

Radiation Oncology in Queensland

Infocus – access and flows

2007 – 2014



Radiation Oncology in Queensland, Infocus access and flows 2007 – 2014 has been developed under the auspices of the Queensland Cancer Control Safety and Quality Partnership (The Partnership). The members of The Partnership include: Professor David E Theile AO (Chair), Professor Joanne Aitken, Dr Marie-Frances Burke, Aniko Cooper, Professor Kwun Fong, Adjunct Professor Liz Kenny, Shoni Philpot, Professor Mark Smithers, Associate Professor Euan Walpole, and Associate Professor David Wyld.

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Message from the Chair

As the Chair of the Radiation Oncology sub-committee of the Queensland Cancer Control Safety and Quality Partnership (The Partnership), I am privileged to introduce the **Radiation Oncology in Queensland, Infocus access and flows 2007 – 2014** report. This report provides the first population-wide profile for Queenslanders receiving external beam radiation therapy treatment for cancer and provides an important first step in understanding radiation therapy utilisation in Queensland.

This report describes the radiation therapy utilisation rate by: cancer type; where patients live; where patients receive their treatment; and public and private treatment services. The characteristics of patients who receive radiation therapy treatment are examined to paint the picture of who is receiving radiation therapy as part of their cancer treatment.

The Queensland radiation therapy utilisation rates have been compared broadly with those proposed in the Review of Optimal Radiotherapy Utilisation Rates by the Collaboration for Cancer Outcomes, Research and Evaluation (CCORE); Ingham Institute, Liverpool Hospital Sydney, Australia in 2013⁴. The CCORE optimal radiotherapy utilisation rate for all cancers is 48%, compared with this report where the Queensland 'real world' radiotherapy utilisation rate is 30% (for persons with cancer diagnosed between 2007 and 2014).

Many factors may contribute to this variation of radiation therapy rates including changes to clinical practice over time, patient suitability, patient preference, access to services and referral by service providers. Further analysis is required to determine if these factors impact on the radiation therapy utilisation rates in Queensland and if patient outcomes such as overall survival are affected.

I encourage you to consider how this information will inform the treatment of cancer patients with radiation therapy in your facility in Queensland. Radiation therapy for cancer patients in Queensland will continue to be monitored with a focus on ensuring the best possible outcomes for our patients.

I wish to acknowledge the commitment of the members of the Radiation Oncology sub-committee and QCCAT in providing the information, analysis, statistics, discussion and recommendations for this report.



Professor Bryan Burmeister
Chair, Radiation Oncology Sub-committee
Queensland Cancer Control Safety and Quality Partnership

What is the radiation therapy in Queensland report?

The Radiation Oncology in Queensland: Infocus – access and flows 2007-2014 report has been developed for public and private cancer services. It is an initiative of the Radiation Oncology Sub-committee, part of the Cancer Alliance Queensland which brings together the Cancer Control Safety and Quality Partnership (The Partnership), Queensland Cancer Control Analysis Team (QCCAT) and the Queensland Cancer Register (QCR) (<https://qccat.health.qld.gov.au>).

The Cancer Alliance Queensland supports a clinician-led, safety and quality program for cancer across Queensland. The Partnership was gazetted as a quality assurance committee under Part 6, Division 1 of the Hospital and Health Boards Act 2011 in 2004. A key role of the Partnership is to provide cancer clinicians, Hospital and Health Services (HHS), hospitals, treatment facilities and Queensland Health with cancer information and tools to deliver the best patient care.

The Radiation Oncology in Queensland: Infocus – access and flows 2007-2014 report is the first population wide profile for Queenslanders receiving external beam radiation therapy treatment for cancer. Preparing this report is an important first step in providing a baseline overview of Queensland's radiation therapy patterns of care over eight cancer incidence years from 2007 to 2014.

Where has the data come from?

Key to QCCAT's program of work is the ability to match and link population based cancer information on an individual patient basis. This matched and linked data is housed in the Queensland Oncology Repository (QOR), a resource managed by QCCAT. This centralised repository compiles and collates data from a range of source systems including the QCR, hospital admissions data, death data, treatment systems, public and private pathology, hospital clinical data systems and QOOL. QOR contains approximately 46 million records between 1982 and 2018. Our matching and linking processes provide the 195,940 matched and linked records of cancer patients between 2007 and 2014, which provide the data for this report.

Linking radiation therapy to a person with cancer

Each invasive cancer diagnosed in a calendar year was matched and linked to the earliest radiation therapy record created from radiation therapy treatment systems. The radiation therapy record is linked to the diagnosis record if the radiation therapy record start date is 30 days prior to diagnosis or any time after diagnosis. This radiation therapy flag determines the radiation therapy rate (utilisation rate) and includes treatment anytime (curative and palliative) during the course of the disease. Of the 195,940 QCR invasive diagnosis records for diagnosis year 2007 – 2014, 30% (59,679) were matched with a radiation therapy record. There were 4,051 (3%) radiation therapy records that were not matched to a diagnosis record because the treatment date was more than 30 days prior to the diagnosis date. These records were excluded from the report. Other diagnosis records excluded from this report include non-melanomatous skin cancer.

What do we know about radiation therapy utilisation for people with cancer in Queensland?

In 2014 there were 27,022 new cases of invasive cancer among Queensland residents². Cancer is the leading cause of burden of disease and injury in Queensland³, and has claimed 8,732 lives in 2014². With the ageing population in Queensland, the number of new cases of cancer is expected to reach 44,720 by 2031².

Radiation therapy is a key component of cancer treatment both in the curative and palliative setting. As more people with cancer live longer it is expected that treatment with radiation therapy will increase.

In 2006 The Partnership published the results of a state-wide patterns of care study: *Treating cancer in Queensland Public Hospitals: Service improvement starts here*¹. The aim of this study was to identify specific areas for improvement in cancer services in Queensland public hospitals. In 2006, radiation therapy rates were similar for urban and rural public patients and the combined rate of radiation therapy for colon, rectal, prostate and head and neck cancers was 29% and for breast cancer 58%. This report builds on the 2006 patterns of care study by providing population information on radiation therapy rates for all cancers. Now QCCAT are able to routinely match and link patient data, it has been possible to update and broaden this initial study and provide a fresh look at current patterns of radiation therapy utilisation in Queensland.

Radiation therapy utilisation rates

It is widely reported that cancer treatment with radiation therapy may be under-utilised when compared with modelled optimal utilisation rates of 44-48%.^[4,9] Actual 'real-life' radiation therapy rates vary from 26% in USA (2010-2012), and NSW and ACT (2004-2006), 37% in UK (2007) and 39% in Ontario, Canada (2015 – 2016).^[5-8]

The CCORE optimal utilisation rates⁴ comparison with Queensland radiation therapy rates have been included in this report as a baseline guide only. The optimal rates are determined by systematic review of international guidelines based on best evidence, however the level of clinical detail required for comparison, such as stage distribution of disease and patient performance status are not available at a population level in Queensland. Care should be taken when making direct comparison to any optimal utilisation rates as many factors may contribute to variation in radiation therapy rates.

Key Findings

- The radiation therapy utilisation rate for Queenslanders diagnosed with invasive cancer between 2007 and 2014 is 30%.
- There are favourable comparisons for high volume Queensland cancers treated with radiation therapy, and CCORE Optimal utilisation rates⁴, such as breast, brain, gynaecological, head and neck and urological cancers.
- Access to radiation therapy treatment across HHS of residence is similar ranging from 27% in South West HHS to 32% in Townsville and Metro South HHS.
- Overall access to radiation therapy for people living in regional and remote areas is similar to people living in the metropolitan areas although lung and breast cancer patients from remote areas have lower rates of radiation therapy (24% and 16% lower respectively), when compared with their metropolitan counterparts. Lower radiation therapy rates for breast cancer patients in regional and remote areas may indicate a higher mastectomy rate and therefore less need for radiation therapy.
- Access to radiation therapy for Indigenous people is similar to non-indigenous people.
- The overall trend in radiotherapy utilisation over eight years has shown little change which may indicate that any increase in radiation therapy activity or services is just keeping pace with increases in cancer incidence.
- The opening of new Radiation Oncology Services in regional Queensland allow patients to be treated closer to home. For example between 2007 and 2014 over half (52%) of people living in the Cairns HHS travelled to another HHS to receive radiation therapy. By 2014 this rate had decreased to 18%.
- The decreasing radiation therapy utilisation rate for cancers such as prostate and testis may highlight the change in patterns of care where there is appropriate use of active surveillance.
- Cancers such as gynaecological, lung and head and neck cancers are more likely to be treated in public radiation oncology services whereas more common cancers such as prostate and breast are distributed equally between public and private services. This may indicate that the complexity of care for patients is different between the public and private treatment facilities.
- Changes in the trend of utilisation rates at individual treatment centres may indicate a change in referral patterns as new services open.
- Changes in the complexity of patients being treated at treatment centres may indicate a change in the trend of utilisation rates. For example patients from Children's Health QLD - Oncology Services now receive radiation therapy at Radiation Oncology Princess Alexandra Raymond Terrace (ROPART). Radiation therapy treatments for paediatric patients are complex and resource intensive; subsequently this can result in a lower total number of patients being able to be accommodated in the service.
- Cancer patients who are reviewed by a multidisciplinary team (MDT) are twice as likely, (52% compared with 26%) to receive radiation therapy as part of their cancer treatment. This is likely to be an underestimate of the difference in radiation therapy rates as MDT data included in this report is

only from the 67 teams who use QOOL. Currently state-wide coverage of MDT data does not exist and in this report there is known missing data in areas such as the private sector and Townsville HHS. If this data were available it would likely result in higher radiation therapy rates among MDT patients and lower rates among non-MDT patients.

- There is little variation in the characteristics of Queenslanders receiving radiation therapy for breast, brain, lung, prostate or rectal cancer except for age, with people over 75 years receiving less radiation therapy than those that are younger.

1 Radiation therapy rate for Queenslanders diagnosed with cancer

1.1 Characteristics of people receiving radiation therapy

YEAR OF DIAGNOSIS 2007 – 2014

	Diagnosis		Radiation therapy*	
	N	(Qld %)	n	(RT %)
Queensland	195,940	(100%)	59,679	(30%)
Gender				
Male	111,289	(57%)	31,687	(28%)
Female	84,651	(43%)	27,992	(33%)
Age Group				
0-14	1,097	(0.6%)	349	(32%)
15-24	1,683	(0.9%)	340	(20%)
25-34	4,764	(2%)	995	(21%)
35-44	10,858	(6%)	3,444	(32%)
45-54	24,931	(13%)	8,942	(36%)
55-64	45,590	(23%)	15,946	(35%)
65-74	53,158	(27%)	18,251	(34%)
75-84	38,135	(19%)	9,409	(25%)
85+	15,724	(8%)	2,003	(13%)
Indigenous status				
Indigenous	2,716	(1%)	980	(36%)
Other than Indigenous	193,224	(99%)	58,699	(30%)
Socioeconomic status				
Affluent	28,163	(14%)	8,547	(30%)
Middle	123,267	(63%)	37,700	(31%)
Disadvantaged	44,360	(23%)	13,380	(30%)
Remoteness				
Metropolitan	124,842	(64%)	38,600	(31%)
Inner Regional	45,918	(23%)	13,374	(29%)
Outer Regional	21,160	(11%)	6,505	(31%)
Remote & Very Remote	4,020	(2%)	1,200	(30%)
MDT[^]				
MDT Review	32,434	(17%)	17,003	(52%)
No MDT Review	163,506	(83%)	42,676	(26%)
Comorbidities				
0-1 Comorbidities	172,083	(88%)	52,137	(30%)
2+ Comorbidities	23,857	(12%)	7,542	(32%)

*Radiation therapy refers to external beam radiation therapy only.

[^]MDT rate is limited to hospitals that use QOOL to capture MDT review.

1.2 Radiation therapy rate by cancer site

YEAR OF DIAGNOSIS 2007 – 2014

Cancer group	Cancer**	Diagnosis		Radiation therapy*		CCORE Optimal rate^ (%)
		N	(Qld %)	n	(%)	
Breast	Breast	23,712	(12.1%)	15,329	(65%)	(87%)
CNS and Brain	CNS and Brain	2,511	(1.3%)	1,535	(61%)	(80%)
Colorectal	Colon	15,509	(7.9%)	1,222	(8%)	(4%)
	Rectal	7,361	(3.8%)	2,955	(40%)	(60%)
Endocrine	Thyroid Gland	3,982	(2.0%)	271	(7%)	(4%)
Gynaecological	Cervix	1,404	(0.7%)	710	(51%)	(71%)
	Ovary	2,007	(1.0%)	152	(8%)	(4%)
	Uterus	3,564	(1.8%)	902	(25%)	(38%)
	Vagina	104	(0.1%)	76	(73%)	(94%)
	Vulva	477	(0.2%)	166	(35%)	(39%)
Haematological	Hodgkin Lymphoma	826	(0.4%)	357	(43%)	(85%)
	Leukaemia	5,663	(2.9%)	589	(10%)	(4%)
	Myeloma	2,332	(1.2%)	689	(30%)	(45%)
	Non-Hodgkin Lymphoma	7,101	(3.6%)	1,682	(24%)	(71%)
Head and neck	Hypopharynx	118	(0.1%)	97	(82%)	(100%)
	Larynx	934	(0.5%)	668	(72%)	(93%)
	Lip	1,655	(0.8%)	198	(12%)	(41%)
	Nasal Cavity and Paranasal Sinuses	212	(0.1%)	144	(68%)	(100%)
	Nasopharynx	152	(0.1%)	127	(84%)	(100%)
	Oral Cavity	1,684	(0.9%)	883	(52%)	(69%)
	Oropharynx	1,692	(0.9%)	1,440	(85%)	(81%)
	Pharynx	142	(0.1%)	99	(70%)	(100%)
Hepatobiliary	Salivary Glands	498	(0.3%)	341	(68%)	(100%)
	Biliary Tract	665	(0.3%)	71	(11%)	(0%)#
	Gallbladder	458	(0.2%)	38	(8%)	(17%)
	Liver	2,182	(1.1%)	155	(7%)	(0%)#
Lung	Pancreas	3,944	(2.0%)	346	(9%)	(49%)
	NSCLC	13,744	(7.0%)	6,759	(49%)	(80%)
Male genital organs	SCLC	1,817	(0.9%)	1,010	(56%)	(59%)
	Prostate	31,832	(16.2%)	10,409	(33%)	(58%)
Melanoma	Testis	1,184	(0.6%)	72	(6%)	(7%)
	Melanoma	26,068	(13.3%)	2,540	(10%)	(21%)
Mesothelioma	Mesothelioma	1,160	(0.6%)	279	(24%)	(0%)*
Upper GI	Oesophagus	2,086	(1.1%)	1,175	(56%)	(71%)
	Small Intestine	897	(0.5%)	67	(7%)	(0%)
	Stomach	2,748	(1.4%)	619	(23%)	(27%)
Urological	Bladder	3,706	(1.9%)	1,097	(30%)	(47%)
	Kidney	4,769	(2.4%)	732	(15%)	(15%)
Unknown Primary	Unknown Primary	3,979	(2.0%)	1,164	(29%)	(61%)
Other	Other invasive cancers	11,061	(5.6%)	2,514	(23%)	
All cancers		195,940	(100%)	59,679	(30%)	(48%)

*Radiation therapy refers to external beam radiation therapy only.

** See appendix for cancer descriptions.

^Barton M, Jacob S, Shafiq J, et al. Review of Optimal Radiotherapy Utilisation Rates. Collaboration for Cancer Outcomes, Research and Evaluation (CCORE); Ingham Institute, Liverpool Hospital Sydney, Australia, 2013.

#According to clinical guidelines the role of radiotherapy for the treatment of biliary tract, liver and mesothelioma cancers is not well established, therefore there are no indications for radiotherapy in the optimal CCORE model.

1.2.1 What cancers are included in the 'Other' group?

YEAR OF DIAGNOSIS 2007 – 2014

Cancer group	Cancer**	Diagnosis		Radiation therapy*	
		N	(Other %)	n	(%)
Other	Adrenal gland	105	(0.9%)	36	(34%)
	Anus, Anal Canal	412	(3.7%)	326	(79%)
	Bones and articular cartilage	147	(1.3%)	75	(51%)
	Bones upper and lower limbs	178	(1.6%)	35	(20%)
	Connective tissue	838	(7.6%)	448	(53%)
	Eye	516	(4.7%)	81	(16%)
	Kaposi sarcoma	64	(0.6%)	9	(14%)
	Lymphoid, haematopoietic and related tissue	54	(0.5%)	14	(26%)
	Malignant immunoproliferative disease	64	(0.6%)	4	(6%)
	Mediastinum, pleura, heart	79	(0.7%)	23	(29%)
	Other Haematological	3,411	(30.8%)	173	(5%)
	Other lung	1,488	(13.5%)	132	(9%)
	Other specified female genital organs	193	(1.7%)	21	(11%)
	Other specified male genital organs	39	(0.4%)	15	(38%)
	Parathyroid gland, endocrine gland	38	(0.3%)	23	(61%)
	Pelvis, thorax	136	(1.2%)	23	(17%)
	Penis	156	(1.4%)	32	(21%)
	Peripheral nerves	40	(0.4%)	20	(50%)
	Peritoneum, retroperitoneum	353	(3.2%)	65	(18%)
	Placenta	20	(0.2%)	2	(10%)
	Renal pelvis	462	(4.2%)	107	(23%)
	Skin^	1,557	(14.1%)	693	(45%)
	Spleen, Unspecified, ill-defined digestive tract	320	(2.9%)	10	(3%)
	Thymus	81	(0.7%)	54	(67%)
	Unspecified respiratory tract	2	(0.0%)	0	(0%)
	Ureter	210	(1.9%)	59	(28%)
	Urethra	98	(0.9%)	34	(35%)
Total (Other)		11,061	(100%)	2,514	(23%)

*Radiation therapy refers to external beam radiation therapy only.

** See appendix for cancer descriptions.

^ Skin cancer excludes non-melanomatous skin cancers such as basal cell and squamous cell carcinomas; but includes rarer skin cancers such as Merkel cell carcinoma.

1.2.2 Where do people receiving radiation therapy get treated?

YEAR OF DIAGNOSIS 2007 – 2014

Cancer group	Cancer**	Diagnosis		Radiation therapy*					
		N	(Qld %)	All n	(%)	Public facility n	(%)	Private facility^ n	(%)
Breast	Breast	23,712	(12.1%)	15,329	(65%)	8,177	(53%)	7,152	(47%)
CNS and Brain	CNS and Brain	2,511	(1.3%)	1,535	(61%)	993	(65%)	542	(35%)
Colorectal	Colon	15,509	(7.9%)	1,222	(8%)	699	(57%)	523	(43%)
	Rectal	7,361	(3.8%)	2,955	(40%)	1,744	(59%)	1,211	(41%)
Endocrine	Thyroid Gland	3,982	(2.0%)	271	(7%)	174	(64%)	97	(36%)
Gynaecological	Cervix	1,404	(0.7%)	710	(51%)	526	(74%)	184	(26%)
	Ovary	2,007	(1.0%)	152	(8%)	96	(63%)	56	(37%)
	Uterus	3,564	(1.8%)	902	(25%)	590	(65%)	312	(35%)
	Vagina	104	(0.1%)	76	(73%)	51	(67%)	25	(33%)
	Vulva	477	(0.2%)	166	(35%)	118	(71%)	48	(29%)
Haematological	Hodgkin Lymphoma	826	(0.4%)	357	(43%)	237	(66%)	120	(34%)
	Leukaemia	5,663	(2.9%)	589	(10%)	448	(76%)	141	(24%)
	Myeloma	2,332	(1.2%)	689	(30%)	398	(58%)	291	(42%)
	Non-Hodgkin Lymphoma	7,101	(3.6%)	1,682	(24%)	1,004	(60%)	678	(40%)
Head and neck	Hypopharynx	118	(0.1%)	97	(82%)	84	(87%)	13	(13%)
	Larynx	934	(0.5%)	668	(72%)	561	(84%)	107	(16%)
	Lip	1,655	(0.8%)	198	(12%)	128	(65%)	70	(35%)
	Nasal Cavity and Paranasal Sinuses	212	(0.1%)	144	(68%)	122	(85%)	22	(15%)
	Nasopharynx	152	(0.1%)	127	(84%)	115	(91%)	12	(9%)
	Oral Cavity	1,684	(0.9%)	883	(52%)	741	(84%)	142	(16%)
	Oropharynx	1,692	(0.9%)	1,440	(85%)	1,278	(89%)	162	(11%)
	Pharynx	142	(0.1%)	99	(70%)	87	(88%)	12	(12%)
Salivary Glands	498	(0.3%)	341	(68%)	251	(74%)	90	(26%)	
Hepatobiliary	Biliary Tract	665	(0.3%)	71	(11%)	37	(52%)	34	(48%)
	Gallbladder	458	(0.2%)	38	(8%)	22	(58%)	16	(42%)
	Liver	2,182	(1.1%)	155	(7%)	102	(66%)	53	(34%)
	Pancreas	3,944	(2.0%)	346	(9%)	168	(49%)	178	(51%)
Lung	NSCLC	13,744	(7.0%)	6,759	(49%)	4,257	(63%)	2,502	(37%)
	SCLC	1,817	(0.9%)	1,010	(56%)	647	(64%)	363	(36%)
Male genital organs	Prostate	31,832	(16.2%)	10,409	(33%)	5,215	(50%)	5,194	(50%)
	Testis	1,184	(0.6%)	72	(6%)	35	(49%)	37	(51%)
Melanoma	Melanoma	26,068	(13.3%)	2,540	(10%)	1,572	(62%)	968	(38%)
Mesothelioma	Mesothelioma	1,160	(0.6%)	279	(24%)	127	(46%)	152	(54%)
Upper GI	Oesophagus	2,086	(1.1%)	1,175	(56%)	711	(61%)	464	(39%)
	Small Intestine	897	(0.5%)	67	(7%)	43	(64%)	24	(36%)
	Stomach	2,748	(1.4%)	619	(23%)	348	(56%)	271	(44%)
Urological	Bladder	3,706	(1.9%)	1,097	(30%)	648	(59%)	449	(41%)
	Kidney	4,769	(2.4%)	732	(15%)	444	(61%)	288	(39%)
Unknown Primary	Unknown Primary	3,979	(2.0%)	1,164	(29%)	755	(65%)	409	(35%)
Other	Other invasive cancers	11,061	(5.6%)	2,514	(23%)	1,522	(61%)	992	(39%)
All cancers		195,940	(100%)	59,679	(30%)	35,275	(59%)	24,404	(41%)

*Radiation therapy refers to external beam radiation therapy only.

** See appendix for cancer descriptions.

^Private facilities include those facilities that have a public/private partnership with Qld Health to treat public patients.

1.3 Radiation therapy rate by Hospital and Health Service (HHS) of residence

YEAR OF DIAGNOSIS 2007 – 2014

HHS of residence	Diagnosis		Radiation therapy*	
	N	(Qld %)	n	(%)
Cairns and Hinterland	10,077	(5%)	3,130	(31%)
Central Queensland	8,476	(4%)	2,336	(28%)
Central West	541	(0%)	149	(28%)
Darling Downs	13,083	(7%)	3,824	(29%)
Gold Coast	24,305	(12%)	7,176	(30%)
Mackay	6,519	(3%)	1,921	(29%)
Metro North	38,215	(20%)	11,584	(30%)
Metro South	40,166	(20%)	12,926	(32%)
North West	842	(0%)	257	(31%)
South West	1,157	(1%)	311	(27%)
Sunshine Coast	19,869	(10%)	6,116	(31%)
Torres and Cape	603	(0%)	174	(29%)
Townsville	9,570	(5%)	3,061	(32%)
West Moreton	9,778	(5%)	3,058	(31%)
Wide Bay	12,739	(7%)	3,656	(29%)
Queensland	195,940	(100%)	59,679	(30%)

*Radiation therapy refers to external beam radiation therapy only.

1.3.1 Radiation therapy rate by HHS of residence and treatment facility type

YEAR OF DIAGNOSIS 2007 – 2014

HHS of residence	Diagnosis		Radiation therapy*					
	N	(Qld %)	All	(%)	Public facility	Private facility [^]		
			n	(%)	n	(%)		
Cairns and Hinterland	10,077	(5%)	3,130	(31%)	1,338	(43%)	1,792	(57%)
Central Queensland	8,476	(4%)	2,336	(28%)	1,783	(76%)	553	(24%)
Central West	541	(0%)	149	(28%)	98	(66%)	51	(34%)
Darling Downs	13,083	(7%)	3,824	(29%)	715	(19%)	3,109	(81%)
Gold Coast	24,305	(12%)	7,176	(30%)	2,014	(28%)	5,162	(72%)
Mackay	6,519	(3%)	1,921	(29%)	1,683	(88%)	238	(12%)
Metro North	38,215	(20%)	11,584	(30%)	7,481	(65%)	4,103	(35%)
Metro South	40,166	(20%)	12,926	(32%)	11,285	(87%)	1,641	(13%)
North West	842	(0%)	257	(31%)	228	(89%)	29	(11%)
South West	1,157	(1%)	311	(27%)	99	(32%)	212	(68%)
Sunshine Coast	19,869	(10%)	6,116	(31%)	1,096	(18%)	5,020	(82%)
Torres and Cape	603	(0%)	174	(29%)	95	(55%)	79	(45%)
Townsville	9,570	(5%)	3,061	(32%)	3,018	(99%)	43	(1%)
West Moreton	9,778	(5%)	3,058	(31%)	2,085	(68%)	973	(32%)
Wide Bay	12,739	(7%)	3,656	(29%)	2,257	(62%)	1,399	(38%)
Queensland	195,940	(100%)	59,679	(30%)	35,275	(59%)	24,404	(41%)

*Radiation therapy refers to external beam radiation therapy only.

[^]Private facilities include those facilities that have a public/private partnership with Qld Health to treat public patients.

1.4 Treatment facilities which deliver radiation therapy in Queensland

YEAR OF DIAGNOSIS 2007 – 2014

Facility	Radiation therapy*	
	n	(QLD%)
GenesisCare Centres	14,538	(24%)
<i>Chermside</i>	2,480	(4%)
<i>Nambour</i>	2,563	(4%)
<i>Southport</i>	2,424	(4%)
<i>Tugun</i>	1,955	(3%)
<i>Wesley</i>	5,116	(9%)
Radiation Oncology Princess Alexandra Hospital	17,313	(29%)
<i>ROPAIR^(a)</i>	8,249	(14%)
<i>ROPART^(b)</i>	9,064	(15%)
Radiation Oncology Centres	9,866	(17%)
<i>Bundaberg</i>	491	(1%)
<i>Cairns</i>	1,615	(3%)
<i>Fraser Coast</i>	166	(0%)
<i>Gold Coast</i>	889	(1%)
<i>Greenslopes**</i>	8	(0%)
<i>Maroochydore</i>	2,982	(5%)
<i>North Lakes**</i>	16	(0%)
<i>Redland**</i>	2	(0%)
<i>Springfield**</i>	54	(0%)
<i>Toowoomba</i>	3,643	(6%)
RBWH ^(c)	12,019	(20%)
The Townsville Hospital	5,796	(10%)
Unknown ^(d)	147	(0%)
Queensland	59,679	(100%)

*Radiation therapy refers to external beam radiation therapy only.

(a) Radiation Oncology Princess Alexandra Ipswich Road (ROPAIR)

(b) Radiation Oncology Princess Alexandra Raymond Terrace (ROPART)

(c) Royal Brisbane and Women's Hospital (RBWH)

(d) Unknown facility includes admitted patient records that cannot be attributed to known radiation oncology facilities

**ROC facilities that have opened in 2016 & 2017 and treated patients that were diagnosed within the reporting cohort (diagnosis years 2007-2014).

1.5 Characteristics of cancer patients receiving radiation therapy by HHS of residence

YEAR OF DIAGNOSIS 2007 – 2014

HHS of residence	Radiation therapy patients (N)		Male		Age 75+		Disadvantaged		Rural [#]		Indigenous		1+ Comorbidities		Had MDT Review [^]		Median age at diagnosis
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	
Cairns and Hinterland	3,130	(31%)	1,763	(56%)	475	(15%)	1,014	(32%)	3,130	(100%)	168	(5%)	662	(21%)	1,115	(36%)	63 yrs
Central Queensland	2,336	(28%)	1,382	(59%)	356	(15%)	499	(21%)	2,336	(100%)	53	(2%)	651	(28%)	612	(26%)	63 yrs
Central West	149	(28%)	95	(64%)	37	(25%)	42	(28%)	149	(100%)	6	(4%)	53	(36%)	32	(21%)	67 yrs
Darling Downs	3,824	(29%)	2,172	(57%)	789	(21%)	1,333	(35%)	3,824	(100%)	68	(2%)	1,021	(27%)	977	(26%)	65 yrs
Gold Coast	7,176	(30%)	3,695	(51%)	1,460	(20%)	358	(5%)	61	(1%)	33	(0%)	1,475	(21%)	1,931	(27%)	65 yrs
Mackay	1,921	(29%)	1,096	(57%)	245	(13%)	549	(29%)	1,921	(100%)	43	(2%)	442	(23%)	165	(9%)	62 yrs
Metro North	11,584	(30%)	5,838	(50%)	2,445	(21%)	1,454	(13%)	807	(7%)	87	(1%)	2,874	(25%)	3,679	(32%)	65 yrs
Metro South	12,926	(32%)	6,407	(50%)	2,420	(19%)	2,026	(16%)	640	(5%)	131	(1%)	3,012	(23%)	3,736	(29%)	64 yrs
North West	257	(31%)	154	(60%)	19	(7%)	82	(32%)	257	(100%)	53	(21%)	70	(27%)	18	(7%)	59 yrs
South West	311	(27%)	171	(55%)	42	(14%)	31	(10%)	311	(100%)	18	(6%)	94	(30%)	83	(27%)	64 yrs
Sunshine Coast	6,116	(31%)	3,196	(52%)	1,387	(23%)	787	(13%)	1,858	(30%)	26	(0%)	1,382	(23%)	2,472	(40%)	66 yrs
Torres and Cape	174	(29%)	97	(56%)	13	(7%)	148	(85%)	174	(100%)	88	(51%)	52	(30%)	61	(35%)	59 yrs
Townsville	3,061	(32%)	1,830	(60%)	564	(18%)	760	(25%)	821	(27%)	123	(4%)	712	(23%)	98	(3%)	64 yrs
West Moreton	3,058	(31%)	1,646	(54%)	456	(15%)	1,312	(43%)	1,134	(37%)	39	(1%)	762	(25%)	834	(27%)	63 yrs
Wide Bay	3,656	(29%)	2,145	(59%)	704	(19%)	2,985	(82%)	3,656	(100%)	44	(1%)	1,021	(28%)	1,190	(33%)	66 yrs
Queensland	59,679	(30%)	31,687	(53%)	11,412	(19%)	13,380	(22%)	21,079	(35%)	980	(2%)	14,283	(24%)	17,003	(28%)	64 yrs

[#]Rural includes inner regional, outer regional, remote and very remote.

[^]MDT rate is limited to hospitals that use QOOL to capture MDT review.

1.6 Characteristics of cancer patients receiving radiation therapy by treatment facility

YEAR OF DIAGNOSIS 2007 – 2014

Facility	Radiation therapy patients (N)	Male		Age 75+		Disadvantaged		Rural [#]		Indigenous		1+ Comorbidities		Had MDT Review [^]		Median age at diagnosis
		n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	
GenesisCare Centres	14,538	7,255	(50%)	3,129	(22%)	1,794	(12%)	3,117	(21%)	35	(0%)	3,049	(21%)	1,199	(8%)	65 yrs
Chermside	2,480	1,243	(50%)	479	(19%)	269	(11%)	396	(16%)	10	(0%)	447	(18%)	71	(3%)	65 yrs
Nambour	2,563	1,250	(49%)	568	(22%)	506	(20%)	1,077	(42%)	9	(0%)	517	(20%)	495	(19%)	66 yrs
Southport	2,424	1,137	(47%)	484	(20%)	102	(4%)	88	(4%)	4	(0%)	404	(17%)	328	(14%)	65 yrs
Tugun	1,955	954	(49%)	541	(28%)	109	(6%)	71	(4%)	4	(0%)	384	(20%)	160	(8%)	67 yrs
Wesley	5,116	2,671	(52%)	1,057	(21%)	808	(16%)	1,485	(29%)	8	(0%)	1,297	(25%)	145	(3%)	65 yrs
Radiation Oncology PAH	17,313	8,977	(52%)	2,930	(17%)	3,543	(20%)	2,951	(17%)	204	(1%)	4,032	(23%)	5,984	(35%)	63 yrs
ROPAIR ^(a)	8,249	5,168	(63%)	1,429	(17%)	1,918	(23%)	1,420	(17%)	104	(1%)	2,223	(27%)	3,673	(45%)	64 yrs
ROPART ^(b)	9,064	3,809	(42%)	1,501	(17%)	1,625	(18%)	1,531	(17%)	100	(1%)	1,809	(20%)	2,311	(25%)	63 yrs
Radiation Oncology Centres	9,866	5,464	(55%)	2,106	(21%)	2,678	(27%)	6,707	(68%)	211	(2%)	2,229	(23%)	3,774	(38%)	66 yrs
Bundaberg	491	286	(58%)	113	(23%)	327	(67%)	483	(98%)	6	(1%)	128	(26%)	135	(27%)	67 yrs
Cairns	1,615	878	(54%)	262	(16%)	494	(31%)	1,602	(99%)	117	(7%)	321	(20%)	791	(49%)	64 yrs
Fraser Coast	166	117	(70%)	19	(11%)	135	(81%)	161	(97%)	2	(1%)	29	(17%)	33	(20%)	66 yrs
Gold Coast	889	467	(53%)	154	(17%)	65	(7%)	33	(4%)	6	(1%)	183	(21%)	500	(56%)	65 yrs
Greenslopes	8	5	(63%)	3	(38%)	0	(0%)	0	(0%)	0	(0%)	2	(25%)	0	(0%)	70 yrs
Maroochydore	2,982	1,561	(52%)	742	(25%)	411	(14%)	836	(28%)	15	(1%)	640	(21%)	1,489	(50%)	67 yrs
North Lakes	16	7	(44%)	9	(56%)	5	(31%)	2	(13%)	0	(0%)	2	(13%)	6	(38%)	75 yrs
Redland	2	2	(100%)	1	(50%)	0	(0%)	0	(0%)	0	(0%)	0	(0%)	0	(0%)	61 yrs
Springfield	54	44	(81%)	8	(15%)	16	(30%)	22	(41%)	1	(2%)	8	(15%)	3	(6%)	64 yrs
Toowoomba	3,643	2,097	(58%)	795	(22%)	1,225	(34%)	3,568	(98%)	64	(2%)	916	(25%)	817	(22%)	66 yrs
RBWH ^(c)	12,019	6,467	(54%)	2,245	(19%)	3,571	(30%)	4,633	(39%)	195	(2%)	3,573	(30%)	5,590	(47%)	64 yrs
The Townsville Hospital	5,796	3,429	(59%)	971	(17%)	1,768	(31%)	3,636	(63%)	332	(6%)	1,360	(23%)	410	(7%)	64 yrs
Unknown ^(d)	147	95	(65%)	31	(21%)	26	(18%)	35	(24%)	3	(2%)	40	(27%)	46	(31%)	67 yrs
Queensland	59,679	31,687	(53%)	11,412	(19%)	13,380	(22%)	21,079	(35%)	980	(2%)	14,283	(24%)	17,003	(28%)	64 yrs

[#]Rural includes inner regional, outer regional, remote and very remote.

[^]MDT rate is limited to hospitals that use QOOL to capture MDT review.

(a) Radiation Oncology Princess Alexandra Ipswich Road

(b) Radiation Oncology Princess Alexandra Raymond Terrace

(c) Royal Brisbane and Women's Hospital (RBWH)

(d) Unknown facility includes admitted patient records that cannot be attributed to known radiation oncology facilities

**ROC facilities that have opened in 2016 & 2017 and treated patients that were diagnosed within the reporting cohort (diagnosis years 2007-2014)

2 Radiation therapy rates by year

2.1 Trends in radiation therapy by cancer site

YEAR OF DIAGNOSIS 2007 – 2014

Cancer group	Cancer	Diagnosis year							
		2007 n (N)	2008 n (N)	2009 n (N)	2010 n (N)	2011 n (N)	2012 n (N)	2013 n (N)	2014 n (N)
Breast	Breast	1,645 (2,485) (66%)	1,775 (2,776) (64%)	1,792 (2,810) (64%)	1,869 (2,923) (64%)	1,948 (2,920) (67%)	2,024 (3,158) (64%)	2,127 (3,308) (64%)	2,149 (3,332) (64%)
CNS and Brain	CNS and Brain	169 (279) (61%)	179 (293) (61%)	206 (345) (60%)	201 (311) (65%)	217 (339) (64%)	183 (310) (59%)	178 (296) (60%)	202 (338) (60%)
Colorectal	Colon	197 (1,854) (11%)	188 (1,884) (10%)	170 (1,908) (9%)	143 (1,943) (7%)	146 (1,976) (7%)	145 (1,952) (7%)	124 (1,937) (6%)	109 (2,055) (5%)
	Rectal	334 (902) (37%)	372 (917) (41%)	354 (842) (42%)	367 (915) (40%)	372 (918) (41%)	411 (963) (43%)	373 (945) (39%)	372 (959) (39%)
Endocrine	Thyroid Gland	44 (468) (9%)	35 (434) (8%)	35 (469) (7%)	33 (488) (7%)	40 (478) (8%)	16 (482) (3%)	31 (565) (5%)	37 (598) (6%)
Gynaecological	Cervix	76 (146) (52%)	86 (150) (57%)	78 (165) (47%)	87 (179) (49%)	85 (173) (49%)	108 (206) (52%)	78 (183) (43%)	112 (202) (55%)
	Ovary	26 (223) (12%)	25 (217) (12%)	15 (249) (6%)	23 (247) (9%)	17 (255) (7%)	24 (277) (9%)	12 (266) (5%)	10 (273) (4%)
	Uterus	86 (389) (22%)	95 (417) (23%)	112 (408) (27%)	115 (456) (25%)	113 (439) (26%)	117 (484) (24%)	145 (515) (28%)	119 (456) (26%)
	Vagina	11 (15) (73%)	7 (10) (70%)	15 (18) (83%)	9 (14) (64%)	7 (10) (70%)	6 (12) (50%)	8 (11) (73%)	13 (14) (93%)
	Vulva	20 (48) (42%)	14 (47) (30%)	16 (48) (33%)	24 (59) (41%)	21 (57) (37%)	22 (76) (29%)	14 (61) (23%)	35 (81) (43%)
	Haematological	Hodgkin Lymphoma	38 (88) (43%)	41 (80) (51%)	47 (99) (47%)	42 (100) (42%)	56 (121) (46%)	45 (111) (41%)	44 (114) (39%)
	Leukaemia	90 (649) (14%)	96 (767) (13%)	70 (657) (11%)	67 (691) (10%)	78 (736) (11%)	66 (724) (9%)	67 (698) (10%)	55 (741) (7%)
	Myeloma	88 (227) (39%)	88 (253) (35%)	90 (291) (31%)	81 (255) (32%)	94 (264) (36%)	101 (322) (31%)	69 (322) (21%)	78 (398) (20%)
	Non-Hodgkin Lymphoma	208 (758) (27%)	211 (785) (27%)	213 (829) (26%)	223 (830) (27%)	203 (904) (22%)	208 (987) (21%)	216 (1,018) (21%)	200 (990) (20%)
Head and neck	Hypopharynx	17 (18) (94%)	12 (13) (92%)	11 (12) (92%)	15 (17) (88%)	9 (13) (69%)	11 (13) (85%)	10 (15) (67%)	12 (17) (71%)
	Larynx	91 (123) (74%)	91 (116) (78%)	84 (123) (68%)	86 (119) (72%)	81 (108) (75%)	77 (123) (63%)	83 (117) (71%)	75 (105) (71%)
	Lip	22 (188) (12%)	28 (160) (18%)	30 (201) (15%)	34 (224) (15%)	24 (227) (11%)	19 (219) (9%)	23 (250) (9%)	18 (186) (10%)
	Nasal Cavity and Paranasal Sinuses	13 (19) (68%)	21 (30) (70%)	18 (21) (86%)	23 (30) (77%)	17 (27) (63%)	16 (29) (55%)	17 (28) (61%)	19 (28) (68%)
	Nasopharynx	14 (15) (93%)	11 (16) (69%)	18 (19) (95%)	16 (19) (84%)	12 (16) (75%)	17 (20) (85%)	16 (19) (84%)	23 (28) (82%)
	Oral Cavity	118 (206) (57%)	119 (212) (56%)	116 (204) (57%)	109 (203) (54%)	118 (213) (55%)	98 (200) (49%)	97 (224) (43%)	108 (222) (49%)

2.1 Trends in radiation therapy by cancer site (cont.)

Cancer group	Cancer	Diagnosis year							
		2007 n (N)	2008 n (N)	2009 n (N)	2010 n (N)	2011 n (N)	2012 n (N)	2013 n (N)	2014 n (N)
Head and neck	Oropharynx	137 (163) (84%)	137 (164) (84%)	159 (176) (90%)	189 (208) (91%)	175 (211) (83%)	184 (237) (78%)	196 (241) (81%)	263 (292) (90%)
	Pharynx	18 (24) (75%)	12 (13) (92%)	20 (25) (80%)	8 (18) (44%)	8 (16) (50%)	15 (20) (75%)	11 (17) (65%)	7 (9) (78%)
	Salivary Glands	47 (70) (67%)	44 (63) (70%)	34 (47) (72%)	52 (68) (76%)	44 (67) (66%)	35 (48) (73%)	46 (70) (66%)	39 (65) (60%)
Hepatobiliary	Biliary Tract	7 (66) (11%)	9 (66) (14%)	7 (89) (8%)	9 (68) (13%)	11 (81) (14%)	12 (96) (13%)	9 (85) (11%)	7 (114) (6%)
	Gallbladder	4 (52) (8%)	10 (50) (20%)	5 (49) (10%)	6 (63) (10%)	4 (52) (8%)	4 (62) (6%)	3 (64) (5%)	2 (66) (3%)
	Liver	12 (219) (5%)	16 (238) (7%)	18 (233) (8%)	24 (254) (9%)	20 (257) (8%)	29 (301) (10%)	20 (347) (6%)	16 (333) (5%)
	Pancreas	30 (453) (7%)	36 (456) (8%)	38 (444) (9%)	47 (496) (9%)	62 (516) (12%)	54 (534) (10%)	37 (512) (7%)	42 (533) (8%)
		790 (1,558) (51%)	814 (1,667) (49%)	811 (1,659) (49%)	858 (1,757) (49%)	851 (1,703) (50%)	905 (1,778) (51%)	892 (1,850) (48%)	838 (1,772) (47%)
Lung	SCLC	116 (220) (53%)	131 (230) (57%)	121 (220) (55%)	118 (212) (56%)	113 (222) (51%)	120 (215) (56%)	132 (231) (57%)	159 (267) (60%)
		1,387 (3,778) (37%)	1,421 (3,946) (36%)	1,374 (4,082) (34%)	1,311 (3,804) (34%)	1,349 (4,067) (33%)	1,285 (4,161) (31%)	1,220 (4,111) (30%)	1,062 (3,883) (27%)
Male genital organs	Prostate	17 (117) (15%)	21 (151) (14%)	13 (156) (8%)	4 (142) (3%)	9 (153) (6%)	2 (146) (1%)	4 (150) (3%)	2 (169) (1%)
	Testis	357 (2,728) (13%)	342 (2,971) (12%)	366 (3,060) (12%)	349 (3,125) (11%)	322 (3,319) (10%)	306 (3,452) (9%)	255 (3,712) (7%)	243 (3,701) (7%)
Mesothelioma	Melanoma	29 (129) (22%)	20 (124) (16%)	39 (141) (28%)	39 (148) (26%)	32 (142) (23%)	59 (171) (35%)	25 (137) (18%)	36 (168) (21%)
		147 (248) (59%)	136 (227) (60%)	136 (243) (56%)	150 (259) (58%)	169 (282) (60%)	156 (295) (53%)	133 (249) (53%)	148 (283) (52%)
Upper GI	Oesophagus	14 (91) (15%)	5 (84) (6%)	6 (105) (6%)	11 (112) (10%)	6 (112) (5%)	8 (128) (6%)	10 (132) (8%)	7 (133) (5%)
	Small Intestine	58 (317) (18%)	66 (347) (19%)	78 (324) (24%)	74 (330) (22%)	80 (332) (24%)	93 (371) (25%)	84 (348) (24%)	86 (379) (23%)
	Stomach	120 (420) (29%)	142 (425) (33%)	160 (451) (35%)	161 (464) (35%)	130 (463) (28%)	129 (473) (27%)	125 (494) (25%)	130 (516) (25%)
Urological	Bladder	105 (523) (20%)	93 (478) (19%)	96 (586) (16%)	97 (555) (17%)	97 (610) (16%)	86 (664) (13%)	89 (666) (13%)	69 (687) (10%)
	Kidney	133 (481) (28%)	166 (503) (33%)	128 (492) (26%)	137 (477) (29%)	137 (465) (29%)	139 (476) (29%)	164 (557) (29%)	160 (528) (30%)
Unknown Primary	Unknown Primary	259 (1,294) (20%)	290 (1,254) (23%)	311 (1,327) (23%)	329 (1,282) (26%)	345 (1,374) (25%)	335 (1,431) (23%)	325 (1,491) (22%)	320 (1,608) (20%)
	Other	7,094 (22,051) (32%)	7,405 (23,034) (32%)	7,410 (23,627) (31%)	7,540 (23,865) (32%)	7,622 (24,638) (31%)	7,670 (25,727) (30%)	7,512 (26,356) (29%)	7,426 (26,642) (28%)
All cancers		7,094 (22,051) (32%)	7,405 (23,034) (32%)	7,410 (23,627) (31%)	7,540 (23,865) (32%)	7,622 (24,638) (31%)	7,670 (25,727) (30%)	7,512 (26,356) (29%)	7,426 (26,642) (28%)

*Radiation therapy refers to external beam radiation therapy only.

** See appendix for cancer descriptions.

2.2 Trends in radiation therapy HHS of residence

YEAR OF DIAGNOSIS 2007 – 2014

HHS of residence	Diagnosis Year							
	2007 n (N)	2008 n (N)	2009 n (N)	2010 n (N)	2011 n (N)	2012 n (N)	2013 n (N)	2014 n (N)
Cairns and Hinterland	358 (1,124) (32%)	322 (1,135) (28%)	360 (1,191) (30%)	399 (1,253) (32%)	427 (1,272) (34%)	439 (1,334) (33%)	419 (1,356) (31%)	406 (1,412) (29%)
Central Queensland	279 (990) (28%)	317 (1,021) (31%)	327 (1,048) (31%)	261 (941) (28%)	313 (1,128) (28%)	275 (1,093) (25%)	269 (1,130) (24%)	295 (1,125) (26%)
Central West	27 (79) (34%)	16 (65) (25%)	19 (64) (30%)	19 (67) (28%)	18 (62) (29%)	17 (74) (23%)	17 (70) (24%)	16 (60) (27%)
Darling Downs	476 (1,493) (32%)	492 (1,610) (31%)	499 (1,668) (30%)	456 (1,559) (29%)	484 (1,624) (30%)	486 (1,710) (28%)	461 (1,693) (27%)	470 (1,726) (27%)
Gold Coast	871 (2,718) (32%)	820 (2,833) (29%)	859 (2,811) (31%)	896 (2,839) (32%)	901 (3,062) (29%)	954 (3,318) (29%)	943 (3,310) (28%)	932 (3,414) (27%)
Mackay	209 (702) (30%)	242 (756) (32%)	250 (849) (29%)	257 (805) (32%)	231 (807) (29%)	281 (840) (33%)	221 (880) (25%)	230 (880) (26%)
Metro North	1,439 (4,361) (33%)	1,507 (4,531) (33%)	1,423 (4,505) (32%)	1,471 (4,627) (32%)	1,484 (4,939) (30%)	1,461 (5,026) (29%)	1,395 (5,069) (28%)	1,404 (5,157) (27%)
Metro South	1,557 (4,619) (34%)	1,629 (4,681) (35%)	1,647 (4,915) (34%)	1,671 (5,055) (33%)	1,664 (4,999) (33%)	1,672 (5,207) (32%)	1,566 (5,356) (29%)	1,520 (5,334) (28%)
North West	34 (98) (35%)	42 (120) (35%)	36 (127) (28%)	26 (106) (25%)	33 (91) (36%)	23 (90) (26%)	35 (102) (34%)	28 (108) (26%)
South West	37 (127) (29%)	53 (173) (31%)	32 (133) (24%)	35 (133) (26%)	47 (140) (34%)	41 (153) (27%)	26 (143) (18%)	40 (155) (26%)
Sunshine Coast	650 (2,065) (31%)	730 (2,339) (31%)	751 (2,453) (31%)	809 (2,525) (32%)	778 (2,497) (31%)	786 (2,563) (31%)	818 (2,669) (31%)	794 (2,758) (29%)
Torres and Cape	21 (63) (33%)	16 (73) (22%)	23 (68) (34%)	20 (81) (25%)	17 (70) (24%)	23 (84) (27%)	25 (85) (29%)	29 (79) (37%)
Townsville	372 (1,058) (35%)	385 (1,110) (35%)	363 (1,090) (33%)	373 (1,122) (33%)	372 (1,159) (32%)	397 (1,311) (30%)	420 (1,409) (30%)	379 (1,311) (29%)
West Moreton	359 (1,140) (31%)	371 (1,100) (34%)	379 (1,190) (32%)	382 (1,169) (33%)	408 (1,210) (34%)	386 (1,267) (30%)	391 (1,319) (30%)	382 (1,383) (28%)
Wide Bay	405 (1,414) (29%)	463 (1,487) (31%)	442 (1,515) (29%)	465 (1,583) (29%)	445 (1,578) (28%)	429 (1,657) (26%)	506 (1,765) (29%)	501 (1,740) (29%)
Queensland	7,094 (22,051) (32%)	7,405 (23,034) (32%)	7,410 (23,627) (31%)	7,540 (23,865) (32%)	7,622 (24,638) (31%)	7,670 (25,727) (30%)	7,512 (26,356) (29%)	7,426 (26,642) (28%)

*Radiation therapy refers to external beam radiation therapy only.

2.3 Trends in radiation therapy by treatment facility

YEAR OF DIAGNOSIS 2007 – 2014

Facility	Diagnosis Year							
	2007 n(%)	2008 n(%)	2009 n(%)	2010 n(%)	2011 n(%)	2012 n(%)	2013 n(%)	2014 n(%)
GenesisCare Centres	1,998 (28%)	2,114 (29%)	2,075 (28%)	2,037 (27%)	1,790 (23%)	1,738 (23%)	1,515 (20%)	1,271 (17%)
<i>Chermside</i>	74 (1%)	227 (3%)	363 (5%)	377 (5%)	397 (5%)	383 (5%)	327 (4%)	332 (4%)
<i>Nambour</i>	497 (7%)	538 (7%)	496 (7%)	388 (5%)	222 (3%)	177 (2%)	133 (2%)	112 (2%)
<i>Southport</i>	70 (1%)	188 (3%)	326 (4%)	378 (5%)	389 (5%)	437 (6%)	369 (5%)	267 (4%)
<i>Tugun</i>	498 (7%)	356 (5%)	221 (3%)	217 (3%)	190 (2%)	180 (2%)	170 (2%)	123 (2%)
<i>Wesley</i>	859 (12%)	805 (11%)	669 (9%)	677 (9%)	592 (8%)	561 (7%)	516 (7%)	437 (6%)
Radiation Oncology PAH	2,193 (31%)	2,176 (29%)	2,210 (30%)	2,251 (30%)	2,242 (29%)	2,226 (29%)	2,077 (28%)	1,938 (26%)
<i>ROPAIR^(a)</i>	909 (13%)	973 (13%)	953 (13%)	1,035 (14%)	1,026 (13%)	1,200 (16%)	1,082 (14%)	1,071 (14%)
<i>ROPART^(b)</i>	1,284 (18%)	1,203 (16%)	1,257 (17%)	1,216 (16%)	1,216 (16%)	1,026 (13%)	995 (13%)	867 (12%)
Radiation Oncology Centres	496 (7%)	635 (9%)	730 (10%)	900 (12%)	1,425 (19%)	1,596 (21%)	1,838 (24%)	2,246 (30%)
<i>Bundaberg</i>	15 (0%)	13 (0%)	20 (0%)	19 (0%)	32 (0%)	34 (0%)	136 (2%)	222 (3%)
<i>Cairns</i>	40 (1%)	32 (0%)	51 (1%)	74 (1%)	307 (4%)	379 (5%)	372 (5%)	360 (5%)
<i>Fraser Coast</i>	4 (0%)	6 (0%)	7 (0%)	13 (0%)	20 (0%)	22 (0%)	12 (0%)	82 (1%)
<i>Gold Coast</i>	20 (0%)	19 (0%)	26 (0%)	35 (0%)	38 (0%)	61 (1%)	198 (3%)	492 (7%)
<i>Greenslopes**</i>	2 (0%)	1 (0%)	0 (0%)	0 (0%)	2 (0%)	3 (0%)	0 (0%)	0 (0%)
<i>Maroochydore</i>	63 (1%)	92 (1%)	112 (2%)	311 (4%)	510 (7%)	613 (8%)	648 (9%)	633 (9%)
<i>North Lakes**</i>	1 (0%)	1 (0%)	2 (0%)	1 (0%)	1 (0%)	2 (0%)	3 (0%)	5 (0%)
<i>Redland**</i>	0 (0%)	0 (0%)	0 (0%)	1 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (0%)
<i>Springfield**</i>	1 (0%)	5 (0%)	0 (0%)	7 (0%)	7 (0%)	6 (0%)	8 (0%)	20 (0%)
<i>Toowoomba</i>	350 (5%)	466 (6%)	512 (7%)	439 (6%)	508 (7%)	476 (6%)	461 (6%)	431 (6%)
RBWH ^(c)	1,611 (23%)	1,686 (23%)	1,571 (21%)	1,503 (20%)	1,490 (20%)	1,421 (19%)	1,413 (19%)	1,324 (18%)
The Townsville Hospital	769 (11%)	781 (11%)	802 (11%)	842 (11%)	663 (9%)	678 (9%)	660 (9%)	601 (8%)
Unknown ^(d)	27 (0%)	13 (0%)	22 (0%)	7 (0%)	12 (0%)	11 (0%)	9 (0%)	46 (1%)
Queensland	7,094	7,405	7,410	7,540	7,622	7,670	7,512	7,426

*Radiation therapy refers to external beam radiation therapy only.

(a) Radiation Oncology Princess Alexandra Ipswich Road (ROPAIR)

(b) Radiation Oncology Princess Alexandra Raymond Terrace (ROPART)

(c) Royal Brisbane and Women's Hospital (RBWH)

(d) Unknown facility includes admitted patient records that cannot be attributed to known radiation oncology facilities

**ROC facilities that have recently opened in 2016 & 2017 and treated patients that were diagnosed within the reporting cohort (diagnosis years 2007-2014).

2.4 Trends in radiation therapy by remoteness

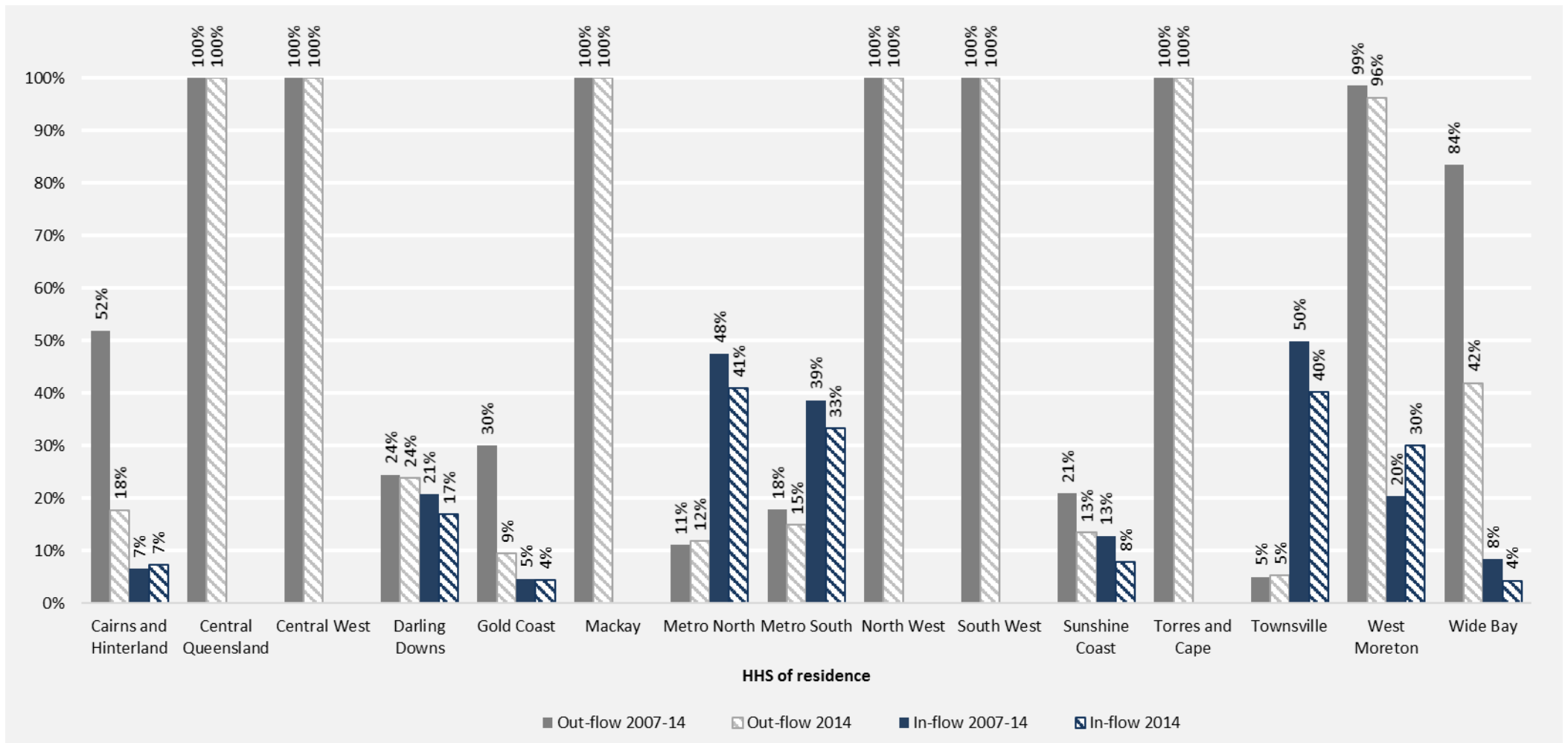
YEAR OF DIAGNOSIS 2007 – 2014

Region of residence	Diagnosis Year							
	2007 n (N) (%)	2008 n (N) (%)	2009 n (N) (%)	2010 n (N) (%)	2011 n (N) (%)	2012 n (N) (%)	2013 n (N) (%)	2014 n (N) (%)
Metropolitan	4,607 (14,054) (33%)	4,818 (14,678) (33%)	4,789 (14,885) (32%)	4,916 (15,225) (32%)	4,882 (15,722) (31%)	5,004 (16,453) (30%)	4,849 (16,825) (29%)	4,735 (17,000) (28%)
Inner Regional	1,558 (5,154) (30%)	1,640 (5,344) (31%)	1,702 (5,710) (30%)	1,624 (5,555) (29%)	1,729 (5,758) (30%)	1,662 (5,915) (28%)	1,713 (6,207) (28%)	1,746 (6,275) (28%)
Outer Regional	763 (2,383) (32%)	774 (2,472) (31%)	786 (2,570) (31%)	854 (2,581) (33%)	857 (2,673) (32%)	872 (2,833) (31%)	805 (2,801) (29%)	794 (2,847) (28%)
Remote & Very Remote	166 (460) (36%)	173 (540) (32%)	133 (462) (29%)	146 (504) (29%)	154 (485) (32%)	132 (526) (25%)	145 (523) (28%)	151 (520) (29%)
Queensland	7,094 (22,051) (32%)	7,405 (23,034) (32%)	7,410 (23,627) (31%)	7,540 (23,865) (32%)	7,622 (24,638) (31%)	7,670 (25,727) (30%)	7,512 (26,356) (29%)	7,426 (26,642) (28%)

3 Where do patients receive their radiation therapy treatment?

3.1 Summary of patient flows by HHS of residence for 2007-2014 and 2014

YEAR OF DIAGNOSIS 2007 – 2014



3.2 Patient flows for radiation therapy (2007 – 2014)

YEAR OF DIAGNOSIS 2007 – 2014

Radiation Oncology facility																					
HHS of residence	ROC - Cairns	ROC - Toowoomba	GenesisCare - Southport	GenesisCare - Tugun	ROC - Gold Coast	GenesisCare - Chermside	GenesisCare - Wesley	ROC - North Lakes	RBWH	ROPAIR	ROPART	ROC - Greenslopes	ROC - Redland	GenesisCare - Nambour	ROC - Maroochydore	The Townsville Hospital	ROC - Springfield	ROC - Bundaberg	ROC - Fraser Coast	Unknown	Queensland
Cairns and Hinterland	1,509 (48% 93%)	5 (0% 0%)	4 (0% 0%)	11 (0% 1%)	2 (0% 0%)	17 (1% 1%)	227 (7% 4%)		95 (3% 1%)	92 (3% 1%)	69 (2% 1%)			6 (0% 0%)	6 (0% 0%)	1,080 (35% 19%)		3 (0% 1%)	2 (0% 1%)	2 (0% 1%)	3,130 (5%)
Central Queensland	4 (0% 0%)	44 (2% 1%)	9 (0% 0%)	8 (0% 0%)	1 (0% 0%)	67 (3% 3%)	317 (14% 6%)		1,258 (54% 10%)	152 (7% 2%)	288 (12% 3%)			63 (3% 2%)	18 (1% 1%)	77 (3% 1%)		20 (1% 4%)	2 (0% 1%)	8 (0% 5%)	2,336 (4%)
Central West		25 (17% 1%)	1 (1% 0%)	3 (2% 0%)		5 (3% 0%)	12 (8% 0%)		42 (28% 0%)	9 (6% 0%)	12 (8% 0%)			2 (1% 0%)	3 (2% 0%)	35 (23% 1%)					149 (0%)
Darling Downs	1 (0% 0%)	2,889 (76% 79%)	3 (0% 0%)	7 (0% 0%)	3 (0% 0%)	22 (1% 1%)	138 (4% 3%)		230 (6% 2%)	236 (6% 3%)	242 (6% 3%)			19 (0% 1%)	24 (1% 1%)	5 (0% 0%)			3 (0% 2%)	2 (0% 1%)	3,824 (6%)
Gold Coast	3 (0% 0%)	8 (0% 0%)	2,316 (32% 96%)	1,870 (26% 96%)	840 (12% 94%)	10 (0% 0%)	91 (1% 2%)		183 (3% 2%)	883 (12% 11%)	862 (12% 10%)			17 (0% 1%)	6 (0% 0%)	3 (0% 0%)			1 (0% 1%)	83 (1% 56%)	7,176 (12%)
Mackay	7 (0% 0%)	11 (1% 0%)	5 (0% 0%)	9 (0% 0%)	3 (0% 0%)	24 (1% 1%)	148 (8% 3%)		163 (8% 1%)	72 (4% 1%)	76 (4% 1%)			18 (1% 1%)	7 (0% 0%)	1,368 (71% 24%)		4 (0% 1%)	2 (0% 1%)	4 (0% 3%)	1,921 (3%)
Metro North	6 (0% 0%)	16 (0% 0%)	7 (0% 0%)	4 (0% 0%)	7 (0% 1%)	2,143 (18% 86%)	1,728 (15% 34%)	16 (0% 100%)	6,412 (55% 53%)	503 (4% 6%)	551 (5% 6%)	3 (0% 38%)		88 (1% 3%)	77 (1% 3%)	9 (0% 0%)	1 (0% 2%)	5 (0% 1%)	2 (0% 1%)	6 (0% 4%)	11,584 (19%)
Metro South	2 (0% 0%)	16 (0% 0%)	52 (0% 2%)	23 (0% 1%)	26 (0% 3%)	44 (0% 2%)	1,440 (11% 28%)		655 (5% 5%)	5,201 (40% 63%)	5,416 (42% 60%)	5 (0% 63%)	2 (0% 100%)	7 (0% 0%)	10 (0% 0%)	6 (0% 0%)	10 (0% 19%)	1 (0% 0%)	3 (0% 2%)	7 (0% 5%)	12,926 (22%)
North West	6 (2% 0%)	2 (1% 0%)		2 (1% 0%)		3 (1% 0%)	13 (5% 0%)		26 (10% 0%)	6 (2% 0%)	1 (0% 0%)			3 (1% 0%)		194 (75% 3%)				1 (0% 1%)	257 (0%)
South West	1 (0% 0%)	173 (56% 5%)	2 (1% 0%)			3 (1% 0%)	27 (9% 1%)		15 (5% 0%)	46 (15% 1%)	36 (12% 0%)			1 (0% 0%)	5 (2% 0%)	1 (0% 0%)				1 (0% 1%)	311 (1%)
Sunshine Coast	3 (0% 0%)	20 (0% 1%)	12 (0% 0%)	4 (0% 0%)	3 (0% 0%)	50 (1% 2%)	92 (2% 2%)		827 (14% 7%)	166 (3% 2%)	74 (1% 1%)			2,074 (34% 81%)	2,759 (45% 93%)	8 (0% 0%)		1 (0% 0%)	2 (0% 1%)	21 (0% 14%)	6,116 (10%)
Torres and Cape	66 (38% 4%)	1 (1% 0%)	1 (1% 0%)				9 (5% 0%)		5 (3% 0%)	5 (3% 0%)	5 (3% 0%)			1 (1% 0%)		80 (46% 1%)			1 (1% 1%)		174 (0%)
Townsville	5 (0% 0%)	1 (0% 0%)	1 (0% 0%)	2 (0% 0%)	1 (0% 0%)	5 (0% 0%)	19 (1% 0%)		63 (2% 1%)	21 (1% 0%)	21 (1% 0%)			3 (0% 0%)	5 (0% 0%)	2,908 (95% 50%)			1 (0% 1%)	5 (0% 3%)	3,061 (5%)
West Moreton		368 (12% 10%)	4 (0% 0%)	2 (0% 0%)	2 (0% 0%)	9 (0% 0%)	536 (18% 10%)		168 (5% 1%)	642 (21% 8%)	1,269 (41% 14%)			4 (0% 0%)	3 (0% 0%)	4 (0% 0%)	43 (1% 80%)	2 (0% 0%)		2 (0% 1%)	3,058 (5%)
Wide Bay	2 (0% 0%)	64 (2% 2%)	7 (0% 0%)	10 (0% 1%)	1 (0% 0%)	78 (2% 3%)	319 (9% 6%)		1,877 (51% 16%)	215 (6% 3%)	142 (4% 2%)			257 (7% 10%)	59 (2% 2%)	18 (0% 0%)		455 (12% 93%)	147 (4% 89%)	5 (0% 3%)	3,656 (6%)
Queensland	1,615 (3%)	3,643 (6%)	2,424 (4%)	1,955 (3%)	889 (1%)	2,480 (4%)	5,116 (9%)	16 (0%)	12,019 (20%)	8,249 (14%)	9,064 (15%)	8 (0%)	2 (0%)	2,563 (4%)	2,982 (5%)	5,796 (10%)	54 (0%)	491 (1%)	166 (0%)	147 (0%)	59,679 (100%)

Row% is used to show the proportion of patients residing in a given HHS who also receive their RT treatment in the same HHS, and what proportion had their RT treatment in another HHS. For example: of the 3,130 patients who reside in Cairns and Hinterland HHS, 1,509 (48%) also had their RT treatment in Cairns and Hinterland HHS. The remaining 1,621 patients (52%) had RT treatment in 14 other treatment facilities.

Col% is used to show the distribution of residence for the total group of patients who received RT by a single RT facility. For example: of the 1,615 patients who had RT treatment performed at ROC – Cairns 1,509 (93%) of patients were also residents of Cairns and Hinterland HHS. The remaining 106 (7%) who received treatment at ROC Cairns reside in 14 other HHS.

3.3 Patient flows for radiation therapy (2014)

YEAR OF DIAGNOSIS 2014

HHS of residence	Radiation Oncology facility																		Queensland	
	ROC - Cairns	ROC - Toowoomba	GenesisCare - Southport	GenesisCare - Tugun	ROC - Gold Coast	GenesisCare - Chermerside	GenesisCare - Wesley	ROC - North Lakes	RBWH	ROPAIR	ROPART	ROC - Redland	GenesisCare - Nambour	ROC - Maroochydore	The Townsville Hospital	ROC - Springfield	ROC - Bundaberg	ROC - Fraser Coast		Unknown
Cairns and Hinterland	334 (82% 93%)			1 (0% 1%)	1 (0% 0%)		7 (2% 2%)		16 (4% 1%)	11 (3% 1%)	4 (1% 0%)				31 (8% 5%)				1 (0% 2%)	406 (5%)
Central Queensland		3 (1% 1%)		2 (1% 2%)				16 (5% 5%)	36 (12% 8%)				1 (0% 1%)	3 (1% 0%)	14 (5% 2%)		3 (1% 1%)		1 (0% 2%)	295 (4%)
Central West		3 (19% 1%)						1 (6% 0%)							1 (6% 0%)	4 (25% 1%)				16 (0%)
Darling Downs		358 (76% 83%)			2 (0% 0%)	4 (1% 1%)	14 (3% 3%)		27 (6% 2%)	37 (8% 3%)	17 (4% 2%)		1 (0% 1%)	6 (1% 1%)				3 (1% 4%)	1 (0% 2%)	470 (6%)
Gold Coast		1 (0% 0%)	255 (27% 96%)	115 (12% 93%)	474 (51% 96%)	1 (0% 0%)	8 (1% 2%)		11 (1% 1%)	27 (3% 3%)	12 (1% 1%)				1 (0% 0%)				27 (3% 59%)	932 (13%)
Mackay	1 (0% 0%)	1 (0% 0%)		3 (1% 2%)		2 (1% 1%)	12 (5% 3%)		22 (10% 2%)	12 (5% 1%)	8 (3% 1%)		1 (0% 1%)	1 (0% 0%)	163 (71% 27%)		2 (1% 1%)	1 (0% 1%)	1 (0% 2%)	230 (3%)
Metro North		4 (0% 1%)	1 (0% 0%)		1 (0% 0%)	290 (21% 87%)	160 (11% 37%)	5 (0% 100%)	783 (56% 59%)	71 (5% 7%)	58 (4% 7%)		4 (0% 4%)	19 (1% 3%)	2 (0% 0%)		4 (0% 2%)		2 (0% 4%)	1,404 (19%)
Metro South		2 (0% 0%)	6 (0% 2%)		13 (1% 3%)	4 (0% 1%)	119 (8% 27%)		73 (5% 6%)	749 (49% 70%)	544 (36% 63%)	1 (0% 100%)		1 (0% 0%)		6 (0% 30%)			2 (0% 4%)	1,520 (20%)
North West				1 (4% 1%)			1 (4% 0%)		4 (14% 0%)						22 (79% 4%)					28 (0%)
South West	1 (3% 0%)	25 (63% 6%)	1 (3% 0%)				2 (5% 0%)		1 (3% 0%)	6 (15% 1%)	3 (8% 0%)				1 (3% 0%)					40 (1%)
Sunshine Coast	1 (0% 0%)		3 (0% 1%)			7 (1% 2%)	6 (1% 1%)		64 (8% 5%)	17 (2% 2%)	4 (1% 0%)		90 (11% 80%)	597 (75% 94%)					5 (1% 11%)	794 (11%)
Torres and Cape	22 (76% 6%)						1 (3% 0%)				2 (7% 0%)				4 (14% 1%)					29 (0%)
Townsville	1 (0% 0%)					1 (0% 0%)			6 (2% 0%)	3 (1% 0%)	3 (1% 0%)			1 (0% 0%)	359 (95% 60%)				5 (1% 11%)	379 (5%)
West Moreton		34 (9% 8%)			1 (0% 0%)		49 (13% 11%)		21 (5% 2%)	98 (26% 9%)	164 (43% 19%)						14 (4% 70%)		1 (0% 2%)	382 (5%)
Wide Bay			1 (0% 0%)	1 (0% 1%)		6 (1% 2%)	22 (4% 5%)		135 (27% 10%)	18 (4% 2%)	8 (2% 1%)		15 (3% 13%)	4 (1% 1%)				213 (43% 96%)	78 (16% 95%)	501 (7%)
Queensland	360 (5%)	431 (6%)	267 (4%)	123 (2%)	492 (7%)	332 (4%)	437 (6%)	5 (0%)	1,324 (18%)	1,071 (14%)	867 (12%)	1 (0%)	112 (2%)	633 (9%)	601 (8%)	20 (0%)	222 (3%)	82 (1%)	46 (1%)	7,426 (100%)

Row% is used to show the proportion of patients residing in a given HHS who also receive their RT treatment in the same HHS, and what proportion had their RT treatment in another HHS. For example: of the 406 patients who reside in Cairns and Hinterland HHS, 334 (82%) also had their RT treatment in Cairns and Hinterland HHS. The remaining 72 patients (18%) had RT treatment in seven other treatment facilities.

Col% is used to show the distribution of residence for the total group of patients who received RT by a single RT facility. For example: of the 360 patients who had RT treatment performed at ROC – Cairns 334 (93%) of patients were also residents of Cairns and Hinterland HHS. The remaining 26 (7%) who received treatment at ROC Cairns reside in 5 other HHS

4 Spotlight on common cancers treated with radiation therapy

Breast, Brain and CNS, Lung, Prostate and Rectal cancers

4.1 Breast cancer

4.1.1 Characteristics of breast cancer patients receiving radiation therapy

YEAR OF DIAGNOSIS 2007 – 2014

	Diagnosis		Radiation therapy*	
	N	(Qld %)	n	(RT %)
Age Group				
0-24	16	(0%)	10	(63%)
25-49	5,429	(23%)	3,954	(73%)
50-74	14,371	(61%)	10,047	(70%)
75+	3,896	(16%)	1,318	(34%)
Indigenous status				
Indigenous	315	(1%)	218	(69%)
Other than Indigenous	23,397	(99%)	15,111	(65%)
Socioeconomic status				
Affluent	3,990	(17%)	2,793	(70%)
Middle	15,054	(63%)	9,724	(65%)
Disadvantaged	4,656	(20%)	2,803	(60%)
Remoteness				
Metropolitan	15,752	(66%)	10,580	(67%)
Inner Regional	5,136	(22%)	3,067	(60%)
Outer Regional	2,426	(10%)	1,455	(60%)
Remote	398	(2%)	227	(57%)
MDT				
MDT Review	6,529	(28%)	4,405	(67%)
No MDT Review	17,183	(72%)	10,924	(64%)
Comorbidities				
0-1 Comorbidities	22,695	(96%)	14,816	(65%)
2+ Comorbidities	1,017	(4%)	513	(50%)
HHS of residence				
Cairns and Hinterland	1270	(5%)	768	(60%)
Central Queensland	987	(4%)	495	(50%)
Central West	65	(0%)	32	(49%)
Darling Downs	1439	(6%)	880	(61%)
Gold Coast	3015	(13%)	1,878	(62%)
Mackay	748	(3%)	463	(62%)
Metro North	4849	(20%)	3,249	(67%)
Metro South	5178	(22%)	3,658	(71%)
North West	80	(0%)	44	(55%)
South West	120	(1%)	69	(58%)
Sunshine Coast	2479	(10%)	1,663	(67%)
Torres and Cape	47	(0%)	31	(66%)
Townsville	1009	(4%)	647	(64%)
West Moreton	1144	(5%)	728	(64%)
Wide Bay	1282	(5%)	724	(56%)
Queensland	23,712	(100%)	15,329	(65%)

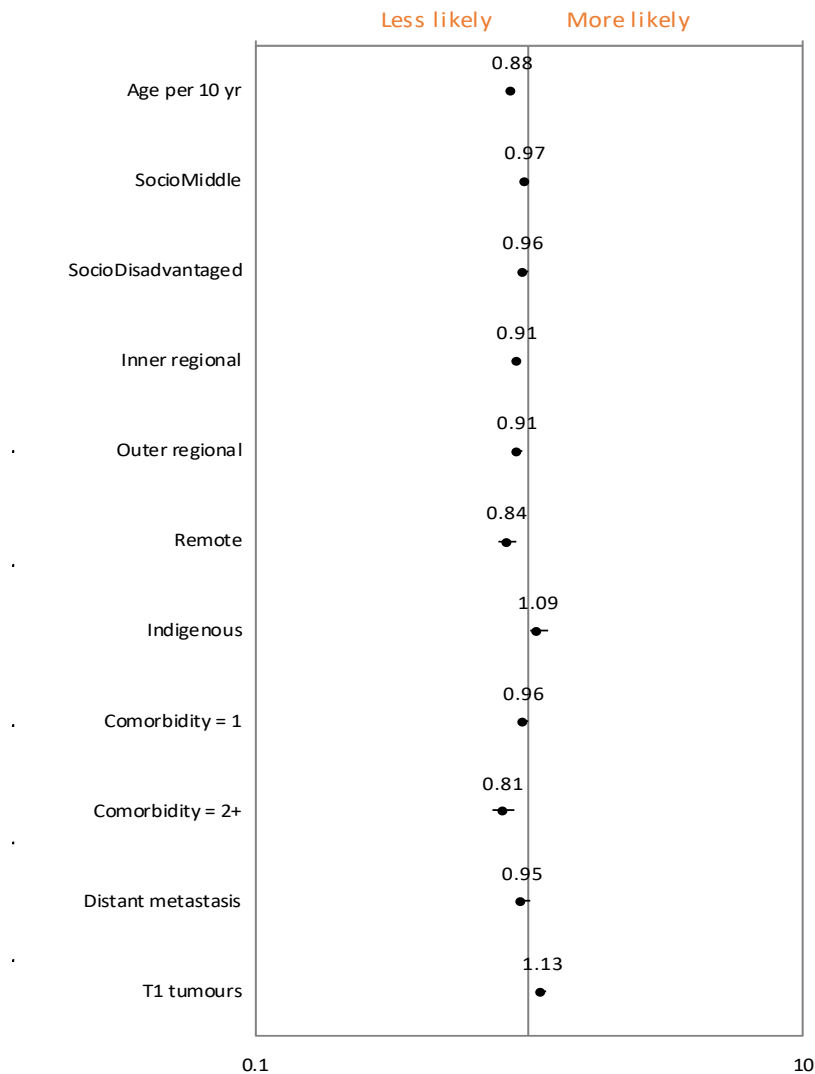
*Radiation therapy refers to external beam radiation therapy only.

§Remote includes remote and very remote.

^MDT rate is limited to hospitals that use QOOL to capture MDT review.

4.1.2 Factors associated with receiving radiation therapy for breast cancer

YEAR OF DIAGNOSIS 2007 – 2014



The above graph (forest plot) is a graphical display of the hazard ratios for each covariate in the analysis. The dot represents the estimate of the hazard ratio with the confidence interval of the estimate represented by a horizontal line. The central vertical line represents no effect, if the confidence intervals for an estimate cross this central vertical line then the effect is considered not to be statistically significant. Hazard ratios for those from Middle and Disadvantaged socioeconomic areas are obtained by comparing to those from Affluent areas. Inner and Outer Regional, Remote areas are compared with Major Cities. Patients with comorbidities are compared to those with no comorbidities.

4.2 CNS and Brain cancer

4.2.1 Characteristics of CNS and brain cancer patients receiving radiation therapy

YEAR OF DIAGNOSIS 2007 – 2014

	Diagnosis		Radiation therapy*	
	N	(Qld %)	n	(RT %)
Gender				
Male	1,442	(57%)	916	(64%)
Female	1,069	(43%)	619	(58%)
Age Group				
0-24	244	(10%)	161	(66%)
25-49	546	(22%)	388	(71%)
50-74	1,290	(51%)	866	(67%)
75+	431	(17%)	120	(28%)
Indigenous status				
Indigenous	38	(2%)	21	(55%)
Other than Indigenous	2,473	(98%)	1,514	(61%)
Socioeconomic status				
Affluent	392	(16%)	265	(68%)
Middle	1,616	(64%)	975	(60%)
Disadvantaged	502	(20%)	294	(59%)
Remoteness				
Metropolitan	1,633	(65%)	1,014	(62%)
Inner Regional	565	(23%)	331	(59%)
Outer Regional	257	(10%)	153	(60%)
Remote [§]	56	(2%)	37	(66%)
MDT[^]				
MDT Review	718	(29%)	508	(71%)
No MDT Review	1,793	(71%)	1,027	(57%)
Comorbidities				
0-1 Comorbidities	1,640	(65%)	1,019	(62%)
2+ Comorbidities	871	(35%)	516	(59%)
HHS of residence				
Cairns and Hinterland	133	(5%)	74	(56%)
Central Queensland	108	(4%)	60	(56%)
Central West	11	(0%)	8	(73%)
Darling Downs	161	(6%)	102	(63%)
Gold Coast	306	(12%)	178	(58%)
Mackay	85	(3%)	46	(54%)
Metro North	483	(19%)	310	(64%)
Metro South	583	(23%)	353	(61%)
North West	17	(1%)	10	(59%)
South West	15	(1%)	12	(80%)
Sunshine Coast	244	(10%)	149	(61%)
Torres and Cape	3	(0%)	1	(33%)
Townsville	110	(4%)	65	(59%)
West Moreton	120	(5%)	83	(69%)
Wide Bay	132	(5%)	84	(64%)
Queensland	2,511	(100%)	1,535	(61%)

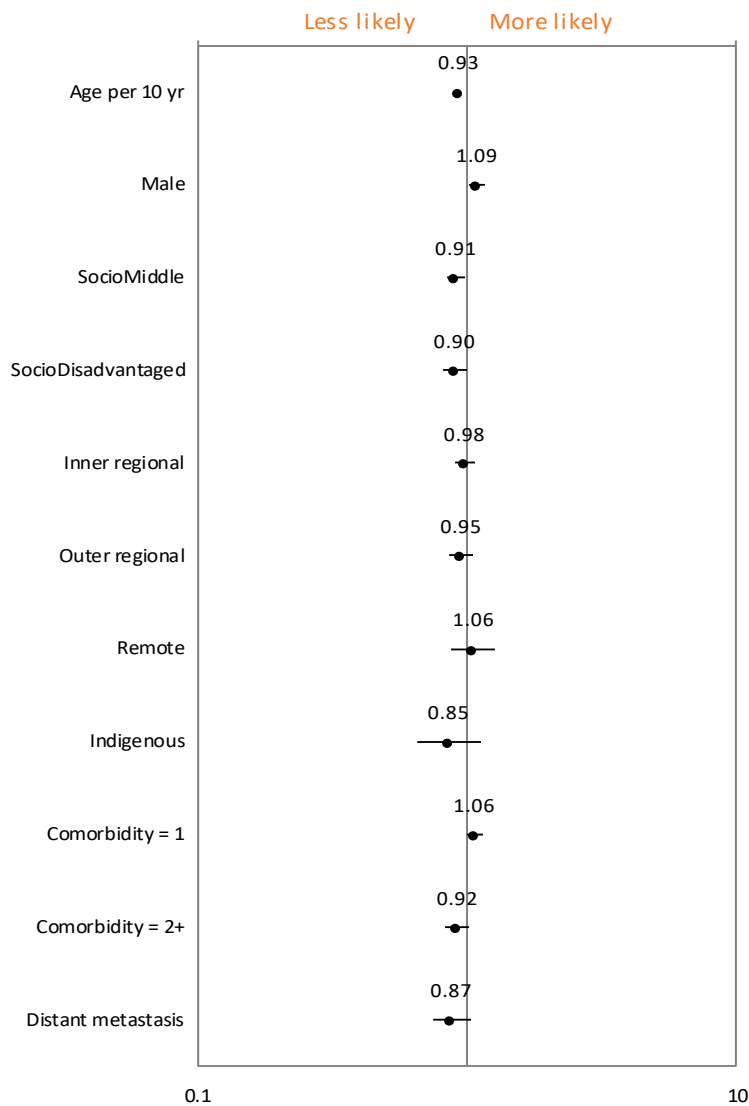
*Radiation therapy refers to external beam radiation therapy only.

§Remote includes remote and very remote.

[^]MDT rate is limited to hospitals that use QOOL to capture MDT review.

4.2.2 Factors associated with receiving radiation therapy for CNS and brain cancer

YEAR OF DIAGNOSIS 2007 – 2014



The above graph (forest plot) is a graphical display of the hazard ratios for each covariate in the analysis. The dot represents the estimate of the hazard ratio with the confidence interval of the estimate represented by a horizontal line. The central vertical line represents no effect, if the confidence intervals for an estimate cross this central vertical line then the effect is considered not to be statistically significant. Hazard ratios for those from Middle and Disadvantaged socioeconomic areas are obtained by comparing to those from Affluent areas. Inner and Outer Regional, Remote areas are compared with Major Cities. Patients with comorbidities are compared to those with no comorbidities.

4.3 Lung cancer

4.3.1 Characteristics of lung cancer patients receiving radiation therapy

YEAR OF DIAGNOSIS 2007 – 2014

	Diagnosis		Radiation therapy*	
	N	(Qld %)	n	(RT %)
Gender				
Male	9,552	(61%)	4,786	(50%)
Female	6,009	(39%)	2,983	(50%)
Age Group				
0-24	4	(0%)	2	(50%)
25-49	626	(4%)	430	(69%)
50-74	9,735	(63%)	5,463	(56%)
75+	5,196	(33%)	1,874	(36%)
Indigenous status				
Indigenous	393	(3%)	183	(47%)
Other than Indigenous	15,168	(97%)	7,586	(50%)
Socioeconomic status				
Affluent	1,622	(10%)	881	(54%)
Middle	9,656	(62%)	4,837	(50%)
Disadvantaged	4,272	(27%)	2,045	(48%)
Remoteness				
Metropolitan	9,650	(62%)	4,986	(52%)
Inner Regional	3,722	(24%)	1,789	(48%)
Outer Regional	1,730	(11%)	809	(47%)
Remote [§]	459	(3%)	185	(40%)
MDT[^]				
MDT Review	6,467	(42%)	3,754	(58%)
No MDT Review	9,094	(58%)	4,015	(44%)
Comorbidities				
0-1 Comorbidities	12,155	(78%)	6,183	(51%)
2+ Comorbidities	3,406	(22%)	1,586	(47%)
HHS of residence				
Cairns and Hinterland	814	(5%)	375	(46%)
Central Queensland	759	(5%)	345	(45%)
Central West	63	(0%)	24	(38%)
Darling Downs	890	(6%)	439	(49%)
Gold Coast	1879	(12%)	931	(50%)
Mackay	507	(3%)	222	(44%)
Metro North	2916	(19%)	1,542	(53%)
Metro South	3165	(20%)	1,667	(53%)
North West	101	(1%)	46	(46%)
South West	123	(1%)	53	(43%)
Sunshine Coast	1528	(10%)	755	(49%)
Torres and Cape	73	(0%)	28	(38%)
Townsville	753	(5%)	361	(48%)
West Moreton	796	(5%)	433	(54%)
Wide Bay	1194	(8%)	548	(46%)
Queensland	15,561	(100%)	7,769	(50%)

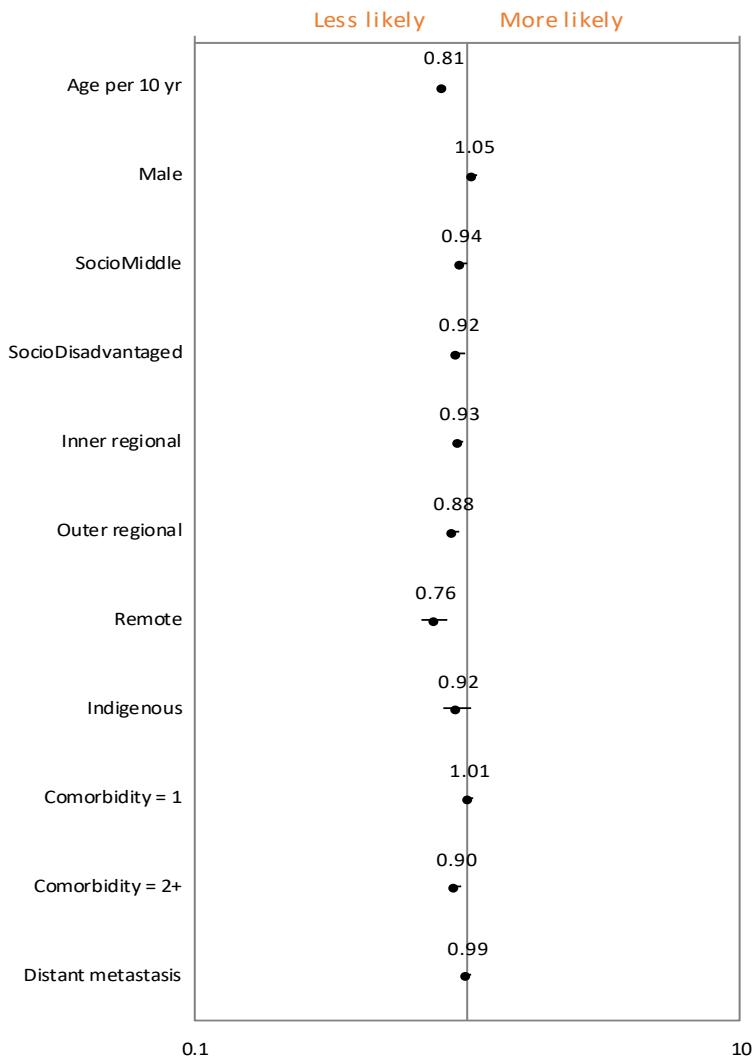
*Radiation therapy refers to external beam radiation therapy only.

§Remote includes remote and very remote.

^MDT rate is limited to hospitals that use QOOL to capture MDT review.

4.3.2 Factors associated with receiving radiation therapy for lung cancer

YEAR OF DIAGNOSIS 2007 – 2014



The above graph (forest plot) is a graphical display of the hazard ratios for each covariate in the analysis. The dot represents the estimate of the hazard ratio with the confidence interval of the estimate represented by a horizontal line. The central vertical line represents no effect, if the confidence intervals for an estimate cross this central vertical line then the effect is considered not to be statistically significant. Hazard ratios for those from Middle and Disadvantaged socioeconomic areas are obtained by comparing to those from Affluent areas. Inner and Outer Regional, Remote areas are compared with Major Cities. Patients with comorbidities are compared to those with no comorbidities.

4.4. Prostate cancer

4.4.1 Characteristics of prostate cancer patients receiving radiation therapy

YEAR OF DIAGNOSIS 2007 – 2014

	Diagnosis		Radiation therapy*	
	N	(Qld %)	n	(RT %)
Age Group				
0-24	3	(0%)	2	(67%)
25-49	890	(3%)	125	(14%)
50-74	23,657	(74%)	8,087	(34%)
75+	7,282	(23%)	2,195	(30%)
Indigenous status				
Indigenous	250	(1%)	98	(39%)
Other than Indigenous	31,582	(99%)	10,311	(33%)
Socioeconomic status				
Affluent	4,828	(15%)	1,409	(29%)
Middle	19,803	(62%)	6,555	(33%)
Disadvantaged	7,172	(23%)	2,429	(34%)
Remoteness				
Metropolitan	19,570	(61%)	6,272	(32%)
Inner Regional	8,129	(26%)	2,679	(33%)
Outer Regional	3,486	(11%)	1,240	(36%)
Remote [§]	647	(2%)	218	(34%)
MDT[^]				
MDT Review	906	(3%)	545	(60%)
No MDT Review	30,926	(97%)	9,864	(32%)
Comorbidities				
0-1 Comorbidities	29,749	(93%)	9,691	(33%)
2+ Comorbidities	2,083	(7%)	718	(34%)
HHS of residence				
Cairns and Hinterland	1448	(5%)	537	(37%)
Central Queensland	1556	(5%)	459	(29%)
Central West	86	(0%)	30	(35%)
Darling Downs	2058	(6%)	797	(39%)
Gold Coast	3988	(13%)	1,175	(29%)
Mackay	1222	(4%)	371	(30%)
Metro North	6144	(19%)	1,879	(31%)
Metro South	5761	(18%)	2,032	(35%)
North West	116	(0%)	39	(34%)
South West	183	(1%)	44	(24%)
Sunshine Coast	3344	(11%)	1,034	(31%)
Torres and Cape	47	(0%)	11	(23%)
Townsville	1777	(6%)	687	(39%)
West Moreton	1636	(5%)	527	(32%)
Wide Bay	2466	(8%)	787	(32%)
Queensland	31,832	(100%)	10,409	(33%)

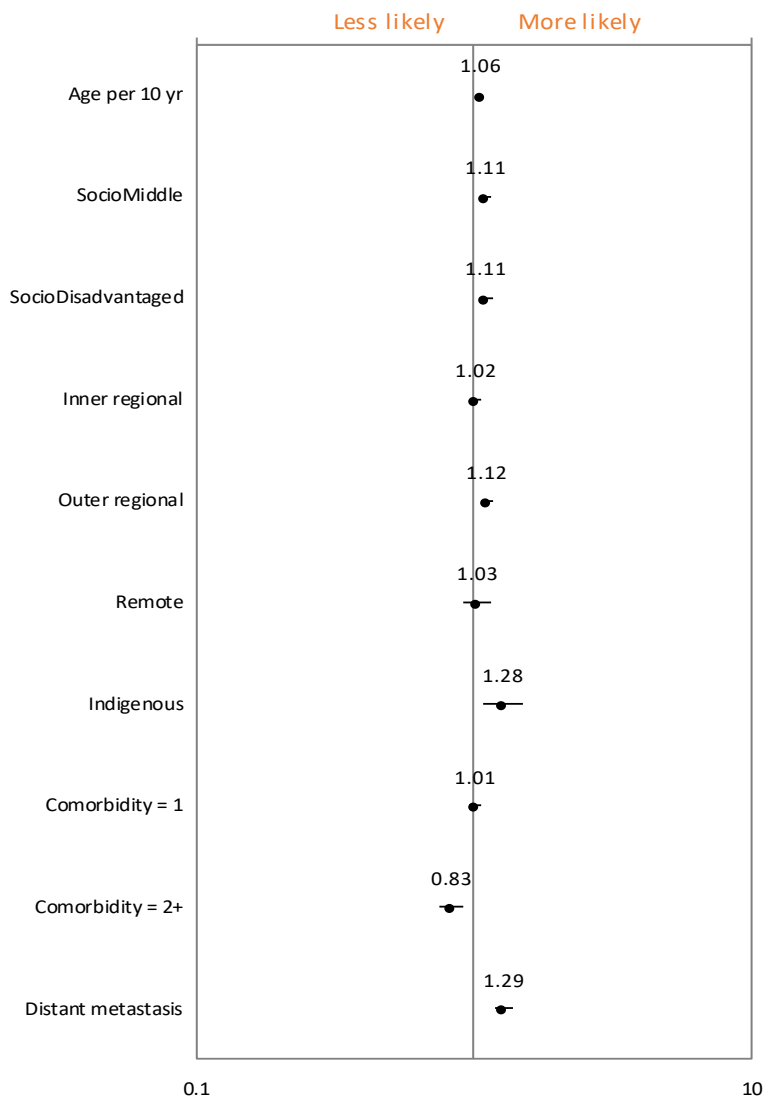
*Radiation therapy refers to external beam radiation therapy only.

§Remote includes remote and very remote.

^MDT rate is limited to hospitals that use QOOL to capture MDT review.

4.4.2 Factors associated with receiving radiation therapy for prostate cancer

YEAR OF DIAGNOSIS 2007 – 2014



The above graph (forest plot) is a graphical display of the hazard ratios for each covariate in the analysis. The dot represents the estimate of the hazard ratio with the confidence interval of the estimate represented by a horizontal line. The central vertical line represents no effect, if the confidence intervals for an estimate cross this central vertical line then the effect is considered not to be statistically significant. Hazard ratios for those from Middle and Disadvantaged socioeconomic areas are obtained by comparing to those from Affluent areas. Inner and Outer Regional, Remote areas are compared with Major Cities. Patients with comorbidities are compared to those with no comorbidities.

4.5 Rectal cancer

4.5.1 Characteristics of rectal cancer patients receiving radiation therapy

YEAR OF DIAGNOSIS 2007 – 2014

	Diagnosis		Radiation therapy*	
	N	(Qld %)	n	(RT %)
Gender				
Male	4,666	(63%)	1,963	(42%)
Female	2,695	(37%)	992	(37%)
Age Group				
0-24	13	(0%)	2	(15%)
25-49	755	(10%)	362	(48%)
50-74	4,630	(63%)	2,012	(43%)
75+	1,963	(27%)	579	(29%)
Indigenous status				
Indigenous	96	(1%)	47	(49%)
Other than Indigenous	7,265	(99%)	2,908	(40%)
Socioeconomic status				
Affluent	989	(13%)	348	(35%)
Middle	4,650	(63%)	1,890	(41%)
Disadvantaged	1,715	(23%)	714	(42%)
Remoteness				
Metropolitan	4,524	(61%)	1,732	(38%)
Inner Regional	1,728	(23%)	720	(42%)
Outer Regional	957	(13%)	436	(46%)
Remote [§]	152	(2%)	67	(44%)
MDT[^]				
MDT Review	1,829	(25%)	1,059	(58%)
No MDT Review	5,532	(75%)	1,896	(34%)
Comorbidities				
0-1 Comorbidities	6,376	(87%)	2,531	(40%)
2+ Comorbidities	985	(13%)	424	(43%)
HHS of residence				
Cairns and Hinterland	454	(6%)	212	(47%)
Central Queensland	311	(4%)	130	(42%)
Central West	17	(0%)	4	(24%)
Darling Downs	502	(7%)	233	(46%)
Gold Coast	905	(12%)	311	(34%)
Mackay	258	(4%)	106	(41%)
Metro North	1399	(19%)	525	(38%)
Metro South	1451	(20%)	575	(40%)
North West	36	(0%)	17	(47%)
South West	43	(1%)	17	(40%)
Sunshine Coast	716	(10%)	296	(41%)
Torres and Cape	22	(0%)	12	(55%)
Townsville	357	(5%)	155	(43%)
West Moreton	387	(5%)	176	(45%)
Wide Bay	503	(7%)	186	(37%)
Queensland	7,361	(100%)	2,955	(40%)

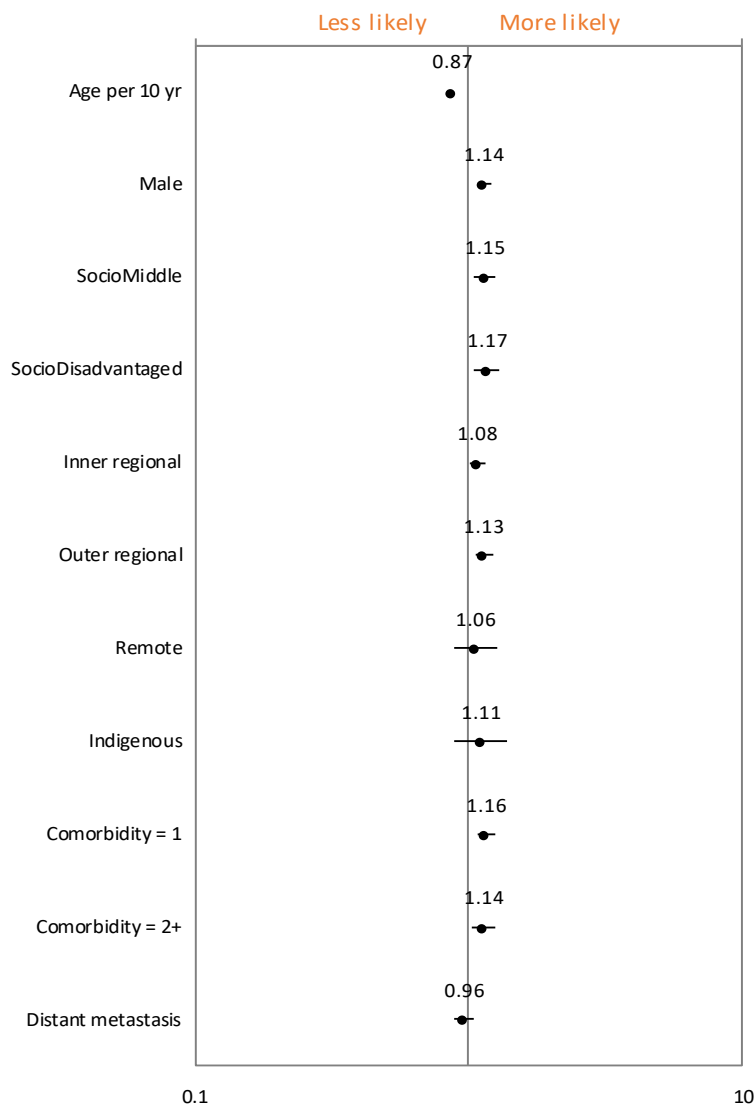
*Radiation therapy refers to external beam radiation therapy only.

§Remote includes remote and very remote.

^MDT rate is limited to hospitals that use QOOL to capture MDT review.

4.5.2 Factors associated with receiving radiation therapy for rectal cancer

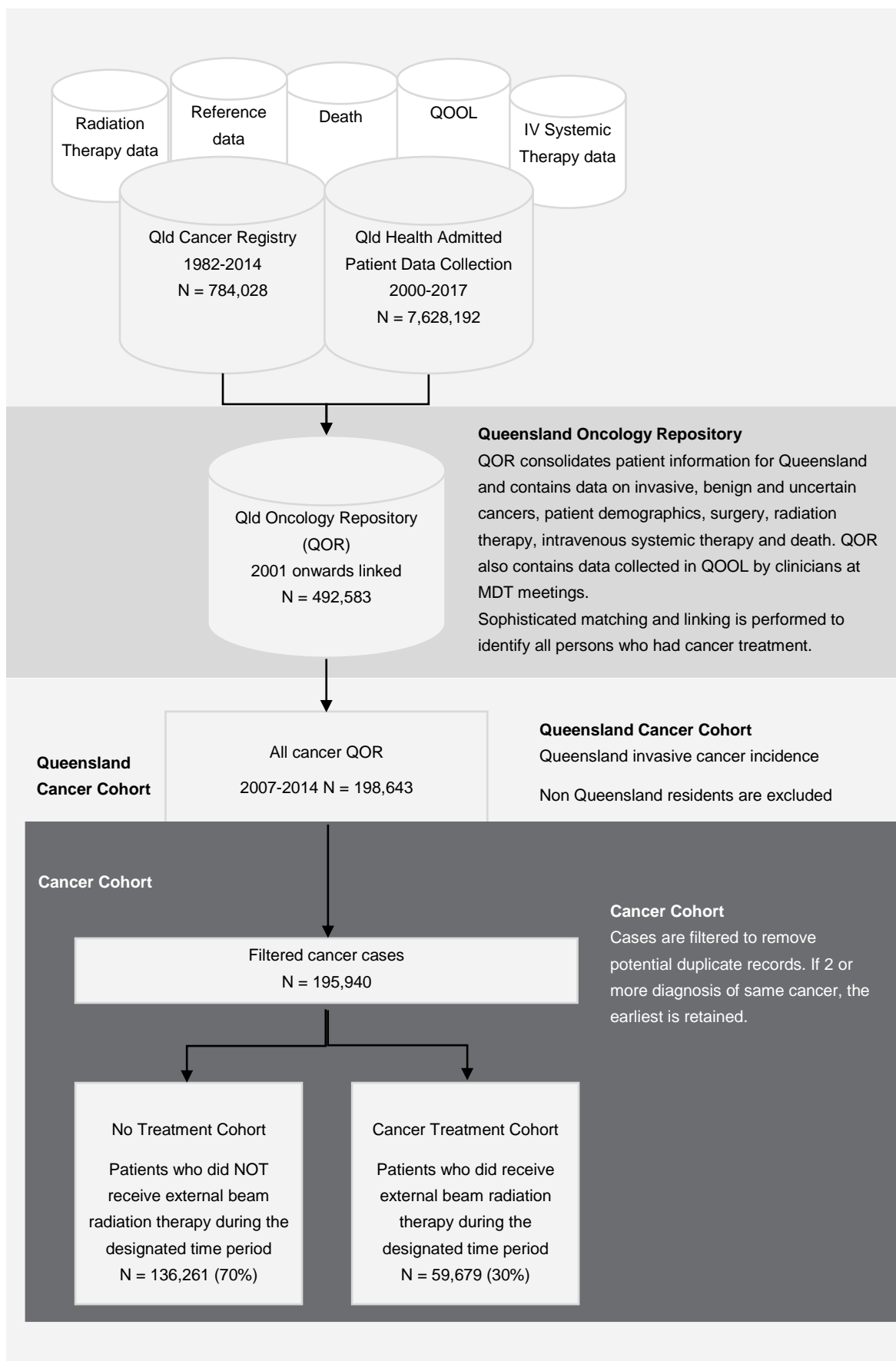
YEAR OF DIAGNOSIS 2007 – 2014



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Appendix 1

How are the cohorts identified?



Appendix 2

Cancer groupings

Cancer Group	Cancer	ICD-10 AM code
Breast	Breast	C50
CNS and Brain	CNS and Brain	C70-C72
Colorectal	Colon	C18
	Rectal	C19-C20,C218
Endocrine	Thyroid Gland	C73
Gynaecological	Cervix	C53
	Ovary	C56
	Uterus	C54-C55
	Vagina	C52
	Vulva	C51
Haematological	Hodgkin Lymphoma	M965-M966
	Leukaemia	M980-M994
	Myeloma	M973
	Non-Hodgkin Lymphoma	M967-M972
Head and neck	Hypopharynx	C13
	Larynx	C32
	Lip	C00
	Nasal Cavity and Paranasal Sinuses	C30-C31
	Nasopharynx	C11
	Oral Cavity	C02-C06
	Oropharynx	C01, C09-C10, C12
	Pharynx Other	C14
	Salivary Glands	C07-C08
Hepatobiliary	Biliary Tract (not incl Bile Ducts and Vater)	C24
	Gallbladder	C23
	Liver	C22
	Pancreas	C25
Lung	NSCLC/SCLC	C33-C34
Male genital organs	Prostate/Testis	C61-C62
Melanoma	Melanoma	C43
Mesothelioma	Mesothelioma	C45
Upper GI	Oesophagus	C15
	Small Intestine	C17
	Stomach	C16
Urological	Bladder	C67
	Kidney	C64

Appendix 2 (cont.)

Unknown Primary	Unknown Primary	C80
Other invasive cancers	Anus, Anal Canal	C21
	Spleen, Unspecified, ill-defined digestive tract	C26
	Other lung	C34
	Thymus	C37
	Mediastinum, pleura, heart	C38
	Unspecified respiratory tract	C39
	Bones upper and lower limbs	C40
	Bones and articular cartilage	C41
	Skin	C44
	Kaposi sarcoma	C46
	Peripheral nerves	C47
	Peritoneum, retroperitoneum	C48
	Connective tissue	C49
	Other specified female genital organs	C57
	Placenta	C58
	Penis	C60
	Other specified male genital organs	C63
	Renal pelvis	C65
	Ureter	C66
	Urethra	C68
	Eye	C69
	Adrenal gland	C74
	Parathyroid gland, endocrine gland	C75
	Pelvis, thorax	C76
	Secondary and unspecified lymph nodes	C77
	Secondary respiratory and digestive organs	C78
	Secondary other and unspecified sites	C79
	Other non-follicular lymphoma	C83
	Malignant immunoproliferative disease	C88
	Lymphoid, haematopoietic and related tissue	C96

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Glossary

Comorbidity

A clinical condition that has the potential to significantly affect a cancer patient's prognosis.

Comorbidity is derived from hospital admissions data following the Quan algorithm for classifying ICD-10 coded conditions, modified to exclude metastasis, which is represented by a separate and distinct metastasis dimension.

Comorbidity is limited to conditions coded in any admission episode between 12 months before and 12 months after the date of cancer diagnosis.

For any given cancer diagnosis, comorbidity is restricted to conditions other than the primary cancer. E.g. A rectum cancer can be a comorbidity to a colon cancer diagnosis and vice versa, if they are diagnosed within 12 months of each other.

Benign tumours are not considered comorbidities.

Co-morbidity list:

AIDS	Acute myocardial	Cancer
Cerebrovascular disease	Congestive heart failure	Chronic obstructive pulmonary disease
Dementia	Diabetes	Diabetes + complications
Hemiplegia or Paraplegia	Mild liver disease	Moderate/severe liver disease
Peptic ulcer	Peripheral vascular disease	Renal disease
Rheumatoid disease		

Confidence interval (CI)

The confidence interval represents the probability that a population parameter will fall between two set values. A very wide interval may indicate that more data should be collected before anything very definite can be said about the parameter.

Distant Metastases

Patients are identified as having metastases at diagnosis from their stage at diagnosis as supplied by a number of sources or through subsequent identification of metastases during an admitted hospital episode of care.

Flows

In-flows

In-flows show the distribution of residence for the total group of patients who receive radiation therapy by a treating facility

Out-flows

Out-flows shows the proportion of patients residing in a given HHS who receive radiation therapy in a different HHS.

Forest plots

The forest plot is a graphical display of the results from a regression model, illustrating the hazard ratio (HR) or relative risk (RR) for each covariate included in the regression model. The dot represents the estimate of the HR/RR with the confidence interval of the estimate represented by a horizontal line. A central vertical line representing no effect is also plotted, and if the confidence intervals for an estimate cross this line then the effect is considered not to be statistically significant.

HHS of Residence

Hospital and Health Service of residence is a geographic area defined by a collection of Statistical Areas Level 2 (SA2s) where the patient resides at time of diagnosis. Queensland unknown residence includes addresses reported as overseas, unknown, or not fixed.

Indigenous status

A measure of whether a person identifies as being of Aboriginal or Torres Strait Islander origin.

MDT Review

Cancer patients are discussed by a Multidisciplinary Team (MDT) to ensure all available treatment options are considered.

Median age (years)

The age that divides a population into two halves: one older than the median, the other younger than the median.

Over 75 years

The age that divides this population into over 75 years and under 75 years, it describes Queensland's ageing population.

Private facility

All facilities that are not Queensland Health facilities.

Public facility

Queensland Health facilities.

Radiation therapy

Includes Queensland residents of all ages diagnosed with invasive cancer who received external beam radiotherapy anytime during the course of their disease. For further information on radiation therapy <https://www.targetingcancer.com.au>

Radiation therapy rate (utilisation)

Number of cases who received radiation therapy by invasive cancer diagnosis divided by the number of cases of invasive cancer diagnosed in the specified timeframe.

Remoteness

The relative remoteness of residence at time of diagnosis, derived from the Australian Standard Geographical Classification (ASGC). In this report, remoteness is classified into three groups based on the original ASGC grouping.

ASGC classifications	Modified ASGC classification	Rurality classification
Major City	Metropolitan	Urban
Inner Regional	Regional	Rural
Outer Regional		
Remote	Rural and Remote	
Very Remote		

An exception to this grouping is the metropolitan area of Townsville (originally classified as Rural). Townsville has been classified as Metropolitan because of the availability of tertiary level cancer services.

Sex

Refers to the biological and physiological characteristics that define men and women.

Socioeconomic status

Socioeconomic status is based on the Socio-Economic Indexes for Areas (SEIFA), a census-based measure of social and economic well-being developed by the Australian Bureau of Statistics (ABS) and aggregated at the level of Statistical Local Areas (SLA).

The ABS uses SEIFA scores to rank regions into ten groups or deciles numbered one to ten, with one being the most disadvantaged and ten being the most affluent group. This ranking is useful at the national level, but the number of people in each decile often becomes too small for meaningful comparisons when applied to a subset of the population. For this reason, this document further aggregates SEIFA deciles into 3 socioeconomic groups.

<i>SEIFA Group</i>	<i>Decile</i>	<i>Percentage of population (approximate)</i>
Disadvantaged	1-2	20%
Middle	3-8	60%
Affluent	9-10	20%

T1 Tumours (Breast Cancer)

Breast tumour size in millimetres classified according to 'TNM Classification of Malignant Tumours' 7th edition, UICC International Union Against Cancer.

T1 – Tumour ≤ 2cm in greatest dimension

FOR MORE INFORMATION

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<https://qccat.health.qld.gov.au>

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