Australian Government
Australian Institute of Health and Welfare

Radiation oncology areas of need

cancer incidence projections 2014–2024

CANCER SERIES NO. 85

Australian Government
Australian Institute of Health and Welfare

Authoritative information and statistics to promote better health and wellbeing

CANCER SERIES
Number 85

Radiation oncology areas of need

Cancer incidence projections

2014–2024

Australian Institute of Health and Welfare
Canberra
Cat. no. CAN 82

The Australian Institute of Health and Welfare is a major national agency which provides reliable, regular and relevant information and statistics on Australia's health and welfare. The Institute's mission is *authoritative information and statistics to promote better health and wellbeing*.

This publication is part of the Australian Institute of Health and Welfare's Cancer series. A complete list of the Institute's publications is available from the Institute's website <www.aihw.gov.au>.

ISSN 1039-3307
ISBN 978-1-74249-588-0

Suggested citation
Australian Institute of Health and Welfare 2014. Radiation oncology areas of need: cancer incidence projections 2014–2024. Cancer series no. 85. Cat. no. CAN 82. Canberra: AIHW.

Any enquiries about or comments on this publication should be directed to:
Media and Strategic Engagement Unit
Australian Institute of Health and Welfare
GPO Box 570
Canberra ACT 2601
Tel: (02) 6244 1032
Email: info@aihw.gov.au

Published by the Australian Institute of Health and Welfare

This publication is printed in accordance with ISO 14001 (Environmental Management Systems) and ISO 9001 (Quality Management Systems). The paper is sourced from sustainably managed certified forests.

Please note that there is the potential for minor revisions of data in this report. Please check the online version at <www.aihw.gov.au> for any amendments.

Contents

Acknowledgments

This report was prepared by staff in the Cancer and Screening Unit of the Australian Institute of Health and Welfare. The main author was Mardi Ellis, with valuable analytical contributions made by Brett Davis, Melissa Goodwin, Chun Chen, Justin Harvey, Mark Short and David Whitelaw.

The authors acknowledge the assistance of the state and territory health departments for providing geographical boundary information, and that of the state and territory cancer registries for providing incidence data, and for permission to publish state and territory estimates.

This project was funded by the Radiation Oncology and Optometry Section of the Australian Government Department of Health.

Abbreviations

ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
AIHW	Australian Institute of Health and Welfare
Health	Australian Government Department of Health
HPR	health planning region
MBS	Medicare Benefits Schedule
NSW	New South Wales
NT	Northern Territory
PSA	prostate-specific antigen
Qld	Queensland
SA	South Australia
SLA	Statistical Local Area
Tas	Tasmania
Vic	Victoria
WA	Western Australia

Summary

Cancer incidence in Australia is projected to rise due to an expected increase in both the underlying cancer rates and in the Australian population over the age of 65. As a result, planning for cancer treatment services must anticipate future trends and age structures.

This report presents projections of the number of new cases of cancer (all cancers combined) diagnosed in Australia from 2014 to 2024, by state and territory health planning regions.

Projections of the number of new cancer cases for each health planning region have been calculated using trends in cancer incidence from 1997 to 2010—the latter being the most recent year for which national cancer incidence data are available—and population projections provided by the Australian Government Department of Health.

Key findings

In 2024, an estimated 169,648 new cases of cancer are expected to be diagnosed in Australia, an average annual increase of 3.3% per year from 2010 (Table 2.1).

The proportional increase is expected to vary between states and territories. The largest increase is expected in Western Australia (5.0% per year), followed by the Australian Capital Territory (4.4%), Queensland (4.2%), the Northern Territory (3.9%) and Victoria (3.2%). New South Wales (2.5% per year), Tasmania (2.3%) and South Australia (1.9%) are expected to have the smallest annual proportional increases in cancer incidence rates.

Important notes

Projections are, by nature, estimates at best and are subject to a number of limitations and assumptions. The combined impact of these is such that the Australian Institute of Health and Welfare (AIHW) presents these projections only as approximate statistical extrapolations of the period 1997 to 2010 as a means to illustrate future changes that would occur if the stated assumptions were to apply over the projection interval. The AIHW can offer no guarantees as to the true predictive value of these estimates out to 2024.

These estimates were developed for the Australian Government Department of Health for their planning purposes. The methods used to derive projected cancer incidence counts for this report were developed so as to be consistent and comparable across all jurisdictional health planning regions.

The projection methodology does not take into account variations in historical incidence at the health planning region level. The resulting incidence projections also do not account for the future use of radiation oncology services by residents of other states, territories or health planning regions. For further information see the 'Limitations and assumptions' section in Chapter 1.

The projected estimates presented in this report may differ from those published by the states and territories, due to differences in the underlying methodologies. In particular, state and territory cancer registries have access to additional information that could lead their projections to be more accurate at the jurisdictional level.

Consumers are advised to exercise caution and consider the methodology when applying these estimates to other purposes.

The state and territory cancer registries have given approval to publish these data.

1 Introduction

Background

Radiation oncology (or radiotherapy) is one of the main treatment modalities contributing to the cure or palliation of many cancer patients. Most recent evidence estimates that approximately 48% of new notifiable cancers in Australia should receive at least one course of radiotherapy, referred to as the optimal radiotherapy utilisation rate (Barton et al. 2013).

Demand for radiotherapy treatment services is highly dependent on the number of new cancer cases diagnosed. Hence, estimates of future cancer incidence play an important role in health resource planning. As part of the planning process for new radiotherapy centres, the Radiation Oncology and Optometry Section of the Australian Government Department of Health (Health) contracted the Australian Institute of Health and Welfare (AIHW) to provide cancer incidence projections for all cancers combined (excluding basal cell and squamous cell carcinoma) at the national and jurisdictional health planning region levels (see Box 1).

This report presents those projections for 2014 to 2024, based on cancer incidence trends from 1997 to 2010.

The data used in this report were supplied by the state and territory cancer registries to the National Cancer Statistics Clearing House and form the Australian Cancer Database. The methods and assumptions for these projections were developed by the AIHW in consultation with the state and territory cancer registries and Health.

The state and territory cancer registries provided approvals to publish these estimates (see 'Summary—Important notes').

Box 1: Terminology used in this report

Radiotherapy planning regions are referred to as health planning regions (HPRs) throughout the report. These regions are defined by geographical boundaries that may not reflect the total population accessing services (see Box 2). Each jurisdiction has a different name for these regions, as detailed in Chapter 2.

Methods

A number of models may be used for cancer incidence projections. These range from simple linear regression to multi-state analyses that attempt to account for changes in cancer incidence in response to changes in incidence of other diseases, such as diabetes and cardiovascular disease. Generally, more complex models will often provide a better fit of the historical data, but may provide a less robust predictive model if the pattern of interactions observed in the past does not continue into the future. There is a general consensus that a relatively simple linear or log-linear Poisson model of age-specific rates provides a good fit of the data while giving reasonably accurate predictions over a short to medium time span.

Overview of projections method

Generally, cancer projections are calculated by summing the projected incidence of each cancer type or grouping. However, the small area geography at which projected counts are

required for this project meant that the incidence of individual cancers would be too small in some cases for that method to be robust. Therefore, this project did not consider trends of individual cancers separately, instead modelling all cases of cancer together. The exception is prostate cancer, which was modelled separately to account for recent significantly fluctuating trends in prostate specific antigen (PSA) testing (see Figure A1). This method has been used in previous AIHW reports (AIHW 2012; AIHW 2013).

The following four-step strategy was used to derive the projected incidence counts presented in this report:

1. estimating the trend in annual incidence
2. testing the significance of the trend
3. extrapolating that trend to predict annual rates for the years 2014 to 2024
4. applying those rates to projected populations to derive projected incidence counts by jurisdictional HPRs.

These steps, summarised below, were applied separately to prostate cancer (males only) and all cancers (excluding prostate cancer) combined, and then summed for each jurisdiction's HPRs. A more detailed description of the method—including the mathematical model and the prostate cancer-specific method—is available at appendix A. The data sources and populations used in deriving the estimates are available at Appendix B.

Step 1—estimating the trend in annual incidence for 1997 to 2010

The trend in annual cancer incidence was derived for each jurisdiction by sex and 5-year age group, using national cancer incidence data for the period 1997–2010. The exceptions are New South Wales and the Australian Capital Territory, where incidence data are available to 2009 only. The trend estimation is based on the period 1997–2009 for these two jurisdictions.

Step 2—testing the significance of the trend

Each age–sex trend in each jurisdiction, derived in Step 1, was tested for significance, with one of three possible outcomes: a significant increasing trend, a significant decreasing trend or no significant trend.

Step 3—predicting annual rates for 2014 to 2024

The age–sex trends for each jurisdiction derived in Step 1 were linearly extrapolated to predict future annual rates, using one of three models—linear, logit or mean—applied according to the outcome of the significance testing in Step 2.

- The linear model was applied to those age–sex groups with an increasing incidence, to avoid over-estimating future incidence as the rates are projected further forward in time.
- The logit model was applied to those age–sex groups with decreasing incidence to avoid projecting incidence rates below zero.
- The mean incidence rate was applied to those age–sex groups with a non–significant trend.

Step 4—deriving projected incidence counts

The projected rates, estimated in Step 3, were applied to Health projected populations by Statistical Local Area (SLA) (tables B3–B10) and summed to calculate projected counts for

each jurisdictional HPR. HPRs were defined using 2011 SLAs (online supplementary tables C1–C8).

Limitations and assumptions

It is important to note that the projections presented in this report are based on a number of assumptions relating to the estimation and extrapolation of trends in cancer incidence rates. The combined impact of these is such that the AIHW presents these projections only as approximate statistical extrapolations of the period 1997–2010, and can offer no guarantees as to their true predictive value out to 2014–2024.

Projections of cancer rates and numbers are uncertain for a number of reasons:

- uncertainties inherent in the fitted model that arise from the usual effects of random variation
- assumptions that the trends of the past will continue into the future and that the chosen model is an adequate representation of those trends between populations and over time
- uncertainties in projected populations.

These sources of error are important and many of them cannot be readily quantified.

Box 2: Limitations of using cancer incidence projections to determine future demand for radiation oncology services

These projections are only for cancer incidence within geographically defined HPRs. They do not take into account the actual use of radiation oncology services within HPRs, including the use of services by residents of other states, territories or HPRs.

For example, some residents of New South Wales use radiation oncology services within the Australian Capital Territory. The projected cancer incidence for the Australian Capital Territory will not take this additional demand for services into account.

This means that cancer incidence projections alone are not a complete measure of future demand for radiation oncology services within each HPR.

Uncertainties inherent in the fitted model

Modelling cancer data to perform predictions of future trends is subject to both model-selection uncertainty and model-fitting instability. All models are subject to uncertainties, and while various models will often fit the historical data well for short time periods, projections arising from alternative models can be quite different. The accepted (conservative) approach among statisticians preparing projections of this nature is to assume a linear model for increasing rates, and a log-linear (logit transformation) model for decreasing rates. It should be noted, however, the trends for individual age groups used in these projections are not necessarily all in the same direction.

Assumptions regarding cancer trends

It is important to note that the projections presented here should be treated with caution as they depend on a number of assumptions relating to trends in cancer incidence; namely that:

- incidence rates for all cancers are homogeneous across all HPRs within each jurisdiction
- the trends of the 14 years from 1997 to 2010 will continue for 2014 to 2024.

Population projections

Projected age-specific rates were used to calculate the number of future cancer cases for each HPR using projected population counts for that region; however, population projections are themselves subject to error due to assumptions of fertility, mortality and migration based on historical trends. Such trends may not reflect future effects on mortality through changing lifestyle factors such as decreases in smoking or increases in obesity. The Australian Bureau of Statistics (ABS) prepared the population projections used in this report specifically for Health planning purposes. They are not the official ABS projected populations. For more information on these populations, see Appendix B.

2 All cancer projections to 2024

Since 1982, the first year for which national data are available, the number of new cancer cases diagnosed in Australia each year increased from around 47,400 in 1982 to more than 116,500 in 2010, an increase of 146%. For comparison, during that same period, the Australian population increased from more than 15 million in 1982 to around 22 million in 2010, an increase of 45%.

This section provides the projected number of new cancer cases diagnosed for all cancers combined, in each jurisdictional HPR, from 2014 to 2024.

National projections

In 2024, an estimated 169,648 new cases of cancer are expected to be diagnosed in Australia, an average annual increase of 3.3% per year from 2010 (Table 2.1). The Australian population is expected to exceed 27 million by 2024, an increase of 1.8% per year from 2010.

The proportional increase is expected to vary between states and territories: the largest increase is expected in Western Australia (5.0% per year), and the smallest in South Australia (1.9% per year). Note that these differences are due to differences between the population projections for each state and territory and/or the cancer incidence rate projections for each state and territory.

Table 2.1: Incidence of all cancers combined, by jurisdiction: observed 2010[(a)] and projected 2014 and 2024

State/territory	2010[(a)]	2014	2024	Average annual change (%)[(b)]
NSW	38,279	41,918	52,428	2.5
Vic	28,502	31,563	41,247	3.2
Qld	23,453	27,325	37,348	4.2
WA	11,231	13,032	19,104	5.0
SA	9,219	9,772	11,722	1.9
Tas	3,172	3,368	4,182	2.3
ACT	1,524	1,969	2,541	4.4
NT	697	841	1,075	3.9
Australia	**116,077**	**129,790**	**169,648**	**3.3**

(a) The actual counts presented for New South Wales and the Australian Capital Territory are for 2009, as actual data for these jurisdictions are not yet available for 2010.

(b) The annual average percentage change is for 2024 compared with the last year of actual data available (2009 or 2010, see note (a)).

Note: Projected jurisdictional estimates may not sum to the Australia total due to rounding.

Source: Analysis of AIHW Australian Cancer Database 2010.

State and territory projections

Cancer incidence projections from 2014 to 2024 by HPR are presented for each jurisdiction. Information on the construction of the HPRs, and any exceptions or exclusions, is detailed in the introductory text. The name given to the HPR-equivalent region in each jurisdiction is provided; however, the term HPR is used to refer to these regions thereafter.

New South Wales

New South Wales HPRs align with the state's 16 Local Health Districts: Albury Wodonga Health, Central Coast, Far West, Hunter New England, Illawarra Shoalhaven, Mid North Coast, Murrumbidgee, Nepean Blue Mountains, Northern NSW, Northern Sydney, South Eastern Sydney, South Western Sydney, Southern NSW, Sydney, Western NSW, Western Sydney.

A map showing the boundaries of these areas is available as supplementary material to this report, at <www.aihw.gov.au/cancer-publications/>.

In 2011, 2 SLAs were split between HPRs. These were:

- SLA 14600—Lachlan (A): 73.35% Western NSW and 26.65% Murrumbidgee
- SLA 17400—Tenterfield (A): 91.84% Hunter New England and 8.16% Northern NSW.

The concordance of SLAs to New South Wales HPRs is presented in online supplementary Table C1. See Table B3 for underlying projected populations for New South Wales HPRs.

In 2024, an estimated 52,428 new cases of cancer are expected to be diagnosed in New South Wales, an annual average increase of 2.5% per year from 2009 (Table 2.1). Table 2.2 shows projected estimates by HPR.

These projections were developed for national health planning purposes. For projections specific to New South Wales, see *Cancer incidence and mortality projections: 2011–2021* (Cancer Institute NSW 2011).

Table 2.2: Projected incidence of all cancers combined, by HPR, 2014 to 2024: New South Wales

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. Albury Wodonga Health	296	303	311	319	328	336	344	353	362	371	380
2. Central Coast	2,135	2,162	2,190	2,219	2,245	2,271	2,296	2,322	2,352	2,378	2,403
3. Far West	214	219	224	229	234	239	244	248	254	259	264
4. Hunter New England	5,628	5,760	5,898	6,039	6,178	6,320	6,458	6,599	6,749	6,893	7,038
5. Illawarra Shoalhaven	2,540	2,597	2,654	2,713	2,771	2,831	2,890	2,949	3,011	3,072	3,133
6. Mid North Coast	1,570	1,598	1,627	1,657	1,685	1,713	1,741	1,769	1,800	1,829	1,856
7. Murrumbidgee	1,530	1,566	1,601	1,638	1,674	1,710	1,747	1,784	1,821	1,860	1,898
8. Nepean Blue Mountains	1,844	1,900	1,958	2,017	2,074	2,130	2,187	2,244	2,305	2,363	2,420
9. Northern NSW	2,094	2,137	2,179	2,223	2,266	2,309	2,353	2,396	2,442	2,487	2,530
10. Northern Sydney	4,968	5,061	5,161	5,263	5,366	5,471	5,575	5,684	5,798	5,911	6,026
11. South Eastern Sydney	4,662	4,757	4,857	4,956	5,058	5,162	5,267	5,378	5,493	5,609	5,728
12. South Western Sydney	4,448	4,576	4,705	4,833	4,963	5,092	5,224	5,356	5,492	5,628	5,764
13. Southern NSW	1,339	1,375	1,412	1,449	1,486	1,523	1,560	1,597	1,635	1,673	1,710
14. Sydney	2,927	3,003	3,082	3,160	3,241	3,323	3,407	3,494	3,583	3,673	3,768
15. Western NSW	1,702	1,745	1,791	1,837	1,881	1,925	1,971	2,017	2,065	2,111	2,157
16. Western Sydney	4,022	4,145	4,273	4,402	4,532	4,665	4,797	4,935	5,073	5,214	5,354
Total	**41,918**	**42,905**	**43,921**	**44,954**	**45,982**	**47,020**	**48,062**	**49,125**	**50,234**	**51,330**	**52,428**

Note: Projected HPR estimates may not sum to the state total due to rounding.

Source: Analysis of AIHW Australian Cancer Database 2010.

Victoria

Victoria HPRs align with the state's 8 Integrated Cancer Service areas: Barwon South Western, Gippsland, Grampians, Hume, Loddon Mallee, North Eastern, Southern, Western Central.

A map showing the boundaries of these areas is available as supplementary material to this report, at <www.aihw.gov.au/cancer-publications/>.

The concordance of SLAs to Victoria HPRs, including 5 SLAs not assigned to an HPR, is presented in online supplementary Table C2. See Table B4 for underlying projected populations for Victoria HPRs.

In 2024, an estimated 41,247 new cases of cancer are expected to be diagnosed in Victoria, an annual average increase of 3.2% per year from 2010 (Table 2.1). Table 2.3 shows projected estimates by HPR.

These projections were developed for national health planning purposes. For projections specific to Victoria, see *Cancer in Victoria: statistics and trends 2012* (Thursfield et al. 2013).

Table 2.3: Projected incidence of all cancers combined, by HPR, 2014 to 2024: Victoria

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. Barwon South Western	2,354	2,414	2,476	2,542	2,606	2,671	2,735	2,801	2,871	2,938	3,007
2. Gippsland	1,789	1,837	1,884	1,932	1,979	2,026	2,071	2,117	2,165	2,211	2,256
3. Grampians	1,417	1,457	1,499	1,542	1,584	1,626	1,669	1,711	1,756	1,799	1,844
4. Hume	1,728	1,777	1,828	1,878	1,928	1,978	2,029	2,081	2,134	2,185	2,236
5. Loddon Mallee	2,020	2,074	2,130	2,188	2,245	2,301	2,357	2,415	2,475	2,533	2,592
6. North Eastern	6,751	6,939	7,139	7,342	7,545	7,751	7,956	8,168	8,390	8,613	8,838
7. Southern	8,606	8,823	9,048	9,281	9,515	9,752	9,996	10,248	10,513	10,775	11,042
8. Western Central	6,892	7,113	7,345	7,582	7,821	8,070	8,325	8,590	8,863	9,138	9,427
Ungrouped SLAs	*5*	*5*	*5*	*5*	*5*	*5*	*5*	*5*	*5*	*5*	*5*
Total	**31,563**	**32,439**	**33,352**	**34,292**	**35,229**	**36,181**	**37,144**	**38,136**	**39,171**	**40,198**	**41,247**

Note: Projected HPR estimates may not sum to the state total due to rounding.

Source: Analysis of AIHW Australian Cancer Database 2010.

Queensland

Queensland HPRs align with the state's 16 Hospital and Health Services areas: Cairns and Hinterland, Cape York, Central Queensland, Central West, Darling Downs, Gold Coast, Mackay, Metro North, Metro South, North West, South West, Sunshine Coast, Torres Strait—Northern Peninsula, Townsville, West Moreton, Wide Bay.

A map showing the boundaries of these areas is available as supplementary material to this report, at <www.aihw.gov.au/cancer-publications/>.

In 2011, 2 SLAs were split between HPRs. These were:

- SLA 32662 (Banana (S)): 95% Central Queensland and 5% Darling Downs
- SLA 30370 (Cassowary Coast (R)—Cardwell): 80% Cairns and Hinterland and 20% Townsville.

The concordance of SLAs to Queensland HPRs is presented in online supplementary Table C3. See Table B5 for underlying projected populations for Queensland HPRs.

In 2024, an estimated 37,348 new cases of cancer are expected to be diagnosed in Queensland, an annual average increase of 4.2% per year from 2010 (Table 2.1). Table 2.4 shows projected estimates by HPR.

These projections were developed for national health planning purposes. For projections specific to Queensland, see *Oncology Analysis System (OASys)* (QCCAT 2014).

Table 2.4: Projected incidence of all cancers combined, by HPR, 2014 to 2024: Queensland

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. Cairns and Hinterland	1,428	1,489	1,552	1,616	1,681	1,747	1,814	1,880	1,947	2,014	2,084
2. Cape York	60	63	66	69	73	77	80	84	87	91	95
3. Central Queensland	1,137	1,187	1,238	1,290	1,343	1,397	1,451	1,506	1,562	1,619	1,679
4. Central West	78	80	81	83	85	87	89	91	92	94	96
5. Darling Downs	1,864	1,922	1,982	2,043	2,103	2,163	2,225	2,286	2,349	2,412	2,477
6. Gold Coast	3,447	3,564	3,686	3,811	3,937	4,066	4,194	4,327	4,462	4,597	4,738
7. Mackay	964	1,011	1,059	1,110	1,161	1,212	1,265	1,318	1,374	1,429	1,486
8. Metro North	5,168	5,322	5,481	5,647	5,814	5,981	6,150	6,321	6,497	6,674	6,856
9. Metro South	5,740	5,931	6,130	6,336	6,542	6,753	6,966	7,182	7,401	7,623	7,853
10. North West	145	154	162	172	181	191	200	210	220	230	241
11. South West	162	168	175	182	188	195	201	208	215	222	229
12. Sunshine Coast	2,765	2,842	2,925	3,007	3,088	3,168	3,247	3,329	3,410	3,489	3,570
13. Torres Strait—Northern Peninsula	32	33	34	36	37	38	39	41	42	44	45
14. Townsville	1,311	1,365	1,423	1,482	1,541	1,600	1,659	1,722	1,786	1,850	1,915
15. West Moreton	1,346	1,397	1,451	1,506	1,561	1,615	1,671	1,726	1,783	1,840	1,896
16. Wide Bay	1,678	1,722	1,766	1,810	1,852	1,894	1,934	1,974	2,014	2,051	2,088
Total	**27,325**	**28,250**	**29,211**	**30,200**	**31,187**	**32,182**	**33,185**	**34,205**	**35,242**	**36,280**	**37,348**

Note: Projected HPR estimates may not sum to the state total due to rounding.

Source: Analysis of AIHW Australian Cancer Database 2010.

Western Australia

Western Australia HPRs align with the state's 9 Health Region areas: Goldfields, Great Southern, Kimberley, Midwest, North Metro, Pilbara, South Metro, South West, Wheatbelt.

A map showing the boundaries of these areas is available as supplementary material to this report, at <www.aihw.gov.au/cancer-publications/>.

The concordance of SLAs to Western Australia HPRs is presented in online supplementary Table C4. See Table B6 for underlying projected populations for Western Australia HPRs.

In 2024, an estimated 19,104 new cases of cancer are expected to be diagnosed in Western Australia, an annual average increase of 5.0% per year from 2010 (Table 2.1). Table 2.5 shows projected estimates by HPR.

These projections were developed for national health planning purposes. For projections specific to Western Australia, see *Cancer incidence and mortality in Western Australia, 2009* (Threlfall & Thompson 2010).

Table 2.5: Projected incidence of all cancers combined, by HPR, 2014 to 2024: Western Australia

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. Goldfields	256	271	287	304	321	339	356	374	393	412	432
2. Great Southern	396	410	425	440	455	469	484	499	513	528	543
3. Kimberley	141	151	162	173	184	196	207	220	233	247	260
4. Midwest	378	393	409	425	441	457	473	489	506	523	540
5. North Metro	5,314	5,529	5,757	5,995	6,235	6,480	6,729	6,987	7,256	7,529	7,809
6. Pilbara	208	227	247	269	291	313	337	362	388	415	443
7. South Metro	4,871	5,060	5,257	5,461	5,666	5,877	6,090	6,311	6,539	6,771	7,010
8. South West	967	1,008	1,051	1,093	1,136	1,180	1,223	1,269	1,315	1,360	1,406
9. Wheatbelt	501	516	532	549	566	582	597	613	630	646	661
Total	**13,032**	**13,566**	**14,127**	**14,708**	**15,294**	**15,892**	**16,497**	**17,125**	**17,774**	**18,431**	**19,104**

Note: Projected HPR estimates may not sum to the state total due to rounding.

Source: Analysis of AIHW Australian Cancer Database 2010.

South Australia

South Australia HPRs align with the state's 4 Local Hospital Network areas: Central Adelaide, Country Health SA, Northern Adelaide, Southern Adelaide.

A map showing the boundaries of these areas is available as supplementary material to this report, at <www.aihw.gov.au/cancer-publications/>.

The concordance of SLAs to South Australia HPRs is presented in online supplementary Table C5. See Table B7 for underlying projected populations for South Australia HPRs.

In 2024, an estimated 11,722 new cases of cancer are expected to be diagnosed in South Australia, an annual average increase of 1.9% per year from 2010 (Table 2.1). Table 2.6 shows projected estimates by HPR.

These projections were developed for national health planning purposes. For information on cancer incidence specific to South Australia, see *Cancer in South Australia 2009 – with projections to 2012 (*South Australian Cancer Registry 2013).

Table 2.6: Projected incidence of all cancers combined, by HPR, 2014 to 2024: South Australia

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. Central Adelaide	2,880	2,915	2,952	2,990	3,027	3,069	3,111	3,155	3,205	3,254	3,304
2. Country Health SA	3,070	3,136	3,203	3,269	3,335	3,401	3,467	3,534	3,604	3,670	3,736
3. Northern Adelaide	1,733	1,776	1,821	1,867	1,911	1,956	2,001	2,047	2,096	2,143	2,190
4. Southern Adelaide	2,089	2,124	2,161	2,200	2,239	2,279	2,320	2,361	2,406	2,449	2,492
Total	**9,772**	**9,952**	**10,137**	**10,325**	**10,513**	**10,704**	**10,899**	**11,096**	**11,311**	**11,516**	**11,722**

Note: Projected HPR estimates may not sum to the state total due to rounding.

Source: Analysis of AIHW Australian Cancer Database 2010.

Tasmania

Tasmania HPRs align with the state's 3 Health Region areas: North West, Northern, Southern.

A map showing the boundaries of these areas is available as supplementary material to this report, at <www.aihw.gov.au/cancer-publications/>.

The concordance of SLAs to Tasmania HPRs is presented in online supplementary Table C6. See Table B8 for underlying projected populations for Tasmania HPRs.

In 2024, an estimated 4,182 new cases of cancer are expected to be diagnosed in Tasmania, an annual average increase of 2.3% per year from 2010 (Table 2.1). Table 2.7 shows projected estimates by HPR.

These projections were developed for national health planning purposes. For information on cancer incidence specific to Tasmania, see *Cancer in Tasmania: incidence and mortality 2010* (Stokes et al. 2013).

Table 2.7: Projected incidence of all cancers combined, by HPR, 2014 to 2024: Tasmania

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. North West	774	790	808	824	841	857	874	890	906	922	937
2. Northern	959	981	1,003	1,026	1,048	1,071	1,093	1,115	1,138	1,160	1,183
3. Southern	1,635	1,677	1,720	1,764	1,808	1,850	1,891	1,934	1,976	2,018	2,061
Total	**3,368**	**3,448**	**3,531**	**3,615**	**3,697**	**3,778**	**3,858**	**3,939**	**4,020**	**4,100**	**4,182**

Note: Projected HPR estimates may not sum to the state total due to rounding.

Source: Analysis of AIHW Australian Cancer Database 2010.

Australian Capital Territory

The Australian Capital Territory is considered a single HPR. A map of the Australian Capital Territory HPR is available as supplementary material to this report, at <www.aihw.gov.au/cancer-publications/>.

See Table B9 for underlying projected populations for the Australian Capital Territory.

In 2024, an estimated 2,541 new cases of cancer are expected to be diagnosed in the Australian Capital Territory, an annual average increase of 4.4% per year from 2009 (Table 2.1). These data are also shown in Table 2.8.

These projections were developed for national health planning purposes. For information on cancer incidence specific to the Australian Capital Territory, see *Cancer in the ACT: incidence and mortality 2011* (ACT Health 2011).

Table 2.8: Projected incidence of all cancers combined, by HPR, 2014 to 2024: Australian Capital Territory

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total	1,969	2,026	2,084	2,145	2,203	2,260	2,317	2,373	2,429	2,485	2,541

Source: Analysis of AIHW Australian Cancer Database 2010.

Northern Territory

The Northern Territory is considered a single HPR. A map of the Northern Territory HPR is available as supplementary material to this report, at <www.aihw.gov.au/cancer-publications/>.

See Table B10 for underlying projected populations for the Northern Territory.

In 2024, an estimated 1,075 new cases of cancer are expected to be diagnosed in the Northern Territory, an annual average increase of 3.9% per year from 2010 (Table 2.1). These data are also shown below in Table 2.9.

These projections were developed for national health planning purposes. For information on cancer incidence specific to the Northern Territory, see *Cancer in the Northern Territory 1991–2010: incidence, mortality and survival* (Zhang et al. 2014).

Table 2.9: Projected incidence of all cancers combined, by HPR, 2014 to 2024: Northern Territory

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total	841	867	895	921	945	968	991	1,013	1,034	1,054	1,075

Source: Analysis of AIHW Australian Cancer Database 2010.

Appendix A Statistical methods

Modelling jurisdictional trends to HPRs

State and territory level projections for all cancers combined include projections for individual HPRs. Past trends for cancer incidence in small geographic areas are of limited value as estimators of future trends because they are imprecise, due to the small number of cancer cases in any specific area. For example, if a specific HPR had a trend of decline or increase that was significantly different for the state or territory, it would be unclear whether this reflected a real difference or a random fluctuation. This is a critical problem because even small changes in the trend can cause large changes in projected numbers. The strategy used by Coorey and Armstrong (1998) and adapted in this study was to obtain projections for each HPR using projected rates for the whole state or territory applied to small area-specific population projections. This provides sufficient data to provide statistical stability while retaining state and territory level variations from the national data.

The projected rates for each state or territory were obtained by extrapolating past trends for all cancers (except prostate cancer) combined and prostate cancer separately using age-period interaction models. The historical trend data were taken from 1997 to 2010, with the exception of New South Wales and the Australian Capital Territory where the period 1997 to 2009 was used (Table A1).

The prostate cancer method differs slightly from that for all cancers combined. Projected rates were predicted using observed incidence counts for the years 1997 to 2010 and estimated counts for 2011 to 2013; these estimates were obtained by regressing annual incidence for 2002 to 2010 against the corresponding number of PSA tests (see 'Special case of prostate cancer incidence trends' below).

The choice of age groups is a compromise between accurate fitting of the data and precision of the model parameters. While a greater number of age groups provides more accurate fitting of the data, precision of model parameters falls with the reduced number of cases in each group. The age groups for modelling each jurisdiction were the standard 5-year age groups. Exceptions to this were those jurisdictions where there were zero (0) cases in some 5-year age groups. To overcome this problem and maintain statistical integrity, some age groups were combined (Table A1).

Table A1: Input variables to projections model, by state and territory

State/territory	First year	Final year	Age groups
New South Wales	1997	2009	0–4, 5–9, …, 75–79, 85+
Victoria	1997	2010	0–4, 5–9, …, 75–79, 85+
Queensland	1997	2010	0–4, 5–9, …, 75–79, 85+
Western Australia	1997	2010	0–4, 5–9, …, 75–79, 85+
South Australia	1997	2010	0–4, 5–9, …, 75–79, 85+
Tasmania	1997	2010	0–14, 15–19, 20–24, 25–29, …, 75–79, 85+
Australian Capital Territory	1997	2009	0–14, 15–24, 25–29, 30–34, …, 75–79, 85+
Northern Territory	1997	2010	0–14, 15–24, 25–29, 30–34, …, 75–79, 85+

For prostate cancer, broader age groups were selected (0–44, 45–54, 55–64, 65–74, 75–84 and 85 and over), and applied to all jurisdictions.

For each age–sex combination, a simple linear model—with time as the explanatory variable—was estimated for the incidence rate using ordinary least squares. This effectively fits a separate linear model to each age group by sex cross-classification and assumes that the incidence rate within each age–sex cross-classification changes by a fixed quantity each year.

Parameter estimation was carried out in SAS using PROC REG. The significance of time as a predictor was determined at the 5% level by applying a two-tailed test to its coefficient. The model selected was dependent on the significance and direction of each age–sex trend:

- A linear regression model was used for significant increasing trends.
- A logit transformation was used for significant decreasing trends.
- The mean was used for non-significant trends.

The appropriate model was fitted to past age–sex cancer incidence data and used to project future incidence rates for 2014 to 2024. A mathematical form of the model is shown in Box A1.

Confidence, projection or sensitivity intervals were not calculated for the projected incidence counts presented in this report. The calculation of such intervals is not recommended practice when the projected data are used for administrative or planning purposes (Moller et al. 2005).

Box A1: Statistical projection model

Let

a_i = the incidence rate in age–sex cell *i* for the whole state or territory

b_i = the increment rate in age–sex cell *i* for the whole state or territory

t = year

R_{it} = the modelled age–sex specific incidence rate for age–sex cell *I* and year *t*

n_{it} = the population count in age–sex cell *i* for year *t* in the SLA

e_{it} = the expected number of cancer cases in age–sex cell *i* for year *t* in the SLA

Then the modelled rate for age–sex cell *i* in the whole state or territory is given by

$R_{it} = a_i + b_i t$ for increasing trends

or

$logit\left(R_{it}\right) = a_i + b_i t$ for decreasing trends.

That is,

$$R_{it} = \frac{\exp\left(a_i + b_i t\right)}{1 + \exp\left(a_i + b_i t\right)}$$

and the expected number of cancer cases in each HPR for year *t* is given by

$$E_t\left(HPR\right) = \sum_i e_{it} = \sum_i n_{it} \times R_{it}$$

Special case of prostate cancer incidence trends

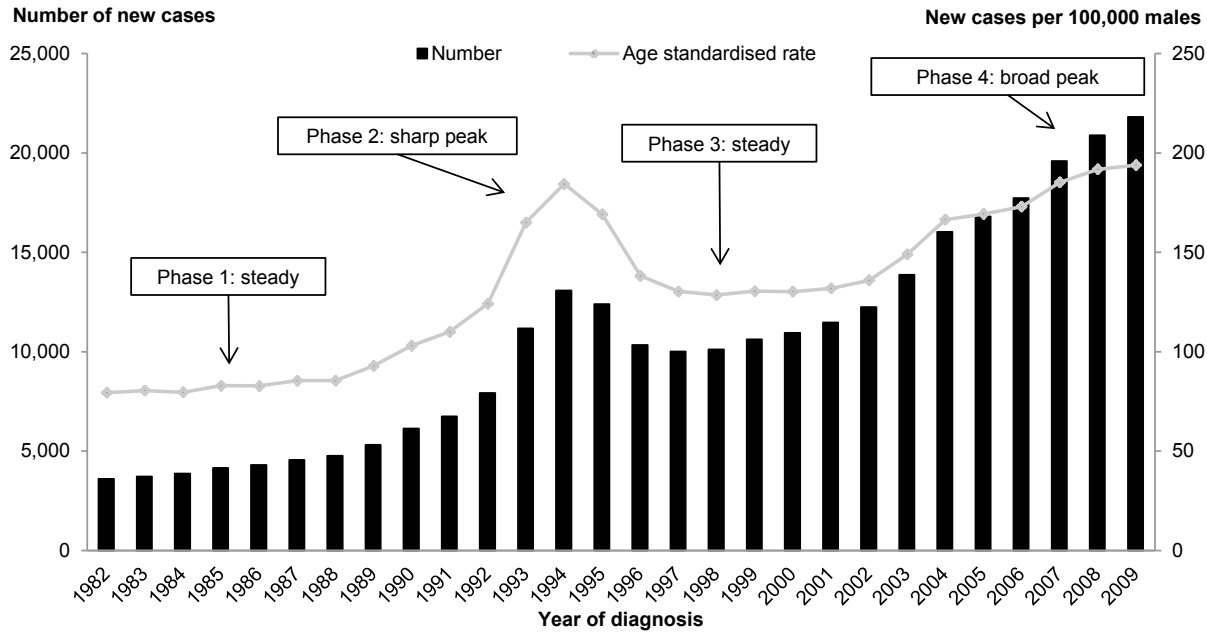
The incidence of all cancers combined is increasing over time. This does not account for variations in specific cancers, which may be affected by a number of factors including lifestyle changes, screening and early detection. This effect is particularly evident for prostate cancer, following the introduction of PSA testing.

Prostate cancer accounts for around 30% of all new cancers diagnosed in males (excluding non-melanoma skin cancers). Age-standardised incidence rates of prostate cancer in Australia have undergone a number of fluctuations since national data were first collected in 1982.

Between 1982 and 2009, there was an overall 144% increase in the incidence of prostate cancer (Figure A1). This increase occurred in four broad phases, with some annual fluctuation, in which age-standardised prostate cancer incidence rates:

- were steady between 1982 and 1988, at around 82 new cases per 100,000 males
- increased sharply from 86 per 100,000 in 1988 to 184 per 100,000 in 1994, followed by a sharp decline to 130 per 100,000 in 1997

- were steady between 1997 and 2001, at around 130 new cases per 100,000 males
- increased from 136 per 100,000 in 2002 to 194 per 100,000 in 2009 (AIHW 2013).



Note: Rates are directly age-standardised to the Australian population as at 30 June 2001 and expressed per 100,000 males.

Source: AIHW Australian Cancer Database 2009; Figure 3.2 in AIHW 2013.

Figure A1: Prostate cancer incidence among males, Australia, 1982 to 2009

Some of this variation in prostate cancer incidence is attributed to PSA testing for the detection of asymptomatic prostate cancer.

PSA is a protein produced within the prostate and is quantifiable by a blood test (PSA test). PSA levels in the blood naturally increase with increasing age, and a PSA level that is higher than 'normal' for that age can be an indicator of risk of prostate cancer (AIHW 2013).

In Australia, the PSA test was introduced in 1987 and first included on the Medicare Benefits Schedule (MBS) in 1989. This is thought to have contributed to the peak in prostate cancer incidence during the early 1990s by uncovering a large pool of asymptomatic cases (Figure A1). Many of those cases may have remained undiagnosed until symptoms developed years later (AIHW & AACR 2010a). The PSA threshold at which a male is referred for a prostate biopsy was lowered in 2002 (Smith et al. 2008). This procedural change is thought to have contributed to the second increase in prostate cancer incidence—observed from 2002 (Figure A1)—by uncovering another pool of prostate cancer cases that may otherwise have remained undetected for many years. Many of these males would previously have been considered 'lower risk'. The resulting upward trend in incidence was similar to that for the early 1990s.

The volatile fluctuation of age-standardised incidence rates for prostate cancer makes it difficult to predict future incidence trends. While data are available for most states and territories for 2010, data are not available for New South Wales or the Australian Capital Territory. Available state and territory incidence data for 2010 show that prostate cancer incidence has started to decrease, suggesting a similar downward trend to that seen in 1997. However, without actual incidence data from New South Wales and the Australian Capital

Territory, it is not possible to confirm either that this change in trend is occurring nationally, or to what degree the downward turn will continue.

Because of this uncertainty, projections for prostate cancer have been modelled separately to all other cancers combined and the results from each model summed to provide projections for all cancers. The method for the prostate cancer model uses current MBS data on PSA testing to assess:

1. the trend in PSA testing
2. the relationship between prostate cancer incidence and PSA testing (incidence: PSA test ratio).

These data are then used to estimate prostate cancer incidence from 2011 to 2013 and, combined with historical data from 1997 to 2010, provide a more robust model from which to project incidence to 2024. Note that, similar to the model for all other cancers combined, the model for New South Wales and the Australian Capital Territory is based on actual prostate cancer incidence data from 1997 to 2009, and inferred incidence data from 2010 to 2013.

MBS Item 66655, allowing a single test for 'prostate specific antigen, quantitation' in each 12-month period, has been listed on the MBS since May 2001. For the purpose of this report, data from 1 January 2002 to 31 December 2010 were used to quantify the relationship between PSA testing and prostate cancer incidence, by broad age groups (0–44, 45–54, 55–64, 65–74, 75–84, 85 and over) for each state and territory.

The observed ratios were regressed using the method shown in Box A1 and the resulting model (significant increasing, significant decreasing or mean) for each age group was used to estimate the ratio for years 2011 to 2013. These ratios were applied to PSA test data for 1 January 2011 to 31 December 2013 and used to estimate prostate cancer incidence for those years.

The estimated incidence data for prostate cancer for the period 2011–2013 were added to those actual data for 1997–2010, and projected counts for prostate cancer for 2014 to 2024 were calculated as per the model for all cancers combined (Box A1). Note that for New South Wales and the Australian Capital Territory—similar to the model for all other cancers combined—estimated (inferred) prostate cancer incidence data for 2010–2013 were added to the actual data for 1997–2009.

It is important to note that if the actual prostate cancer incidence data for New South Wales and the Australian Capital Territory for 2010, when available, differ substantially from the inferred incidence derived by the method above, it would be prudent to revise the projections for these jurisdictions.

Appendix B Data sources and classifications

Australian Cancer Database

The Australian Cancer Database contains information on Australians who were diagnosed with cancer (excluding basal cell and squamous cell carcinomas of the skin) between 1982 and 2010. Data are collected by state and territory cancer registries from a number of sources and are supplied annually to the AIHW. The AIHW compiles and maintains the Australian Cancer Database, in partnership with the Australasian Association of Cancer Registries. In Australia, cancer is a notifiable disease. This means that reporting all cancers (excluding basal cell and squamous cell carcinomas of the skin) is mandatory under legislation in each Australian state and territory.

Cancer reporting and registration is a dynamic process, and records in the state and territory cancer registries may be modified if new information is received. As a result, the number of cancer cases reported by the AIHW for any particular year may change slightly over time and may not always align with state and territory reporting for that same year (AIHW & AACR 2010b).

The most recent year of national cancer incidence data currently available in the Australian Cancer Database is 2010. The 2010 incidence data are based on actual incidence data for all states and territories except New South Wales and the Australian Capital Territory, where actual incidence data are available up to 2009.

The Data Quality Statement for the Australian Cancer Database 2010 can be found on the AIHW website at <http://meteor.aihw.gov.au/content/index.phtml/itemId/565218>.

A review of the Australian Cancer Database collection is in progress and this report will be published on the AIHW website in 2014.

Medicare Benefits Schedule

The MBS database records the number of tests and demographic information on the recipients of those tests. Medicare claims data, used to derive trends in PSA testing based on 'Item 66655—prostate specific antigen, quantitation' for the period 1 January 2002 to 31 December 2013, were sourced from the Medicare Australia website, <https://www.medicareaustralia.gov.au/statistics/mbs_item.shtml>.

A summary of claims, by state and territory and years, is presented in Table B1.

Table B1: MBS claims for Item 66655, by state and territory, 2002, 2013 and 2002–2013

State/territory	2002	2013	2002–2013
NSW	153,282	216,472	2,753,029
Vic	103,344	185,444	2,313,650
Qld	96,910	159,025	1,685,623
WA	62,080	72,366	945,948
SA	48,586	59,617	792,131
Tas	12,697	10,795	212,323
ACT	10,484	8,669	140,014
NT	3,228	3,971	53,540
Australia	**490,611**	**716,359**	**8,896,258**

Source: Medicare Australia 2014.

These data include only those services performed by a registered provider of services that qualify for Medicare Benefit and for which a claim was processed by Medicare 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. The state or territory is determined according to the address (at the time of claiming) of the patient to whom the service was rendered.

Population data

Two distinct sources of population data are used in this report: historical populations and projected populations.

Historical population data

Historical populations for 1997 to 2013, used to derive the age-specific incidence rates, were sourced from the ABS. The populations used in this report are the 30 June rebased populations derived from the 2011 Census of Population and Housing. Note that while the populations for 1997 to 2011 are final, those for 2012 and 2013 are preliminary.

Populations are updated over time, and those used in this report are summarised in Table B2 for information. They are also available from the ABS website, <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3101.0Jun%202013?OpenDocument >.

Table B2: Rebased estimated resident population, by state and territory, 1997 to 2010 (30 June)

Year	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
1997	6,246,267	4,569,297	3,355,417	1,798,341	1,475,658	474,908	310,533	189,755	18,420,176
1998	6,305,799	4,606,970	3,404,484	1,826,440	1,483,270	473,430	311,532	192,905	18,604,830
1999	6,375,103	4,652,462	3,453,936	1,853,936	1,490,934	473,030	314,171	196,012	18,809,584
2000	6,446,558	4,704,065	3,509,458	1,879,093	1,497,503	473,123	317,235	199,149	19,026,184
2001	6,530,349	4,763,615	3,571,469	1,906,274	1,503,461	473,668	321,538	201,743	19,272,117
2002	6,580,807	4,817,774	3,653,123	1,928,512	1,511,567	474,152	324,627	202,251	19,492,813
2003	6,620,715	4,873,809	3,743,121	1,952,741	1,520,399	478,534	327,357	201,725	19,718,401
2004	6,650,735	4,927,149	3,829,970	1,979,542	1,528,189	483,178	328,940	202,663	19,930,366
2005	6,693,206	4,989,246	3,918,494	2,011,207	1,538,804	486,202	331,399	205,905	20,174,463
2006	6,742,690	5,061,266	4,007,992	2,050,581	1,552,529	489,302	335,170	209,057	20,448,587
2007	6,834,156	5,153,522	4,111,018	2,106,139	1,570,619	493,262	342,644	213,748	20,825,108
2008	6,943,461	5,256,375	4,219,505	2,171,700	1,588,665	498,568	348,368	219,874	21,246,516
2009	7,053,755	5,371,934	4,328,771	2,240,250	1,608,902	504,353	354,785	226,027	21,688,777
2010	7,144,292	5,461,101	4,404,744	2,290,845	1,627,322	508,847	361,766	229,778	22,028,695
2011	7,218,529	5,537,817	4,476,778	2,353,409	1,639,614	511,483	367,985	231,292	22,336,907
2012	*7,305,530*	*5,631,567*	*4,568,695*	*2,436,179*	*1,656,274*	*512,190*	*375,117*	*235,206*	*22,720,758*
2013	*7,407,682*	*5,737,615*	*4,658,557*	*2,517,165*	*1,670,834*	*513,012*	*383,375*	*239,507*	*23,127,747*

Note: While populations for 1997 to 2011 are final, those for 2012 and 2013 are preliminary.

Source: ABS rebased 30 June estimated resident population.

Projected population data (*preliminary*)

Preliminary projected populations by SLA for 2014 to 2024, used to derive the projected incidence counts by jurisdictional HPR, were prepared by the ABS as consultant to Health to inform statistics on ageing and aged care.

The projected populations used in this report are based on *preliminary* 2011 Census-based estimated resident populations, projected forward to 2026. The assumptions used to derive these projections are consistent with the ABS Series B projections, and reflect moderate assumptions of births, deaths and migration. The underlying geography for these preliminary projections is the Australian Standard Geographical Classification SLA.

It is important to note that the projections used in this report are not official ABS data and differ from projected populations published elsewhere. The differences can be attributed to methodology, geography (Australian Standard Geographical Classification, not Australian Standard Geographical Standard) and status (preliminary, not final). Caution is advised when comparing the projections presented in this report with other incidence projections, taking into consideration the underlying populations. Tables B3–B10 present a summary of the *preliminary* population projections used in this report for each jurisdiction.

The final version of these projections, based on the Australian Statistical Geography Standard geography (SA2), will be available on the Health website from mid-2014 <http://www.health.gov.au/internet/main/publishing.nsf/Content/ageing–stats–lapp.htm>.

Table B3: Preliminary projected populations by HPR, 2014 to 2024: New South Wales

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. Albury Wodonga Health	51,101	51,660	52,221	52,780	53,335	53,878	54,405	54,925	55,428	55,917	56,388
2. Central Coast	329,998	333,376	336,960	340,551	344,144	347,746	351,362	355,093	358,947	362,931	367,048
3. Far West	32,057	32,351	32,640	32,922	33,196	33,463	33,721	33,977	34,226	34,469	34,707
4. Hunter New England	890,726	898,590	906,450	914,169	921,757	929,175	936,386	943,408	950,219	956,805	963,179
5. Illawarra Shoalhaven	394,505	398,000	401,480	404,913	408,275	411,594	414,811	417,959	421,026	424,011	426,896
6. Mid North Coast	211,341	212,698	214,059	215,397	216,718	218,016	219,313	220,588	221,854	223,107	224,352
7. Murrumbidgee	241,894	244,195	246,547	248,872	251,173	253,429	255,653	257,854	260,014	262,155	264,256
8. Nepean Blue Mountains	362,467	367,863	373,441	378,960	384,408	389,795	395,123	400,488	405,889	411,339	416,830
9. Northern NSW	301,130	303,266	305,326	307,343	309,319	311,256	313,172	315,064	316,919	318,751	320,557
10. Northern Sydney	878,772	888,735	899,012	909,031	918,822	928,401	937,795	947,304	956,913	966,644	976,503
11. South Eastern Sydney	878,091	889,970	902,270	914,349	926,198	937,763	949,009	960,218	971,367	982,427	993,343
12. South Western Sydney	914,141	928,598	943,500	958,267	972,885	987,367	1,001,670	1,016,073	1,030,599	1,045,292	1,060,115
13. Southern NSW	201,536	203,278	204,988	206,651	208,253	209,832	211,377	212,879	214,334	215,754	217,133
14. Sydney	608,831	618,726	628,824	638,690	648,303	657,596	666,543	675,310	683,886	692,266	700,426
15. Western NSW	282,902	286,147	289,316	292,441	295,524	298,543	301,526	304,447	307,321	310,154	312,947
16. Western Sydney	882,953	896,376	910,061	923,447	936,505	949,205	961,534	973,759	985,880	997,930	1,009,911
Total	**7,462,445**	**7,553,829**	**7,647,095**	**7,738,783**	**7,828,815**	**7,917,059**	**8,003,400**	**8,089,346**	**8,174,822**	**8,259,952**	**8,344,591**

Source: Department of Health 2013.

Table B4: Preliminary projected populations by HPR, 2014 to 2024: Victoria

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. Barwon South Western	378,434	382,740	387,044	391,287	395,462	399,558	403,564	407,489	411,331	415,090	418,762
2. Gippsland	267,134	270,074	273,005	275,872	278,681	281,431	284,119	286,744	289,292	291,778	294,194
3. Grampians	231,192	233,897	236,611	239,285	241,928	244,527	247,079	249,586	252,056	254,487	256,874
4. Hume	275,352	278,600	281,830	285,016	288,149	291,234	294,264	297,243	300,187	303,085	305,943
5. Loddon Mallee	318,606	322,212	325,826	329,407	332,954	336,446	339,878	343,279	346,631	349,939	353,180
6. North Eastern	1,250,285	1,282,159	1,315,846	1,348,361	1,379,682	1,409,801	1,438,662	1,467,785	1,497,190	1,526,913	1,556,947
7. Southern	1,592,848	1,618,713	1,644,700	1,670,845	1,697,112	1,723,505	1,749,977	1,776,424	1,802,830	1,829,230	1,855,578
8. Western Central	1,508,216	1,537,183	1,566,247	1,595,376	1,624,521	1,653,605	1,682,576	1,711,335	1,739,875	1,768,200	1,796,260
Ungrouped SLAs	*746*	*746*	*746*	*746*	*746*	*746*	*746*	*746*	*746*	*746*	*746*
Total	**5,822,813**	**5,926,324**	**6,031,855**	**6,136,195**	**6,239,235**	**6,340,853**	**6,440,865**	**6,540,631**	**6,640,138**	**6,739,468**	**6,838,484**

Source: Department of Health 2013.

Table B5: Preliminary projected populations by HPR, 2014 to 2024: Queensland

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. Cairns and Hinterland	247,394	252,899	258,501	264,041	269,527	274,939	280,273	285,567	290,830	296,059	301,275
2. Cape York	15,578	15,968	16,361	16,751	17,137	17,517	17,891	18,268	18,648	19,028	19,407
3. Central Queensland	211,154	215,907	220,823	225,690	230,508	235,266	239,948	244,596	249,215	253,819	258,409
4. Central West	13,017	13,229	13,436	13,645	13,851	14,061	14,267	14,469	14,667	14,869	15,068
5. Darling Downs	299,162	305,679	312,163	318,625	325,028	331,385	337,710	344,023	350,358	356,713	363,068
6. Gold Coast	559,655	570,650	581,733	592,714	603,559	614,285	624,847	635,340	645,727	656,043	666,238
7. Mackay	183,939	188,202	192,495	196,723	200,886	204,997	209,020	212,992	216,917	220,800	224,657
8. Metro North	940,322	958,796	977,717	996,420	1,014,984	1,033,274	1,051,364	1,069,465	1,087,623	1,105,803	1,123,995
9. Metro South	1,099,235	1,123,092	1,147,461	1,171,542	1,195,338	1,218,863	1,242,002	1,265,109	1,288,161	1,311,223	1,334,241
10. North West	35,369	36,415	37,462	38,497	39,523	40,535	41,532	42,521	43,497	44,462	45,425
11. South West	28,628	29,341	30,059	30,771	31,471	32,165	32,855	33,546	34,232	34,922	35,612
12. Sunshine Coast	382,751	389,341	395,996	402,586	409,119	415,575	421,966	428,348	434,728	441,108	447,489
13. Torres Strait—Northern Peninsula	11,466	11,682	11,901	12,118	12,338	12,557	12,775	12,993	13,211	13,434	13,655
14. Townsville	254,646	260,566	266,502	272,383	278,228	283,991	289,702	295,387	301,040	306,651	312,230
15. West Moreton	260,928	267,222	273,539	279,865	286,058	292,180	298,220	304,239	310,234	316,229	322,228
16. Wide Bay	216,170	219,960	223,807	227,622	231,399	235,145	238,834	242,529	246,215	249,895	253,572
Total	**4,759,414**	**4,858,949**	**4,959,956**	**5,059,993**	**5,158,954**	**5,256,735**	**5,353,206**	**5,449,392**	**5,545,303**	**5,641,058**	**5,736,569**

Source: Department of Health 2013.

Table B6: Preliminary projected populations by HPR, 2014 to 2024: Western Australia

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. Goldfields	62,448	64,209	65,982	67,737	69,466	71,172	72,863	74,536	76,197	77,843	79,473
2. Great Southern	62,928	64,240	65,571	66,891	68,200	69,500	70,784	72,067	73,349	74,629	75,908
3. Kimberley	40,588	41,579	42,577	43,571	44,553	45,523	46,477	47,426	48,365	49,297	50,220
4. Midwest	69,745	71,284	72,840	74,386	75,917	77,439	78,941	80,445	81,945	83,445	84,934
5. North Metro	1,065,560	1,099,715	1,134,835	1,169,655	1,204,131	1,238,197	1,271,803	1,305,544	1,339,394	1,373,364	1,407,425
6. Pilbara	67,898	69,609	71,302	72,972	74,604	76,202	77,766	79,297	80,792	82,255	83,686
7. South Metro	952,666	982,763	1,013,659	1,044,295	1,074,650	1,104,673	1,134,328	1,164,051	1,193,832	1,223,681	1,253,575
8. South West	169,762	173,554	177,388	181,187	184,941	188,663	192,328	195,994	199,653	203,289	206,909
9. Wheatbelt	78,861	80,128	81,413	82,690	83,959	85,208	86,457	87,695	88,924	90,152	91,375
Total	**2,570,456**	**2,647,081**	**2,725,567**	**2,803,384**	**2,880,421**	**2,956,577**	**3,031,747**	**3,107,055**	**3,182,451**	**3,257,955**	**3,333,505**

Source: Department of Health 2013.

Table B7: Preliminary projected populations by HPR, 2014 to 2024: South Australia

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. Central Adelaide	489,315	493,972	498,816	503,577	508,231	512,782	517,211	521,617	525,985	530,294	534,522
2. Country Health SA	491,351	496,193	501,036	505,786	510,441	514,995	519,446	523,826	528,125	532,349	536,495
3. Northern Adelaide	348,886	354,331	359,858	365,274	370,568	375,726	380,749	385,705	390,613	395,474	400,312
4. Southern Adelaide	360,323	364,125	368,037	371,869	375,634	379,319	382,901	386,484	390,053	393,640	397,213
Total	**1,689,875**	**1,708,621**	**1,727,747**	**1,746,506**	**1,764,874**	**1,782,822**	**1,800,307**	**1,817,632**	**1,834,776**	**1,851,757**	**1,868,542**

Source: Department of Health 2013.

Table B8: Preliminary projected populations by HPR, 2014 to 2024: Tasmania

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. North West	115,670	116,133	116,587	117,012	117,412	117,789	118,145	118,469	118,770	119,045	119,296
2. Northern	144,902	145,510	146,106	146,667	147,183	147,659	148,090	148,482	148,823	149,129	149,382
3. Southern	260,180	262,336	264,496	266,606	268,667	270,660	272,578	274,453	276,279	278,049	279,772
Total	**520,752**	**523,979**	**527,189**	**530,285**	**533,262**	**536,108**	**538,813**	**541,404**	**543,872**	**546,223**	**548,450**

Source: Department of Health 2013.

Table B9: Preliminary projected populations, 2014 to 2024: Australian Capital Territory

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Australian Capital Territory	387,037	393,801	400,660	407,445	414,151	420,768	427,285	433,772	440,233	446,674	453,084

Source: Department of Health 2013.

Table B10: Preliminary projected populations, 2014 to 2024: Northern Territory

HPR	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Northern Territory	240,151	243,146	246,147	249,148	252,023	254,945	257,718	260,503	263,311	266,035	268,844

Source: Department of Health 2013.

References

ACT Health 2011. Cancer in the ACT: incidence and mortality 2011. Health series no. 56. Canberra: ACT Health.

AIHW (Australian Institute of Health and Welfare) 2012. Cancer incidence projections: Australia, 2011 to 2020. Cancer series no. 66. Cat. no. CAN 62. Canberra: AIHW.

AIHW 2013. Prostate cancer in Australia. Cancer series no. 79. Cat. no. CAN 76. Canberra: AIHW.

AIHW & AACR 2010a. Cancer in Australia 2010: an overview. Cancer series no. 60. Cat. no. CAN 56. Canberra: AIHW.

AIHW & AACR 2010b. National Cancer Statistics Clearing House protocol 2010. Canberra: AIHW. Viewed 7 March 2013, <http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=10737421344>.

Australian Government Department of Health 2013. Statistical Local Area Population Projections, 2011 (base) to 2026, Preliminary. Canberra: Australian Government Department of Health. Viewed October 2013, <http://www.health.gov.au/internet/main/publishing.nsf/Content/ageing-stats-lapp.htm>.

Barton M, Jacob S, Shafiq J, Wong KHW, Delaney G & Hanna T 2013. Review of optimal radiotherapy utilisation rates. Liverpool (NSW): Ingham Institute for Applied Medical Research.

Cancer Institute NSW 2011. Cancer incidence and mortality: projections 2011 to 2021. Sydney: Cancer Institute NSW.

Coorey M & Armstrong B 1998. Cancer incidence projections for Area and Rural Health Services in New South Wales. Sydney: NSW Cancer Council.

Medicare Australia 2014. Medicare Australia statistics. Canberra: Medicare Australia. Viewed February 2014, <https://www.medicareaustralia.gov.au/statistics/mbs_item.shtml>.

Moller B, Weedon-Fekjaer H & Haldorsen T 2005. Empirical evaluation of prediction intervals for cancer incidence. BMC Medical Research Methodology 5:21.

QCCAT (Queensland Cancer Control Analysis Team) 2014. OASys (Oncology Analysis System). Brisbane: Queensland Health. Viewed 6 June 2014, <https://qccat.health.qld.gov.au/AboutOASys>.

Smith D, Supramaniam R, Marshall V & Armstrong B 2008. Prostate cancer and prostate-specific antigen testing in New South Wales. Medical Journal of Australia 189(6).

South Australian Cancer Registry 2013. Cancer in South Australia 2009—with projections to 2012. Adelaide: South Australian Department for Health and Ageing. Viewed 15 April 2014, <www.health.sa.gov.au/pehs/health-statistics.htm>.

Stokes B, Albion T, Otahal P & Venn A 2013. Cancer in Tasmania: incidence and mortality 2010. Hobart: Menzies Research Institute Tasmania.

Threlfall T & Thompson J 2010. Cancer incidence and mortality in Western Australia, 2009. Statistical Series number 91. Perth: Department of Health (Western Australia).

Thursfield V, Staines C, Giles G & Farrugia H 2013. Cancer in Victoria: statistics and trends 2012. Melbourne: Cancer Council Victoria.

Zhang X, Condon J, Dempsey K & Garling L 2014. Cancer in the Northern Territory 1991–2010: incidence, mortality and survival. Darwin: Department of Health.

List of tables

Radiation oncology areas of need: cancer incidence projections 2014–2024 presents cancer incidence projections at the jurisdictional health planning region level for 2014 to 2024. These projections were developed specifically for Australian Government Department of Health planning purposes.