 C45-96, all invasive cancers excl. NMSC**	11798	12221	11824-12618	-3%	Lower
F	C01-C14 mouth & pharynx	171	180	148-211	-5%	Expected
F	C15 oesophagus	146	159	132-186	-8%	Expected
F	C16 stomach	207	206	174-238	0%	Expected
F	C18-C20 colorectum	1172	1206	1138-1275	-3%	Expected
F	C22 liver and intrahepatic bile ducts	97	137	119-155	-29%	Lower
F	C25 pancreas	220	314	279-350	-30%	Lower
F	C33-34 lung and trachea	1169	1261	1095-1427	-7%	Expected
F	C43 melanoma of skin	628	613	477-748	2%	Expected
F	C50 breast	3797	3951	3669-4233	-4%	Expected
F	C53 cervix uteri	296	264	198-330	12%	Expected
F	C54 corpus uteri	591	639	579-698	-7%	Expected
F	C56 ovary	324	426	381-471	-24%	Lower
F	C64 kidney	203	273	236-310	-26%	Lower
F	C67 bladder	155	202	146-258	-23%	Expected
F	C71-C72 brain and spinal cord	206	190	157-223	8%	Expected
F	C73 thyroid	230	189	103-276	22%	Expected
F	C81 Hodgkin disease	81	79	62-96	2%	Expected
F	C82-C85 all non-Hodgkin lymphoma	386	435	386-483	-11%	Lower
F	C90 multiple myeloma	153	151	118-183	2%	Expected
F	C91-C95 Leukaemia	205	245	202-289	-16%	Expected
Sex	**Cancer**	**Observed 2021**	**Projected 2021**	**95%PI**	**% change**	**Obs. relative to PI**
ALL	**C00-43 C45-96, all invasive cancers excl. NMSC**	25046	26710	25950-27469	-6%	Lower
ALL	C01-C14 mouth & pharynx	598	618	550-686	-3%	Expected
ALL	C15 oesophagus	523	493	420-567	6%	Expected
ALL	C16 stomach	567	545	409-681	4%	Expected
ALL	C18-C20 colorectum	2748	2738	2584-2892	0%	Expected
ALL	C22 liver and intrahepatic bile ducts	300	467	409-524	-36%	Lower
ALL	C25 pancreas	491	661	584-738	-26%	Lower
ALL	C33-34 lung and trachea	2447	2841	2605-3077	-14%	Lower
ALL	C43 melanoma of skin	1270	1223	956-1490	4%	Expected
ALL	C64 kidney	606	759	654-863	-20%	Lower
ALL	C67 bladder	565	642	476-808	-12%	Expected
ALL	C71-C72 brain and spinal cord	440	445	380-509	-1%	Expected
ALL	C73 thyroid	308	297	187-406	4%	Expected
ALL	C81 Hodgkin disease	178	140	74-206	27%	Expected
ALL	C82-C85 all non-Hodgkin lymphoma	869	1002	912-1091	-13%	Lower
ALL	C90 multiple myeloma	379	378	311-445	0%	Expected
ALL	C91-C95 Leukaemia	537	634	544-724	-15%	Lower

Interpretation of Appendix I table (above): Based on the last stable trend (pre-2020) in incident cases for each cancer type, the projected number of cases was calculated for 2021 (ignoring the effect of the COVID-19 pandemic). The column '% change' presents the percentage change from the projected number to the observed number *i.e.* [(observed 2021/projected 2021) -1]*100. The column 'Obs. relative to PI' notes whether the observed number is higher, lower, or in the expected range of the 95% prediction interval (95%PI) of the projected number.

APPENDIX II: OBSERVED VS. PROJECTED MICROSCOPICALLY VERIFIED CASES, 2021

Sex	Cancer	Observed 2021	Projected 2021	95%PI	% change	Obs. relative to PI
M	**C00-C43, C45-C96 all invasive cancers, excluding NMSC**	**11602**	**12322**	**11859-12785**	**-6**	**Lower**
M	C01-C14 mouth & pharynx	401	426	389-462	-6	Expected
M	C15 oesophagus	355	332	291-372	7	Expected
M	C16 stomach	339	311	208-413	9	Expected
M	C18-C20 colorectum	1474	1512	1411-1614	-3	Expected
M	C22 liver and intrahepatic bile ducts	111	143	110-176	-22	Expected
M	C25 pancreas	192	252	197-307	-24	Lower
M	C33-34 lung and trachea	1058	1293	1209-1376	-18	Lower
M	C43 melanoma of skin	622	601	484-719	3	Expected
M	C61 prostate	3819	4394	4258-4529	-13	Lower
M	C62 testis	174	160	135-185	9	Expected
M	C64 kidney	332	455	414-496	-27	Lower
M	C67 bladder	364	387	286-487	-6	Expected
M	C71-C72 brain and spinal cord	168	211	187-236	-21	Lower
M	C73 thyroid	77	107	84-130	-28	Lower
M	C81 Hodgkin disease	88	52	0-141	68	Expected
M	C82-C85 all non-Hodgkin lymphoma	417	552	515-589	-24	Lower
M	C90 multiple myeloma	167	211	182-240	-21	Lower
M	C91-C95 Leukaemia	209	346	295-397	-40	Lower
Sex	**Cancer**	**Observed 2021**	**Projected 2021**	**95%PI**	**% change**	**Obs. relative to PI**
F	**C00-C43, C45-C96 all invasive cancers, excluding NMSC**	**10547**	**10965**	**10751-11180**	**-4**	**Lower**
F	C01-C14 mouth & pharynx	159	173	144-202	-8	Expected
F	C15 oesophagus	132	152	125-178	-13	Expected
F	C16 stomach	192	200	168-231	-4	Expected
F	C18-C20 colorectum	1091	1100	1029-1171	-1	Expected
F	C22 liver and intrahepatic bile ducts	56	78	67-89	-28	Lower
F	C25 pancreas	167	212	174-250	-21	Lower
F	C33-34 lung and trachea	960	1065	954-1176	-10	Expected
F	C43 melanoma of skin	608	605	475-736	0	Expected
F	C50 breast	3714	3708	3435-3981	0	Expected
F	C53 cervix uteri	294	263	197-330	12	Expected
F	C54 corpus uteri	568	623	565-681	-9	Expected
F	C56 ovary	287	384	336-431	-25	Lower
F	C64 kidney	161	243	217-268	-34	Lower
F	C67 bladder	134	106	76-136	26	Expected
F	C71-C72 brain and spinal cord	152	136	111-162	12	Expected
F	C73 thyroid	205	175	103-248	17	Expected
F	C81 Hodgkin disease	77	78	61-95	-1	Expected
F	C82-C85 all non-Hodgkin lymphoma	324	347	267-428	-7	Expected
F	C90 multiple myeloma	106	137	109-165	-22	Lower
F	C91-C95 Leukaemia	120	147	75-218	-18	Expected
Sex	**Cancer**	**Observed 2021**	**Projected 2021**	**95%PI**	**% change**	**Obs. relative to PI**
ALL	C00-C43, C45-C96 all invasive cancers, excluding NMSC	22149	23287	22610-23965	-5	Lower
ALL	C01-C14 mouth & pharynx	560	599	533-664	-6	Expected
ALL	C15 oesophagus	487	483	416-550	1	Expected
ALL	C16 stomach	531	510	376-644	4	Expected
ALL	C18-C20 colorectum	2565	2613	2441-2785	-2	Expected
ALL	C22 liver and intrahepatic bile ducts	167	221	178-265	-25	Lower
ALL	C25 pancreas	359	464	371-557	-23	Lower
ALL	C33-34 lung and trachea	2018	2357	2163-2552	-14	Lower
ALL	C43 melanoma of skin	1230	1207	959-1454	2	Expected
ALL	C64 kidney	493	698	631-764	-29	Lower
ALL	C67 bladder	498	493	362-624	1	Expected
ALL	C71-C72 brain and spinal cord	320	348	298-398	-8	Expected
ALL	C73 thyroid	282	282	187-377	0	Expected
ALL	C81 Hodgkin disease	165	131	43-219	26	Expected
ALL	C82-C85 all non-Hodgkin lymphoma	741	900	782-1017	-18	Lower
ALL	C90 multiple myeloma	273	348	291-405	-22	Lower
ALL	C91-C95 Leukaemia	329	492	370-615	-33	Lower

Interpretation of Appendix II table (above): Based on the last stable trend (pre-2020) in microscopically verified incident cases for each cancer type, the projected number of cases was calculated for 2021 (ignoring the effect of the COVID-19 pandemic). The column '% change' presents the percentage change from the projected number to the observed number *i.e.* [(observed 2021/projected 2021) -1]*100. The column 'Obs. relative to PI' notes whether the observed number is higher, lower, or in the expected range of the 95% prediction interval (95%PI) of the projected number.

APPENDIX III: OBSERVED VS. PROJECTED CANCER INCIDENCE, 2020 + 2021 COMBINED

Sex	Cancer	Observed 2020+2021	Projected 2020+2021	95%PI	% change	Obs. relative to PI
M	C00-C43, C45-C96 all invasive cancers, excluding NMSC	25833	28483	27803-29164	-9	Lower
M	C01-C14 mouth & pharynx	791	854	783-927	-7	Expected
M	C15 oesophagus	734	660	568-753	11	Expected
M	C16 stomach	701	684	487-881	2	Expected
M	C18-C20 colorectum	2866	3070	2910-3229	-7	Lower
M	C22 liver and intrahepatic bile ducts	412	635	557-714	-35	Lower
M	C25 pancreas	589	684	601-766	-14	Lower
M	C33-34 lung and trachea	2641	3127	2988-3266	-16	Lower
M	C43 melanoma of skin	1232	1208	962-1454	2	Expected
M	C61 prostate	7792	9038	8821-9256	-14	Lower
M	C62 testis	349	331	287-376	5	Expected
M	C64 kidney	771	959	829-1089	-20	Lower
M	C67 bladder	811	845	643-1046	-4	Expected
M	C71-C72 brain and spinal cord	502	504	442-566	0	Expected
M	C73 thyroid	170	207	161-253	-18	Expected
M	C81 Hodgkin disease	189	127	38-218	49	Expected
M	C82-C85 all non-Hodgkin lymphoma	973	1113	1031-1194	-13	Lower
M	C90 multiple myeloma	465	449	381-517	4	Expected
M	C91-C95 Leukaemia	651	772	680-865	-16	Lower
Sex	**Cancer**	**Observed 2020+2021**	**Projected 2020+2021**	**95%PI**	**% change**	**Obs. relative to PI**
F	C00-C43, C45-C96 all invasive cancers, excluding NMSC	22450	24121	23342-24899	-7	Lower
F	C01-C14 mouth & pharynx	305	352	289-415	-13	Expected
F	C15 oesophagus	313	316	262-370	-1	Expected
F	C16 stomach	414	411	347-475	1	Expected
F	C18-C20 colorectum	2123	2392	2256-2529	-11	Lower
F	C22 liver and intrahepatic bile ducts	200	265	229-301	-25	Lower
F	C25 pancreas	530	621	551-692	-15	Lower
F	C33-34 lung and trachea	2351	2513	2210-2815	-6	Expected
F	C43 melanoma of skin	1192	1220	967-1472	-2	Expected
F	C50 breast	6727	7748	7213-8283	-13	Lower
F	C53 cervix uteri	481	533	403-662	-10	Expected
F	C54 corpus uteri	1126	1250	1130-1368	-10	Lower
F	C56 ovary	746	846	756-935	-12	Lower
F	C64 kidney	429	539	467-610	-20	Lower
F	C67 bladder	300	382	280-484	-21	Expected
F	C71-C72 brain and spinal cord	418	376	310-442	11	Expected
F	C73 thyroid	451	380	215-547	19	Expected
F	C81 Hodgkin disease	161	156	122-189	3	Expected
F	C82-C85 all non-Hodgkin lymphoma	731	856	759-952	-15	Lower
F	C90 multiple myeloma	336	298	233-363	13	Expected
F	C91-C95 Leukaemia	421	486	400-573	-13	Expected
Sex	**Cancer**	**Observed 2020+2021**	**Projected 2020+2021**	**95%PI**	**% change**	**Obs. relative to PI**
ALL	C00-C43, C45-C96 all invasive cancers, excluding NMSC	48283	52604	51144-54063	-8	Lower
ALL	C01-C14 mouth & pharynx	1096	1207	1072-1342	-9	Expected
ALL	C15 oesophagus	1047	976	830-1123	7	Expected
ALL	C16 stomach	1115	1095	834-1356	2	Expected
ALL	C18-C20 colorectum	4989	5462	5166-5758	-9	Lower
ALL	C22 liver and intrahepatic bile ducts	612	900	785-1014	-32	Lower
ALL	C25 pancreas	1119	1304	1152-1458	-14	Lower
ALL	C33-34 lung and trachea	4992	5640	5198-6081	-11	Lower
ALL	C43 melanoma of skin	2424	2427	1929-2926	0	Expected
ALL	C64 kidney	1200	1498	1295-1699	-20	Lower
ALL	C67 bladder	1111	1227	924-1530	-9	Expected
ALL	C71-C72 brain and spinal cord	920	880	751-1008	5	Expected
ALL	C73 thyroid	621	589	376-800	5	Expected
ALL	C81 Hodgkin disease	350	283	160-406	24	Expected
ALL	C82-C85 all non-Hodgkin lymphoma	1704	1969	1790-2146	-13	Lower
ALL	C90 multiple myeloma	801	747	613-880	7	Expected
ALL	C91-C95 Leukaemia	1072	1259	1080-1437	-15	Lower

Interpretation of Appendix III table (above): Based on the last stable trend (pre-2020) in incident cases for each cancer type, the projected numbers of cases were calculated for 2020 and 2021 (ignoring the effect of the COVID-19 pandemic) and summed. The column '% change' presents the percentage change from the projected number to the observed number *i.e.* [(observed 2020 & 2021/projected 2020 & 2021) -1]*100. The column 'Obs. relative to PI' notes whether the observed number is higher, lower, or in the expected range of the 95% prediction interval (95%PI) of the projected number.

APPENDIX IV: OBSERVED VS. PROJECTED MICROSCOPICALLY VERIFIED CASES, 2020 + 2021 COMBINED

Sex	Cancer	Observed 2021	Projected 2021	95%PI	% change	Obs. relative to PI
M	C00-C43, C45-C96 all invasive cancers, excluding NMSC	22581	24394	23490-25298	-7	Lower
M	C01-C14 mouth & pharynx	747	830	758-902	-10	Lower
M	C15 oesophagus	692	654	572-734	6	Expected
M	C16 stomach	655	630	435-824	4	Expected
M	C18-C20 colorectum	2699	3016	2820-3212	-11	Lower
M	C22 liver and intrahepatic bile ducts	213	282	219-345	-24	Lower
M	C25 pancreas	421	499	392-606	-16	Expected
M	C33-34 lung and trachea	2148	2565	2401-2727	-16	Lower
M	C43 melanoma of skin	1205	1191	972-1411	1	Expected
M	C61 prostate	7318	8549	8296-8801	-14	Lower
M	C62 testis	321	321	272-371	0	Expected
M	C64 kidney	653	886	805-968	-26	Lower
M	C67 bladder	728	745	562-928	-2	Expected
M	C71-C72 brain and spinal cord	364	417	369-466	-13	Lower
M	C73 thyroid	163	207	161-252	-21	Expected
M	C81 Hodgkin disease	171	111	0-258	54	Expected
M	C82-C85 all non-Hodgkin lymphoma	843	1084	1010-1158	-22	Lower
M	C90 multiple myeloma	354	415	357-472	-15	Lower
M	C91-C95 Leukaemia	438	690	589-790	-37	Lower
Sex	**Cancer**	**Observed 2021**	**Projected 2021**	**95%PI**	**% change**	**Obs. relative to PI**
F	C00-C43, C45-C96 all invasive cancers, excluding NMSC	19895	21686	21266-22107	-8	Lower
F	C01-C14 mouth & pharynx	276	339	281-397	-19	Lower
F	C15 oesophagus	276	301	248-353	-8	Expected
F	C16 stomach	378	397	334-460	-5	Expected
F	C18-C20 colorectum	1959	2185	2044-2325	-10	Lower
F	C22 liver and intrahepatic bile ducts	110	150	128-172	-27	Lower
F	C25 pancreas	366	418	345-492	-12	Expected
F	C33-34 lung and trachea	1901	2112	1899-2325	-10	Expected
F	C43 melanoma of skin	1160	1206	963-1449	-4	Expected
F	C50 breast	6610	7318	6781-7855	-10	Lower
F	C53 cervix uteri	470	531	401-661	-11	Expected
F	C54 corpus uteri	1082	1219	1103-1334	-11	Lower
F	C56 ovary	652	762	666-856	-14	Lower
F	C64 kidney	334	474	423-524	-30	Lower
F	C67 bladder	250	213	153-272	17	Expected
F	C71-C72 brain and spinal cord	289	269	218-320	7	Expected
F	C73 thyroid	416	354	215-493	18	Expected
F	C81 Hodgkin disease	149	154	120-188	-3	Expected
F	C82-C85 all non-Hodgkin lymphoma	629	695	542-850	-9	Expected
F	C90 multiple myeloma	248	270	214-326	-8	Expected
F	C91-C95 Leukaemia	270	305	171-438	-11	Expected
Sex	**Cancer**	**Observed 2021**	**Projected 2021**	**95%PI**	**% change**	**Obs. relative to PI**
ALL	C00-C43, C45-C96 all invasive cancers, excluding NMSC	42476	46080	44756-47405	-8	Lower
ALL	C01-C14 mouth & pharynx	1023	1169	1039-1299	-12	Lower
ALL	C15 oesophagus	968	954	820-1087	1	Expected
ALL	C16 stomach	1033	1026	769-1284	1	Expected
ALL	C18-C20 colorectum	4658	5202	4865-5537	-10	Lower
ALL	C22 liver and intrahepatic bile ducts	323	432	348-517	-25	Lower
ALL	C25 pancreas	787	917	737-1098	-14	Expected
ALL	C33-34 lung and trachea	4049	4676	4300-5052	-13	Lower
ALL	C43 melanoma of skin	2365	2399	1972-2825	-1	Expected
ALL	C64 kidney	987	1360	1228-1492	-27	Lower
ALL	C67 bladder	978	958	715-1201	2	Expected
ALL	C71-C72 brain and spinal cord	653	687	587-786	-5	Expected
ALL	C73 thyroid	579	561	376-744	3	Expected
ALL	C81 Hodgkin disease	320	266	102-429	20	Expected
ALL	C82-C85 all non-Hodgkin lymphoma	1472	1780	1552-2008	-17	Lower
ALL	C90 multiple myeloma	602	685	571-798	-12	Expected
ALL	C91-C95 Leukaemia	708	994	760-1228	-29	Lower

Interpretation of Appendix IV table (above): Based on the last stable trend (pre-2020) in microscopically verified incident cases for each cancer type, the projected numbers of microscopically verified cases were calculated for 2020 and 2021 (ignoring the effect of the COVID-19 pandemic) and summed. The column '% change' presents the percentage change from the projected number to the observed number *i.e.* [(observed/projected) -1]*100. The column 'Obs. relative to PI' notes whether the observed number is higher, lower, or in the expected range of the 95% prediction interval (95%PI) of the projected number.

APPENDIX V: OBSERVED VS. PROJECTED CANCER INCIDENCE, 2020

Figures as previously published in 'Cancer in Ireland 1994-2020: Annual Statistical Report of the National Cancer Registry' [1]

sex	cancer	Observed 2020	Projected 2020	95%PI	% change	Obs. relative to PI
M	C00-43 C45-96 all invasive cancers excl. NMSC	12585	13994	13676-14313	-10%	**Lower**
M	C01-14 mouth & pharynx	364	416	381-452	-13%	Lower
M	C15 oesophagus	357	326	280-372	10%	Expected
M	C16 stomach	341	345	252-438	-1%	Expected
M	C18-20 colorectal	1290	1538	1464-1612	-16%	Lower
M	C22 liver	209	305	266-344	-31%	Lower
M	C25 pancreas	318	337	296-378	-6%	Expected
M	C33-34 lung	1363	1547	1478-1616	-12%	Lower
M	C43 melanoma of skin	590	598	483-712	-1%	Expected
M	C61 prostate	3744	4392	4290-4494	-15%	Lower
M	C62 testis	154	166	144-188	-7%	Expected
M	C64 kidney	368	473	410-536	-22%	Lower
M	C67 bladder	401	405	314-496	-1%	Expected
M	C71-72 brain & CNS	268	249	218-280	8%	Expected
M	C73 thyroid	92	100	77-123	-8%	Expected
M	C81 Hodgkin lymphoma	92	66	26-107	39%	Expected
M	C82-85 non-Hodgkin lymphoma	490	546	505-586	-10%	Lower
M	C90 multiple myeloma	239	221	187-255	8%	Expected
M	C91-95 leukaemia	319	383	338-429	-17%	Lower
sex	**cancer**	**Observed 2020**	**Projected 2020**	**95%PI**	**% change**	
F	C00-43 C45-96 all invasive cancers excl. NMSC	10652	11900	11518-12281	-10%	**Lower**
F	C01-14 mouth & pharynx	134	172	141-204	-22%	Lower
F	C15 oesophagus	167	157	130-184	6%	Expected
F	C16 stomach	207	205	173-237	1%	Expected
F	C18-20 colorectal	951	1186	1118-1254	-20%	Lower
F	C22 liver	103	128	110-146	-19%	Lower
F	C25 pancreas	310	307	272-342	1%	Expected
F	C33-34 lung	1182	1252	1115-1388	-6%	Expected
F	C43 melanoma of skin	564	607	490-724	-7%	Expected
F	C50 breast	2930	3797	3544-4050	-23%	Lower
F	C53 cervix	185	269	205-332	-31%	Lower
F	C54 corpus uteri	535	611	551-670	-12%	Lower
F	C56 ovary	422	420	375-464	1%	Expected
F	C64 kidney	226	266	231-300	-15%	Expected
F	C67 bladder	145	180	134-226	-19%	Expected
F	C71-72 brain & CNS	212	186	153-219	14%	Expected
F	C73 thyroid	221	191	112-271	15%	Expected
F	C81 Hodgkin lymphoma	80	77	60-93	4%	Expected
F	C82-85 non-Hodgkin lymphoma	345	421	373-469	-18%	Lower
F	C90 multiple myeloma	183	147	115-180	24%	Higher
F	C91-95 leukaemia	216	241	198-284	-11%	Expected
sex	**cancer**	**Observed 2020**	**Projected 2020**	**95%PI**	**% change**	
All	C00-43 C45-96 all invasive cancers excl. NMSC	23237	25894	25194-26594	-10%	**Lower**
All	C01-14 mouth & pharynx	498	589	522-656	-15%	Lower
All	C15 oesophagus	524	483	410-556	9%	Expected
All	C16 stomach	548	550	425-675	0%	Expected
All	C18-20 colorectal	2241	2724	2582-2866	-18%	Lower
All	C22 liver	312	433	376-490	-28%	Lower
All	C25 pancreas	628	643	568-720	-2%	Expected
All	C33-34 lung	2545	2799	2593-3004	-9%	Lower
All	C43 melanoma of skin	1154	1204	973-1436	-4%	Expected
All	C64 kidney	594	739	641-836	-20%	Lower
All	C67 bladder	546	585	448-722	-7%	Expected
All	C71-72 brain & CNS	480	435	371-499	10%	Expected
All	C73 thyroid	313	292	189-394	7%	Expected
All	C81 Hodgkin lymphoma	172	143	86-200	20%	Expected
All	C82-85 non-Hodgkin lymphoma	835	967	878-1055	-14%	Lower
All	C90 multiple myeloma	422	369	302-435	14%	Expected
All	C91-95 leukaemia	535	625	536-713	-14%	Lower

Interpretation of Appendix V table (above): Based on the last stable trend (pre-2020) 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 column '% change' presents the percentage change from the projected number to the observed number *i.e.* [(observed 2020/projected 2020) -1]*100. The column 'Obs. relative to PI' notes whether the observed number is higher, lower, or in the expected range of the 95% prediction interval (95%PI) of the projected number

APPENDIX VI: OBSERVED VS. PROJECTED MICROSCOPICALLY VERIFIED CASES, 2020

Figures as previously published in 'Cancer in Ireland 1994-2020: Annual Statistical Report of the National Cancer Registry' [1]

sex	cancer	Observed 2020	Projected 2020	95%PI	% change	Obs. relative to PI
M	C00-C43 C45-C96 all invasive cancers excl. NMSC	10979	12072	11631-12513	-9%	**Lower**
M	C01-14 mouth & pharynx	346	404	369-440	-14%	Lower
M	C15 oesophagus	337	322	281-362	5%	Expected
M	C16 stomach	316	319	227-411	-1%	Expected
M	C18-20 colorectal	1225	1504	1409-1598	-19%	Lower
M	C22 liver	102	139	109-169	-27%	Lower
M	C25 pancreas	229	247	195-299	-7%	Expected
M	C33-34 lung	1090	1272	1192-1351	-14%	Lower
M	C43 melanoma of skin	583	590	488-692	-1%	Expected
M	C61 prostate	3499	4155	4038-4272	-16%	Lower
M	C62 testis	147	161	137-186	-9%	Expected
M	C64 kidney	321	431	391-472	-26%	Lower
M	C67 bladder	364	358	276-441	2%	Expected
M	C71-72 brain & CNS	196	206	182-230	-5%	Expected
M	C73 thyroid	86	100	77-122	-14%	Expected
M	C81 Hodgkin lymphoma	83	59	0-117	41%	Expected
M	C82-85 non-Hodgkin lymphoma	426	532	495-569	-20%	Lower
M	C90 multiple myeloma	187	204	175-232	-8%	Expected
M	C91-95 leukaemia	229	344	294-393	-33%	Lower
sex	**cancer**	**Observed 2020**	**Projected 2020**	**95%PI**	**% change**	
F	C00-C43 C45-C96 all invasive cancers excl. NMSC	9348	10721	10515-10927	-13%	**Lower**
F	C01-C14 mouth & pharynx	117	166	137-195	-30%	Lower
F	C15 oesophagus	144	149	123-175	-3%	Expected
F	C16 stomach	186	197	166-229	-6%	Expected
F	C18-20 colorectal	868	1085	1015-1154	-20%	Lower
F	C22 liver	54	72	61-83	-25%	Lower
F	C25 pancreas	199	206	171-242	-3%	Expected
F	C33-34 lung	941	1047	945-1149	-10%	Lower
F	C43 melanoma of skin	552	601	488-713	-8%	Expected
F	C50 breast	2896	3610	3346-3874	-21%	Lower
F	C53 cervix	176	268	204-331	-34%	Lower
F	C54 corpus uteri	514	596	538-653	-14%	Lower
F	C56 ovary	365	378	330-425	-3%	Expected
F	C64 kidney	173	231	206-256	-25%	Lower
F	C67 bladder	116	107	77-136	8%	Expected
F	C71-C72 brain & CNS	137	133	107-158	3%	Expected
F	C73 thyroid	211	179	112-245	18%	Expected
F	C81 Hodgkin lymphoma	72	76	59-93	-5%	Expected
F	C82-C85 non-Hodgkin lymphoma	305	348	275-422	-12%	Expected
F	C90 multiple myeloma	142	133	105-161	7%	Expected
F	C91-95 leukaemia	150	158	96-220	-5%	Expected
sex	**cancer**	**Observed 2020**	**Projected 2020**	**95%PI**	**% change**	
All	C00-C43 C45-C96 all invasive cancers excl. NMSC	20327	22793	22146-23440	-11%	**Lower**
All	C01-C14 mouth & pharynx	463	570	506-635	-19%	Lower
All	C15 oesophagus	481	471	404-537	2%	Expected
All	C16 stomach	502	516	393-640	-3%	Expected
All	C18-20 colorectal	2093	2589	2424-2752	-19%	Lower
All	C22 liver	156	211	170-252	-26%	Lower
All	C25 pancreas	428	453	366-541	-6%	Expected
All	C33-34 lung	2031	2319	2137-2500	-12%	Lower
All	C43 melanoma of skin	1135	1192	1013-1371	-5%	Expected
All	C64 kidney	494	662	597-728	-25%	Lower
All	C67 bladder	480	465	353-577	3%	Expected
All	C71-C72 brain & CNS	333	339	289-388	-2%	Expected
All	C73 thyroid	297	279	189-367	6%	Expected
All	C81 Hodgkin lymphoma	155	135	59-210	15%	Expected
All	C82-C85 non-Hodgkin lymphoma	731	880	770-991	-17%	Lower
All	C90 multiple myeloma	329	337	280-393	-2%	Expected
All	C91-95 Leukaemia	379	502	390-613	-25%	Lower

Interpretation of Appendix VI table (above): Based on the last stable trend (pre-2020) in microscopically verified incident cases for each cancer type, the projected number of cases was calculated for 2020 (ignoring the effect of the COVID-19 pandemic). The column '% change' presents the percentage change from the projected number to the observed number *i.e.* [(observed 2020/projected 2020) -1]*100. The column 'Obs. relative to PI' notes whether the observed number is higher, lower, or in the expected range of the 95% prediction interval (95%PI) of the projected number