



Queensland Health  
Queensland Bowel Cancer  
Screening Program

**Statistical Report**  
August 2006–December 2010

Cancer Screening Services Branch  
Queensland Health  
October 2011

**Toward**   
Tomorrow's Queensland

 **Queensland**  
Government

## Acknowledgments

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**This population screening program has resulted in significant health gains for Queenslanders. The data presented provide clear evidence of the success of the Program in Queensland.**

Queensland was the first state to implement the National Bowel Cancer Screening Program (NBCSP) in August 2006, following the successful Bowel Cancer Screening Pilot Program in Mackay between 2002 and 2004.

The National Bowel Cancer Screening Program (NBCSP) is being phased in, with people turning 55 or 65 years of age initially being offered screening with the Faecal Occult Blood Test (FOBT) between 2006 and 2008. Eligibility was expanded in 2008 to include people turning 50 years of age.

The Australian Government announced in May 2011 that the NBCSP will continue as an ongoing population screening program with the current age cohorts of people turning 50, 55 or 65 years of age being eligible to participate.

Over 200,000 Queenslanders have participated in the Program during its first five years of implementation. While most participants had a negative test result, over 16,000 Queensland participants had a positive FOBT result requiring further investigation, usually by assessment colonoscopy.

The Queensland Bowel Cancer Screening Program, the state component of the NBCSP, established an Authorised Provider Model in

2006 as a means of promoting and coordinating implementation of the Program, and ensuring high quality assessment colonoscopy services are provided for Program participants. This model supports the collection of critical data relating to quality and clinical outcomes for participants that has enabled this report to be produced.

This report demonstrates that this population-based screening program has had a significant impact on reducing the burden of illness caused by bowel cancer. The achievements of the Program thus far are very encouraging in terms of the potential to reduce deaths from bowel cancer.

As we reflect on the achievements of the Queensland Bowel Cancer Screening Program, there remain a number of challenges in the future including increasing participation rates, particularly by men, 50 year olds, and people living in remote/very remote areas so we can maximise outcomes at a population level; and ensuring high quality and timely data collection to monitor Program outcomes.

⋮

**Dr Tony O'Connell**  
Director-General  
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### The Queensland Bowel Cancer Screening Program (QBCSP) established an integrated screening pathway and Authorised Provider Model for the provision of colonoscopy services in the public sector for the National Bowel Cancer Screening Program (NBCSP).

This report provides an overview of participation by Queensland residents in the Program, screening outcomes, and detection of cancer and precancerous adenomas over the period August 2006–December 2010. It also reports on colorectal cancer incidence and mortality in Queensland over the period 1996–2007.

### Participation

Of 464,240 people from Queensland invited to the NBCSP over the period August 2006–December 2010 (excluding those involved in the remediation process in 2009), 186,775 people (40.2%) participated in the Program by returning a completed Faecal Occult Blood Test kit. Participation rates varied across catchment areas, ranging from 36.3% to 50.6%. Men, people in the younger age group (50 years old), and those from remote/very remote regions tended to have lower participation rates. Further analysis indicates that the first four months following the invitation are the critical period for implementing targeted strategies to improve participation.

### Faecal Occult Blood Test Outcomes

A total of 182,434 participants had a valid Faecal Occult Blood Test (FOBT) result. Of these, 14,005 (7.7%) had a positive result. FOBT positivity rates varied across catchment areas (range 7.1–9.0%). Men had higher positivity rates than women (8.9% versus 6.6%,  $P < 0.001$ ). People in the older age group (65 years), living in remote/very remote regions, or from areas with lower socioeconomic status were more likely to have higher positivity rates.

### Colorectal Cancer and Adenoma Detection

There were 4,817 participants who chose to have a colonoscopy undertaken in QBCSP designated facilities (the public sector) following a positive FOBT result. Of those participants, 209 (4.3%) had colorectal cancer detected, 2,311 (48.0%) had an adenoma detected, and 3,072 (63.8%) had a polypectomy to remove polyps. Cancer detection rates varied across catchment areas, ranging from 1.3% to 5.8%, as did adenoma detection rates (range 31.5–55.9%) and polypectomy rates (range 42.3–72.4%).

### Colorectal Cancer Incidence and Mortality

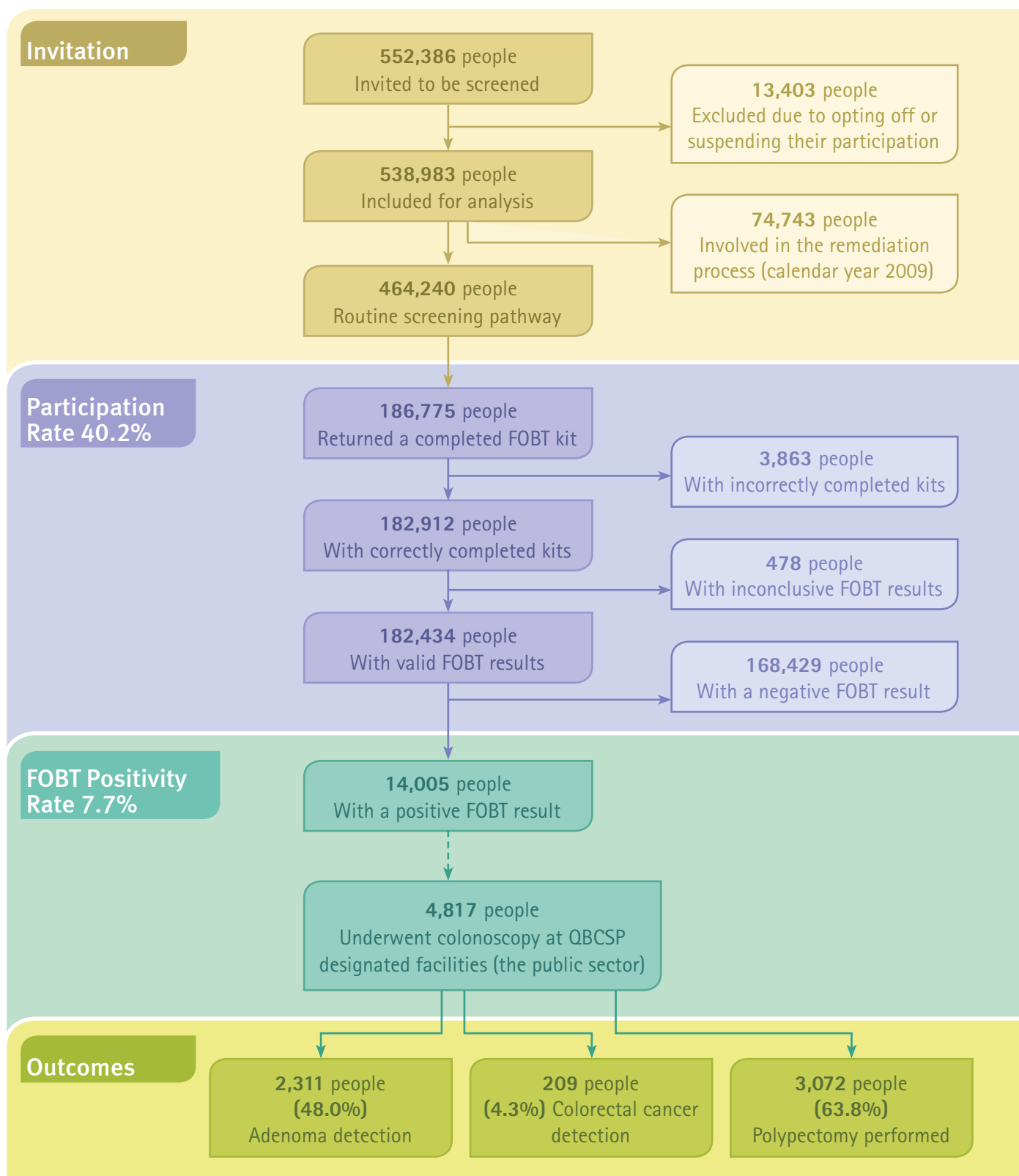
Between 1996 and 2007, there was a slight decrease in colorectal cancer incidence rates in Queensland (from 68.2 per 100,000 to 66.0 per 100,000), and in mortality rates (from 27.4 per 100,000 to 22.9 per 100,000). Males had a higher incidence rate and mortality rate than females. More than 90% of the new colorectal cancer cases and deaths were among people aged 50 years or older.

With continuation and expansion of the Program, there is potential to assess the impact of population-based screening on trends of colorectal cancer incidence and mortality rates in the future.

A summary of the key findings of this report is presented in Figure 1 (over page).

**Figure 1**

Participation in the NBCSP, screening results, and colonoscopy outcomes, Queensland  
(7 August 2006 – 31 December 2010)



The purpose of this report is to highlight the outcomes and achievements of the Queensland Bowel Cancer Screening Program (QBCSP) over the period 2006–10. This report builds on the Quality Assurance (QA) reports that are provided to individual authorised providers and the QBCSP catchments.

### Section One (Chapters 1–2)

**Chapter One** provides context for the epidemiology of bowel cancer and the introduction of the National Bowel Cancer Screening Program (NBCSP), while **Chapter Two** provides an overview of the QBCSP model.

### Section Two (Chapters 3–5)

Section Two of the report includes three chapters which describe participation and screening results for Queensland participants in the NBCSP.

**Chapter Three** provides an analysis of participation by Queensland men and women of different ages (50, 55 or 65 years) in the NBCSP. It compares participation rates by year, QBCSP catchment area, geographic region and socioeconomic status.

**Chapter Four** reports on the positivity rates of the Faecal Occult Blood Test (FOBT), analysing differences by year, gender, age, QBCSP catchment area, geographic region and socioeconomic status.

The final chapter of this Section (**Chapter Five**) is devoted to an analysis of the remediation process which occurred in 2009 following the discovery of a fault in the FOBT kit used between December 2008 and April 2009.

Section Two of the report was based on data derived from the NBCSP Register held by the Department of Health and Ageing. Access to these data was facilitated by a data request to the Department of Health and Ageing in April 2011.

### Section Three (Chapters 6–9)

Section Three of the report includes four chapters which report in detail on the clinical outcomes of assessment colonoscopies performed by Queensland Health in designated facilities as part of the Authorised Provider model. Therefore, these data represent a snapshot of

Queensland participants in the Program who chose to have their assessment colonoscopy in the public sector. It may not be reflective of all Queensland participants. However, it presents for the first time a level of detailed analysis of over 5,000 colonoscopies undertaken for 4,817 Queensland participants in the NBCSP.

**Chapter Six** reports on the number of participants undergoing colonoscopies at QBCSP designated facilities (the public sector), analysed by year, age, gender and QBCSP catchment. The next chapter (**Chapter Seven**) reports on colorectal cancer detection among these participants, again analysed by age, gender and QBCSP catchment.

**Chapters Eight and Nine** report on adenoma detection and polypectomies performed respectively. Both chapters include analysis by year, age, gender and catchment.


Data for Section Three of the report were from the Gastroenterology Nurse Coordinator (GENC) database established by the QBCSP in 2006. The database is maintained by each GENC and reported to the QBCSP each month for monitoring and evaluation purposes.

### Section Four (Chapters 10–11)

Section Four of the report includes two chapters which report on colorectal cancer incidence (**Chapter 10**) and mortality (**Chapter 11**) in Queensland. Data for this section was provided by the Queensland Cancer Control Analysis Team (QCCAT) using the Queensland Oncology Repository (QOR) database.

Data sources, definitions and analytical methods are described in Appendix A.

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A man in a dark blue tank top and black shorts is running on a sandy beach. The background shows the ocean with waves and a sunset sky with a low sun on the horizon. The overall tone is warm and active.

Providing context for the epidemiology of bowel cancer and the introduction of the National Bowel Cancer Screening Program (NBCSP).

An overview of the QBCSP model.

## Section 1

### Background

Bowel cancer, also known as colorectal cancer, is the second most common form of cancer affecting men (after prostate cancer) and women (after breast cancer) in Australia (AIHW 2010).

Australia has one of the highest rates of bowel cancer in the world

One in 18 men and one in 26 women are likely to develop the disease by the age of 75

Most bowel cancers develop slowly from adenomas or polyps, which are benign tumours that develop on the lining of the large intestine (bowel). Most polyps do not cause symptoms and only a small proportion become malignant.

The early detection of precancerous polyps and adenomas is crucial to improving the outcomes for those affected. If a tumour becomes malignant it may spread through the bowel wall to lymph nodes and other areas of the body. Survival rates improve significantly when the disease is detected and treated early.

Australia has one of the highest rates of bowel cancer in the world (Ferlay et al 2010). One in 18 men and one in 26 women in Australia are likely to develop the disease by the age of 75 years (AIHW 2010). This increases to one in 10 men and one in 14 women by 85 years. The risk of developing bowel cancer increases sharply from the age of 50 years with most colorectal cancers (more than 90%) diagnosed among people aged 50 years or older.

Bowel cancer is the third most common cause of cancer death in men (after lung and prostate cancer) and women (after lung and breast cancer) in Australia (AIHW 2010).

Three international randomised controlled trials in Denmark (Kronberg et al 1996), United States (Mandel et al 1993) and United Kingdom (Hardcastle et al 1996) demonstrated that an organised population screening program using Faecal Occult Blood Testing (FOBT) can reduce mortality from bowel cancer by 15–33%.

The non-invasive FOBT aims to detect small amounts of blood in a bowel motion, but does not detect cancer itself. Where a positive result is indicated by the FOBT, further investigation by colonoscopy or other appropriate tests is required to provide a diagnosis and treatment options.

Based on this evidence, the Australian Health Technology Advisory Committee (AHTAC) recommended in 1997 that Australia move towards population screening for bowel cancer using FOBT (AHTAC 1997). This recommendation was further supported in 1999 by the National Health and Medical Research Council's (NHMRC) *Clinical Practice Guidelines for the Prevention, Early Detection and Management of Colorectal Cancer* which recommended biennial (two yearly) FOBT screening for people over 50 years. These guidelines were updated in 2005 (NHMRC 2005). A review of the guidelines relating to surveillance following detection of an adenoma has recently been completed (July 2011), and recommendations have been made to the NHMRC.

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In response to this evidence, the Australian Government conducted the Bowel Cancer Screening Pilot Program (the Pilot) between November 2002 and June 2004 in Mackay (Queensland), and selected postcodes in Adelaide (South Australia) and Melbourne (Victoria) (Australian Government 2005). The aim of the Pilot was to determine if a national program in Australia would be feasible, cost effective and acceptable to the general population. The Pilot targeted men and women aged between 55 and 74 years as at 1 January 2003, and used an immunochemical FOBT followed by assessment colonoscopy for those with a positive result.

The evaluation report for the Bowel Cancer Screening Pilot Program found that screening for bowel cancer by FOBT was acceptable within the target population and effective in improving the rate of early detection of bowel cancer (Australian Government 2005). The report recommended the introduction of a national program using FOBT as the screening test and colonoscopy as the assessment test.

The National Bowel Cancer Screening Program (NBCSP) was announced by the Australian Government in 2005. Funding of \$43 million over three years was provided for a nationally coordinated, population-based bowel cancer screening program. The intention was to phase in the Program gradually to ensure that health services (including general practitioners and colonoscopy and treatment services) were able to meet increased demand.

Provision of assessment colonoscopy services for participants of the NBCSP with a positive FOBT result is via usual care arrangements, following referral by a General Practitioner.

Phase 1 of the NBCSP invited people turning 55 or 65 years of age between 1 May 2006 and 30 June 2008 to be screened. In addition, those who were invited to participate in the Pilot were invited to re-screen.

In April 2008, the Australian Government announced funding of \$87.4 million over three years for Phase 2 of the NBCSP, which extended age eligibility to include all people turning 50, 55 or 65 over the three year period from 1 January 2008 to 31 December 2010. Invitations for Phase 2 commenced on 1 July 2008.

In May 2011, the Australian Government announced the continuation of the NBCSP for people turning 50, 55 or 65 years of age. The NBCSP is now considered an ongoing population screening program.

## Remediation for Faulty FOBT Kits

In May 2009, the Department of Health and Ageing temporarily suspended invitations for a period of six months (May–October 2009) after detecting a lower than expected rate of positive results from a modified FOBT kit, which had been introduced by the manufacturer on 1 December 2008.

Extensive research identified that the serum contained in the collection tubes was different to that of the original kits and was unstable when exposed to higher temperatures (over 30°C), which may have resulted in a number of false negative results.

The kit used prior to December 2008 (in the Pilot, Phase 1 of the NBCSP and the early stages of Phase 2) was deemed a reliable test with no significant variance in positivity rates with varying temperatures in the Australian climate. People who had previously received a positive result were therefore not affected, and their original results were considered to be accurate.

Invitations re-commenced in November 2009, and more than 600,000 people across Australia who had received a faulty FOBT kit were sent a new kit as approved by the Therapeutic Goods Administration (TGA). Priority was given to those who had received a negative result, followed by those with an inconclusive result and those who had received the kit but not yet completed it (non-responders). Invitations to the remaining cohort of people eligible to participate in the Program during Phase 2 were sent by the end of June 2011.

In Queensland, replacement kits were sent to 22,122 people who had completed the faulty kit and had recorded either a negative or inconclusive result. An additional 50,151 Queensland residents who had received but not completed the faulty kit (non-responders), were also sent a replacement kit.

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## Hot Zones

The effect of extreme heat on the completed FOBT kit and the risk of a false negative result is a major issue for Queensland, with many catchments containing areas where the mean daily temperature is over 30°C for many months of the year. This also affects a number of other states and territories.

During the remediation process, the NBCSP identified the affected postcodes and reorganised mailing schedules to ensure FOBT kits were sent outside of the identified 'hot zone' periods. This had the effect of compressing invitations into a shorter time period which had subsequent flow-on effects on the timing of demand for colonoscopy services.

Prior to the remediation, the QBCSP calculated the number of invitations to be sent to each catchment each week and advised the Department of Health and Ageing, and Medicare Australia. This approach resulted in a more consistent demand for colonoscopies at the local level.

Following the remediation process, Queensland has limited control over the number and destination of invitations being sent, which has resulted in inconsistent mailing volumes in individual catchments. The effects of this can be seen in some of the analyses of Section Three which compares colonoscopy activity in different years.

Queensland Health will continue to negotiate with the Department of Health and Ageing for the ability to control NBCSP invitation schedules in order to better manage the demand for colonoscopy services.

As a result of the remediation, the Therapeutic Goods Association has imposed listing conditions for the FOBT kit relating to both temperature exposure of the samples, and the time from sampling to analysis at the laboratory. These conditions aim to maintain the integrity of the FOBT screening process.

As outlined, temperature issues are primarily addressed through not sending out kits to identified hot zones at certain times of the year. Samples received at the pathology laboratory more than 14 days from being taken are processed: a positive result is considered valid; if the result is negative or inconclusive, no result is issued and the participant is sent a replacement FOBT for completion and encouraged to return the samples in a more timely manner.

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#### Queensland was the first state to implement Phase 1 of the NBCSP in August 2006.

The Queensland Bowel Cancer Screening Program (QBCSP) works in partnership with the NBCSP through the provision of assessment colonoscopies or other tests, under an Authorised Provider Model for participants with a positive FOBT result who choose to have their follow up tests in the public sector. The QBCSP also actively promotes bowel cancer awareness and encourages participation in the Program at a state level.

Implementation commenced in the Mackay catchment on 7 August 2006, with the last catchments commencing invitations on 14 May 2007 (Table 2.1). This staggered implementation allowed each catchment time to develop the required infrastructure to support the Program. Figure 2.1 shows boundaries of the catchment areas for the QBCSP.

**Table 2.1**

National Bowel Cancer Screening Program—Queensland catchment invitation commencement schedule

Catchment	Commencement date
Mackay	7 August 2006
Brisbane North	27 November 2006
Brisbane South	27 November 2006
Gold Coast	8 January 2007
Cairns	19 March 2007
Townsville	19 March 2007
West Moreton	2 April 2007
Bundaberg	14 May 2007
Rockhampton	14 May 2007
Sunshine Coast	14 May 2007
Toowoomba	14 May 2007

Queensland Health committed recurrent state funding for the QBCSP from 2006/07 and established a State Coordination Unit in the Cancer Screening Services Branch, which is responsible for:

- planning, developing, implementing and coordinating the Program at a state level
- establishing and supporting the network of Gastroenterology Nurse Coordinators and Health Promotion Officers across the state
- coordinating QBCSP colonoscopy and support services in the public sector
- contributing to the cost of assessment colonoscopies in the public sector
- quality assurance for QBCSP colonoscopy services
- health promotion, education and information provision to GPs, other healthcare providers and the general public
- data collection, performance monitoring and evaluation
- development and implementation of a data collection system for endoscopy services to be used in Queensland Health endoscopy facilities.

The Authorised Provider Model established by Queensland Health aims to ensure an organised and standardised approach to the provision of follow-up services in the public sector for those participants with a positive FOBT result. This is done by identifying and authorising specific proceduralists (authorised providers) and Queensland Health and non-Queensland Health facilities (designated facilities) within each catchment to provide services for the QBCSP.

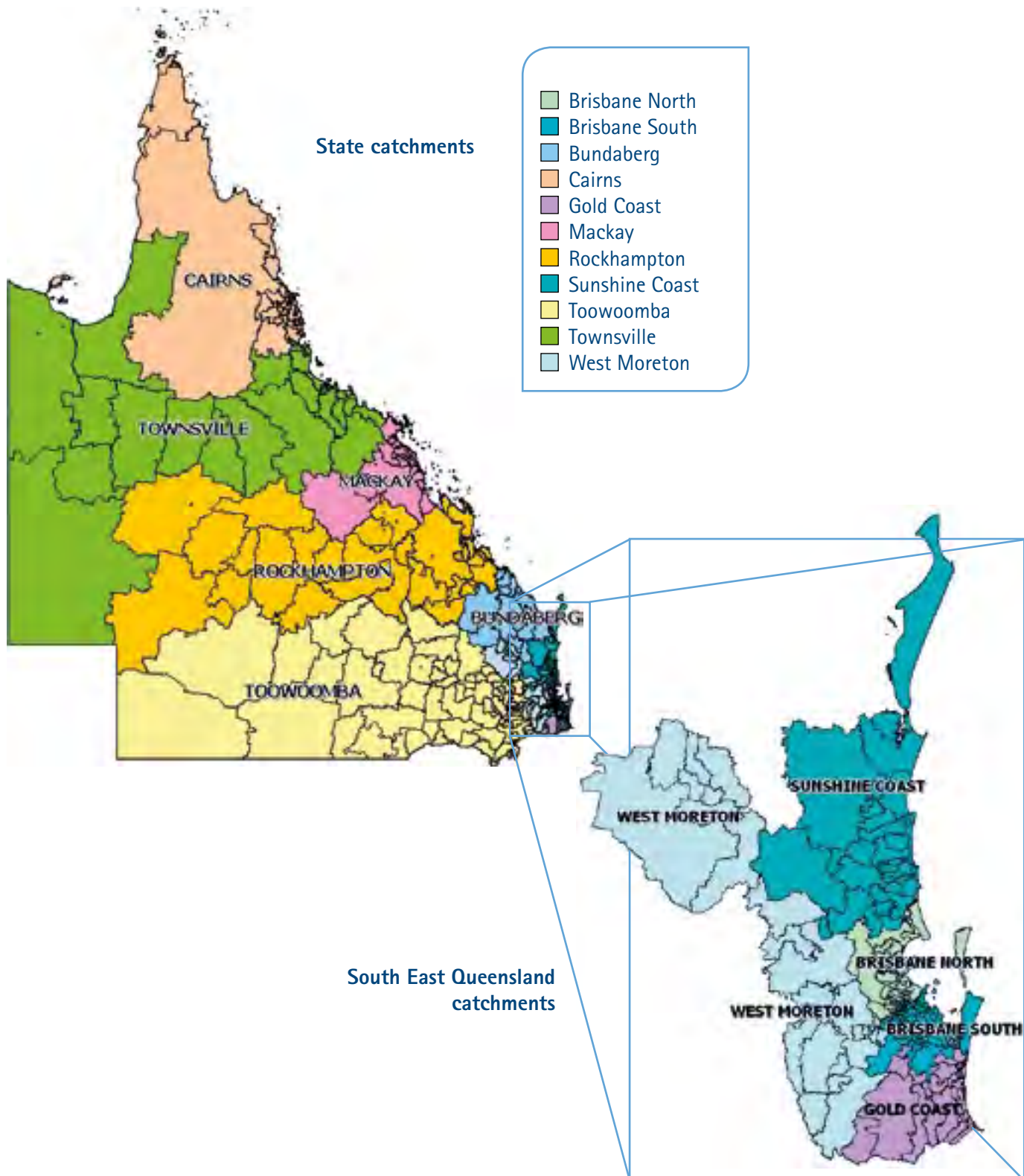
This approach facilitates service coordination within and between catchments, and monitoring and reporting for quality assurance purposes. Implementation of this model has supported the collection of much of the data included in this report, a feature unique to Queensland.

Queensland Health currently has service agreements in place with three private hospitals to provide colonoscopy services for public patients where public sector capacity is limited. This report does not differentiate which designated facilities provided services for Program participants.

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Figure 2.1

Queensland Bowel Cancer Screening Program catchment areas





## Section 2

### Participation and Screening Results—Queensland

This section presents data relating to participation in the NBCSP by Queensland residents between 7 August 2006 and 31 December 2010.

Chapters 3 and 4 report on participation and FOBT positivity respectively, by catchment, year (2006, 2007, 2008, 2010), age, gender, geographic region and socioeconomic status.

Chapter 5 reports on the number of people who received a faulty FOBT kit and the remediation process undertaken. Participation and FOBT positivity rates for this cohort of people were calculated in relation to the initial faulty FOBT kits (December 2008–April 2009) and the subsequent replacement FOBT kits (November 2009–February 2010).

A summary of key results from Chapters 3 and 4 is presented in Table 3. Of 464,240 eligible Queenslanders invited to the Program in 2006, 2007, 2008 and 2010, 40.2% participated by returning a completed FOBT kit. The overall FOBT positivity rate was 7.7%. There was variation in participation rates across catchments, ranging from 36.3% to 50.6%. There was also variation in positivity rates (range 7.1–9.0%).

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**Table 3**

Queenslanders invited to the NBCSP, participation and FOBT positivity  
(7 August 2006–31 December 2010)

Catchment	No. of Queenslanders <sup>#</sup> invited to the NBCSP	Participation rate (%)	FOBT positivity rate (%)
Brisbane North	85,761	40.5%	7.1%*
Brisbane South	94,851	37.7%*	7.2%*
Bundaberg	23,855	45.7%*	9.0%*
Cairns	28,913	38.2%*	7.9%
Gold Coast	57,632	38.1%*	7.8%
Mackay	23,505	50.6%*	8.3%*
Rockhampton	23,380	41.0%	8.4%*
Sunshine Coast	43,311	43.3%*	7.2%*
Toowoomba	30,043	40.9%	8.0%
Townsville	28,694	36.3%*	8.1%
West Moreton	24,295	39.1%*	8.1%
<b>Queensland</b>	<b>464,240</b>	<b>40.2%</b>	<b>7.7%</b>

<sup>#</sup> Excluding 74,743 people who initially received a faulty FOBT kit between December 2008 and April 2009 (see Chapter 5 for details).

\* Indicating a statistically significant difference when compared to the Queensland overall rate.

## Chapter 3

### Participation rates—Queensland

A total of 552,386 eligible Queenslanders were invited to participate in the NBCSP between 7 August 2006 and 31 December 2010 (Figure 1 on page 2).

Of those invited, 13,403 had documentation on the NBCSP Register of opting off or suspending their participation and therefore were excluded from this analysis. With a further exclusion of 74,743 people who initially received a faulty FOBT kit (December 2008–April 2009) and subsequently were involved in the remediation process (May 2009–February 2010), a total of 464,240 people were included for analysis (Table 3.1).

As a result of remediation, for the entire period of 2009, no people were involved in the routine screening process and therefore no data were reported for the year. Data for the 74,743 people involved in the remediation process are presented separately in Chapter 5.

As shown in Table 3.1, Brisbane North, Brisbane South and Gold Coast are the three catchments with the largest eligible population, accounting for half of the total number of people invited to the Program. There was a substantial increase in the number of eligible people being invited to the Program in 2010 when compared with 2008. This is partly due to catch-up invitations being sent in 2010 for eligible people who otherwise would have been invited between May 2009 and February 2010 but whose invitations were postponed because of the remediation process.

Achieving high levels of participation is critically important in population screening programs

**Table 3.1**

Numbers of eligible Queenslanders<sup>#</sup> invited to the NBCSP (invitees)  
(7 August 2006–31 December 2010)

Catchment*	Calendar year					Total	Percent
	2006	2007	2008	2009	2010		
Brisbane North	1,497	21,558	23,855	0	38,851	<b>85,761</b>	<b>18.5%</b>
Brisbane South	1,801	26,654	25,815	0	40,581	<b>94,851</b>	<b>20.4%</b>
Bundaberg	31	5,545	8,557	0	9,722	<b>23,855</b>	<b>5.1%</b>
Cairns	24	5,810	9,238	0	13,841	<b>28,913</b>	<b>6.2%</b>
Gold Coast	89	15,942	16,170	0	25,431	<b>57,632</b>	<b>12.4%</b>
Mackay	1,990	6,723	8,661	0	6,131	<b>23,505</b>	<b>5.1%</b>
Rockhampton	30	4,656	7,840	0	10,854	<b>23,380</b>	<b>5.0%</b>
Sunshine Coast	42	8,898	16,197	0	18,174	<b>43,311</b>	<b>9.3%</b>
Toowoomba	33	6,377	10,673	0	12,960	<b>30,043</b>	<b>6.5%</b>
Townsville	26	5,840	9,108	0	13,720	<b>28,694</b>	<b>6.2%</b>
West Moreton	27	5,468	8,370	0	10,430	<b>24,295</b>	<b>5.2%</b>
<b>Queensland</b>	<b>5,590</b>	<b>113,471</b>	<b>144,484</b>	<b>0</b>	<b>200,695</b>	<b>464,240</b>	<b>100.0%</b>

<sup>#</sup> Excluding 74,743 people who initially received a faulty FOBT kit during December 2008 and April 2009, and were involved in the remediation process between May 2009 and February 2010. Detailed data related to these 74,743 people are presented in Chapter 5.

\* Staggered implementation of the Program with Mackay as the first catchment to commence invitations on 7 August 2006.

Overall, 40.2% of invitees returned a completed FOBT kit (Table 3.2). Participation rates varied across catchments, ranging from 36.3% in Townsville to 50.6% in Mackay (Figure 3.1). Relatively higher participation in the Mackay catchment appears to be reflective of this area being a pilot site for the Program and the continuing high level of community awareness of bowel cancer screening that was generated by the Pilot.

Participation rates have varied across years (Table 3.2). The statewide overall rate dropped slightly from 44.3% in 2007 to 41.8% in 2008, thought to be largely due to the first inclusion of the younger age group (50 year olds) in the Program since July 2008. Calendar year 2010 saw a further decrease in the overall participation rate to 36.6%.

In Table 3.2, crude participation rates were calculated for people invited in each calendar year. Due to a time lag between invitation and completion of an FOBT, calculation

of a crude participation rate for 2010 can lead to an underestimate of the true participation rate. In this report, the individual progression of participants through the screening pathway was analysed up to 31 March 2011. People invited during the last three months of 2010 might not have sufficient time to return their completed kits by 31 March 2011 when the data extraction for this report was undertaken.

The Kaplan-Meier method calculates an estimated participation rate based on the time each individual takes from being invited to returning a completed FOBT (see Appendix A for details). This enables the calculation of a participation rate over time from the date of invitation. The Implementation Advisory Group of the NBCSP had endorsed the use of the Kaplan-Meier method as a valid estimate of participation.

**Table 3.2**

Crude participation rates (in the NBCSP) by catchment, Queensland  
(7 August 2006–31 December 2010)

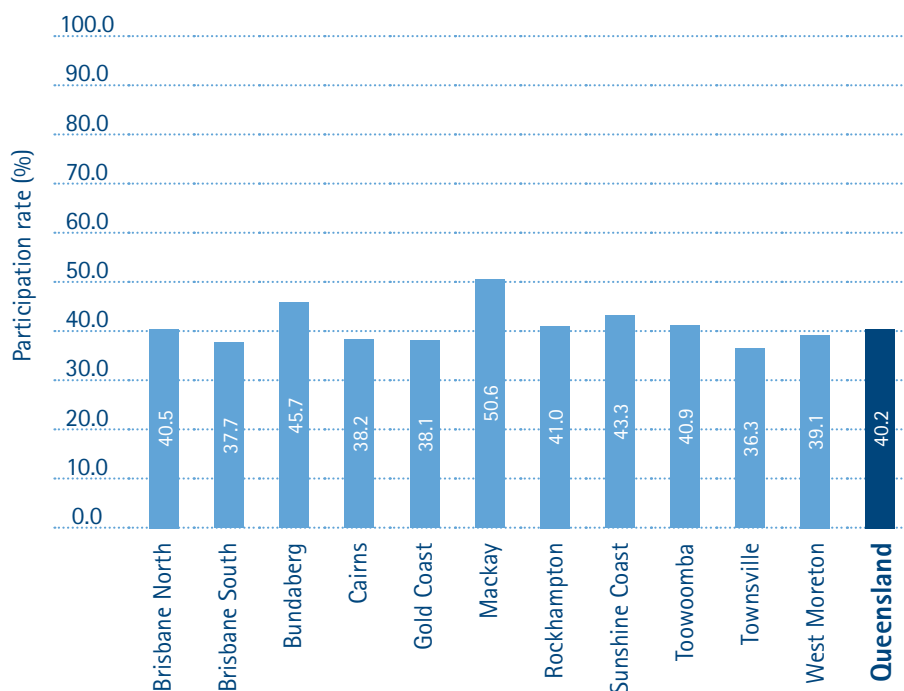
Catchment	2006	2007	2008	2009	2010	Total	
	Participation rate (%)					n	Rate (%)*
Brisbane North	44.6%	44.0%	41.7%	-	37.6%	34,689	40.5%
Brisbane South	41.1%	41.2%	39.2%	-	34.4%	35,778	37.7%*
Bundaberg	41.9%	49.7%	46.8%	-	42.4%	10,889	45.7%*
Cairns	45.8%	43.1%	40.3%	-	34.6%	11,037	38.2%*
Gold Coast	44.9%	42.0%	38.7%	-	35.2%	21,955	38.1%*
Mackay	63.0%	61.4%	47.5%	-	39.2%	11,900	50.6%*
Rockhampton	43.3%	44.8%	43.0%	-	37.8%	9,576	41.0%
Sunshine Coast	35.7%	47.9%	44.6%	-	39.9%	18,755	43.3%*
Toowoomba	48.5%	42.6%	43.8%	-	37.8%	12,299	40.9%
Townsville	46.2%	40.0%	38.3%	-	33.3%	10,404	36.3%*
West Moreton	51.9%	42.9%	40.9%	-	35.6%	9,493	39.1%*
Queensland n	2,796	50,283	60,336	-	73,360	186,775	40.2%
Rate*	50.0%*	44.3%*	41.8%*	-	36.6%*		

n: the number of eligible invitees who returned a completed FOBT kit—the numerator used for calculation of the crude participation rate.

\* Indicating a statistically significant difference when compared to the overall rate of 40.2%.

Figure 3.1

Variation in crude participation rates across 11 catchments, Queensland  
(7 August 2006–31 December 2010)



Kaplan-Meier estimated participation rates for each year, at a specific point in time (weeks since invitation), are presented in Table 3.3. For individuals invited in 2010, the estimated participation rate at 52 weeks since invitation was 37.0%, which is similar to the crude participation rate of 36.6% (Table 3.2) where participants were followed up until 31 March 2011. Moreover, Kaplan-Meier estimated participation rates for 2006, 2007 and 2008 are also consistent with the corresponding crude participation rates. For example, for those invited in 2006 (commenced on 7 August), by 31 March 2011 (roughly 4.5 years later) the crude participation was 50.0%, which is nearly identical to the Kaplan-Meier estimated rate of 50.1% at 234 weeks (4.5 years) since invitation.

The results from the Kaplan-Meier estimates confirm that following up of participants until 31 March 2011 has not led to a significant underestimate of participation when reporting the crude participation rates. Therefore, for simplicity of data presentation and interpretation, crude participation rates were calculated and used throughout this report.

Overall participation rates (2006–10 data combined) since invitation by weeks (up to 52 weeks), based on Kaplan-Meier estimates, are illustrated in Figure 3.2. There was a sharp increase in participation rates between weeks 10 and 12, an apparent effect of reminder letters sent by the NBCSP Register in week eight if there is no recorded response to the initial invitation. After week 16, the participation rates appeared to reach a plateau, characterised by a slight increase from 37.9% at week 16 to 40.0% at week 52.

This particular pattern of participation indicates that the first four months following the initial invitation are the critical period for people to decide to participate. Public health and health promotion efforts to improve participation in the NBCSP should tap into this window of opportunity

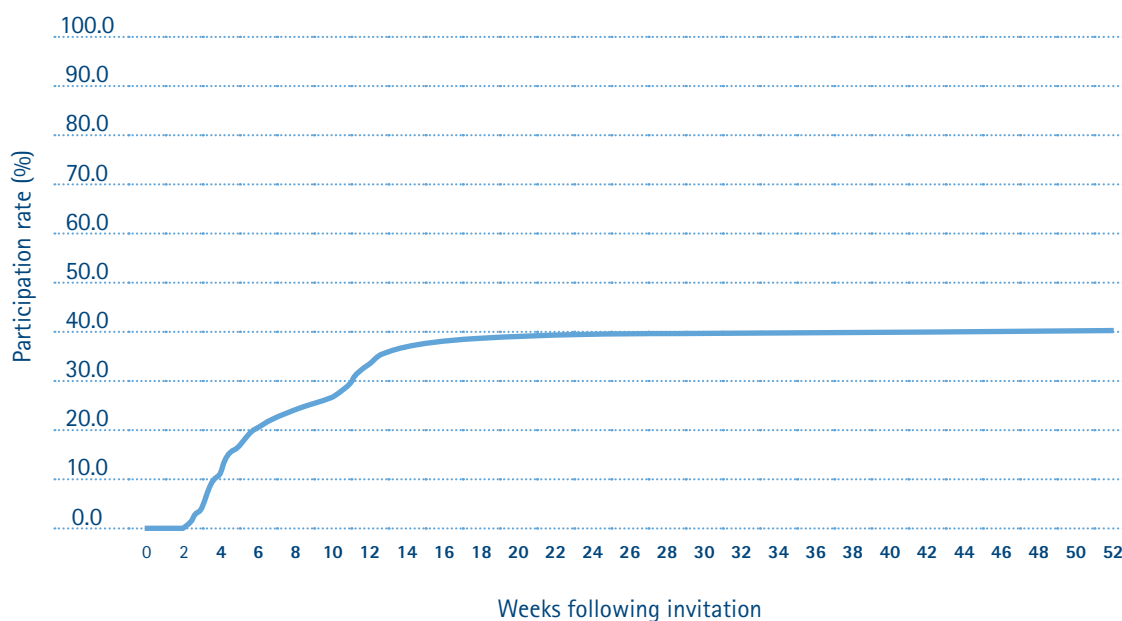
**Table 3.3**

Kaplan-Meier estimated participation rates (in the NBCSP), by weeks since invitation, Queensland  
(7 August 2006-31 December 2010)

	2006	2007	2008	2009	2010	Total
	Participation rate (%) [95% CI]					
26 weeks (0.5 year)	47.2% [ 45.9 – 48.5% ]	42.3% [ 42.0 – 42.6% ]	40.8% [ 40.5 – 41.0% ]	-	36.4% [ 36.2 – 36.6% ]	<b>39.3%</b> [ 39.2 – 39.5% ]
52 weeks (1 year)	47.7% [ 46.4 – 49.1% ]	43.5% [ 43.2 – 43.8% ]	41.2% [ 40.9 – 41.4% ]	-	37.0% [ 36.8 – 37.2% ]	<b>40.0%</b> [ 39.9 – 40.2% ]
104 weeks (2 years)	49.7% [ 48.4 – 51.1% ]	44.2% [ 44.0 – 44.5% ]	41.5% [ 41.2 – 41.7% ]	-	-	<b>40.6%</b> [ 40.4 – 40.7% ]
156 weeks (3 years)	49.8% [ 48.5 – 51.1% ]	44.3% [ 44.0 – 44.6% ]	41.8% [ 41.5 – 42.0% ]	-	-	<b>40.8%</b> [ 40.6 – 40.9% ]
208 weeks (4 years)	49.9% [ 48.6 – 51.3% ]	44.3% [ 44.0 – 44.6% ]	-	-	-	<b>40.8%</b> [ 40.7 – 41.0% ]
234 weeks (4.5 years)	50.1% [ 48.8 – 51.4% ]	-	-	-	-	<b>41.0%</b> [ 40.7 – 41.2% ]

**Figure 3.2**

Kaplan-Meier estimated participation rates in the NBCSP, by weeks since invitation, Queensland  
(7 August 2006-31 December 2010)



Females had higher participation rates overall than males (43.2% versus 37.3%,  $P < 0.001$ ) (Table 3.4). Older people were more likely to participate in the Program than the younger groups, with participation rates increasing from 32.1% among 50 year olds to 48.2% among 65 year olds.

Adjustment for differences in age and gender did not alter differences in participation rates across catchments as presented in Table 3.2.

**Table 3.4**

Crude participation rates (in the NBCSP) by age and gender, Queensland  
(7 August 2006–31 December 2010)

Age group	2006		2007		2008		2009		2010		Total		
	n	Rate (%)	n	Rate (%)	n	Rate (%)	n	Rate (%)	n	Rate (%)	n	Rate (%) <sup>#</sup>	
Males	50 years	-	-	-	-	6,463	33.5%	0	-	11,239	28.1%	17,702	29.9%
	55 years	404	36.6%	11,718	35.9%	11,191	36.3%	0	-	11,439	32.6%	34,752	34.9%
	65 years	399	48.5%	10,239	46.0%	9,759	46.1%	0	-	11,607	44.8%	32,004	45.6%
	Others*	510	60.5%	1,529	61.4%	615	47.9%	0	-	61	37.9%	2,715	56.8%
	Total	1,313	47.4%	23,486	40.9%	28,028	38.6%	0	-	34,346	34.0%	87,173	37.3%
Females	50 years	-	-	-	-	7,538	38.4%	0	-	12,871	32.3%	20,409	34.3%
	55 years	524	44.4%	14,281	44.4%	13,571	44.5%	0	-	13,855	39.4%	42,231	42.7%
	65 years	443	52.7%	10,909	51.1%	10,575	51.7%	0	-	12,220	50.0%	34,147	50.9%
	Others*	516	64.5%	1,607	62.4%	624	48.0%	0	-	68	38.4%	2,815	58.0%
	Total	1,483	52.6%	26,797	47.8%	32,308	44.9%	0	-	39,014	39.2%	99,602	43.2%
Persons	50 years	-	-	-	-	14,001	36.0%	0	-	24,110	30.2%	38,111	32.1%
	55 years	928	40.6%	25,999	40.1%	24,762	40.4%	0	-	25,294	36.0%	76,983	38.8%
	65 years	842	50.6%	21,148	48.5%	20,334	48.8%	0	-	23,827	47.3%	66,151	48.2%
	Others*	1,026	62.5%	3,136	61.9%	1,239	47.9%	0	-	129	38.2%	5,530	57.4%
	Total	2,796	50.0%	50,283	44.3%	60,336	41.8%	0	-	73,360	36.6%	186,775	40.2%

n: The number of invitees who returned a completed FOBT kit—the numerator for calculation of the participation rate.

\* Mainly including those from the pilot program in Mackay who were offered re-screening during phase 1 and those who were part of the Indigenous pilot project, where age eligibility was people aged 50 years or older.

# P for comparison: males 37.3% versus females 43.2% ( $P < 0.001$ ); 55 years 38.8% versus 50 years 32.1% ( $P < 0.001$ ); 65 years 48.2% versus 50 years 32.1% ( $P < 0.001$ ).



**Table 3.5**

Crude participation rates (in the NBCSP) by geographic region, Queensland  
(7 August 2006–31 December 2010)

Geographic region <sup>^</sup>	2006	2007	2008	2009	2010	Total	
	Participation rate (%)					n	Rate*
Major cities	42.5%	42.1%	39.8%	-	35.5%	89,405	38.5%
Inner regional	46.3%	46.2%	44.2%	-	39.1%	54,386	42.5%*
Outer regional	62.2%	48.8%	43.3%	-	36.7%	39,031	42.2%*
Remote	57.1%	39.0%	36.0%	-	33.9%	2,430	35.6%*
Very remote	33.3%	34.8%	35.5%	-	27.3%	1,523	31.3%*
Queensland	50.0%	44.3%	41.8%	-	36.6%	186,775	40.2%

n: the number of invitees who returned a completed FOBT kit—the numerator for calculation of the participation rate.

<sup>^</sup> Geographic regions are classified based on the Australian Bureau of Statistics (ABS) Australian Standard Geographic Classification Remoteness Structure (see Appendix A for details).

\* Indicating a statistically significant difference when compared to the rate for major cities (38.5%).

As shown in Table 3.5, grouped by geographic region, participation rates were highest among people from inner/outer regional areas (42.2–42.5%), followed by those from major cities (38.5%) and remote areas (35.6%). The lowest participation rate (31.3%) was among people in very remote areas. Inner/outer regional areas in Queensland include locations such as Bundaberg and Sunshine Coast.

Participation rates for invitees are presented by population-based socioeconomic status quintiles (Table 3.6). Overall, participation rates were consistent across these groups. Invitees from the mid-range socioeconomic status group (quintile 3) tended to have a statistically significantly higher participation rate than other groups.

⋮

**Table 3.6**

Crude participation rates (in the NBCSP) by socioeconomic status, Queensland  
(7 August 2006–31 December 2010)

Socioeconomic status <sup>^</sup>	2006	2007	2008	2009	2010	Total	
	Participation rate (%)					n	Rate*
(lowest) Quintile 1	39.5%	44.5%	41.9%	-	36.8%	38,399	40.3%
Quintile 2	52.0%	44.2%	42.7%	-	36.6%	36,673	40.5%
Quintile 3	57.6%	47.0%	42.4%	-	36.7%	41,379	41.5%*
Quintile 4	43.9%	43.3%	41.1%	-	36.3%	35,769	39.6%*
(highest) Quintile 5	45.4%	42.5%	40.4%	-	36.4%	34,555	39.2%*
Queensland	50.0%	44.3%	41.8%	-	36.6%	186,775	40.2%

n: the number of invitees who returned a completed FOBT kit—the numerator for calculation of the participation rate.

<sup>^</sup> Socioeconomic status is measured using the ABS Index of Relative Socioeconomic Disadvantage (IRSD) (see Appendix A for details). Quintile 1 represents the most disadvantaged 20% of the population, and quintile 5 the least disadvantaged 20%.

\* Indicating a statistically significant difference when compared to the rate for quintile 1 (40.3%).

## Chapter 4

### Faecal Occult Blood Test positivity rates—Queensland

FOBT positivity is calculated for invitees who returned a completed FOBT kit and had a valid result (positive or negative) reported by the pathology laboratory.

As illustrated in Figure 1 (on page 2), of the 464,240 invitees included for analysis (excluding calendar year 2009), 186,775 returned a completed FOBT kit, and of these, 182,434 (97.7%) had a valid FOBT result.

This chapter describes the FOBT results of these 182,434 participants. A detailed breakdown on numbers of these participants by catchment and by year is presented in Table 4.1.

**Table 4.1**

Numbers of NBCSP invitees who returned a completed FOBT kit with valid results<sup>#</sup>, Queensland (7 August 2006–31 December 2010)

Catchment*	Calendar year					Total	Percent
	2006	2007	2008	2009	2010		
Brisbane North	655	9,203	9,791	-	14,316	33,965	18.6%
Brisbane South	717	10,585	9,883	-	13,687	34,872	19.1%
Bundaberg	13	2,685	3,924	-	4,051	10,673	5.9%
Cairns	11	2,420	3,631	-	4,653	10,715	5.9%
Gold Coast	38	6,465	6,140	-	8,780	21,423	11.7%
Mackay	1,224	3,992	4,040	-	2,356	11,612	6.4%
Rockhampton	12	2,007	3,312	-	3,987	9,318	5.1%
Sunshine Coast	15	4,148	7,106	-	7,125	18,394	10.1%
Toowoomba	15	2,635	4,597	-	4,796	12,043	6.6%
Townsville	12	2,251	3,414	-	4,473	10,150	5.6%
West Moreton	14	2,270	3,355	-	3,630	9,269	5.1%
Queensland	2,726	48,661	59,193	-	71,854	182,434	100.0%

# A valid FOBT result was either positive or negative; inconclusive results were excluded.

\* Staggered implementation of the Program with Mackay as the first catchment to commence invitations on 7 August 2006.

Of invitees who returned  
a completed kit

7.7%  
had a positive  
FOBT result

As shown in Table 4.2, 14,005 people (7.7% of participants) had a positive FOBT result. Positivity rates varied across catchments, ranging from 7.1% in Brisbane North to 9.0% in Bundaberg (Figure 4.1). There was fluctuation in positivity rates over time, with a range between 5.8% in 2006 and 8.4% in 2010. It is unclear whether the impact of changed temperature and time control conditions imposed by the TGA in late 2009 following the remediation process is a factor in the higher positivity rate in 2010.

**Table 4.2**

**FOBT positivity rates (in the NBCSP) by catchment, Queensland**  
(7 August 2006–31 December 2010)

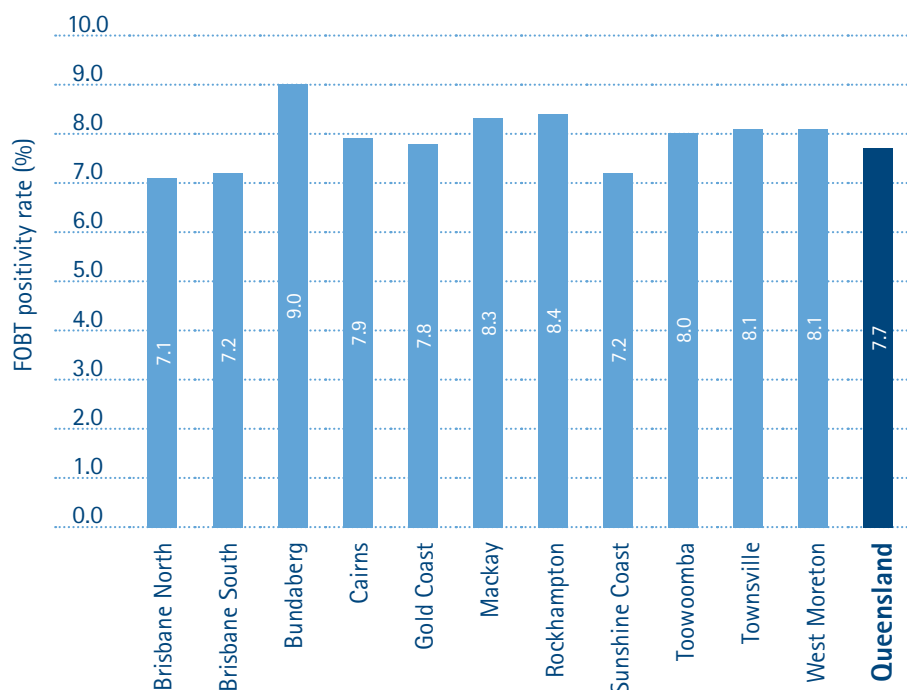
Catchment	2006	2007	2008	2009	2010	Total n	Total Rate*
	FOBT positivity rate (%)						
Brisbane North	5.8%	7.3%	6.0%	-	7.9%	2,426	7.1%*
Brisbane South	3.9%	7.5%	6.1%	-	8.0%	2,513	7.2%*
Bundaberg	7.7%	9.7%	7.2%	-	10.2%	956	9.0%*
Cairns	0.0%	8.3%	6.9%	-	8.5%	842	7.9%
Gold Coast	7.9%	7.7%	6.6%	-	8.6%	1,660	7.8%
Mackay	6.5%	9.9%	7.0%	-	8.9%	966	8.3%*
Rockhampton	25.0%	8.2%	7.1%	-	9.4%	779	8.4%*
Sunshine Coast	6.7%	8.3%	6.2%	-	7.6%	1,325	7.2%*
Toowoomba	6.7%	8.8%	6.8%	-	8.8%	968	8.0%
Townsville	8.3%	8.8%	6.5%	-	8.9%	820	8.1%
West Moreton	7.1%	8.9%	7.0%	-	8.6%	750	8.1%
<b>Queensland n</b>	<b>157</b>	<b>3,955</b>	<b>3,852</b>	<b>-</b>	<b>6,041</b>	<b>14,005</b>	<b>7.7%</b>
<b>Rate*</b>	<b>5.8%*</b>	<b>8.1%*</b>	<b>6.5%*</b>	<b>-</b>	<b>8.4%*</b>		

n: the number of invitees who returned a correctly completed FOBT kit with positive results – the numerator for calculation of the positivity rate.

\* Indicating a statistically significant difference when compared to the overall rate of 7.7 %.

**Figure 4.1**

**Variation in FOBT positivity rates (in the NBCSP) across catchments, Queensland**  
(7 August 2006–31 December 2010)



Males had higher FOBT positivity rates than females (8.9% versus 6.6%,  $P < 0.001$ ) (Table 4.3). FOBT positivity rates increased with increasing age, rising from 6.3% in 50 year olds to 6.9% in 55 year olds, and peaking at 9.3% for 65 year olds.

Table 4.4 shows FOBT positivity rates for five geographic regions (major cities, inner regional, outer regional, remote and very remote). With an increase in the remoteness index from major cities to very remote regions, there was a gradual increase in FOBT positivity rates from 7.3% to 9.0%. This demonstrates a clear association between remoteness and FOBT positivity rates.

**Table 4.3**

FOBT positivity rates (in the NBCSP) by age and gender, Queensland  
(7 August 2006–31 December 2010)

Age group	2006		2007		2008		2009		2010		Total		
	n	Rate (%)	n	Rate (%)	n	Rate (%)	n	Rate (%)	n	Rate (%)	n	Rate* (%)	
Males	50 years	-	-	-	-	400	6.3%	-	-	808	7.3%	1,208	7.0%
	55 years	19	4.8%	935	8.2%	756	6.9%	-	-	1,022	9.1%	2,732	8.0%
	65 years	30	7.7%	1,140	11.4%	883	9.2%	-	-	1,339	11.8%	3,392	10.8%
	Others	33	6.6%	193	13.0%	56	9.4%	-	-	8	13.6%	290	11.0%
	Total	82	6.4%	2,268	9.9%	2,095	7.6%	-	-	3,177	9.5%	7,622	8.9%
Females	50 years	-	-	-	-	334	4.5%	-	-	816	6.5%	1,150	5.8%
	55 years	21	4.1%	770	5.6%	674	5.1%	-	-	955	7.0%	2,420	5.9%
	65 years	21	4.9%	789	7.5%	703	6.8%	-	-	1,088	9.1%	2,601	7.8%
	Others	33	6.6%	128	8.3%	46	7.6%	-	-	5	7.8%	212	7.8%
	Total	75	5.2%	1,687	6.5%	1,757	5.6%	-	-	2,864	7.5%	6,383	6.6%
Persons	50 years	-	-	-	-	734	5.4%	-	-	1,624	6.9%	2,358	6.3%
	55 years	40	4.4%	1,705	6.8%	1,430	5.9%	-	-	1,977	8.0%	5,152	6.9%
	65 years	51	6.2%	1,929	9.4%	1,586	8.0%	-	-	2,427	10.4%	5,993	9.3%
	Others	66	6.6%	321	10.6%	102	8.5%	-	-	13	10.6%	502	9.4%
	Total	157	5.8%	3,955	8.1%	3,852	6.5%	-	-	6,041	8.4%	14,005	7.7%

n: the number of invitees who returned a correctly completed FOBT kit with positive results—the numerator for calculation of the positivity rate.

\* P for comparison: males 8.9% versus females 6.6% ( $P < 0.001$ ); 55 years 6.9% versus 50 years 6.3% ( $p = 0.001$ ); 65 years 9.3% versus 50 years 6.3% ( $P < 0.001$ ).

**Table 4.4**

FOBT positivity rates (in the NBCSP) by geographic region, Queensland  
(7 August 2006–31 December 2010)

Geographic region <sup>^</sup>	2006	2007	2008	2009	2010	Total n	Rate*
	Positivity rate (%)						
Major cities	5.1%	7.5%	6.2%	-	8.0%	6,347	7.3%
Inner regional	4.9%	8.6%	6.6%	-	8.7%	4,193	7.9%*
Outer regional	6.6%	9.2%	7.0%	-	8.9%	3,130	8.2%*
Remote	0.0%	9.6%	6.0%	-	10.2%	204	8.6%*
Very remote	0.0%	7.1%	7.7%	-	10.8%	131	9.0%*
Queensland	5.8%	8.1%	6.5%	-	8.4%	14,005	7.7%

n: the number of invitees who returned a correctly completed FOBT kit with positive results—the numerator for calculation of the positivity rate.

<sup>^</sup> Geographic regions are classified based on the Australian Bureau of Statistics (ABS) Australian Standard Geographic Classification Remoteness Structure (see Appendix A for details).

\* Indicating a statistically significant difference when compared to the rate for major cities (7.3%).

Participants are grouped by population-based socioeconomic status quintiles (Table 4.5). With an increase in participants' socioeconomic status from quintile 1 to quintile 5, there was a gradual decrease in FOBT positivity rates from 8.4% to 6.8%, showing a reverse relationship between socioeconomic status and positivity rates.

⋮

**Table 4.5**

FOBT positivity rates (in the NBCSP) by socioeconomic status, Queensland  
(7 August 2006–31 December 2010)

Socioeconomic status <sup>^</sup>	2006	2007	2008	2009	2010	Total n	Rate*
	Positivity rate (%)						
(lowest) Quintile 1	8.5%	9.3%	6.9%	-	9.2%	3,159	8.4%
Quintile 2	4.8%	8.6%	7.0%	-	9.1%	2,932	8.2%
Quintile 3	6.2%	8.2%	6.7%	-	8.4%	3,122	7.7%*
Quintile 4	5.5%	7.6%	6.1%	-	7.8%	2,509	7.2%*
(highest) Quintile 5	4.6%	6.9%	5.6%	-	7.5%	2,283	6.8%*
Queensland	5.8%	8.1%	6.5%	-	8.4%	14,005	7.7%

n: the number of invitees who returned a correctly completed FOBT kit with positive results—the numerator for calculation of the positivity rate.

<sup>^</sup> Socioeconomic status is measured using the ABS Index of Relative Socioeconomic Disadvantage (IRSD) (see Appendix A for details). Quintile 1 represents the most disadvantaged 20% of the population, and quintile 5 the least disadvantaged 20%.

\* Indicating a statistically significant difference when compared to the rate for quintile 1 (8.4%).

#### Key time periods relating to the faulty kits and the remediation process instituted by the Department of Health and Ageing include:

- **December 2008–April 2009:** people eligible for the NBCSP received faulty FOBT kits
- **May 2009–October 2009:** suspension of the Program with no FOBT kits sent out
- **November 2009–February 2010:** implementation of the remediation process. Replacement FOBT kits were sent to people affected by the faulty FOBT kits, with first priority being given to those participants who received a negative result from the faulty kit.



As shown in Figure 5.1, a total of 74,743 Queenslanders received a faulty FOBT kit during the period December 2008–April 2009. With exclusion of 1,807 people who opted off or suspended their participation, the remaining 72,936 people were included for analysis in this Chapter.

Initially 22,785 people (31.2% of invitees) participated in the Program by returning the faulty FOBT kit (Figure 5.1). The positivity rate for the faulty FOBT was 3.0%, which is statistically significantly lower than the FOBT positivity rate (6.5%, Table 4.2) reported in 2008 when there were no faulty FOBT kits involved ( $P < 0.0001$ ).

Of these initial participants, 663 had a positive result based on laboratory analysis of the faulty FOBT kits. These positive results were considered as valid, and those participants continued through the routine screening pathway with no requirement for rescreening.

During the remediation process, replacement FOBT kits were mailed out to invitees affected by the faulty kits. Priority order for issuing replacement FOBT kits was as follows:

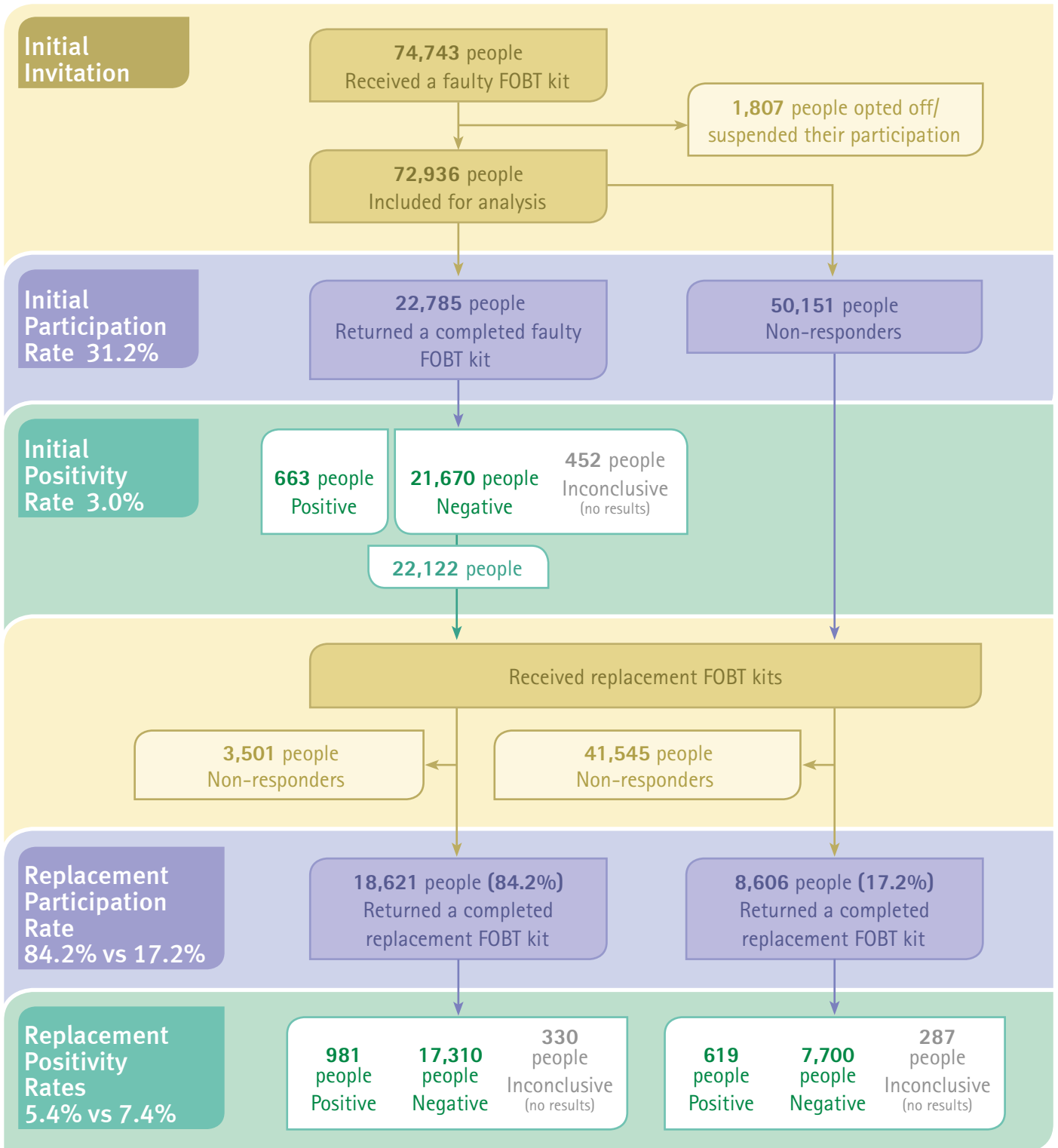
- **Priority 1:** initial participants with a negative result based on the faulty kit (21,670 people)
- **Priority 2:** initial participants with an inconclusive or no result based on the faulty kit (452 people)
- **Priority 3:** non-responders in relation to the invitation package containing a faulty kit (50,151 people).


A total of 22,122 people fell into priority 1 and 2 groups (Figure 5.1). After receiving a replacement FOBT kit, 84.2% of people returned a completed replacement kit. This reflects the effectiveness of implementing a dedicated remediation process to mitigate and minimise the adverse impact of the faulty FOBT kit on people in the NBCSP. The replacement FOBT positivity rate among these people was 5.4%. When considering the initial positivity rate of 3.0% (based on faulty kits), an overall positivity rate of roughly 8.4% was achieved for this cohort, which is relatively higher than the overall positivity rate of 7.7% (see Table 4.2) among participants not affected by the faulty kits.

For the non-responders to the initial faulty kit, the participation rate in relation to the replacement FOBT kits was 17.2%. The opportunity to successfully offer screening to an additional 17.0% of participants who were previously non-responders was one of the successful outcomes of the remediation process. The FOBT positivity rate among this group was 7.4%. ❖❖❖

Figure 5.1

Faulty FOBT kits, remediation, and screening outcomes, Queensland





## Section 3

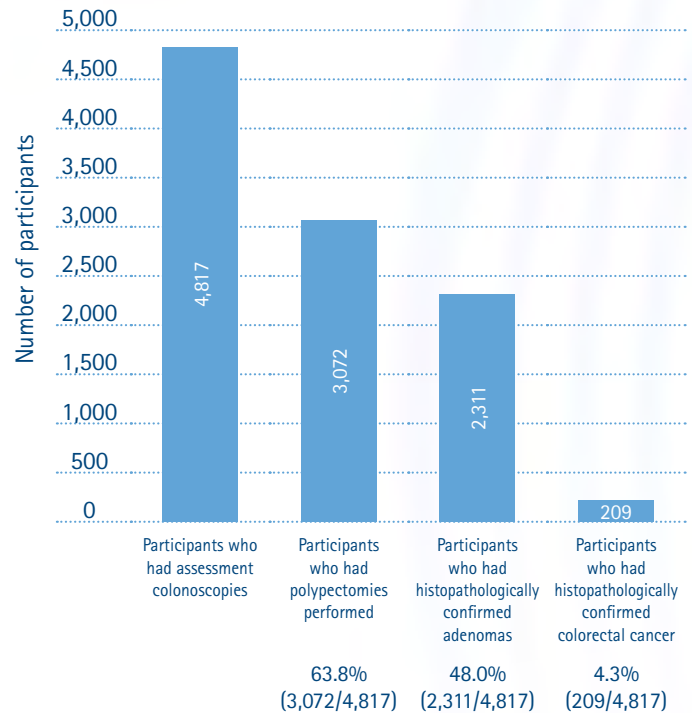
### Assessment Colonoscopies and Outcomes for Participants in the Program—Public Sector

This section reports on the clinical outcomes of 4,817 QBCSP participants who underwent assessment colonoscopies at designated facilities for the Program (through the public sector) following a positive FOBT result.

The timeframe for reporting is between 7 August 2006 and 31 December 2010. The source of data is the QBCSP Gastroenterology Nurse Coordinator (GENC) database which collects data from participants undergoing colonoscopy as part of the Authorised Provider model (see Appendix A for details).

**Figure 6**

Assessment colonoscopies, polypectomies, and adenoma and colorectal cancer detection at designated facilities, QBCSP (7 August 2006–31 December 2010)



Key outcomes are as follows (Figure 6):

- 63.8% (3,072) of those undergoing colonoscopy had polypectomies performed.
- 48.0% (2,311) had histopathologically confirmed adenomas.
- 4.3% (209) had histopathologically confirmed colorectal cancer.

Table 6 provides further details for each catchment regarding assessment colonoscopies, polypectomies performed, and adenoma/colorectal cancer detection.

The key outcome measures varied between catchments. For example, colorectal cancer detection rates ranged from 1.3% (in West Moreton) to 5.8% (in Gold Coast).

⋮

**Table 6**

Assessment colonoscopies, polypectomies, and adenoma and colorectal cancer detection among participants at designated facilities, QBCSP (7 August 2006–31 December 2010)

Catchment	Colonoscopies		Polypectomies		Adenomas		Colorectal cancer	
	N		N	Rate (%)	N	Rate (%)	N	Rate (%)
Brisbane North	636		437	(68.7%)*	339	(53.3%)*	27	(4.3%)
Brisbane South	887		552	(62.2%)	412	(46.5%)	33	(3.7%)
Bundaberg	542		315	(58.1%)*	234	(43.2%)*	20	(3.7%)
Cairns	390		256	(65.6%)	193	(49.5%)	21	(5.4%)
Gold Coast	398		272	(68.3%)	186	(46.7%)	23	(5.8%)
Mackay	357		247	(69.2%)*	182	(51.0%)	15	(4.2%)
Rockhampton	213		90	(42.3%)*	67	(31.5%)*	10	(4.7%)
Sunshine Coast	453		299	(66.0%)	228	(50.3%)	26	(5.7%)
Toowoomba	374		235	(62.8%)	185	(49.5%)	18	(4.8%)
Townsville	333		241	(72.4%)*	186	(55.9%)	13	(3.9%)
West Moreton	234		128	(54.7%)*	99	(42.3%)	3	(1.3%)*
<b>Queensland</b>	<b>4,817</b>		<b>3,072</b>	<b>(63.8%)</b>	<b>2,311</b>	<b>(48.0%)</b>	<b>209</b>	<b>(4.3%)</b>

N: refers to the number of participants.

\* Indicating a statistically significant difference when compared to the Qld overall rate.

## Chapter 6

### Assessment colonoscopies performed at designated facilities for the Program—public sector

As reported in Chapter 4 (Table 4.2), 14,005 participants had a positive FOBT result. Chapter 5 (Figure 5.1) shows an additional 2,263 participants involved in the remediation process had a positive FOBT.

In total, 16,268 Queensland participants with a positive FOBT would proceed to see their GP and be referred for colonoscopy assessment as appropriate.

The QBCSP maintains a Gastroenterology Nurse Coordinator (GENC) database which collects information on all colonoscopies undertaken by Queensland Health at designated facilities for participants of the Program who choose to have their follow up colonoscopies in the public sector. The GENC database documented a total of 4,817 participants who had colonoscopies in the public sector following a positive FOBT result. Less data are available for participants who decide to have a colonoscopy in the private sector due to incomplete data on the NBCSP Register (see Appendix A for details).

The colonoscopy data from the GENC database for the public sector participants may not be representative of all Queensland participants in the Program. An analysis

of public/private referral patterns during Phase 1 by the QBCSP indicated that around 40% of all participants with a positive FOBT result were referred to the public sector for their colonoscopy (unpublished). The analysis showed that referral patterns varied between catchments, ranging from 29% in the south-east corner, to over 60% in some regional areas like Mackay and Bundaberg.

A total of 5,060 colonoscopies were performed for 4,817 participants at QBCSP designated facilities during the period 7 August 2006–31 December 2010 (Tables 6.1 and 6.2). Of those participants, 4.8% (243) had repeated colonoscopies (228 with one subsequent colonoscopy, 13 with two subsequent colonoscopies and two with three subsequent colonoscopies). A repeat colonoscopy may have been undertaken in situations such as poor bowel preparation for the initial colonoscopy, follow-up procedures for removal of complex polyps, or checking the polypectomy site.

**Table 6.1**

Numbers of colonoscopies performed at designated facilities, QBCSP  
(7 August 2006–31 December 2010)

Catchment*	Calendar year					Total	Percent
	2006	2007	2008	2009	2010		
Brisbane North	-	132	183	87	257	659	13.0%
Brisbane South	-	175	233	149	381	938	18.5%
Bundaberg	-	87	191	76	207	561	11.1%
Cairns	-	44	148	52	157	401	7.9%
Gold Coast	-	73	125	62	160	420	8.3%
Mackay	6*	105	124	33	112	380	7.5%
Rockhampton	-	21	74	26	98	219	4.3%
Sunshine Coast	-	58	157	82	191	488	9.6%
Toowoomba	-	47	130	61	153	391	7.7%
Townsville	-	60	107	37	149	353	7.0%
West Moreton	-	36	83	31	100	250	4.9%
Queensland	6	838	1,555	696	1,965	5,060	100.0%

\* Staggered implementation of the Program with Mackay as the first catchment to commence invitations on 7 August 2006.

Implementation of the QBCSP started on 7 August 2006 with Mackay as the first catchment to commence invitations. In 2006, a total of 6 participants (all from Mackay) underwent a colonoscopy (Table 6.2). The number of participants increased substantially each year since 2007, except for 2009 which saw a sharp drop in the number of participants undergoing colonoscopy due to the suspension of invitations for six months (May–October 2009) and the implementation of the remediation process.

High volumes of procedures were undertaken in 2008 and 2010, partly due to the scheduling of when invitations are sent to participants throughout the year. As these two years corresponded with the end of a designated Phase of the Program, the Department of Health and Ageing needed to ensure all eligible people received invitations by the end of the respective Phase.

**Table 6.2**

Numbers of participants undergoing colonoscopy at designated facilities, QBCSP  
(7 August 2006–31 December 2010)

Catchment*	Calendar year					Total	Percent
	2006	2007	2008	2009	2010		
Brisbane North	-	125	174	83	254	636	13.2%
Brisbane South	-	170	223	128	366	887	18.4%
Bundaberg	-	87	189	73	193	542	11.3%
Cairns	-	44	141	49	156	390	8.1%
Gold Coast	-	69	119	56	154	398	8.3%
Mackay	6*	104	112	28	107	357	7.4%
Rockhampton	-	21	72	24	96	213	4.4%
Sunshine Coast	-	57	147	71	178	453	9.4%
Toowoomba	-	47	122	57	148	374	7.8%
Townsville	-	59	95	32	147	333	6.9%
West Moreton	-	36	77	26	95	234	4.9%
<b>Queensland</b>	<b>6</b>	<b>819</b>	<b>1,471</b>	<b>627</b>	<b>1,894</b>	<b>4,817</b>	<b>100.0%</b>

\* Staggered implementation of the Program with Mackay as the first catchment to commence invitations on 7 August 2006.

Table 6.3 shows the age structures for participants undergoing colonoscopy at designated facilities. Calendar year 2008 saw the inclusion of the first participants aged 50 years undergoing colonoscopy.

In 2009 and 2010, each of the three age groups (50, 55 and 65 years) accounted for roughly a third of the participants undergoing colonoscopy.

**Table 6.3**

Numbers of participants undergoing colonoscopy at designated facilities by age group, QBCSP (7 August 2006–31 December 2010)

Age group	2006		2007		2008		2009		2010		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
50 years	0	0.0	0	0.0	120	8.2	232	37.0	550	29.1	902	18.7
55 years	0	0.0	321	39.2	602	40.9	176	28.1	586	30.9	1,685	35.0
65 years	0	0.0	405	49.4	705	47.9	211	33.6	745	39.3	2,066	42.9
Others*	6	100.0	93	11.4	44	3.0	8	1.3	13	0.7	164	3.4
<b>Total</b>	<b>6</b>	<b>100.0</b>	<b>819</b>	<b>100.0</b>	<b>1,471</b>	<b>100.0</b>	<b>627</b>	<b>100.0</b>	<b>1,894</b>	<b>100.0</b>	<b>4,817</b>	<b>100.0</b>

\* Mainly including those from the Pilot in Mackay who were offered re-screening during Phase 1 and those who were part of the Indigenous pilot project, where age eligibility was people aged 50 years or older.

The QBCSP GENC database documents information on the gender of participants during Phase 2 of the Program, but no such information was collected during Phase 1 (see Appendix A for details). Therefore, sub-group analysis by gender is limited to 2009 and 2010 data. As shown in

Table 6.4, there were more males than females undergoing assessment colonoscopy (53% versus 47%) during 2009 and 2010. This reflects the higher level of FOBT positivity seen in male participants compared to female participants (Table 4.3).

**Table 6.4**

Numbers of participants undergoing colonoscopy at designated facilities by gender, QBCSP (2009–2010)

Gender	2009		2010		Total	
	N	%	N	%	N	%
Males	346	55.2%	991	52.3%	1,337	53.0%
Females	281	44.8%	903	47.7%	1,184	47.0%
<b>Total</b>	<b>627</b>	<b>100.0%</b>	<b>1,894</b>	<b>100.0%</b>	<b>2,521</b>	<b>100.0%</b>

### Detecting cancer among asymptomatic participants is one of the major aims of a population-based bowel cancer screening program.

Early detection of colorectal cancer and subsequent treatment significantly improve participants' survival and health outcomes. The prevalent (first) screening round of a population-based screening program such as this would be expected to detect a significant number of participants with latent disease.

Overall, the statewide colorectal cancer detection rate was 4.3% (209/4,817) for participants undergoing colonoscopy over the period 7 August 2006–31 December 2010 (Table 7.1). These data represent only those public sector participants who had their assessment colonoscopies at designated facilities for the Program. Hence, they may not be representative of all Queensland participants.

**Table 7.1**

Colorectal cancer detection rates among participants undergoing colonoscopy at designated facilities, QBCSP (7 August 2006–31 December 2010)

Catchment	2006	2007	2008	2009	2010	Total	
	Rate (n)					Rate*	(n / N)
Brisbane North	-	9.6% (12)	4.0% (7)	4.8% (4)	1.6% (4)	<b>4.3%</b>	<b>(27/636)</b>
Brisbane South	-	5.9% (10)	2.7% (6)	3.9% (5)	3.3% (12)	<b>3.7%</b>	<b>(33/887)</b>
Bundaberg	-	2.3% (2)	4.2% (8)	4.1% (3)	3.6% (7)	<b>3.7%</b>	<b>(20/542)</b>
Cairns	-	6.8% (3)	5.7% (8)	10.2% (5)	3.2% (5)	<b>5.4%</b>	<b>(21/390)</b>
Gold Coast	-	2.9% (2)	10.9% (13)	3.6% (2)	3.9% (6)	<b>5.8%</b>	<b>(23/398)</b>
Mackay	0.0% (0)	2.9% (3)	6.3% (7)	0.0% (0)	4.7% (5)	<b>4.2%</b>	<b>(15/357)</b>
Rockhampton	-	14.3% (3)	5.6% (4)	0.0% (0)	3.1% (3)	<b>4.7%</b>	<b>(10/213)</b>
Sunshine Coast	-	12.3% (7)	8.2% (12)	5.6% (4)	1.7% (3)	<b>5.7%</b>	<b>(26/453)</b>
Toowoomba	-	6.4% (3)	3.3% (4)	10.5% (6)	3.4% (5)	<b>4.8%</b>	<b>(18/374)</b>
Townsville	-	3.4% (2)	4.2% (4)	3.1% (1)	4.1% (6)	<b>3.9%</b>	<b>(13/333)</b>
West Moreton	-	2.8% (1)	0.0% (0)	3.9% (1)	1.1% (1)	<b>1.3%*</b>	<b>(3/234)</b>
<b>Queensland Rate*</b> (n / N)	<b>0.0%</b> <b>(0/6)</b>	<b>5.9%*</b> <b>(48/819)</b>	<b>5.0%</b> <b>(73/1,471)</b>	<b>4.9%</b> <b>(31/627)</b>	<b>3.0%*</b> <b>(57/1,894)</b>	<b>4.3%</b>	<b>(209/4,817)</b>

n: the numerator (the number of participants undergoing colonoscopy who had colorectal cancer).

N: the denominator (the number of participants undergoing colonoscopy).

\* Indicating a statistically significant difference when compared to the overall rate (4.3%).

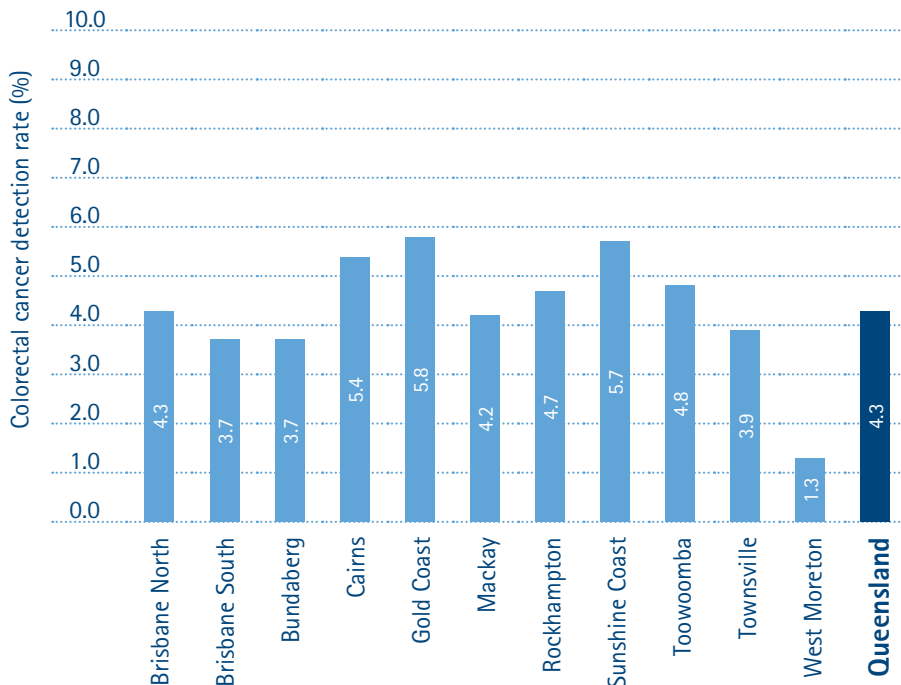
There was variation in colorectal cancer detection rates across catchments (Table 7.1 and Figure 7.1), with the highest rate of 5.8% in Gold Coast ( $P>0.05$  for comparison to the overall rate of 4.3%) and the lowest rate of 1.3% in West Moreton ( $P<0.05$  for comparison to the overall rate). After adjusting for difference in age compositions cross catchments, the cancer detection rate in West Moreton remained statistically significantly lower than the overall rate (4.3%).

Colorectal cancer detection rates dropped from 5.9% in 2007 to about 5.0% in 2008 and 2009 (Table 7.1), possibly due to inclusion of the younger age cohort (50 year olds)

who were invited from 1 January 2008. A further reduction to a cancer detection rate of 3.0% in 2010 was observed. This drop in 2010 is not likely to be related to differences in age structures and gender compositions of participants between 2009 and 2010, as age structures and gender compositions were fairly similar for these two years (Tables 6.3 and 6.4). Further investigation is needed to explore whether there is an association between the increase in FOBT positivity rates (from 6.5% in 2008 to 8.4% in 2010, Table 4.2) and the decrease in colorectal cancer detection rates (from 5.0% in 2008 to 3.0% in 2010).

**Figure 7.1**

Variation in colorectal cancer detection rates among participants undergoing colonoscopy at designated facilities, by QBCSP catchment (7 August 2006–31 December 2010)



Participants aged 65 years had a higher colorectal cancer detection rate than those aged 50 or 55 years ( $P<0.01$ ) (Table 7.2). For each specific age group, there was

variation in cancer detection rates from year to year. For example, the highest cancer detection rate for 65 year olds was 7.4% in 2007, dropping to 4.3% in 2010.

**Table 7.2**

Colorectal cancer detection rates among participants undergoing colonoscopy at designated facilities, by age group, QBCSP (7 August 2006–31 December 2010)

Age group	2006		2007		2008		2009		2010		Total	
	n	Rate (%)	n	Rate (%)	n	Rate (%)	n	Rate (%)	n	Rate (%)	n	Rate (%)
50 years	-	-	-	-	3	2.5%	12	5.2%	13	2.4%	28	3.1%
55 years	0	0.0%	14	4.4%	25	4.2%	5	2.8%	12	2.1%	56	3.3%
65 years	0	0.0%	30	7.4%	43	6.1%	14	6.6%	32	4.3%	119	5.8%*
Others	0	0.0%	4	4.3%	2	4.6%	0	0.0%	0	0.0	6	3.7%
<b>Total</b>	<b>0</b>	<b>0.0%</b>	<b>48</b>	<b>5.9%</b>	<b>73</b>	<b>5.0%</b>	<b>31</b>	<b>4.9%</b>	<b>57</b>	<b>3.0%</b>	<b>209</b>	<b>4.3%</b>

n: the number of participants with histopathologically confirmed colorectal cancer.

\* Indicating a statistically significant difference when compared to the cancer detection rate (3.1%) for 50 year olds.

The colorectal cancer detection rate among male participants was slightly higher than among female participants (3.8% versus 3.1%,  $P=0.347$ ) (Table 7.3). This higher cancer detection rate in males compared to females

is reflective of colorectal cancer incidence data reported by the Queensland Cancer Registry (Youlden DR et al, 2008) and elsewhere. ❧

**Table 7.3**

Colorectal cancer detection rates among participants undergoing colonoscopy at designated facilities, by gender, QBCSP (2009–2010)

Gender	2009		2010		Total	
	n	Rate (%)	n	Rate (%)	n	Rate (%)
Males	18	5.2%	33	3.3%	51	3.8%*
Females	13	4.6%	24	2.7%	37	3.1%
<b>Total</b>	<b>31</b>	<b>4.9%</b>	<b>57</b>	<b>3.0%</b>	<b>88</b>	<b>3.5%</b>

n: the number of participants with histopathologically confirmed colorectal cancer.

\* 3.8% versus 3.1%,  $P=0.347$

## Chapter 8

### Adenoma detection—public sector

#### Reduction in mortality is the ultimate aim for any cancer screening program.

Screening for colorectal cancer has the potential to prevent cancer from developing by detecting and removing cancer precursor lesions—polyps and adenomas.

Overall, 48.0% of participants undergoing colonoscopy at designated facilities for the QBCSP had histopathologically confirmed adenomas (Table 8.1). These included tubulovillous adenomas, tubular adenomas, villous adenomas, serrated adenomas, and adenomas not otherwise classified.

Adenoma detection is a key indicator of the impact of the screening program in preventing colorectal cancer

**Table 8.1**

Adenoma detection rates among participants undergoing colonoscopy at designated facilities, QBCSP (7 August 2006–31 December 2010)

Catchment	2006	2007	2008	2009	2010	Total	
	Rate (%)					Rate*	(n / N)
Brisbane North	-	61.6%	47.7%	56.6%	52.0%	53.3%*	(339/636)
Brisbane South	-	51.2%	50.7%	42.2%	43.2%	46.5%	(412/887)
Bundaberg	-	39.1%	47.1%	41.1%	42.0%	43.2%*	(234/542)
Cairns	-	45.5%	48.2%	42.9%	53.9%	49.5%	(193/390)
Gold Coast	-	47.8%	49.6%	39.3%	46.8%	46.7%	(186/398)
Mackay	50.0%	46.2%	56.3%	46.4%	51.4%	51.0%	(182/357)
Rockhampton	-	33.3%	27.8%	33.3%	33.3%	31.5%*	(67/213)
Sunshine Coast	-	56.1%	45.6%	39.4%	56.7%	50.3%	(228/453)
Toowoomba	-	66.0%	54.9%	38.6%	43.9%	49.5%	(185/374)
Townsville	-	54.2%	54.7%	62.5%	55.8%	55.9%*	(186/333)
West Moreton	-	33.3%	36.4%	53.9%	47.4%	42.3%	(99/234)
<b>Queensland Rate*</b> (n / N)	<b>50.0%</b> (3/6)	<b>50.4%</b> (413/819)	<b>48.2%</b> (709/1,471)	<b>44.5%</b> (279/627)	<b>47.9%</b> (907/1,894)	<b>48.0%</b>	<b>(2,311/4,817)</b>

n: the number of participants undergoing colonoscopy who had an adenoma detected.

N: the number of participants undergoing colonoscopy.

\* Indicating a statistically significant difference when compared to the overall rate (48.0%).

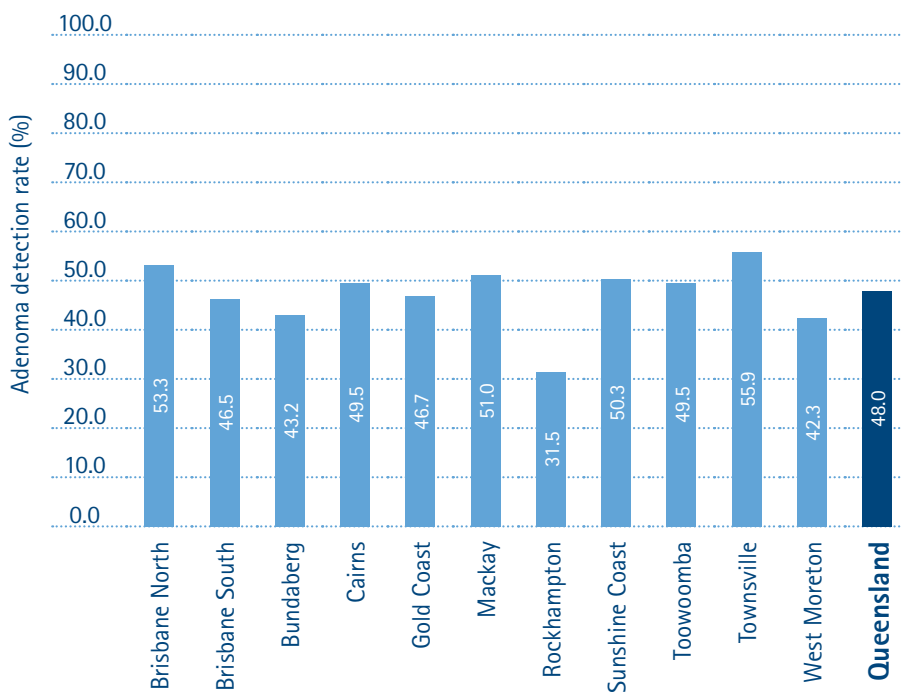
Adenoma detection rates varied across catchments (Figure 8.1):

- The highest adenoma detection rate was in Townsville (55.9%)
- Three catchments had rates between 50.0% and 54.0%
- Six catchments had rates between 40.0% and 49.9%
- The lowest adenoma detection rate was in Rockhampton (31.5%)

Adenoma detection rates fluctuated from year to year, but within a relatively narrow band of 44.5–50.4% (no statistically significant differences).

**Figure 8.1**

Variation in adenoma detection rates among participants undergoing colonoscopy at designated facilities, by catchment, QBCSP (7 August 2006–31 December 2010)



Adenoma detection rates increased with increasing age (Table 8.2), rising from 41.5% among 50 year olds to 52.7% among 65 year olds. ❏

**Table 8.2**

Adenoma detection rates among participants undergoing colonoscopy at designated facilities, by age group, QBCSP (7 August 2006–31 December 2010)

Age group	2006		2007		2008		2009		2010		Total	
	n	Rate (%)	n	Rate (%)	n	Rate (%)	n	Rate (%)	n	Rate (%)	n	Rate* (%)
50 years	-	-	-	-	36	30.0%	86	37.1%	252	45.8%	374	41.5%
55 years	-	-	158	49.2%	267	44.4%	77	43.8%	266	45.4%	768	45.6%*
65 years	-	-	212	52.4%	382	54.2%	111	52.6%	383	51.4%	1,088	52.7%*
Others	3	50.0%	43	46.2%	24	54.6%	5	62.5%	6	46.2%	81	49.4%
<b>Total</b>	<b>3</b>	<b>50.0%</b>	<b>413</b>	<b>50.4%</b>	<b>709</b>	<b>48.2%</b>	<b>279</b>	<b>44.5%</b>	<b>907</b>	<b>47.9%</b>	<b>2,311</b>	<b>48.0%</b>

n: the number of participants undergoing colonoscopy who had an adenoma detected.

\* Indicating a statistically significant difference when compared to the rate (41.5%) for 50 year olds.

Male participants had a much higher adenoma detection rate than female participants (55.7% versus 37.3%,  $P < 0.05$ ) (Table 8.3). This gender difference in adenoma detection rate was consistent for each of the three age groups (50, 55 and 65 year olds).

**Table 8.3**

Adenoma detection rates among participants undergoing colonoscopy at designated facilities, by gender, QBCSP (2009–2010)

Age/Gender		2009		2010		Total	
		n	%	n	%	n	%*
50 Years	Males	63	47.4%	155	53.8%	218	51.8%
	Females	23	23.2%	97	37.0%	120	33.2%*
55 Years	Males	45	52.3%	162	55.1%	207	54.5%
	Females	32	35.6%	104	35.6%	136	35.6%*
65 Years	Males	71	57.3%	241	60.3%	312	59.5%
	Females	40	46.0%	142	41.2%	182	42.1%*
Others	Males	2	66.7%	5	55.6%	7	58.3%
	Females	3	60.0%	1	25%	4	44.4%
Total	Males	181	52.3%	563	56.8%	744	55.7%
	Females	98	34.9%	344	38.1%	442	37.3%*
Persons		279	44.5%	907	47.9%	1,186	47.0%

n: the number of participants undergoing colonoscopy who had an adenoma detected.

\* Indicating a statistically significant difference in rates between females and males.

### Colonoscopic removal of polyps (polypectomy) is an important and effective measure in preventing/reducing colorectal cancer among participants.

Polypectomies were performed on 63.8% of participants undergoing colonoscopies at QBCSP designated facilities during the reporting period (Table 9.1).

Polypectomy rates varied between catchments (Figure 9.1):

- The highest polypectomy rate was in Townsville (72.4%)
- Seven catchments had polypectomy rates between 60.0% and 70.0%
- Two catchments had polypectomy rates between 54.0 and 59.0%
- The lowest polypectomy rate was in Rockhampton (42.3%).

There was fluctuation in the statewide polypectomy rates during the reporting period, ranging from 58.5% in 2009 to 71.3% in 2007. These variations in polypectomy rates by year may in part be due to the different age groups being offered screening for the first time (i.e. screening of 50 year olds from mid 2008 may have reduced the polypectomy rate).

**Table 9.1**

Polypectomy rates among participants undergoing colonoscopy at designated facilities, QBCSP (7 August 2006–31 December 2010)

Catchment	2006	2007	2008	2009	2010	Total	
	Rate (%)					Rate* (%)	(n / N)
Brisbane North	-	80.0%	64.4%	67.5%	66.5%	<b>68.7%*</b>	<b>(437/636)</b>
Brisbane South	-	72.9%	65.0%	53.1%	58.7%	<b>62.2%</b>	<b>(552/887)</b>
Bundaberg	-	58.6%	60.9%	52.1%	57.5%	<b>58.1%*</b>	<b>(315/542)</b>
Cairns	-	77.3%	66.7%	57.1%	64.1%	<b>65.6%</b>	<b>(256/390)</b>
Gold Coast	-	73.9%	74.0%	60.7%	64.3%	<b>68.3%</b>	<b>(272/398)</b>
Mackay	50.0%	66.4%	74.1%	57.1%	71.0%	<b>69.2%*</b>	<b>(247/357)</b>
Rockhampton	-	57.1%	36.1%	54.2%	40.6%	<b>42.3%*</b>	<b>(90/213)</b>
Sunshine Coast	-	77.2%	63.3%	56.3%	68.5%	<b>66.0%</b>	<b>(299/453)</b>
Toowoomba	-	74.5%	67.2%	56.1%	58.1%	<b>62.8%</b>	<b>(235/374)</b>
Townsville	-	74.6%	75.8%	81.3%	67.4%	<b>72.4%*</b>	<b>(241/333)</b>
West Moreton	-	55.6%	46.8%	61.5%	59.0%	<b>54.7%*</b>	<b>(128/234)</b>
Queensland %* (n / N)	50.0% (3/6)	71.3%* (584/819)	64.3% (946/1,471)	58.5%* (367/627)	61.9% (1,172/1,894)	63.8%	<b>(3,072/4,817)</b>

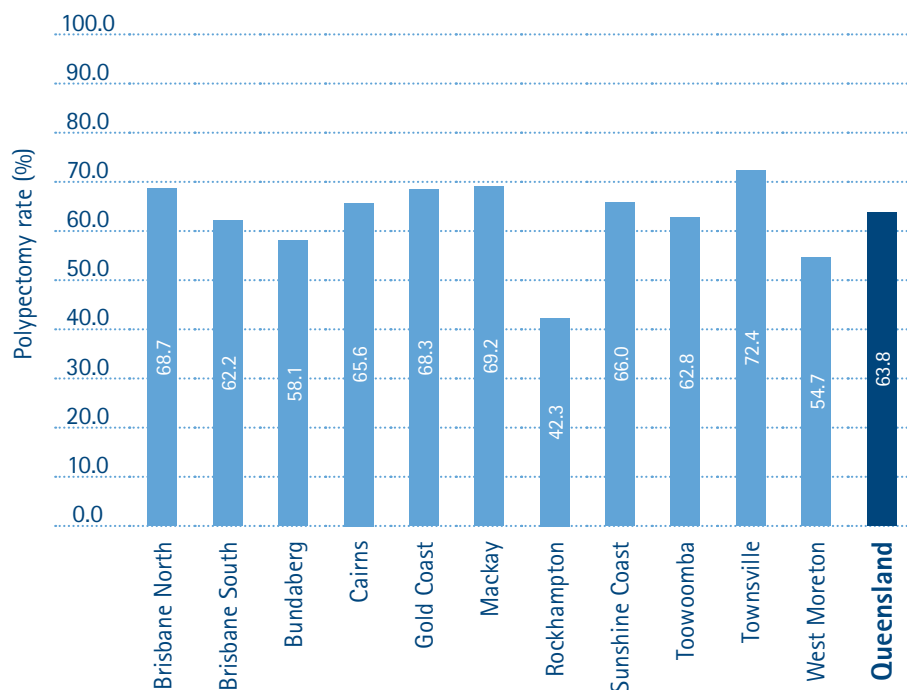
n: the number of participants undergoing colonoscopy who had a polypectomy performed.

N: the number of participants undergoing colonoscopy.

\* Indicating a statistically significant difference when compared to the overall polypectomy rate (63.8%).

**Figure 9.1**

Variation in polypectomy rates among participants undergoing colonoscopy at designated facilities, by catchment, QBCSP  
(7 August 2006–31 December 2010)



Participants in older age groups were more likely to undergo polypectomy than those in younger age groups (Table 9.2). For example, almost 70% of participants aged 65 years had polypectomies compared to 54%

among those aged 50 years. The polypectomy rate was significantly higher for males than for females (70.3% versus 50.6%,  $P < 0.001$ ) (Table 9.3).

⋮

**Table 9.2**

Polypectomy rates among participants undergoing colonoscopy at designated facilities, by age, QBCSP  
(7 August 2006–31 December 2010)

Age group	2006		2007		2008		2009		2010		Total	
	n	Rate (%)	n	Rate (%)	n	Rate (%)	n	Rate (%)	n	Rate (%)	n	Rate (%)*
50 years	-	-	-	-	46	38.3%	116	50.0%	328	59.6%	490	54.3%
55 years	-	-	223	69.5%	368	61.1%	100	56.8%	343	58.5%	1,034	61.4%*
65 years	-	-	296	73.1%	498	70.6%	145	68.7%	494	66.3%	1,433	69.4%*
Others	3	50.0%	65	69.9%	34	77.3%	6	75%	7	53.9%	115	70.1%*
<b>Total</b>	<b>3</b>	<b>50.0%</b>	<b>584</b>	<b>71.3%</b>	<b>946</b>	<b>64.3%</b>	<b>367</b>	<b>58.5%</b>	<b>1,172</b>	<b>61.9%</b>	<b>3,072</b>	<b>63.8%</b>

n: the number of participants undergoing colonoscopy who had a polypectomy performed.

\* Indicating a statistically significant difference when compared to the rate (54.3%) for 50 year olds.

**Table 9.3**

Polypectomy rates among participants undergoing colonoscopy at designated facilities, by gender, QBCSP (2009–2010)


Age/gender		2009		2010		Total	
		n	Rate (%)	n	Rate (%)	n	Rate (%)*
50 Years	Males	83	62.4%	196	68.1%	279	66.3%
	Females	33	33.3%	132	50.4%	165	45.7%*
55 Years	Males	58	67.4%	202	68.7%	260	68.4%
	Females	42	46.7%	141	48.3%	183	47.9%*
65 Years	Males	95	76.6%	297	74.3%	392	74.8%
	Females	50	57.5%	197	57.1%	247	57.2%*
Others	Males	3	100.0%	6	66.7%	9	75.0%
	Females	3	60.0%	1	25.0%	4	44.4%
Total	Males	239	69.1%	701	70.7%	940	70.3%
	Females	128	45.6%	471	52.2%	599	50.6%*
	Persons	367	58.5%	1,172	61.9%	1,539	61.1%

n: the number of participants undergoing colonoscopy who had a polypectomy performed.

\* Indicating a statistically significant difference in polypectomy rates between females and males.



Photographed by Alan Jensen



## Section 4

### Colorectal Cancer Incidence and Mortality in Queensland

This section reports on colorectal cancer incidence (Chapter 10) and mortality (Chapter 11) in Queensland, by year (1996–2007), age, gender, catchment, geographic region and socioeconomic status. It intends to provide useful reference and context information for implementation of the QBCSP.

Data in this section were provided by the Queensland Cancer Control Analysis Team (QCCAT) using the Queensland Oncology Repository (QOR) database. Colorectal cancer in QOR is defined by the ICD-10 codes C18, C19, C20 and C218. All age-standardised rates are based on the Australian population age distribution in 2001.

## Chapter 10

### Colorectal cancer incidence in Queensland

Between 1996 and 2007, there was a slight drop in age-standardised incidence rates for colorectal cancer in Queensland (Table 10.1 and Figure 10.1), from 68.2 per 100,000 in 1996 to 66.0 per 100,000 in 2007, with a peak of 70.2 per 100,000 in 2000.

While the overall trends in incidence rates are similar for males and females, males had a higher colorectal cancer incidence rate than females [78.0 per 100,000 (95% CI 74.2–81.9) versus 55.1 per 100,000 (95% CI 52.1–58.3), 2007 data].

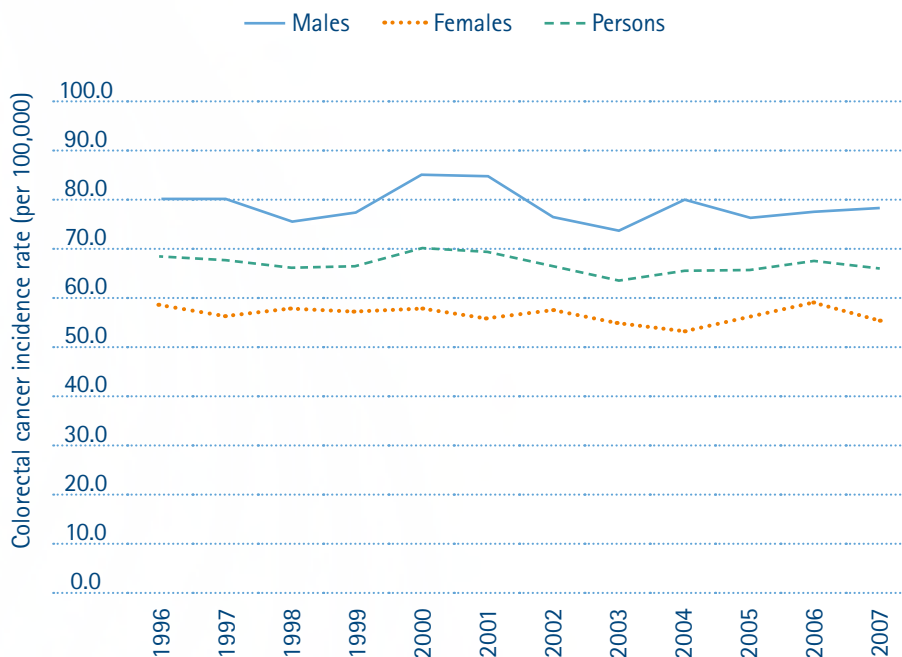
Table 10.1

Age-standardised incidence rates (per 100,000) for colorectal cancer, Queensland (1996–2007)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Males	79.8	79.8	75.7	77.3	84.5	84.5	76.2	73.8	80.0	76.4	77.4	78.0
Females	57.9	56.3	57.7	57.1	57.6	55.7	57.2	54.7	52.8	55.9	58.8	55.1
Persons	68.2	67.5	66.2	66.6	70.2	69.4	66.1	63.5	65.6	65.8	67.6	66.0

Figure 10.1

Age-standardised incidence rates for colorectal cancer, Queensland (1996–2007)



Age-specific incidence rates in 2007 are presented in Table 10.2 and Figure 10.2. Incidence was relatively low among people under 45 years old. However, there was a substantial increase in incidence rates thereafter, from 133.7 per 100,000 among 55-64 year olds to 405.5 among those aged 75-84 years.

Of 2,801 new colorectal cancer cases diagnosed in 2007, 2,590 (92.5%) were among people aged 50 years or older, and 2,413 (86.1%) were among people aged 55 years or older.

**Table 10.2**

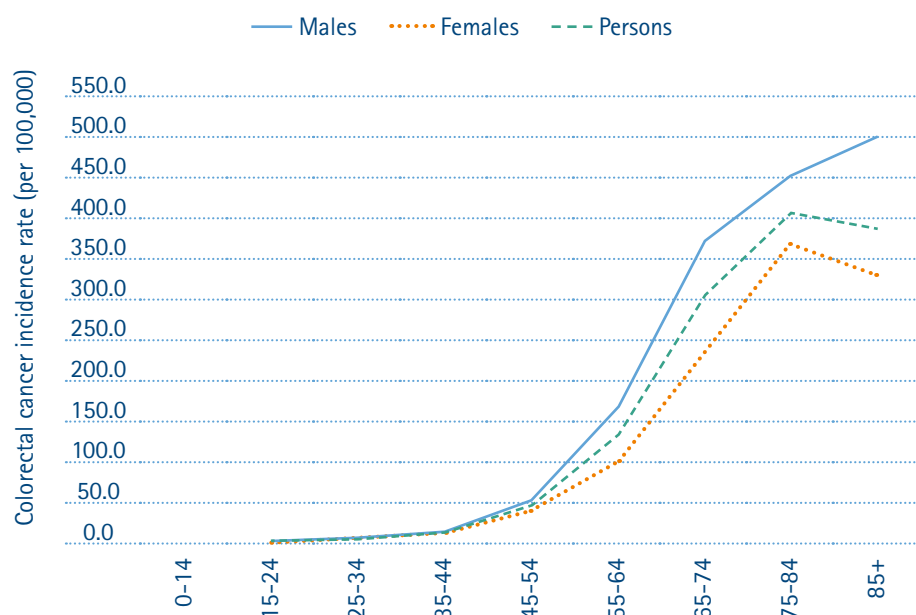
Incidence and age-specific incidence rates for colorectal cancer, by gender, Queensland (2007)

Gender		Age group (years)									Total
		0-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	
Incidence (No. of new cases)	Males	0	1	16	38	153	396	517	350	104	1,575
	Females	0	6	10	43	121	231	335	348	132	1,226
	Persons	0	7	26	81	274	627	852	698	236	2,801
Incidence rate* (per 100,000)	Males	-	0.3	5.5	12.5	53.6	167.3	371.5	451.9	499.7	75.2
	Females	-	2.1	3.5	13.8	41.7	99.4	240.8	367.7	330.3	58.4
	Persons	-	1.2	4.5	13.2	47.6	133.7	306.1	405.5	388.3	66.8

\* refers to a crude incidence rate

**Figure 10.2**

Age-specific incidence rates for colorectal cancer, by gender, Queensland (2007)



As shown in Table 10.3, Brisbane North, Brisbane South and Gold Coast are the three catchments with the largest number of new cases of colorectal cancer, accounting for half of the total number of new cases in Queensland. There was variation in age-standardised incidence rates

across catchments, ranging from 55.3 per 100,000 (in Rockhampton) to 72.0 per 100,000 (in West Moreton). However, the differences in rates were not statistically significant.

**Table 10.3**

Age-standardised incidence rates for colorectal cancer, by catchment, Queensland (2007)

Catchment	No. of new cases of colorectal cancer	Incidence rate (per 100,000)	95% CI
Brisbane North	577	71.7	66.0–77.7
Brisbane South	567	66.6	61.3–72.2
Bundaberg	168	60.5	51.8–70.0
Cairns	157	68.1	57.9–79.2
Gold Coast	369	66.8	60.2–73.8
Mackay	71	58.2	45.6–72.5
Rockhampton	111	55.3	45.5–66.0
Sunshine Coast	264	59.7	52.7–67.1
Toowoomba	198	65.3	56.6–74.7
Townsville	134	58.3	48.9–68.6
West Moreton	159	72.0	61.2–83.6
Unknown	26	-	-
<b>Queensland</b>	<b>2,801</b>	<b>66.0</b>	<b>63.6–68.5</b>



Photographed by Alan Jensen

As shown in Table 10.4 and Figure 10.3, with an increase of remoteness from major cities to remote/very remote areas, there appeared to be a decrease in colorectal cancer incidence rates from 69.2 per 100,000 to 50.0 per 100,000. However, the difference in rates was not statistically significant.

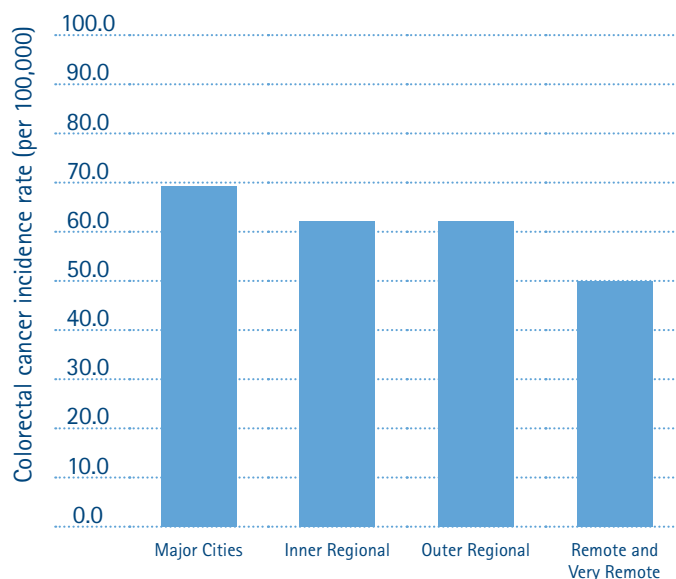
**Table 10.4**

Age-standardised incidence rates for colorectal cancer, by geographic region, Queensland (2007)

Geographic region	Incidence rate (per 100,000)	95% CI
Major cities	69.2	65.7–72.8
Inner regional	62.2	58.1–66.5
Outer regional	62.2	56.5–68.2
Remote / very remote	50.0	36.0–66.4
<b>Total</b>	<b>66.0</b>	<b>63.6–68.5</b>

**Figure 10.3**

Age-standardised incidence rates for colorectal cancer, by geographic region, Queensland (2007)



Colorectal cancer incidence rates by socioeconomic status are presented in Table 10.5 and Figure 10.4. People living in areas of higher average socioeconomic status tended to have higher colorectal cancer incidence rates. However, the difference was not of statistical significance. ❏

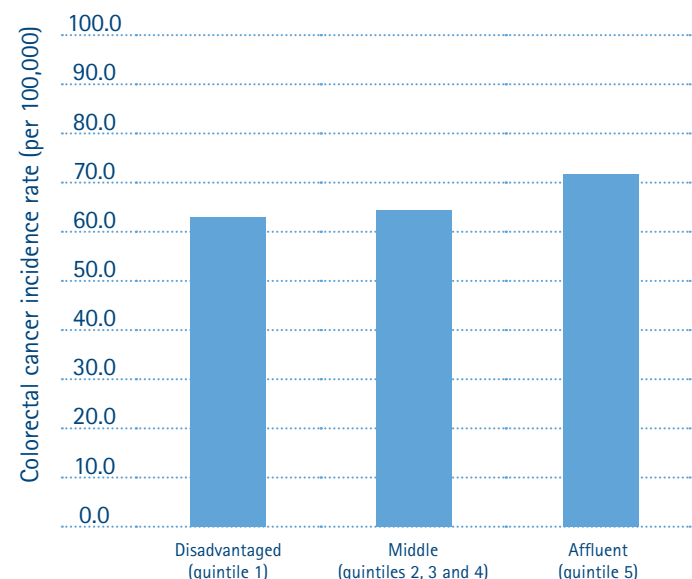
**Table 10.5**

Age-standardised incidence rates for colorectal cancer by socioeconomic status, Queensland (2007)

Socioeconomic status	Incidence rate (per 100,000)	95% CI
Disadvantaged (quintile 1)	63.1	56.7–69.7
Middle (quintiles 2, 3 and 4)	64.5	61.6–67.4
Affluent (quintile 5)	71.6	65.5–77.8
<b>Total</b>	<b>66.0</b>	<b>63.6–68.5</b>

**Figure 10.4**

Age-standardised incidence rates for colorectal cancer, by socioeconomic status, Queensland (2007)



## Chapter 11

### Colorectal cancer mortality in Queensland

Between 1996 and 2007, there was a downward trend in colorectal cancer mortality rates, dropping from 27.4 per 100,000 to 22.9 per 100,000 (Table 11.1 and Figure 11.1).

This decrease in mortality rates occurred among both males and females. Males had higher colorectal cancer mortality rates than females in any specific year [e.g. 26.4 per 100,000 (95% CI 24.5–29.1) versus 19.7 per 100,000 (95% CI 18.1–21.8), 2007 data].

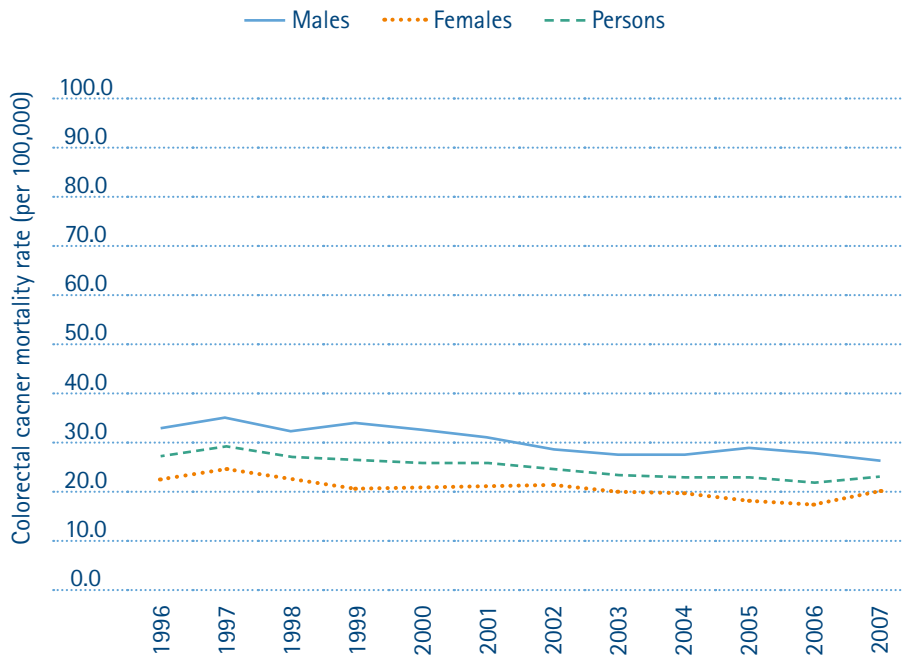
**Table 11.1**

Age-standardised mortality rates (per 100,000) for colorectal cancer, Queensland (1996–2007)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Males	32.7	35.0	32.5	33.8	32.4	31.2	28.4	27.2	27.4	28.8	27.7	26.4
Females	22.8	24.5	22.1	20.5	20.6	20.7	21.3	19.6	19.3	17.9	17.1	19.7
Persons	27.4	29.1	27.0	26.5	26.0	25.8	24.7	23.2	23.0	23.0	21.9	22.9

**Figure 11.1**

Age-standardised mortality rates for colorectal cancer, Queensland (1996–2007)



Based on 2007 data (Table 11.2 and Figure 11.2), colorectal cancer mortality rates were low among people aged under 45 years. Afterwards, there was a substantial increase in mortality rates with increasing age, from 34.7 per 100,000 among 55-64 year olds to 230.4 per 100,000 among people aged 85 years or older.

Of 962 deaths due to colorectal cancer in 2007, 914 (95.0%) were among people aged 50 years or older, and 873 (90.7%) were among people aged 55 years or older.

**Table 11.2**

Mortality and age-specific mortality rates for colorectal cancer, by gender, Queensland (2007)

Gender		Age group (years)									Total
		0-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	
Mortality (No. of deaths)	Males	0	1	1	9	37	107	142	166	52	515
	Females	0	0	2	5	34	56	102	160	88	447
	Persons	0	1	3	14	71	163	244	326	140	962
Mortality rate* (per 100,000)	Males	-	0.3	0.3	3.0	13.0	45.2	102.0	214.3	249.9	24.6
	Females	-	-	0.7	1.6	11.7	24.1	73.3	169.0	220.2	21.3
	Persons	-	0.2	0.5	2.3	12.3	34.7	87.7	189.4	230.4	22.9

\* refers to a crude mortality rate

**Figure 11.2**

Age-specific mortality rates for colorectal cancer, by gender, Queensland (2007)

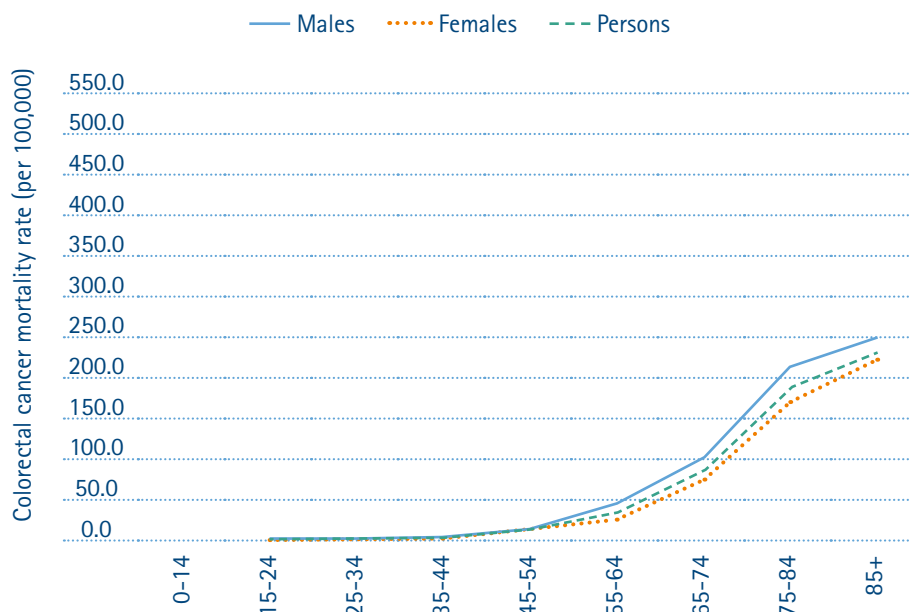


Table 11.3 shows mortality rates for colorectal cancer across 11 QBCSP catchments. There was variation in mortality rates, ranging from 19.5 per 100,000 (in Sunshine Coast) to 29.2 per 100,000 (in Rockhampton). However, the differences in rates were not of statistical significance.

**Table 11.3**

Age-standardised mortality rates for colorectal cancer, by catchment, Queensland (2007)

Catchment	No. of deaths from colorectal cancer	Mortality rate (per 100,000)	95% CI
Brisbane North	199	24.8	21.5–28.4
Brisbane South	172	20.3	17.4–23.5
Bundaberg	66	23.3	18.0–29.2
Cairns	58	26.1	19.9–33.3
Gold Coast	114	20.5	17.0–24.5
Mackay	26	20.0	13.2–28.3
Rockhampton	56	29.2	22.1–37.3
Sunshine Coast	86	19.5	15.7–23.9
Toowoomba	68	22.4	17.4–28.0
Townsville	63	28.1	21.6–35.4
West Moreton	45	21.0	15.3–27.5
Unknown	9	-	-
<b>Queensland</b>	<b>962</b>	<b>22.9</b>	<b>21.5–24.4</b>

As shown in Table 11.4 and Figure 11.3, colorectal cancer mortality rates tended to increase with increasing remoteness from major cities to remote/very remote areas. However, the difference in mortality rates between regions was not statistically significant.

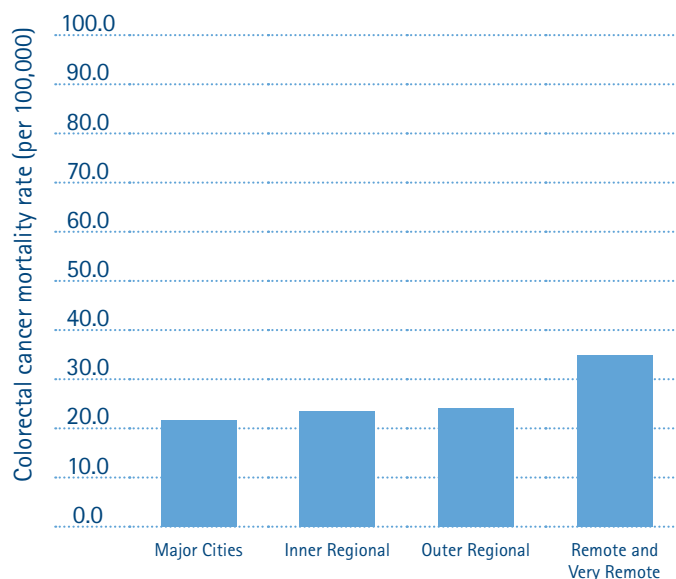
**Table 11.4**

Age-standardised mortality rates for colorectal cancer, by geographic region, Queensland (2007)

Geographic region	Mortality rate (per 100,000)	95% CI
Major cities	21.4	19.5–23.4
Inner regional	23.3	20.8–26.0
Outer regional	23.9	20.4–27.7
Remote / very remote	34.9	23.4–49.0
<b>Total</b>	<b>22.9</b>	<b>21.5–24.4</b>

**Figure 11.3**

Age-standardised mortality rates for colorectal cancer, by geographic region, Queensland (2007)



Colorectal cancer mortality rates by socioeconomic status are presented in Table 11.5 and Figure 11.4. It appeared that people living in areas with higher average socioeconomic status tended to have slightly lower mortality rates for colorectal cancer. The difference in mortality rates between socioeconomic groups was not statistically significant. ❏

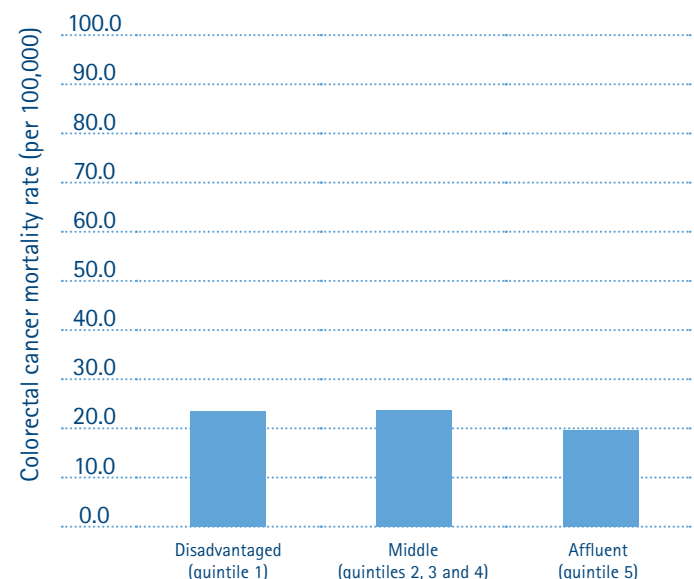
**Table 11.5**

Age-standardised mortality rates for colorectal cancer, by socioeconomic status, Queensland (2007)

Socioeconomic status	Mortality rate (per 100,000)	95% CI
Disadvantaged (quintile 1)	23.3	19.5–27.5
Middle (quintiles 2, 3 and 4)	23.4	21.7–25.2
Affluent (quintile 5)	19.7	16.6–23.1
<b>Total</b>	<b>22.9</b>	<b>21.5–24.4</b>

**Figure 11.4**

Age-standardised mortality rates for colorectal cancer, by socioeconomic status, Queensland (2007)



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## Appendix A

### Data sources, definitions and analytical methods

#### Data Sources

This report was based on three data sources, as summarised in Table A.1

#### NBCSP Register

The NBCSP Register collects information on participation in the Program and test results. While the NBCSP Register has consistent and complete documentation of invitations to people eligible for the Program and FOBT results, follow up colonoscopy and histopathology results for participants with a positive FOBT result were under-documented. Reasons for the under-documentation include: i) time lag in reporting colonoscopy and histopathology results to the Register; and ii) the voluntary nature of reporting colonoscopy and histopathology results by providers to the Register. Due to the incompleteness and inconsistency of the data, colonoscopy and histopathology results from the NBCSP Register have not been included in this report. Information on participation and FOBT positivity (presented in Chapters 3–5) was based on the NBCSP Register data.

Analysis of participation and FOBT positivity by Aboriginal and Torres Strait Islander status and by language spoken at home is not provided in this report, due to concerns with the reliability of relevant data. Information on Indigenous status and language spoken at home is unknown for people who were invited to the Program but did not participate. For people participating in the Program, there is a relatively high proportion of non-response to questions relating to Indigenous status or language spoken at home.

Table A.1

Data sources for this statistical report

Chapter	Description	Data source
3–5	Participation, FOBT positivity	National Bowel Cancer Screening Program (NBCSP) Register. Accessed on 4 April 2011.
6–9	Colonoscopy outcomes (adenoma and cancer detection, polypectomy)	Queensland Bowel Cancer Screening Program (QBCSP) Gastroenterology Nurse Coordinator Database
10–11	Colorectal cancer (ICD-10, C18, C19, C20, C218) incidence and mortality	Queensland Oncology Repository. Accessed on 20 July 2011.

#### QBCSP Gastroenterology Nurse Coordinator (GENC) Database

The GENC database was established in 2006 by the QBCSP. The Program GE Nurse Coordinator records information in an Excel spreadsheet for each participant who was referred for colonoscopy assessment through the public sector following a positive FOBT result. Data collected include participant and GP information, GE Nurse clinic visits, colonoscopy quality and outcomes, histopathology results, adverse events and follow-ups. Chapters 6–9 were based on data from the GENC database.

There are some limitations to the data collected in this database. Data for the public sector participants may not be representative of all participants in the Program, and little is known about participants who chose to have a colonoscopy in the private sector due to incomplete data on the NBCSP Register. Gender of participants was not recorded during Phase 1 which limits our ability to analyse colonoscopy data by gender for calendar years 2006–08.

#### Queensland Oncology Repository

The Queensland Oncology Repository (QOR) is a cancer patient database developed and maintained by the Queensland Cancer Control Analysis Team (QCCAT) to support Queensland Health's cancer control, safety, and quality assurance initiatives. QOR consolidates cancer patient information for the entire state and contains data on cancer diagnoses and deaths, surgery, chemotherapy, and radiotherapy. QOR also includes data collected by over 800 clinicians at multidisciplinary team (MDT) meetings across the state. For more information, visit <https://qccat.health.qld.gov.au/QOR>.

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## Definitions

**Crude participation rate:** the proportion of eligible people invited to the NBCSP who return a completed FOBT kit over a specified period of time. Those people who were invited but had either opted off or suspended their participation in the Program as at 31 March 2011 were excluded for calculation of a crude participation rate.

**FOBT positivity rate:** the number of participants with a positive FOBT result divided by the total number of participants with a valid FOBT result. A valid FOBT result is either positive or negative; an inconclusive result is excluded for calculation.

## Geographic region classification

Geographic regions are classified according to the Australian Standard Geographic Classification (ASGC) Remoteness Structure developed by the Australian Bureau of Statistics (ABS). Five categories for geographic regions are used in this report: major cities, inner regional, outer regional, remote and very remote.

According to invitees' residential postcodes, each invitee was probabilistically allocated to a specific Statistical Local Area (SLA) based on population-based concordance of postcode (2009 edition) to SLA (ASGC 2006). SLAs were linked to the Accessibility/Remoteness Index for Australia (ARIA) and then classified to the five categories for geographic regions.

## Socioeconomic classification

Socioeconomic status is measured using the ABS Index of Relative Socioeconomic Disadvantage (IRSD). The IRSD is an area-based (not an individual-based) measurement that

summarises the economic and social resources of people and households within an area (e.g. low income, low education, high unemployment and unskilled occupations).

According to invitees' residential postcodes, each invitee was probabilistically allocated to a specific Statistical Local Area (SLA) based on population-based concordance of postcode (2009 edition) to SLA (ASGC 2006). Then SLAs were linked to the Socioeconomic Index For Areas (SEIFA). Quintiles based on the level of the index (SEIFA) with population weighting were generated. Quintile 1 represents the most disadvantaged 20% of the population, and quintile 5 the least disadvantaged 20%.

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## Analytical Methods

### Comparisons and tests of statistical significance

Comparisons of rates by person (age, gender), time (year), and space (catchment, geographic region and socioeconomic status) were performed in this report. For non-ranking categorical variables (e.g. catchment), the rate for each subgroup was compared to the overall statewide rate using chi-squared or Fisher's exact estimates. For ranking categorical variables (e.g. socioeconomic status), the rate for the lowest ranking subgroup (e.g. quintile 1) was compared to the rate for each of the other subgroups (e.g. quintiles 2–5), based on logistic regression models. For dichotomous variables (e.g. gender), logistic regression models were used for comparison of rates. P values and/or 95% confidence intervals were presented to indicate statistical significance.

### Kaplan–Meier estimates of participation

Kaplan–Meier methods are commonly used to model the time to an event and the change in the rates of an event over time. A Kaplan–Meier estimated participation rate is a modelled rate based on the time each individual takes from being invited to returning a completed FOBT kit.

Calculation of a crude participation rate can result in underestimation of the true participation rate, due to the time lag for invitees to return a completed FOBT kit following invitation. However, based on event information (returning FOBT or not) available for individuals, Kaplan–Meier methods provide valid estimates of participation rates at specific points of time after invitation. The use of Kaplan–Meier estimated participation rates has been endorsed by the Implementation Advisory Group of the NBCSP.

The use of a Kaplan–Meier estimated participation rate in this report has two purposes. First, it provides useful information on the extent to which the participation rate is underestimated when calculating a crude participation rate. Second, it provides insight into the pattern of participation following the initial invitation.

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