Australian Government
Cancer Australia

Trends in cancer-related medical services and procedures in Australia in 2020-2022: including potential effects of the COVID-19 pandemic

Examination of MBS claims data for 2020, 2021 and 2022 nationally and by jurisdiction

November 2023

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Contents

Tables

Figures

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Key Findings

Cancer Australia examined the potential effects of the COVID-19 pandemic on cancer-related diagnostic and treatment services for the period January 2020 to December 2022 for 14 cancer types: breast, colorectal, lung, prostate, melanoma of the skin, stomach, kidney, pancreatic, liver, uterine, ovarian, cervical, vaginal, and vulval cancers, using selected Medicare Benefits Schedule (MBS) claims data as sentinel markers of cancer care activity.

Compared with expected projections based on 2017-2019 trends, there was a reduction in aggregated diagnostic and treatment sentinel services that was greatest in 2020, similar in 2021 (<5% change), and continuing in 2022. The reductions were:

- 8.0% lower (178,156 fewer services) in 2020
- 3.8% lower (86,159 fewer services) in 2021
- 6.8% lower (158,211 fewer services) in 2022

For aggregated diagnostic and treatment sentinel services in 2020-2022, observed numbers were lower than projected at:

- 5.6% lower (356,284 fewer services) for diagnostic services
- 12.9% lower (66,240 fewer services) for treatment services
- 6.2% lower (422,526 fewer services) for aggregated diagnostic and treatment services.

Across the jurisdictions there was a reduction in sentinel diagnostic, treatment, and aggregated diagnostic and treatment services for all jurisdictions except for Queensland, which had a similar number of aggregated diagnostic and treatment services.

Across the period 2020 to 2022, the numbers of observed services compared to expected projections for diagnostic and treatment services were:

- 12.5% lower (70,394 fewer services) for South Australia/Northern Territory
- 8.3% lower (56,492 fewer services) for Western Australia
- 7.0% lower (164,131 fewer services) for New South Wales/Australian Capital Territory
- 6.7% lower (120,842 fewer services) for Victoria/Tasmania
- 0.7% lower (10,663 fewer services) for Queensland

Similar patterns in procedures to those observed nationally generally applied when examined by age, sex, remoteness of residence, and socioeconomic status (SES) areas. No notable differences were observed between subgroups within each of these sociodemographic groups.

The MBS data used in this report applied to sentinel health services provided to the Australian public in non-inpatient settings, private outpatient clinics and to private inpatients in public and private hospitals. They did not include services provided by hospital doctors to public patients in public hospitals, or services that qualified for a benefit under the Department of Veterans' Affairs Treatment Account, or screening tests performed as part of Australia's population screening programs for breast, cervical and bowel cancer.

Sustained reductions in the number of MBS claims for cancer-related diagnostic and treatment services were observed during the COVID-19 pandemic, compared to that expected from pre-pandemic levels, with the greatest reduction in 2020, and remaining below expected in 2021 and 2022.

The sustained reductions were similar in scale to the 7% and 4% reduction in cancer diagnoses observed in Victoria, as reported by the Victorian Cancer Registry for 2020[1], and 2021[2], respectively. International data from multiple countries suggest a decline in cancer diagnoses during the pandemic, with possible explanations relating to the severity of the pandemic, temporary halting of screening activities, and changes in healthcare seeking behaviour .[3]

Any delays in diagnosis and treatment in response to these reductions in services may lead to more cancers being diagnosed at a later stage and poorer patient outcomes.[4] It is uncertain when cancer service activity will return to pre-pandemic levels. This may take several years at a population level depending on extent of continuing COVID-19 activity and associated public health and health-service responses.

1 Background

Reductions in cancer-related sentinel diagnostic and treatment procedures were reported in 2020 by service providers in Australia in association with the COVID-19 pandemic.[5,6,7,8]

Cancer Australia published a series of reports examining MBS claims data for cancer-related sentinel diagnostic and treatment procedures in Australia[5,6,7,9,10] as a proxy measure for estimating the impact of the COVID-19 pandemic on cancer care across the health system.

In 2020, Cancer Australia examined the first three quarters of 2020 for the five highest incidence cancers (breast, prostate, colorectal, and lung cancer, and cutaneous melanoma). These analyses showed notable reductions in the number of services claimed for a range of sentinel diagnostic and treatment procedures during the initial COVID-19 period between March and May 2020, with many service types showing partial or full recovery in the monthly number of services by September 2020.[7,9,10]

In 2021, Cancer Australia examined reductions in sentinel procedures for the twelve-month period from January to December 2020 for 14 cancer types: breast, colorectal, lung, prostate, melanoma of the skin, stomach, kidney, pancreatic, liver, uterine, ovarian, cervical, vaginal, and vulval cancers. These analyses showed overall sustained reductions in the observed compared to expected number of MBS services in Australia in 2020 for sentinel diagnostic and treatment procedures.[11]

This report builds on the previous analyses by examining the cumulative number of services observed across the three-year period between January 2020 to December 2022*, a period including the COVID-19 pandemic.

* The figures in the report include only those services that are performed by a registered provider, for services that qualify for Medicare Benefit and for which a claim has been processed by Services Australia. They do not include services provided by hospital doctors to public patients in public hospitals or services that qualify for a benefit under the Department of Veterans' Affairs National Treatment Account. Services in the relevant periods are determined by the date the service was processed by Services Australia, not the date the service was provided.

2 Methodology

Selection of MBS items

As timely national cancer incidence data were not available in Australia during the COVID-19 pandemic, selected MBS items were analysed as sentinel markers of cancer control activity (see Table A1 and A2 for all MBS item codes).

MBS items for diagnostic and surgical and non-surgical treatment procedures known to be related to malignancies or cancer, and pre-cancerous conditions,[9,10] were selected based on their specificity for the investigation and management of cancer.

MBS data apply to health services provided to the Australian public in non-inpatient settings, private outpatient clinics and to private inpatients in public and private hospitals. They do not include services provided by hospital doctors to public patients in public hospitals, or services that qualify for a benefit under the Department of Veterans' Affairs National Treatment Account.

The services analysed in this report do not include screening tests performed as part of Australia's three population-based cancer screening programs, BreastScreen Australia Program, National Bowel Cancer Screening Program, and National Cervical Screening Program.

Services were selected as sentinel items in consultation with cancer registry and specialist clinicians with expertise in the relevant cancer fields. As principal diagnoses are not routinely recorded alongside MBS claims, clinical judgement was required for this process including weighing the likely specificity and sensitivity of an MBS item relating to a particular cancer type.

Analysis of data

The numbers of services in 2020, 2021 and 2022 annually, and 2020-2022 cumulatively, were compared with the expected number of services for the same period, derived by linear projection of trends in claims across 2017-2019.

This approach accounts for annual increases of around 3% normally occurring prior to the COVID-19 pandemic. Greater confidence should be ascribed to 2020 expected values due to proximity to 2017-2019, with decreasing confidence in values for subsequent years that are further away from the baseline period.

To be eligible, MBS item descriptors needed to have consistent scope and criteria for use from 2017 so that expected values for 2020, 2021 and 2022 could be projected using the same procedure codes. In some instances, where the criteria for making claims had changed from 2017-2018, numbers of claims for 2019 were used as the expected values. This applied to a minority of MBS items which have been identified in Appendix A.

To accommodate annual growth, wherever feasible, linear projections of annual claims across 2017-2019 were the preferred approach for calculating expected values for 2020, 2021 and 2022.

Analysis of population sub-groups

Further analysis of population sub-groups classified by sociodemographic factors, including age, sex, remoteness of residence, and SES area, was undertaken. However, due to small numbers, these projections became unstable for analysis, and supplementary projection methodologies were added as a result. This methodology involved scaling mean MBS claims for 2017-2019 to 2020-2022, using pre-COVID-19 annual linear trends in cancer incidence for 2014-2019*. Results showed a decline in ratios of observed to expected MBS items in 2020-2022, irrespective of the methodology used.

Reporting results

For reporting of changes in the observed number of services in 2020-2022, as compared to the expected number of services, a difference threshold of 5 or more percentage points was used.

- The term 'similar' was used for an observed value with a less than 5% difference from that expected.
- The term 'reduction' was used for an observed value that was more than 5% lower than expected.
- The term 'increase' was used for an observed value that was more than 5% higher than expected.

For some services, data for states and territories were provided as aggregated data through the Medicare Statistics online portal, with the following groupings: New South Wales and the Australian Capital Territory (NSW/ACT); Victoria and Tasmania (Victoria/Tasmania); and South Australia and the Northern Territory (SA/NT). For consistency throughout the report, data for these states and territories were similarly grouped when presenting jurisdictional breakdowns.

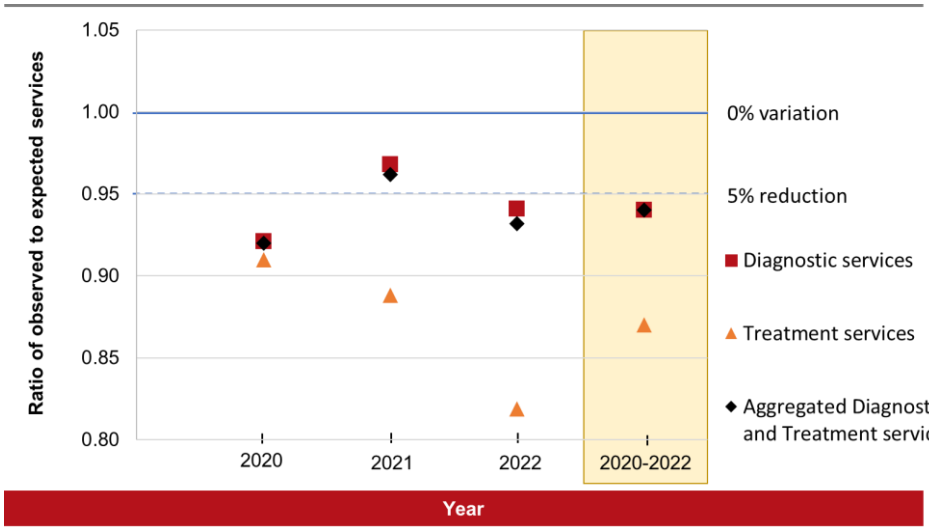
Aggregate data for procedure groupings within the diagnostic and treatment categories for the cancer types analysed were also presented for population sub-groups. The previously described supplementary methodologies were used to calculate results for these categories.

* As reported by the Australian Institute of Health and Welfare (AIHW).

3 National data for sentinel cancer-related diagnostic and treatment services

Nationally there was a reduction in diagnostic and treatment services, and aggregated diagnostic and treatment services for the combined 14 selected cancer types in 2020, 2021, 2022 and 2020-2022, with the exception of diagnostic and aggregated services in 2021 which were similar to expected projections (Figure 1, Table 1).

Figure 1 **Ratio of observed to expected cancer-related diagnostic, treatment, and aggregated services across the years 2020, 2021 and 2022**



Aggregated diagnostic and treatment data are regarded as the most reliable due to larger annual numbers. This applies especially for 2022, where reliability was already more uncertain as the most distant year from the 2017-2019 projection base.

Table 1 **Observed and expected diagnostic, treatment, and aggregated services across the years 2020, 2021, 2022 and 2020-2022**

Year	Observed	Expected	Ratio (O/E)	Difference	
				Number of services	% difference
Diagnostic					
2020	1,912,542	2,076,135	0.92	-163,593	-7.9%
2021	2,043,641	2,110,679	0.97	-67,038	-3.2%
2022	2,019,568	2,145,221	0.94	-125,653	-5.9%
2020-2022	5,975,751	6,332,035	0.94	-356,284	-5.6%
Treatment					
2020	147,454	162,016	0.91	-14,562	-9.0%
2021	151,679	170,800	0.89	-19,121	-11.2%
2022	147,024	179,583	0.82	-32,559	-18.1%
2020-2022	446,157	512,397	0.87	-66,240	-12.9%
Aggregated diagnostic & treatment					

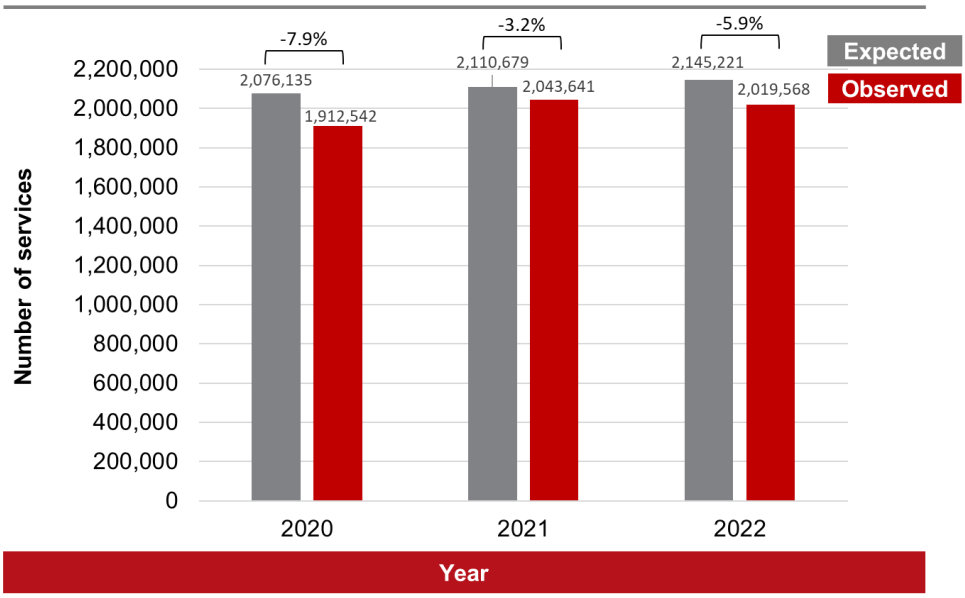
2020	2,059,996	2,238,152	0.92	-178,156	-8.0%
2021	2,195,320	2,281,479	0.96	-86,159	-3.8%
2022	2,166,592	2,324,803	0.93	-158,211	-6.8%
2020-2022	6,421,908	6,844,434	0.94	-422,526	-6.2%

Values for observed and expected number of services for each cancer type individually can be found in Appendix Table B1.

3.1 National cancer-related diagnostic services

Nationally, there was a reduction of cancer-related diagnostic services for the combined 14 selected cancer types in 2020 and 2022. The observed number of cancer-related diagnostic services in 2021 was similar to expected projections. (Figure 2)

Figure 2 Observed and expected cancer-related diagnostic services across 2020, 2021 and 2022, nationally



For the period 2020 to 2022, the observed number of diagnostic services compared to the expected number of services for the combined 14 cancer types were:

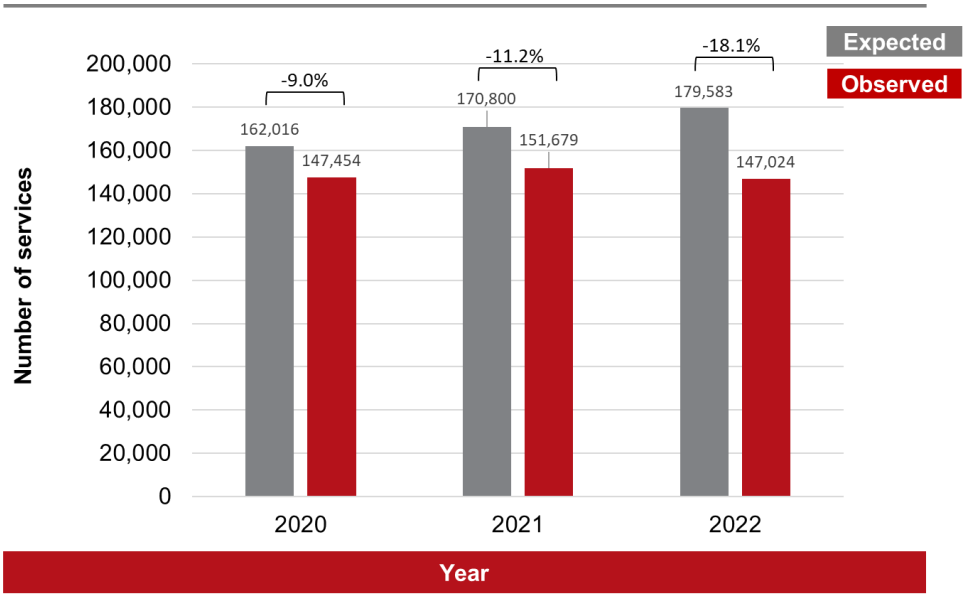
- 7.9% lower (163,593 fewer services) in 2020; with 1,912,542 observed and 2,076,135 expected services
- 3.2% lower (67,038 fewer services) in 2021; with 2,043,641 observed and 2,110,679 expected services
- 5.9% lower (125,653 fewer services) in 2022; with 2,019,568 observed and 2,145,221 expected services
- **5.6% lower (356,284 fewer services) in 2020-22; with 5,975,751 observed and 6,332,035 expected services).**

The number of observed and expected cancer-related diagnostic services by year and for 2020-2022 can be found in Table 1. Values for observed and expected number of services for each cancer type individually can be found in Appendix Table B1.

3.2 National cancer-related treatment services

Nationally there was a reduction of cancer-related treatment services for the combined 14 selected cancer types in 2020, 2021 and 2022. The scale of reduction increased annually from 2020 to 2022. (Figure 3)

Figure 3 Observed and expected cancer-related treatment services across 2020, 2021 and 2022, nationally



As above, the least reliable data may have been 2022 which was the most distant year from the 2017-2019 projection base.

For the period 2020 to 2022, the observed numbers of cancer-related treatment services compared to the expected number of services for the combined 14 cancer types were:

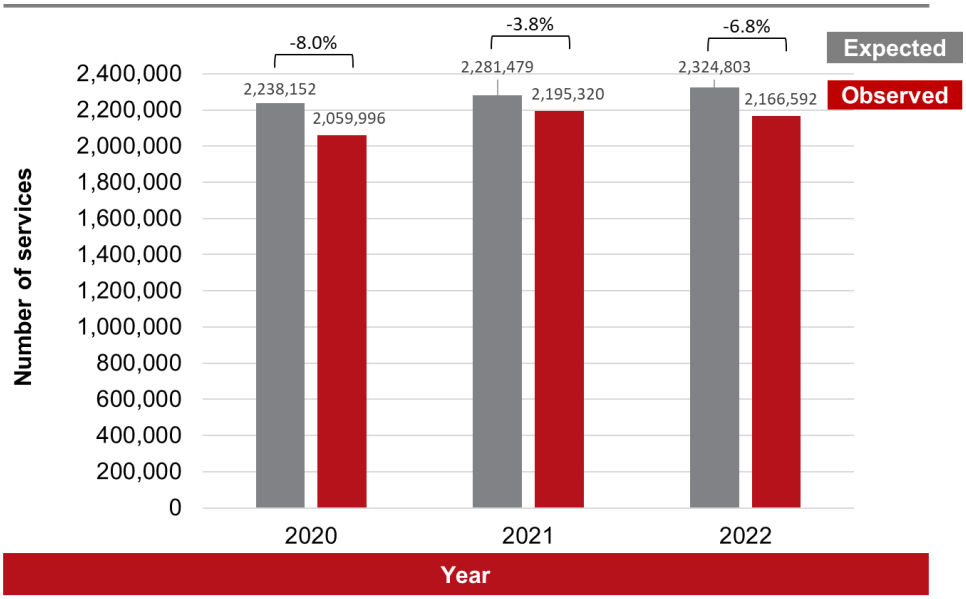
- 9.0% lower (14,562 fewer services) in 2020; with 147,454 observed and 162,016 expected services
- 11.2% lower (19,121 fewer services) in 2021; with 151,679 observed and 170,800 expected services
- 18.1% lower (32,559 fewer services) in 2022; with 147,024 observed and 179,583 expected services
- **12.9% lower (66,240 fewer services) in 2020-22;** with 446,157 observed and 512,397 expected services.

The number of observed and expected cancer-related treatment services by year and for 2020-2022 can be found in Table 1. Values for observed and expected number of services for each cancer type individually can be found in Appendix Table B2.

3.3 National aggregated cancer-related diagnostic and treatment services

Nationally there was a reduction in aggregated cancer-related diagnostic and treatment services for the combined 14 selected cancer types in 2020, and 2022. The observed number of services in 2021 was similar to expected projections (less than 5% change) (Figure 4).

Figure 4 **Observed and expected aggregated diagnostic and treatment services across 2020, 2021 and 2022, nationally**



For the period 2020 to 2022, the observed numbers of aggregated cancer-related diagnostic and treatment services compared to the expected numbers of services for the combined 14 cancer types were:

- 8.0% lower (178,156 fewer services) in 2020; with 2,059,996 observed and 2,238,152 expected services
- 3.8% lower (86,159 fewer services) in 2021; with 2,195,320 observed and 2,281,479 expected services
- 6.8% lower (158,211 fewer services) in 2022; with 2,166,592 observed and 2,324,803 expected services
- **6.2% lower (422,526 fewer services) in 2020-22**; with 6,421,908 observed and 6,844,434 expected services.

The numbers of observed and expected cancer-related aggregated cancer-related diagnostic and treatment services by year and for 2020-2022 can be found in Table 1.

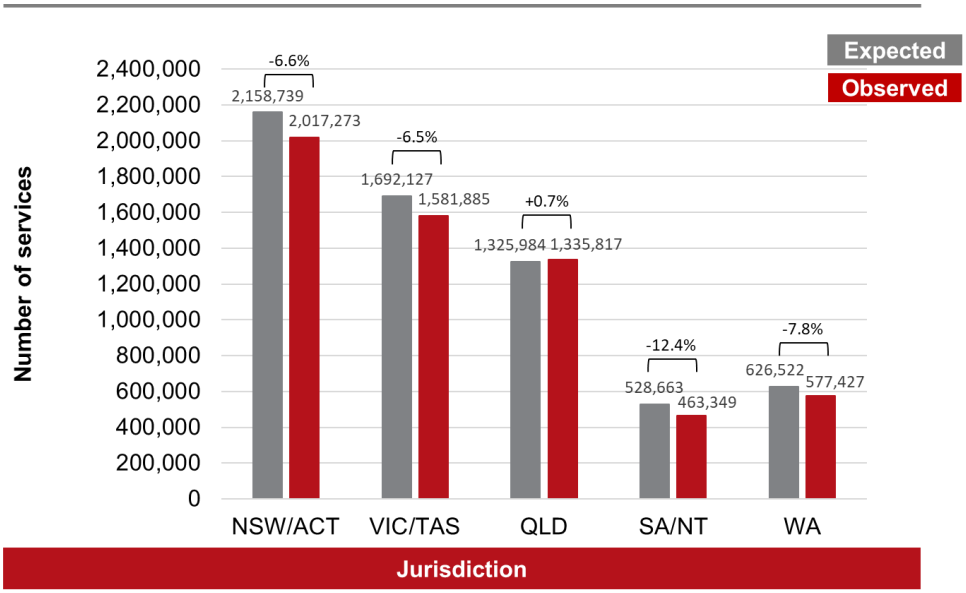
4 Jurisdictional and population sub-group data for sentinel cancer-related diagnostic and treatment services

4.1 Jurisdictional cancer-related diagnostic services

For the period 2020 to 2022, there was a reduction in cancer-related diagnostic services for all jurisdictions, except for Queensland which had a similar number of observed compared to expected services (Figure 5).

Queensland was the only jurisdictional sub-group to have a similar level of observed compared to expected cancer-related diagnostic services. SA/NT was the only jurisdictional category to have a reduction greater than 10% in observed compared to expected services.

Figure 5 Observed and expected cancer-related diagnostic services across 2020-2022, by jurisdiction



For the period 2020 to 2022, the numbers of observed cancer-related diagnostic services for the combined 14 selected cancer types were:

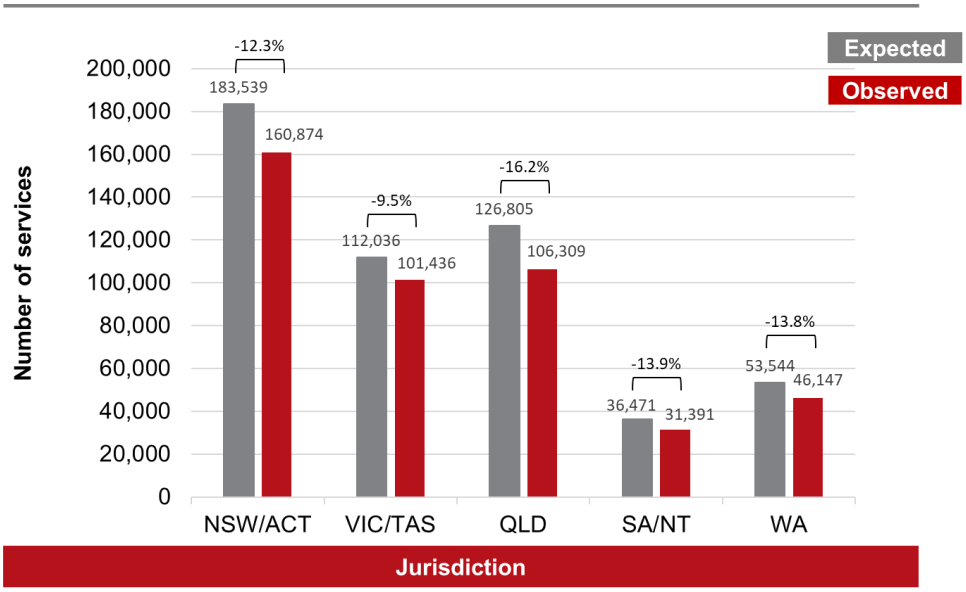
- 12.4% lower (65,314 fewer services) for South Australia/Northern Territory; with 463,349 observed and 528,663 expected services
- 7.8% lower (49,095 fewer services) for Western Australia; with 577,427 observed and 626,522 expected services
- 6.6% lower (141,466 fewer services) for New South Wales/Australian Capital Territory; with 2,017,273 observed and 2,158,739 expected services
- 6.5% lower (110,242 fewer services) for Victoria/Tasmania; with 1,581,885 observed and 1,692,127 expected services
- 0.7% higher (9,833 more services) for Queensland; with 1,335,817 observed and 1,325,984 expected services.

The observed and expected number of diagnostic services for 2020-2022 by jurisdiction are provided in Table 2, below.

4.2 Jurisdictional cancer-related treatment services

For the period 2020 to 2022 there was a reduction in cancer-related treatment services for all jurisdictions (Figure 6).

Figure 6 Observed and expected cancer-related treatment services across 2020-2022, by jurisdiction



For the period 2020 to 2022, the numbers of observed cancer-related treatment procedures for the combined 14 selected cancer types were:

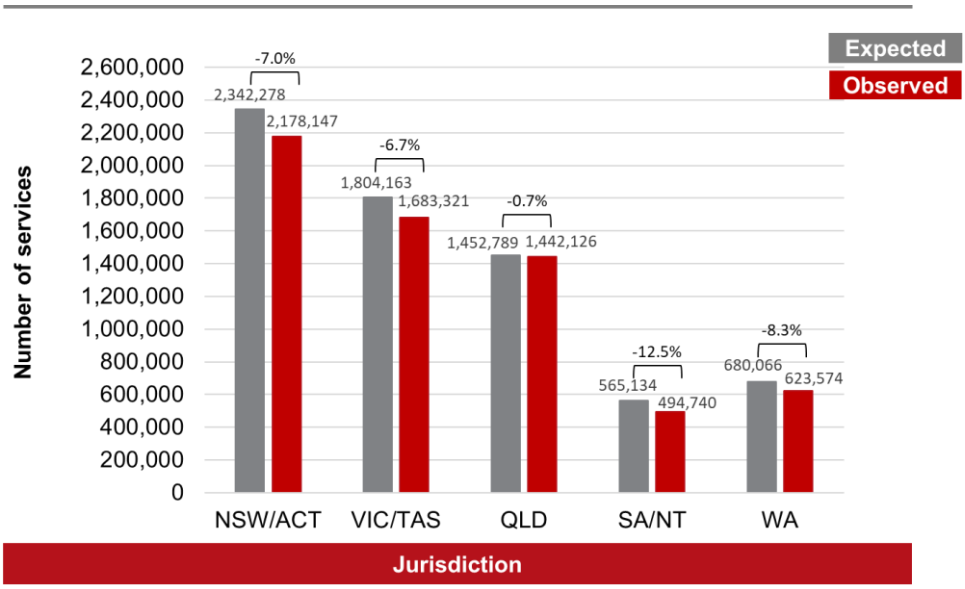
- 16.2% lower (20,496 fewer services) for Queensland; with 106,309 observed and 126,805 expected services
- 13.9% lower (5,080 fewer services) for South Australia/Northern Territory; with 31,391 observed and 36,471 expected services
- 13.8% lower (7,397 fewer services) for Western Australia; with 46,147 observed and 53,544 expected services
- 12.3% lower (22,665 fewer services) for New South Wales/Australian Capital Territory; with 160,874 observed and 183,539 expected services
- 9.5% lower (10,600 fewer services) for Victoria/Tasmania; with 101,436 observed and 112,036 expected services

The observed and expected numbers of treatment services related to 2020-2022 for each state and territory are provided in Table 2.

4.3 Jurisdictional aggregated cancer-related diagnostic and treatment services

For the period 2020 to 2022, there was a reduction in aggregated cancer-related diagnostic and treatment services for all jurisdictions, except Queensland which had a similar number of observed compared to expected services (Figure 7).

Figure 7 **Observed and expected aggregated diagnostic and treatment services across 2020-2022, by jurisdiction**



For the period 2020 to 2022, the numbers of observed cancer-related aggregated sentinel diagnostic and treatment services for the combined 14 selected cancer types were:

- 12.5% lower (70,394 fewer services) for South Australia/Northern Territory; with 494,740 observed and 565,134 expected services
- 8.3% lower (56,492 fewer services) for Western Australia; with 623,574 observed and 680,066 expected services
- 7.0% lower (164,131 fewer services) for New South Wales/Australian Capital Territory; with 2,178,147 observed and 2,342,278 expected services
- 6.7% lower (120,842 fewer services) for Victoria/Tasmania; with 1,683,321 observed and 1,804,163 expected services
- 0.7% lower (10,663 fewer services) for Queensland; with 1,442,126 observed and 1,452,789 expected services.

The observed and expected numbers of aggregated diagnostic and treatment services related to 2020-2022 for each state and territory are provided in Table 2.

Table 2: Observed and expected cancer-related diagnostic, treatment and aggregated services across 2020-2022, by jurisdiction

Total Services (Australia) 2020-2022					
Jurisdiction	Number of Services			Difference	
	Expected	Observed	Ratio (O/E)	Number	%
Diagnostic procedures					
NSW/ACT	2,158,739	2,017,273	0.93	-141,466	-6.6%
Victoria/Tasmania	1,692,127	1,581,885	0.94	-110,242	-6.5%
Queensland	1,325,984	1,335,817	1.01	9,833	0.7%
SA/NT	528,663	463,349	0.88	-65,314	-12.4%
WA	626,522	577,427	0.92	-49,095	-7.8%
Total services (Australia)	**6,332,035**	**5,975,751**	**0.94**	**-356,284**	**-5.6%**
Treatment procedures					
NSW/ACT	183,539	160,874	0.88	-22,665	-12.3%
Victoria/Tasmania	112,036	101,436	0.91	-10,600	-9.5%
Queensland	126,805	106,309	0.84	-20,496	-16.2%
SA/NT	36,471	31,391	0.86	-5,080	-13.9%
WA	53,544	46,147	0.86	-7,397	-13.8%
Total services (Australia)	**512,397**	**446,157**	**0.87**	**-66,240**	**-12.9%**
Aggregated diagnostic & treatment procedures					
NSW/ACT	2,342,278	2,178,147	0.93	-164,131	-7.0%
Victoria/Tasmania	1,804,163	1,683,321	0.93	-120,842	-6.7%
Queensland	1,452,789	1,442,126	0.99	-10,663	-0.7%
SA/NT	565,134	494,740	0.88	-70,394	-12.5%
WA	680,066	623,574	0.92	-56,492	-8.3%
Total services (Australia)	**6,844,430**	**6,421,908**	**0.94**	**-422,522**	**-6.2%**

4.4 Population sub-group cancer-related diagnostic, treatment and aggregated services

Population sub-groups by age, sex, remoteness of residence, and SES area showed reductions in observed services corresponding with reductions seen at a national level, however no additional differences were observed specific to any population subgroup (Appendix C).

The observed and expected number of diagnostic, treatment, and aggregated services related to 2020 to 2022 for each population group as shown in Appendix Tables C1, C2 and C3.

5 Appendices

Appendix A: MBS Item Codes

Cancer-related diagnostic services

MBS data were examined for the following sentinel cancer-related diagnostic procedure(s) for the detection of the specified cancer types.

- Breast cancer: imaging procedures (diagnostic mammography and 3D-tomosynthesis where malignancy is suspected, magnetic resonance imaging (MRI) for breast cancer), and surgical biopsy procedures (including solid tumour breast biopsies and fine needle aspiration procedures and associated lymph node procedures, such as sentinel lymph node biopsy);
- Colorectal cancer: colonoscopies and sigmoidoscopies with or without removal of polyp procedures*†. Some pre-cancerous polyps and some early-stage malignant polyps can be removed during the colonoscopy/ sigmoidoscopy procedure and may not require further/ extended surgical procedures in relation to treatment of colorectal cancer. Therefore, use of these item codes by service providers may represent both a diagnostic procedure as well as a treatment procedure for early-stage colorectal cancers‡;
- Kidney cancer: surgical renal biopsy (closed) procedures;
- Liver cancer: surgical biopsy of the liver;
- Lung cancer: Positron Emission Tomography (PET) studies for evaluation of lung nodules, needle biopsies (percutaneous, endoscopic, or by bronchoscopy), and thoracoscopy and thoracotomy procedures with or without biopsies;
- Prostate cancer: PSA testing (annual), magnetic resonance imaging (MRI) procedures and biopsy procedures of the prostate gland;
- Stomach and pancreatic cancers: endoscopic ultrasound procedures (endoscopy with ultrasound imaging), with or without biopsy; oesophagoscopy with biopsy procedures and whole body (68Ga-DOTA-peptide) Positron Emission Tomography (PET) studies. Some of these diagnostic procedures may also be used for diagnosing oesophageal cancer;
- Uterine cancer – endometrial biopsy for suspected malignancy. This procedure is predominantly used for diagnosis of uterine cancers; however, this procedure may also be used for diagnosing other gynaecological cancers.

* Colonoscopy procedures as a group may include investigations for reasons other than colorectal cancer including e.g., inflammatory bowel disease and post-polypectomy bleeding.
† Colorectal cancer-related procedures excluded a separate item code for removal of polyp(s) procedures during colonoscopy procedures as the introduction of the separate MBS item code for this specific procedure type and data was only available from Oct 2019 onwards.
‡ As the number of colonoscopy/ sigmoidoscopy procedures where a polyp has been removed is not known, to avoid duplication of service counts, these procedures have been included for diagnostic procedures only.

Treatment Services

MBS data were examined for the following range of sentinel surgical and non-surgical treatment procedures for the detection of the specified cancer types.

- Breast cancer: surgical excision of breast lesions and mastectomies;
- Colorectal cancer: resection of lesions, colectomy and hemicolectomy procedures, as well as abdominoperineal resections and anterior resections of the bowel. Some early-stage malignant polyps can be removed during the colonoscopy/ sigmoidoscopy procedure and may not require further or extended surgical procedures in relation to treatment of colorectal cancer, thus representing both a diagnostic procedure as well as a treatment procedure for early stage colorectal cancers;
- Kidney cancer: partial, complete or radical nephrectomy surgeries with *en bloc* lymph node dissections (with or without adrenalectomy) and nephro-ureterectomy procedures;
- Liver cancer: lobectomy (i.e., removal of a lobe of the liver), or segmental/ subsegmental liver resection procedures as well liver ablation procedures, which encompasses radiofrequency or microwave ablation of unresectable liver tumours;
- Lung cancer: lobectomies, segmentectomies, wedge resections, pneumonectomies and endobronchial laser resection procedures;
- Melanoma of the skin: definitive surgical excisions for confirmed melanoma-related skin cancers*. This encompasses procedures where treatment is by definitive surgical excision and suture, for a range of excision sites and tumour diameters. These procedures are reimbursed where "*the excised specimen is sent for histological examination; and malignancy is confirmed from the excised specimen or previous biopsy*". Therefore, use of these item codes by service providers represents confirmed diagnosis and treatment procedures for these cancer types;
- Prostate cancer includes both surgical and non-surgical procedures:
    - *Definitive treatment procedures examined in these analyses included prostatectomy surgeries,* both endoscopic and open procedures, and radical prostatectomy which may include pelvic lymphadenectomy, and also:
    - *brachytherapy delivery procedures* and *prostate ablation procedures (e.g.,* transurethral radiofrequency needle ablation (TUNA), endoscopic laser ablation procedures and transurethral microwave thermotherapy procedures. These latter procedures are used in the treatment of prostatic disease, although predominantly for treatment of benign disease i.e., benign prostate hyperplasia (BPH).

  Note: Treatment options for some earlier stage cancers may also involve the monitoring of key indicators of progression of disease and undergoing regular testing to monitor the requirement to progress to active treatment if necessary, also known as active surveillance[12,13]. Data for these procedures are outside of the scope of this report.
- Pancreatic cancer: local excision of pancreatic/ duodenal tumours, pancreatectomy procedures including near, total or distal pancreatectomies, Whipple's procedures, and endoscopic stenting procedures of bile ducts;

* Grouping includes Malignant Melanoma, Appendageal Carcinoma, Malignant Fibrous Tumour of Skin, Merkel Cell Carcinoma of Skin, or Hutchinson's Melanotic Freckle).

- Stomach cancer: local excision of gastric tumours and partial or total gastrectomy procedures;
- Gynaecological cancers (uterine, ovarian, cervical, vaginal and vulval cancers) encompass both surgical and non-surgical procedures. In some cases, the same procedure type may be used in the treatment of more than one type of gynaecological cancer, in particular for advanced disease; or may be grouped together for the purposes of reimbursement through the MBS. Therefore, analyses for all treatment procedures examined in the report are presented as a gynaecological cancer grouping:
    - Surgical procedures including salpingectomy or salpingo-oophorectomy laparotomy procedures; partial, complete or radical vaginectomy procedures for proven malignancy; excision of vulva or vulvectomy procedures for suspected or proven malignancy; colposcopy and large loop excisions for previously confirmed intraepithelial neoplastic changes and radical or debulking operations for advanced gynaecological malignancy
    - Non-surgical procedures including intrauterine and/ or intravaginal brachytherapy procedures.

Table A 1: Sentinel MBS item codes for cancer-related diagnostic services

Cancer type	MBS Item code
Breast cancer	59300, 59301, 59302, 59303, 59304, 59305, 63458, 63467, 63487, 63488, 63531, 63532, 63533, 63534, 31506, 31509, 31530, 31533, 31536, 31539, 31545, 31548, 63489, 63490, 30299, 30300, 30302, 30303
Colorectal cancers	32072, 32075, 32084, 32087, 32096, 32222, 32223, 32224, 32225, 32226, 32227, 32228, 32088, 32089, 32090, 32093
Kidney cancer	36561
Liver cancer	30409, 30411,30412
Lung cancer	30696, 30710, 38418, 38812, 38436, 38448, 41892, 41898, 61523
Prostate cancer	63541*, 63542* , 37212, 37215, 37218, 37219, 37226, 66655
Stomach and pancreatic cancers†	30688, 30690, 30692, 30694, 61647 ‡, 41822
Uterine cancers§	35620

Underlined codes are historical and no longer current

* Data for MRI scan for detection of prostate cancer available from July 2018 onwards. Note: only 6 services recorded for item 63542 during this study period (2017-2022).
† Diagnostic procedures used for detection of stomach and pancreatic cancers may also be used as diagnostic procedures for detecting oesophageal cancers. MBS item code 30484 was included in the 2017-2020 population sub-group data for age, sex, remoteness of area of residence, and socioeconomic area of residence.
‡ Data for whole body PET study for suspected gastro-entero-pancreatic neuroendocrine tumour from May 2018.
§ Endometrial biopsy for suspected malignancy for the detection of uterine cancer may also be used for diagnosing other gynaecological cancers.

Table A 2: Sentinel MBS item codes for cancer-related treatment services

Cancer type	MBS Item code
Breast cancer	31512, 31515, 31516, 31519, 31524
Colorectal cancer*	32000, 32003, 32004, 32005, 32006, 32009, 32012, 32024, 32025, 32026, 32028, 32039, 32042, 32045, 32046, 32099, 32102, 32103, 32104, 32105, 32106, 32108, 32015, 32018, 32021, 32023, 32030, 32047, 32051, 32054, 32057, 32231, 32232
Kidney cancer	36516, 36519, 36522, 36525, 36526, 36527, 36528, 36529, 36531, 36532, 36533, 43984, 43987
Liver cancer	30414, 30415, 30418, 30421, 50950, 50952
Lung cancer	38438, 38440, 38441, 41901
Melanoma skin cancers†	31371, 31372, 31373, 31374, 31375, 31376, 31300, 31305, 31310, 31315, 31320, 31325, 31330, 31335
Prostate cancer (definitive treatment)	15338, 37220, 37227, 37200, 37203, 37206, 37209, 37210, 37211, 37201, 37202, 37207, 37208, 37224, 37230, 37233
Pancreatic cancer	30578, 30580, 30583, 30584, 30593, 30491
Stomach cancer	30518, 30520, 30523, 30524, 30526
Gynaecological cancers (including uterine, ovarian, cervical, vaginal and vulval cancers)	35664, 35667, 15308, 15316, 15324, 35720, 35713, 35717, 35536, 35548, 35557, 35560, 35561, 35562, 35564, 35644,35645, 35646, 35647, 35648

Underlined codes are historical and no longer current

* Colorectal cancer-related procedures excluded a separate item code for removal of polyp(s) procedures during colonoscopy procedures as the introduction of the separate MBS item code for this specific procedure type and data was only available from Oct 2019 onwards. MBS item codes 32009 and 32012 were not included in the 2019-2022 population sub-groups for age, sex, remoteness of area of residence, and socioeconomic area of residence.
† Grouping includes Malignant Melanoma, Appendageal Carcinoma, Malignant Fibrous Tumour of Skin, Merkel Cell Carcinoma of Skin, or Hutchinson's Melanotic Freckle

Appendix B: Data tables by selected cancer type

Table B 1 Observed and expected sentinel cancer-related diagnostic services by cancer type across 2020, 2021, 2022 and 2020-2022

Year	Diagnostic services for 2020 to 2022				
	Number of annual services		Difference		
	Expected	Observed	O/E ratio	Number	%
Breast Cancer					
2020	541,285	520,613	0.96	-20,672	-3.8%
2021	551,038	542,052	0.98	-8,986	-1.6%
2022	560,791	522,839	0.93	-37,952	-6.8%
2020-2022	1,653,114	1,585,504	0.96	-67,610	-4.1%
Colorectal Cancer					
2020	696,938	609,645	0.88	-87,293	-12.5%
2021	709,297	674,415	0.95	-34,882	-4.9%
2022	721,655	650,532	0.90	-71,123	-9.9%
2020-2022	2,127,890	1,934,592	0.91	-193,298	-9.1%
Lung Cancer					
2020	44,446	40,562	0.91	-3,884	-8.7%
2021	46,886	31,050	0.66	-15,836	-33.8%
2022	49,325	26,499	0.54	-22,826	-46.3%
2020-2022	140,657	98,111	0.70	-42,546	-30.2%
Prostate Cancer					
2020	764,616	713,998	0.93	-50,618	-6.6%
2021	773,450	766,190	0.99	-7,260	-0.9%
2022	782,283	790,417	1.01	8,134	1.0%
2020-2022	2,320,349	2,270,605	0.98	-49,744	-2.1%
†Stomach and Pancreatic Cancers					
2020	13,858	12,990	0.94	-868	-6.3%
2021	14,369	14,959	1.04	590	4.1%
2022	14,880	14,919	1.00	39	0.3%
2020-2022	43,107	42,868	0.99	-239	-0.6%
Kidney Cancer					
2020	1,854	1,940	1.05	86	4.7%
2021	1,867	1,914	1.03	47	2.5%
2022	1,881	1,959	1.04	78	4.2%
2020-2022	5,602	5,813	1.04	211	3.8%
Liver Cancer					
2020	3,934	3,446	0.88	-488	-12.4%
2021	4,094	3,742	0.91	-352	-8.6%
2022	4,254	3,352	0.79	-902	-21.2%
2020-2022	12,282	10,540	0.86	-1,742	-14.2%
‡Uterine Cancer					
2020	9,204	9,348	1.02	144	1.6%
2021	9,678	9,319	0.96	-359	-3.7%
2022	10,151	9,051	0.89	-1,100	-10.8%
2020-2022	29,033	27,718	0.96	-1,315	-4.5%

† Diagnostic procedures used for detection of stomach and pancreatic cancers may also be used as diagnostic procedures for detecting oesophageal cancers.
‡ Endometrial biopsy for suspected malignancy for the detection of uterine cancer may also be used for diagnosing other gynaecological cancers.

Table B 2 Observed and expected sentinel cancer-related treatment services by cancer type across 2020, 2021, 2022 and 2020-2022

Treatment services for 2020 to 2022					
Year	Number of annual services		Difference		
	Expected	Observed	O/E ratio	Number	%
Breast Cancer					
2020	16,866	15,865	0.94	-1,001	-5.9%
2021	17,101	17,161	1.00	60	0.3%
2022	17,336	17,857	1.03	521	3.0%
2020-2022	51,303	50,883	0.99	-420	-0.8%
Colorectal Cancer					
2020	11,656	11,505	0.99	-151	-1.3%
2021	11,395	12,001	1.05	606	5.3%
2022	11,134	10,791	0.97	-343	-3.1%
2020-2022	34,185	34,297	1.00	112	0.3%
Lung Cancer					
2020	3,628	3,696	1.02	68	1.9%
2021	3,646	3,706	1.02	60	1.7%
2022	3,663	3,580	0.98	-83	-2.3%
2020-2022	10,937	10,982	1.00	45	0.4%
Prostate Cancer					
2020	22,198	21,662	0.98	-536	-2.4%
2021	22,367	22,068	0.99	-299	-1.3%
2022	22,536	22,267	0.99	-269	-1.2%
2020-2022	67,101	65,997	0.98	-1,104	-1.6%
Pancreatic Cancer					
2020	5,297	4,942	0.93	-355	-6.7%
2021	5,562	4,922	0.89	-640	-11.5%
2022	5,827	4,908	0.84	-919	-15.8%
2020-2022	16,686	14,772	0.89	-1,914	-11.5%
Stomach Cancer					
2020	1,000	1,004	1.00	4	0.4%
2021	1,040	1,084	1.04	44	4.2%
2022	1,081	998	0.92	-83	-7.6%
2020-2022	3,121	3,086	0.99	-35	-1.1%
Kidney Cancer					
2020	2,519	2,451	0.97	-68	-2.7%
2021	2,542	2,618	1.03	76	3.0%
2022	2,565	2,488	0.97	-77	-3.0%
2020-2022	7,626	7,557	0.99	-69	-0.9%
Liver Cancer					
2020	1,454	1,507	1.04	53	3.6%
2021	1,426	1,533	1.08	107	7.5%
2022	1,397	1,710	1.22	313	22.4%
2020-2022	4,277	4,750	1.11	473	11.1%
†Gynaecological Cancer					
2020	18,022	16,691	0.93	-1,331	-7.4%
2021	18,946	15,373	0.81	-3,573	-18.9%
2022	19,871	11,990	0.60	-7,881	-39.7%
2020-2022	56,839	44,054	0.78	-12,785	-22.5%
Melanoma Skin Cancers					
2020	79,377	68,131	0.86	-11,246	-14.2%
2021	86,775	71,213	0.82	-15,562	-17.9%
2022	94,173	70,435	0.75	-23,738	-25.2%
2020-2022	260,325	209,779	0.81	-50,546	-19.4%

† Gynaecological cancers include procedures for uterine, ovarian, vaginal, vulval and cervical cancers

Appendix C: Data tables by population sub-group with expected services calculated using supplementary methodology

Table C 1 Observed and expected cancer-related diagnostic services by year and population group*

Population group	Number of Services 2020 to 2022									Total Services 2020-2022
	2020			2021			2022			
	Observed	O/E ratio	%	Observed	O/E ratio	%	Observed	O/E ratio	%	Observed
Sex										
Male	1,032,380	0.90	-10.0%	1,116,408	0.95	-5.0%	1,119,970	0.93	-7.0%	**3,268,758**
Female	883,901	0.95	-5.0%	938,633	0.99	-1.0%	899,811	0.95	-5.0%	**2,722,345**
†**Total services**	**1,916,281**			**2,055,041**			**2,019,781**			**5,991,103**
Age group (years)										
<65 years	1,153,665	0.93	-7.0%	1,228,776	0.98	-2.0%	1,185,803	0.95	-5.0%	**3,568,244**
≥65 years	754,450	0.90	-10.0%	817,930	0.94	-6.0%	825,696	0.93	-7.0%	**2,398,076**
Total services	**1,908,115**			**2,046,706**			**2,011,499**			**1,908,115**
Remoteness										
Major cities	1,390,528	0.91	-8.6%	1,491,981	0.96	-4.2%	1,465,195	0.93	-7.1%	**4,347,704**
Inner regional areas	346,180	0.93	-7.4%	374,946	0.99	-1.3%	372,304	0.97	-2.7%	**1,093,430**
Outer regional areas	138,517	0.93	-7.2%	146,991	0.98	-1.6%	144,538	0.97	-2.6%	**430,046**
Remote & Very-remote areas	20,247	0.91	-8.7%	20,679	0.92	-7.9%	19,236	0.85	-14.7%	**60,162**
Total services	**1,895,472**			**2,034,597**			**2,001,273**			**5,931,342**
Socioeconomic status										
SES 1 areas	263,489	0.93	-7.2%	274,407	0.96	-4.1%	268,640	0.94	-6.0%	**806,536**
SES 2 areas	299,422	0.92	-7.6%	317,445	0.97	-3.4%	311,735	0.94	-5.6%	**928,602**
SES 3 areas	372,562	0.93	-6.8%	398,778	0.98	-2.1%	391,768	0.95	-4.7%	**1,163,108**
SES 4 areas	398,806	0.92	-7.9%	432,672	0.97	-2.8%	424,851	0.94	-6.1%	**1,256,329**
SES 5 areas	560,576	0.91	-9.2%	610,507	0.96	-3.7%	603,276	1.00	-0.3%	**1,774,359**
Total services	**1,894,855**			**2,033,809**			**2,000,270**			**5,928,934**

*A small number of services may be excluded from reporting due to cell suppression applied for small cell size and therefore totals may not sum to the same total value.
†Sentinel items selected as described in base report. Note: some differences with data previously released apply, reflecting MBS updates, coding refinements, and estimations where cell sizes were too small for release of actual data.

Table C 2 Observed and expected cancer-related treatment services by year and population group*

Population group	Number of Services 2020 to 2022									Total Services 2020-2022
	2020			2021			2022			
	Observed	O/E ratio	%	Observed	O/E ratio	%	Observed	O/E ratio	%	Observed
Sex										
Male	73,876	0.90	-10.0%	76,447	0.89	-11.0%	74,918	0.84	-16.0%	**225,241**
Female	73,139	0.92	-8.0%	74,110	0.89	-11.0%	69,900	0.80	-20.0%	**217,149**
†**Total services**	**147,015**			**150,557**			**144,818**			**442,390**
Age group (years)										
<65 years	69,334	0.90	-10.0%	69,430	0.86	-14.0%	64,844	0.77	-23.0%	**203,608**
≥65 years	77,687	0.92	-8.0%	81,135	0.91	-9.0%	79,977	0.86	-14.0%	**238,799**
Total services	**147,021**			**150,565**			**144,821**			**442,407**
Remoteness										
Major cities	100,199	0.92	-8.2%	101,956	0.89	-10.6%	97,641	0.82	-17.6%	**299,796**
Inner regional areas	32,284	0.90	-10.3%	33,747	0.88	-11.9%	33,005	0.82	-18.4%	**99,036**
Outer regional areas	11,793	0.89	-10.6%	12,257	0.89	-11.2%	11,828	0.82	-17.6%	**35,878**
Remote & Very-remote areas	1,723	0.86	-14.2%	1,714	0.79	-20.7%	1,547	0.67	-33.0%	**4,984**
Total services	**145,999**			**149,674**			**144,021**			**439,694**
Socioeconomic status										
SES 1 areas	18,534	0.90	-9.9%	18,678	0.86	-14.2%	17,798	0.78	-22.3%	**55,010**
SES 2 areas	24,078	0.90	-10.5%	25,011	0.88	-12.2%	24,342	0.81	-18.7%	**73,431**
SES 3 areas	28,973	0.91	-9.5%	29,922	0.89	-11.5%	29,047	0.82	-18.1%	**87,942**
SES 4 areas	30,509	0.94	-5.7%	30,629	0.91	-9.1%	30,011	0.86	-14.2%	**91,149**
SES 5 areas	43,884	0.92	-8.2%	45,374	0.91	-8.9%	42,784	0.83	-17.1%	**132,042**
Total services	**145,978**			**149,614**			**143,982**			**439,574**

*A small number of services may be excluded from reporting due to cell suppression applied for small cell size and therefore totals may not sum to the same total value.
†Sentinel items selected as described in base report. Note: some differences with data previously released apply, reflecting MBS updates, coding refinements, and estimations where cell sizes were too small for release of actual data.

Table C 3 Observed and expected aggregated cancer-related diagnostic and treatment services by year and population group*

Population group	Number of Services 2020 to 2022									Total Services 2020-2022
	2020			2021			2022			
	Observed	O/E ratio	%	Observed	O/E ratio	%	Observed	O/E ratio	%	Observed
Sex										
Male	1,106,256	0.90	-10.0%	1,192,855	0.94	-6.0%	1,194,888	0.93	-7.0%	**3,493,999**
Female	957,040	0.95	-5.0%	1,012,743	0.99	-1.0%	969,711	0.94	-6.0%	**2,939,494**
†**Total services**	**2,063,296**			**2,205,598**			**2,164,599**			**6,433,493**
Age group (years)										
<65 years	1,222,999	0.93	-7.0%	1,298,206	0.97	-3.0%	1,250,647	0.94	-6.0%	**3,771,852**
≥65 years	832,137	0.90	-10.0%	899,065	0.94	-6.0%	905,673	0.92	-8.0%	**2,636,875**
Total services	**2,055,136**			**2,197,271**			**2,156,320**			**6,408,727**
Remoteness										
Major cities	1,490,727	0.91	-8.6%	1,593,937	0.95	-4.6%	1,562,836	0.92	-7.6%	**4,647,500**
Inner regional areas	378,464	0.92	-7.6%	408,693	0.98	-2.2%	405,309	0.96	-4.3%	**1,192,466**
Outer regional areas	150,310	0.93	-7.4%	159,248	0.98	-2.4%	156,366	0.96	-4.0%	**465,924**
Remote & Very remote areas	21,970	0.91	-9.1%	22,393	0.91	-0.9%	20,783	0.84	-16.4%	**65,146**
Total services	**2,041,471**			**2,184,271**			**2,145,294**			**6,371,036**
Socioeconomic status										
SES 1 areas	282,023	0.93	-7.4%	293,085	0.95	-4.8%	286,438	0.93	-7.2%	**861,546**
SES 2 areas	323,500	0.92	-7.8%	342,456	0.96	-4.1%	336,077	0.93	-6.7%	**1,002,033**
SES 3 areas	401,535	0.93	-6.9%	428,700	0.97	-2.8%	420,815	0.94	-5.8%	**1,251,050**
SES 4 areas	429,315	0.92	-7.8%	463,301	0.97	-3.2%	454,862	0.93	-6.7%	**1,347,478**
SES 5 areas	604,460	0.91	-9.2%	655,881	0.96	-4.0%	646,060	0.93	-7.1%	**1,906,401**
Total services	**2,040,833**			**2,183,423**			**2,144,252**			**6,368,508**

*A small number of services may be excluded from reporting due to cell suppression applied for small cell size and therefore totals may not sum to the same total value.
†Sentinel items selected as described in base report. Note: some differences with data previously released apply, reflecting MBS updates, coding refinements, and estimations where cell sizes were too small for release of actual data.

Appendix D: Caveats for data used within this report

Data source:

- National and jurisdictional data were obtained via the Services Australia online portal with date of service between January 2017 and December 2022.
- Data by age/sex/remoteness/SES for 2017-2019 were provided on 21 June 2021 with date of service between January 2017 and December 2020.
- Data by age/sex/remoteness/SES for 2019-2022 were provided on 17 April 2023 with date of service between January 2019 and December 2022.

The data in the report include only those services that are performed by a registered provider, for services that qualify for a Medicare Benefit and for which a claim has been processed by Services Australia. They do not include services provided by hospital doctors to public patients in public hospitals or services that qualify for a benefit under the Department of Veterans' Affairs National Treatment Account.

Remoteness area: For cases where no residential address was recorded, the mailing address was used. Unknown jurisdiction, remoteness and SES areas (less than 1% of services) resulted from unmapped postcodes (data not shown) and therefore data may not add to 100%.

Cell suppression:

Cell suppression was applied for small numbers of services (between 1 and 5) for a given period and/or category. Less than 0.01% of services were excluded from the analysis due to cell suppression.

Methodology:

While linear projections from 2017-2019 were the preferred methodology where applicable for estimating expected numbers, there is less confidence in their accuracy for later years, at greater distance from the 2017-2019 projection base. This applied in particular in the analyses of sub-populations where small numbers frequently presented. A supplementary analysis was therefore undertaken for the sub-populations to address these matters.

This analysis methodology involved scaling mean MBS claims for 2017-2019 to 2020-2022, using pre-COVID-19 annual linear trends in cancer incidence for 2014-2019, as reported by AIHW. Results showed a decline in ratios of observed to expected MBS items in 2020-2022, irrespective of the methodology used.

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