

Long-term projections 2011–2021

- » Cancer incidence projections in NSW are increasing on average by 5,000 new cases every five years. There were 36,041 new cases of cancer in 2007, and in 2021 the estimated number of new cases is expected to be 50,967 (28,789 males and 22,178 females), an increase of 42 per cent between 2007 and 2021.
- » On average, there is expected to be a 14 per cent increase in the number of cancer deaths between 2007 and 2021.
- » The major cancer sites of prostate, bowel, breast, melanoma of the skin and lung accounted for 59 per cent of total cancers in 2003, increasing gradually to 63 per cent of total cancers in 2007 and is projected to remain at 62 per cent of total cancers in 2021.
- » The projected numbers of new cases of cancer are increasing on average by 1,000 cases a year. This compares well with the average annual increase in the numbers of cases of cancer of 962 cases between 1998 and 2007.
- » Projections can be used to help set priorities for research and cancer control activities and to assist health planners in allocating resources.

Projections by major cancer site and clinical grouping

This chapter presents an analysis of projected rates and numbers of cancers for 2011 and 2021. Cancers of high volume like breast, colon/rectum, lung, cervix, non-Hodgkin's lymphomas and melanomas have been analysed. Projected numbers of new cases can be useful from a planning perspective, while rates show changes in risk by taking account of increases in population and changes in age structure over time.

Projections can be used to help set priorities for research and cancer control activities and to assist health planners in allocating resources. Projections depend on mathematical modelling of trends in the past and the assumption that these trends will continue in the future. The resulting projections will be inaccurate if, during the projection period, new factors arise that effect cancer incidence rates. Such factors may include the introduction or change in the use of screening tests or changes in exposure to risk factors (which may not be manifest in the incidence rates until sometime after the change has occurred). Projections decline in certainty with time, that is, projections for 2011 are likely to be closer to the observed than those for 2021. Those individual sites that show a strong linear relationship over time are associated with more convincing projections, regardless of the methodology employed.

Increased attention is being given to cancer projections to assist health services planning in Australia and other countries. Methodological aspects are presently under review and development, with the aim of improving accuracy. In the meantime, traditional methodologies were used because of the requirement to look at projections at the small Local Government Area (LGA) level.

Projections of cancer incidence were undertaken using traditional regression methodologies applied to annual age-specific cancer rates by five-year age groups from 1993 to 2007. Linear regression of these historical cancer age-specific rates was undertaken to obtain 2011, 2016 and 2021 projected age-specific cancer rates by sex. These projected age-specific cancer rates were then applied to recently updated and released health-specific population projections from the Department of Planning, NSW, to project numbers of new cases of cancer. Projections are provided by LGA and by old and new health service areas of residence at diagnosis. A worked example is provided of the modifications made by local government areas for each cancer site to take into account the different risk profile for each cancer site within each LGA (see Appendixes).

To minimise the impact of screening and changes in cancer trends, selected time periods were used for prostate, breast and lung cancer in females. The time trends selected were based on time periods that showed consistent trends in age-standardised incidence rates for those cancers, to enable more robust future trend estimates. In males, annual age-specific rates were selected from 1998 to 2007 for prostate cancers. In females, annual age-specific rates were selected from 1995 to 2007 for lung and breast. While it is desirable when projecting trends to use consistent time periods for all sites, the present adaptations were introduced to gain more realistic projections. Because different time periods were used to obtain projected numbers for selected sites, all cancers in males and females have been presented as the sum of all sites as well as the total number for all cancer as a group. There are slight differences when the individual sites are added and the total number of cases is used. However, when looking at the total numbers for a small geographical area, all cancer incidences (all types combined except non-melanoma skin cancers) are more stable estimates than the sum of many small individual types. Comparison is made with actual data for the most recent five-year period. This comparison provides a good internal check.

Actual and projected new case of cancer in NSW

Cancer incidence projections in NSW are increasing on average by 5,000 new cases every five years. There were 36,041 new cases of cancer in 2007, and in 2021 the estimated number of new cases is expected to be 50,967 (28,789 males and 22,178 females), an increase of 42 per cent between 2007 and 2021.

The number of actual and projected new cases of cancer by major cancer type and sex are presented below. Of note is that the actual cases by cancer site and projected cases are quite similar. That is, the proportional breakdown by cancer type is the same, unless the cancer has historically been increasing (as is the case for prostate cancer increasing from 17 per cent to 19 per cent in 2021) or decreasing (as is the case for breast cancer decreasing from 27 per cent of total cases in females in 2007 to 24 per cent of total cases in females in 2021).

Table 18
New cases of cancer by type and sex, 2011, 2016 and 2021

Cancer site	2003	2004	2005	2006*	2007	2011		2011	2016		2016	2021		2021
	Actual	Actual	Actual	Actual	Actual	Males	Females	Persons	Males	Females	Persons	Males	Females	Persons
Head and Neck	889	887	924	959	956	691	283	975	707	314	1,022	711	349	1,060
	3%	3%	3%	3%	3%	3%	2%	2%	3%	2%	2%	2%	2%	2%
Upper GI	2,414	2,419	2,631	2,548	2,620	1,730	1,156	2,886	1,962	1,289	3,250	2,209	1,443	3,652
	7%	7%	8%	7%	7%	8%	7%	7%	8%	7%	7%	8%	7%	7%
Colon	2,696	3,010	2,882	3,033	3,052	1,684	1,668	3,352	1,885	1,897	3,782	2,117	2,185	4,303
	8%	9%	8%	9%	8%	8%	10%	8%	7%	10%	8%	7%	10%	8%
Rectum	1,550	1,520	1,624	1,684	1,829	1,190	735	1,926	1,363	815	2,178	1,553	899	2,452
	5%	4%	5%	5%	5%	5%	4%	5%	5%	4%	5%	5%	4%	5%
Lung	2,818	3,113	3,094	3,171	3,197	1,958	1,423	3,381	1,991	1,709	3,700	2,024	2,057	4,081
	9%	9%	9%	9%	9%	9%	8%	8%	8%	9%	8%	7%	9%	8%
Melanoma	3,274	3,443	3,553	3,570	3,525	2,493	1,664	4,157	2,957	1,911	4,868	3,503	2,196	5,699
	10%	10%	10%	10%	10%	11%	10%	10%	12%	10%	11%	12%	10%	11%
Breast	4,134	4,160	4,093	4,183	4,211	42	4,599	4,641	50	4,985	5,036	60	5,333	5,393
	13%	12%	12%	12%	12%	0%	26%	12%	0%	25%	11%	0%	24%	11%
Cervix	242	257	218	224	276		227	227		205	205		216	216
	1%	1%	1%	1%	1%	0%	1%	1%	0%	1%	0%	0%	1%	0%
Ovary	390	459	449	400	446		464	464		494	494		526	526
	1%	1%	1%	1%	1%	0%	3%	1%	0%	3%	1%	0%	2%	1%
Prostate	4,716	5,513	6,007	6,192	6,660	6,969		6,969	8,433		8,433	9,846		9,846
	14%	16%	17%	18%	19%	31%	0%	17%	33%	0%	19%	34%	0%	19%
Brain	485	458	453	462	482	303	214	517	332	231	562	365	250	615
	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Thyroid	568	615	678	697	672	206	635	841	249	786	1,035	296	951	1,247
	2%	2%	2%	2%	2%	1%	4%	2%	1%	4%	2%	1%	4%	2%
NHL	1,298	1,324	1,413	1,325	1,376	857	696	1,553	975	786	1,761	1,116	867	1,983
	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Leukaemia	1,415	1,440	1,355	1,336	1,296	642	413	1,055	718	442	1,160	805	472	1,277
	4%	4%	4%	4%	4%	3%	2%	3%	3%	2%	3%	3%	2%	3%
Unknown Primary	1,465	1,317	1,277	1,263	1,203	709	716	1,425	744	761	1,505	774	813	1,587
	4%	4%	4%	4%	3%	3%	4%	4%	3%	4%	3%	3%	4%	3%
Other	3,501	3,615	3,648	3,555	3,627	2,731	2,736	5,467	2,958	3,145	6,103	3,201	3,598	6,800
	11%	10%	10%	10%	10%	12%	16%	14%	12%	16%	13%	11%	16%	13%
Total	32,779	34,436	34,916	35,288	35,952	22,367	17,505	39,872	25,505	19,705	45,210	28,789	22,178	50,967
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Sum of individual sites compared to all-cancer (total)						22,205	17,629	39,833	25,324	19,770	45,094	28,581	22,156	50,736

Tracey E, Projections of NSW Cancer cases. NSW 2007 Central Cancer Registry data. NSW Health Population Projection Series 1.2009. August 2009.
* There are more cases reported than in the published report for the same year due to late registrations.

In 2011, the proportional breakdown of the most common cancers is similar to the actual proportional breakdown for cases in 2006 and 2007, with the exception that cancer of the prostate with 6,969 (17 per cent) is 2 per cent lower than 2007. This is because prostate cancer incidence rates increased between 2004 and 2005, appeared to remain constant and then increased again in 2007. Bowel with 5,261 (13 per cent) and breast with 4,641 (12 per cent) cases remain at the same proportion of total cancer as the actual data for 2003 to 2007. However, breast cancer as a proportion of total cancer is plateauing and starting to decline over time and is projected to be accountable for 11 per cent of cases in 2021. Melanoma of the skin, with 4,157 (10 per cent) in 2011, remains at this level until 2016 and increases to 11 per cent of total cancers in 2021. Lung cancer, with 3,381 (9 per cent), continues at this level and then declines to 8 per cent of total cancer in 2021. While rates are increasing in females, most cases are found in males and the rates of lung cancer in males have been declining since the mid 1980s.

The major cancer sites of prostate, bowel, breast, melanoma of the skin and lung accounted for 59 per cent of total cancers in 2003, increasing gradually to 63 per cent of total cancers in 2007 and are projected to remain at 62 per cent of total cancers in 2021. Age-specific changes in these major cancer sites will make the most impact on the projected numbers of cases.

The proportional breakdown of major cancer sites varies by sex. Four cancers accounted for 64 per cent of new cancers in males in 2006 and 2007. They were cancers of the prostate (31 per cent), large bowel (13 per cent), melanoma (11 per cent) and lung cancer (10 per cent). The same cancers are expected to be responsible for 64 per cent in 2011, 65 per cent in 2016 and 66 per cent in 2021. Prostate cancer cases are projected to continue to contribute the largest volume of cases increasing to 34 per cent of new cases in males in 2021. Lung cancer, by contrast, is declining from 9 per cent of cases in males to 7 per cent in 2021, reflecting the continued declining trend. Melanoma is increasing from 11 per cent of total cases in males to 12 per cent from 2016 onwards, reflecting the continued increase in incidence rates in males.

Similarly, in females four cancers accounted for 59 per cent of new cancers in 2006 and 2007, declining to 57 per cent of all new cases in 2021. The most common were cancers of the breast (27 per cent), large bowel (15 per cent), melanoma of the skin (9 per cent) and lung cancer (8 per cent). Breast cancer is expected to decline as a proportion of total cancers in females to 24 per cent in 2021. Lung cancer cases, by contrast, are expected to increase to 9 per cent of total cases in 2021. Bowel cancer and melanoma cancer cases are expected to increase by 1 per cent each from 2006 and remain at 15 per cent and 10 per cent of total cases in females in 2021.

In summary:

In 2021, the most common cancers overall are projected to be cancers of the prostate 9,846 (19 per cent overall or 34 per cent in males), bowel 6,696 (13 per cent), breast 5,393 (11 per cent), melanoma of the skin 5,699 (11 per cent) and lung cancer 4,081 (8 per cent), accounting for 62 per cent of all cancers in both sexes combined or 66 per cent in males and 57 per cent of total cases in females.

A similar breakdown to Table 18 is presented in Table 19, with the exception that cancers are classed by clinical grouping instead of by individual cancer site and are ranked in order of volume of cases. The purpose of looking at activity by clinical grouping is that it is useful from a planning perspective. For example, cancers of the oesophagus, liver, stomach, pancreas and gallbladder have been grouped into upper gastrointestinal. An urologist would commonly treat cancers of the prostate, testis, bladder, kidney and other male genital organs. Similarly, a gynaecologist would normally treat cancers of the cervix, uterus, ovary and other female genital organs. The cancers included in each of the clinical groupings are described in Appendix 3.

Urogenital cancers comprising prostate, bladder and kidney cancers will be responsible for 24 per cent of all cases in 2021, increasing from 20 per cent of cases in 2003. The increase in cases as a proportion of the total will be due to increases in prostate cancer incidence. The last two columns of Table 19 illustrate the difference in the total proportion of cancers in 2007 and the total proportion expected in 2021. The proportional breakdown is in most cases similar with the exception of those major cancer sites already described in Table 18.

Lymphohaematopoetic cancers (multiple myeloma, non-Hodgkin's lymphoma, leukaemias) and myelodysplasia should be considered together. They are presented separately because myelodysplasia has only been considered an invasive cancer since the introduction of ICD-03 coding in 2003. Projections for myelodysplasia are based on population increases based on average age-specific rates for 2004 to 2007 applied to the Department of Planning population projections. Overall, lymphohaematopoetic cancers and myelodysplasia were responsible for 10 per cent of total cancer activity in 2006 and 2007 and continue to be responsible for this proportion in 2021.

Table 19
Number and percentage of new cases of cancer by clinical grouping 2006, 2011, 2016 and 2021 ranked in order of volume of cases

Clinical grouping	Actual 2003	Actual 2004	Actual 2005	Actual 2006	Actual 2007	Projected 2011	Projected 2016	Projected 2021	% total 2007	% total 2021	% difference
Urogenital	6,611 20%	7,484 22%	7,970 23%	8,108 23%	8,580 24%	9,108 23%	10,721 24%	12,289 24%	24%	24%	-0.2%
Bowel cancer	4,246 13%	4,530 13%	4,506 13%	4,717 13%	4,881 14%	5,261 13%	5,925 13%	6,696 13%	14%	13%	0.4%
Breast	4,134 13%	4,160 12%	4,093 12%	4,183 12%	4,211 12%	4,641 12%	5,036 11%	5,393 11%	12%	11%	1.1%
Skin	3,564 11%	3,695 11%	3,831 11%	3,827 11%	3,812 11%	4,351 11%	4,993 11%	5,746 11%	11%	11%	-0.7%
Respiratory	3,066 9%	3,340 10%	3,335 10%	3,416 10%	3,443 10%	3,670 9%	4,045 9%	4,495 9%	10%	9%	0.8%
Lymphohaematopoetic	2,856 9%	2,938 9%	2,946 8%	2,811 8%	2,847 8%	3,350 8%	3,785 8%	4,289 8%	8%	8%	-0.5%
Upper GI	2,414 7%	2,419 7%	2,631 8%	2,548 7%	2,620 7%	2,886 7%	3,250 7%	3,652 7%	7%	7%	0.1%
Gynaecological	1,295 4%	1,429 4%	1,401 4%	1,374 4%	1,469 4%	1,464 4%	1,548 3%	1,626 3%	4%	3%	0.9%
Unknown primary	1,465 4%	1,317 4%	1,277 4%	1,263 4%	1,203 3%	1,425 4%	1,505 3%	1,587 3%	3%	3%	0.2%
Head and neck	889 3%	887 3%	924 3%	959 3%	956 3%	968 2%	1,014 2%	1,052 2%	3%	2%	0.6%
Thyroid and other endocrine	568 2%	615 2%	678 2%	697 2%	672 2%	841 2%	1,035 2%	1,247 2%	2%	2%	-0.6%
Myelodysplasia	857 3%	769 2%	522 1%	587 2%	443 1%	665 2%	716 2%	811 2%	1%	2%	-0.4%
Neurological	515 2%	493 1%	483 1%	482 1%	517 1%	549 1%	597 1%	652 1%	1%	1%	0.2%
Bone and Connective tissue	232 1%	243 1%	224 1%	217 1%	217 1%	247 1%	265 1%	284 1%	1%	1%	0.0%
Eye	67 0%	117 0%	95 0%	99 0%	81 0%	93 0%	99 0%	106 0%	0%	0%	0.0%
All cancer types	32,779	34,436	34,916	35,288	35,952	39,872	45,210	50,967	100%	100%	

Tracey E, Projections of NSW Cancer cases. NSW 2007 Central Cancer Registry data. NSW Health Population Projection Series 1.2009. August 2009.

Comparison of actual and projected cancer cases for 2006 and projected cases for 2011 using the 2005 and revised 2009 populations

Actual and projected numbers of cases were compared for 2006. Earlier projected rates were based on linear regression of age-specific rates from 1993 to 2002 using the same methodology as the current projections.

Overall, there was a net difference of 34 cases between actual cases and projected cases in 2006. However, there was considerable variability in four cancer sites. There were 1,200 more cases of prostate cancer than projected and 340 fewer cases of breast cancer. There were fewer cases of bowel cancer than projected (122 cases less) and more lung than projected (173 cases). There were also 844 fewer cancers of unknown site. Some of these cases of unknown site are now grouped under myelodysplasia. This cancer type was recognised as an invasive cancer with the introduction of ICD-0-3 coding in 2003 and subsequently grouped as a separate cancer group.

The following needs to be considered when understanding the differences:

- The patterns seen for 2006, actual and projected, are also reflected in 2011.
- Prostate cancer incidence rates and therefore number of new cases of prostate cancer increased between 2003 and 2007. In the same time period, breast cancer incidence rates and numbers and unknown site have declined.
- Comparison of the old 2005 and new 2009 health related population projections for 2011 were also considered. It is worth noting that the population aged 65 years and older has declined by 1.5 per cent in the latest 2009 population projections, compared to the 2005 projections for the age group.

In 2011, the estimated number of new cases using the most recent 2009 populations is 39,872 (22,367 males and 17,505 females). This is slightly lower (793 cases or 2 per cent) than the previous cancer projections for 2011 of 40,665 new cases of cancer (21,965 in males and 18,700 in females). The most likely explanation is both the reduction in the population aged over 65 years and the relative differences by cancer type (Table 20).

Table 20
Comparison of old and new cancer projections using the 2005 and 2009 population projections

Cancer Site	2006 projections			2006 Actual			2006 Actual compared to projected			Comment
	Males	Females	Persons	Males	Females	Persons	Males	Females	Persons	
Melanoma	2,135	1,443	3,578	2,171	1,388	3,559	36	-55	-19	
Head and Neck	656	269	925	703	248	951	47	-21	26	
Upper GI	1,474	1,062	2,536	1,504	1,024	2,528	30	-38	-8	
Colorectal	2,629	2,203	4,832	2,535	2,175	4,710	-94	-28	-122	less bowel than projected
Lung	1,861	1,103	2,964	1,946	1,188	3,137	85	85	173	more lung than projected
Breast	43	4,470	4,513	43	4,136	4,173	0	-334	-340	less breast than projected
Prostate	4,918		4,918	6,158	-	6,158	1,240	-	1,240	more prostate than projected
Cervix	-	203	203	-	222	222	-	-203	19	
Non-Hodgkin's lymphoma	760	636	1,396	748	572	1,320	-12	-64	-76	
Unknown primary	1,136	1,069	2,205	713	648	1,361	-423	-421	-844	less unknown primary than projected
Other	3,569	3,553	7,122	3,208	3,829	6,649	-361	276	-473	less other
All cancers	19,179	16,014	35,193	19,951	15,208	35,159	772	-806	-34	

Table 20 (cont'd)
Comparison of old and new cancer projections using the 2005 and 2009 population projections

Cancer Site	2011 - projections using 2005 DIPNR# populations			2011 - projections using 2009 DOP* populations			2011 using the 2005 and 2009 projected populations			Comment
	Males	Females	Persons	Males	Females	Persons	Males	Females	Persons	
Melanoma	2,541	1,643	4,184	2,493	1,664	4,157	-48	21	-27	
Head and Neck	663	295	958	691	283	975	28	-12	17	
Upper GI	1641	1191	2,832	1,730	1,156	2,886	88	-35	53	
Colorectal	2,973	2,501	5,473	2,864	2,397	5,261	-109	-103	-212	less colorectal
Lung	1,835	1,269	3,104	1,958	1,423	3,381	123	154	277	more lung
Breast	53	5,039	5,092	42	4,599	4,641	-11	-440	-451	less breast than projected
Prostate	5,944	-	5,944	6,969	-	6,969	1,025	-	1,025	more prostate cancer than earlier projections
Cervix	-	164	164	-	227	227	-	63	63	
Non-Hodgkin's lymphoma	877	726	1,603	857	696	1,553	-20	-30	-50	
Unknown primary	1,458	1,355	2,813	709	716	1,425	-749	-639	-1,388	less unknown primary cancers expected
Other	3935	4014	7,948	4,055	4,344	8,399	120	330	450	
All cancers	21,965	18,196	40,161	22,367	17,505	39,872	402	-691	-290	less female cancer overall due to less breast

Tracey E, Projections of NSW Cancer cases. NSW 2007 Central Cancer Registry data. NSW Health Population Projection Series 1.2009. August 2009.

Department of Infrastructure, Planning and Natural Resources.

* Department of Planning.

Number of actual and projected new cases of cancer by new and old Health Area and year of diagnosis, 2003–2021

Presented in the following tables are the actual (2003–2007) and projected (2011, 2016 and 2021) numbers of new cancers and percentages of cancers for each new (AHS boundaries from 2005 onwards) and old (pre 2005 boundaries) Area Health Services (AHS).

To determine numbers of projected new cases by LGA, and for new and old Health Areas, the projected age-specific rates for each cancer site for the State were applied to the population projections for each LGA. This approach was taken because of the small number of cancer cases by organ site, age and sex in each LGA, which prevented regression analyses at this local level.

However, as there were differences in incidence by LGA, age-sex specific rates for 2002–2007 were calculated by cancer site for each LGA and a ratio (local age-specific rates /divided by the state age-specific rates) used to adjust the projected local numbers. The adjusted numbers of cases for each LGA for 2011, 2016 and 2012 were then grouped into old and new AHS to obtain numbers of new cancers for each AHS.

A comparison of the percentage for each old and new Area reveals that the proportion of total new cases has remained very similar with a change of no more than 1 per cent within the total proportion of cases for an Area.

Actual and projected cases of cancer were compared for new and old AHS. The number of new cases is projected to increase by 42 per cent in NSW between 2007 and 2021. This percentage varies by AHS, with the percentage increase in the number of new cases of cancer greatest in the North Coast with 56 per cent, 52 per cent in Sydney South West and 50 per cent in Sydney West.

Increases in the numbers of new cases of cancer are due to a combination of factors. These are:

- increases in the incidence of cancer of a particular type reflected in increasing age-specific rates
- increase in the population, in particular for those age 65 years and older
- the risk profile of the LGA by cancer type and how this compared to the NSW average.

These three factors have been considered in these population projections.

The increase in cancer cases is largely explained by increases in the projected population, projected demographic shift and changes in age- and sex-specific rates. Overall, there is a projected increase of 17 per cent in the total population of NSW between 2006 and 2021. However, this percentage varies by age category, with the largest increases in the population occurring in those aged 65 years and older. There is projected to be a 52 per cent increase in the population between 2006 and 2021 in people aged 65 years and older reflecting both increased life expectancy and ageing of the population (see appendixes).

Area Health Services with the largest projected increases in the population aged 65 years and older are Sydney West with 71 per cent, North Coast 64 per cent and Sydney South West 60 per cent. Northern Sydney Central Coast is projected to have the lowest percentage increase of 37 per cent, followed by South Eastern Sydney Illawarra and Greater Western, both with 42 per cent increases respectively.

In general, the proportion of the total breakdown of cases by AHS remains similar for actual and projected years and increases or decreases based on either a disproportionate increase in the population, as is the case in Western Sydney (12 per cent of total cases in 2006 to 14 per cent in 2021), or a difference in risk profile for major cancer sites (prostate, breast, bowel, lung and melanoma). This is particularly evident for melanoma in coastal LGAs.

The average annual increase between the projected years and the actual years is generally similar within each AHS. For example, the average annual increase in cases of cancer between 2003 and 2007 was 2 per cent in residents of Northern Sydney Central Coast. This remains at 2 per cent with the exception of the average annual increase between 2016 and 2021, where it increases to 3 per cent per annum. South Eastern Sydney and Illawarra shows no increase between 2003 and 2007, but a 3 per cent per annum increase thereafter, indicating that projected population increases are the most likely factors that will be influencing future cases.

Of note is the decline of 725 cases in residents of Western Sydney AHS in projections in 2011 from using the 2005 populations and then using the latest 2009 populations. This adjustment in projections for 2011 based on the 2009 populations is appropriate for two reasons: there has been an average annual increase in the numbers of cases of cancer in Western Sydney residents of 3 per cent per annum for the time period 2003 to 2007 and 3 per cent for the period 2007 to 2011. If the earlier projections for Western Sydney were used, then the increase for the time period 2007 to 2011 would have been 7 per cent per annum; much greater and not consistent with the earlier time period (Table 21).

The analysis is repeated by old AHS and shows that for residents diagnosed with cancer in the old AHS of South Western Sydney there is a projected 67 per cent increase in cases between 2007 and the expected new cases in 2021. For Western Sydney there is a 55 per cent increase in new cases for the same time period.

Table 21
Number of actual and projected new cases of cancer by new Health Area and year of diagnosis, 2003-2021

Area Health Service of residence	Actual 2003		Actual 2004		Actual 2005		Actual 2006		Actual 2007		Projected 2011 using 2005 DIPNR# populations		Projected 2011 using 2009 DOP* populations		Projected 2016 using 2009 DOP* populations		Projected 2021 using 2009 DOP* populations		Difference between old and new population projections	Average annual % increase			Total % increase from 2007 to 2021	
	2003	2004	2004	2005	2005	2006	2006	2007	2007	2007	2007	2007	2009	2009	2009	2009	2009	2009		2003-2007	2007-2011	2011-2016		2016-2021
Northern Sydney	5,918	6,243	6,166	6,329	6,446	6,881	7,559	8,367	8,367	8,367	8,367	8,367	8,367	8,367	8,367	8,367	8,367	8,367	-47	2%	2%	2%	3%	30%
Central Coast AHS	18%	18%	18%	18%	18%	17%	17%	17%	17%	17%	17%	17%	16%	16%	16%	16%	16%	16%						
Greater Southern	2431	2662	2669	2668	2686	2,990	3,426	3,884	3,884	3,884	3,884	3,884	3,884	3,884	3,884	3,884	3,884	3,884	-176	2%	4%	3%	3%	45%
Greater Western	1,598	1,684	1,639	1,642	1,659	1,847	2,043	2,234	2,234	2,234	2,234	2,234	2,234	2,234	2,234	2,234	2,234	2,234	-105	1%	3%	3%	2%	35%
Hunter-New England	4,512	4,815	4,989	4,935	5,263	5,599	6,353	7,153	7,153	7,153	7,153	7,153	7,153	7,153	7,153	7,153	7,153	7,153	8	3%	2%	3%	3%	36%
North Coast	3,006	3,185	3,298	3,368	3,369	3,948	4,581	5,244	5,244	5,244	5,244	5,244	5,244	5,244	5,244	5,244	5,244	5,244	41	2%	4%	4%	4%	56%
South Eastern Sydney-Illawarra AHS	6,176	6,234	6,409	6,327	6,298	7,076	7,853	8,654	8,654	8,654	8,654	8,654	8,654	8,654	8,654	8,654	8,654	8,654	-189	0%	3%	3%	3%	37%
South Western Sydney	5,124	5,377	5,419	5,572	5,636	6,422	7,408	8,540	8,540	8,540	8,540	8,540	8,540	8,540	8,540	8,540	8,540	8,540	510	2%	3%	4%	4%	52%
Western Sydney	4,014	4,236	4,327	4,447	4,593	5,109	5,986	6,891	6,891	6,891	6,891	6,891	6,891	6,891	6,891	6,891	6,891	6,891	-725	3%	4%	4%	4%	50%
Total	32,779	34,436	34,916	35,288	35,952	39,872	45,210	50,967	50,967	50,967	50,967	50,967	50,967	50,967	50,967	50,967	50,967	50,967	-793	2%	3%	3%	3%	42%
Average annual increase in the number of cases	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100						
	1,657	1,657	480	372	664	784	1,068	1,151	1,151	1,151	1,178	1,178	1,151	1,151	1,151	1,068	1,068	1,151						

Tracey E, Projections of NSW Cancer cases, NSW 2007 Central Cancer Registry data, NSW Health Population Projection Series 1, 2009, August 2009.

Department of Infrastructure, Planning and Natural Resources.

* Department of Planning.

Table 22
Number of actual and projected new cases of cancer by old Health Area and year of diagnosis, 2003–2021

Old Area Health Service of residence	Actual 2003	Actual 2004	Actual 2005	Actual 2006	Actual 2007	Projected 2011	Projected 2016	Projected 2021	Average annual % increase 2003 to 2007	Average annual % increase 2007 to 2011	Average annual % increase 2011 to 2016	Average annual % increase 2016 to 2021	Total % increase between 2007 and 2021
Central Coast AHS	1,895 6%	1,948 6%	2,015 6%	2,038 6%	2,149 6%	2,212 6%	2,443 5%	2,768 5%	3%	1%	3%	3%	29%
Central Sydney AHS	2,097 6%	2,204 6%	2,187 6%	2,315 7%	2,231 6%	2,350 6%	2,610 6%	2,854 6%	2%	1%	3%	2%	28%
Far west AHS	241 1%	244 1%	247 1%	232 1%	242 1%	261 1%	275 1%	285 1%	0%	2%	1%	1%	18%
Greater Murray AHS	1,365 4%	1,502 4%	1,480 4%	1,519 4%	1,445 4%	1,594 4%	1,795 4%	2,006 4%	1%	3%	3%	3%	39%
Hunter AHS	2,985 9%	3,163 9%	3,258 9%	3,209 9%	3,410 9%	3,707 9%	4,238 9%	4,812 9%	4%	2%	4%	3%	41%
Illawarra AHS	2,048 6%	2,088 6%	2,143 6%	2,085 6%	2,150 6%	2,461 6%	2,819 6%	3,189 6%	1%	4%	4%	3%	48%
Macquarie AHS	518 2%	585 2%	575 2%	595 2%	540 2%	652 2%	721 2%	788 2%	1%	5%	3%	2%	46%
Mid north coast AHS	1,925 6%	1,960 6%	2,065 6%	2,044 6%	2,180 6%	2,431 6%	2,831 6%	3,252 6%	3%	3%	4%	4%	49%
Mid western AHS	971 3%	975 3%	950 3%	925 3%	1,007 3%	1,110 3%	1,246 3%	1,381 3%	1%	3%	3%	3%	37%
New England AHS	912 3%	1,047 3%	1,078 3%	1,038 3%	1,091 3%	1,109 3%	1,218 3%	1,324 3%	5%	0%	2%	2%	21%
Northern rivers AHS	1,696 5%	1,830 5%	1,886 5%	2,012 6%	1,951 5%	2,300 6%	2,648 6%	3,009 6%	4%	4%	4%	3%	54%
Northern Sydney AHS	4,023 12%	4,295 12%	4,151 12%	4,291 12%	4,297 12%	4,668 12%	5,116 11%	5,598 11%	2%	2%	2%	2%	30%
South eastern Sydney AHS	4,128 13%	4,146 12%	4,266 12%	4,242 12%	4,148 12%	4,614 12%	5,035 11%	5,465 11%	0%	3%	2%	2%	32%
South Western Sydney AHS	3,027 9%	3,173 9%	3,232 9%	3,257 9%	3,405 9%	4,071 10%	4,798 11%	5,686 11%	3%	5%	4%	5%	67%
Southern AHS	1,066 3%	1,160 3%	1,189 3%	1,149 3%	1,241 3%	1,397 4%	1,631 4%	1,878 4%	4%	3%	4%	4%	51%
Wentworth AHS	1,192 4%	1,244 4%	1,342 4%	1,284 4%	1,418 4%	1,488 4%	1,715 4%	1,951 4%	5%	1%	4%	3%	38%
Western Sydney AHS	2,690 8%	2,872 8%	2,852 8%	3,053 9%	3,045 8%	3,445 9%	4,072 9%	4,721 9%	3%	3%	5%	4%	55%
Total	32,779	34,436	34,916	35,288	35,952*	39,872	45,210	50,967	2%	3%	3%	3%	42%

Tracey E, Projections of NSW Cancer cases. NSW 2007 Central Cancer Registry data. NSW Health Population Projection Series 1.2009, August 2009.

* There are more cases reported than in the published report for the same year due to more registrations.

Number of actual and projected new cases of cancer by new and old health area, year of diagnosis and cancer site and clinical grouping, 2003–2021

The tables on the following pages show breakdowns of the numbers and percentages of projected new cancers by site and AHS for 2011, 2016 and 2021. Cancers are also presented by clinical groupings (Table 24 and Table 25).

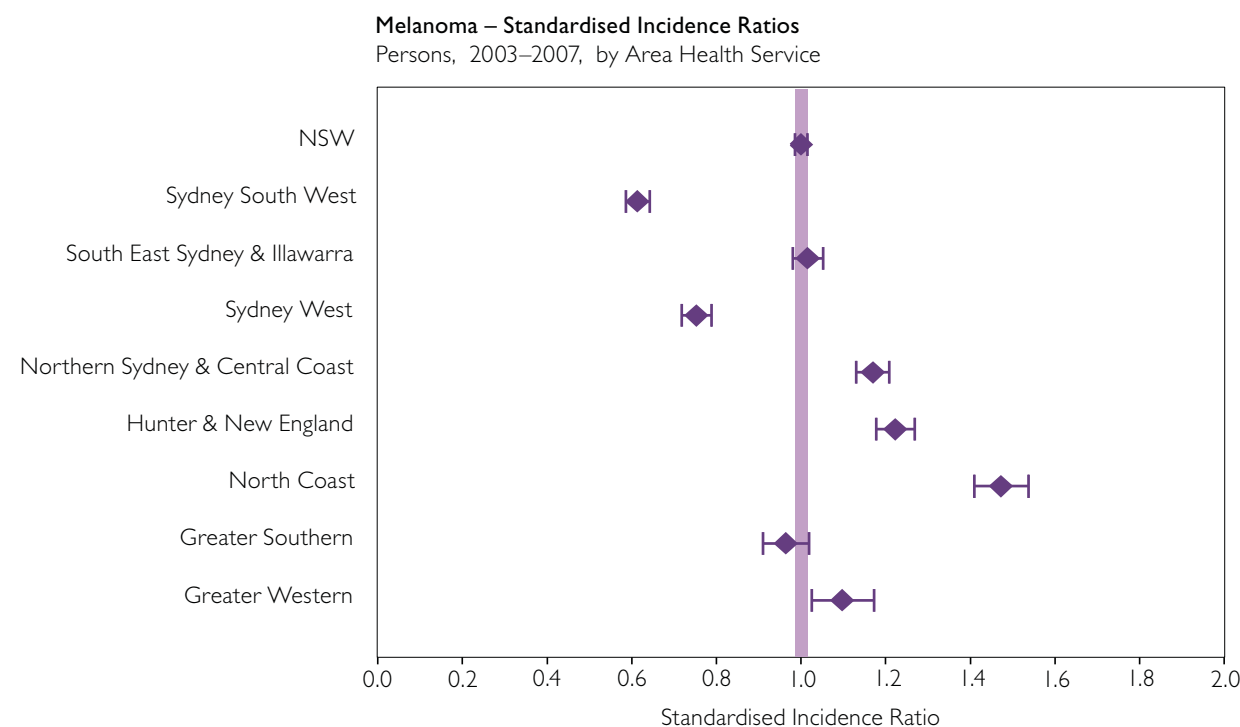
The proportion of cancers in each AHS for a particular site will vary depending on the risk profiles of the LGAs within that AHS. Melanoma is projected to be 10 per cent of all new cases of cancer in NSW in 2011. However, this percentage of total cancers varies by AHS. For example, 14 per cent of all new cases in the North Coast are projected to be melanoma, compared to 7 per cent in Sydney South West.

The best way to illustrate this is to consider the standardised incidence ratios for melanoma by AHS for the latest time period 2002 to 2006. Of note, the North Coast has 50 per cent more cases than the State average and Sydney South West had 0.5 or 50 per cent less than the State average. As can be seen in the worked example in the Appendixes, the projected age-specific rates calculated for each LGA, and cancer site within each LGA, is adjusted by calculating the ratio of the LGA rate divided by the State rate and then summing the number of cases. This ensures that the different risk profiles by cancer site are reflected in the number of cases by cancer site for each LGA.

An alternative to this method could have been to look at age- and sex-specific rates by cancer type within each LGA over time. This method is not practical, due to the small numbers of cases by cancer site within an LGA leading to unstable rates that would provide meaningless projections.

Prostate cancer also varies by AHS. The number and proportion of prostate cancers were higher in Greater Southern (20 per cent of total cases compared to the State average of 17 per cent), reflecting a significantly higher incidence. The proportion of lung cancers in males is also lower in Northern Sydney Central Coast, which has significantly lower rates of lung cancer. The proportion of cases of breast cancer is also higher in Northern Sydney Central Coast (13 per cent compared to 12 per cent), reflecting the higher incidence of breast cancer in Northern Sydney LGAs.

Figure 14
Age-standardised incidence rates by AHS 2003–2007



Cancer deaths in NSW actual and projected 2011, 2016 and 2021

Projected cancer deaths are presented in Table 23 and 24. These projections used the same methodology as incidence with one exception. Unlike incidence, the annual age-specific rates were for the entire time period of 1993 to 2007. Therefore, the projected numbers of deaths by cause of cancer death summed together more closely approximate all deaths combined.

The number of cancer deaths reflects the trends in death rates and the population projections. Unlike incidence rates, most death rates are declining, particularly for high volume cancers.

Cancer sites with statistically significantly declining death rates include oesophagus, stomach, bowel, cervix, uterus, bladder, prostate, testes, brain (males only), multiple myeloma, leukaemia, unknown primary cancers and all cancers.

Cancer sites with statistically significantly increasing death rates include: liver cancer in males and females, pancreatic cancer in males and lung cancer in females.

Liver and pancreatic cancer rates are grouped in upper gastrointestinal (GI) cancers. Lung cancer death rates in females and hence numbers of deaths are projected to increase from 16 per cent of cancer deaths in females in 2006 to 18 per cent of cancer deaths in 2011 and 22 per cent of cancer deaths in 2021. By contrast, breast cancer death rates in females are expected to decline from 16 per cent of deaths in 2006 to 13 per cent of total female deaths in 2021.

In both males and females, upper GI cancers are projected to increase from 15 per cent of total cancers to 17 per cent of total cancers in 2021. Increases in upper GI cancers are mainly impacted by changes in pancreatic and liver cancer deaths rates. Lung, pancreatic and liver cancers have poor survival. Therefore, any improvement in mortality rates is subject to either earlier detection or more targeted therapies in those who are diagnosed with these cancers.

The number of projected cancer deaths by new and old Area Health Service of residence actual and projected 2011, 2016, 2021

On average, there is expected to be a 14 per cent increase in the number of cancer deaths between 2007 and 2021. This varies by AHS, with the number of projected deaths expected to increase by 22 per cent in Greater Southern and the North Coast and 21 per cent in Sydney South West and Sydney West. Variation in the number of cancer deaths are a combination of higher deaths rates and increases in the projected population.

A breakdown of cancer deaths by sex and LGA shows that the proportion of actual deaths per LGA is similar to the projected proportion for each LGA.

Within each LGA there is a breakdown by major cause of cancer death and by clinical grouping. The increase in myelodysplasia should be viewed with caution because of the number of years of available data. However, all cancer deaths were calculated separately and will remain at this number regardless of whether myelodysplasia is overestimated.

Table 23
Number of actual and projected cancer deaths by cause of death 2011 to 2021

Cancer site	2003		2004		2005		2006*		2007		2011		2016		2021		
	Actual	%	Actual	%	Actual	%	Actual	%	Actual	%	Males	Females	Persons	Males	Females	Persons	
Head and Neck	375	3%	368	3%	340	3%	338	3%	350	3%	251	84	334	233	78	311	282
Upper GI	1,845	14%	1,808	14%	1,920	15%	1,982	15%	2,042	15%	1,251	886	2,137	1,390	975	2,365	2,616
Colon	1,088	8%	1,083	8%	1,062	8%	1,093	8%	1,116	8%	545	543	1,088	540	550	1,090	1,085
Rectum	573	4%	571	4%	607	5%	596	5%	604	5%	380	212	592	385	195	580	559
Lung	2,274	18%	2,484	19%	2,456	19%	2,473	19%	2,602	20%	1,533	1,071	2,604	1,495	1,262	2,757	2,946
Melanoma	416	3%	389	3%	481	4%	454	3%	482	4%	362	160	522	421	181	602	695
Breast	934	7%	965	7%	916	7%	944	7%	910	7%	-	914	921	-	906	913	901
Ovary	220	2%	283	2%	294	2%	261	2%	258	2%	-	290	290	-	315	315	345
Prostate	951	7%	922	7%	1,020	8%	986	8%	978	7%	1,009	-	1,009	1,014	-	1,014	982
Brain	371	3%	354	3%	325	2%	319	2%	362	3%	219	148	367	231	154	384	400
NHL	527	4%	497	4%	487	4%	511	4%	514	4%	271	232	503	263	218	480	455
Leukaemia	732	6%	735	6%	680	5%	697	5%	701	5%	293	187	480	303	183	486	494
Unknown Primary	1,183	9%	980	8%	975	7%	967	7%	790	6%	456	505	961	420	488	908	832
Myelodysplasia	151	1%	190	1%	188	1%	206	2%	215	2%	190	138	328	299	205	504	728
Other	1,105	9%	1,247	10%	1,195	9%	1,186	9%	1,221	9%	900	751	1,650	968	787	1,755	1,878
Total	12,843	100%	12,970	100%	13,044	100%	13,117	100%	13,235	100%	7,655	6,114	13,769	7,946	6,488	14,434	15,151

Tracey E. Projections of NSW Cancer deaths. NSW 2007 Central Cancer Registry data. NSW Health Population Projection Series 1.2009. August 2009.

* There are more cases reported than in the published report for the same year due to more registrations.

Table 24
Number of actual and projected cancer deaths by clinical grouping 2011–2021

Description of cause of death	2003		2004		2005		2006*		2007		2011		2016		2021		
	Actual	%	Actual	%	Actual	%	Actual	%	Actual	%	Males	Females	Persons	Males	Females	Persons	
Head and neck	375	3%	368	3%	340	3%	338	3%	350	3%	251	84	334	233	78	311	282
Upper GI	1,845	14%	1,808	14%	1,920	15%	1,982	15%	2,042	15%	1,251	886	2,137	1,390	975	2,365	2,616
Bowel cancer	1,661	13%	1,654	13%	1,669	13%	1,689	13%	1,720	13%	925	755	1,681	925	745	1,670	1,646
Respiratory	2,444	19%	2,675	21%	2,674	20%	2,651	20%	2,836	21%	1,725	1,120	2,845	1,721	1,324	3,045	3,294
Bone and Connective tissue	72	1%	96	1%	83	1%	86	1%	61	0%	45	33	78	43	34	77	76
Skin	422	3%	403	3%	494	4%	468	4%	496	4%	365	170	535	420	203	623	724
Breast	934	7%	965	7%	916	7%	944	7%	910	7%	7	914	921	7	906	913	901
Gynaecological	459	4%	522	4%	538	4%	491	4%	497	4%	-	522	522	-	543	543	567
Urogenital	1,575	12%	1,620	12%	1,659	13%	1,660	13%	1,635	12%	1,462	250	1,712	1,491	261	1,752	1,749
Eye	19	0%	16	0%	20	0%	23	0%	20	0%	7	10	17	5	10	15	13
Neurological	378	3%	359	3%	330	3%	331	3%	366	3%	223	150	373	234	156	390	404
Thyroid and other endocrine	40	0%	51	0%	43	0%	52	0%	49	0%	21	33	54	22	40	62	71
Lymphohaematopoietic	1,285	10%	1,263	10%	1,195	9%	1,229	9%	1,248	9%	738	556	1,294	758	547	1,304	1,329
Unknown primary	1,183	9%	980	8%	975	7%	967	7%	790	6%	456	505	961	420	488	908	832
Myelodysplasia	151	1%	190	1%	188	1%	206	2%	215	2%	190	138	328	299	205	504	728
All cancer types	12,843	100%	12,970	100%	13,044	100%	13,117	100%	13,235	100%	7,655	6,114	13,769	7,946	6,488	14,434	15,151
											100%	100%	100%	100%	100%	100%	100%

Tracey E. Projections of NSW Cancer deaths. NSW 2007 Central Cancer Registry data. NSW Health Population Projection Series 1.2009. August 2009.

* There are more cases reported than in the published report for the same year due to more registrations.

Table 25
Number of actual and projected cancer deaths by new Health Area and year of death, 2003–2021

Area Health Service of residence	Actual 2003	Actual 2004	Actual 2005	Actual 2006	Actual 2007	Projected 2011 using 2005 DIPNR# 2009 DOP* populations			Projected 2016 using 2009 DOP* populations			Projected 2021 using 2009 DOP* populations		Difference between old and new population projections	Average annual % increase 2003-2007	Average annual % increase 2007-2011	Average annual % increase 2011-2016	Average annual % increase 2016-2021	Total % increase from 2007 to 2021
Greater Southern	985	1,005	1,004	1,023	969	1,011	1,046	1,113	1,113	1,180	1,180	35	0%	2%	2%	2%	2%	22%	
	8%	8%	8%	8%	7%	8%	8%	8%	8%	8%	8%								
Greater Western	661	585	674	618	643	634	658	671	684	684	684	25	-1%	1%	0%	0%	0%	6%	
	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%								
Hunter-New England	1,856	1,984	1,858	1,953	1,924	1,903	2,007	2,108	2,218	2,218	2,218	104	1%	1%	1%	1%	1%	15%	
	14%	15%	14%	15%	15%	15%	15%	15%	15%	15%	15%								
North Coast	1,212	1,086	1,151	1,155	1,235	1,180	1,309	1,404	1,501	1,501	1,501	129	0%	1%	2%	2%	2%	22%	
	9%	8%	9%	9%	9%	9%	10%	10%	10%	10%	10%								
Northern Sydney Central Coast AHS	2,306	2,250	2,246	2,287	2,323	2,150	2,322	2,364	2,445	2,445	2,445	172	0%	0%	0%	0%	0%	5%	
	18%	17%	17%	17%	18%	16%	17%	16%	16%	16%	16%								
South Eastern Sydney-Illawarra AHS	2,168	2,315	2,400	2,334	2,374	2,301	2,419	2,494	2,561	2,561	2,561	118	2%	0%	1%	1%	1%	8%	
	17%	18%	18%	18%	18%	18%	18%	17%	17%	17%	17%								
South Western Sydney	2,094	2,125	2,134	2,213	2,145	2,172	2,312	2,445	2,596	2,596	2,596	140	0%	2%	1%	1%	2%	21%	
	16%	16%	16%	17%	16%	17%	17%	17%	17%	17%	17%								
Western Sydney	1,558	1,620	1,577	1,534	1,620	1,689	1,697	1,835	1,966	1,966	1,966	8	1%	1%	2%	2%	2%	21%	
	12%	12%	12%	12%	12%	13%	12%	13%	13%	13%	13%								
Total	12,843	12,970	13,044	13,117	13,235	13,040	13,769	14,434	15,151	15,151	15,151	730	1%	1%	1%	1%	1%	14%	

Tracey E, Projections of NSW Cancer cases. NSW 2007 Central Cancer Registry data. NSW Health Population Projection Series 1.2009. August 2009.

Department of Infrastructure, Planning and Natural Resources.

* Department of Planning.

Table 26
Number of actual and projected cancer deaths by old Health Area and year of death, 2003–2021

Area Health Service of residence	Actual 2003	Actual 2004	Actual 2005	Actual 2006	Actual 2007	Projected 2011 using 2009 DOP* populations	Projected 2016 using 2009 DOP* populations	Projected 2021 using 2009 DOP* populations	Average annual % increase 2003-2007	Average annual % increase 2007-2011	Average annual % increase 2011-2016	Average annual % increase 2016-2021	Total % increase from 2007 to 2021
Central Coast AHS	796	758	769	780	841	796	807	846	1%	-1%	0%	1%	1%
Central Sydney AHS	905	880	879	927	883	879	900	909	0%	0%	1%	0%	3%
Far west AHS	109	99	116	105	105	105	102	98	-1%	0%	-1%	-1%	-7%
Greater Murray AHS	529	564	568	593	508	555	582	606	-1%	2%	1%	1%	19%
Hunter AHS	1,255	1,348	1,264	1,282	1,280	1,354	1,426	1,506	0%	1%	1%	1%	18%
Illawarra AHS	748	788	872	836	841	889	946	999	2%	1%	2%	1%	19%
Macquarie AHS	217	188	199	213	216	221	226	231	0%	1%	0%	1%	7%
Mid north coast AHS	844	728	772	777	810	868	941	1,014	-1%	2%	2%	2%	25%
Mid western AHS	376	339	413	341	369	390	405	421	0%	1%	1%	1%	14%
New England AHS	337	393	363	405	391	377	387	396	3%	-1%	1%	1%	1%
Northern rivers AHS	632	601	610	644	678	716	758	803	1%	1%	1%	1%	18%
Northern Sydney AHS	1,510	1,492	1,477	1,507	1,482	1,526	1,557	1,599	0%	1%	0%	1%	8%
South eastern Sydney AHS	1,420	1,527	1,528	1,498	1,533	1,530	1,548	1,562	2%	0%	0%	0%	2%
South Western Sydney AHS	1,189	1,245	1,255	1,286	1,262	1,432	1,545	1,686	1%	3%	2%	2%	34%
Southern AHS	456	441	436	430	461	490	531	574	0%	2%	2%	2%	25%
Wentworth AHS	497	438	464	463	501	488	518	552	0%	-1%	2%	2%	10%
Western Sydney AHS	1,020	1,141	1,059	1,030	1,072	1,151	1,255	1,348	1%	2%	2%	2%	26%
Total	12,843	12,970	13,044	13,117	13,235	13,769	14,434	15,151	1%	1%	1%	1%	14%

Tracey E. Projections of NSW Cancer cases. NSW 2007 Central Cancer Registry data. NSW Health Population Projection Series 1.2009. August 2009.
* Department of Planning.