Australian Government
Australian Institute of Health and Welfare

Authoritative information and statistics to promote better health and wellbeing

CANCER SERIES
NO. 65

National Bowel Cancer Screening Program

Monitoring report

Phase 2, July 2008–June 2011

Australian Institute of Health and Welfare and
the Australian Government Department of Health and Ageing
for the National Bowel Cancer Screening Program

Australian Institute of Health and Welfare
Canberra
Cat. no. CAN 61

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

This publication is part of the Australian Institute of Health and Welfare's Cancer series. A complete list of the Institute's publications is available from the Institute's website <www.aihw.gov.au>.
ISBN 978-1-74249-280-3

Suggested citation
Australian Institute of Health and Welfare 2012. National Bowel Cancer Screening Program monitoring report: phase 2, July 2008-June 2011. CANCER SERIES NO. 65. CAN 61. Canberra: AIHW.

Australian Institute of Health and Welfare
Board Chair
Dr Andrew Refshauge

Director
David Kalisch

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

Published by the Australian Institute of Health and Welfare

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

Contents

Acknowledgments

This report was prepared by Mr David Meere, Ms Melissa Goodwin and Ms Christine Sturrock. The authors thank members of the National Bowel Cancer Screening Program Advisory group and Report and Indicator group, and Bowel Screening section staff at the Australian Government Department of Health and Ageing, who helped produce this document.

Data were extracted from the National Bowel Cancer Screening Register and supplied by the Department of Human Services (formerly Medicare Australia).

The financial support of the Bowel Screening section of the Australian Government Department of Health and Ageing is gratefully acknowledged.

Any enquiries about, or comments on, the National Bowel Cancer Screening Program should be directed to:

Ms Kate Jorgenson
Director, Bowel Screening
Cancer and Palliative Care Branch
MDP 803
Department of Health and Ageing
GPO Box 9848
Canberra ACT 2601

Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ACD	Australian cancer database
ACPS	Australian clinicopathological staging
ACT	Australian Capital Territory
ARIA	Accessibility/Remoteness Index for Australia
ATSI	Aboriginal and Torres Strait Islander
CI	Confidence interval
DoHA	Department of Health and Ageing
DoHS	Department of Human Services (formerly Medicare Australia)
FOBT	Faecal occult blood test
FSANZ	Food Standards Australia New Zealand
GP	General practitioner
ICD	International Classification of Diseases
IRSD	Index of Relative Socioeconomic Disadvantage
mm	millimetres
NBCSP	National Bowel Cancer Screening Program
NHMRC	National Health and Medical Research Council
NSW	New South Wales
NT	Northern Territory
PHCP	General practitioner or other primary health care provider
Qld	Queensland
SA	South Australia
SEIFA	Socio-Economic Index for Areas
Tas	Tasmania
TGA	Therapeutic Goods Administration
Vic	Victoria
WA	Western Australia

Symbols

–	nil or rounded to zero
. .	not applicable
n.a.	not available
n.p.	not publishable because of small numbers, confidentiality or other concerns about the quality of the data

Summary

The National Bowel Cancer Screening Program (NBCSP) aims to reduce the incidence, illness and mortality related to bowel cancer in Australia through screening to detect cancers and pre-cancerous lesions in their early stages, when treatment will be most successful.

Phase 2 of the NBCSP ran from 1 July 2008 to 30 June 2011 and invited people turning 50, 55 or 65 between 1 January 2008 and 31 December 2010 to screen for bowel cancer. This report focuses on measures of Program performance for these people.

During Phase 2, the Program was suspended for about six months after the screening test was found to be returning a higher rate of negative results than expected. Remediation actions to retest those who may have been affected were undertaken and the apparent effects are also presented in this report.

How many people participated in Phase 2 of the NBCSP?

About 38% of the 2.1 million people invited in Phase 2 returned a completed bowel cancer screening kit for analysis. This overall participation rate was slightly lower than Phase 1, due to the inclusion of 50 year olds in Phase 2, as participation for the other two ages increased in Phase 2 (Table 1).

How many positive screening results were returned in Phase 2?

About 62,000 participants (7.8%) who returned a valid screening test had a positive screening result. These people were encouraged to follow up this result by visiting their primary health care practitioner and having further investigative testing (colonoscopy).

About 71% of those with a positive screening result were recorded as having had a colonoscopy.

How many bowel cancers and adenomas were detected in Phase 2?

One in 33 colonoscopies performed to follow up a positive screening result diagnosed a confirmed (253) or suspected (868) cancer, while advanced adenomas were found in a further 3,333 participants (1 in 11 colonoscopies) investigated. Adenomas are benign growths that have the potential to become cancerous, and their removal is likely to lower the risk of future bowel cancers in these patients.

From the available NBCSP data, almost 80% of bowel cancers removed (resected) were in the earliest two (out of four) stages of cancer spread.

Were there differences between subgroups participating in the NBCSP?

Women were more likely to screen than men; conversely, men had higher rates of screen-detected bowel cancers and overall bowel cancer incidence and mortality.

Aboriginal and Torres Strait Islander participants, participants who spoke a language other than English at home, and participants who lived in *Inner regional* and *Outer regional* or areas of lower socioeconomic status had higher rates of positive screening results, yet lower rates of follow-up colonoscopies than other participants.

Phase 2 data at a glance

The following table compares NBCSP data for key performance measures for the target ages of 50, 55 and 65. Summary statistics for Phase 2 are compared with those from Phase 1; however, it should be noted that Phase 1 did not include 50 year olds.

Definitions for these performance measures are in Section 2.

Table 1: Performance measures for the NBCSP, people aged 50, 55 and 65, Phase 2 and Phase 1

	Phase 1		Phase 2 (this report)	
Performance measure	**Reporting period**	**Statistic**	**Reporting period**	**Statistic**
Participation rate[(a)]	8/2006–6/2008	38.7%	7/2008–6/2011	38.4%
50 years		. .		33.9%
55 years		36.2%		38.6%
65 years		42.6%		46.7%
FOBT positivity rate		7.5%		7.8%
PHCP follow-up rate		43.2%		53.5%
Colonoscopy follow-up rate		63.2%		71.4%
Colonoscopy outcomes[(b)]				
Suspected/confirmed cancers		5.2%		3.0%
Advanced adenomas		8.0%		8.9%
Polyps awaiting histopathology		41.3%		34.9%
No abnormality		41.1%		48.4%

(a) Previously in Phase 1, those who had suspended their participation or opted off were excluded from participation rate calculations. For this Phase 2 report, all eligible invitees regardless of whether they later suspended their participation or opted off were included. The Phase 1 participation rates shown used the updated method to allow direct comparisons with Phase 2.

(b) Colonoscopy outcomes relate to those known for the participants of each phase. Phase 1 data were as reported at December 2008. Phase 2 data were as recorded at 21 July 2011.

Notes

1. See Table S1.3 for NBCSP phase timelines.
2. Participation is the per cent of eligible invitees who returned a completed FOBT kit, regardless of whether they later suspended their participation or opted off.
3. FOBT positivity equals the per cent of valid FOBT results that were positive, with valid results being either positive or negative; inconclusive results were excluded.
4. PHCP follow-up rate equals the per cent of people with a positive FOBT result who then consulted a PHCP and had an Assessment form returned to the Register.
5. Colonoscopy follow-up rate equals the per cent of people with a positive FOBT result who then had a colonoscopy recorded on the Register.
6. Colonoscopy outcomes relate to the most accurate outcome data available for recorded colonoscopies.

Section 1 Introductory material

Structure of this report

This report provides the most up-to-date national data available for Phase 2 of the National Bowel Cancer Screening Program (NBCSP).

The first section presents an overview of the natural history and burden of bowel cancer in Australia, outlines the process of bowel cancer screening, and details the development and management of the NBCSP. It also provides a brief overview of technical issues that should be considered when interpreting the information in this report.

The second section presents national data for Phase 2 of the NBCSP from 1 July 2008 to 30 June 2011. Data are presented against a series of performance measures. A summary of each performance measure, including its definition and rationale, along with information on data quality and guide for interpretation, is at the start of each chapter. This is followed by measure-specific background information and detailed analyses.

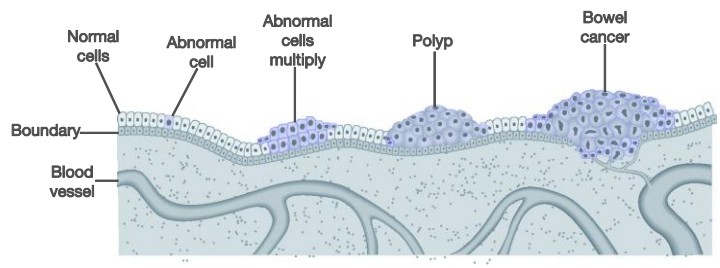
Additional data tables that show greater detail for some sections of this report are at the AIHW *National Bowel Cancer Screening Program Monitoring report: Phase 2, July 2008–June 2011 Supplementary tables* webpage.

Overview of bowel cancer and bowel screening

What is bowel cancer?

Cancer is a group of several hundred diseases in which abnormal cells are not destroyed by the body, but multiply and spread out of control. Cancers are distinguished from each other by the specific type of cell involved and the place in the body in which the disease began.

Bowel cancer refers specifically to cancer of the large intestine (that is, the colon or rectum). It is often referred to as colorectal cancer.



Source: Reproduced with permission by Cancer Council Victoria.

Figure S1.1: The beginnings of bowel cancer

Generally, bowel cancer involves a multistage process in which a series of cellular mutations occur in epithelial cells (the protective layer of surface tissue on exposed bodily surfaces, which also forms the lining of some internal cavities, such as the large intestine) over time. Early stages of these mutations result in benign polyps that are relatively common in old age. However, a polyp may then undergo additional mutations and become a benign adenoma, and ultimately, a malignant bowel cancer that can invade into deeper layers of bowel tissue and then spread to other sites in the body (Figure S1.1).

These mutations occur relatively slowly making early detection and removal of small cancers—and adenomas and polyps that may become cancerous—effective in preventing ill health or death from bowel cancer.

How common is bowel cancer?

Bowel cancer is a disease predominantly seen in developed and affluent countries, with the highest rates occurring in Australia, New Zealand and Western Europe. It has been estimated that there were about 1.2 million new cases of bowel cancer diagnosed worldwide in 2008 (10% of worldwide cancer diagnoses), and 608,000 deaths attributed (8% of all worldwide cancer deaths). Worldwide, males have 1.4 times higher rates of bowel cancer incidence than females (Jemal et al. 2011).

Terminology

Incidence: the number of new cases of bowel cancer diagnosed per 100,000 people in a year.

Morbidity: illness.

Mortality: the number of deaths from bowel cancer per 100,000 people in a year.

Prognosis: the likely outcome of an illness.

In Australia, incidence of bowel cancer has been increasing slightly each year since 1982, with 14,225 new cases diagnosed in 2008. The risk of being diagnosed by the age of 85 was 1 in 10 for males and 1 in 15 for females in 2008, with the risk increasing sharply from the age of 45. Bowel cancer also accounts for 10% of all deaths from invasive cancers in Australia, with 4,047 deaths in 2007, making it the second most common cause of cancer-related death after lung cancer (AIHW & AACR 2010).

What causes bowel cancer?

A proportion of bowel cancers (about 20%) are thought to be due to a hereditary component (Weitz et al. 2005). However, a larger proportion can be attributed to known and unknown environmental and lifestyle factors (WCRF/AICR 2011).

An evaluation of the evidence by the World Cancer Research Fund found there was sufficient evidence that tobacco smoking, obesity and the consumption of alcohol and red and processed meats were risk factors for colorectal cancer, while consumption of foods containing dietary fibre and higher levels of physical activity provided a protective effect from bowel cancer (WCRF/AICR 2011).

Incidence of bowel cancer is also known to increase with age—about 93% of people diagnosed in Australia in 2008 were 50 or older (see '7 Incidence of bowel cancer', Section 2). This is likely to be due to the accumulation of cellular mutations with increasing age.

How is bowel cancer treated?

Treatment for bowel cancer commonly involves surgery to remove the cancer, with or without additional chemotherapy or radiation therapy. Prognosis depends mainly on what stage of development the cancer had reached, with smaller, less developed cancers having much better prognoses than advanced cancers (Table S1.1). Bowel cancer stages are generally defined using the Australian clinopathological stage (ACPS) classification system shown in Table S1.1 (ACN 2005).

Table S1.1: Defined Australian clinopathological stages of bowel cancer

ACPS Stage	Description	Survival estimates[(a)]
A	Submucosa or into but not through muscularis propria (cancer contained within superficial layers of bowel)	Bowel cancers diagnosed at this stage showed a 93% 5-year survival rate
B	Through muscularis propria (deep invasion into bowel tissue)	Bowel cancers diagnosed at this stage showed an 82% 5-year survival rate
C	Spread of cancer to lymph nodes (invasion through bowel tissue, and cancer found in lymph nodes)	Bowel cancers diagnosed at this stage showed a 59% 5-year survival rate
D	Metastatic disease (cancer also discovered at other sites in the body)	Bowel cancers diagnosed at this stage showed an 8% 5-year survival rate. Palliative care is commonly used at this stage

(a) Survival estimates were sourced from an American study by O'Connell, Maggard & Ko (2004) which used a different, but comparable, classification system. Similar rates have been shown in Australia (Morris, Lacopetta & Platell 2007).

Improving treatment outcomes

Improved treatment outcomes and survival are expected with an earlier diagnosis of any bowel cancers found. Removal of non-benign polyps (polypectomy) and adenomas during a colonoscopy reduces the risk of them developing into bowel cancer. Studies have shown that 14% of patients who refuse polypectomy for adenomas will develop bowel cancer within 10 years (Stryker et al. 1987). The excision of adenomatous polyps, and regular surveillance thereafter, has been found to reduce bowel cancer risk by about 76–90% (Winawer et al. 1993).

A bowel cancer screening program that can highlight individuals with signs of a potential bowel abnormality, allowing earlier investigation by colonoscopy, can therefore reduce bowel cancer morbidity and mortality.

How do we screen for bowel cancer?

Bowel cancer may be present for many years before showing symptoms such as visible rectal bleeding, change in bowel habit, bowel obstruction or anaemia. Often symptoms such as these are not exhibited until the cancer has reached a relatively advanced stage. However, non-visible bleeding of the bowel may have been occurring in the pre-cancerous stages for some time, and the relatively slow development of bowel cancer makes it a valid candidate for population screening (APHDPCSS 2008).

Screening tools and target populations for screening for bowel cancer vary around the world (Table S1.2). Evidence from clinical trials has shown that regular (biennial) screening using faecal occult blood testing, which can detect evidence of blood in the stool (faeces) not visible to the naked eye, can reduce mortality from bowel cancer by 15–33% (DoHA 2005).

A faecal occult blood test (FOBT) is a non-invasive test that detects microscopic amounts of blood in the bowel motion, a common sign of a bowel abnormality such as an adenoma or cancer. An FOBT is accepted as the primary screening tool for bowel cancer by a large number of countries, and some supplement the FOBT with flexible sigmoidoscopy (a thin flexible tube that is inserted into the rectum and guided around the lower part of the bowel where most bowel cancers develop) or colonoscopy (a thin flexible tube that is inserted into the rectum and guided around the entire length of the bowel). Table S1.2 summarises the screening tools and target populations of screening programs for a number of countries.

Table S1.2: International bowel cancer screening programs—tools and target populations

Country	Primary screening tool	Frequency	Target population (age)	Notes
Australia	FOBT	Single screen	50, 55, 65	People turning the target ages are sent an FOBT kit. Those with a negative result are encouraged to retest every 2 years, though this is not through the Program.
Canada	FOBT	Varies between provinces	50–74	10 provinces had started programs or pilots by 2010. FOBT is restarted as the primary screening tool, however, provinces are free to adopt other primary screening tools
England	FOBT	Biennial	60–69	FOBTs are supplemented by one-off flexible sigmoidoscopy in individuals aged 55–64
France	FOBT	Biennial	50–74	
Germany	FOBT	Annual	50–54	Followed by
	FOBT	Biennial	55 and over	or
	Colonoscopy	10 yearly	55 and over	
Ireland	FOBT	Biennial	55–74	Scheduled for introduction in January 2012
Japan	FOBT	Annual	40 and over	
New Zealand	FOBT	Biennial	50–74	Four-year pilot program scheduled to start in late 2011 for residents of the Waitemata District
Scotland	FOBT	Biennial	50–74	
United States	FOBT, sigmoidoscopy and colonoscopy	See note	50–75	While no organised program exists, screening with FOBT (annual), sigmoidoscopy (5-yearly) and colonoscopy (10-yearly) depending on individual risk factors are promoted through guideline dissemination and media campaigns

How is bowel cancer screening managed in Australia?

Population-based bowel cancer screening involves testing for signs of bowel cancer in people who do not have any obvious symptoms of the disease. People with symptoms or a significant family history are encouraged to discuss these with their primary health care practitioner (PHCP). In accordance with the clinical practice guidelines for the prevention, early detection and management of colorectal cancer, approved by the National Health and Medical Research Council (NHMRC) (ACN 2005), these people should be referred directly to diagnostic assessment (generally colonoscopy). However, it is recognised that some people at increased risk may not seek the assistance of a medical professional (for example, those who are symptomatic but reluctant to act on their symptoms). As a result, all people of the target ages are invited to screen regardless of evidence of previous symptoms or significant family history.

The clinical practice guidelines for the prevention, early detection and management of colorectal cancer (ACN 2005) recommend organised screening with an FOBT, performed at least once every 2 years, for the Australian population aged 50 or over.

A variety of FOBT kits to aid the early detection of bowel cancer are available in Australia over the counter from pharmacies, through medical practitioners and through the following programs:

- BowelScreen Australia™—this is a pharmacy-based bowel cancer awareness, education and screening initiative for the Australian community advocating annual screening for

all non-symptomatic Australians aged 50 and over (see <www.bowelscreenaustralia.org>).

- BowelScan—this is a community service project of various Rotary clubs and districts in Australia. It has been operating since 1982, advocating annual screening for men and women over the age of 40. It seeks to increase community knowledge of bowel cancer and its symptoms, and distributes subsidised FOBT kits to facilitate early diagnosis (see <www.nationalbowelscan.org.au>).

The National Bowel Cancer Screening Program (NBCSP) is the national screening Program implemented in 2006 by the Australian Government in partnership with the state and territory governments (see < www.cancerscreening.gov.au>). This report is based on data collected through the National Bowel Cancer Screening Program.

The National Bowel Cancer Screening Program

In 1996, the Australian Health Technology Advisory Committee systematically reviewed the literature on screening for bowel cancer against the World Health Organization principles for the assessment of a screening program. They concluded that, if pilot testing was encouraging, the Australian Government should develop a bowel cancer screening program for the at-risk population—the 'well population aged over 50' (AHTAC 1997).

The Bowel Cancer Screening Pilot Program was conducted between November 2002 and June 2004 to test the feasibility, acceptability and cost-effectiveness of bowel cancer screening in the Australian community. After the success of this pilot, the Australian Government implemented Phase 1 of the National Bowel Cancer Screening Program in late 2006. In July 2008, Phase 2 of the NBCSP began, which is the focus of this report. However, Phase 2 has recently been extended to the end of 2014 (Table S1.3).

The goals of the NBCSP are to reduce the incidence of, and mortality due to, bowel cancer through screening to detect abnormalities of the colon and rectum at a pre-cancerous stage, and, where bowel cancer has developed, to detect cancers at an early stage to maximise the effectiveness of treatment.

The NBCSP has been phased in gradually to help ensure that health services, such as colonoscopy and treatment options, are able to meet any increased demand. This is consistent with the introduction of other screening programs, such as the National Cervical Screening Program, which was also phased in over several years.

Table S1.3: NBCSP phases and target populations

Phase	Start date	End date	Target ages	Target age birthdays included
1	7 August 2006	30 June 2008	55 and 65	1 May 2006–30 June 2008
2	1 July 2008	30 June 2011	50, 55 and 65	1 January 2008–31 December 2010
2[(a)]	1 July 2011	31 December 2014	50, 55 and 65	1 January 2011–31 December 2014

(a) Phase 2 to continue between 1 July 2011 and 31 December 2014.

Phase 1 of the NBCSP began in Queensland in August 2006, and was progressively rolled out to the remaining states and territories by April 2007. The National Bowel Cancer Screening Register (the Register) maintained by the Department of Human Services (DoHS, formerly Medicare Australia) was responsible for inviting people aged 55 and 65 to participate in screening using an FOBT supplied with the invitation pack. About 40% of people invited in Phase 1 returned the FOBT for analysis, with participation higher in women (43%) than men

(36%). A full analysis of Phase 1 monitoring data is in the *National Bowel Cancer Screening Program monitoring report 2008* (DoHA & AIHW 2008).

Phase 2 of the NBCSP began on 1 July 2008 and was expanded to include people turning 50 from 1 January 2008, as well as those aged 55 and 65. In an effort to improve participation rates (Cole et al. 2007), Phase 2 also included pre-invitation letters sent to eligible people about 2 weeks before the invitation packs were sent (Appendix B, Figure B.2).

Once an eligible person has been sent and completed their FOBT, they are requested to post it to a central pathology laboratory for analysis. Results are sent to the participant, the participant's nominated PHCP and the Register. Participants with a positive result, indicating blood in their stool, are advised to consult their PHCP to discuss further diagnostic testing—in most cases, this will be a colonoscopy.

Responses to invitations, and the outcomes for participants who complete the screening test, are monitored to the point of definite diagnosis for those who are found to have bowel cancer (DoHA 2008). Refer to Appendix B, Figure B.1 for a complete representation of the Phase 2 screening pathway from invitation to diagnosis.

NBCSP Phase 2 suspension and remediation

Population-based screening programs require an accurate, reliable, safe and simple test that can detect the presence of disease before the onset of clinical symptoms. The NBCSP uses the immunochemical FOBT, as opposed to the guaiac FOBT used in some other countries, as it has shown higher sensitivity and specificity, does not require dietary restrictions and can be easily used at home (ACN 2005). Positivity rates of the FOBT are continuously monitored to ensure the accuracy of the screening test, and subsequently the safety of all participants by minimising the rate of false positive results—and the unnecessary concern they generate.

In late 2008 the FOBT sample tubes used by the NBCSP were modified to fit a new analyser at the pathology laboratory. These modified kits were provided to participants from 1 December 2008; however, due to uncertainty about the accuracy of negative results produced with these modified kits, NBCSP invitations were halted on 8 May 2009. People who had completed the modified kit and returned a negative or inconclusive result, and those who had not yet returned the kit, were advised there was a problem with the FOBT and that a replacement kit would be sent when available. However, those people who had completed the modified kit and received a positive result were advised that their result was considered reliable and encouraged to consult their PHCP, and their progression through the screening pathway continued to be monitored. From 26 October 2009, the invitation process was restarted using a new FOBT kit, approved by the Therapeutic Goods Administration (TGA). A full analysis of the suspension and remediation of Phase 2 of the NBCSP is in '6 Program suspension, remediation and resumption', Section 2.

How is the National Bowel Cancer Screening Program monitored?

The Australian Institute of Health and Welfare (AIHW) produces NBCSP monitoring reports for the Australian Government Department of Health and Ageing (DoHA). These analyse data extracted from the Register (maintained by DoHS) and provide an overview of screening participation and outcomes.

This report presents statistics for Phase 2 of the NBCSP on the progression of eligible participants through the screening pathway, and covers measures of participation, FOBT results, and follow-up investigations and outcomes. Analyses are presented by age, sex, state

and territory, geographic region, socioeconomic status, Aboriginal and Torres Strait Islander status, language spoken at home, and disability status.

In addition, the most recent incidence and mortality data for bowel cancer are presented as an indication of the current status of bowel cancer in Australia. As the NBCSP only began in late 2006 and targets a relatively small population, any influence NBCSP screening has on incidence and mortality rates may not be apparent for several years.

Terminology and concepts used in this report

Eligible population

The Phase 2 NBCSP target ages were 50, 55 and 65. To be included in the eligible population for this report, invitees must have turned 50, 55 or 65 between 1 January 2008 and 31 December 2010, been registered with DoHS or the Department of Veterans' Affairs, and been living in Australia at the time of invitation. While all kits returned are analysed and processed by the Program, invitees who were outside the target ages or did not live in Australia at the time of invitation were excluded from analyses in this report.

There were 4,042 invitees excluded from the eligible population in Phase 2 (see Table 1.1). These people were mainly participants outside the target ages who independently requested a kit, or were involved in jurisdictional pilot projects (such as improving Aboriginal and Torres Strait Islander participation).

Those people in the eligible population who had opted off the NBCSP (due to reasons such as a previous diagnosis of bowel cancer) or suspended their participation as at 30 June 2011, were included in the analyses as many had progressed through the screening pathway before opting off or suspending their participation.

Participation

The term participation is used to refer to participation in the screening test. Hence, the participation rate is the proportion of the eligible Phase 2 population who returned a completed FOBT.

FOBT positivity rate

The FOBT positivity rate refers to the proportion of positive FOBT results out of all valid FOBT kits returned; kits that were inconclusive were excluded from this rate.

Primary health care practitioner and colonoscopy follow-up rates

The proportion of people with a positive FOBT result and who subsequently visited a PHCP is referred to as the primary health care practitioner follow-up rate. PHCPs are classified by DoHS as a general practitioner or other primary health care provider. This may include remote health clinics or specialists providing general practitioner services.

The proportion of people with a positive FOBT who subsequently had a colonoscopy is referred to as the colonoscopy follow-up rate.

Crude versus estimated rates

Due to the lag time between invitation and completion of an FOBT, calculation of a crude participation rate can result in an underestimate of the true participation rate. To adjust for the lag time, modelled rates based on the time it takes each individual invited to respond (by returning a completed FOBT) are calculated by following each invited person, and recording the time it takes him or her to respond. This allows a response rate over time from the date of invitation. The modelled response rates were calculated using the Kaplan-Meier method. A similar approach was used to determine current PHCP and colonoscopy follow-up rates, though this method can only minimise the effect of the lag time—it cannot account for non-return of NBCSP forms. More detail of the Kaplan-Meier method is in Appendix D.

Data considerations

The analyses in this report are based on data recorded in the Register for the eligible Phase 2 population invited between 1 July 2008 and 30 June 2011, and include participation and PHCP follow-up activity until 30 June 2011. Additional colonoscopy and histopathology follow-up activity are included to 21 July 2011 to take advantage of additional data collected through jurisdictional data collection projects.

NBCSP data collection

Data are collected about participants and their screening outcomes from a variety of sources throughout the screening pathway and stored in the Register. The data are collected on forms completed by participants, PHCPs, colonoscopists, pathologists, nurses, other specialists or by administrative staff on behalf of health professionals.

Completion of NBCSP forms by practitioners is not mandatory, and there is the possibility of inconsistent reporting. For example, Assessment, Colonoscopy and Histopathology Report forms are received from different sources and may be entered into the Register in any sequence; however, each must have a positive FOBT result to be included. This means that there may be data for colonoscopies without an associated PHCP Assessment form, and data for histopathology results without a completed Colonoscopy Report form. When inconsistencies occur, these are noted to provide an indication of the reliability of the data. Additionally, specific histopathology data collection projects have been undertaken in some states and territories that may distort comparisons of confirmed outcomes between jurisdictions.

Because of time lags in reporting and under-reporting by clinicians, data on PHCP consultations, colonoscopies and histopathological outcomes in this report may understate the true performance of the NBCSP in this period and should be interpreted with caution.

Self-reported population subgroup identification

Identification of participants as Aboriginal or Torres Strait Islander, having a disability, or speaking a language other than English is by self-identification through return of a completed Personal Details form along with their FOBT for analysis. As membership of these subgroups is only known for invitees who participate, it is not possible to accurately determine NBCSP participation rates for these subgroups. Instead, the percentage of participants who reported as members of these subgroups is shown, and compared with the corresponding percentage of the population aged 50, 55 and 65 who declared themselves as

members of these subgroups in the 2006 Australian Census of Population and Housing. This allows an estimation of under-reporting or under-participation for these subgroups to be made, depending on the number who did not report their subgroup status.

Postcode-based subgroup identification

Subgroup analyses based on remoteness area and socioeconomic status area are based on an invitee's postcode at the time of invitation. The need to apply concordances to determine subgroup identification introduces an unavoidable level of inaccuracy. These concordances are based on 2006 postal area boundaries and classifications (See Appendix C for further details).

Overall, many postcodes may not have valid socioeconomic status or remoteness concordance data available, and many may have changed classification group since 2006. Participants whose postcode was not available in the socioeconomic status or remoteness concordance were included in an 'Unknown' grouping for the relevant disaggregation reported.

Colonoscopy follow-up

Theoretically, the denominator for the colonoscopy follow-up rate should be all positive FOBTs that were referred for colonoscopy by a PHCP. However, due to the lag time in visiting PHCPs and the low rate of PHCP Assessment form return, this cannot be accurately estimated. Instead, the total number of positive FOBTs recorded was used as the denominator.

As not all participants with a positive FOBT will be referred for a colonoscopy (for example, see tables 3.9 and 3.11), this may result in an underestimation of the true follow-up rate. The use of positive FOBTs as the denominator may also influence the rates shown in unexpected ways. For example, differences in age and sex population subgroups may be masked by differing referral rates; tables 2.2 and 3.9 show that the rate of positive FOBTs (used as the denominator for colonoscopy follow-up) increases with age, yet referrals for colonoscopy generally decrease with age.

Section 2 Performance measures

1 Participation

What do we mean by participation?

Definition: The proportion of the eligible population invited in Phase 2 who returned a completed FOBT kit for analysis.

Rationale: Through increased participation in bowel cancer screening, abnormalities that could otherwise develop into bowel cancer can be detected and treated. High participation is required for the NBCSP to achieve its major objectives of reducing bowel cancer incidence, morbidity and mortality.

Data source: National Bowel Cancer Screening Register.

Data quality: Excellent. See 'Data considerations', Section 1 for further details.

Guide to interpretation: Participation data are based on invitations and responses recorded in the Register between 1 July 2008 and 30 June 2011. Persons are counted only once in the reporting period, even if they were screened more than once.

Participation rate calculations should, in principle, exclude people from the denominator who are unlikely to require screening, such as those who have a previous diagnosis of bowel cancer, those who have had a colonoscopy in the past 5 years, or those who have completed any FOBT kit within the past 2 years. In practice, none of these groups can be reliably identified, and so all people invited to participate are included in both the denominator and the numerator. Similarly, those who had opted off or suspended their participation are included in this chapter.

Kaplan-Meier rates are presented to take into account participation lag time, as discussed under 'Crude versus estimated rates', Section 1.

Key results

- Of the 2,097,520 eligible people invited into the NBCSP in Phase 2, 806,480 (38.4%) had participated by 30 June 2011.
- Kaplan-Meier curves showed that participation rates tended to plateau about 16 weeks after original invitation.
- There were statistically significant differences in participation between the three target ages. Using Kaplan-Meier estimates at 52 weeks after invitation, the highest rate of participation was by people aged 65 (46.9%), followed by those aged 55 (38.8%). Those aged 50 had the lowest participation (34.0%).
- There was also a statistically significant difference in participation between the sexes; the women's participation rate (41.2%) was higher than that for the men (36.0%).
- Those people invited in *Remote* and *Very Remote* regions had a statistically significant lower level of participation than people invited from all other regions.
- People living in areas with the lowest socioeconomic status had a statistically significant lower level of participation than people from other socioeconomic areas.

Detailed analyses of Phase 2 response

A total of 2,101,562 FOBT invitations were sent out in Phase 2 of the NBCSP between 1 July 2008 and 30 June 2011 (Table 1.1). Of these, 4,042 were ineligible for analysis as they were sent to people outside the target ages, or to addresses that were not in Australia. Of the 2,097,520 invitations issued in Phase 2 that were then eligible for analysis, 806,480 people participated by returning a completed FOBT kit. This gave an overall Australia-wide crude participation rate of 38.4% (Table 1.2). A further 63,863 people responded by opting off or suspending participation, as at 30 June 2011. This meant 870,343 people (41.5% of invitations) responded to the invitation in some form.

Figure 1.4 presents the proportion of individuals who responded to the invitation, by time in weeks, calculated using the Kaplan-Meier estimates. Table 1.3 presents the estimated participation rate and corresponding 95% confidence intervals at 26 and 52 weeks. As most invitations were sent out well before 30 June 2011 (thus limiting the effect of the lag time in kit return), the crude and Kaplan-Meier estimate provide a similar result.

The effect of invitation reminders 8 weeks after the original invitation can be seen in figures 1.4, 1.5 and 1.6, with a second steep rise in participation between weeks 10 and 14. Participation rates generally plateau after 16 weeks from original invitation.

Participation by population subgroups

The eligible population was analysed by certain subgroups with the view that any subgroup recording a statistically significant lower participation rate may benefit from additional initiatives to increase their levels of participation.

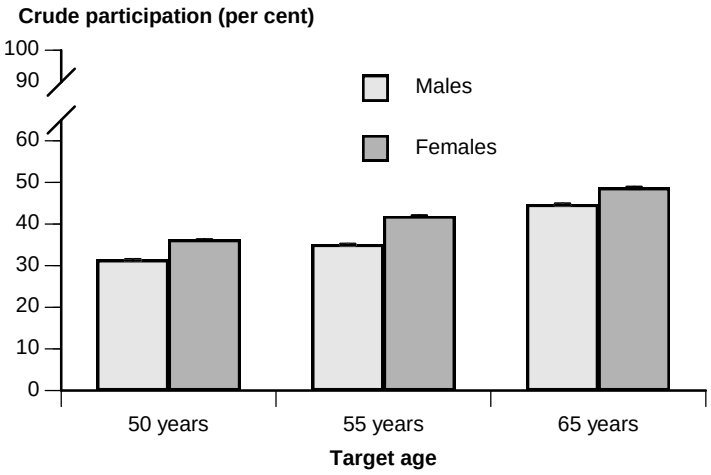
Kaplan-Meier data were used for some subgroups to show differences in participation over time (weeks) since initial invitation.

Participation by state and territory

Participation rates varied by state and territory; Northern Territory (27.7% crude participation), New South Wales (36.4%) and Queensland (37.4%) were statistically significantly lower than the other jurisdictions (Table 1.2). Participation rates were statistically significantly higher than the overall Australian rate in all other jurisdictions. These differences were also evident in the Kaplan-Meier estimates for both 26 and 52 weeks post-invitation (Table 1.3).

Participation by age and sex

Participation differences between ages and sexes were similar to those shown in previous NBCSP monitoring reports; participation was statistically significantly higher with increasing age, and was also higher for women than men (figures 1.1, 1.5 and 1.6). This trend was across all population subgroups.



Note: Bars on columns represent 95% confidence intervals.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

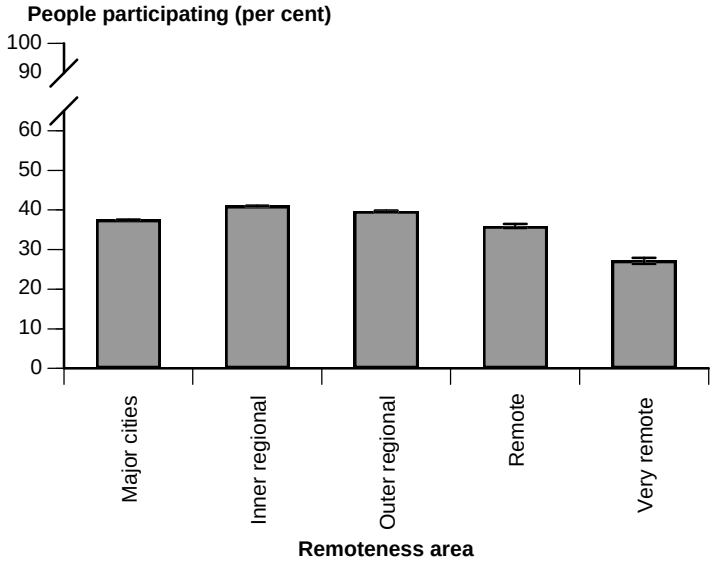
Figure 1.1: Crude participation, by age and sex, Phase 2

Table 1.4 and Figure 1.5 highlight the difference in participation rates between the three ages invited. Using Kaplan-Meier estimates at 52 weeks post-invitation, those aged 55 (38.8% participation) were 1.1 times more likely to have participated than those aged 50 (34.0%). Those aged 65 (46.9%) were 1.4 times more likely to have participated than 50 year olds.

Table 1.5 and Figure 1.6 show that women were 1.1 times more likely to participate than men (41.2% Kaplan-Meier estimated participation for women compared with 36.0% for men after 52 weeks). Research has suggested that previous contact with cancer screening (such as cervical or breast cancer screening) predicts an improved likelihood of bowel cancer screening (Gregory et al. 2011), and this may be a factor influencing the sex-specific differences in participation.

Participation by remoteness area and socioeconomic status area

While more than 65% of all Phase 2 NBCSP participants came from *Major cities* (with a 37.6% crude participation rate), participation was statistically significantly higher in *Inner regional* (41.1%) and *Outer regional* (39.9%) areas than the remaining geographical areas (Table 1.6 and Figure 1.2). The remaining areas (*Major cities*, *Remote* and *Very remote*) all had statistically significantly lower crude participation than the Australian average.

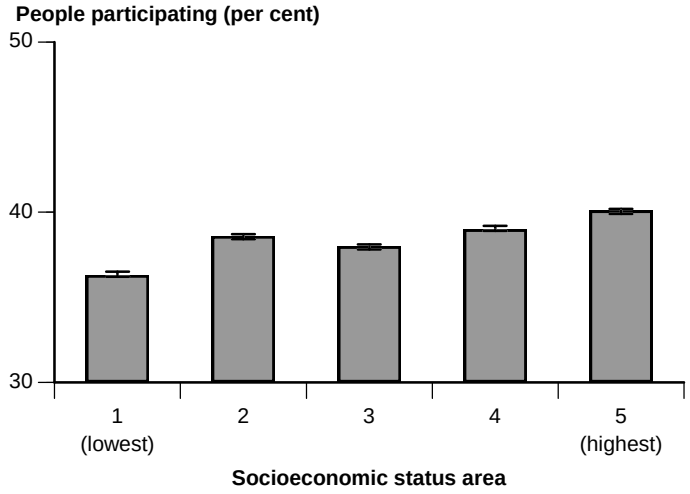


Note: Bars on columns represent 95% confidence intervals.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Figure 1.2: Crude participation, by remoteness area, Phase 2

Analysis of invitees grouped into population-based socioeconomic status areas showed participation by invitees from within the lowest socioeconomic area was statistically significantly lower than for those living in all other socioeconomic areas (Table 1.7 and Figure 1.3).



Notes

1. Bars on columns represent 95% confidence intervals.

2. For clarity, Y axis scale range shows 30–50 people per 100 participation.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Figure 1.3: Crude participation, by socioeconomic status area, Phase 2

Participation by Aboriginal and Torres Strait Islander status, language spoken at home and disability subgroups

As discussed under 'Data considerations', Section 1, details of an invitee's status regarding these subgroups is not known at the time of invitation—these details are only collected if a person becomes a participant in the NBCSP and completes the relevant section of their Participant Details form. Hence, as the number of people invited into the NBCSP of these subgroups is not known, it is not possible to accurately determine their subsequent participation levels.

Instead, the proportion of participants who reported their status within these subgroups is shown, along with the corresponding population proportions derived from those reported in the 2006 Census of Population and Housing. As the relevant subgroup questions on the NBCSP Participant Details form are worded identically to those in the Census, basic comparisons can be made. While it should be noted that proportions may have changed since the 2006 Census, these data allow two things to be determined:

1. Comparing the percentage of people who did not answer these questions (that is, those counted in the 'Not stated' columns) between the NBCSP participation data and the 2006 Census data provides an indication of the data quality.
2. If the data quality compared with the 2006 Census appears reasonable, an estimation of the level of participation of those within the subgroup can be made.

As the 'Not stated' percentages for questions related to Aboriginal and Torres Strait Islander status and disability status were similar between NBCSP participation data and the 2006 Census, it can be assumed that these questions were answered thoroughly for NBCSP participants (tables 1.8 and 1.10).

The proportion of participants who identified as Indigenous in the NBCSP was consistently lower than the comparable proportion who identified as Indigenous in the 2006 Census (Table 1.8). This may have been due to:

1. The proportions of Indigenous and non-Indigenous people in the Australian population having changed slightly since the 2006 Census.
2. The eligible population who were Indigenous having participated at a lower rate than the eligible population who were non-Indigenous. That is, 0.6% of the eligible population who participated were reported as Indigenous, compared with 2.3% of the eligible population reporting as Indigenous at the time of the 2006 Census.

However, it should be noted that the proportion who did not respond to this question in the NBCSP was also consistently lower than in the 2006 Census.

Conversely, as the proportion of participants who identified as having a severe of profound activity limitation (5.0%) was slightly greater than the proportion identified in the 2006 Census (3.9%), it may be concluded that participation among this subgroup was at least equal to that of those without severe or profound activity limitations (Table 1.10). However, participation outcomes for the Aboriginal and Torres Strait Islander and language spoken at home subgroups cannot be statistically verified with the available data.

As the Register assumes all people who do not answer the question regarding language spoken at home speak English, it was not possible to determine the 'Not stated' percentage for comparison with the percentage from the 2006 Census (Table 1.9). Therefore, no interpretation regarding participation rates by people who speak a language other than English at home should be made.

Recent research into NBCSP participation

A number of research studies have been undertaken in recent years to investigate participation and barriers to bowel screening participation in subgroups such as Indigenous Australians and those in specific minority groups.

- Severino et al. (2009)
- Weber et al. (2009)
- Christou, Katzenellenbogen & Thompson (2010)
- Paddison & Yip (2010)
- Gregory et al. (2011)

See References for publication details.

Participation tables and figures

Table 1.1: Screening invitation, by state and territory, Phase 2

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Unknown[f]	Australia
Invitations issued[a]										
50 years	298,047	225,172	182,030	93,980	70,132	22,574	15,081	8,937	22	915,975
55 years	224,078	168,775	135,206	70,946	53,215	17,441	11,086	6,368	15	687,130
65 years	167,565	118,912	98,955	47,340	37,832	13,583	7,212	3,053	15	494,467
Other[f]	1,229	983	791	381	273	102	38	193	0	3,990
Total	**690,919**	**513,842**	**416,982**	**212,647**	**161,452**	**53,700**	**33,417**	**18,551**	**52**	**2,101,562**
Persons suspended[b]										
50 years	1,423	1,331	950	496	445	140	102	36	. .	4,923
55 years	1,460	1,180	904	504	419	166	104	27	. .	4,764
65 years	1,961	1,348	1,169	580	562	218	145	34	. .	6,017
Total	*4,844*	*3,859*	*3,023*	*1,580*	*1,426*	*524*	*351*	*97*	. .	*15,704*
Persons opting off[c]										
50 years	3,809	3,303	2,527	1,159	1,057	375	212	84	. .	12,526
55 years	4,223	3,494	2,679	1,229	1,203	407	203	89	. .	13,527
65 years	7,378	5,465	4,574	1,862	1,802	628	289	108	. .	22,106
Total	*15,410*	*12,262*	*9,780*	*4,250*	*4,062*	*1,410*	*704*	*281*	. .	*48,159*
Persons participating[d]										
50 years	95,143	78,684	59,024	35,333	25,993	8,496	5,422	2,208	. .	310,303
55 years	81,407	66,190	50,464	30,358	22,808	7,492	4,575	1,858	. .	265,152
65 years	74,398	54,536	46,057	24,544	20,070	6,781	3,628	1,011	. .	231,025
Total	*250,948*	*199,410*	*155,545*	*90,235*	*68,871*	*22,769*	*13,625*	*5,077*	. .	*806,480*
Total respondents[e]										
50 years	100,375	83,318	62,501	36,988	27,495	9,011	5,736	2,328		327,752
55 years	87,090	70,864	54,047	32,091	24,430	8,065	4,882	1,974		283,443
65 years	83,737	61,349	51,800	26,986	22,434	7,627	4,062	1,153		259,148
Total	**271,202**	**215,531**	**168,348**	**96,065**	**74,359**	**24,703**	**14,680**	**5,455**		**870,343**

(a) Invitations to screen were issued between 1 July 2008 and 30 June 2011 to all members of the Australian population (registered with DoHS or the Department of Veterans' Affairs) who turned 50, 55 or 65 between 1 January 2008 and 31 December 2010.

(b) 'Persons suspended' refers to those people invited to participate in the NBCSP who did not return an FOBT kit, but elected to suspend participation until a later date.

(c) 'Persons opting off' refers to those people invited to participate in the NBCSP who did not return an FOBT kit, but elected to opt off.

(d) 'Persons participating' refers to people invited to participate in the NBCSP who returned an FOBT kit for analysis, regardless of whether they later suspended or opted off.

(e) 'Total respondents' refers to the number of people invited who returned a response (returned an FOBT kit, or suspension/opt off request).

(f) Invitations to those not of the three target ages at the time of invitation, or to addresses overseas were excluded from further analysis.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 1.2: Crude participation, by state and territory, Phase 2

		NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Males										
50 years	Number	44,487	36,008	27,468	16,462	12,021	3,796	2,488	1,049	143,779
	Per cent	29.9	32.2	30.3	35.0	34.4	34.4	33.8	23.0	31.5
55 years	Number	37,096	29,526	22,702	13,767	10,346	3,304	2,052	885	119,678
	Per cent	33.3	35.5	33.8	39.1	39.2	38.9	38.4	26.8	35.1
65 years	Number	35,741	25,591	22,283	12,126	9,463	3,216	1,726	541	110,687
	Per cent	42.6	43.6	44.4	50.0	51.1	47.4	48.7	31.6	44.7
Total	*Number*	*117,324*	*91,125*	*72,453*	*42,355*	*31,830*	*10,316*	*6,266*	*2,475*	*374,144*
	Per cent	*34.1*	*35.9*	*34.8*	*39.7*	*39.8*	*39.2*	*38.5*	*25.8*	*35.8*
	95% CI	*34.0–34.3*	*35.7–36.1*	*34.6–35.0*	*39.5–40.0*	*39.5–40.2*	*38.6–39.8*	*37.8–39.3*	*25.0–26.7*	*35.7–35.9*
Females										
50 years	Number	50,656	42,676	31,556	18,871	13,972	4,700	2,934	1,159	166,524
	Per cent	33.9	37.7	34.6	40.2	39.8	40.8	38.0	26.5	36.2
55 years	Number	44,311	36,664	27,762	16,591	12,462	4,188	2,523	973	145,474
	Per cent	39.3	42.9	40.8	46.5	46.4	46.8	44.0	31.7	42.0
65 years	Number	38,657	28,945	23,774	12,418	10,607	3,565	1,902	470	120,338
	Per cent	46.2	48.0	48.7	53.8	54.9	52.4	51.8	35.1	48.7
Total	*Number*	*133,624*	*108,285*	*83,092*	*47,880*	*37,041*	*12,453*	*7,359*	*2,602*	*432,336*
	Per cent	*38.7*	*41.8*	*39.9*	*45.3*	*45.6*	*45.7*	*43.0*	*29.6*	*41.1*
	95% CI	*38.5–38.8*	*41.6–42.0*	*39.7–40.1*	*45.0–45.6*	*45.2–45.9*	*45.1–46.3*	*42.2–43.7*	*28.7–30.6*	*41.0–41.1*
Persons										
50 years	Number	95,143	78,684	59,024	35,333	25,993	8,496	5,422	2,208	310,303
	Per cent	31.9	34.9	32.4	37.6	37.1	37.6	36.0	24.7	33.9
55 years	Number	81,407	66,190	50,464	30,358	22,808	7,492	4,575	1,858	265,152
	Per cent	36.3	39.2	37.3	42.8	42.9	43.0	41.3	29.2	38.6
65 years	Number	74,398	54,536	46,057	24,544	20,070	6,781	3,628	1,011	231,025
	Per cent	44.4	45.9	46.5	51.8	53.1	49.9	50.3	33.1	46.7
Total	**Number**	**250,948**	**199,410**	**155,545**	**90,235**	**68,871**	**22,769**	**13,625**	**5,077**	**806,480**
	Per cent	**36.4**	**38.9**	**37.4**	**42.5**	**42.7**	**42.5**	**40.8**	**27.7**	**38.4**
	95% CI	**36.3–36.5**	**38.7–39.0**	**37.2–37.5**	**42.3–42.7**	**42.5–43.0**	**42.1–42.9**	**40.3–41.3**	**27.0–28.3**	**38.4–38.5**

Notes

1. Participants in the Program were defined as members of the eligible population who returned a completed FOBT kit.
2. Percentages equal people participating as a proportion of the total number of the eligible population who were invited to screen. This includes people who suspended or opted off.

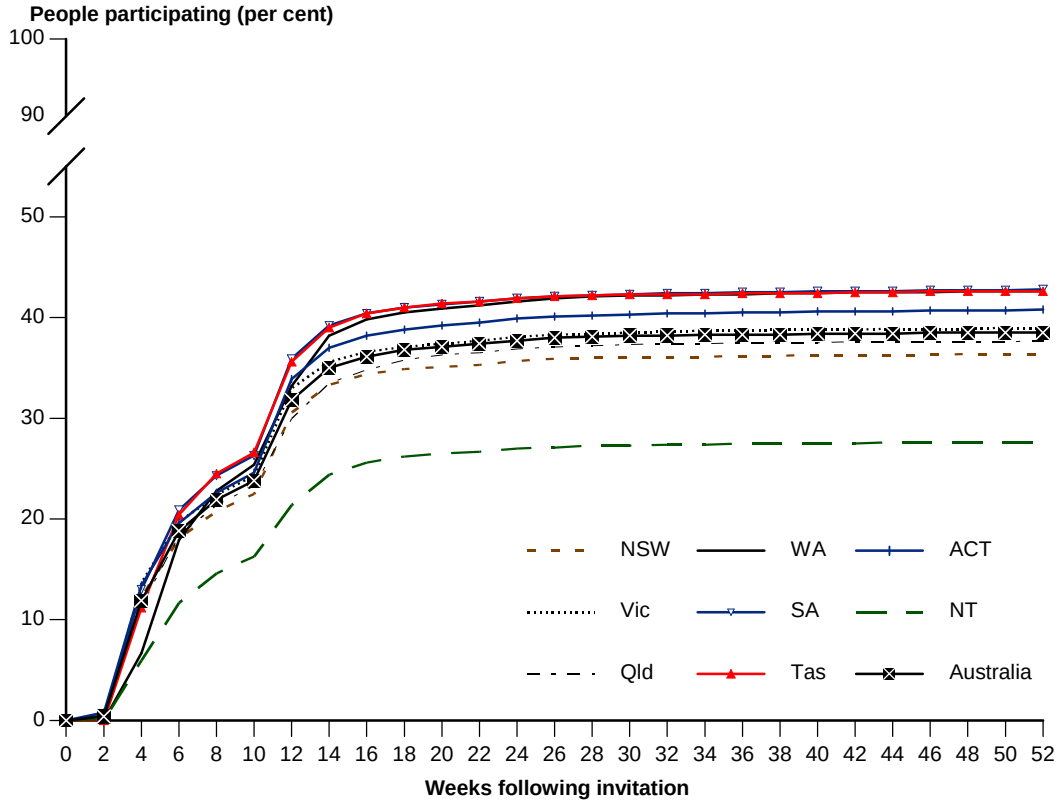
Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 1.3: Kaplan-Meier estimated participation rates at 26 and 52 weeks since invitation, by state and territory, Phase 2

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
26 weeks									
People participating (per cent)	35.9	38.4	37.2	41.9	42.2	42.1	40.1	27.3	38.0
95% CI	35.8–36.0	38.2–38.5	37.0–37.3	41.7–42.1	42.0–42.5	41.7–42.6	39.6–40.6	26.6–27.9	37.9–38.1
52 weeks									
People participating (per cent)	36.5	39.0	37.7	42.7	42.9	42.7	40.8	27.7	38.6
95% CI	36.3–36.6	38.9–39.2	37.6–37.9	42.4–42.9	42.6–43.1	42.2–43.1	40.3–41.3	27.1–28.4	38.5–38.7

Note: Participation rates equal the estimated Kaplan-Meier participation rate of people who returned a completed FOBT kit as a proportion of the total number of the eligible population who were invited to screen, including people who suspended or opted off the Program.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.



Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Figure 1.4: Participation, by weeks since invitation using Kaplan-Meier estimates, by state and territory, Phase 2

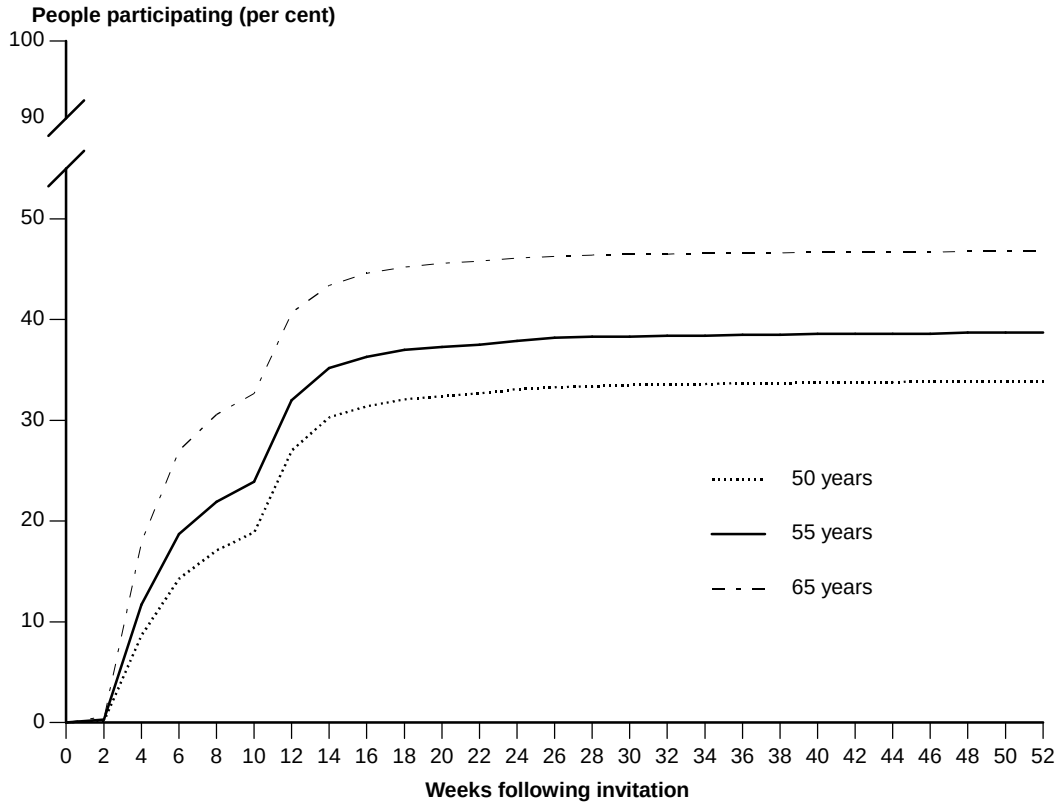
Participation by population subgroups

Table 1.4: Kaplan-Meier estimated participation rates at 26 and 52 weeks since invitation, by age, Phase 2

	50 years	55 years	65 years
26 weeks			
People participating (per cent)	33.3	38.2	46.4
95% CI	33.2–33.4	38.1–38.3	46.2–46.5
52 weeks			
People participating (per cent)	34.0	38.8	46.9
95% CI	33.9–34.1	38.7–38.9	46.7–47.0

Note: Participation rates equal the estimated Kaplan-Meier participation rate of people who returned a completed FOBT kit as a proportion of the total number of the eligible population who were invited to screen, including people who suspended or opted off the Program.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.



Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

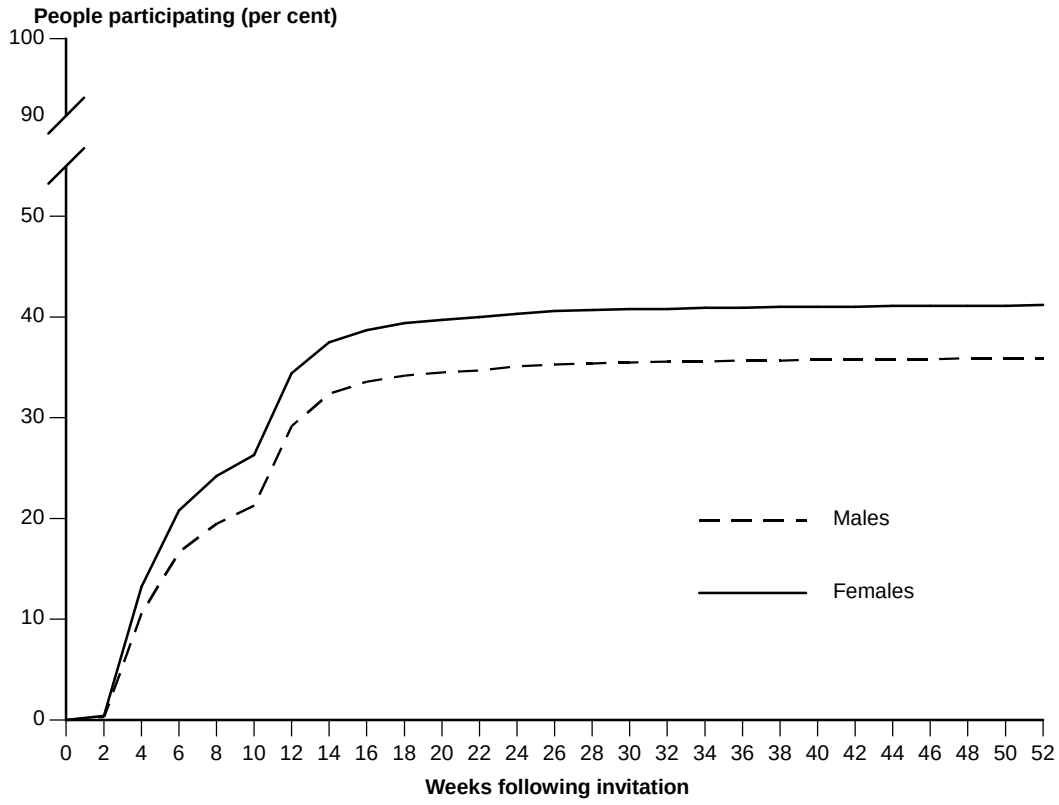
Figure 1.5: Participation, by weeks since invitation using Kaplan-Meier estimates, by age, Phase 2

Table 1.5: Kaplan-Meier estimated participation rates at 26 and 52 weeks since invitation, by sex, Phase 2

	Males	Females
26 weeks		
People participating (per cent)	35.4	40.6
95% CI	35.3–35.5	40.5–40.7
52 weeks		
People participating (per cent)	36.0	41.2
95% CI	35.9–36.1	41.1–41.3

Note: Participation rates equal the estimated Kaplan-Meier participation rate of people who returned a completed FOBT kit as a proportion of the total number of the eligible population who were invited to screen, including people who suspended or opted off the Program.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.



Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Figure 1.6: Participation, by weeks since invitation using Kaplan-Meier estimates, by sex, Phase 2

Table 1.6: Crude participation, by remoteness area, Phase 2

		Remoteness area						
		Major cities	Inner regional	Outer regional	Remote	Very remote	Unknown	Total
Males								
50 years	Number	97,139	29,610	14,224	1,950	764	91	143,779
	Per cent	31.5	32.2	31.2	28.9	23.0	32.4	31.5
55 years	Number	78,118	26,376	12,859	1,580	668	77	119,678
	Per cent	34.5	37.1	36.8	31.5	26.3	34.2	35.1
65 years	Number	68,940	27,449	12,279	1,450	509	60	110,687
	Per cent	43.4	48.1	46.2	42.7	33.8	35.7	44.7
Total	*Number*	*244,198*	*83,436*	*39,362*	*4,980*	*1,941*	*228*	*374,144*
	Per cent	*35.2*	*37.9*	*36.7*	*32.8*	*26.4*	*33.8*	*35.8*
	95% CI	*35.1–35.3*	*37.7–38.1*	*36.5–37.0*	*32.1–33.6*	*25.3–27.4*	*30.3–37.4*	*35.7–35.9*
Females								
50 years	Number	111,637	35,577	16,307	2,126	790	88	166,524
	Per cent	35.7	38.0	37.3	34.4	25.3	39.8	36.2
55 years	Number	95,621	32,687	14,592	1,792	678	104	145,474
	Per cent	40.8	45.3	44.2	41.2	30.4	40.8	42.0
65 years	Number	75,363	30,388	12,784	1,366	381	56	120,338
	Per cent	46.8	52.9	52.1	49.1	34.0	42.1	48.7
Total	*Number*	*282,622*	*98,652*	*43,682*	*5,284*	*1,848*	*248*	*432,336*
	Per cent	*39.9*	*44.2*	*43.2*	*39.7*	*28.5*	*40.7*	*41.1*
	95% CI	*39.8–40.0*	*44.0–44.4*	*42.8–43.5*	*38.9–40.5*	*27.4–29.6*	*36.8–44.6*	*41.0–41.1*
Persons								
50 years	Number	208,776	65,187	30,530	4,076	1,554	179	310,303
	Per cent	33.6	35.1	34.2	31.5	24.1	35.7	33.9
55 years	Number	173,740	59,063	27,451	3,372	1,345	181	265,152
	Per cent	37.7	41.2	40.4	36.0	28.2	37.7	38.6
65 years	Number	144,304	57,837	25,063	2,816	889	116	231,025
	Per cent	45.1	50.5	49.0	45.6	33.8	38.5	46.7
Total	**Number**	**526,819**	**182,087**	**83,044**	**10,264**	**3,789**	**476**	**806,480**
	Per cent	**37.6**	**41.1**	**39.9**	**36.0**	**27.4**	**37.1**	**38.4**
	95% CI	**37.5–37.7**	**40.9–41.2**	**39.6–40.1**	**35.5–36.6**	**26.6–28.1**	**34.5–39.7**	**38.4–38.5**

Notes

1. Percentages equal the number of people returning a completed FOBT kit as a proportion of the total number of the eligible population who were invited to screen.
2. The residential postcodes of invitees and respondents were mapped to remoteness areas in the Australian Standard Geographic Classification for 2006 through a postal area concordance. Those that could not be mapped were included in the 'Unknown' column.
3. Because some postcodes cross regional boundaries, totals may not add up due to rounding.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 1.7: Crude participation, by socioeconomic status area, Phase 2

		Socioeconomic status area						
		1 (lowest)	2	3	4	5 (highest)	Unknown	Total
Males								
50 years	Number	25,727	27,311	28,004	29,464	31,353	1,920	143,779
	Per cent	29.1	30.6	31.1	32.7	34.0	31.6	31.5
55 years	Number	22,306	23,925	23,195	23,590	25,043	1,619	119,678
	Per cent	33.3	35.3	34.9	35.7	36.5	33.9	35.1
65 years	Number	22,526	23,455	21,009	20,332	21,959	1,406	110,687
	Per cent	43.0	45.6	44.4	45.5	45.5	41.1	44.7
Total	*Number*	*70,559*	*74,691*	*72,208*	*73,386*	*78,355*	*4,945*	*374,144*
	Per cent	*34.0*	*35.8*	*35.4*	*36.5*	*37.5*	*34.7*	*35.8*
	95% CI	*33.8–34.2*	*35.6–36.0*	*35.2–35.6*	*36.3–36.7*	*37.3–37.7*	*33.9–35.4*	*35.7–35.9*
Females								
50 years	Number	29,141	31,710	32,614	34,077	37,071	1,911	166,524
	Per cent	33.7	35.7	35.8	37.3	38.5	35.7	36.2
55 years	Number	26,469	28,926	28,354	28,645	31,269	1,811	145,474
	Per cent	39.8	42.3	41.8	42.4	43.6	41.9	42.0
65 years	Number	23,837	25,898	23,057	22,126	24,208	1,212	120,338
	Per cent	46.4	50.3	48.3	49.3	49.6	46.2	48.7
Total	*Number*	*79,447*	*86,534*	*84,025*	*84,848*	*92,548*	*4,934*	*432,336*
	Per cent	*38.8*	*41.4*	*40.6*	*41.6*	*42.7*	*40.1*	*41.1*
	95% CI	*38.6–39.1*	*41.2–41.7*	*40.4–40.9*	*41.4–41.8*	*42.5–42.9*	*39.3–41.0*	*41.0–41.1*
Persons								
50 years	Number	54,868	59,021	60,618	63,541	68,424	3,831	310,303
	Per cent	31.3	33.1	33.4	35.0	36.3	33.5	33.9
55 years	Number	48,775	52,851	51,549	52,235	56,312	3,430	265,152
	Per cent	36.5	38.8	38.4	39.1	40.1	37.7	38.6
65 years	Number	46,363	49,353	44,066	42,458	46,167	2,618	231,025
	Per cent	44.7	48.0	46.4	47.4	47.6	43.3	46.7
Total	**Number**	**150,006**	**161,225**	**156,233**	**158,234**	**170,903**	**9,879**	**806,480**
	Per cent	**36.4**	**38.6**	**38.0**	**39.1**	**40.1**	**37.2**	**38.4**
	95% CI	**36.2–36.5**	**38.5–38.8**	**37.9–38.2**	**38.9–39.2**	**40.0–40.3**	**36.6–37.8**	**38.4–38.5**

Notes

1. Percentages equal the number of people returning a completed FOBT kit as a proportion of the total number of the eligible population who were invited to screen.
2. An invitee's socioeconomic status area was classified by mapping their residential postcode (through a postal area) to the ABS IRSD for 2006. Those that could not be mapped were included in the 'Unknown' column.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 1.8: Proportion of participants who indicated Aboriginal and Torres Strait Islander status, Phase 2

	NBCSP participants							2006 Census		
	Indigenous		Non-Indigenous		Not stated		Total	Indigenous	Non-Indigenous	Not stated
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent		
Males										
50 years	956	0.7	135,962	94.6	6,861	4.8	143,779	1.5	93.0	5.5
55 years	755	0.6	113,199	94.6	5,724	4.8	119,678	1.1	93.3	5.5
65 years	497	0.4	104,432	94.3	5,758	5.2	110,687	0.8	93.4	5.8
Total	*2,208*	*0.6*	*353,593*	*94.5*	*18,343*	*4.9*	*374,144*	*1.2*	*93.2*	*5.6*
Females										
50 years	1,153	0.7	159,173	95.6	6,198	3.7	166,524	1.5	93.9	4.5
55 years	938	0.6	138,972	95.5	5,564	3.8	145,474	1.3	94.2	4.6
65 years	526	0.4	114,435	95.1	5,377	4.5	120,338	1.0	93.6	5.4
Total	*2,617*	*0.6*	*412,580*	*95.4*	*17,139*	*4.0*	*432,336*	*1.3*	*93.9*	*4.7*
Persons										
50 years	2,109	0.7	295,135	95.1	13,059	4.2	310,303	1.5	93.5	5.0
55 years	1,693	0.6	252,171	95.1	11,288	4.3	265,152	1.2	93.7	5.1
65 years	1,023	0.4	218,867	94.7	11,135	4.8	231,025	0.9	93.5	5.6
Total	**4,825**	**0.6**	**766,173**	**95.0**	**35,482**	**4.4**	**806,480**	**1.3**	**93.6**	**5.2**

Notes

1. NBCSP percentages equal the number of people returning a completed FOBT who indicated their Aboriginal and Torres Strait Islander status as a proportion of the total number of people returning a completed FOBT.
2. NBCSP Aboriginal and Torres Strait Islander status was reported by the participant on the returned Participant Details form. Participants who did not indicate Aboriginal and Torres Strait Islander status were included in the 'Not stated' column.
3. Indigenous status proportions as recorded at the 2006 Australian Census of Population and Housing are included for comparative purposes.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 1.9: Proportion of participants who indicated preferred language spoken at home, Phase 2

	NBCSP participants					2006 Census		
	Language other than English		English		Total	Language other than English	English	Not stated
	Number	Per cent	Number	Per cent	Number	Per cent		
Males								
50 years	18,270	12.7	125,509	87.3	143,779	15.2	79.3	5.5
55 years	14,464	12.1	105,214	87.9	119,678	14.1	80.5	5.4
65 years	11,298	10.2	99,389	89.8	110,687	16.2	78.4	5.5
Total	*44,032*	*11.8*	*330,112*	*88.2*	*374,144*	*15.0*	*79.5*	*5.5*
Females								
50 years	22,451	13.5	144,073	86.5	166,524	16.8	78.9	4.3
55 years	18,226	12.5	127,248	87.5	145,474	15.5	80.3	4.2
65 years	11,818	9.8	108,520	90.2	120,338	16.7	78.6	4.7
Total	*52,495*	*12.1*	*379,841*	*87.9*	*432,336*	*16.3*	*79.4*	*4.3*
Persons								
50 years	40,721	13.1	269,582	86.9	310,303	16.0	79.1	4.9
55 years	32,690	12.3	232,462	87.7	265,152	14.8	80.4	4.8
65 years	23,116	10.0	207,909	90.0	231,025	16.4	78.5	5.1
Total	**96,527**	**12.0**	**709,953**	**88.0**	**806,480**	**15.7**	**79.4**	**4.9**

Notes

1. NBCSP percentages equal the number of people returning a completed FOBT who indicated their preferred language spoken at home as a proportion of the total number of people returning a completed FOBT.
2. NBCSP preferred language spoken at home was reported by the participant on the returned Participant Details form. Participants who did not indicate preferred language spoken at home were assumed to speak English.
3. Language spoken at home proportions as recorded at the 2006 Australian Census of Population and Housing are included for comparative purposes.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 1.10: Proportion of participants who indicated disability status, Phase 2

	NBCSP participants							2006 Census		
	Severe or profound activity limitation		No severe or profound activity limitation		Not stated		Total	Severe or profound activity limitation	No severe or profound activity limitation	Not stated
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent		
Males										
50 years	5,302	3.7	129,757	90.2	8,720	6.1	143,779	2.9	91.1	6.0
55 years	5,287	4.4	106,904	89.3	7,487	6.3	119,678	3.8	90.4	5.8
65 years	7,973	7.2	95,495	86.3	7,219	6.5	110,687	6.4	87.7	5.9
Total	*18,562*	*5.0*	*332,156*	*88.8*	*23,426*	*6.3*	*374,144*	*4.1*	*90.0*	*5..9*
Females										
50 years	7,495	4.5	151,259	90.8	7,770	4.7	166,524	2.9	92.4	4.7
55 years	7,268	5.0	131,170	90.2	7,036	4.8	145,474	3.6	91.8	4.6
65 years	7,085	5.9	106,866	88.8	6,387	5.3	120,338	5.4	89.4	5.2
Total	*21,848*	*5.1*	*389,295*	*90.0*	*21,193*	*4.9*	*432,336*	*3.8*	*91.5*	*4.8*
Persons										
50 years	12,797	4.1	281,016	90.6	16,490	5.3	310,303	2.9	91.8	5.4
55 years	12,555	4.7	238,074	89.8	14,523	5.5	265,152	3.7	91.1	5.2
65 years	15,058	6.5	202,361	87.6	13,606	5.9	231,025	5.9	88.6	5.5
Total	**40,410**	**5.0**	**721,451**	**89.5**	**44,619**	**5.5**	**806,480**	**3.9**	**90.8**	**5.3**

Notes

1. NBCSP percentages equal the number of people returning a completed FOBT who indicated their disability status as a proportion of the total number of people returning a completed FOBT.
2. NBCSP disability status was reported by the participant on the Participant Details form. Participants who did not indicate disability status are included in the 'Not stated' column.
3. A 'profound' activity limitation indicates that a person always needs assistance with self-care, movement and/or communications activities. A 'severe' activity limitation indicates that a person sometimes needs assistance with these activities.
4. Activity limitation status proportions as recorded at the 2006 Australian Census of Population and Housing are included for comparative purposes.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

2 Faecal occult blood test outcomes

What do we mean by FOBT outcomes?

Definition: The proportion of the eligible population invited in Phase 2 who returned a positive result from a correctly completed FOBT kit.

Rationale: Monitoring of FOBT outcomes, including for various subgroups, is important to ensure the quality of the screening test results and participant safety.

Data source: National Bowel Cancer Screening Register.

Data quality: Excellent. See 'Data considerations', Section 1 for further details.

Guide to interpretation: FOBT result data are based on data recorded in the Register to 30 June 2011 for persons invited between 1 July 2008 and 30 June 2011.

Persons are counted only once in the reporting period, even if they completed more than one FOBT during this period. For participants who returned more than one FOBT kit, the results were analysed according to the following order of precedence: a positive result was selected over any other result, and a negative result was selected over an inconclusive result.

This chapter provides overall FOBT results for Phase 2 of the NBCSP. Problems with the accuracy of the FOBT kit in 2009 resulting in temporary suspension of the NBCSP are detailed separately in '6 Program suspension, remediation and resumption', Section 2.

Key results

- Of the 806,480 participants who had completed an FOBT kit, 794,454 (98.5%) had done so correctly, allowing for analysis by the pathology laboratory. However, 308 were inconclusive when analysed.
- Out of the 794,146 valid FOBT kits analysed, 62,067 returned a positive result, giving an overall positivity rate of 7.8%. There were different FOBT positivity rates for the three different FOBT kits used within Phase 2. See '6 Program suspension, remediation and resumption', Section 2 for details.
- The positivity rate for men (8.8%) was 1.3 times that for women (7.0%).
- The FOBT positivity rates for both sexes increased with older age, consistent with the increase in actual bowel cancer incidence with increasing age.
- Positivity rates increased with increasing geographic remoteness. Rates for participants in *Very remote* (9.5%), *Remote* (9.2%), *Outer regional* (8.6%) and *Inner regional* (8.0%) areas were all statistically significantly higher than for participants in *Major cities* (7.6%).
- Positivity rates also increased for participants living in areas with increasing socioeconomic disadvantage, from 6.7% for participants living in areas with the highest socioeconomic status, to 9.1% for participants living in areas with the lowest socioeconomic status.
- Participants reporting as Aboriginal and Torres Strait Islander (10.8%) had a statistically significant higher positivity rate than those who reported as non-Indigenous, (7.7%), or those who did not state their Indigenous status (8.9%).
- The positivity rate of participants with a severe or profound activity limitation (12.1%) was statistically significantly higher than participants without those limitations (7.6%).

Background information

Each invitee in the NBCSP is initially sent one FOBT kit containing two sample tubes to be completed and returned to the pathology laboratory for analysis. Pathologists categorise these returned FOBTs into three groups: correctly completed, incorrectly completed or unsatisfactory. A kit may be incorrectly completed or unsatisfactory (and thus ineligible for analysis) due to:

- the participant not completing the test correctly
- the completed kit having expired
- a gap of more than 2 weeks between the dates of the two samples collected
- the kit having taken more than 1 month between the first sample date and arrival at the pathology laboratory for analysis.

Participants with FOBTs that are not correctly completed are requested to complete another FOBT. See Figure B.1, Appendix B for details of the screening pathway.

Results of correctly completed FOBT kits are classified by pathologists as either positive (blood was detected in either sample), negative (blood was not detected in either sample) or inconclusive (only one sample was taken, and it was negative). Valid kits are considered to be those from which it is possible to determine a positive or negative outcome.

Participants with a positive FOBT are encouraged to visit their PHCP to follow up this finding. Those with an inconclusive kit are requested to complete another FOBT kit, while those with a negative result are reminded that it is recommended they rescreen every 2 years with an FOBT. Participants are advised to discuss continuing screening options with their PHCP.

Different FOBT kits used in Phase 2

Three different FOBT kits were used in Phase 2. These kits had different positivity rates. See '6 Program suspension, remediation and resumption', Section 2 for further details of these kits and differences in outcomes; this chapter provides overall Phase 2 FOBT positivity results only.

Program adjustments to improve FOBT accuracy

To avoid the possibility of samples deteriorating due to exposure to heat and delays in processing (van Rossum et al. 2009; Grazzini et al. 2010), the following changes were made to kit instructions and processing after the Program was suspended in May 2009 and restarted in October 2009:

- 'hot zone' postcodes were used. Participants in these postcodes were not sent kits during months where the average temperature has historically been greater than 30.5 degrees Celsius
- enhanced collection and sample storage instructions were given with new kits
- the acceptable time frame between the date of first sample and analysis was reduced to 14 days (down from 1 month).

Mandatory folic acid fortification in Australia

Mandatory folic acid fortification of bread-making flour began in Australia in October 2009, with the aim of decreasing the incidence of neural tube defects in newborns (AIHW 2011). During investigation into the development of this standard, Food Standards Australia New

Zealand (FSANZ) looked into the risk of potential adverse events related to increasing the level of folic acid in the population food supply.

It had earlier been speculated by Kim (2004) that while increases in folic acid had been shown to reduce neural tube defects, they may also increase the rate of growth of pre-existing bowel cancers and adenomas, yet decrease the risk of future bowel cancers where no pre-cancerous lesions already existed. The review of research in this area by FSANZ in 2007 found the results were equivocal at that time. However, data from additional studies since that time indicated that the introduction of mandatory folic acid fortification in the United States, Canada and Chile coincided with short-term increases in bowel cancer incidence in those countries (Mason et al. 2007; Hirsch et al. 2009). This would seem to correlate with the hypothesis that increased folic acid increases pre-existing cancers, but not the growth of new cancers. However, no causal relationship has been supported by unequivocal results from clinical trials (Herrmann & Obeid 2011).

With this in mind, FSANZ recommended it was critical that ongoing monitoring of bowel cancer rates occur in Australia. Therefore, a baseline report for monitoring mandatory folic acid fortification was prepared (AIHW 2011). Bowel cancer screening, incidence and mortality statistics were included until 2008, to allow pre-fortification baseline data to be compared with post-fortification data. However, causality attributed to any increase in bowel cancer incidence from mandatory folic acid fortification post-October 2009 cannot be readily proven with these data.

This Phase 2 report provides the first screening data post-mandatory fortification, where changes in FOBT positivity may be of interest.

Detailed faecal occult blood test outcome analyses

There were 2,097,520 eligible people invited to screen in Phase 2 of the NBCSP, and by 30 June 2011, 806,480 participants had returned at least one completed FOBT kit. Of these, 794,454 (98.5%) had a correctly completed FOBT kit tested by the pathology laboratory (Table 2.1); the rest of the kits had been incorrectly completed. Of the correctly completed kits, 308 were, however, deemed inconclusive when tested. Those participants recorded as having inconclusive or incorrectly completed FOBT kits were requested to complete another FOBT, but some had not returned a correctly completed kit by 30 June 2011.

Of the 794,146 valid FOBT kits analysed, 62,067 (7.8%) returned a positive FOBT result (Table 2.2). These people were advised to consult their PHCP to discuss this result and seek further diagnostic testing ('3 Follow-up of positive FOBT results', Section 2).

Box 2.1 Interpretation of Phase 2 FOBT results

The Phase 2 positivity rate was higher than in previous NBCSP monitoring reports and this may be related to the different kits used within Phase 2, retesting as part of remediation actions in Phase 2, or other unknown factors. Positivity rates for the different FOBT kits used in Phase 2 are analysed and discussed further in '6 Program suspension, remediation and resumption', Section 2.

Faecal occult blood test outcomes by population subgroups

Faecal occult blood test outcomes by state and territory

Most jurisdictions had overall positivity rates that did not significantly differ from the Australian positivity rate (Table 2.3). However, the positivity rates for Tasmania (8.9%) and

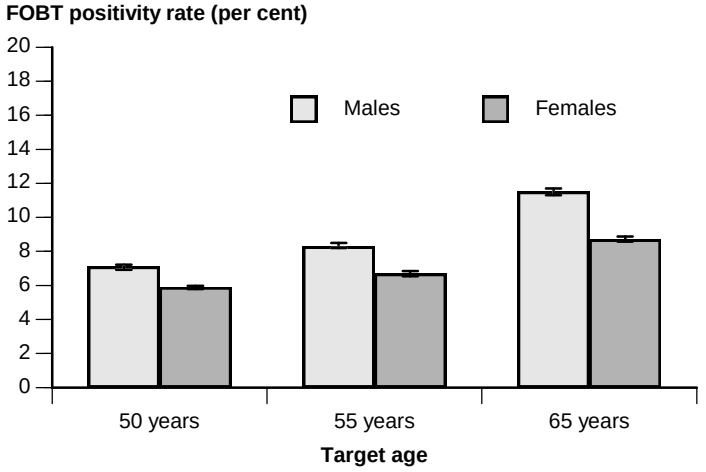
the Northern Territory (9.0%) were statistically significantly higher than the Australian rate, while the rate for Queensland (7.5%) was statistically significantly lower.

Notable sex-specific jurisdictional differences included South Australian and Northern Territory men—and both Tasmanian men and women—having statistically significantly higher positivity rates than the sex-specific Australian rates. Conversely, Queensland men and women both had statistically significant lower rates than their respective Australian rates.

Faecal occult blood test outcomes by age and sex

There was in increase in the FOBT positivity rate with an increase in age. This was true for both men and women (Figure 2.1 and Table 2.2). These findings are consistent with the increase in prevalence of polyps and adenomas with age (Winawer et al. 1997).

The positivity rate of men who participated (8.8%) was 1.3 times that of women (7.0%), indicating both age and sex affect the FOBT positivity rate (Table 2.2).



Note: Bars on columns represent 95% confidence intervals.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Figure 2.1: FOBT positivity, by age and sex, Phase 2

Faecal occult blood test outcomes by remoteness area and socioeconomic status area

Analysis of the positivity rate by area (Table 2.4) showed increasing positivity with increasing remoteness. All other areas were statistically significantly higher than *Major cities* (7.6%). *Inner regional, Outer regional, Remote* and *Very remote* areas had positivity rates 1.1, 1.1, 1.2 and 1.3 times the positivity rate of *Major cities* respectively. This was a similar result to that from previous monitoring reports.

FOBT positivity rates also increased for people living in areas of increasing disadvantage (Table 2.5). The positivity rate for participants living in areas with the lowest socioeconomic status (9.1%) was 1.4 times that of participants living in areas with the highest socioeconomic status (6.7%). Socioeconomic status analyses for the Participation measure ('1 Participation', Section 2) and the FOBT analyses in this chapter show that those living in areas with lower socioeconomic status participate less in the NBCSP (Table 1.8); yet, when they do participate, they return a higher rate of positive FOBT results (Table 2.5).

Faecal occult blood test outcomes by Aboriginal and Torres Strait Islander status, language spoken at home and disability subgroups

Aboriginal and Torres Strait Islander participants showed a statistically significant higher positivity rate (10.8%) than non-Indigenous participants (7.7%) (Table 2.6).

There was a statistically significant difference in the positivity rate between participants who spoke a language other than English at home (8.0%) to participants who spoke English (7.8%)

(Table 2.7); however, as those who do not report their language spoken at home are assumed to speak English, the interpretability of this result is limited.

People with a severe or profound activity limitation also recorded a statistically significant higher positivity rate (12.1%) than people without such limitations (7.6%) (Table 2.8). Reasons for this difference are speculative, but may include a lower level of physical activity (Wolin, Yan & Colditz 2011), or comorbidities and medications that increase bowel screening positivity in people with a severe or profound activity limitation.

Faecal occult blood test outcome tables

Table 2.1: FOBT results, by age and sex, Phase 2

	FOBT positive		FOBT negative		FOBT inconclusive		All results
	Number	Per cent	Number	Per cent	Number	Per cent	Number
Males							
50 years	10,061	7.1	131,694	92.9	65	0.0	141,820
55 years	9,834	8.3	108,178	91.6	43	0.0	118,055
65 years	12,561	11.5	96,400	88.4	33	0.0	108,994
Total	*32,456*	*8.8*	*336,272*	*91.2*	*141*	*0.0*	*368,869*
95% CI		*8.7–8.9*		*91.1–91.3*		*0.0–0.0*	
Females							
50 years	9,744	5.9	154,325	94.0	84	0.1	164,153
55 years	9,560	6.7	133,742	93.3	48	0.0	143,350
65 years	10,307	8.7	107,740	91.2	35	0.0	118,082
Total	*29,611*	*7.0*	*395,807*	*93.0*	*167*	*0.0*	*425,585*
95% CI		*6.9–7.1*		*92.9–93.1*		*0.0–0.0*	
Persons							
50 years	19,805	6.5	286,019	93.5	149	0.0	305,973
55 years	19,394	7.4	241,920	92.5	91	0.0	261,405
65 years	22,868	10.1	204,140	89.9	68	0.0	227,076
Total	**62,067**	**7.8**	**732,079**	**92.1**	**308**	**0.0**	**794,454**
95% CI		**7.8–7.9**		**92.1–92.2**		**0.0–0.0**	

Notes

1. Percentages equal the number of participants with FOBT results in each category in terms of 'positive', 'negative' and 'inconclusive' as a proportion of the total number of participants with correctly completed FOBTs.
2. For participants who returned more than one FOBT kit, a positive result was selected over any other result, and a negative result was selected over an inconclusive result.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 2.2: FOBT positivity rates, by age and sex, Phase 2

	Positive tests	Valid results	Positivity rate (per cent)
Males			
50 years	10,061	141,755	7.1
55 years	9,834	118,012	8.3
65 years	12,561	108,961	11.5
Total	*32,456*	*368,728*	*8.8*
Females			
50 years	9,744	164,069	5.9
55 years	9,560	143,302	6.7
65 years	10,307	118,047	8.7
Total	*29,611*	*425,418*	*7.0*
Persons			
50 years	19,805	305,824	6.5
55 years	19,394	261,314	7.4
65 years	22,868	227,008	10.1
Total	**62,067**	**794,146**	**7.8**

Note: Positivity equals the number of participants with positive FOBT results as a percentage of the total number of participants with valid results. A valid result was either positive or negative; inconclusive results were excluded.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Faecal occult blood test positivity rates by population subgroups

Table 2.3: FOBT positivity rates, by state and territory, Phase 2

		NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Males										
50 years	Positive tests	3,067	2,651	1,807	1,109	895	274	182	76	10,061
	Positivity rate	7.0	7.5	6.7	6.9	7.5	7.3	7.4	7.3	7.1
55 years	Positive tests	3,000	2,453	1,812	1,095	906	329	153	86	9,834
	Positivity rate	8.2	8.4	8.1	8.1	8.9	10.1	7.5	9.9	8.3
65 years	Positive tests	4,010	2,982	2,408	1,379	1,123	391	183	85	12,561
	Positivity rate	11.4	11.8	11.0	11.6	12.0	12.3	10.8	16.0	11.5
Total	*Positive tests*	*10,077*	*8,086*	*6,027*	*3,583*	*2,924*	*994*	*518*	*247*	*32,456*
	Positivity rate	*8.7*	*9.0*	*8.4*	*8.6*	*9.3*	*9.7*	*8.4*	*10.2*	*8.8*
	95% CI	*8.6–8.9*	*8.8–9.2*	*8.2–8.6*	*8.3–8.9*	*9.0–9.6*	*9.2–10.3*	*7.7–9.1*	*9.0–11.4*	*8.7–8.9*
Females										
50 years	Positive tests	2,849	2,652	1,753	1,081	829	333	164	83	9,744
	Positivity rate	5.7	6.3	5.6	5.8	6.0	7.2	5.6	7.3	5.9
55 years	Positive tests	2,874	2,432	1,763	1,114	814	339	149	75	9,560
	Positivity rate	6.6	6.7	6.4	6.8	6.6	8.2	6.0	7.9	6.7
65 years	Positive tests	3,297	2,519	1,940	1,054	937	345	174	41	10,307
	Positivity rate	8.7	8.9	8.3	8.6	9.0	9.8	9.3	9.1	8.7
Total	*Positive tests*	*9,020*	*7,603*	*5,456*	*3,249*	*2,580*	*1,017*	*487*	*199*	*29,611*
	Positivity rate	*6.9*	*7.1*	*6.7*	*6.9*	*7.1*	*8.3*	*6.7*	*7.8*	*7.0*
	95% CI	*6.7–7.0*	*7.0–7.3*	*6.5–6.8*	*6.7–7.1*	*6.8–7.3*	*7.8–8.8*	*6.1–7.3*	*6.8–8.9*	*6.9–7.0*
Persons										
50 years	Positive tests	5,916	5,303	3,560	2,190	1,724	607	346	159	19,805
	Positivity rate	6.3	6.8	6.1	6.3	6.7	7.2	6.4	7.3	6.5
55 years	Positive tests	5,874	4,885	3,575	2,209	1,720	668	302	161	19,394
	Positivity rate	7.3	7.5	7.2	7.4	7.7	9.0	6.7	8.9	7.4
65 years	Positive tests	7,307	5,501	4,348	2,433	2,060	736	357	126	22,868
	Positivity rate	10.0	10.3	9.6	10.1	10.4	11.0	10.0	12.9	10.1
Total	**Positive tests**	**19,097**	**15,689**	**11,483**	**6,832**	**5,504**	**2,011**	**1,005**	**446**	**62,067**
	Positivity rate	**7.7**	**8.0**	**7.5**	**7.7**	**8.1**	**8.9**	**7.5**	**9.0**	**7.8**
	95% CI	**7.6–7.8**	**7.9–8.1**	**7.4–7.6**	**7.5–7.9**	**7.9–8.3**	**8.6–9.3**	**7.0–7.9**	**8.2–9.8**	**7.8–7.9**

Note: Positivity equals the number of participants with positive FOBT results as a percentage of the total number of participants with valid results. A valid result was either positive or negative; inconclusive results were excluded.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 2.4: FOBT positivity rates, by geographic region, Phase 2

		Remoteness area						
		Major cities	**Inner regional**	**Outer regional**	**Remote**	**Very remote**	**Unknown**	**Total**
Males								
50 years	Positive tests	6,616	2,121	1,100	154	65	6	10,061
	Positivity rate	6.9	7.3	7.8	8.0	8.7	n.p.	7.1
55 years	Positive tests	6,219	2,249	1,143	154	63	6	9,834
	Positivity rate	8.1	8.6	9.0	9.9	9.8	n.p.	8.3
65 years	Positive tests	7,620	3,127	1,539	209	63	3	12,561
	Positivity rate	11.2	11.5	12.7	14.6	12.8	n.p.	11.5
Total	*Positive tests*	*20,455*	*7,496*	*3,782*	*517*	*191*	*15*	*32,456*
	Positivity rate	*8.5*	*9.1*	*9.7*	*10.6*	*10.1*	*6.7*	*8.8*
	95% CI	*8.4–8.6*	*8.9–9.3*	*9.4–10.0*	*9.7–11.4*	*8.8–11.5*	*3.4–9.9*	*8.7–8.9*
Females								
50 years	Positive tests	6,448	2,086	998	145	61	6	9,744
	Positivity rate	5.9	5.9	6.2	6.9	7.9	n.p.	5.9
55 years	Positive tests	6,195	2,128	1,039	133	62	4	9,560
	Positivity rate	6.6	6.6	7.2	7.5	9.3	3.9[(a)]	6.7
65 years	Positive tests	6,285	2,653	1,199	130	36	3	10,307
	Positivity rate	8.5	8.9	9.6	9.7	9.9	n.p.	8.7
Total	*Positive tests*	*18,928*	*6,867*	*3,235*	*408*	*159*	*13*	*29,611*
	Positivity rate	*6.8*	*7.1*	*7.5*	*7.9*	*8.8*	*5.3*	*7.0*
	95% CI	*6.7–6.9*	*6.9–7.2*	*7.3–7.8*	*7.1–8.6*	*7.5–10.1*	*2.5–8.1*	*6.9–7.0*
Persons								
50 years	Positive tests	13,064	4,207	2,098	299	125	12	19,805
	Positivity rate	6.4	6.5	7.0	7.5	8.3	6.8[(a)]	6.5
55 years	Positive tests	12,413	4,377	2,182	287	125	10	19,394
	Positivity rate	7.3	7.5	8.1	8.6	9.5	5.6[(a)]	7.4
65 years	Positive tests	13,905	5,780	2,738	339	99	6	22,868
	Positivity rate	9.8	10.1	11.1	12.3	11.6	5.3[(a)]	10.1
Total	**Positive tests**	**39,383**	**14,364**	**7,018**	**925**	**350**	**28**	**62,067**
	Positivity rate	**7.6**	**8.0**	**8.6**	**9.2**	**9.5**	**6.0**	**7.8**
	95% CI	**7.5–7.7**	**7.9–8.1**	**8.4–8.8**	**8.6–9.7**	**8.6–10.4**	**3.8–8.1**	**7.8–7.9**

(a) Based on numerator < 20 or denominator < 300; interpret with caution.

Notes

1. Positivity equals the number of participants with positive FOBT results as a percentage of the total number of participants with valid results. A valid result was either positive or negative; inconclusive results were excluded.
2. The residential postcodes of participants were mapped to remoteness areas in the Australian Standard Geographic Classification for 2006 through a postal area concordance. Those that could not be mapped were included in the 'Unknown' column.
3. Because some postcodes cross regional boundaries, totals may not add up due to rounding.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 2.5: FOBT positivity rates, by socioeconomic status area, Phase 2

		Socioeconomic status area						
		1 (lowest)	**2**	**3**	**4**	**5 (highest)**	**Unknown**	**Total**
Males								
50 years	Positive tests	2,162	2,018	1,956	1,894	1,897	134	10,061
	Positivity rate	8.5	7.5	7.1	6.5	6.1	7.1	7.1
55 years	Positive tests	2,100	2,026	1,975	1,868	1,736	129	9,834
	Positivity rate	9.6	8.6	8.6	8.0	7.0	8.1	8.3
65 years	Positive tests	2,824	2,795	2,532	2,194	2,057	159	12,561
	Positivity rate	12.8	12.1	12.2	11.0	9.5	11.5	11.5
Total	*Positive tests*	*7,086*	*6,839*	*6,463*	*5,956*	*5,690*	*422*	*32,456*
	Positivity rate	*10.2*	*9.3*	*9.1*	*8.2*	*7.4*	*8.6*	*8.8*
	95% CI	*10.0–10.4*	*9.1–9.5*	*8.9–9.3*	*8.0–8.4*	*7.2–7.5*	*7.9–9.4*	*8.7–8.9*
Females								
50 years	Positive tests	1,915	1,891	1,977	1,927	1,937	97	9,744
	Positivity rate	6.7	6.1	6.2	5.7	5.3	5.1	5.9
55 years	Positive tests	1,974	2,028	1,764	1,837	1,842	115	9,560
	Positivity rate	7.6	7.1	6.3	6.5	6.0	6.4	6.7
65 years	Positive tests	2,356	2,273	1,961	1,798	1,829	90	10,307
	Positivity rate	10.1	8.9	8.7	8.3	7.7	7.5	8.7
Total	*Positive tests*	*6,245*	*6,192*	*5,702*	*5,562*	*5,608*	*302*	*29,611*
	Positivity rate	*8.0*	*7.3*	*6.9*	*6.7*	*6.1*	*6.2*	*7.0*
	95% CI	*7.8–8.2*	*7.1–7.4*	*6.7–7.1*	*6.5–6.8*	*6.0–6.3*	*5.5–6.9*	*6.9–7.0*
Persons								
50 years	Positive tests	4,077	3,909	3,933	3,821	3,834	231	19,805
	Positivity rate	7.6	6.7	6.6	6.1	5.7	6.1	6.5
55 years	Positive tests	4,074	4,054	3,739	3,705	3,578	244	19,394
	Positivity rate	8.5	7.8	7.4	7.2	6.4	7.2	7.4
65 years	Positive tests	5,180	5,068	4,493	3,992	3,886	249	22,868
	Positivity rate	11.4	10.4	10.4	9.6	8.5	9.6	10.1
Total	**Positive tests**	**13,331**	**13,031**	**12,165**	**11,518**	**11,298**	**724**	**62,067**
	Positivity rate	**9.1**	**8.2**	**7.9**	**7.4**	**6.7**	**7.4**	**7.8**
	95% CI	**8.9–9.2**	**8.1–8.3**	**7.8–8.0**	**7.3–7.5**	**6.6–6.8**	**6.9–7.9**	**7.8–7.9**

Notes

1. Positivity equals the number of participants with positive FOBT results as a percentage of the total number of participants with valid results. A valid result was either positive or negative; inconclusive results were excluded.
2. A participant's socioeconomic status area was classified by mapping their residential postcode (through a postal area) to the ABS IRSD for 2006. Those that could not be mapped were included in the 'Unknown' column.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 2.6: FOBT positivity rates, by Aboriginal and Torres Strait Islander status, Phase 2

		Indigenous	Non-Indigenous	Not stated	Total
Males					
50 years	Positive tests	99	9,438	524	10,061
	Positivity rate	10.7	7.0	7.9	7.1
55 years	Positive tests	100	9,195	539	9,834
	Positivity rate	13.7	8.2	9.7	8.3
65 years	Positive tests	77	11,804	680	12,561
	Positivity rate	16.0	11.5	12.3	11.5
Total	*Positive tests*	*276*	*30,437*	*1,743*	*32,456*
	Positivity rate	*12.9*	*8.7*	*9.8*	*8.8*
	95% CI	*11.5–14.3*	*8.6–8.8*	*9.4–10.3*	*8.7–8.9*
Females					
50 years	Positive tests	87	9,231	426	9,744
	Positivity rate	7.8	5.9	7.1	5.9
55 years	Positive tests	73	9,087	400	9,560
	Positivity rate	8.0	6.6	7.5	6.7
65 years	Positive tests	69	9,774	464	10,307
	Positivity rate	13.5	8.7	9.0	8.7
Total	*Positive tests*	*229*	*28,092*	*1,290*	*29,611*
	Positivity rate	*9.0*	*6.9*	*7.8*	*7.0*
	95% CI	*7.9–10.1*	*6.8–7.0*	*7.4–8.2*	*6.9–7.0*
Persons					
50 years	Positive tests	186	18,669	950	19,805
	Positivity rate	9.1	6.4	7.5	6.5
55 years	Positive tests	173	18,282	939	19,394
	Positivity rate	10.5	7.3	8.6	7.4
65 years	Positive tests	146	21,578	1,144	22,868
	Positivity rate	14.7	10.0	10.7	10.1
Total	**Positive tests**	**505**	**58,529**	**3,033**	**62,067**
	Positivity rate	**10.8**	**7.7**	**8.9**	**7.8**
	95% CI	**9.9–11.7**	**7.7–7.8**	**8.6–9.2**	**7.8–7.9**

Notes

1. Positivity equals the number of participants with positive FOBT results as a percentage of the total number of participants with valid results. A valid result was either positive or negative; inconclusive results were excluded.
2. NBCSP Aboriginal and Torres Strait Islander status was reported by the participant on the returned Participant Details form. Participants who did not indicate Aboriginal and Torres Strait Islander status were included in the 'Not stated' column.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 2.7: FOBT positivity rates, by language spoken at home, Phase 2

		Language other than English	English	Total
Males				
50 years	Positive tests	1,334	8,727	10,061
	Positivity rate	7.4	7.0	7.1
55 years	Positive tests	1,191	8,643	9,834
	Positivity rate	8.4	8.3	8.3
65 years	Positive tests	1,319	11,242	12,561
	Positivity rate	12.0	11.5	11.5
Total	*Positive tests*	*3,844*	*28,612*	*32,456*
	Positivity rate	*8.9*	*8.8*	*8.8*
	95% CI	*8.6–9.2*	*8.7–8.9*	*8.7–8.9*
Females				
50 years	Positive tests	1,437	8,307	9,744
	Positivity rate	6.5	5.8	5.9
55 years	Positive tests	1,274	8,286	9,560
	Positivity rate	7.2	6.6	6.7
65 years	Positive tests	1,032	9,275	10,307
	Positivity rate	9.0	8.7	8.7
Total	*Positive tests*	*3,743*	*25,868*	*29,611*
	Positivity rate	*7.3*	*6.9*	*7.0*
	95% CI	*7.1–7.5*	*6.8–7.0*	*6.9–7.0*
Persons				
50 years	Positive tests	2,771	17,034	19,805
	Positivity rate	6.9	6.4	6.5
55 years	Positive tests	2,465	16,929	19,394
	Positivity rate	7.7	7.4	7.4
65 years	Positive tests	2,351	20,517	22,868
	Positivity rate	10.5	10.0	10.1
Total	**Positive tests**	**7,587**	**54,480**	**62,067**
	Positivity rate	**8.0**	**7.8**	**7.8**
	95% CI	**7.9–8.2**	**7.7–7.8**	**7.8–7.9**

Notes

1. Positivity equals the number of participants with positive FOBT results as a percentage of the total number of participants with valid results. A valid result was either positive or negative; inconclusive results were excluded.
2. NBCSP preferred language spoken at home was reported by the participant on the returned Participant Details form. Participants who did not indicate preferred language spoken at home were assumed to speak English.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 2.8: FOBT positivity rates, by disability status, Phase 2

		Severe or profound activity limitation	No severe or profound activity limitation	Not stated	Total
Males					
50 years	Positive tests	581	8,861	619	10,061
	Positivity rate	11.3	6.9	7.3	7.1
55 years	Positive tests	604	8,621	609	9,834
	Positivity rate	11.8	8.2	8.4	8.3
65 years	Positive tests	1,235	10,551	775	12,561
	Positivity rate	15.9	11.2	11.1	11.5
Total	*Positive tests*	*2,420*	*28,033*	*2,003*	*32,456*
	Positivity rate	*13.4*	*8.5*	*8.8*	*8.8*
	95% CI	*12.9–13.9*	*8.5–8.6*	*8.5–9.2*	*8.7–8.9*
Females					
50 years	Positive tests	715	8,586	443	9,744
	Positivity rate	9.8	5.8	5.9	5.9
55 years	Positive tests	740	8,333	487	9,560
	Positivity rate	10.5	6.4	7.2	6.7
65 years	Positive tests	859	8,925	523	10,307
	Positivity rate	12.6	8.5	8.6	8.7
Total	*Positive tests*	*2,314*	*25,844*	*1,453*	*29,611*
	Positivity rate	*10.9*	*6.7*	*7.1*	*7.0*
	95% CI	*10.5–11.4*	*6.7–6.8*	*6.8–7.5*	*6.9–7.0*
Persons					
50 years	Positive tests	1,296	17,447	1,062	19,805
	Positivity rate	10.4	6.3	6.7	6.5
55 years	Positive tests	1,344	16,954	1,096	19,394
	Positivity rate	11.0	7.2	7.8	7.4
65 years	Positive tests	2,094	19,476	1,298	22,868
	Positivity rate	14.4	9.8	9.9	10.1
Total	**Positive tests**	**4,734**	**53,877**	**3,456**	**62,067**
	Positivity rate	**12.1**	**7.6**	**8.0**	**7.8**
	95% CI	**11.8–12.4**	**7.5–7.6**	**7.8–8.3**	**7.8–7.9**

Notes

1. Positivity equals the number of participants with positive FOBT results as a percentage of the total number of participants with valid results. A valid result was either positive or negative; inconclusive results were excluded.
2. NBCSP disability status was reported by the participant on the Participant Details form. Participants who did not indicate disability status are included in the 'Not stated' column.
3. A 'profound' activity limitation indicates that a person always needs assistance with self-care, movement and/or communications activities. A 'severe' activity limitation indicates that a person sometimes needs assistance with these activities.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

3 Follow-up of positive FOBT results

What do we mean by FOBT follow-up?

Definition: The proportion of eligible population invited in Phase 2 who returned a positive result from a correctly completed FOBT kit who received follow-up care by a PHCP and colonoscopist.

Rationale: People who complete a screening test and receive a positive result are likely to be concerned; however, not all positive screening results are 'true' positives for bowel cancer. Monitoring of follow-up care for participants with a positive FOBT is important to ensure those participants follow up their screening result with medical specialists.

Data source: National Bowel Cancer Screening Register.

Data quality: Moderate. All positive FOBT results are recorded in the Register; however, reporting of follow-up care by PHCPs, colonoscopists, surgeons and pathologists is not mandatory, so follow-up rates in this section may be underestimated. See 'Data considerations', Section 1 for further details.

Guide to interpretation: This chapter discusses the follow-up procedures, including PHCP visits, colonoscopy procedures and histopathology diagnoses for those participants who were invited in Phase 2 between 1 July 2008 and 30 June 2011. Persons are counted only once in the reporting period, even if they attended more than one follow-up consultation during this period. For participants who attended more than one follow-up consultation, the first consultation after the positive result was used to establish time to follow-up, while the most serious result was used for outcomes.

Kaplan-Meier rates (see 'Crude versus estimated rates', Section 1) are used to take into account the lag time between positive FOBT and both PHCP and colonoscopy follow-up.

The rates of colonoscopy follow-up are discussed in this chapter, while the actual outcomes of colonoscopic investigation are discussed in '4 Bowel abnormality detection', Section 2.

Key results

- Using Kaplan-Meier estimates, of the 62,067 participants who had a positive FOBT, 54.6% had a follow-up PHCP visit and 74.0% had a follow-up colonoscopy within 1 year of their screening result; PHCP visits appear to be under-reported (see Box 3.1).
- PHCP follow-up was highest for participants living in areas with the lowest socioeconomic status and lowest for participants living in areas with the highest socioeconomic status. This difference was not statistically significant. However, this pattern was not mirrored in colonoscopy follow-up, where participants living within the lowest socioeconomic areas had the lowest colonoscopy follow-up rates.
- Of the 33,204 participants who had reported a PHCP consultation, 84.2% reported experiencing no symptoms before their positive FOBT result and 92.1% were referred for colonoscopy.
- Participants who spoke English at home had a statistically significant higher rate of colonoscopy follow-up than participants who spoke a language other than English.
- Participants with a severe or profound activity limitation had a statistically significant lower rate of colonoscopy follow-up than participants without such limitations.

Background information

The NBCSP uses an FOBT as the screening tool to detect potential bowel problems that require further investigation. A procedure such as colonoscopy is required to actually diagnose a bowel condition after a positive screening test.

Participants who receive a positive FOBT result are encouraged to follow up this outcome with their PHCP. In accordance with clinical practice guidelines for the prevention, early detection and management of colorectal cancer (ACN 2005), PHCPs are encouraged to refer all participants with a positive FOBT for a colonoscopy, unless other information gained at the consultation suggests an alternative course of action.

Colonoscopy is considered the most accurate method of investigation to assess the colon and rectum, as it enables biopsy and subsequent histopathological diagnosis. Colonoscopy also allows identification and endoscopic removal of polyps and adenomas.

As most bowel cancers are known to initiate from polyps (Cappell 2005), their removal at colonoscopy provides a preventive measure to lower the risk of future bowel cancers. A study by Stryker and colleagues (1987) estimated the cumulative risk of bowel cancer at the site of an untreated polyp was 2.5% at 5 years, 8% at 10 years and 24% at 20 years post-discovery.

This is one of the advantages of the NBCSP; while screening aims to find cancers at an earlier and treatable stage, it can also identify and remove these pre-cancerous lesions. This should result in lower rates bowel cancer incidence in future years. However, the full effect may not be apparent until about 10 years from the start the Program.

Detailed primary health care practitioner follow-up analyses

Of the 62,067 participants invited in Phase 2 who returned a positive FOBT result, 33,204 (53.5%) had a PHCP visit registered by 30 June 2011 (Table 3.1). Using Kaplan-Meier estimates to minimise the effect of lag time, an estimated 54.6% of participants had consulted a PHCP within 1 year of their positive FOBT result (Table 3.2). The reminder letter sent to participants and their PHCP 8 weeks after a positive FOBT clearly had a positive effect, with an increase in the follow-up rate between 10 and 12 weeks (Figures 3.2a–c).

Box 3.1 Interpretation of Phase 2 follow-up results

Assessment form return has improved over that recorded in previous monitoring reports. Some of this improvement is due to the timing of this report, which has allowed sufficient time for the majority of participants with positive FOBT results to attend their PHCP, thus reducing the effect of lag time. This is apparent as the similar crude and Kaplan-Meier rates. However, both crude and Kaplan-Meier rates have increased in this Phase 2 report, suggesting that form return by PHCPs is also improving over previously reported levels. There is still room for improvement in Assessment form return, as there were more recorded colonoscopies than recorded PHCP visits (tables 3.1 and 3.12). As PHCP referral is generally required to progress to colonoscopy, more participants must have consulted their PHCP than the levels reported here.

Of the participants who had a reported PHCP consultation:

- 84.2% reported having no symptoms before the positive FOBT result (Table 3.8)
- 92.1% were referred for colonoscopy (Table 3.9)

- for those not referred for colonoscopy (2,620), the main reasons were having had a recent colonoscopy (39.9%), or the participant declining a colonoscopy (33.9%) (Table 3.11).

From DoHA analysis of DoHS colonoscopy claim data for Phase 2 invitees (using Medicare item numbers 32090 and 32093 that relate to rebates for private system colonoscopies), about 4% of those sent a Phase 2 invitation had claimed for a private colonoscopy procedure in the year before their invitation (data not shown). Therefore, with the current NBCSP invitation strategy, a proportion of invitees who have had a recent colonoscopy are likely to decline their NBCSP invitation altogether (by opting off or simply not returning the kit), or to decline a colonoscopy, even if they complete a kit that returns a positive FOBT screening result.

Primary health care practitioner follow-up by population subgroups

Primary health care practitioner follow-up by state and territory

NBCSP implementation is the responsibility of each jurisdiction, and states and territories may have different follow-up policies and procedures.

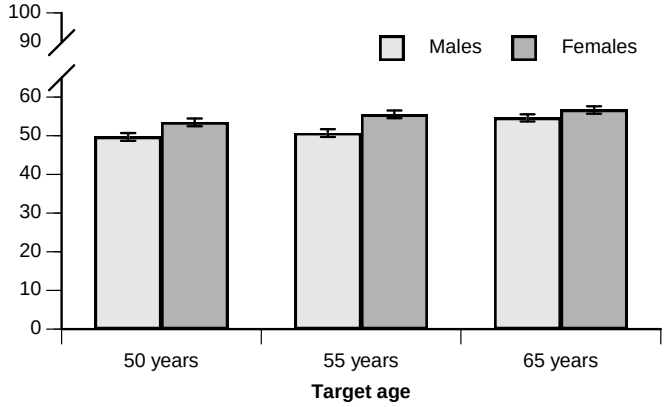
There were significant differences recorded in PHCP follow-up between the jurisdictions. Tasmania (58.4%) and Queensland (56.6%) had the highest crude rates of follow-up, while PHCP follow-up rates in Western Australia (51.6%), the Northern Territory (47.1%) and the Australian Capital Territory (45.3%) were statistically significantly lower than the Australian rate (Table 3.1).

Table 3.2 and figures 3.2b and 3.2c show the Kaplan-Meier PHCP follow-up rates up to 52 weeks from a positive FOBT result. These results showed a similar pattern to the crude data regarding state and territory differences. For clarity, Kaplan-Meier curves for the states and territories were divided between figures 3.2b and 3.2c.

Primary health care practitioner follow-up by age and sex

PHCP follow-up rates increased with age (Figure 3.1 and Table 3.1). As it is unlikely that PCHPs would return Assessment forms differently for different ages, this suggests that people are more likely to follow up the result with increasing age.

Significantly more women (55.2%) than men (51.9%) had an Assessment form recorded, suggesting that more women follow up a positive FOBT with their PHCP. This was a common finding when comparing sexes across all PHCP subgroup tables.



Note: Bars on columns represent 95% confidence intervals.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Figure 3.1: Primary health care practitioner follow-up, by age and sex, Phase 2

From the PHCP visits recorded, women had a slightly higher rate of reported symptoms (Table 3.8), and a slightly lower rate of referral for colonoscopy (Table 3.9), possibly due to a higher percentage of women (37.0%) declining colonoscopy than men (30.5%) (Table 3.11).

Primary health care practitioner follow-up by remoteness area and socioeconomic status

Participants in *Inner regional* (57.0%) and *Outer regional* areas (56.8%) had statistically significant higher rates of PHCP consultations—about 1.1 times the rate of *Major cities* (51.8%) (Table 3.3). Participants in *Remote* (49.2%) and *Very remote* (46.8%) areas showed no statistically significant differences in PHCP follow-up to those in *Major cities*.

Referral for colonoscopy was slightly more common in *Remote* and *Very remote* areas than in other regions, but this difference was not statistically significant due to the small numbers of consultations in these areas (Table 3.10).

There were no statistically significant differences in PHCP follow-up between participants from different socioeconomic status areas (Table 3.4).

Primary health care practitioner follow-up by Aboriginal and Torres Strait Islander status, language spoken at home and disability subgroups

All three population subgroups had low numbers of participants with returned Assessment forms. Care must be taken when interpreting results in these tables.

While Aboriginal and Torres Strait Islander participants (51.5%) had a lower rate of PHCP visits compared with non-Indigenous participants (54.9%), the low number of visits reported (260 compared with 32,106) means this was not statistically significant and no conclusions should be drawn from these data (Table 3.5).

Overall, in Phase 2 there was not a statistically significant difference in the rate of PHCP visits when comparing participants by language spoken at home (Table 3.6).

Participants with a severe or profound activity limitation had a statistically significant higher rate of PHCP follow-up (57.1%) than those without such limitations (54.9%) (Table 3.7). This overall difference was mainly due to men with a severe or profound activity limitation having a statistically significant higher rate of PHCP follow-up than men without such limitations.

Primary health care practitioner follow-up tables and figures

Table 3.1: Crude follow-up by primary health care practitioners after a positive FOBT result, by state and territory, Phase 2

		NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Males										
50 years	Number	1,552	1,352	922	516	407	142	80	36	5,007
	Per cent	50.6	51.0	51.0	46.5	45.5	51.8[(a)]	44.0[(a)]	n.p.	49.8
55 years	Number	1,504	1,244	1,001	542	412	192	60	34	4,989
	Per cent	50.1	50.7	55.2	49.5	45.5	58.4	39.2[(a)]	n.p.	50.7
65 years	Number	2,155	1,614	1,410	714	605	230	80	40	6,848
	Per cent	53.7	54.1	58.6	51.8	53.9	58.8	43.7[(a)]	n.p.	54.5
Total	*Number*	*5,211*	*4,210*	*3,333*	*1,772*	*1,424*	*564*	*220*	*110*	*16,844*
	Per cent	*51.7*	*52.1*	*55.3*	*49.5*	*48.7*	*56.7*	*42.5*	*44.5*	*51.9*
	95% CI	*50.7–52.7*	*51.0–53.2*	*54.0–56.6*	*47.8–51.1*	*46.9–50.5*	*53.7–59.8*	*38.2–46.7*	*38.3–50.7*	*51.4–52.4*
Females										
50 years	Number	1,482	1,419	981	564	460	196	69	43	5,214
	Per cent	52.0	53.5	56.0	52.2	55.5	58.9	42.1[(a)]	n.p.	53.5
55 years	Number	1,549	1,333	1,013	623	463	210	77	39	5,307
	Per cent	53.9	54.8	57.5	55.9	56.9	61.9	51.7[(a)]	n.p.	55.5
65 years	Number	1,850	1,413	1,168	567	529	205	89	18	5,839
	Per cent	56.1	56.1	60.2	53.8	56.5	59.4	51.1[(a)]	n.p.	56.7
Total	*Number*	*4,881*	*4,165*	*3,162*	*1,754*	*1,452*	*611*	*235*	*100*	*16,360*
	Per cent	*54.1*	*54.8*	*58.0*	*54.0*	*56.3*	*60.1*	*48.3*	*50.3*	*55.2*
	95% CI	*53.1–55.1*	*53.7–55.9*	*56.6–59.3*	*52.3–55.7*	*54.4–58.2*	*57.1–63.1*	*43.8–52.7*	*43.3–57.2*	*54.7–55.8*
Persons										
50 years	Number	3,034	2,771	1,903	1,080	867	338	149	79	10,221
	Per cent	51.3	52.3	53.5	49.3	50.3	55.7	43.1	49.7[(a)]	51.6
55 years	Number	3,053	2,577	2,014	1,165	875	402	137	73	10,296
	Per cent	52.0	52.8	56.3	52.7	50.9	60.2	45.4	45.3[(a)]	53.1
65 years	Number	4,005	3,027	2,578	1,281	1,134	435	169	58	12,687
	Per cent	54.8	55.0	59.3	52.7	55.0	59.1	47.3	46.0[(a)]	55.5
Total	**Number**	**10,092**	**8,375**	**6,495**	**3,526**	**2,876**	**1,175**	**455**	**210**	**33,204**
	Per cent	**52.8**	**53.4**	**56.6**	**51.6**	**52.3**	**58.4**	**45.3**	**47.1**	**53.5**
	95% CI	**52.1–53.6**	**52.6–54.2**	**55.7–57.5**	**50.4–52.8**	**50.9–53.6**	**56.3–60.6**	**42.2–48.4**	**42.5–51.7**	**53.1–53.9**

(a) Based on numerator < 20 or denominator < 300; interpret with caution.

Notes

1. Percentages equal the number of people having consulted a PHCP after a positive FOBT result as a proportion of the total number of people with positive FOBT results.
2. Reporting of PHCP follow-up is not mandatory; actual numbers of participant consultations may be underestimated.

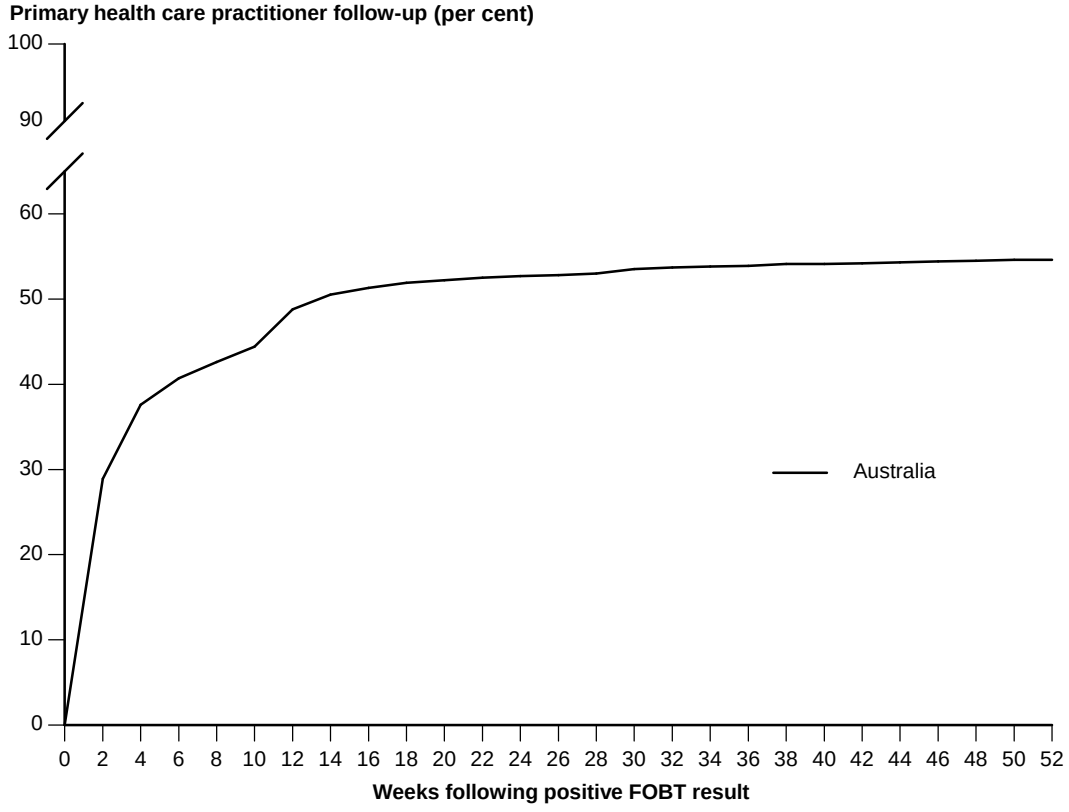
Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 3.2: Kaplan-Meier primary health care practitioner follow-up at 26 and 52 weeks after a positive FOBT, by state and territory, Phase 2

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
26 weeks									
PHCP follow-up rate (per cent)	50.9	53.3	56.8	51.4	52.1	58.4	44.4	45.8	52.8
95% CI	50.1–51.6	52.5–54.1	55.9–57.7	50.2–52.6	50.7–53.4	56.2–60.6	41.3–47.5	41.2–50.5	52.4–53.2
52 weeks									
PHCP follow-up rate (per cent)	54.0	54.5	58.1	52.5	52.9	59.7	45.6	47.8	54.6
95% CI	53.3–54.7	53.7–55.3	57.1–59.0	51.3–53.7	51.5–54.2	57.5–61.9	42.5–48.8	43.0–52.5	54.2–55.0

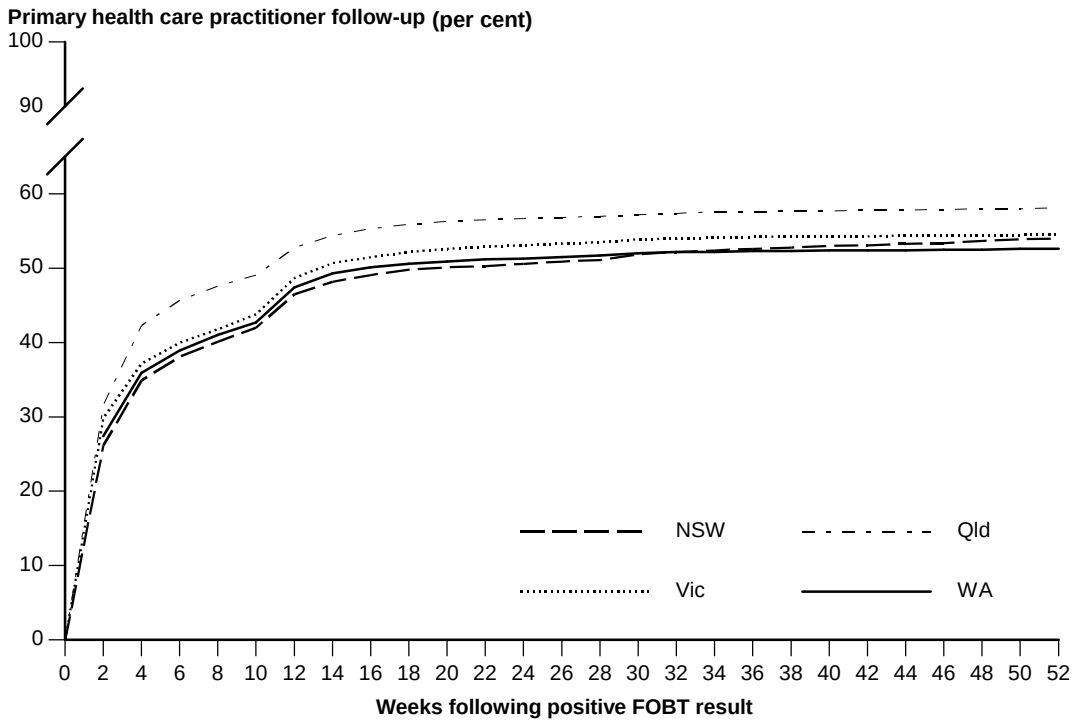
Note: PHCP follow-up rates equal the estimated Kaplan-Meier follow-up rate of people who consulted a PHCP as a proportion of the total number of people with positive FOBT results.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.



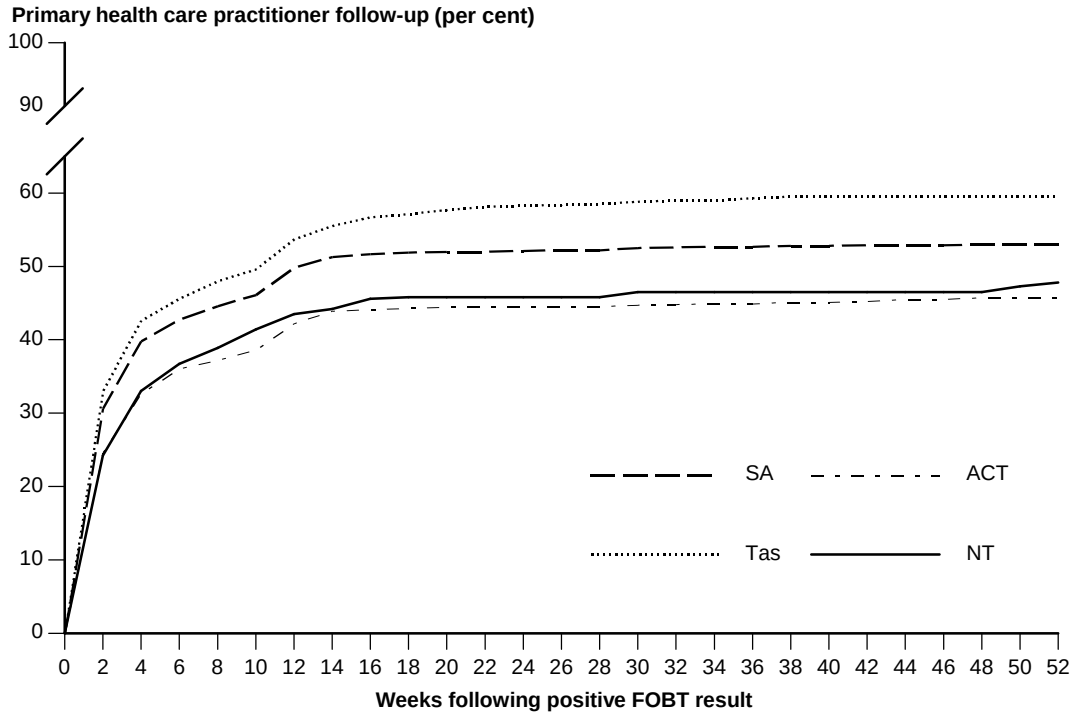
Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Figure 3.2a: Primary health care practitioner follow-up rate after positive FOBT using Kaplan-Meier estimates, Australia, Phase 2



Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Figure 3.2b: Primary health care practitioner follow-up rate after positive FOBT using Kaplan-Meier estimates, New South Wales, Victoria, Queensland and Western Australia, Phase 2



Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Figure 3.2c: Primary health care practitioner follow-up rate after positive FOBT using Kaplan-Meier estimates, South Australia, Tasmania, Australian Capital Territory and Northern Territory, Phase 2

Primary health care practitioner follow-up by population subgroups

Table 3.3: Crude follow-up by primary health care practitioners after a positive FOBT result, by remoteness area, Phase 2

		Remoteness area						
		Major cities	Inner regional	Outer regional	Remote	Very remote	Unknown	Total
Males								
50 years	Number	3,173	1,135	597	70	27	5	5,007
	Per cent	48.0	53.5	54.3	45.4[(a)]	n.p.	n.p.	49.8
55 years	Number	3,011	1,241	623	76	35	3	4,989
	Per cent	48.4	55.2	54.5	49.5[(a)]	n.p.	n.p.	50.7
65 years	Number	3,991	1,834	888	108	25	2	6,848
	Per cent	52.4	58.6	57.7	51.8[(a)]	n.p.	n.p.	54.5
Total	*Number*	*10,175*	*4,210*	*2,107*	*254*	*87*	*10*	*16,844*
	Per cent	*49.7*	*56.2*	*55.7*	*49.2*	*45.8*	*66.7*	*51.9*
	95% CI	*49.1–50.4*	*55.0–57.3*	*54.1–57.3*	*44.9–53.6*	*38.8–52.9*	*42.8–90.5*	*51.4–52.4*
Females								
50 years	Number	3,381	1,170	556	69	33	4	5,214
	Per cent	52.4	56.1	55.7	47.8[(a)]	n.p.	n.p.	53.5
55 years	Number	3,352	1,245	612	69	27	2	5,307
	Per cent	54.1	58.5	59.0	51.7[(a)]	n.p.	n.p.	55.5
65 years	Number	3,489	1,561	707	63	16	3	5,839
	Per cent	55.5	58.9	59.0	48.2[(a)]	n.p.	n.p.	56.7
Total	*Number*	10,222	3,977	1,876	201	76	9	16,360
	Per cent	54.0	57.9	58.0	49.2	47.8	69.2	55.2
	95% CI	*53.3–54.7*	*56.7–59.1*	*56.3–59.7*	*44.4–54.1*	*40.1–55.6*	*44.1–94.3*	*54.7–55.8*
Persons								
50 years	Number	6,554	2,306	1,153	139	61	9	10,221
	Per cent	50.2	54.8	55.0	46.6[(a)]	48.3[(a)]	n.p.	51.6
55 years	Number	6,363	2,486	1,235	145	62	5	10,296
	Per cent	51.3	56.8	56.6	50.5[(a)]	49.4[(a)]	n.p.	53.1
65 years	Number	7,480	3,396	1,595	171	41	5	12,687
	Per cent	53.8	58.7	58.2	50.4	n.p.	n.p.	55.5
Total	**Number**	**20,396**	**8,187**	**3,983**	**455**	**164**	**19**	**33,204**
	Per cent	**51.8**	**57.0**	**56.8**	**49.2**	**46.8**	**n.p.**	**53.5**
	95% CI	**51.3–52.3**	**56.2–57.8**	**55.6–57.9**	**46.0–52.4**	**41.5–52.0**	**n.p.**	**53.1–53.9**

(a) Based on numerator < 20 or denominator < 300; interpret with caution.

Notes

1. Percentages equal the number of people having consulted a PHCP after a positive FOBT result as a proportion of the total number of people with positive FOBT results.
2. Reporting of PHCP follow-up is not mandatory; actual numbers of participant consultations may be underestimated.
3. The residential postcodes of participants were mapped to remoteness areas in the Australian Standard Geographic Classification for 2006 through a postal area concordance. Those that could not be mapped were included in the 'Unknown' column.
4. Because some postcodes cross regional boundaries, totals may not add up due to rounding.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 3.4: Crude follow-up by primary health care practitioners after a positive FOBT result, by socioeconomic status area, Phase 2

		Socioeconomic status area						
		1 (lowest)	2	3	4	5 (highest)	Unknown	Total
Males								
50 years	Number	1,094	1,007	975	920	950	61	5,007
	Per cent	50.6	49.9	49.8	48.6	50.1	45.5[(a)]	49.8
55 years	Number	1,108	1,041	987	959	832	62	4,989
	Per cent	52.8	51.4	50.0	51.3	47.9	48.1[(a)]	50.7
65 years	Number	1,600	1,531	1,375	1,175	1,081	86	6,848
	Per cent	56.7	54.8	54.3	53.6	52.6	54.1[(a)]	54.5
Total	*Number*	*3,802*	*3,579*	*3,337*	*3,054*	*2,863*	*209*	*16,844*
	Per cent	*53.7*	*52.3*	*51.6*	*51.3*	*50.3*	*49.5*	*51.9*
	95% CI	*52.5–54.8*	*51.1–53.5*	*50.4–52.9*	*50.0–52.5*	*49.0–51.6*	*44.8–54.3*	*51.4–52.4*
Females								
50 years	Number	1,013	996	1,058	1,042	1,046	59	5,214
	Per cent	52.9	52.7	53.5	54.1	54.0	n.p.	53.5
55 years	Number	1,083	1,091	993	1,038	1,028	74	5,307
	Per cent	54.9	53.8	56.3	56.5	55.8	64.3[(a)]	55.5
65 years	Number	1,350	1,267	1,132	1,021	1,015	54	5,839
	Per cent	57.3	55.7	57.7	56.8	55.5	n.p.	56.7
Total	*Number*	*3,446*	*3,354*	*3,183*	*3,101*	*3,089*	*187*	*16,360*
	Per cent	*55.2*	*54.2*	*55.8*	*55.8*	*55.1*	*61.9*	*55.2*
	95% CI	*53.9–56.4*	*52.9–55.4*	*54.5–57.1*	*54.4–57.1*	*53.8–56.4*	*56.4–67.4*	*54.7–55.8*
Persons								
50 years	Number	2,107	2,003	2,033	1,962	1,996	120	10,221
	Per cent	51.7	51.2	51.7	51.3	52.1	51.9[(a)]	51.6
55 years	Number	2,191	2,132	1,980	1,997	1,860	136	10,296
	Per cent	53.8	52.6	53.0	53.9	52.0	55.7[(a)]	53.1
65 years	Number	2,950	2,798	2,507	2,196	2,096	140	12,687
	Per cent	56.9	55.2	55.8	55.0	53.9	56.2[(a)]	55.5
Total	**Number**	**7,248**	**6,933**	**6,520**	**6,155**	**5,952**	**396**	**33,204**
	Per cent	**54.4**	**53.2**	**53.6**	**53.4**	**52.7**	**54.7**	**53.5**
	95% CI	**53.5–55.2**	**52.3–54.1**	**52.7–54.5**	**52.5–54.3**	**51.8–53.6**	**51.1–58.3**	**53.1–53.9**

(a) Based on numerator < 20 or denominator < 300; interpret with caution.

Notes

1. Percentages equal the number of people having consulted a PHCP after a positive FOBT result as a proportion of the total number of people with positive FOBT results.
2. Reporting of PHCP follow-up is not mandatory; actual numbers of participant consultations may be underestimated.
3. A participant's socioeconomic status area was classified by mapping their residential postcode (through a postal area) to the ABS IRSD for 2006. Those that could not be mapped were included in the 'Unknown' column.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 3.5: Crude follow-up by primary health care practitioners after a positive FOBT result, by Aboriginal and Torres Strait Islander status, Phase 2

		Indigenous	Non-Indigenous	Not stated	Total
Males					
50 years	Number	45	4,832	130	5,007
	Per cent	n.p.	51.2	24.8	49.8
55 years	Number	46	4,821	122	4,989
	Per cent	n.p.	52.4	22.6	50.7
65 years	Number	41	6,613	194	6,848
	Per cent	n.p.	56.0	28.5	54.5
Total	*Number*	*132*	*16,266*	*446*	*16,844*
	Per cent	*47.8*	*53.4*	*25.6*	*51.9*
	95% CI	*41.9–53.7*	*52.9–54.0*	*23.5–27.6*	*51.4–52.4*
Females					
50 years	Number	50	5,046	118	5,214
	Per cent	n.p.	54.7	27.7	53.5
55 years	Number	35	5,149	123	5,307
	Per cent	n.p.	56.7	30.8	55.5
65 years	Number	43	5,645	151	5,839
	Per cent	n.p.	57.8	32.5	56.7
Total	*Number*	*128*	*15,840*	*392*	*16,360*
	Per cent	*55.9*	*56.4*	*30.4*	*55.2*
	95% CI	*49.5–62.3*	*55.8–57.0*	*27.9–32.9*	*54.7–55.8*
Persons					
50 years	Number	95	9,878	248	10,221
	Per cent	51.1[(a)]	52.9	26.1	51.6
55 years	Number	81	9,970	245	10,296
	Per cent	46.8[(a)]	54.5	26.1	53.1
65 years	Number	84	12,258	345	12,687
	Per cent	57.5[(a)]	56.8	30.2	55.5
Total	**Number**	**260**	**32,106**	**838**	**33,204**
	Per cent	**51.5**	**54.9**	**27.6**	**53.5**
	95% CI	**47.1–55.8**	**54.5–55.3**	**26.0–29.2**	**53.1–53.9**

(a) Based on numerator < 20 or denominator < 300; interpret with caution.

Notes

1. Percentages equal the number of people having consulted a PHCP after a positive FOBT result as a proportion of the total number of people with positive FOBT results.
2. Reporting of PHCP follow-up is not mandatory; actual numbers of participant consultations may be underestimated.
3. NBCSP Aboriginal and Torres Strait Islander status was reported by the participant on the returned Participant Details form. Participants who did not indicate Aboriginal and Torres Strait Islander status were included in the 'Not stated' column.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 3.6: Crude follow-up by primary health care practitioners after a positive FOBT result, by language spoken at home, Phase 2

		Language other than English	English	Total
Males				
50 years	Number	665	4,342	5,007
	Per cent	49.9	49.8	49.8
55 years	Number	587	4,402	4,989
	Per cent	49.3	50.9	50.7
65 years	Number	681	6,167	6,848
	Per cent	51.6	54.9	54.5
Total	*Number*	*1,933*	*14,911*	*16,844*
	Per cent	*50.3*	*52.1*	*51.9*
	95% CI	*48.7–51.9*	*51.5–52.7*	*51.4–52.4*
Females				
50 years	Number	768	4,446	5,214
	Per cent	53.4	53.5	53.5
55 years	Number	697	4,610	5,307
	Per cent	54.7	55.6	55.5
65 years	Number	589	5,250	5,839
	Per cent	57.1	56.6	56.7
Total	*Number*	*2,054*	*14,306*	*16,360*
	Per cent	*54.9*	*55.3*	*55.2*
	95% CI	*53.3–56.5*	*54.7–55.9*	*54.7–55.8*
Persons				
50 years	Number	1,433	8,788	10,221
	Per cent	51.7	51.6	51.6
55 years	Number	1,284	9,012	10,296
	Per cent	52.1	53.2	53.1
65 years	Number	1,270	11,417	12,687
	Per cent	54.0	55.6	55.5
Total	**Number**	**3,987**	**29,217**	**33,204**
	Per cent	**52.6**	**53.6**	**53.5**
	95% CI	**51.4–53.7**	**53.2–54.0**	**53.1–53.9**

Notes

1. Percentages equal the number of people having consulted a PHCP after a positive FOBT result as a proportion of the total number of people with positive FOBT results.
2. Reporting of PHCP follow-up is not mandatory; actual numbers of participant consultations may be underestimated.
3. NBCSP preferred language spoken at home was reported by the participant on the returned Participant Details form. Participants who did not indicate preferred language spoken at home were assumed to speak English.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 3.7: Crude follow-up by primary health care practitioners after a positive FOBT result, by disability status, Phase 2

		Severe or profound activity limitation	No severe or profound activity limitation	Not stated	Total
Males					
50 years	Number	325	4,536	146	5,007
	Per cent	55.9	51.2	23.6	49.8
55 years	Number	338	4,503	148	4,989
	Per cent	56.0	52.2	24.3	50.7
65 years	Number	709	5,922	217	6,848
	Per cent	57.4	56.1	28.0	54.5
Total	*Number*	*1,372*	*14,961*	*511*	*16,844*
	Per cent	*56.7*	*53.4*	*25.5*	*51.9*
	95% CI	*54.7–58.7*	*52.8–54.0*	*23.6–27.4*	*51.4–52.4*
Females					
50 years	Number	412	4,706	96	5,214
	Per cent	57.6	54.8	21.7	53.5
55 years	Number	435	4,721	151	5,307
	Per cent	58.8	56.7	31.0	55.5
65 years	Number	484	5,193	162	5,839
	Per cent	56.3	58.2	31.0	56.7
Total	*Number*	*1,331*	*14,620*	*409*	*16,360*
	Per cent	*57.5*	*56.6*	*28.1*	*55.2*
	95% CI	*55.5–59.5*	*56.0–57.2*	*25.8–30.5*	*54.7–55.8*
Persons					
50 years	Number	737	9,242	242	10,221
	Per cent	56.9	53.0	22.8	51.6
55 years	Number	773	9,224	299	10,296
	Per cent	57.5	54.4	27.3	53.1
65 years	Number	1,193	11,115	379	12,687
	Per cent	57.0	57.1	29.2	55.5
Total	**Number**	**2,703**	**29,581**	**920**	**33,204**
	Per cent	**57.1**	**54.9**	**26.6**	**53.5**
	95% CI	**55.7–58.5**	**54.5–55.3**	**25.1–28.1**	**53.1–53.9**

Notes

1. Percentages equal the number of people having consulted a PHCP after a positive FOBT result as a proportion of the total number of people with positive FOBT results.
2. Reporting of PHCP follow-up is not mandatory; actual numbers of participant consultations may be underestimated.
3. NBCSP disability status was reported by the participant on the Participant Details form. Participants who did not indicate disability status are included in the 'Not stated' column.
4. A 'profound' activity limitation indicates that a person always needs assistance with self-care, movement and/or communications activities. A 'severe' activity limitation indicates that a person sometimes needs assistance with these activities.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 3.8: Symptoms reported to primary health care practitioners after a positive FOBT result, Phase 2

		No symptoms	Recent onset rectal bleeding ≤6 months	Longer standing rectal bleeding >6 months	Significant change in bowel habits	Iron deficiency anaemia	Abdominal pain	All participants reporting symptom status
Males								
50 years	Number	3,803	286	308	107	27	125	4,544
	Per cent	83.7	6.3	6.8	2.4	0.6	2.8	
55 years	Number	3,823	254	262	76	30	89	4,478
	Per cent	85.4	5.7	5.9	1.7	0.7	2.0	
65 years	Number	5,302	292	282	150	61	136	6,128
	Per cent	86.5	4.8	4.6	2.4	1.0	2.2	
Total	*Number*	*12,928*	*832*	*852*	*333*	*118*	*350*	*15,150*
	Per cent	*85.3*	*5.5*	*5.6*	*2.2*	*0.8*	*2.3*	
Females								
50 years	Number	3,919	273	262	157	109	157	4,769
	Per cent	82.2	5.7	5.5	3.3	2.3	3.3	
55 years	Number	3,973	251	298	169	59	184	4,834
	Per cent	82.2	5.2	6.2	3.5	1.2	3.8	
65 years	Number	4,463	241	245	174	66	185	5,267
	Per cent	84.7	4.6	4.7	3.3	1.3	3.5	
Total	*Number*	*12,355*	*765*	*805*	*500*	*234*	*526*	*14,870*
	Per cent	*83.1*	*5.1*	*5.4*	*3.4*	*1.6*	*3.5*	
Persons								
50 years	Number	7,722	559	570	264	136	282	9,313
	Per cent	82.9	6.0	6.1	2.8	1.5	3.0	
55 years	Number	7,796	505	560	245	89	273	9,312
	Per cent	83.7	5.4	6.0	2.6	1.0	2.9	
65 years	Number	9,765	533	527	324	127	321	11,395
	Per cent	85.7	4.7	4.6	2.8	1.1	2.8	
Total	**Number**	**25,283**	**1,597**	**1,657**	**833**	**352**	**876**	**30,020**
	Per cent	**84.2**	**5.3**	**5.5**	**2.8**	**1.2**	**2.9**	

Notes

1. Percentages equal the number of PHCP consultations reporting specific symptoms after a positive FOBT result as a proportion of the total number of consultations after a positive FOBT result in which respondents reported any symptoms.
2. Only participants who had a symptom status (including 'no symptoms') recorded in the Assessment form question 2 were included in this analysis. There were 3,184 participants with missing data for this question excluded from the analysis.
3. Percentages can add to more than 100, as respondents may have reported more than one symptom.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 3.9: Referrals made by primary health care practitioners after a positive FOBT result and subsequent consultation, Phase 2

		Colonoscopy	Double contrast barium enema	Sigmoidoscopy	CT colonography	Other	No referral	All PHCP visits
Males								
50 years	Number	4,676	10	0	6	81	234	5,007
	Per cent	93.4	0.2	0.0	0.1	1.6	4.7	
55 years	Number	4,659	13	n.p.	6	83	226	4,989
	Per cent	93.4	0.3	n.p.	0.1	1.7	4.5	
65 years	Number	6,274	19	3	16	101	435	6,848
	Per cent	91.6	0.3	0.0	0.2	1.5	6.4	
Total	*Number*	*15,609*	*42*	*5*	*28*	*265*	*895*	*16,844*
	Per cent	*92.7*	*0.2*	*0.0*	*0.2*	*1.6*	*5.3*	
Females								
50 years	Number	4,774	5	0	11	137	287	5,214
	Per cent	91.6	0.1	0.0	0.2	2.6	5.5	
55 years	Number	4,885	5	n.p.	6	117	292	5,307
	Per cent	92.0	0.1	n.p.	0.1	2.2	5.5	
65 years	Number	5,316	12	5	13	117	376	5,839
	Per cent	91.0	0.2	0.1	0.2	2.0	6.4	
Total	*Number*	*14,975*	*22*	*7*	*30*	*371*	*955*	*16,360*
	Per cent	*91.5*	*0.1*	*0.0*	*0.2*	*2.3*	*5.8*	
Persons								
50 years	Number	9,450	15	0	17	218	521	10,221
	Per cent	92.5	0.1	0.0	0.2	2.1	5.1	
55 years	Number	9,544	18	4	12	200	518	10,296
	Per cent	92.7	0.2	0.0	0.1	1.9	5.0	
65 years	Number	11,590	31	8	29	218	811	12,687
	Per cent	91.4	0.2	0.1	0.2	1.7	6.4	
Total	**Number**	**30,584**	**64**	**12**	**58**	**636**	**1,850**	**33,204**
	Per cent	**92.1**	**0.2**	**0.0**	**0.2**	**1.9**	**5.6**	

Notes

1. Percentages equal the number of people consulting a PHCP after a positive FOBT who received/did not receive referral for either colonoscopy or other examination as a proportion of the total number of follow-up consultations after a positive FOBT.
2. Referrals may sum to more than all follow-up PHCP visits, as more than one referral may be given at each visit.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 3.10: Referrals for colonoscopy or other examination after a positive FOBT result, by geographic location, Phase 2

		Colonoscopy		Other		No referral		All PHCP visits
		Number	Per cent	Number	Per cent	Number	Per cent	Number
Major cities	Males	9,422	92.6	192	1.9	561	5.5	10,175
	Females	9,353	91.5	270	2.6	599	5.9	10,222
	Persons	*18,775*	*92.1*	*462*	*2.3*	*1,160*	*5.7*	*20,396*
	95% CI		*91.7–92.4*		*2.1–2.5*		*5.4–6.0*	
Inner regional	Males	3,885	92.3	88	2.1	237	5.6	4,210
	Females	3,635	91.4	113	2.8	229	5.8	3,977
	Persons	*7,520*	*91.9*	*201*	*2.5*	*467*	*5.7*	*8,187*
	95% CI		*91.3–92.4*		*2.1–2.8*		*5.2–6.2*	
Outer regional	Males	1,964	93.2	53	2.5	89	4.2	2,107
	Females	1,724	91.9	42	2.2	109	5.8	1,876
	Persons	*3,689*	*92.6*	*94*	*2.4*	*199*	*5.0*	*3,983*
	95% CI		*91.8–93.4*		*1.9–2.8*		*4.3–5.7*	
Remote	Males	244	96.1[(a)]	5	2.0[(a)]	6	2.4[(a)]	254
	Females	187	93.0[(a)]	4	2.0[(a)]	10	5.0[(a)]	201
	Persons	*431*	*94.7*	*8*	*1.8*	*16*	*3.5*	*455*
	95% CI		*92.7–96.8*		*0.6–3.0*		*1.8–5.2*	
Very remote	Males	85	n.p.	2	n.p.	0	0.0	87
	Females	67	n.p.	3	n.p.	6	n.p.	76
	Persons	*152*	*92.7*	*5*	*3.0*	*7*	*4.3*	*164*
	95% CI		*88.7–96.7*		*0.4–5.7*		*1.2–7.4*	
Unknown	Males	9	n.p.	0	0.0	1	n.p.	10
	Females	8	n.p.	0	0.0	1	n.p.	9
	Persons	*17*	*n.p.*	*0*	*0.0*	*2*	*n.p.*	*19*
	95% CI		*n.p.*		*0.0–0.0*		*n.p.*	

(a) Based on numerator < 20 or denominator < 300; interpret with caution.

Notes

1. Percentages equal the number of people consulting a PHCP after a positive FOBT who received/did not receive referral for either colonoscopy or other examination as a proportion of the total number of follow-up consultations after a positive FOBT.
2. The residential postcodes of participants were mapped to remoteness areas in the Australian Standard Geographic Classification for 2006 through a postal area concordance. Those that could not be mapped were included in the 'Unknown' row.
3. Because some postcodes cross regional boundaries, totals may not add up due to rounding.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 3.11: Reason for non-referrals for colonoscopy by primary health care practitioners, Phase 2

		Bowel cancer previously diagnosed	Limited life expectancy	Recent colonoscopy (<18 months)	Patient declines colonoscopy	Significant comorbidity	Other medical condition(s)	All non-referred participants
Males								
50 years	Number	n.p.	5	129	106	21	106	331
	Per cent	n.p.	1.5[(a)]	39.0	32.0	6.3	32.0	
55 years	Number	3	0	123	107	12	114	330
	Per cent	0.9[(a)]	0.0	37.3	32.4	3.6[(a)]	34.5	
65 years	Number	11	22	247	164	62	175	574
	Per cent	1.9[(a)]	3.8	43.0	28.6	10.8	30.5	
Total	*Number*	*15*	*27*	*499*	*377*	*95*	*395*	*1,235*
	Per cent	*1.2[(a)]*	*2.2*	*40.4*	*30.5*	*7.7*	*32.0*	
Females								
50 years	Number	n.p.	n.p.	142	178	18	142	440
	Per cent	n.p.	n.p.	32.3	40.5	4.1[(a)]	32.3	
55 years	Number	5	4	166	160	13	122	422
	Per cent	1.2[(a)]	0.9[(a)]	39.3	37.9	3.1[(a)]	28.9	
65 years	Number	6	17	238	174	39	121	523
	Per cent	1.1[(a)]	3.3[(a)]	45.5	33.3	7.5	23.1	
Total	*Number*	*12*	*22*	*546*	*512*	*70*	*385*	*1,385*
	Per cent	*0.9[(a)]*	*1.6*	*39.4*	*37.0*	*5.1*	*27.8*	
Persons								
50 years	Number	n.p.	6	271	284	39	248	771
	Per cent	n.p.	0.8[(a)]	35.1	36.8	5.1	32.2	
55 years	Number	8	4	289	267	25	236	752
	Per cent	1.1[(a)]	0.5[(a)]	38.4	35.5	3.3	31.4	
65 years	Number	17	39	485	338	101	296	1,097
	Per cent	1.5[(a)]	3.6	44.2	30.8	9.2	27.0	
Total	**Number**	**27**	**49**	**1,045**	**889**	**165**	**780**	**2,620**
	Per cent	**1.0**	**1.9**	**39.9**	**33.9**	**6.3**	**29.8**	

(a) Based on numerator < 20 or denominator < 300; interpret with caution.

Notes

1. Percentages equal the number of consultations for each reason (after a positive FOBT) that did not refer for colonoscopy as a proportion of the total number of positive FOBT consultations that did not refer for a colonoscopy.
2. A participant may have multiple reasons for non-referral for colonoscopy indicated.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Overall colonoscopy follow-up

Background

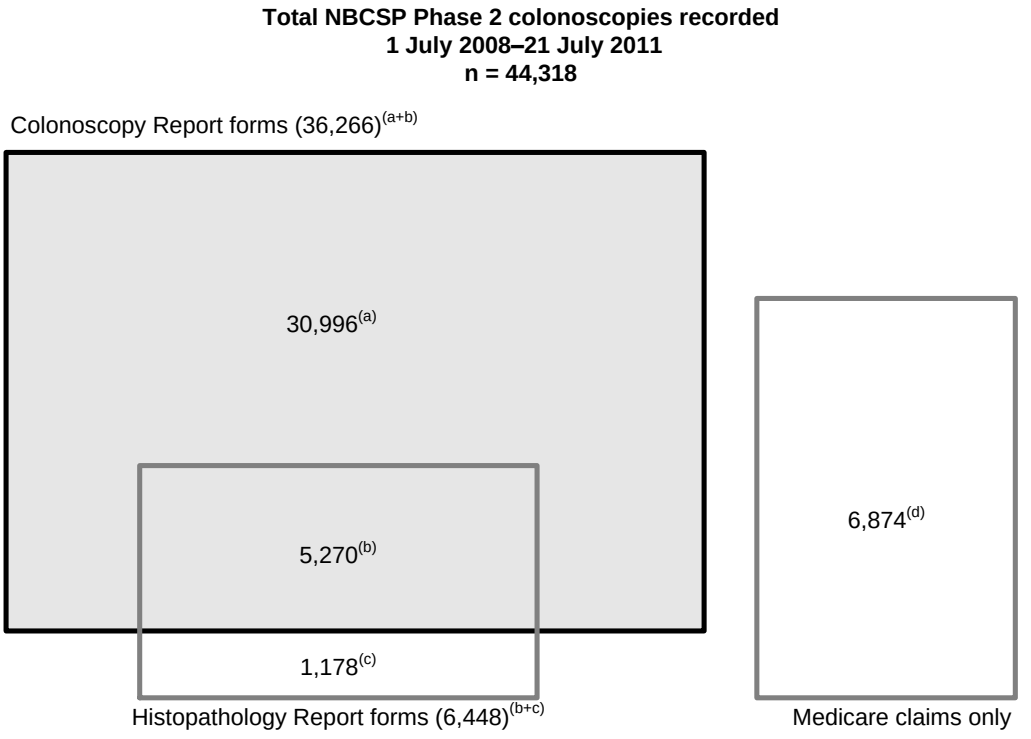
This subsection presents the rate at which participants with a positive FOBT had follow-up by colonoscopy. Due to the NHMRC-approved recommendation that all referrals be for colonoscopy, follow-up by other methods (for example, sigmoidoscopy) were not analysed.

As described in the participant's screening pathway (Figure B.1, Appendix B), PHCPs should refer all relevant participants to colonoscopy, and their colonoscopy results should be returned to the Register on Colonoscopy Report forms. Some of these colonoscopies would also have sent pathology samples for analysis, and these additional results should be returned to the Register on Histopathology Report forms. Lastly, each participant may choose to have a private or public healthcare colonoscopy (depending on their individual circumstances and choice), and those who had a private colonoscopy may then make a Medicare claim for that procedure.

As not all forms are returned to the Register, a count of Colonoscopy Report forms will not include all colonoscopies done as part of NBCSP follow-up. Therefore, in an effort to obtain the most comprehensive picture of true colonoscopy follow-up, NBCSP colonoscopy procedures were identified through three sources (Figure 3.3):

1. Colonoscopy Report forms up until 21 July 2011 (colonoscopy outcomes can be analysed using data on these forms)
2. Additional Histopathology Report forms up until 21 July 2011 (from the subset of colonoscopies that, although not directly reported on a Colonoscopy Report form, must have sent samples to histopathology—which were reported)
3. claims for Medicare benefits for private colonoscopies up until 30 June 2011, that were not reported through a Colonoscopy Report form (from the subset of NBCSP colonoscopies that were undertaken through the private healthcare system, as identified by DoHS).

In Figure 3.3, if all colonoscopy forms were returned and recorded, it would be expected that no extra colonoscopies would be counted from outside the Colonoscopy Report forms box. However, 6,874 colonoscopies from Phase 2 were identified by a private colonoscopy Medicare claim only, and a further 1,178 were identified through a Histopathology Report form only. Details such as colonoscopic findings could not be obtained for these colonoscopies; however, they should still be counted towards known colonoscopies performed as part of NBCSP follow-up activities. Overall, while using these three sources allows as many NBCSP colonoscopies as possible to be counted, a number will remain unaccounted for, so colonoscopy follow-up rates may be underestimated.



People invited in Phase 2 with:

(a) Colonoscopy Report forms recorded in the NBCSP Register for which no Histopathology Report form has been received.

(b) Colonoscopies performed as part of the NBCSP where a Colonoscopy and Histopathology Report form were recorded on which confirmed outcomes can be calculated. The total number of Colonoscopy Report forms is given by (a)+(b).

(c) Colonoscopies performed as part of the NBCSP where only a Histopathology Report form was recorded.

(d) Colonoscopies performed as part of the NBCSP where only a Medicare claim was recorded as at 30 June 2011.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Figure 3.3: Sources of colonoscopy follow-up data, Phase 2

Phase 2 colonoscopy follow-up

Of the 62,067 positive FOBT results from participants invited in Phase 2, 44,318 had a colonoscopy registered by 21 July 2011, giving a crude Phase 2 colonoscopy follow-up rate of 71.4% (Table 3.12). Of these, 6,874 colonoscopies were only known to have taken place through a Medicare claim for the procedure made up until 30 June 2011; no Colonoscopy or Histopathology Report forms were recorded for these colonoscopies.

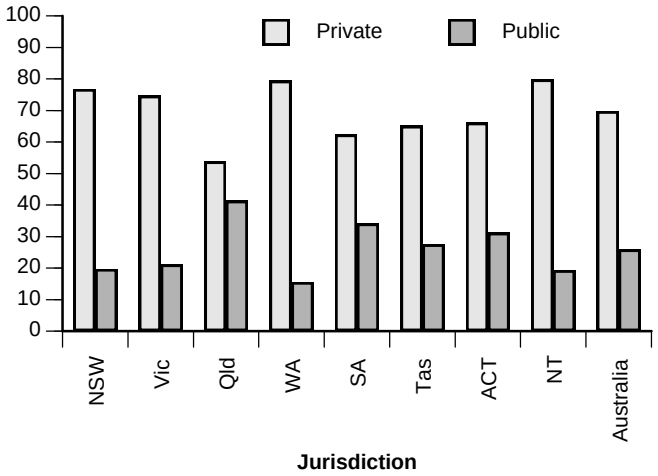
Reasons for this non-complete rate of follow-up are likely to be similar to reasons for the low rate of PHCP follow-up: not all participants may follow up a positive FOBT result, there is a lag time between booking and having a colonoscopy, and there is some delay in returning Colonoscopy Report forms. Additionally, all positive FOBTs instead of all PHCP colonoscopy referrals were used as the denominator for colonoscopy follow-up. This would also have contributed to an apparently lower follow-up rate than may actually be the case. See 'Data considerations' and 'Colonoscopy follow-up', Section 1 for further details.

To adjust for the effect of lag time on the follow-up rate, a Kaplan-Meier analysis was performed. The Kaplan-Meier analysis of colonoscopy follow-up estimated 69.4% of participants with a positive FOBT had a colonoscopy within 26 weeks of notification of their positive result, which increased to 74.0% at 52 weeks post-positive FOBT notification (Table 3.13). As these Kaplan-Meier rates were similar to the crude rate reported, the lag time waiting for a colonoscopy procedure was not a major contributing factor in this report.

Colonoscopy follow-up by population subgroups

Colonoscopy follow-up by state and territory

There were statistically significant differences in colonoscopy follow-up rates between states and territories (tables 3.12 and 3.13). South Australia (79.7%), Queensland (77.8%), the Australian Capital Territory (76.1%) and Tasmania (74.2%) all had a statistically significant higher rate of crude colonoscopy follow-up than the other jurisdictions. The jurisdictions with higher rates of colonoscopy follow-up were also the four with the highest proportion of public system colonoscopies (Figure 3.4). This suggests that colonoscopies done in the public system in those jurisdictions were more likely to be reported back to the Register, which may have resulted in higher colonoscopy follow-up rates in the jurisdictions with the highest proportion of public system colonoscopies.



Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Figure 3.4: Private/public colonoscopy split, by jurisdiction, Phase 2

Additionally, much like the PHCP follow-up differences by jurisdiction (Table 3.1), these colonoscopy follow-up differences may also be affected by Program implementation procedures specific to each jurisdiction (tables 3.12 and 3.13 and figures 3.6a–3.6c).

Colonoscopy follow-up by age and sex

The crude rate of colonoscopy follow-up for people aged 65 (72.3%) was statistically significantly higher than for those aged 50 and 55 (both 70.9%) (Figure 3.5 and Table 3.12).

The difference in crude colonoscopy follow-up between men and women was not statistically significant (Table 3.12). However, the denominator used for colonoscopy follow-up does not take into account the sex-specific differences in actual referral rates from PHCPs (see 'Data considerations', Section 1). Therefore, this result should be interpreted with caution.

Note: Bars on columns represent 95% confidence intervals.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Figure 3.5: Colonoscopy follow-up, by age and sex, Phase 2

Colonoscopy follow-up by region and socioeconomic status

Colonoscopy follow-up for participants living in *Major cities* was higher than in all other regions by a statistically significant amount (Table 3.14), yet PHCP follow-up in *Major cities* was lower than the Australian PHCP follow-up rate by a statistically significant amount. As lag time is not considered a contributing factor towards PHCP or colonoscopy rates in this report, there may be differences in form return between PHCPs and colonoscopists within regions.

There were also statistically significant differences in colonoscopy follow-up between participants living in areas of differing socioeconomic status (Table 3.15); there was a decreasing rate of colonoscopy follow-up for participants living in areas with increasing socioeconomic disadvantage.

Colonoscopy follow-up by Aboriginal and Torres Strait Islander status, language spoken at home and disability subgroups

All three population subgroups had low numbers of participants with returned colonoscopy forms. Care must be taken when interpreting results in these tables.

Although Aboriginal and Torres Strait Islander participants had a statistically significant lower rate of colonoscopy follow-up (58.4%) than non-Indigenous participants (72.2%), this comparison should be made with caution due to the low number of Aboriginal and Torres Strait Islander participants (295) who were recorded as having a colonoscopy (Table 3.16).

Participants who spoke English at home had a statistically significant higher rate of colonoscopy follow-up (71.9%) than participants who spoke a language other than English (67.5%) (Table 3.17).

Participants with a severe or profound activity limitation had a statistically significantly lower rate of colonoscopy follow-up (60.9%) than participants without such limitations (73.5%) (Table 3.18). This is an opposite finding to the PHCP follow-up result, where participants with a severe or profound activity limitation had a statistically significant higher rate of PHCP follow-up (57.1% versus 54.9%) (Table 3.7). Further analysis of referral (Table 3.9) and reason for non-referral (Table 3.11) data showed 8.8% of participants with a severe or profound activity limitation were not referred to colonoscopy, compared with 5.3% of participants without such limitations. Participants with a severe or profound activity limitation were more likely to cite limited life expectancy, a significant comorbidity or other medical condition as the reason for non-referral, while being less likely to report having had a recent colonoscopy as the reason for non-referral.

Lastly, further analysis of colonoscopy and histopathology outcomes revealed participants with a severe or profound activity limitation who did continue on to colonoscopy actually had slightly lower rates of cancer and adenomas compared with participants without those limitations (data not shown). Participants in this subgroup may return a higher rate of false positive FOBT results; however, the small number of those with outcomes for analysis means further investigation would be required before any significant conclusion could be made.

Overall histopathology follow-up

Background

If a NBCSP colonoscopy procedure removed specimens (such as polyps or adenomas) for analysis by histopathology, this is noted on the Colonoscopy Report form and the result of the analysis should then be returned to the Register on a completed Histopathology Report

form. However, there is a high rate of non-return of Histopathology Report forms, which may be due to the lag time in processing of samples, or poor form return from pathology laboratories.

In Phase 2, a number of jurisdictions started projects to improve histopathology data return, and this may have resulted in some jurisdictions having a higher proportion of confirmed colonoscopy outcomes than other jurisdictions.

As final diagnosis of cancers suspected at colonoscopy requires confirmation by histopathology, the suspected high rate of non-return of Histopathology Report forms means the confirmed cancer numbers in '4 Bowel abnormality detection', Section 2 are likely to be under-reported, and by different amounts depending on jurisdiction.

Phase 2 histopathology follow-up

Data recorded on the 36,266 Colonoscopy Report forms returned in Phase 2 indicated samples were sent to histopathology for 18,453 (50.9%) of participants. However, as at 21 July 2011, only 6,448 Histopathology Report forms (34.9%) had been returned. Outcomes of these are discussed in '4 Bowel abnormality detection', Section 2.

Colonoscopy follow-up tables and figures

Table 3.12: Crude colonoscopy follow-up after a positive FOBT result, by state and territory, Phase 2

		NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
Males										
50 years	Number	1,861	1,878	1,402	795	713	213	130	43	7,035
	Per cent	60.7	70.8	77.6	71.7	79.7	77.7[(a)]	71.4[(a)]	n.p.	69.9
55 years	Number	1,927	1,737	1,403	760	703	253	110	40	6,933
	Per cent	64.2	70.8	77.4	69.4	77.6	76.9	71.9[(a)]	n.p.	70.5
65 years	Number	2,639	2,165	1,871	1,003	900	297	145	41	9,061
	Per cent	65.8	72.6	77.7	72.7	80.1	76.0	79.2[(a)]	n.p.	72.1
Total	*Number*	*6,427*	*5,780*	*4,676*	*2,558*	*2,316*	*763*	*385*	*124*	*23,029*
	Per cent	*63.8*	*71.5*	*77.6*	*71.4*	*79.2*	*76.8*	*74.3*	*50.2*	*71.0*
	95% CI	*62.8–64.7*	*70.5–72.5*	*76.5–78.6*	*69.9–72.9*	*77.7–80.7*	*74.1–79.4*	*70.6–78.1*	*44.0–56.4*	*70.5–71.4*
Females										
50 years	Number	1,875	1,947	1,400	722	654	232	125	45	7,000
	Per cent	65.8	73.4	79.9	66.8	78.9	69.7	76.2[(a)]	n.p.	71.8
55 years	Number	1,893	1,757	1,352	764	649	238	120	40	6,813
	Per cent	65.9	72.2	76.7	68.6	79.7	70.2	80.5[(a)]	n.p.	71.3
65 years	Number	2,177	1,860	1,505	748	769	259	135	23	7,476
	Per cent	66.0	73.8	77.6	71.0	82.1	75.1	77.6[(a)]	n.p.	72.5
Total	*Number*	*5,945*	*5,564*	*4,257*	*2,234*	*2,072*	*729*	*380*	*108*	*21,289*
	Per cent	*65.9*	*73.2*	*78.0*	*68.8*	*80.3*	*71.7*	*78.0*	*54.3*	*71.9*
	95% CI	*64.9–66.9*	*72.2–74.2*	*76.9–79.1*	*67.2–70.4*	*78.8–81.8*	*68.9–74.5*	*74.4–81.7*	*47.3–61.2*	*71.4–72.4*
Persons										
50 years	Number	3,736	3,825	2,802	1,517	1,367	445	255	88	14,035
	Per cent	63.2	72.1	78.7	69.3	79.3	73.3	73.7	55.3[(a)]	70.9
55 years	Number	3,820	3,494	2,755	1,524	1,352	491	230	80	13,746
	Per cent	65.0	71.5	77.1	69.0	78.6	73.5	76.2	49.7[(a)]	70.9
65 years	Number	4,816	4,025	3,376	1,751	1,669	556	280	64	16,537
	Per cent	65.9	73.2	77.6	72.0	81.0	75.5	78.4	50.8[(a)]	72.3
Total	**Number**	**12,372**	**11,344**	**8,933**	**4,792**	**4,388**	**1,492**	**765**	**232**	**44,318**
	Per cent	**64.8**	**72.3**	**77.8**	**70.1**	**79.7**	**74.2**	**76.1**	**52.0**	**71.4**
	95% CI	**64.1–65.5**	**71.6–73.0**	**77.0–78.6**	**69.1–71.2**	**78.7–80.8**	**72.3–76.1**	**73.5–78.8**	**47.4–56.7**	**71.0–71.8**

(a) Based on numerator < 20 or denominator < 300; interpret with caution.

Notes

1. Percentages of colonoscopies performed equal the number of people who have had a colonoscopy recorded after a positive FOBT as a proportion of the total number of people with positive FOBT results.
2. Record of a colonoscopy as part of the NBCSP is identified from Colonoscopy Report forms, Histopathology Report forms and/or Medicare claims.
3. As progression through the pathway to the colonoscopy stage may take some time, some participants may not have had sufficient time to have had a colonoscopy. Additionally, reporting of colonoscopy follow-up is not mandatory. Therefore, actual numbers of participant colonoscopies may be underestimated.

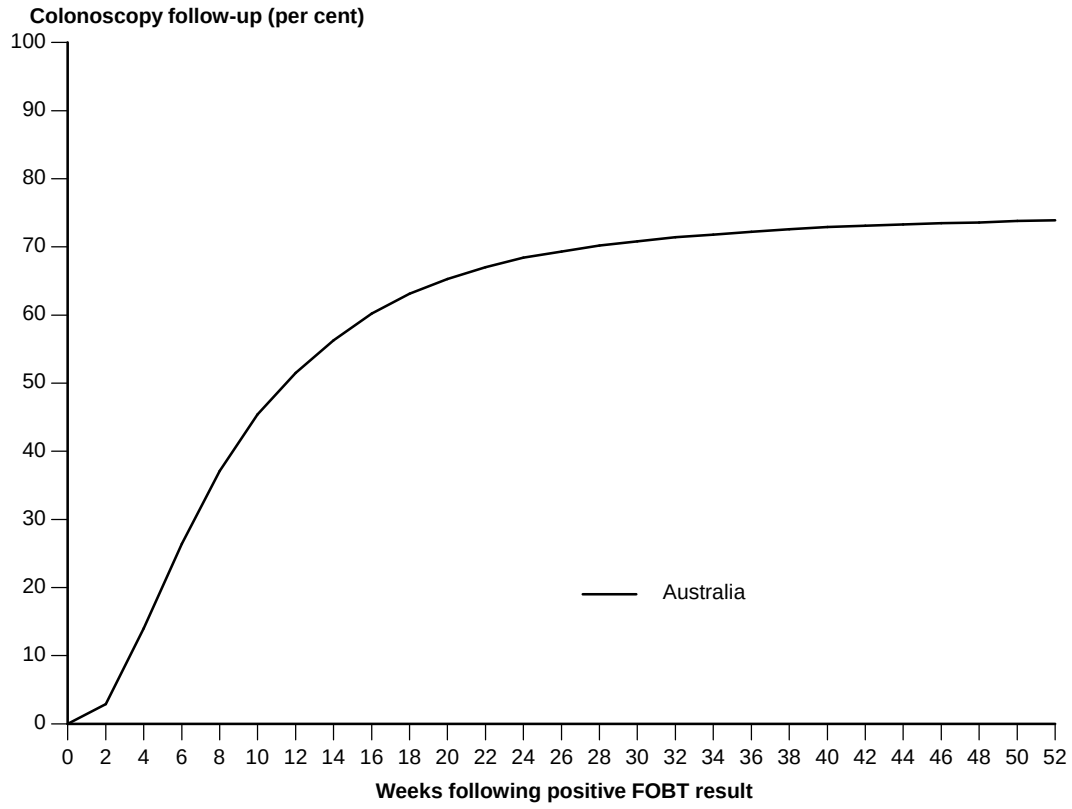
Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Table 3.13: Kaplan-Meier documented colonoscopy follow-up per 100 people with positive FOBTs at 26 and 52 weeks since positive FOBT, by state and territory, Phase 2

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Australia
26 weeks									
Colonoscopy follow-up rate (per cent)	62.2	71.3	78.3	63.8	78.3	71.3	71.8	48.4	69.4
95% CI	61.5–63.0	70.5–72.0	77.5–79.1	62.6–65.0	77.1–79.4	69.2–73.4	68.9–74.6	43.7–53.0	69.0–69.8
52 weeks									
Colonoscopy follow-up rate (per cent)	67.5	74.5	83.2	68.7	82.7	76.2	78.4	51.9	74.0
95% CI	66.7–68.2	73.8–75.2	82.5–84.0	67.5–69.9	81.7–83.8	74.2–78.3	75.7–81.1	47.1–56.6	73.6–74.3

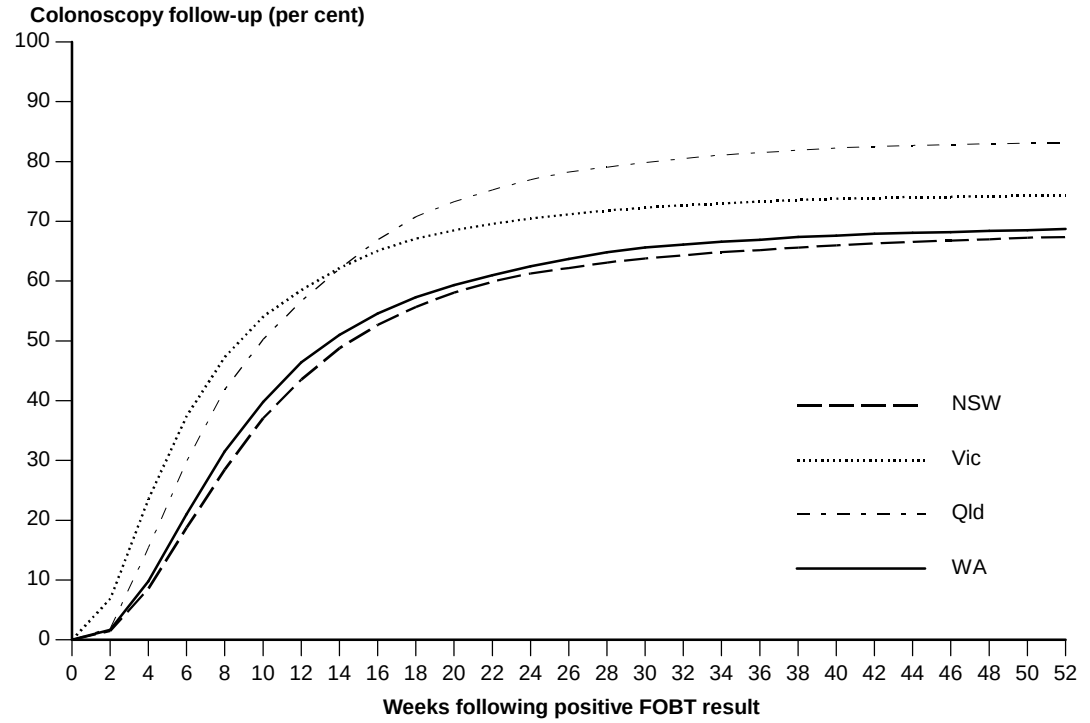
Note: Colonoscopy follow-up rates equal the estimated Kaplan-Meier follow-up rate of people who have had a colonoscopy as a proportion of the total number of people with positive FOBT results, including people who suspended or opted off the Program.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.



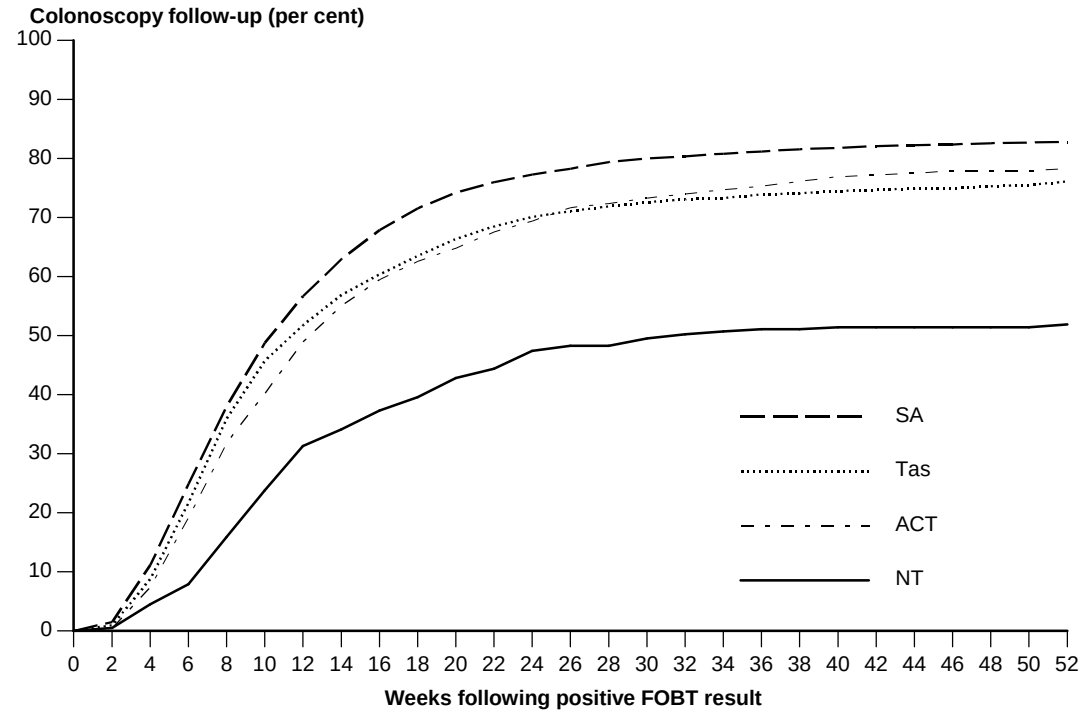
Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Figure 3.6a: Colonoscopy follow-up after a positive FOBT using Kaplan-Meier estimates, Australia, Phase 2



Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Figure 3.6b: Colonoscopy follow-up after a positive FOBT using Kaplan-Meier estimates, New South Wales, Victoria, Queensland and Western Australia, Phase 2



Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Figure 3.6c: Colonoscopy follow-up after a positive FOBT using Kaplan-Meier estimates, South Australia, Tasmania, Australian Capital Territory and Northern Territory, Phase 2

Colonoscopy follow-up by population subgroups

Table 3.14: Crude colonoscopy follow-up after a positive FOBT result, by remoteness area, Phase 2

		Remoteness area						
		Major cities	**Inner regional**	**Outer regional**	**Remote**	**Very remote**	**Unknown**	**Total**
Males								
50 years	Number	4,783	1,380	723	102	45	3	7,035
	Per cent	72.3	65.1	65.7	66.2[(a)]	n.p.	n.p.	69.9
55 years	Number	4,525	1,490	772	102	42	3	6,933
	Per cent	72.8	66.3	67.5	66.2[(a)]	n.p.	n.p.	70.5
65 years	Number	5,662	2,143	1,074	138	40	3	9,061
	Per cent	74.3	68.5	69.8	66.0[(a)]	n.p.	n.p.	72.1
Total	*Number*	*14,970*	*5,013*	*2,569*	*342*	*127*	*9*	*23,029*
	Per cent	*73.2*	*66.9*	*67.9*	*66.2*	*66.5*	*n.p.*	*71.0*
	95% CI	*72.6–73.8*	*65.8–67.9*	*66.4–69.4*	*62.1–70.2*	*59.8–73.2*	*n.p.*	*70.5–71.4*
Females								
50 years	Number	4,740	1,437	678	99	41	5	7,000
	Per cent	73.5	68.9	67.9	68.3[(a)]	n.p.	n.p.	71.8
55 years	Number	4,557	1,429	693	85	45	3	6,813
	Per cent	73.6	67.2	66.7	63.9[(a)]	n.p.	n.p.	71.3
65 years	Number	4,757	1,793	812	89	23	3	7,476
	Per cent	75.7	67.6	67.7	68.5[(a)]	n.p.	n.p.	72.5
Total	*Number*	*14,054*	*4,659*	*2,182*	*273*	*110*	*11*	*21,289*
	Per cent	*74.2*	*67.8*	*67.4*	*66.9*	*69.2*	*n.p.*	*71.9*
	95% CI	*73.6–74.9*	*66.7–69.0*	*65.8–69.1*	*62.3–71.5*	*62.0–76.4*	*n.p.*	*71.4–72.4*
Persons								
50 years	Number	9,523	2,816	1,401	201	86	8	14,035
	Per cent	72.9	66.9	66.8	67.2[(a)]	68.8[(a)]	n.p.	70.9
55 years	Number	9,082	2,919	1,465	187	87	6	13,746
	Per cent	73.2	66.7	67.1	65.2[(a)]	69.6[(a)]	n.p.	70.9
65 years	Number	10,419	3,936	1,885	227	64	6	16,537
	Per cent	74.9	68.1	68.8	67.0	n.p	n.p.	72.3
Total	**Number**	**29,024**	**9,671**	**4,751**	**615**	**237**	**20**	**44,318**
	Per	**73.7**	**67.3**	**67.7**	**66.5**	**67.7**	**n.p.**	**71.4**
	95% CI	**73.3–74.1**	**66.6–68.1**	**66.6–68.8**	**63.4–69.5**	**62.8–72.6**	**n.p.**	**71.0–71.8**

(a) Based on numerator < 20 or denominator < 300; interpret with caution.

Notes

1. Percentages of colonoscopies performed equal the number of people who have had a colonoscopy recorded after a positive FOBT as a proportion of the total number of people with positive FOBT results.
2. Reporting of colonoscopy follow-up is not mandatory. Therefore, actual numbers of participant colonoscopies may be underestimated.
3. The residential postcodes of participants were mapped to remoteness areas in the Australian Standard Geographic Classification for 2006 through a postal area concordance. Those that could not be mapped were included in the 'Unknown' column.
4. Because some postcodes cross regional boundaries, totals may not add up due to rounding.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Table 3.15: Crude colonoscopy follow-up after a positive FOBT result, by socioeconomic status area, Phase 2

		Socioeconomic status area						
		1 (lowest)	2	3	4	5 (highest)	Unknown	Total
Males								
50 years	Number	1,415	1,321	1,375	1,403	1,432	89	7,035
	Per cent	65.4	65.5	70.3	74.1	75.5	66.4[(a)]	69.9
55 years	Number	1,390	1,341	1,429	1,391	1,307	75	6,933
	Per cent	66.2	66.2	72.4	74.5	75.3	58.1[(a)]	70.5
65 years	Number	1,905	1,879	1,874	1,677	1,622	104	9,061
	Per cent	67.5	67.2	74.0	76.4	78.9	65.4[(a)]	72.1
Total	*Number*	*4,710*	*4,541*	*4,678*	*4,471*	*4,361*	*268*	*23,029*
	Per cent	*66.5*	*66.4*	*72.4*	*75.1*	*76.6*	*63.5*	*71.0*
	95% CI	*65.4–67.6*	*65.3–67.5*	*71.3–73.5*	*74.0–76.2*	*75.5–77.7*	*58.9–68.1*	*70.5–71.4*
Females								
50 years	Number	1,277	1,302	1,444	1,441	1,469	67	7,000
	Per cent	66.7	68.9	73.0	74.8	75.8	n.p.	71.8
55 years	Number	1,325	1,369	1,240	1,374	1,426	79	6,813
	Per cent	67.1	67.5	70.3	74.8	77.4	68.7[(a)]	71.3
65 years	Number	1,603	1,591	1,423	1,371	1,418	70	7,476
	Per cent	68.0	70.0	72.6	76.3	77.5	n.p.	72.5
Total	*Number*	*4,205*	*4,262*	*4,107*	*4,186*	*4,313*	*216*	*21,289*
	Per cent	*67.3*	*68.8*	*72.0*	*75.3*	*76.9*	*71.5*	*71.9*
	95% CI	*66.2–68.5*	*67.7–70.0*	*70.9–73.2*	*74.1–76.4*	*75.8–78.0*	*66.4–76.6*	*71.4–72.4*
Persons								
50 years	Number	2,692	2,623	2,819	2,844	2,901	156	14,035
	Per cent	66.0	67.1	71.7	74.4	75.7	67.5[(a)]	70.9
55 years	Number	2,715	2,710	2,669	2,765	2,733	154	13,746
	Per cent	66.6	66.8	71.4	74.6	76.4	63.1[(a)]	70.9
65 years	Number	3,508	3,470	3,297	3,048	3,040	174	16,537
	Per cent	67.7	68.5	73.4	76.4	78.2	69.9[(a)]	72.3
Total	**Number**	**8,915**	**8,803**	**8,785**	**8,657**	**8,674**	**484**	**44,318**
	Per cent	**66.9**	**67.6**	**72.2**	**75.2**	**76.8**	**66.9**	**71.4**
	95% CI	**66.1–67.7**	**66.8–68.4**	**71.4–73.0**	**74.4–75.9**	**76.0–77.6**	**63.4–70.3**	**71.0–71.8**

(a) Based on numerator < 20 or denominator < 300; interpret with caution.

Notes

1. Percentages of colonoscopies performed equal the number of people who have had a colonoscopy recorded after a positive FOBT as a proportion of the total number of people with positive FOBT results.
2. Reporting of colonoscopy follow-up is not mandatory. Therefore, actual numbers of participant colonoscopies may be underestimated.
3. A participant's socioeconomic status area was classified by mapping their residential postcode (through a postal area) to the ABS IRSD for 2006. Those that could not be mapped were included in the 'Unknown' column.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Table 3.16: Crude colonoscopy follow-up after a positive FOBT result, by Aboriginal and Torres Strait Islander status, Phase 2

		Indigenous	Non-Indigenous	Not stated	Total
Males					
50 years	Number	53	6,711	271	7,035
	Per cent	n.p.	71.1	51.7	69.9
55 years	Number	62	6,572	299	6,933
	Per cent	n.p.	71.5	55.5	70.5
65 years	Number	40	8,602	419	9,061
	Per cent	n.p.	72.9	61.6	72.1
Total	*Number*	*155*	*21,885*	*989*	*23,029*
	Per cent	*56.2*	*71.9*	*56.7*	*71.0*
	95% CI	*50.3–62.0*	*71.4–72.4*	*54.4–59.1*	*70.5–71.4*
Females					
50 years	Number	54	6,707	239	7,000
	Per cent	n.p.	72.7	56.1	71.8
55 years	Number	43	6,540	230	6,813
	Per cent	n.p.	72.0	57.5	71.3
65 years	Number	43	7,153	280	7,476
	Per cent	n.p.	73.2	60.3	72.5
Total	*Number*	*140*	*20,400*	*749*	*21,289*
	Per cent	*61.1*	*72.6*	*58.1*	*71.9*
	95% CI	*54.8–67.4*	*72.1–73.1*	*55.4–60.8*	*71.4–72.4*
Persons					
50 years	Number	107	13,418	510	14,035
	Per cent	57.5[(a)]	71.9	53.7	70.9
55 years	Number	105	13,112	529	13,746
	Per cent	60.7[(a)]	71.7	56.3	70.9
65 years	Number	83	15,755	699	16,537
	Per cent	56.8[(a)]	73.0	61.1	72.3
Total	**Number**	**295**	**42,285**	**1,738**	**44,318**
	Per cent	**58.4**	**72.2**	**57.3**	**71.4**
	95% CI	**54.1–62.7**	**71.9–72.6**	**55.5–59.1**	**71.0–71.8**

(a) Based on numerator < 20 or denominator < 300; interpret with caution.

Notes

1. Percentages of colonoscopies performed equal the number of people who have had a colonoscopy recorded after a positive FOBT as a proportion of the total number of people with positive FOBT results.
2. Reporting of colonoscopy follow-up is not mandatory. Therefore, actual numbers of participant colonoscopies may be underestimated.
3. NBCSP Aboriginal and Torres Strait Islander status was reported by the participant on the returned Participant Details form. Participants who did not indicate Aboriginal and Torres Strait Islander status were included in the 'Not stated' column.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Table 3.17: Crude colonoscopy follow-up after a positive FOBT result, by language spoken at home, Phase 2

		Language other than English	English	Total
Males				
50 years	Number	861	6,174	7,035
	Per cent	64.5	70.7	69.9
55 years	Number	789	6,144	6,933
	Per cent	66.2	71.1	70.5
65 years	Number	922	8,139	9,061
	Per cent	69.9	72.4	72.1
Total	*Number*	*2,572*	*20,457*	*23,029*
	Per cent	*66.9*	*71.5*	*71.0*
	95% CI	*65.4–68.4*	*71.0–72.0*	*70.5–71.4*
Females				
50 years	Number	989	6,011	7,000
	Per cent	68.8	72.4	71.8
55 years	Number	838	5,975	6,813
	Per cent	65.8	72.1	71.3
65 years	Number	725	6,751	7,476
	Per cent	70.3	72.8	72.5
Total	*Number*	*2,552*	*18,737*	*21,289*
	Per cent	*68.2*	*72.4*	*71.9*
	95% CI	*66.7–69.7*	*71.9–73.0*	*71.4–72.4*
Persons				
50 years	Number	1,850	12,185	14,035
	Per cent	66.8	71.5	70.9
55 years	Number	1,627	12,119	13,746
	Per cent	66.0	71.6	70.9
65 years	Number	1,647	14,890	16,537
	Per cent	70.1	72.6	72.3
Total	**Number**	**5,124**	**39,194**	**44,318**
	Per cent	**67.5**	**71.9**	**71.4**
	95% CI	**66.5–68.6**	**71.6–72.3**	**71.0–71.8**

Notes

1. Percentages of colonoscopies performed equal the number of people who have had a colonoscopy recorded after a positive FOBT as a proportion of the total number of people with positive FOBT results.
2. Reporting of colonoscopy follow-up is not mandatory. Therefore, actual numbers of participant colonoscopies may be underestimated.
3. NBCSP preferred language spoken at home was reported by the participant on the returned Participant Details form. Participants who did not indicate preferred language spoken at home were assumed to speak English.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Table 3.18: Documented colonoscopy follow-up after a positive FOBT result, by disability status, Phase 2

		Severe or profound activity limitation	No severe or profound activity limitation	Not stated	Total
Males					
50 years	Number	337	6,395	303	7,035
	Per cent	58.0	72.2	48.9	69.9
55 years	Number	363	6,257	313	6,933
	Per cent	60.1	72.6	51.4	70.5
65 years	Number	770	7,854	437	9,061
	Per cent	62.3	74.4	56.4	72.1
Total	*Number*	*1,470*	*20,506*	*1,053*	*23,029*
	Per cent	*60.7*	*73.1*	*52.6*	*71.0*
	95% CI	*58.8–62.7*	*72.6–73.7*	*50.4–54.8*	*70.5–71.4*
Females					
50 years	Number	446	6,344	210	7,000
	Per cent	62.4	73.9	47.4	71.8
55 years	Number	426	6,141	246	6,813
	Per cent	57.6	73.7	50.5	71.3
65 years	Number	543	6,633	300	7,476
	Per cent	63.2	74.3	57.4	72.5
Total	*Number*	*1,415*	*19,118*	*756*	*21,289*
	Per cent	*61.1*	*74.0*	*52.0*	*71.9*
	95% CI	*59.2–63.1*	*73.4–74.5*	*49.5–54.6*	*71.4–72.4*
Persons					
50 years	Number	783	12,739	513	14,035
	Per cent	60.4	73.0	48.3	70.9
55 years	Number	789	12,398	559	13,746
	Per cent	58.7	73.1	51.0	70.9
65 years	Number	1,313	14,487	737	16,537
	Per cent	62.7	74.4	56.8	72.3
Total	**Number**	**2,885**	**39,624**	**1,809**	**44,318**
	Per cent	**60.9**	**73.5**	**52.3**	**71.4**
	95% CI	**59.6–62.3**	**73.2–73.9**	**50.7–54.0**	**71.0–71.8**

Notes

1. Percentages of colonoscopies performed equal the number of people who have had a colonoscopy recorded after a positive FOBT as a proportion of the total number of people with positive FOBT results.
2. Reporting of colonoscopy follow-up is not mandatory. Therefore, actual numbers of participant colonoscopies may be underestimated.
3. NBCSP disability status was reported by the participant on the Participant Details form. Participants who did not indicate disability status are included in the 'Not stated' column.
4. A 'profound' activity limitation indicates that a person always needs assistance with self-care, movement and/or communications activities. A 'severe' activity limitation indicates that a person sometimes needs assistance with these activities.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

4 Bowel abnormality detection

What do we mean by bowel abnormality detection?

Definition: The proportion of eligible population invited in Phase 2 who returned a positive result from a correctly completed FOBT kit who had an abnormality detected at follow-up.

Rationale: Monitoring of abnormalities detected through the NBCSP by various stratifications is important to determine the effectiveness of the Program, and to help determine the rate of false positive screening results.

Data source: National Bowel Cancer Screening Register

Data quality: Improving. See 'Data considerations', Section 1 for further details.

Guide to interpretation: Follow-up data are based on data recorded in the Register to 21 July 2011 for persons invited between 1 July 2008 and 30 June 2011. Due to the time delay between notification of a positive FOBT result and progression to colonoscopy and histopathological confirmation of results, outcome data is incomplete.

Only outcomes from colonoscopies that returned Colonoscopy Report forms are included in Table 4.1; additional data from Histopathology Report forms are included in Figure 4.1 and tables 4.2–4. While additional colonoscopies are known to be have taken place due to the return of Medicare claim forms (see '3 Follow-up of positive FOBT results', Section 2) they do not have outcome data available.

Persons are counted only once in the reporting period, even if they have more than one abnormality detected during this period. Histopathologically confirmed results are reported over suspected results.

The abnormalities analysed in this chapter include polyps, adenomas and cancers diagnosed, and these are reported firstly using colonoscopy findings only, then with the addition of available histopathology confirmation data. Additionally, the stage of confirmed cancer spread is reported for those cancers where staging data are available.

Some jurisdictions undertook specific data collection projects to improve the quantity and quality of the outcome data reported to the Register during Phase 2.

Key results

- Of the 62,067 participants with a positive FOBT, 37,444 (60.3%) had a valid Colonoscopy or Histopathology Report form recorded; outcomes for the remaining 24,623 participants with a positive screening result were unknown as at 21 July 2011.
- There were 253 confirmed and 868 suspected cancers found in those with outcome data available, equating to 1 suspected or confirmed cancer being found for every 33 colonoscopies after a positive FOBT.
- A further 3,333 advanced adenomas were detected during colonoscopy.
- The proportion of people for whom abnormalities were detected at colonoscopy increased with age and was higher for men than women.

Background information

This chapter presents outcomes from the NBCSP as at 21 July 2011 based on those people invited in Phase 2 who returned a positive FOBT and who proceeded to colonoscopy. Program outcomes at key pathway points are summarised in Figure 4.1.

Data for colonoscopy outcomes were derived from information recorded on the Colonoscopy and Histopathology Report forms. Late in Phase 2, a new combined colonoscopy/histopathology form was piloted, with the aim to replace the previous two separate forms and improve the level of outcome data returned to the Register.

Outcome information comes from the last points in the NBCSP pathway, and by 21 July 2011 there were still many Colonoscopy and Histopathology Report forms yet to be returned. Ultimately, for cancers and adenomas detected at colonoscopy, the final diagnosis must be returned by histopathology. However, as reporting by clinicians to the NBCSP is not mandatory, a participant may have colonoscopy details, histopathology details, or both recorded in the Register. As a result, outcomes were classified in the following order:

- Confirmed cancers included suspected cancers at colonoscopy where a biopsy sample was taken that was confirmed as cancer by histopathology. Confirmed cancers also included any tissue samples from surgical resection or colonoscopic excisions that were confirmed to be cancerous, and subsequently reported by Histopathology Report form. Confirmed cancers were given a higher priority than suspected cancers.
- Suspected cancers were abnormalities detected at colonoscopy that the colonoscopist suspected to be cancer, but did not have histopathology outcomes available. Final diagnoses cannot be confirmed until histopathology results are returned, though bowel cancer is highly likely if the colonoscopist has suspected a cancerous lesion.
- Adenomas confirmed by histopathology were categorised into three risk levels—advanced, small and diminutive. These are described fully in Appendix B.
- Polyps awaiting histopathology were polyps detected at colonoscopy that had not had an associated Histopathology Report form returned. There is the potential that a number of these may be classified as adenomas by histopathology, so the number of adenomas counted may be under-reported.
- Participants recorded as having no cancer or adenoma were those who had no polyps or suspected cancers detected at colonoscopy, or had polyps detected at colonoscopy that were confirmed as non-adenomatous by histopathology.

Detailed analyses

Three separate analyses regarding abnormality detection are presented here. As it is important to understand what results the colonoscopists are reporting initially, the first analysis (Table 4.1) reports findings when only analysing Colonoscopy Report forms. The second analyses (Figure 4.1 and tables 4.2 and 4.3) reports colonoscopy outcomes, when including histopathology results recorded as part of the colonoscopy procedures. The final analyses (Table 4.4) reports cancer spread status for those cancers confirmed by histopathology that also recorded additional detail about the spread (or stage) of the cancer. The classifications cancer stage reported in Table 4.4 relate to those in Table S1.1, Section 1.

Bowel abnormality detection at colonoscopy

Of the 806,480 people invited into the NBCSP in Phase 2 who returned FOBT kits, 62,067 were found to have blood in their samples (Figure 4.1), giving a positive result that should be followed up by colonoscopy. However, only 36,266 (58.4%) of these had Colonoscopy Report form details recorded from which colonoscopy outcome data could be reported (Figure 3.3).

Results from the 36,266 colonoscopies with a completed Colonoscopy Report form showed there were 1,171 (3.2%) participants with a suspected cancer and 4,594 (12.7%) with one or more polyps greater than 10 millimetres in size (Table 4.1). The cumulative risk of polyps (mainly adenomas) greater than 10 millimetres developing into bowel cancer within 10 years is considered to be 8% (Stryker et al. 1987). The removal of these polyps alone could be estimated to have stopped a future bowel cancer from developing in about 365 participants screened in Phase 2.

There were a further 14,170 (39.1%) participants with polyps less than or equal to 10 millimetres, and 8,868 (24.5%) other diagnoses, such as diverticulitis or haemorrhoids (Table 4.1). About 1 in 5 participants with a positive FOBT, who had a Colonoscopy Report form returned, were found to have no abnormality.

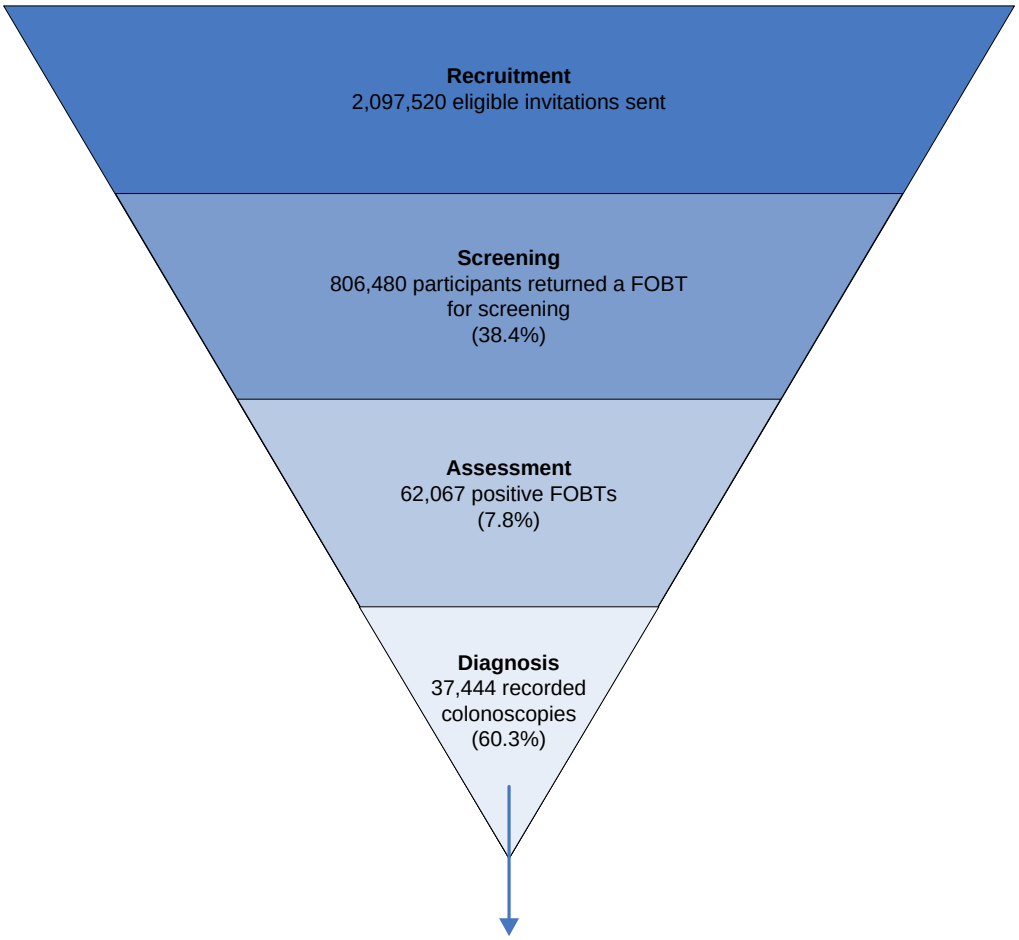
Specimen samples were sent to histopathology for most suspected cancers and polyps found (data not shown).

Bowel abnormality detection, including histopathology

After including the 6,448 Histopathology Report forms—many of which updated the original 'suspected' colonoscopy diagnosis—the outcomes as at 21 July 2011 for those who had a colonoscopy were:

- 253 participants had bowel cancer detected and confirmed by histopathology
- 868 suspected bowel cancers were still awaiting histopathological diagnosis
- 5,120 participants had an adenoma diagnosed by histopathology
- 18,117 participants were found to have no abnormality (Table 4.2).

Results for another 13,086 participants awaiting histopathology outcomes for excised polyps were not available for analysis by 21 July 2011. Another 6,874 known colonoscopies identified through Medicare claims only did not have a Colonoscopy or Histopathology Report form recorded and, therefore, had no diagnostic outcome data.



Recorded colonoscopy outcomes

No cancer or adenoma	18,117	(48.4%)
Polyp awaiting histopathology	13,086	(34.9%)
Diminutive adenoma	865	(2.3%)
Small adenoma	922	(2.5%)
Advanced adenoma	3,333	(8.9%)
Suspected cancer	868	(2.3%)
Confirmed cancer	253	(0.7%)

Notes

1. 6,874 colonoscopies identified through a Medicare claim were not included, as there were no associated outcome data available for analysis.
2. Recruitment, screening and assessment data as at 30 June 2011. Diagnosis and outcome data are to 21 July 2011.
3. Figure is not to scale.

Source: National Bowel Cancer Screening Program Register, outcomes as at 21 July 2011.

Figure 4.1: NBCSP participant outcomes, Phase 2

Bowel abnormality detection, including histopathology, by population subgroups

Bowel abnormality detection by state and territory

As mentioned in the previous chapter, a number of jurisdictions had undertaken projects to improve their level of returned histopathology data for Phase 2. Queensland, Western Australian and Tasmanian participants showed higher proportions of histopathology-confirmed abnormalities (adenomas and cancers) compared with the other jurisdictions (Table 4.2). However, this is mainly due to these states having more complete data for participant outcomes, rather than a geographical link to higher bowel cancer incidence. For example, Western Australia, New South Wales and Victoria all recorded the same proportion of suspected and confirmed cancers (about 3.1 per 100 colonoscopies); however, a higher proportion were confirmed rather than suspected cancers in Western Australia. Therefore, outcome data completeness between jurisdictions needs to be taken into account when analysing Table 4.2.

Considering a number of jurisdictions had run projects to improve histopathology data collection, at the national level the percentage of histology-confirmed outcomes (and the percentage of polyps awaiting histopathology) were not greatly different to those in previous reports (AIHW 2009; AIHW 2010b).

Bowel abnormality detection by age and sex

Table 4.1 presents the recorded *colonoscopy diagnoses* for people invited into the NBCSP in Phase 2; these numbers do not take into account histopathology results that may have updated these diagnoses. Conversely, suspected cancers shown in tables 4.2 and 4.3 only include those that have not been updated by histopathology to their final diagnosis; therefore, tables 4.1 and the later tables show different numbers of suspected cancers.

As would be expected from the known increase in bowel cancer incidence with age (see '7 Incidence of bowel cancer', Section 2), the incidence of abnormalities detected at colonoscopy increased with age; 2.0% of people aged 50 who had a colonoscopy returned a suspected or confirmed cancer outcome compared with 4.2% for those aged 65 (Table 4.3).

Similarly, men (3.5%) showed an incidence of suspected or confirmed cancers that was 1.4 times that of women (2.4%) (Table 4.3). This was also consistent with known bowel cancer incidence in the Australian population.

Cancer spread status

While the scope of the NBCSP is to monitor participants up to the point of 'definite diagnosis' (DoHA 2008), staging data for confirmed cancers is useful to determine the effectiveness of the NBCSP at detecting bowel cancers at a more treatable stage than for those diagnosed with symptomatic bowel cancers. Cancers diagnosed at earlier stages are generally associated with improved patient prognosis (Morris, Lacopetta & Platell 2007).

A biopsy of a suspected cancer taken at colonoscopy is adequate to confirm a cancerous growth, but is not usually sufficient to obtain information on the stage and potential metastatic spread of the cancer. To gain these data, a sample from a surgical resection (or colonoscopic local excision) plus additional biopsies (for example, lymph node) are required. If available, these additional data can be recorded on the Histopathology Report form.

In Phase 2, data suitable for staging of NBCSP-detected bowel cancers were available for 136 of the 253 confirmed cancers. Out of these, 30 (22%) were found to have spread to lymph nodes or metastasised to other secondary sites (Table 4.4). Conversely, 76 (56%) were detected at the earliest stage of spread.

Cancer detection tables

Table 4.1: Colonoscopic outcomes (excludes histopathology), Phase 2

		Colonoscopy outcome						
		Suspected cancer	Polyp(s) > 10mm	Polyp(s) <= 10mm	Other diagnoses[a]	No abnormality	Outcome not specified	All Colonoscopy Report forms
Males								
50 years	Number	145	794	2,395	1,263	1,170	6	5,773
	Per cent	2.5	13.8	41.5	21.9	20.3	0.1[b]	
55 years	Number	170	893	2,542	1,197	857	n.p.	5,661
	Per cent	3.0	15.8	44.9	21.1	15.1	n.p.	
65 years	Number	398	1,336	3,381	1,428	820	8	7,371
	Per cent	5.4	18.1	45.9	19.4	11.1	0.1[b]	
Total	*Number*	*713*	*3,023*	*8,318*	*3,888*	*2,847*	*16*	*18,805*
	Per cent	*3.8*	*16.1*	*44.2*	*20.7*	*15.1*	*0.1*	
	95% CI	*2.4–5.2*	*14.8–17.4*	*43.2–45.3*	*19.4–21.9*	*13.8–16.5*	*0.0–1.5*	
Females								
50 years	Number	98	447	1,669	1,605	1,914	3	5,736
	Per cent	1.7	7.8	29.1	28.0	33.4	0.1[b]	
55 years	Number	130	508	1,846	1,550	1,469	3	5,506
	Per cent	2.4	9.2	33.5	28.2	26.7	0.1[b]	
65 years	Number	230	616	2,337	1,825	1,203	8	6,219
	Per cent	3.7	9.9	37.6	29.3	19.3	0.1[b]	
Total	*Number*	*458*	*1,571*	*5,852*	*4,980*	*4,586*	*14*	*17,461*
	Per cent	*2.6*	*9.0*	*33.5*	*28.5*	*26.3*	*0.1*	
	95% CI	*1.2–4.1*	*7.6–10.4*	*32.3–34.7*	*27.3–29.8*	*25.0–27.5*	*0.0–1.6*	

(continued)

Table 4.1 (continued): Recorded colonoscopy outcomes (excluding histopathology), Phase 2

		Colonoscopy outcome						
		Suspected cancer	Polyp(s) > 10mm	Polyp(s) <= 10mm	Other diagnoses[a]	No abnormality	Outcome not specified	All Colonoscopy Report forms
Persons								
50 years	Number	243	1,241	4,064	2,868	3,084	9	11,509
	Per cent	2.1	10.8	35.3	24.9	26.8	0.1[b]	
55 years	Number	300	1,401	4,388	2,747	2,326	5	11,167
	Per cent	2.7	12.5	39.3	24.6	20.8	0.0[b]	
65 years	Number	628	1,952	5,718	3,253	2,023	16	13,590
	Per cent	4.6	14.4	42.1	23.9	14.9	0.1[b]	
Total	**Number**	**1,171**	**4,594**	**14,170**	**8,868**	**7,433**	**30**	**36,266**
	Per cent	**3.2**	**12.7**	**39.1**	**24.5**	**20.5**	**0.1**	
	95% CI	**2.2–4.2**	**11.7–13.6**	**38.3–39.9**	**23.6–25.3**	**19.6–21.4**	**0.0–1.1**	

(a) Other diagnoses include haemorrhoids, diverticular disease and inflammatory bowel disease.

(b) Based on numerator < 20 or denominator < 300; interpret with caution.

Note: Only colonoscopies with an associated Colonoscopy Report form (36,266) were included in this analysis; colonoscopies identified from Histopathology Report forms or Medicare claims only were not included.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Table 4.2: Overall diagnostic outcomes (including histopathology), by state and territory, Phase 2

State		Invitations issued[a]	Number screened[b]	Total positive FOBT	FOBT positive							
					Colonoscopy recorded[c]	No cancer or adenoma[d]	Polyps awaiting histo-pathology[e]	Confirmed diminutive adenoma[f]	Confirmed small adenoma[f]	Confirmed advanced adenoma[f]	Suspected cancer[g]	Confirmed cancer[h]
NSW	Number	689,690	250,948	19,097	9,603	4,671	4,050	126	93	367	274	22
	Per cent					48.6	42.2	1.3	1.0	3.8	2.9	0.2
Vic	Number	512,859	199,410	15,689	9,709	5,226	3,508	119	131	424	268	33
	Per cent					53.8	36.1	1.2	1.3	4.4	2.8	0.3
Qld	Number	416,191	155,545	11,483	7,973	3,479	2,517	214	322	1,189	171	81
	Per cent					43.6	31.6	2.7	4.0	14.9	2.1	1.0
WA	Number	212,266	90,235	6,832	3,839	1,508	1,006	260	212	737	40	76
	Per cent					39.3	26.2	6.8	5.5	19.2	1.0	2.0
SA	Number	161,179	68,871	5,504	4,102	2,146	1,353	91	97	312	84	19
	Per cent					52.3	33.0	2.2	2.4	7.6	2.0	0.5[i]
Tas	Number	53,598	22,769	2,011	1,331	682	198	49	67	303	10	22
	Per cent					51.2	14.9	3.7	5.0	22.8	0.8[i]	1.7
ACT	Number	33,379	13,625	1,005	685	309	361	0	0	0	15	0
	Per cent					45.1	52.7	0.0	0.0	0.0	2.2[i]	0.0
NT	Number	18,358	5,077	446	202	96	93	6	0	n.p.	6	0
	Per cent					47.5	46.0	3.0[i]	0.0	n.p.	3.0[i]	0.0
Australia	**Number**	**2,097,520**	**806,480**	**62,067**	**37,444**	**18,117**	**13,086**	**865**	**922**	**3,333**	**868**	**253**
	Per cent					**48.4**	**34.9**	**2.3**	**2.5**	**8.9**	**2.3**	**0.7**

(a) 'Invitations issued' equals the number of eligible people who were issued an invitation to screen in the NBCSP.

(b) 'Number screened' equals the number of people who completed an FOBT kit and had results forwarded to the Register.

(c) 'Colonoscopy recorded' includes colonoscopies recorded via the Colonoscopy Report and/or Histopathology Report forms. It does not include colonoscopies identified through Medicare claims.

(d) No cancers were suspected at colonoscopy or confirmed non-cancerous by histopathology; no polyps identified at colonoscopy, or polyps confirmed as non-adenomatous at histopathology.

(e) Polyps detected at colonoscopy and sent to histopathology for analysis. No Histopathology Report form received by Register.

(f) Confirmed adenoma figures were based on a combination of the Colonoscopy and Histopathology Report forms for a person received by the Register.

(g) Cancer suspected at colonoscopy but not yet confirmed by histopathology.

(h) Cancer confirmed by histopathology.

(i) Based on numerator < 20 or denominator < 300; interpret with caution.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Table 4.3: Overall diagnostic outcomes (including histopathology), by age and sex, Phase 2

					FOBT positive							
		Invitations issued(a)	Number screened(b)	Total positive FOBT	Colonoscopy recorded[c]	No cancer or adenoma[d]	Polyps awaiting histo-pathology[e]	Confirmed diminutive adenoma[f]	Confirmed small adenoma[f]	Confirmed advanced adenoma[f]	Suspected cancer[g]	Confirmed cancer[h]
Males												
50 years	Number	456,323	143,779	10,061	5,978	2,743	2,188	139	180	589	105	34
	Per cent					45.9	36.6	2.3	3.0	9.9	1.8	0.6
55 years	Number	340,572	119,678	9,834	5,881	2,333	2,420	149	159	660	132	28
	Per cent					39.7	41.1	2.5	2.7	11.2	2.2	0.5
65 years	Number	247,550	110,687	12,561	7,658	2,633	3,309	215	222	901	284	94
	Per cent					34.4	43.2	2.8	2.9	11.8	3.7	1.2
Total	*Number*	*1,044,445*	*374,144*	*32,456*	*19,517*	*7,709*	*7,917*	*503*	*561*	*2,150*	*521*	*156*
	Per cent					*39.5*	*40.6*	*2.6*	*2.9*	*11.0*	*2.7*	*0.8*
Females												
50 years	Number	459,630	166,524	9,744	5,885	3,772	1,464	115	100	335	77	22
	Per cent					64.1	24.9	2.0	1.7	5.7	1.3	0.4
55 years	Number	346,543	145,474	9,560	5,661	3,294	1,658	106	110	369	100	24
	Per cent					58.2	29.3	1.9	1.9	6.5	1.8	0.4
65 years	Number	246,902	120,338	10,307	6,381	3,342	2,047	141	151	479	170	51
	Per cent					52.4	32.1	2.2	2.4	7.5	2.7	0.8
Total	*Number*	*1,053,075*	*432,336*	*29,611*	*17,927*	*10,408*	*5,169*	*362*	*361*	*1,183*	*347*	*97*
	Per cent					*58.1*	*28.8*	*2.0*	*2.0*	*6.6*	*1.9*	*0.5*

(continued)

Table 4.3 (continued): Overall diagnostic outcomes (including histopathology), by age and sex, Phase 2

					FOBT positive							
		Invitations issued[(a)]	Number screened[(b)]	Total positive FOBT	Colonoscopy recorded[(c)]	No cancer or adenoma[(d)]	Polyps awaiting histo-pathology[(e)]	Confirmed diminutive adenoma[(f)]	Confirmed small adenoma[(f)]	Confirmed advanced adenoma[(f)]	Suspected cancer[(g)]	Confirmed cancer[(h)]
Persons												
50 years	Number	915,953	310,303	19,805	11,863	6,515	3,652	254	280	924	182	56
	Per cent					54.9	30.8	2.1	2.4	7.8	1.5	0.5
55 years	Number	687,115	265,152	19,394	11,542	5,627	4,078	255	269	1,029	232	52
	Per cent					48.8	35.3	2.2	2.3	8.9	2.0	0.5
65 years	Number	494,452	231,025	22,868	14,039	5,975	5,356	356	373	1,380	454	145
	Per cent					42.6	38.2	2.5	2.7	9.8	3.2	1.0
Total	**Number**	**2,097,520**	**806,480**	**62,067**	**37,444**	**18,117**	**13,086**	**865**	**922**	**3,333**	**868**	**253**
	Per cent					**48.4**	**34.9**	**2.3**	**2.5**	**8.9**	**2.3**	**0.7**

(a) 'Invitations issued' equals the number of eligible people who were issued an invitation to screen in the NBCSP.
(b) 'Number screened' equals the number of people who completed an FOBT kit and had results forwarded to the Register.
(c) 'Colonoscopy recorded' includes colonoscopies recorded via the Colonoscopy Report and/or Histopathology Report forms. It does not include colonoscopies identified through Medicare claims.
(d) No cancers were suspected at colonoscopy or confirmed non-cancerous by histopathology; no polyps identified at colonoscopy, or polyps confirmed as non-adenomatous at histopathology.
(e) Polyps detected at colonoscopy and sent to histopathology for analysis. No Histopathology Report form received by Register.
(f) Confirmed adenoma figures were based on a combination of the Colonoscopy and Histopathology Report forms for a person received by the Register.
(g) Cancer suspected at colonoscopy but not yet confirmed by histopathology.
(h) Cancer confirmed by histopathology.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Table 4.4: Cancer spread status, by age and sex, Phase 2

	Cancer confirmed by histopathology					
	Submucosa or into but not through muscularis propria[(a)]	Through muscular propria[(b)]	Spread of cancer to lymph nodes[(c)]	Metastatic disease[(d)]	Not reported[(e)]	All confirmed cancers
Males						
50 years	8	5	3	0	18	34
55 years	10	5	4	n.p.	8	28
65 years	26	8	9	5	46	94
Total	*44*	*18*	*16*	*6*	*72*	*156*
Females						
50 years	9	5	0	0	8	22
55 years	7	3	n.p.	n.p.	12	24
65 years	16	4	3	3	25	51
Total	*32*	*12*	*4*	*4*	*45*	*97*
Persons						
50 years	17	10	3	0	26	56
55 years	17	8	5	n.p.	20	52
65 years	42	12	12	8	71	145
Total	**76**	**30**	**20**	**10**	**117**	**253**

(a) Cancer contained within superficial layers of bowel.
(b) Deep invasion into bowel tissue.
(c) Invasion through bowel tissue, and cancer found in lymph nodes.
(d) Cancer also discovered at other sites in the body.
(e) Cancers confirmed by histopathology but with no staging information available.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

5 Adverse events

What are adverse events within the NBCSP?

Definition: The proportion of eligible people invited between 1 July 2008 and 30 June 2011 who reported an adverse event after having a colonoscopy as part of the NBCSP.

Rationale: As with any invasive procedure, there is the risk of an adverse event occurring with a colonoscopy. Monitoring of adverse events through the NBCSP is important to ensure participant safety in the Program.

Data source: National Bowel Cancer Screening Register.

Data quality: Poor. Reporting of adverse events after a NBCSP colonoscopy is not mandatory. There is a risk an adverse event that occurs days or weeks after the colonoscopy (for example, unplanned hospital admission within 30 days of procedure) will not be associated with a NBCSP procedure, thus not be recorded on the Register using the relevant NBCSP Adverse Event form. See 'Data considerations', Section 1 for further details.

Guide to interpretation: This chapter discusses the recorded adverse events for participants invited into the NBCSP in Phase 2 who had a colonoscopy as a result of a positive FOBT. Adverse event data are based on data recorded in the Register to 30 June 2011 for persons invited between 1 July 2008 and 30 June 2011. Due to the time delay between notification of a positive FOBT result and progression to colonoscopy or surgery, data may be incomplete.

While the NBCSP records the number of people referred by PHCPs for various procedures (for example, sigmoidoscopy, barium enema, colonoscopy), only outcomes (including adverse) of colonoscopy are analysed in this report, as it is the recommended follow-up procedure after a positive FOBT (ACN 2005).

Persons are counted only once in the reporting period, even if they have more than one adverse event reported during this period.

As per the Adverse Event form, unplanned hospital admissions after a colonoscopy are only recorded if they occurred within 30 days of the procedure.

Key results

- For participants invited in Phase 2, 143 out of 44,318 colonoscopies (0.3%) resulted in an adverse event.
- Bleeding was the most commonly recorded adverse event, with more recorded for men than women.

Background information

Colonoscopy is an invasive procedure performed after preparation of the bowel. The procedure is performed under sedation and is considered safe and relatively pain free. However, several complications and adverse events are associated with colonoscopy, including:

- intolerance of the bowel preparation—some people develop dizziness, headaches or vomiting
- reaction to the sedatives or anaesthetic—this is very uncommon but is of concern in people who have severe heart disease or lung disease
- perforation (making a hole in the bowel wall)
- major bleeding from the bowel—this can occur as a result of polyps being removed.

The draft report of the Quality Working Group to the NBCSP noted that the two main complications arising were perforation and post-colonoscopic bleeding. A literature review by the Quality Working Group showed the risk of death associated with colonoscopy to be low, with incidence rates ranging from 0.00% to 0.03%. The incidence rate of perforation varied between 0.07% and 0.30%, and bleeding was found to have an incidence rate between 0.03% and 2.0% (NBCSP-QWG 2008).

Overall adverse events

Table 5.1 shows adverse events recorded up to 30 June 2011 for people participating in the NBCSP in Phase 2. Of participants with a positive FOBT, 44,318 were known to have had a colonoscopy, with 143 (0.3%) recording an adverse outcome. Men recorded more adverse events, with bleeding being the most common. The most frequent additional service required because of an adverse event was unplanned hospital admission within 30 days of colonoscopy.

Overall in Phase 2, the recorded incidence rate of a bleeding event related to colonoscopy was 0.2%. Relatively very small numbers were recorded for all other types of adverse event.

Adverse event tables

Table 5.1: Adverse outcomes after investigation of positive FOBT by colonoscopy, Phase 2

			Adverse outcomes								
		Colonoscopies	Bleeding	Infection/ sepsis	Perforation	Reaction to sedation/ anaesthesia	Death	Other	Delayed discharge	Unplanned hospital admission within 30 days	Surgery required
Males	Number	23,029	61	4	3	8	0	35	40	71	5
	Per cent	52.0	0.3	0.0[(a)]	0.0[(a)]	0.0[(a)]	0.0	0.2	0.2	0.3	0.0[(a)]
Females	Number	21,289	21	0	4	6	0	14	20	38	4
	Per cent	48.0	0.1	0.0	0.0[(a)]	0.0[(a)]	0.0	0.1[(a)]	0.1	0.2	0.0[(a)]
Persons	**Number**	**44,318**	**82**	**4**	**7**	**14**	**0**	**49**	**60**	**109**	**9**
	Per cent	**100.0**	**0.2**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**0.1**	**0.2**	**0.0**
	95% CI		**0.1–0.2**	**0.0–0.0**	**0.0–0.0**	**0.0–0.0**	**0.0–0.0**	**0.1–0.1**	**0.1–0.2**	**0.2–0.3**	**0.0–0.0**

(a) Based on numerator < 20 or denominator < 300; interpret with caution.

Notes

1. All participants known to have had a colonoscopy are included, including those only recorded through Medicare claim or histopathology data.
2. A colonoscopy may have more than one adverse event.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

6 Program suspension, remediation and resumption

How did suspension, remediation and resumption affect Phase 2?

Guide to interpretation: The aim of this chapter is to highlight the NBCSP pathway stages, and participant outcomes, stratified by the kit used for the FOBT test. The three FOBT kits used in Phase 2 were known as the *HemTube*, the *New HemTube* and the *New HemTube (B)*. Originally, the *HemTube* kit was replaced with the *New HemTube* kit; however, as the *New HemTube* kit was found to not be reliable the Program was suspended. The unreliable kit was later replaced with the *New HemTube (B)* kit upon resumption of the Program. After resumption, remediation actions were undertaken for those people sent a *New HemTube* kit. See 'Background information' on the following page for further details.

As these kits were used successively (Figure 6.1), comparing results for the *HemTube* and *New HemTube (B)* kits may show changes in Program results (for example, colonoscopy follow-up rates) between the start and end of Phase 2 of the Program. Some of these changes, particularly at the jurisdictional level, may be due to modifications in Program management within jurisdictions.

While a participant is only counted once in the measures shown in previous chapters, they may be counted up to three times in this chapter, depending on remediation actions. Therefore, data in this chapter cannot be compared with earlier chapters in this report, with the exception of the outcome tables (6.8 and 6.9).

The total number of invitations and kits returned for testing (along with PHCP visits and potentially colonoscopies) are greater in this chapter than in the earlier chapters. As participation rates in this chapter are stratified by kit type, these individual rates may be lower than the overall participation rate in '1 Participation', Section 2.

See the AIHW *National Bowel Cancer Screening Program Monitoring report: Phase 2, July 2008–June 2011 Supplementary tables* webpage for additional tables.

Key results

- The FOBT positivity rate for the *New HemTube* kit was 3.5%, which was statistically significantly lower than the rates for the two other kits used during Phase 2, which were 6.5% and 7.7%.
- There was a higher rate of suspected and confirmed cancers in the 3.5% of *New HemTube* participants who received a positive screening result than for those who received a positive result with the other two kits. That is, outcomes for the lower percentage of positives detected with the *New HemTube* kit were more likely to be cancer.
- About 83% of those who received a negative screening result with the *New HemTube* kit retested with the *New HemTube (B)* kit.
  - The positivity rate for those with a previous negative who retested was 5.5%. It is not possible to determine if these were missed with the *New Hemtube* kit, or whether bowel conditions that resulted in increased bleeding in the bowel occurred in these participants between their first and subsequent screen.

Background information

The NBCSP began in August 2006 using an FOBT kit that used Rabbit Serum Albumin (RSA) to preserve any blood in the collected samples—this kit was known as the *HemTube* FOBT. In December 2008, an upgrade to the FOBT analyser required a new kit with a different shaped tube—this kit was known as the *New HemTube* FOBT. Besides using different collection tubes, the *New HemTube* FOBT also used Bovine Serum Albumin (BSA) as the blood preservative, to allow the kits to have a longer shelf life.

The NBCSP was suspended in May 2009 after a drop in the positivity rate was detected coinciding with the introduction of the *New HemTube* FOBT. Investigations revealed the *New HemTube* FOBT using BSA to preserve blood in collected samples was not as stable at high temperatures as the previous RSA preservative. Consequently, use of the *New HemTube* FOBT kit was discontinued in the NBCSP from this time.

Participants who received a positive result with the *New HemTube* FOBT were advised their result was valid, and they should continue to follow-up investigation by colonoscopy. Participants who had received a negative or inconclusive test result were advised of the uncertainty of their result, and that a new kit would be provided as soon as possible. They were also advised to see their doctor if they experienced any symptoms associated with bowel cancer. Those people who had been invited with the *New HemTube* FOBT but had not yet completed the test kit were advised to discard the kit, and a new kit would be provided as soon as possible. They were also advised to see their doctor if they experienced any symptoms associated with bowel cancer. The number of people affected in each of these result cohorts is in Table 6.1.

Table 6.1: Number of people affected by the *New HemTube* kit remediation, Phase 2

Participant's *New HemTube* result	Number affected
Positive[(a)]	4,493
Negative[(b)]	128,372
Inconclusive[(c)]	3,088
Participant sent but did not return *New HemTube* FOBT kit[(d)]	252,322
Total	**388,275**

(a) Based on the number of positive FOBT results for participants invited 1 December 2008–14 May 2009.

(b) Based on the number of participants recorded in the Register as being sent a *New HemTube (B)* FOBT kit due to a negative result with the *New HemTube* FOBT kit.

(c) Based on the number of participants recorded in the Register as being sent a *New HemTube (B)* FOBT kit due to an inconclusive or incomplete result with the *New HemTube* FOBT kit.

(d) Based on the number of participants recorded in the Register as being sent a *New HemTube (B)* FOBT kit due to not returning the *New HemTube* FOBT kit.

To correct the temperature stability issue discovered with the *New HemTube* FOBT, an updated kit was developed for use on the new analyser, using RSA as the original *HemTube* FOBT kit used in the Program did. This new kit was called *New HemTube (B)* and has been listed for use on the Australian Register of Therapeutic Goods by the TGA.

The NBCSP restarted in November 2009 using the *New HemTube (B)* FOBT kit. Priority was given to retesting those people who had received a negative or inconclusive result with the *New HemTube* FOBT, followed by those people who had previously been invited with the *New HemTube* FOBT but were advised not to complete the kit. Figure 6.1 outlines the timelines during which each of the three kits were sent out during Phase 2.

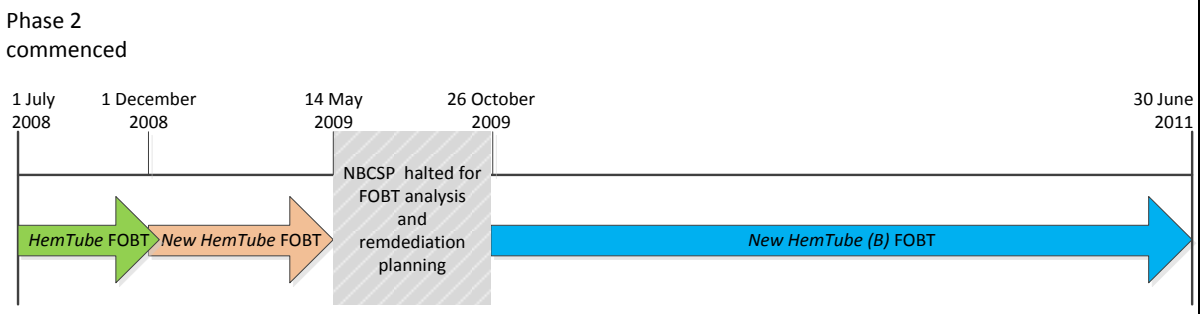


Figure 6.1: Chronological timeline of FOBT kit activity, Phase 2

To decrease possible effects on FOBT performance due to temperature and time between kit completion and analysis, additional changes were made to the handling and processing of the *New HemTube (B)* FOBT kits:

- the declaration of 'hot zones'—postcodes that were not sent kits during months where the average maximum temperature was known to historically be above 30.5 degrees Celsius
- the provision of enhanced collection and storage instructions to participants
- the reduction of the valid laboratory analysis time frame for returned kits to within 14 days of the first sample being taken (down from 1 month). Participants who returned kits for analysis later than 14 days from the first sample were given another kit to repeat the test.

This chapter analyses participation, positivity and outcomes of participants who used the three different Phase 2 FOBT kits, namely: the original *HemTube,* the low-positivity *New HemTube* and the current *New HemTube(B).*

Detailed analyses

Participation by kit type

Analysis of participation by kit type allows differences in participation related to remedial action and previous *New HemTube* FOBT results to be quantified. Further, as the kits were used at different stages of Phase 2 (Figure 6.1), differences in their participation rate can somewhat be used to determine changes in participation over the course of Phase 2. Analyses in this subsection are related to tables 6.2 and 6.3.

HemTube

The *HemTube* FOBT was used for the initial 5 months of Phase 2—from 1 July 2008 until it was phased out at the start of December 2008. Participation of those invited with the *HemTube* FOBT kit (37.5%) was slightly lower than that for all participants invited in 2008 (40.1%) (Table 6.2 and AIHW 2010b). This may be due to a higher proportion of 50 year olds being invited at the start of Phase 2, who showed lower rates of participation (AIHW 2010b).

New HemTube

New HemTube invitations began in early December 2008 and ran until the lower-than-expected proportion of positive results led to the Program being halted in May 2009. Soon after the Program was halted, letters were sent to all participants who had received a *New*

HemTube invitation. Participants who had not yet completed the FOBT test were asked to discard the kit as another would be sent as soon as it was available.

Therefore, participation for those sent the *New HemTube* FOBT kit in Phase 2 (32.0%) was lower than participation levels previously recorded within the Program.

New HemTube (B)

After the Program restarted using the updated and more-stable *New HemTube (B)* FOBT kit, another invitation was sent out to those who previously received the *New HemTube* kits. Once all re-invitations had been sent, initial invitations were sent out for new participants who had since become eligible. The rates of participation varied for the different subgroups using the *New HemTube (B)* kit.

Those who had previously received a negative result with the New HemTube *kit*

Participants who had previously returned a *New HemTube* kit and received a negative result showed a high level of response to the re-invitation; 83.4% of these participants retested with the *New HemTube (B)* kit.

Those who had previously received an inconclusive or incomplete result with the New HemTube *kit*

These participants also had a higher than previously recorded level of response to an FOBT kit invitation, as 52.9% returned their *New HemTube (B)* FOBT kit for analysis. This result is not necessarily related to these participants' first kits being highlighted unreliable; analysis of other participants in the Program who were *not* involved in remediation actions also showed a higher response rate after an inconclusive or incomplete kit (data not shown).

Nevertheless, this participation rate (and that for the previous negative result group above) may indicate that once a participant has completed an initial FOBT test, the rate of response for subsequent FOBT tests is likely to be higher than for those receiving their initial kit.

Those who had not previously returned their New HemTube *kit for testing*

Participants in this subgroup showed a low level of response to the re-invitation, with only 18.0% returning their *New HemTube (B)* FOBT kit for analysis. These participants may have comprised:

- those who did not originally plan to participate, but due to the remediation process reconsidered their initial non-response and had decided to return the *New HemTube (B)* kit for testing
- those who were planning on returning the *New HemTube* kit originally, but received the advice to discard the kit and wait for the new kit when it was provided.

Unfortunately, the proportion from each of these two groups is unable to be determined from the data held in the Register. However, this extra opportunity for participation for those who previously did not respond may have contributed to the increased overall Phase 2 participation rate described in '1 Participation', Section 2, when compared with the participation rates of the three kits individually (tables 1.2 and 6.2).

Those who received the New HemTube (B) *kit only*

Most of these invitees were sent their initial NBCSP invitation in 2010, after the remediation actions involving those originally sent the *New HemTube* kit were completed. Participation for this subgroup (36.7%) was statistically significantly lower than that of the original *HemTube* kit (37.5%). Whether this is due to the suspension and remediation of the Program or other reasons would require further investigation.

Faecal occult blood test outcomes by kit type

HemTube

As would be expected, the positivity rate (6.5%) of the *HemTube* kit used until December 2008 was similar to that in the previous 2008 monitoring report (6.6%) (Table 6.4 and AIHW 2010b).

New HemTube

Table 6.4 confirms that the *New HemTube* kit (used December 2008–May 2009) did have a lower positivity rate (3.5%) than the *HemTube* kit. Table 6.5 shows that while the *New HemTube* positivity rates were lower overall, the differences between jurisdictions still had a similar pattern of positivity to that reported previously.

New HemTube (B)

Participants using the *New HemTube (B)* kit (used October 2009–June 2011) can be divided into two groups; those who had screened with the *New HemTube* kit previously (and had a negative or inconclusive result), and those who had not screened before with the *New HemTube* kit. Different positivity rates would therefore be expected between these groups of participants using the *New HemTube (B)* kit.

Of the 105,494 participants who previously received a negative result with the *New HemTube* kit and retested with the *New HemTube (B)* kit, 5.5% returned a positive result from their retest (Table 6.4).

Those with a previous inconclusive result with the *New HemTube* kit showed a slightly higher positivity rate (9.3%) upon retesting than the overall positivity rate for the *New HemTube (B)* kit. Though the difference was not statistically significant, this finding indicates that any person with an inconclusive *New HemTube* test should be encouraged to retest.

Interestingly, participants who did not return their previous *New HemTube* kit had a statistically significant lower positivity rate (7.6%) than those receiving their *New HemTube (B)* as their initial invitation (8.2%). The reasons for this are unknown and require further investigation.

The overall positivity rate for the *New HemTube (B)* kit was 7.7%, which was statistically significantly higher than the original *HemTube* kit. Reasons for this increase in positivity are unknown, but may relate to:

- differences in sensitivity between the *HemTube* and *New HemTube (B)* kits
- differences in sensitivity in the analysers used for these kits
- changes to the kit storage and handling procedures between the *HemTube* and the *New HemTube (B)*
- changes in the risk factors and underlying incidence of bowel abnormalities in the population being tested over time.

There were no major changes in jurisdictional positivity trends between the three kits (Table 6.5).

Follow-up by kit type

Changes in participant follow-up rates between the kit types may indicate changes in participant willingness to investigate a positive FOBT result, depending on their remediation involvement. However, as follow-up rates are heavily reliant on non-mandatory form return

from PHCPs and specialists, changes in these rates across Phase 2 may indicate changes in form return practices by specialists at different stages of Phase 2, and data should be interpreted with caution. Analyses in this subsection are related to tables 6.6 and 6.7, and figures 6.2 and 6.3

Primary health care practitioner follow-up

PHCP follow-up rates for participants who used the *New HemTube (B)* kit were statistically significantly higher (55.4% using Kaplan-Meier analysis) than the follow-up rates for the earlier two kit types (51.3% and 50.9%) (Table 6.6). This would suggest that not only did overall Phase 2 PHCP follow-up improve since the previous report on 2008 invitees (AIHW 2010b), but that those invited later in Phase 2 had a higher follow-up rate than the earlier Phase 2 invitees.

When looking at PHCP follow-up between kit types by jurisdiction (Figure 6.2), the improvement in the Australian PHCP follow-up rate for *New HemTube (B)* participants was mainly due to statistically significant improvements in the rates for New South Wales, Victoria and Tasmania over the course of Phase 2.

Colonoscopy follow-up

Contrasting with the improved PHCP follow-up as Phase 2 progressed, colonoscopy follow-up for *New HemTube (B)* participants decreased by a statistically significant amount over that for participants invited with the two earlier Phase 2 kits (Table 6.7). New South Wales was the only jurisdiction to record a statistically significant decrease in colonoscopy rate with *New HemTube (B)* participants when compared with follow-up for participants using the previous kits (Figure 6.3).

However, while the rates for *New HemTube (B)* participants were calculated using Kaplan-Meier based on outcomes at 52 weeks post-positive FOBT notification (to minimise the effect of the lag time between positive FOBT and colonoscopy), it may be that not enough time has elapsed between when many of those participants received their positive FOBT notification and the cut-off for data used in this report. This is certainly possible as, for example, the original Kaplan-Meier colonoscopy rate at 26 weeks post-positive FOBT notification was estimated as 64.5% for NBCSP participants invited in 2008 (AIHW 2009), while the final crude rate for colonoscopy for these participants was actually 76.3% (AIHW 2010b). It may be that even the 52-week Kaplan-Meier rate used in this report underestimates final colonoscopy procedure rates.

Cancer detection by kit type

Monitoring the detection of cancers based on kit type used helps to determine if there were differences in the effectiveness of the bowel cancer screening between the kits.

Colonoscopy findings

New HemTube participants with a positive FOBT result appeared to have a higher rate of suspected cancers at colonoscopy than all other participants with a positive FOBT (Table 6.8). This may be because those participants who still gave a positive screening result with the less-reliable *New HemTube* kit were more likely to have cancer (or a large adenoma)—which are known to bleed more (Capell 2005). Studies have found that immunochemical FOBTs—the type used in the NBCSP—have a higher positive predictive value for cancer and larger adenomas than for smaller lesions (Ciatto et al. 2007; van Rossum et al. 2009). That is, even if there were issues with preservation of samples with the *New HemTube* kit, it would be

expected that lesions that bleed the most would still have returned a positive screening result.

As shown in tables 6.4 and 6.5, those who retested after having a previous inconclusive result had a higher positivity rate. Though, this did not translate into a higher rate of cancers or large adenomas (polyps greater than 10 millimetres) when followed up with colonoscopy (Table 6.8). However, as only 83 of those participants had had a colonoscopy, this finding should be interpreted with caution.

Overall findings, including histopathology

After taking into account confirmed histopathology findings, once again, the *New HemTube* participants who returned a positive screen had a higher rate of confirmed cancers (1.7%) compared with the overall confirmed cancer rate for Phase 2 (0.7%).

Of the 5,736 participants who received a previous negative with the *New HemTube*, who then received a positive result when they retested with the *New HemTube (B)*, there were 17 (0.4%) confirmed cancers found. It is not possible to determine if these were missed at the first screen (for example, if the abnormality was not bleeding at the time of screen, or due to the unreliable kit), or whether they developed between the first and subsequent FOBT screen. It should also be kept in mind however, that there are a proportion of false negative results with *any* screening test, which will result in abnormalities being missed (APHDPCSS 2008).

Participation tables and figures

Table 6.2: Differences in participation between kits, by age and sex, Phase 2

	HemTube		*New HemTube*		*New HemTube (B)*									
					Previous negative		Previous inconclusive		Previous no return		First invitation		*New HemTube (B)* total	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Males														
50 years	31.1	30.8–31.4	25.1	24.8–25.4	79.8	79.3–80.3	47.9	43.4–52.4	14.6	14.4–14.9	29.6	29.4–29.8	30.2	30.0–30.3
55 years	35.6	35.1–36.0	28.5	28.1–28.8	82.7	82.1–83.2	56.6	51.8–61.5	16.5	16.1–16.9	33.4	33.2–33.6	34.0	33.8–34.2
65 years	45.0	44.4–45.5	38.0	37.6–38.5	88.1	87.7–88.6	60.5	56.1–64.9	21.4	20.9–21.9	42.9	42.7–43.1	44.0	43.8–44.2
Total	*34.6*	*34.4–34.8*	*29.2*	*29.0–29.4*	*83.2*	*82.9–83.5*	*54.9*	*52.2–57.6*	*16.6*	*16.4–16.8*	*34.3*	*34.2–34.4*	*34.9*	*34.8–35.0*
Females														
50 years	36.6	36.3–36.9	29.9	29.6–30.2	79.8	79.3–80.3	44.0	40.1–48.0	17.5	17.2–17.8	33.5	33.3–33.7	34.4	34.3–34.6
55 years	43.0	42.5–43.4	36.0	35.6–36.3	83.9	83.5–84.4	48.8	44.5–53.0	20.3	19.9–20.7	39.7	39.5–39.9	40.7	40.5–40.8
65 years	49.7	49.1–50.2	42.7	42.2–43.1	88.1	87.7–88.6	61.0	57.1–64.9	23.7	23.1–24.2	46.7	46.4–46.9	48.1	47.9–48.3
Total	*40.4*	*40.2–40.7*	*34.8*	*34.6–35.0*	*83.5*	*83.2–83.8*	*51.4*	*49.0–53.7*	*19.5*	*19.3–19.8*	*39.0*	*38.9–39.1*	*39.9*	*39.8–40.0*
Persons														
50 years	33.9	33.7–34.1	27.5	27.3–27.7	79.8	79.5–80.2	45.7	42.8–48.7	16.0	15.8–16.2	31.6	31.4–31.7	32.3	32.2–32.4
55 years	39.3	39.0–39.6	32.3	32.0–32.5	83.4	83.0–83.8	52.1	48.9–55.4	18.3	18.0–18.5	36.6	36.5–36.7	37.4	37.2–37.5
65 years	47.3	46.9–47.7	40.3	40.0–40.7	88.1	87.8–88.5	60.8	57.8–63.7	22.4	22.1–22.8	44.8	44.6–44.9	46.1	45.9–46.2
Total	**37.5**	**37.4–37.7**	**32.0**	**31.9–32.2**	**83.4**	**83.2–83.6**	**52.9**	**51.2–54.7**	**18.0**	**17.8–18.1**	**36.7**	**36.6–36.7**	**37.4**	**37.4–37.5**

Notes

1. *HemTube* kit used July 2008–December 2008. *New HemTube* kit used December 2008–May 2009. *New HemTube (B)* kit used October 2009 onwards.
2. Participants in the Program were defined as members of the eligible population who returned a completed FOBT kit.
3. Percentages equal people participating as a proportion of the total number of the eligible population who were invited to screen. This includes people who suspended or opted off.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 6.3: Differences in participation between kits, by jurisdiction, Phase 2

	HemTube		*New HemTube*		*New HemTube (B)*									
					Previous negative		Previous inconclusive		Previous no return		First invitation		*New HemTube (B)* total	
Jurisdiction	**%**	**95% CI**	**%**	**95% CI**	**%**	**95% CI**	**%**	**95% CI**	**%**	**95% CI**	**%**	**95% CI**	**%**	**95% CI**
NSW	35.0	34.7–35.2	30.3	30.1–30.6	83.3	83.0–83.7	50.6	47.5–53.7	17.3	17.0–17.6	34.7	34.6–34.9	35.6	35.5–35.7
Vic	38.5	38.2–38.9	32.9	32.6–33.1	82.9	82.5–83.2	53.5	50.1–56.8	17.1	16.8–17.4	36.9	36.8–37.1	37.6	37.4–37.7
Qld	37.9	37.5–38.2	29.7	29.4–30.0	82.5	82.0–83.0	55.7	51.5–59.9	18.2	17.8–18.5	35.4	35.2–35.6	36.1	35.9–36.3
WA	40.2	39.7–40.7	37.2	36.7–37.6	84.0	83.4–84.6	54.3	48.9–59.7	20.8	20.3–21.4	40.5	40.3–40.8	41.7	41.4–41.9
SA	41.3	40.8–41.9	35.5	34.9–36.0	85.3	84.7–86.0	51.0	44.7–57.3	20.5	19.9–21.1	41.1	40.8–41.4	41.9	41.7–42.2
Tas	41.0	39.9–42.1	35.0	34.0–36.0	86.9	85.7–88.1	n.p.	n.p.	18.5	17.4–19.5	41.5	41.0–42.0	41.9	41.4–42.3
ACT	41.5	40.1–42.8	32.5	31.5–33.6	83.9	82.4–85.4	n.p.	n.p.	18.0	16.9–19.1	39.1	38.5–39.8	39.5	38.9–40.0
NT	26.3	25.0–27.7	23.2	21.7–24.7	78.8	75.7–81.8	n.p.	n.p.	14.3	12.7–15.8	26.3	25.5–27.1	27.2	26.5–28.0
Australia	**37.5**	**37.4–37.7**	**32.0**	**31.9–32.2**	**83.4**	**83.2–83.6**	**52.9**	**51.2–54.7**	**18.0**	**17.8–18.1**	**36.7**	**36.6–36.7**	**37.4**	**37.4–37.5**

Notes

1. *HemTube* kit used July 2008–December 2008. *New HemTube* kit used December 2008–May 2009. *New HemTube (B)* kit used October 2009 onwards.
2. Participants in the Program were defined as members of the eligible population who returned a completed FOBT kit.
3. Percentages equal people participating as a proportion of the total number of the eligible population who were invited to screen. This includes people who suspended or opted off.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Faecal occult blood test tables

Table 6.4: Differences in FOBT positivity between kits, by age and sex, Phase 2

	HemTube		*New HemTube*		*New HemTube (B)*									
					Previous negative		Previous inconclusive		Previous no return		First invitation		*New HemTube (B)* total	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Males														
50 years	6.4	6.1–6.7	3.2	2.9–3.4	4.9	4.6–5.2	7.0	3.5–10.5	7.6	7.0–8.1	7.4	7.2–7.6	7.0	6.8–7.1
55 years	7.6	7.2–8.0	3.6	3.4–3.9	5.7	5.3–6.0	8.3	4.5–12.0	8.5	7.9–9.2	8.5	8.3–8.7	8.1	7.9–8.3
65 years	9.8	9.3–10.3	5.2	4.9–5.5	7.6	7.2–8.0	13.0	8.9–17.0	11.5	10.7–12.4	11.9	11.6–12.1	11.1	10.9–11.3
Total	*7.5*	*7.3–7.7*	*3.9*	*3.8–4.1*	*6.0*	*5.8–6.2*	*9.7*	*7.5–12.0*	*8.9*	*8.5–9.3*	*9.2*	*9.1–9.3*	*8.7*	*8.6–8.8*
Females														
50 years	5.1	4.8–5.3	2.8	2.6–3.0	4.5	4.2–4.8	6.2	3.2–9.2	5.7	5.3–6.2	6.3	6.1–6.4	5.9	5.8–6.0
55 years	5.4	5.1–5.7	2.9	2.7–3.2	4.6	4.3–4.9	8.5	4.9–12.0	6.0	5.5–6.6	7.0	6.8–7.2	6.5	6.4–6.7
65 years	7.5	7.1–8.0	4.0	3.8–4.3	6.4	6.0–6.7	11.0	7.7–14.4	8.6	7.9–9.4	8.8	8.6–9.0	8.4	8.2–8.5
Total	*5.7*	*5.5–5.9*	*3.2*	*3.1–3.3*	*5.1*	*4.9–5.2*	*8.9*	*6.9–10.8*	*6.5*	*6.2–6.8*	*7.3*	*7.2–7.4*	*6.9*	*6.8–6.9*
Persons														
50 years	5.7	5.5–5.9	3.0	2.8–3.1	4.7	4.5–4.9	6.6	4.3–8.9	6.6	6.2–7.0	6.8	6.7–6.9	6.4	6.3–6.5
55 years	6.4	6.1–6.7	3.2	3.1–3.4	5.0	4.8–5.3	8.4	5.8–11.0	7.2	6.8–7.6	7.7	7.6–7.8	7.2	7.1–7.4
65 years	8.6	8.3–9.0	4.6	4.4–4.8	6.9	6.7–7.2	11.9	9.3–14.5	10.1	9.5–10.7	10.3	10.1–10.4	9.7	9.6–9.8
Total	**6.5**	**6.4–6.6**	**3.5**	**3.4–3.6**	**5.5**	**5.3–5.6**	**9.3**	**7.8–10.7**	**7.6**	**7.4–7.9**	**8.2**	**8.1–8.3**	**7.7**	**7.6–7.8**

Notes

1. *HemTube* kit used July 2008–December 2008. *New HemTube* kit used December 2008–May 2009. *New HemTube (B)* kit used October 2009 onwards.
2. Rates equal the number of participants with positive FOBT results as a percentage of the total number of participants with valid results. A valid result was either positive or negative; inconclusive results were excluded.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Table 6.5: Differences in FOBT positivity between kits, by jurisdiction, Phase 2

	HemTube		*New HemTube*		*New HemTube (B)*									
					Previous negative		Previous inconclusive		Previous no return		First invitation		*New HemTube (B)* total	
Jurisdiction	**%**	**95% CI**	**%**	**95% CI**	**%**	**95% CI**	**%**	**95% CI**	**%**	**95% CI**	**%**	**95% CI**	**%**	**95% CI**
NSW	6.5	6.2–6.7	3.4	3.2–3.6	5.4	5.2–5.7	7.1	4.7–9.5	7.4	7.0–7.8	8.2	8.0–8.3	7.6	7.5–7.8
Vic	7.0	6.7–7.3	4.3	4.1–4.6	5.3	5.0–5.5	12.4	9.3–15.5	8.0	7.5–8.5	8.1	7.9–8.2	7.6	7.5–7.7
Qld	6.0	5.7–6.3	2.9	2.7–3.1	5.3	5.0–5.7	9.9	6.4–13.3	7.5	6.9–8.0	8.0	7.8–8.2	7.6	7.4–7.7
WA	6.5	6.1–6.9	2.7	2.4–2.9	5.9	5.5–6.3	9.1	4.7–13.5	7.6	6.8–8.3	8.1	7.9–8.3	7.7	7.5–7.9
SA	6.6	6.2–7.1	3.7	3.4–4.1	5.5	5.0–6.0	2.8	0.0–5.9	8.3	7.4–9.2	8.5	8.3–8.8	8.0	7.8–8.2
Tas	6.9	6.0–7.8	4.3	3.6–5.0	6.4	5.5–7.4	n.p.	n.p.	7.4	5.7–9.1	9.3	8.8–9.8	8.8	8.4–9.2
ACT	5.5	4.6–6.5	3.7	3.0–4.5	6.4	5.3–7.5	0.0	0.0–0.0	6.7	5.0–8.5	7.7	7.1–8.2	7.4	6.9–7.8
NT	8.0	6.3–9.7	1.8	0.8–2.8	5.9	3.9–7.9	n.p.	n.p.	8.6	5.2–11.9	9.9	8.8–11.0	9.3	8.4–10.2
Australia	**6.5**	**6.4–6.6**	**3.5**	**3.4–3.6**	**5.5**	**5.3–5.6**	**9.3**	**7.8–10.7**	**7.6**	**7.4–7.9**	**8.2**	**8.1–8.3**	**7.7**	**7.6–7.8**

Notes

1. *HemTube* kit used July 2008–December 2008. *New HemTube* kit used December 2008–May 2009. *New HemTube (B)* kit used October 2009 onwards.
2. Rates equal the number of participants with positive FOBT results as a percentage of the total number of participants with valid results. A valid result was either positive or negative; inconclusive results were excluded.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Primary health care practitioner follow-up tables and figures

Table 6.6: Differences in primary health care practitioner follow-up between kits, by age and sex, Phase 2

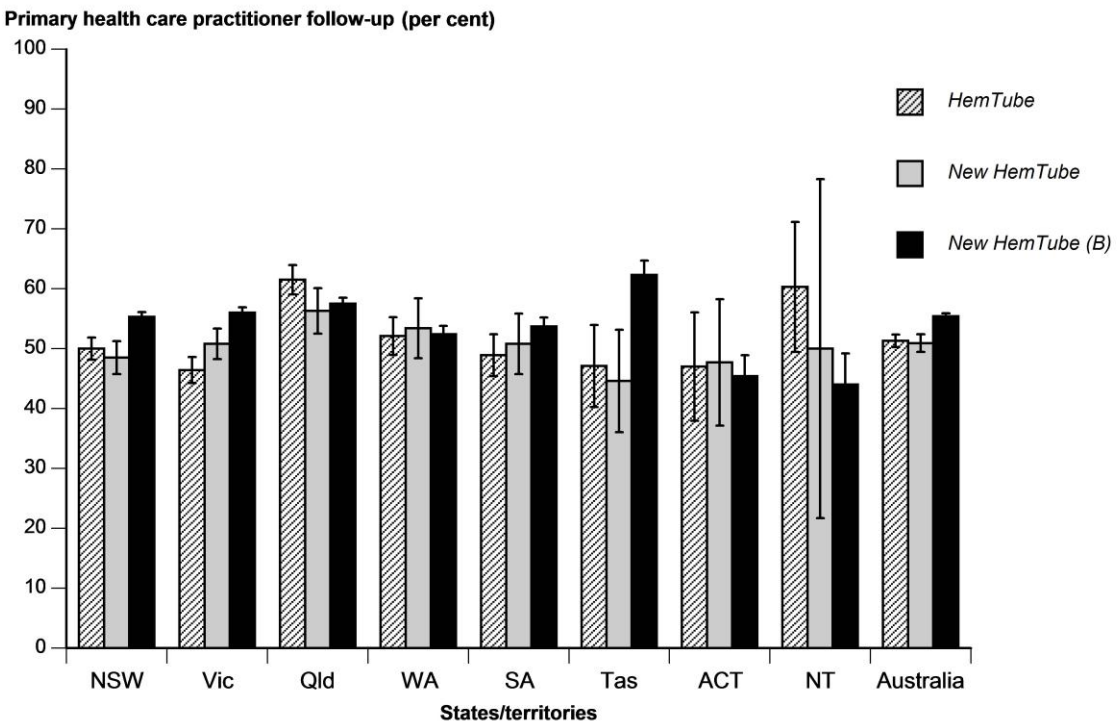
	HemTube		*New HemTube*		*New HemTube (B)*[(a)]	
	%	**95% CI**	**%**	**95% CI**	**%**	**95% CI**
Males						
50 years	50.0	47.8–52.1	49.2	45.5–52.9	51.1	49.9–52.3
55 years	48.4	45.6–51.3	46.0	42.2–49.8	52.7	51.5–53.8
65 years	50.6	48.0–53.3	51.8	48.6–55.1	56.4	55.4–57.4
Total	*49.8*	*48.3–51.2*	*49.3*	*47.3–51.4*	53.7	53.1–54.4
Females						
50 years	52.2	50.0–54.4	52.9	49.4–56.5	55.5	54.2–56.7
55 years	53.0	50.0–56.1	55.1	51.3–58.8	57.2	56.0–58.3
65 years	53.6	50.7–56.4	49.9	46.4–53.4	58.7	57.6–59.8
Total	*52.8*	*51.3–54.3*	*52.5*	*50.5–54.6*	57.2	56.5–57.9
Persons						
50 years	51.0	49.5–52.6	51.1	48.6–53.7	53.2	52.4–54.1
55 years	50.6	48.5–52.7	50.6	47.9–53.3	54.9	54.1–55.7
65 years	52.0	50.0–53.9	50.9	48.6–53.3	57.4	56.7–58.2
Total	**51.2**	**50.1–52.2**	**50.9**	**49.4–52.4**	**55.4**	**54.9–55.8**

(a) *New HemTube (B)* rates were calculated using Kaplan-Meier methods at 52 weeks post-positive FOBT result.

Notes

1. *HemTube* kit used July 2008–December 2008. *New HemTube* kit used December 2008–May 2009. *New HemTube (B)* kit used October 2009 onwards.
2. Percentages equal the number of people having consulted a PHCP after a positive FOBT result as a proportion of the total number of people with positive FOBT results. Reporting of PHCP follow-up is not mandatory; actual numbers of participant consultations may be underestimated.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.



Notes

1. Bars on columns represent 95% confidence intervals.
2. *HemTube* kit used July 2008–December 2008. *New HemTube* kit used December 2008–May 2009. *New HemTube (B)* kit used October 2009 onwards.
3. *New HemTube (B)* rates were calculated using Kaplan-Meier methods at 52 weeks post-positive FOBT result.
4. Percentages equal the number of people having consulted a PHCP after a positive FOBT result as a proportion of the total number of people with positive FOBT results. Reporting of PHCP follow-up is not mandatory; actual numbers of participant consultations may be underestimated.

Source: National Bowel Cancer Screening Program Register as at 30 June 2011.

Figure 6.2: Differences in primary health care practitioner follow-up between kits, by jurisdiction, Phase 2

Colonoscopy follow-up tables and figures

Table 6.7: Differences in colonoscopy follow-up between kits, by age and sex, Phase 2

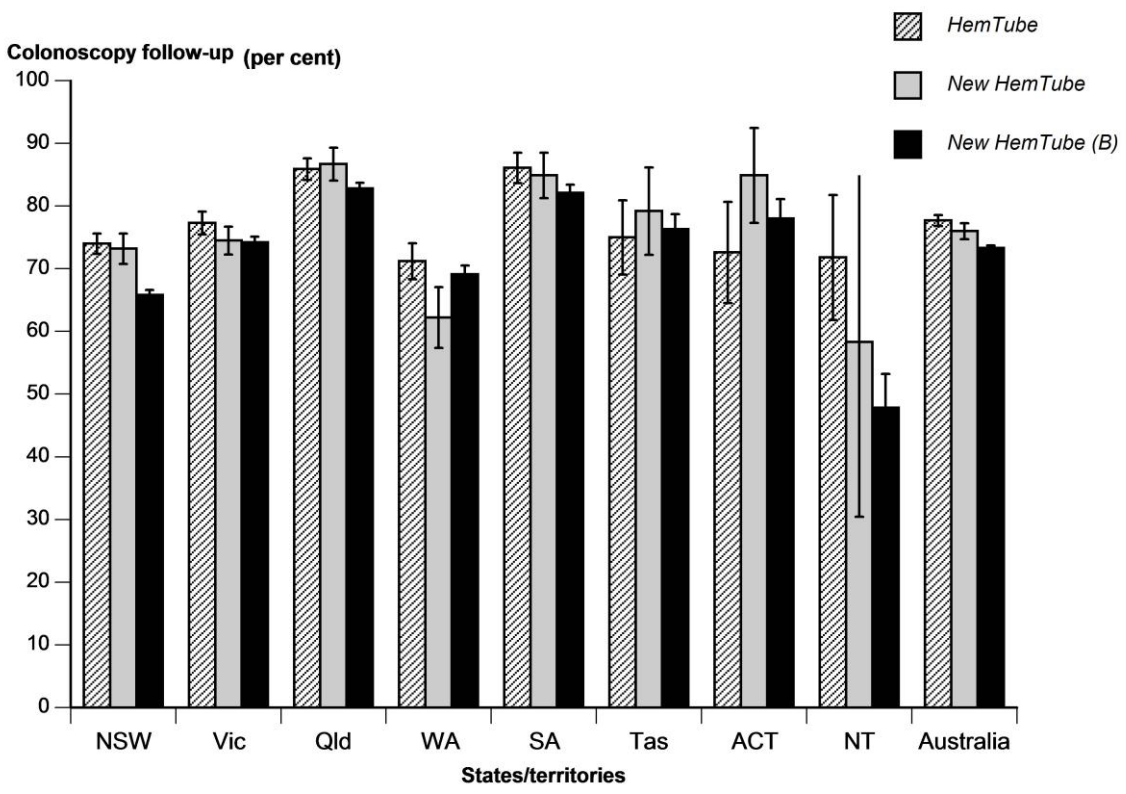
	HemTube		*New HemTube*		*New HemTube (B)*	
	%	**95% CI**	**%**	**95% CI**	**%**	**95% CI**
Males						
50 years	76.3	74.4–78.1	76.4	73.3–79.6	71.1	69.9–72.2
55 years	76.6	74.2–79.0	74.9	71.6–78.2	72.8	71.7–73.9
65 years	78.3	76.1–80.5	76.2	73.4–78.9	73.7	72.7–74.6
Total	*76.9*	*75.7–78.2*	*75.9*	*74.1–77.6*	72.7	72.1–73.3
Females						
50 years	78.4	76.6–80.3	75.6	72.5–78.7	74.3	73.1–75.4
55 years	79.6	77.2–82.1	79.9	76.9–82.9	73.3	72.2–74.4
65 years	77.8	75.4–80.2	74.3	71.2–77.3	74.3	73.3–75.3
Total	*78.6*	*77.3–79.8*	*76.4*	*74.7–78.2*	74.0	73.4–74.6
Persons						
50 years	77.3	76.0–78.6	76.0	73.8–78.2	72.7	71.8–73.5
55 years	78.0	76.3–79.7	77.4	75.2–79.7	73.1	72.3–73.8
65 years	78.1	76.5–79.7	75.3	73.2–77.3	74.0	73.3–74.7
Total	**77.7**	**76.8–78.6**	**76.2**	**74.9–77.4**	**73.3**	**72.9–73.7**

(a) *New HemTube (B)* rates were calculated using Kaplan-Meier methods at 52 weeks post-positive FOBT result.

Notes

1. *HemTube* kit used July 2008–December 2008. *New HemTube* kit used December 2008–May 2009. *New HemTube (B)* kit used October 2009 onwards.
2. Percentages of colonoscopies performed equal the number of people who have had a colonoscopy recorded after a positive FOBT as a proportion of the total number of people with positive FOBT results. Reporting of colonoscopy follow-up is not mandatory; actual numbers of colonoscopies may be underestimated.
3. Record of a colonoscopy as part of the NBCSP is identified from the Colonoscopy Report form, Histopathology Report form and/or Medicare claims.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.



Notes

1. Bars on columns represent 95% confidence intervals.
2. *HemTube* kit used July 2008–December 2008. *New HemTube* kit used December 2008–May 2009. *New HemTube (B)* kit used October 2009 onwards.
3. *New HemTube (B)* rates were calculated using Kaplan-Meier methods at 52 weeks post-positive FOBT result.
4. Percentages of colonoscopies performed equal the number of people who have had a colonoscopy recorded after a positive FOBT as a proportion of the total number of people with positive FOBT results. Reporting of colonoscopy follow-up is not mandatory; actual numbers of colonoscopies may be underestimated.
5. Record of a colonoscopy as part of the NBCSP is identified from the Colonoscopy Report form, Histopathology Report form and/or Medicare claims.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Figure 6.3: Differences in colonoscopy follow-up between kits, by jurisdiction, Phase 2

Cancer detection tables

Table 6.8: Differences in colonoscopic diagnosis outcomes between kits, Phase 2

Kit type			Colonoscopy outcome						All Colonoscopy Report forms
			Suspected cancer	Polyp(s) > 10mm	Polyp(s)<= 10mm	Other diagnoses	No abnormality	Outcome not specified	
HemTube		Number	192	737	2,056	1,376	1,319	7	5,687
		Per cent	3.4	13.0	36.2	24.2	23.2	0.1[(a)]	
New HemTube		Number	171	424	991	749	591	n.p.	2,928
		Per cent	5.8	14.5	33.8	25.6	20.2	n.p.	
New HemTube(B)	*Previous negative*	*Number*	*94*	*347*	*1,541*	*1,006*	*817*	*3*	*3,808*
		Per cent	*2.5*	*9.1*	*40.5*	*26.4*	*21.5*	*0.1[(a)]*	
	Previous inconclusive	*Number*	*0*	*6*	*41*	*23*	*15*	*0*	*85*
		Per cent	*n.p.*	*n.p.*	*n.p.*	*n.p.*	*n.p.*	*n.p.*	
	Previous no return	*Number*	*55*	*294*	*849*	*532*	*437*	*n.p.*	*2,168*
		Per cent	*2.5*	*13.6*	*39.2*	*24.5*	*20.2*	*n.p.*	
	First invite	*Number*	*659*	*2,786*	*8,692*	*5,182*	*4,254*	*17*	*21,590*
		Per cent	*3.1*	*12.9*	*40.3*	*24.0*	*19.7*	*0.1[(a)]*	
	New kit total	Number	808	3,433	11,123	6,743	5,523	21	27,651
		Per cent	2.9	12.4	40.2	24.4	20.0	0.1	
Total		**Number**	**1,171**	**4,594**	**14,170**	**8,868**	**7,433**	**30**	**36,266**
		Per cent	**3.2**	**12.7**	**39.1**	**24.5**	**20.5**	**0.1**	

(a) Based on numerator < 20 or denominator < 300; interpret with caution.

Notes

1. *HemTube* kit used July 2008–December 2008. *New HemTube* kit used December 2008–May 2009. *New HemTube (B)* kit used October 2009 onwards.
2. Only colonoscopies with a Colonoscopy Report form (36,266) could be included in this analysis; colonoscopies identified from Histopathology Report forms or Medicare claims only were not included.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

Table 6.9: Preliminary overall participant follow-up outcomes, by kit, Phase 2

						FOBT positive							
Kit			**Invitations issued[(a)]**	**Number screened[(b)]**	**Total positive FOBT**	**Colonoscopy recorded[(c)]**	**No cancer or adenoma[(d)]**	**Polyps awaiting histo-pathology[(e)]**	**Confirmed diminutive adenoma[(f)]**	**Confirmed small adenoma[(f)]**	**Confirmed advanced adenoma[(f)]**	**Suspected cancer[(g)]**	**Confirmed cancer[(h)]**
HemTube		Number	366,680	137,589	8,667	5937	3,042	1,797	142	171	601	130	54
		Per cent					51.2	30.3	2.4	2.9	10.1	2.2	0.9
New Hemtube		Number	415,469	133,109	4,493	3,048	1,511	951	64	62	293	116	51
		Per cent					49.6	31.2	2.1	2.0	9.6	3.8	1.7
New HemTube(B)	*Previous negative*	Number	*128,372*	*107,011*	*5,783*	*3,963*	*2,045*	*1,280*	*109*	*113*	*325*	*74*	*17*
		Per cent					*51.6*	*32.3*	*2.8*	*2.9*	*8.2*	*1.9*	*0.4[(i)]*
	Previous inconclusive	*Number*	*3,088*	*1,634*	*137*	*87*	*42*	*28*	*3*	*4*	*10*	*0*	*0*
		Per cent					*n.p.*	*n.p.*	*n.p.*	*n.p.*	*n.p.*	*0.0*	*0.0*
	Previous no return	*Number*	*252,322*	*45,371*	*3,363*	*2,254*	*1,116*	*766*	*65*	*52*	*201*	*38*	*16*
		Per cent					*49.5*	*34.0*	*2.9*	*2.3*	*8.9*	*1.7*	*0.7[(i)]*
	First invite	*Number*	*1,338,281*	*490,575*	*39,624*	*22,155*	*10,361*	*8,264*	*482*	*520*	*1,903*	*510*	*115*
		Per cent					*46.8*	*37.3*	*2.2*	*2.3*	*8.6*	*2.3*	*0.5*
	New kit total	Number	1,722,063	644,591	48,907	28,459	13,564	10,338	659	689	2,439	622	148
		Per cent					47.7	36.3	2.3	2.4	8.6	2.2	0.5
Total		**Number**			**62,067**	**37,444**	**18,117**	**13,086**	**865**	**922**	**3,333**	**868**	**253**
		Per					**48.4**	**34.9**	**2.3**	**2.5**	**8.9**	**2.3**	**0.7**

(a) 'Invitations issued' equals the number of eligible people who were issued an invitation to screen in the NBCSP.

(b) 'Number screened' equals the number of people who completed an FOBT kit and had results forwarded to the Register.

(c) 'Colonoscopy recorded' includes colonoscopies recorded via the Colonoscopy Report and/or Histopathology Report forms. It does not include colonoscopies identified through Medicare claims.

(d) No cancers were suspected at colonoscopy or confirmed non-cancerous by histopathology; no polyps identified at colonoscopy, or polyps confirmed as non-adenomatous at histopathology.

(e) Polyps detected at colonoscopy and sent to histopathology for analysis. No Histopathology Report form received by Register.

(f) Confirmed adenoma figures were based on a combination of the Colonoscopy and Histopathology Report forms for a person received by the Register.

(g) Cancer suspected at colonoscopy but not yet confirmed by histopathology.

(h) Cancer confirmed by histopathology.

(i) Based on numerator < 20 or denominator < 300; interpret with caution.

Note: HemTube kit used July 2008–December 2008. *New HemTube* kit used December 2008–May 2009. *New HemTube (B)* kit used October 2009 onwards.

Source: National Bowel Cancer Screening Program Register as at 21 July 2011.

7 Incidence of bowel cancer

What do we mean by bowel cancer incidence?

Definition: The number of people diagnosed with bowel cancer, reported for various population subgroups.

Rationale: Monitoring of bowel cancer incidence statistics alongside the implementation of the NBCSP allows an understanding of the potential effect of screening on incidence.

Data source: Australian Cancer Database (ACD).

Data quality: Excellent. The AIHW compiles and maintains the ACD, in partnership with the Australasian Association of Cancer Registries, whose member registries provide data to the AIHW annually. Each Australian state and territory has legislation that makes the reporting of cancers (excluding basal cell and squamous cell carcinomas of the skin) mandatory. This began with cases first diagnosed in 1982, and the ACD currently has data on cancers diagnosed up to and including 2008.

Guide to interpretation: Bowel cancer comprises cancer of the colon and cancer of the rectum, collectively known as colorectal cancer. An objective of the NBCSP is to reduce the incidence of bowel cancer in Australia. Positive FOBTs and subsequent colonoscopies identify and treat polyps and adenomas that might develop into cancer, thereby reducing future incidence. However, it is expected that during the first few years of the NBCSP incidence rates may increase, as pre-existing, developed cancers (in addition to polyps and adenomas) that had not resulted in symptoms are found earlier through screening. This should stabilise over time as retesting of participants occurs (for example, 50 year olds who are reinvited when they turn 55).

This chapter provides bowel cancer incidence data, grouped by age, sex and population subgroups. See the AIHW *National Bowel Cancer Screening Program Monitoring report: Phase 2, July 2008–June 2011 Supplementary tables* webpage for additional tables.

Detailed numbers and rates for bowel cancer in Australia over time are in the AIHW *Australian Cancer Incidence and Mortality* workbook for colorectal cancer, an interactive workbook that currently includes incidence data from 1982 to 2008 and mortality data from 1968 to 2007. It is available at <www.aihw.gov.au/acim-books>.

Key results

In 2008:

- there were 14,225 people diagnosed with bowel cancer (7,850 males; 6,375 females)
- bowel cancer accounted for 12.7% of all invasive cancers diagnosed, making it the second most commonly diagnosed cancer in Australia, after prostate cancer
- the age-standardised incidence rate for bowel cancer was 73 per 100,000 males, 51 per 100,000 females and 62 per 100,000 persons
- the risk of being diagnosed by the age of 85 was 1 in 10 for males, 1 in 15 for females and 1 in 12 for persons
- the average age of diagnosis was 68 for males and 70 for females.

Detailed bowel cancer incidence analyses

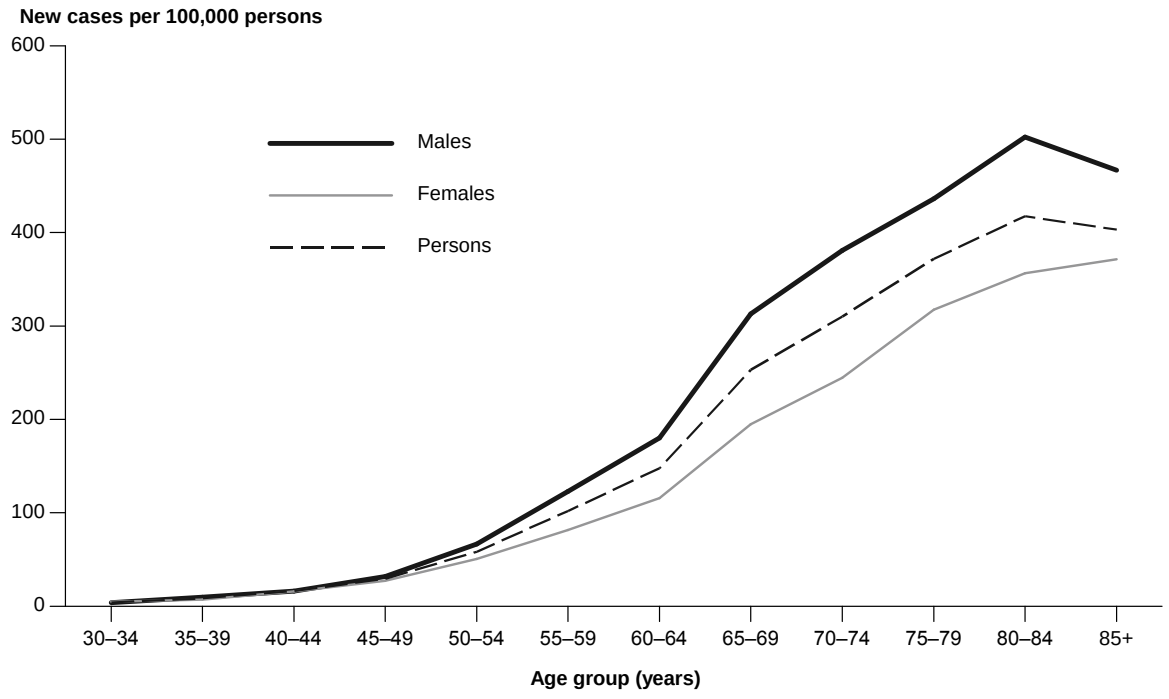
Bowel cancer incidence by state and territory

The incidence of bowel cancer varied between jurisdictions in the period 2004–2008 (tables S2.3a–S2.4c). Tasmania (70.3 cases per 100,000 persons), Queensland (65.2) and South Australia (63.5) had the highest age-standardised incidence rates, and the Northern Territory (54.4) the lowest.

Bowel cancer incidence by age and sex

In 2008, and similar to previous years, newly diagnosed cases of bowel cancer were relatively rare in people under 45; however, the incidence rate was sharply higher for older age groups (Figure 7.1). The highest incidence rates were in people aged 80 and over (more than 400 cases per 100,000 population).

About 27% of the new cases diagnosed were in people aged 50–64, with 8% being diagnosed in people specifically aged 50, 55 or 65—the current NBCSP target ages.

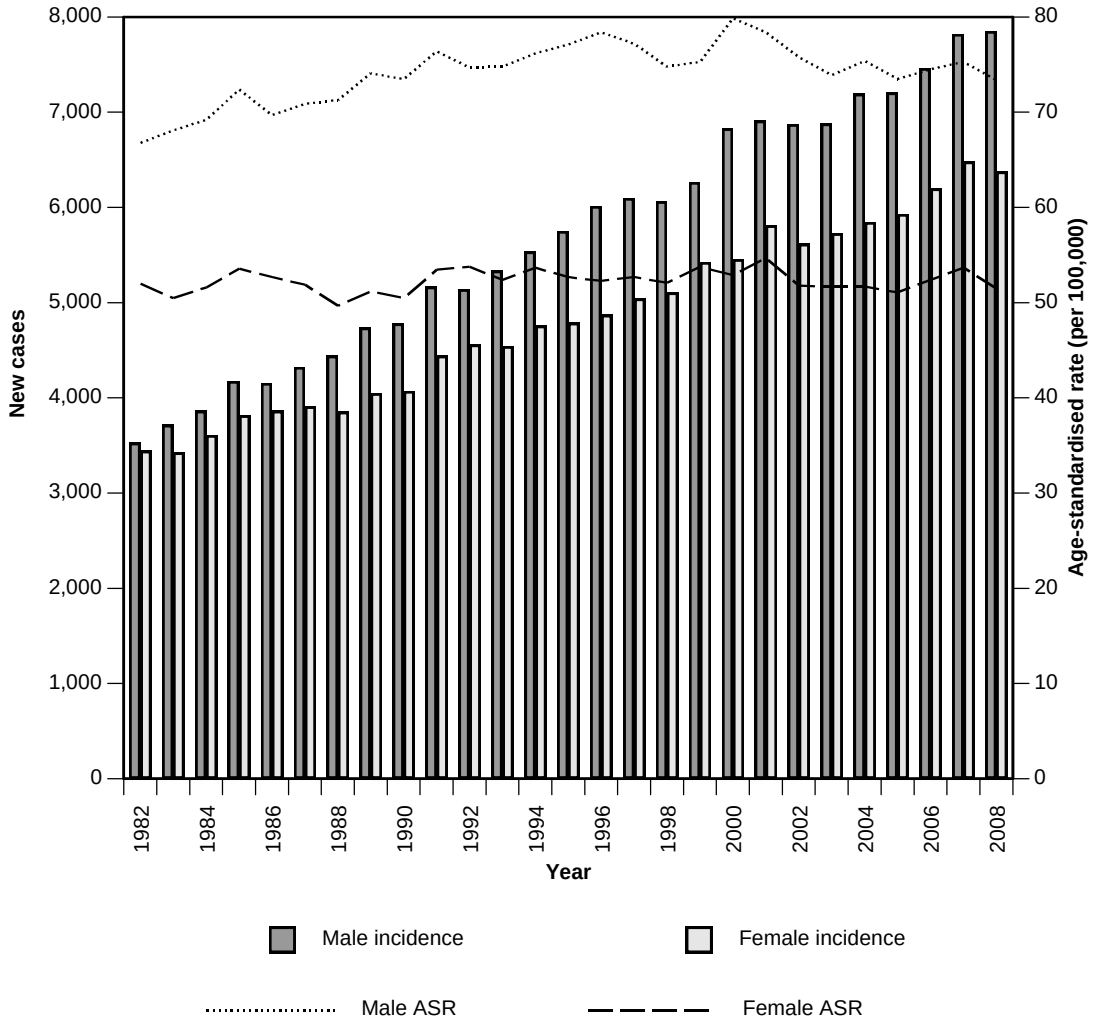


Source: AIHW Australian Cancer Database.

Figure 7.1: Age-specific incidence rates of bowel cancer, Australia, 2008

Trends

The number of new cases of bowel cancer for males more than doubled (122% increase) between 1982 and 2008, with incidence in females showing a smaller (85%) increase. While the age-standardised rates increased slowly between 1982 and 2008 for males (0.4% per year) and actually decreased slightly for females (0.1% per year), the effect of the increase in the number of cases due to the ageing population in Australia means the burden bowel cancer places on the health care system is still increasing (Figure 7.2 and tables S2.1a–S2.2c).



Note: Rates age-standardised to the Australian 2001 population.

Source: AIHW Australian Cancer Database.

Figure 7.2: Incidence and age-standardised incidence rates of bowel cancer, Australia, 1982–2006

Bowel cancer incidence data for 2008 may include diagnoses from screening activities in both the end of Phase 1 and the beginning of Phase 2 of the NBCSP. Analysis of Phase 1 and Phase 2 data shows 594 suspected cancers were detected within the NBCSP in 2008 (data not shown). Due to some limitations in histopathology form return, it is not possible to determine with NBCSP data how many of these were actually confirmed and registered in the ACD as bowel cancers (the NBCSP data for 2008 shows 167 of these were confirmed by NBCSP Histopathology Report form). However, it is likely that of the 1,131 bowel cancers registered in 2008 for those aged 50, 55 or 65 (see AIHW *National Bowel Cancer Screening*

Program Monitoring report: Phase 2, July 2008–June 2011 Supplementary tables webpage), the NBCSP accounted for about 500 of these diagnoses.

One of the goals of the NBCSP is to detect bowel cancers at an earlier stage, when treatment is more likely to be successful, thus reducing mortality. The findings in this report show that 55% of Phase 2-detected bowel cancers that had resection data available were at the earliest stage of cancer spread, which is optimal for successful treatment (See '4 Bowel abnormality detection', Section 2). Further, more detailed recent research by Cole et al. (2011) confirmed that significantly more NBCSP screen-detected cancers in South Australia were found at the earliest, most-curable stage compared with bowel cancers diagnosed outside the Program. This was a similar finding to an earlier study be Ananda and colleagues (2009) which also found 'cancers diagnosed through the NBCSP were detected at a much earlier stage'.

Bowel cancer incidence by region

The age-standardised incidence rates of bowel cancer between 2004 and 2008 were highest in *Inner regional* (66.3 cases per 100,000), *Outer regional* (65.7) and *Remote* areas (64.8) (tables S2.5a–S2.6c). *Very remote* areas had a statistically significant lower age-standardised incidence rate (51.7 per 100,000) than the other regions.

8 Mortality from bowel cancer

What do we mean by bowel cancer mortality?

Definition: The number of people who have died from bowel cancer (as the underlying cause of death), by various stratifications.

Rationale: Changes in the number and rate of bowel cancer deaths are monitored to help understand the effect of interventions (such as screening and improved treatments).

Data source: National Mortality Database (NMD).

Data quality: Excellent. See Appendix C for further information on mortality data.

Guide to interpretation: Bowel cancer mortality data from the NMD includes deaths up to 2007. The denominator is based on ABS estimated resident populations up to 2007. As these data are for years before Phase 2, these outcomes are not currently related in any way to Phase 2 screening activities. However, they provide a baseline to monitor future outcomes against.

A major objective of the NBCSP is to reduce mortality from bowel cancer in Australia through early detection and treatment of bowel cancers, and through identifying and treating polyps and adenocarcinomas that might develop into cancer. It is hoped these outcomes will eventually result in a reduction in the number of people who die from bowel cancer; however, it may take many years for this effect to become apparent, as polyps and adenomas detected at screening now may not have become cancers resulting in death for many years. However, even then it is not possible to provide a causal link between any changes in mortality rates in relation to the NBCSP.

See the AIHW *National Bowel Cancer Screening Program Monitoring report: Phase 2, July 2008–June 2011 Supplementary tables* webpage for additional tables. As mortality data are enumerated by age at death, not age at diagnosis, it is not accurate to analyse NBCSP performance by looking at mortality rates of people aged 50, 55 and 65; the NBCSP target ages were included for illustrative purposes only.

Key results

In 2007:

- there were 4,047 deaths from bowel cancer in Australia (2,191 males; 1,856 females). Bowel cancer accounted for 10.1% of all deaths from invasive cancers, second only to lung cancer
- the age-standardised death rate was 22 per 100,000 males and 15 per 100,000 females
- the risk of dying from bowel cancer by the age of 85 was 1 in 33 for males and 1 in 50 for females (1 in 41 for persons)
- bowel cancer was responsible for 50,818 potential years of life lost by the age of 85 (29,638 for males; 21,180 for females).

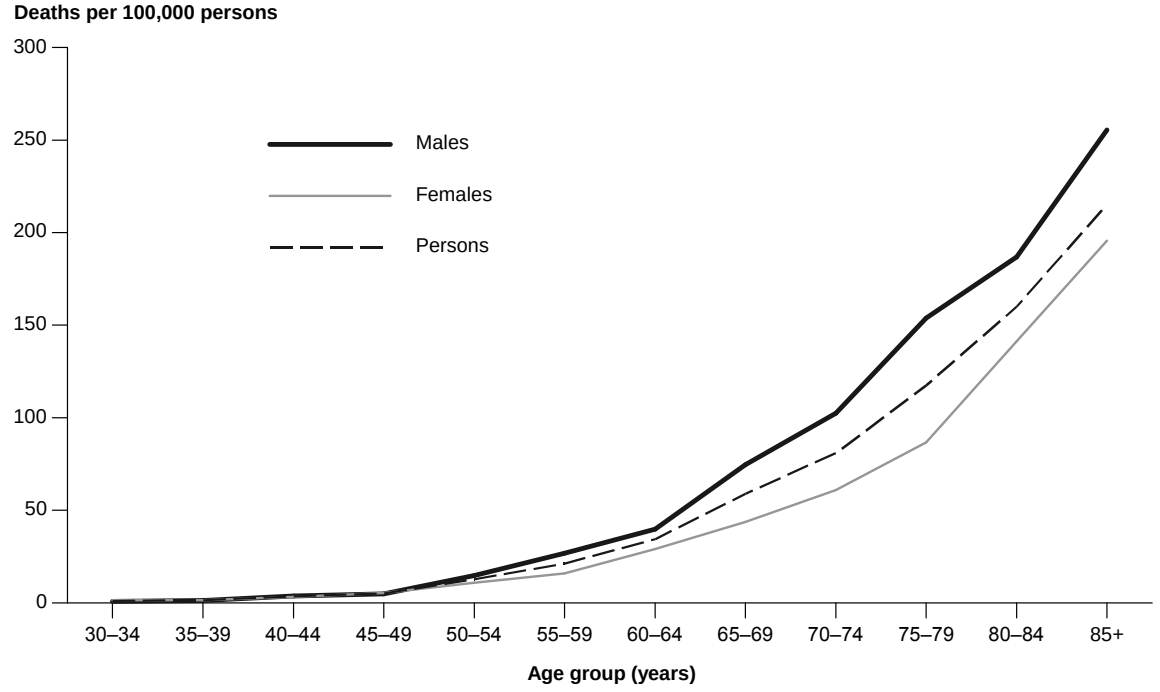
Detailed bowel cancer mortality analyses

Bowel cancer mortality by state and territory

Tasmania experienced the highest age-standardised rate of deaths from bowel cancer for 2003–2007 (22.9 deaths per 100,000 population) followed by the Northern Territory (21.5) and Victoria (20.5). However, only the rates from Tasmania and Victoria were statistically significantly higher that the Australian age-standardised rate (19.1) (tables S3.3a–S3.4c). Only New South Wales (18.0 deaths per 100,000 population) had significantly lower age-standardised mortality rate than the Australian age-standardised rate for 2003–2007.

Bowel cancer mortality by age and sex

Death from bowel cancer is relatively rare before 50 years of age, with 95% of deaths for those aged 50 or more (Figure 8.1). In 2007, the highest age-specific death rates were in the oldest age groups—people aged 80–84 (160 per 100,000 population) and 85 and over (215 per 100,000). There were 1,289 deaths in the 50–69 year age group, 32% of all bowel cancer deaths. This age group is currently targeted by the NBCSP; however, benefits of screening may also continue into older ages.



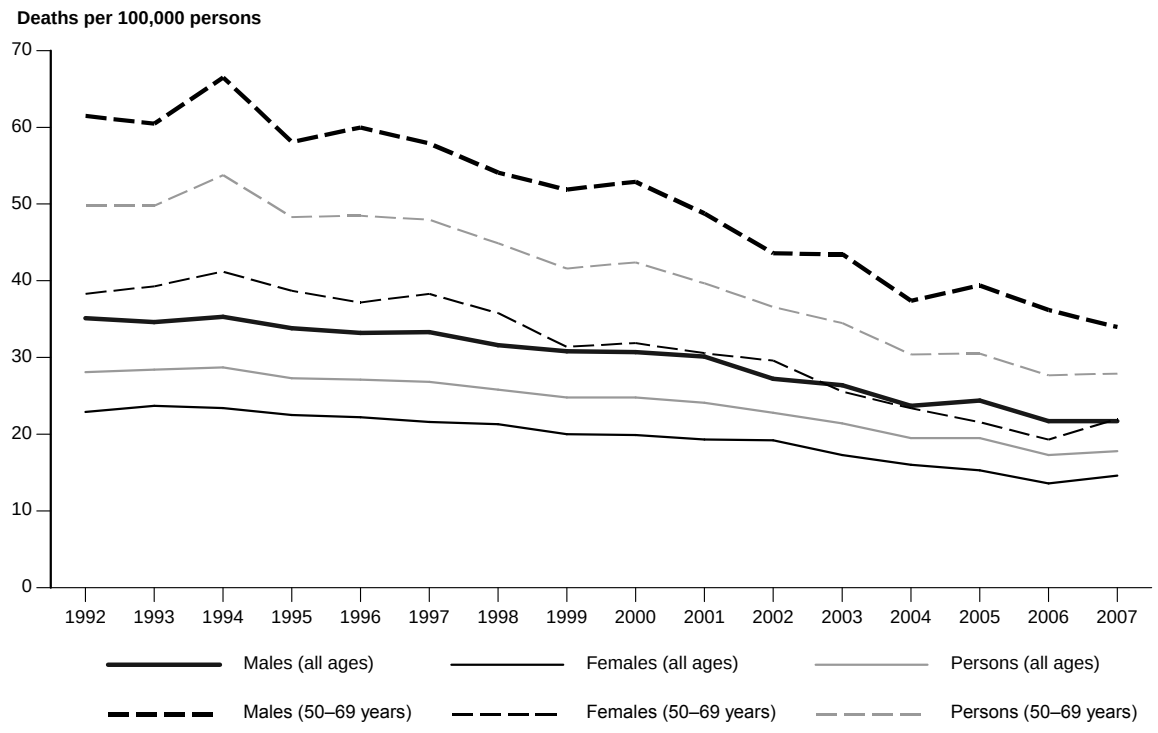
Note: Rates age-standardised to the Australian 2001 population.

Source: AIHW National Mortality Database.

Figure 8.1: Age-specific mortality rates for bowel cancer (ICD-10 C18–C20), Australia, 2007

Trends

Between 1992 and 2007, the age-standardised death rate from bowel cancer fell by an average of 3.9% per year for males, 3.6% per year for females, and 3.8% per year for persons (Figure 8.2 and tables S3.1a–S3.2c). It is expected the NBCSP will, in time, accelerate this decline in the death rate.



Note: Rates age-standardised to the Australian 2001 population.

Source: AIHW National Mortality Database.

Figure 8.2: Age-standardised mortality rates for bowel cancer, Australia, 1992–2007

Bowel cancer mortality by region

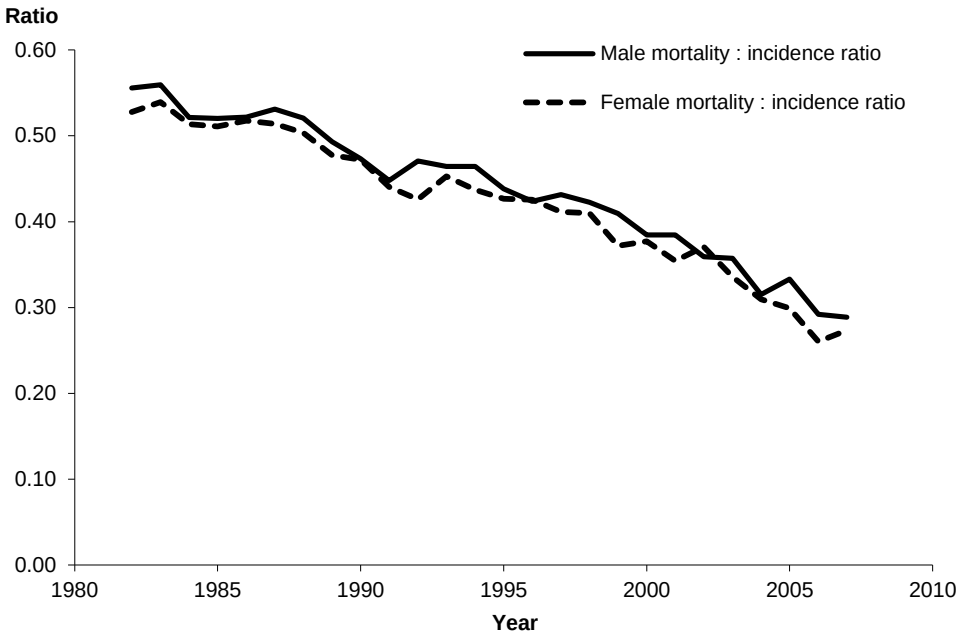
In 2003–2007, age-standardised deaths from bowel cancer were statistically significantly higher in *Outer regional* (21.5 deaths per 100,000) and *Inner regional* (20.5) areas of Australia than the Australian average (tables S3.5a–S3.6c). Age-standardised death rates were statistically significantly lower in *Major cities* (18.2 deaths per 100,000).

Bowel cancer mortality of Aboriginal and Torres Strait Islander peoples

In New South Wales, Queensland, South Australia and the Northern Territory in 2003–2007, the age-standardised rate of deaths from bowel cancer was lower for Aboriginal and Torres Strait Islander peoples (14.1 deaths per 100,000) than for non-Indigenous people (18.4) (tables S3.7a and S3.7b).

Bowel cancer mortality to incidence ratio

As shown in Figure 8.3, the trends in bowel cancer mortality to incidence ratios have been steadily decreasing for many years. Any change in these rates due to the NBCSP would depend on the number of people screened, the number of pre-cancerous polyps removed and the stage of growth at which cancers were detected. However, it would be expected that the NBCSP would assist in ongoing reductions in these ratios.



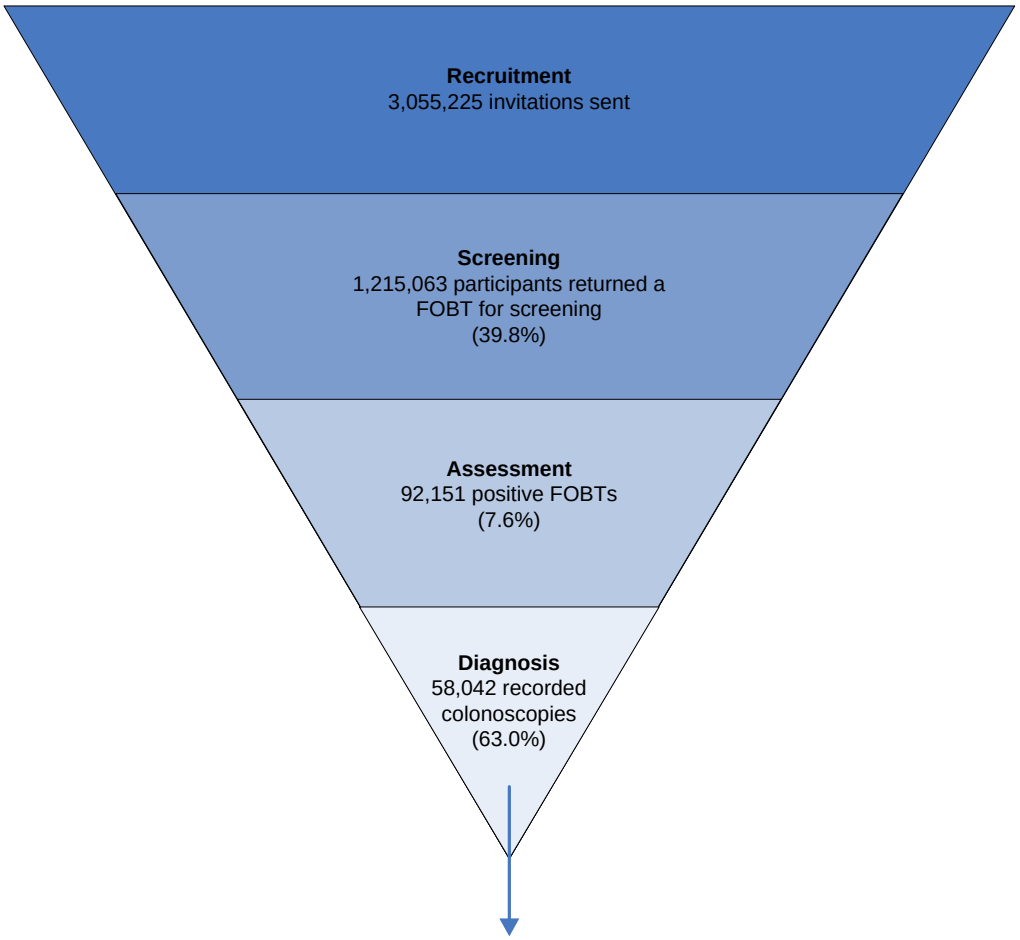
Note: Ratios calculated from rates, age-standardised to the Australian 2001 population.

Source: AIHW Australian Cancer Database and National Mortality Database.

Figure 8.3: Trends in mortality : incidence ratios for bowel cancer, Australia, 1982–2007

Appendix A Overall NBCSP outcomes for Phase 1 and 2 (August 2006–June 2011)

The *Population based screening framework* (APHDPCSS 2008) uses five stages to describe a screening pathway. Overall data on invitees from both Phase 1 and 2 of the NBCSP, and their progression through the pathway, have been applied to these stages in Figure A.1.



Recorded colonoscopy outcomes

No cancer or adenoma	27,663	(47.7%)
Polyp awaiting histopathology	19,690	(33.9%)
Diminutive adenoma	1,494	(2.6%)
Small adenoma	1,529	(2.6%)
Advanced adenoma	5,585	(9.6%)
Suspected cancer	1,598	(2.8%)
Confirmed cancer	483	(0.8%)

Notes

1. Invitees aged 50, 55 and 65 were included; other aged invitees (for example, pilot invitees from phase 1) were excluded.
2. 10,161 colonoscopies identified through Medicare claim only were not included, as there were no associated outcome data available for analysis.
3. Adenoma classifications are described in Appendix B.
4. Figure is not to scale.

Source: National Bowel Cancer Screening Program Register.

Figure A.1: Overall NBCSP outcomes for all invitees aged 50, 55 and 65, August 2006–June 2011

There are no formal performance indicators for the NBCSP; however, the current overall screening rate of 39.8% is lower than the 45.4% rate achieved in the Pilot Program (DoHA 2005). The overall crude colonoscopy follow-up (diagnosis) rate of 63.0% is higher than that achieved in the Pilot Program (55.0%).

Since the inception of the NBCSP about 5 years ago, 2,081 participants have been found with suspected or confirmed cancers and 5,585 more have been diagnosed with advanced adenomas. Additionally, 3,023 participants have been diagnosed with earlier-stage adenomas.

While the NBCSP only follows participants up to the point of definite diagnosis, and outcomes of treatment for these participants are unknown, it would be expected that the earlier treatment the NBCSP afforded these participants should improve their treatment outcomes. This may eventually be shown as reductions in colorectal cancer incidence and mortality in the coming years.

Lastly, increases in the number of people participating in screening, plus an increase in the rate of return of Colonoscopy and Histopathology Report forms, would improve monitoring of the NBCSP and its invitees.

Appendix B NBCSP information

NBCSP resources

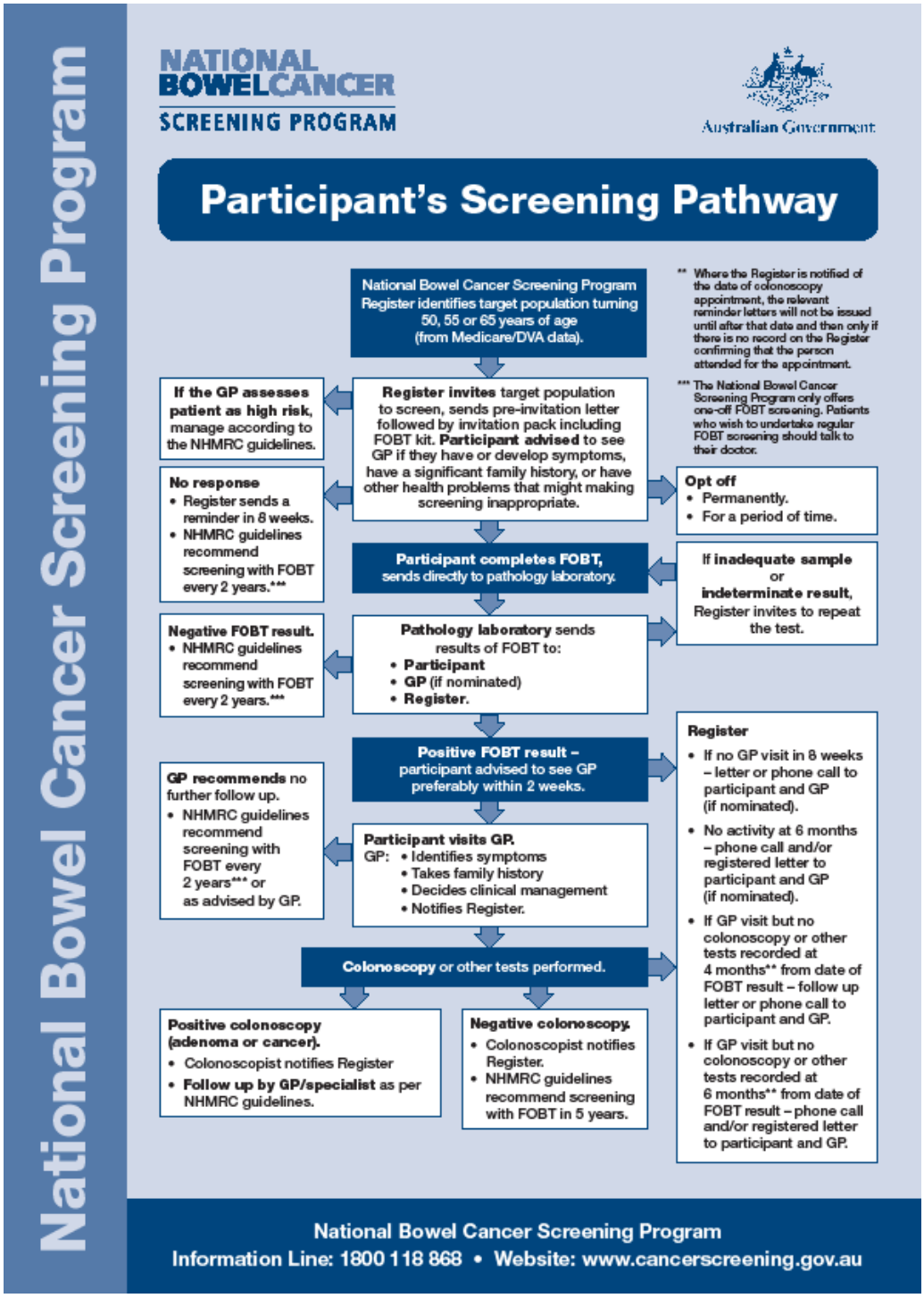


Figure B.1: The NBCSP participant's screening pathway

NATIONAL BOWELCANCER SCREENING PROGRAM

Australian Government

<Date> ID number <Consumer ID>

<Participant Given Name> < Participant Family Name >
<Preferred Mailing Address>
<Preferred Mailing Address >
<LOCALITY> <STATE> <POSTCODE>

Dear <Participant Given Name> < Participant Family Name >

Did you know that around 80 Australians die each week from bowel cancer? Bowel cancer is one of Australia's most common cancers, especially for people over 50. The good news is that there is a simple test you can do in your own home that can help find early signs of bowel cancer.

This test can detect tiny amounts of blood in your bowel motion. This may be a sign of an abnormality or bowel cancer and, if detected at an early stage, it can be more easily and successfully treated.

The Australian Government has introduced the National Bowel Cancer Screening Program for people turning 50, 55 and 65 years of age between January 2008 and December 2010 to help lower the number of Australians who die each year from bowel cancer.

An invitation package which includes a test kit with instructions and an information booklet will be sent to you in the next few weeks. The test is free and doing the test will take just a few minutes at two different times. The test result will be completely confidential to you and if nominated, your doctor.

Special arrangements have been put in place for the Register to select your name from either the Medicare enrolment records or the Department of Veteran's Affairs enrolment file to issue this letter and to invite you to participate in the Program. Your personal information - such as your name, contact details, age, gender, Medicare number, results of your screening tests, and the name of your doctor - is protected by law under the Privacy Act 1988.

Bowel cancer can develop with few, if any, early warning signs so please take the time to read the information in the invitation package when you receive it, as early detection is the best protection we currently have to fight bowel cancer.

If you are already being treated for bowel cancer or have a health condition which your doctor suggests may be affected by participating in the Program, you can choose to opt-off or suspend from the Program by completing the 'Opt Off/Suspend' Form in the information booklet which comes with the invitation package.

I hope you choose to take part in this important Program.

Yours sincerely

Professor Jim Bishop AO
MD MMed MBBS FRACP FRCPA
Chief Medical Officer

NBCSR C221

www.cancerscreening.gov.au

Figure B.2: The NBCSP phase 2 pre-invitation letter

National Bowel Cancer Screening Program definitions

Target population

The NBCSP has been phased in gradually to ensure demand for services such as colonoscopy can be met. Table B.1 outlines the start dates of each phase, and the target age groups.

Table B.1: NBCSP phases and target populations

Phase	Start date	End date	Target ages	Target age birthdays included
1	7 August 2006	30 June 2008	55 and 65	1 May 2006–30 June 2008
2	1 July 2008	30 June 2011	50, 55 and 65	1 January 2008–31 December 2010
2[(a)]	1 July 2011	31 December 2014	50, 55 and 65	1 January 2011–31 December 2014

(a) Phase 2 to continue between 1 July 2011 and 31 December 2014.

Eligible population

Invitees who were outside the target ages or had a current address outside Australia were excluded from this report. People who chose to opt off or suspend participation were included in the eligible population.

Polyps

Colorectal polyps are small growths of colon tissue that protrude into the colonic or rectal lumen. They are usually asymptomatic, but sometimes cause visible rectal bleeding, and rarely, other symptoms. Polyps may occur individually but it is common for a person to have multiple polyps. They occur more commonly in later life, and hereditary and dietary (lifestyle) factors may play a part. Polyps may become cancerous and are generally defined as two main types:

- Hyperplastic: a type of polyp that has a low risk, if any, of developing into a cancer. However, people with multiple hyperplastic polyps are associated with an increased risk of bowel cancer.
- Adenoma (Adenomatous): a polyp that has a higher chance of becoming cancerous, as it contains molecular characteristics that are common with adenocarcinoma. See 'Adenoma classifications' below.

Polyp number, size and microscopic features may also predict the likelihood of a polyp becoming cancerous, with larger and flatter (non-stalked) polyps having the higher risk. During a colonoscopy polyps are removed, thus lowering the risk of bowel cancer developing in the person.

Adenoma classifications

An adenoma (adenomatous polyp) is a benign tumour that arises from epithelial cells. All adenomas have malignant potential. Adenomas in the rectum or colon have a higher chance of developing into cancer (adenocarcinoma) than adenomas in most other organs.

Although nearly all cancers in the colon (adenocarcinoma) arise from adenomas, only a small minority of adenomas (1 in 20 or less) progress to cancer (Ahnen & Macrae 2008). While most small tubular adenomas have a low risk of progressing to cancer, the risk is much higher in advanced adenomas.

Adenoma classifications were derived from information reported by colonoscopists and histopathologists, and were classified from highest risk (advanced) to lowest risk (diminutive), as listed below. Where a person had multiple adenomas, he or she was classified according to the adenoma having the highest risk.

Advanced adenoma

If any of the indicators of higher risk were present, the adenoma was classified as advanced:

- Adenoma multiplicity—three or more adenomas present at examination, regardless of histopathology or size.
- Adenoma size—a size of 10 millimetres or greater. The measurement is subject to certain problems with accuracy. Where colonoscopy and pathology reports differ in their recording of size, the larger size was used.
- High-grade dysplasia.
- Significant villous change or serrated—adenomas recorded as serrated, tubulovillous or villous on pathology reports.

Small adenoma

A tubular or mixed adenoma between 5 millimetres and 9 millimetres.

Diminutive adenoma

A tubular or mixed adenoma smaller than 5 millimetres, or with no size recorded.

Appendix C Data sources and classifications

Data sources

Multiple data sources were analysed to produce this report. These are summarised in Table C.1. All data used in this report were based on calendar years.

Table C.1: Sources for data presented in this report

Description	Data source
Participation	National Bowel Cancer Screening Program Register
Cancer detection	National Bowel Cancer Screening Program Register
Population data	Australian 2001 standard population; Estimated resident populations, ABS; 2006 Census of Population and Housing, ABS
Incidence (ICD-10 C18–20)	Australian Cancer Database (ACD), AIHW
Mortality (ICD-9 153, 154.0–154.1, ICD-10 C18–20)	National Mortality Database (NMD), AIHW

Incidence data

Incidence data came from the Australian Cancer Database (ACD)—a national collection of cancer statistics held and operated by the AIHW. The AIHW receives data from individual state and territory cancer registries on cancers diagnosed in residents of Australia, and produces reports on national incidence.

Incidence of bowel cancer in this report was for 1993 to 2008, the latest year for which national incidence data is available. Data were analysed using the year of diagnosis of cancer. This is because incidence data by year of diagnosis of cancer is a more accurate reflection of incidence during a particular year than year of registration data. However, only data on year of cancer registration are available for the most recent year.

Mortality data

Data for deaths from bowel cancer come from the National Mortality Database (NMD). The NMD is maintained by the AIHW and currently holds records for all deaths registered in Australia between 1964 and 2007. The deaths for 2007 are for preliminary data and are subject to Australian Bureau of Statistics (ABS) revisions processes. Information on the characteristics and causes of death is provided by the Registrars of Births, Deaths and Marriages and the National Coronial Information System to the ABS. The ABS code the information about the cause of death to an international standard (the International Classification of Disease, currently version 10; ICD-10).

Mortality data in this report were for 1992–2007. During this time, changes have been made to the coding and processing of mortality data and these changes affect the comparability of the data over time. Cause of death before 1997 was coded manually to the ninth version of ICD (ICD-9) and deaths from 1997 onwards were coded automatically to ICD-10. For bowel cancer, the relevant ICD-9 codes are 153, 154.0 and 154.1 and for ICD-10 codes used are C18-C20.

The change to the coding and processing of mortality data introduced a break in the data time series. To adjust for the break in series, the ABS calculated comparability factors. The comparability factors, when applied to deaths registered before 1997, adjust the number of deaths to reflect the number that would have occurred if the ICD-10 had been applied.(ABS 2006). For bowel cancer, the comparability factor is close to 1 (0.98); comparability factors were not used to make adjustments in this report.

Data were analysed using the year of occurrence of death for 1982–2006 and year of registration of death for 2007. This is because mortality data by year of occurrence of death is a more accurate reflection of mortality during a particular year than year of registration data; however, deaths by year of occurrence are incomplete due to late registrations. Breakdowns of bowel cancer mortality by state and territory use state/territory of usual residence, not state/territory of death registration.

All states and territories have provision for the identification of Aboriginal and Torres Strait Islander deaths on their death registration forms. However, the coverage of deaths identified as Indigenous varies across states and territories and over time. While the identification of Indigenous deaths is incomplete in all state and territory registration systems, four jurisdictions (New South Wales, Queensland, South Australia and the Northern Territory) have been assessed by the ABS and the AIHW as having adequate identification for 2003–2007 data. These jurisdictions represent about 75% of the Aboriginal and Torres Strait Islander population of Australia (ABS 2009).

Data for Aboriginal and Torres Strait Islander deaths, state and territory and geographic location have been combined for the 5 years from 2003–2007 due to the small number of deaths from bowel cancer in each year.

Population data

The ABS estimated resident population data were used to calculate incidence and mortality rates in this report.

Classifications

Geographic classification

Geographic location was classified according to the ABS Australian Standard Geographical Classification Remoteness Structure, which groups geographic areas into six categories. These categories, called Remoteness Areas, are based on Census Collection Districts and defined using the Accessibility/Remoteness Index for Australia (ARIA). ARIA is a measure of the remoteness of a location from the services provided by large towns or cities. Accessibility is judged purely on distance to one of the metropolitan centres. A higher ARIA score denotes a more remote location. The six Remoteness Areas of the Australian Standard Geographical Classification Remoteness Structure are listed in Table C.3; the sixth, *Migratory* area, is not used in this publication.

Residential address postcodes of participants were mapped to 2006 Census Collection Districts and then classified to the five main Remoteness Areas, ranging from *Major cities* to *Very remote* areas. As some postcodes can span different Remoteness Areas, a weighting for each Remoteness Area is attributed to the postcode. This can result in non-integer counts for remoteness classifications. For example, the Northern Territory postal area 0822 is classified

as 70.54% *Very remote*, 6.64% *Remote* and 22.82% *Outer regional*. Participants with postcode 0822 have their counts apportioned accordingly.

Tables in this report based on geographical location were rounded to integer values. Where figures were rounded, discrepancies may occur between totals and sums of the component items.

Newer participant postcodes may not map to these 2006 Census-based concordances and they were included in an 'Unknown' column in relevant tables. Further, some postcodes may have changed remoteness area since the 2006 Census; however, they will still be included under the area they were assigned in 2006.

Table C.2: Remoteness areas for the Australian Standard Geographical Classification

Region	Collection districts within region
Major cities of Australia	CDs with an average ARIA index value of 0 to 0.2
Inner regional Australia	CDs with an average ARIA index value greater than 0.2 and less than or equal to 2.4
Outer regional Australia	CDs with an average ARIA index value greater than 2.4 and less than or equal to 5.92
Remote Australia	CDs with an average ARIA index value greater than 5.92 and less than or equal to 10.53
Very remote Australia	CDs with an average ARIA index value greater than 10.53
Migratory	Areas composed of off-shore, shipping and migratory CDs

Socioeconomic classification

Socioeconomic classifications were based on the ABS Index of Relative Socioeconomic Disadvantage (IRSD). Geographic areas are assigned a score based on attributes such as low income, low educational attainment, high unemployment and jobs in relatively unskilled occupations. It does not refer to the socioeconomic situation of a particular individual, but instead refers to the area in which a person lives. A low score means an area has more low-income families, people with little training and high unemployment, and may be considered disadvantaged relative to other areas with higher scores. Areas with high index scores may be considered less disadvantaged relative to other areas.

Geographic areas may be excluded where no score is determined due to low populations or high levels of non-response in the underlying census. Additionally, newer participant postcodes may not map to these 2006 Census-based concordances and they were included in an 'Unknown' column in relevant tables. Lastly, some postcodes may have changed remoteness area since the 2006 Census; however, they will still be included under the area they were assigned in 2006.

In this report, a participant's socioeconomic status was classified using the participant's residential postcode according to the IRSD for 2006. Five socioeconomic groups, based on the level of the index, were used for analysis where group 1 represents the most disadvantaged fifth of the population and group 5 the least disadvantaged.

NBCSP classifications

See Appendix B for classifications specific to the NBCSP.

Appendix D Statistical methods

Comparisons and tests of statistical significance

This report includes statistical tests of the significance of comparisons of rates between population groups. Any statistical comparison applied to one variable must take account of any other potentially relevant variables. For example, any comparison of participation by state must also take account of differences in the distribution of age and sex between the states. These other variables are known as confounding variables.

Crude rates

A crude rate is defined as the number of events over a specified period divided by the total population. The crude rate (for participation, attendance and follow-up) is the proportion of people who have proceeded to a key point on the screening pathway (at the date of the data extraction) out of those eligible to proceed to that point. For example, the crude participation rate is the proportion of the eligible people invited in 2008 who return a completed FOBT kit by 31 January 2009. The crude colonoscopy follow-up is the proportion of people invited in 2008 with a positive FOBT result who proceeded to colonoscopy by 31 January 2009.

The crude proportions will generally underestimate the true proportions of the population who participated in the NBCSP. This is because at any point in time there are members of the population who are eligible to proceed to the next point on the screening pathway, but who have not yet had time to do so. For example, a person who has just received an invitation to screen may intend to participate in screening but may not have had time to do so. They will be counted in the denominator of the crude participation but not in the numerator. Similarly, there is the lag time between when a person with a positive FOBT result is referred for colonoscopy and when they can actually have the colonoscopy. A colonoscopy follow-up calculated during this lag includes them in the denominator but not in the numerator.

Age-specific rates

Age-specific rates were calculated by dividing the number of cases occurring in each specified age group by the corresponding population in the same age group, expressed as per 100,000 persons.

Age-standardised rates

Rates are adjusted for age to help comparisons between populations that have different age structures, for example, between youthful and ageing communities. Two different methods are commonly used to adjust for age. In this publication direct standardisation was used, in which age-specific rates were multiplied against a constant population (the Australian 2001 population). This effectively removes the influence of age structure on the summary rate, and is described as the age-standardised rate. The method used for this calculation comprises three steps:

- Calculate the age-specific rate for each age group.
- Calculate the expected number of cases in each 5-year age group by multiplying the age-specific rates by the corresponding standard population, and dividing by 100,000, giving the expected number of cases.

- Calculate the age-standardised rate by summing the expected number of cases in each age group, and dividing this sum by the total of the standard population used in the calculation and multiplying by 100,000.

Confidence intervals

In this report, 95% confidence intervals are used to determine if a statistically significant difference exists between compared values. Where the confidence intervals do not overlap, the difference between values is greater than that which could be explained by chance and is regarded as statistically significant. Different methods of calculating confidence intervals were used for the crude rates in NBCSP chapters 1–6 (Box D.1) and the age-standardised rates in the incidence and mortality chapters, which were calculated using the method developed by Dobson and associates (1991). The Dobson method calculates approximate confidence intervals for a weighted sum of Poisson parameters.

Box D.1: Confidence intervals for proportions

Confidence intervals for crude proportions (p) in chapters 1–6 were calculated using the basic confidence interval formula for binomial proportions:

$$95\%\ \text{CI for proportions} = p \pm 1.96 \times \sqrt{\frac{p \times (1-p)}{\text{Number of cases}}}$$

The use of confidence intervals for non-sample data

The AIHW is reviewing the provision of confidence intervals when data arises from sources that provide information on all subjects, rather than from a sample survey. This review will include analysis of the methods used to calculate confidence intervals, as well as the appropriateness of reporting confidence intervals for such data. It aims to ensure that statistical methods used in AIHW reports remain robust and appropriately inform understanding and decision making.

Kaplan-Meier estimates of participation and follow-up

The Bowel Cancer Screening Pilot Program used Kaplan-Meier estimates of participation, attendance and follow-up. This statistical method calculates a modelled rate based on the time it takes each individual invited for screening to move between points on the screening pathway. For example, participation is calculated by following each invited person and, for those who respond, recording the time it takes them to respond. This allows the calculation of a response rate over time from the date of invitation. Kaplan-Meier methods are standard methods used to model the time to an event and the changes in the rates of an event over time. In this case, the event is a person's response (by returning a completed FOBT kit), and the time to the event is measured in weeks from the date the invitation was sent. These Kaplan-Meier estimates represent valid estimates of the true FOBT participation. The use of Kaplan-Meier estimates in the NBCSP was endorsed by the Implementation Advisory Group, and allows direct comparison of participation, attendance and follow-up rates with the Bowel Cancer Screening Pilot Program.

In principle, the Kaplan-Meier estimate only gives a result at a specific point in time. The estimate is likely to grow for later points in time. However, inspection of these estimates

shows that they reach a plateau, after which they have only a negligible increase. Kaplan-Meier estimates in this report were calculated at 52 weeks for participation, and PHCP and colonoscopy follow-up. Further, preliminary analyses based on modelling the survival time with both a Weibull and an exponential distribution showed that the latest observed Kaplan-Meier estimate differed from the long-term modelled estimate by less than 1 percentage point. Hence, the latest Kaplan-Meier estimate can be taken as an approximate estimate of the overall rate.

The Kaplan-Meier estimates require that classifying variables be known for the population. Hence, they can be calculated for participation classified by age, sex and state. However, they cannot be used for participation classified by Aboriginal and Torres Strait Islander status, language group, or disability status, which are not known for all the invited population. These variables are only known for those participants who identify themselves as a member of these groups on their returned Participant Details form. Therefore, the Kaplan-Meier estimates cannot be applied.

Aboriginal and Torres Strait Islander status, language group status and disability status will be known for all people completing FOBT kits (at least to the extent that people self-identify as members of these groups). Hence, in principle, Kaplan-Meier estimates can be calculated for these groups for participation at subsequent points on the screening pathway. In practice, these calculations depend on sufficient numbers of people identifying as group members to allow the calculation of reliable estimates.

Small counts

The following small cell size rules were applied in this report.

In all tables, numerators of 1 and 2 as well as their rates were suppressed. Rates based on denominators less than 100 (regardless of numerator) were also suppressed. Suppressed values are marked with n.p.

Additionally, rates based on numerators fewer than 20 or denominators fewer than 300 were given confidence intervals or footnotes to ensure they are interpreted with caution.

Jurisdictional bowel cancer incidence data

Further to the above small cell size rules, tables specifically showing bowel cancer incidence by state and territory had numbers fewer than 5 (and rates based on these) suppressed, with the exception of Australian Capital Territory and Northern Territory incidence data, where counts (and rates based on) fewer than 10 cases were suppressed.

Glossary

age standardisation: A method of removing the influence of age when comparing populations with different age structures. This is usually necessary because the rates of many diseases vary strongly (usually increasing) with age. The age structures of the different populations are converted to the same 'standard' structure, then the disease rates that would have occurred with that structure are calculated and compared (AIHW 2010a).

asymptomatic: Without symptoms.

benign: Not malignant.

bowel cancer: Comprises cancer of the colon and cancer of the rectum, collectively known as colorectal cancer.

cancer death: A death where the underlying cause of death is indicated as cancer. Persons with cancer who die of other causes are not counted in the mortality statistics in this publication.

cancer (malignant neoplasm): A large range of diseases whose common feature is that some of the body's cells become defective, begin to multiply out of control, can invade and damage the area around them, and can also spread to other parts of the body to cause further damage (AIHW 2010a).

confidence interval: A range determined by variability in data, within which there is a specified (usually 95%) chance that the true value of a calculated parameter lies.

colonoscopy: Procedure to examine the bowel using a special scope (colonoscope) usually carried out in a hospital or day clinic.

colonoscopy follow-up rate: The proportion of people with a positive FOBT who subsequently had a colonoscopy.

CT colonography: A procedure that produces computed tomography (CT) pictures of the bowel by X-raying from many different angles.

double contrast barium enema: A type of bowel X-ray in which barium sulphate and air are added into the bowel to assist in detecting abnormal growths.

eligible population: For this report monitoring people invited in Phase 2, Australians living in Australia who turned 50, 55 and 65 between 1 January 2008 and 31 December 2010, even if they had opted off or suspended their participation in the Program.

epithelium: The tissue lining the outer layer of the body, the digestive tract, and other hollow organs and structures.

false negative: A screening test result that incorrectly indicates a person does not have a marker for condition being tested when they do have the condition. Not all screening tests are completely accurate, so false positive results cannot be discounted. Further, with an FOBT test for bowel cancer, if a polyp, adenoma or cancer is not bleeding at the time of the test, it may be missed by the screening test.

false positive: A screening test result that incorrectly indicates a person has the condition being tested when they do not have the condition. As FOBT tests detect blood in stool (which may be caused by a number of conditions), a false positive finding regarding bowel cancer may still detect other non-bowel cancer conditions, or pre-cancerous polyps or adenomas.

FOBT: Immunochemical faecal occult blood test—a self-administered test to detect blood in stool (faeces), but not bowel cancer itself. The FOBT is analysed by a pathology laboratory, and results forwarded to the Register, participant and PHCP (if nominated). Pathologists categorise the returned FOBT into one of three groups:

1. correctly completed
2. incorrectly completed
3. unsatisfactory.

Participants are provided with specific instructions on how to complete the FOBT. Any tests not completed according to these instructions are classified as incorrectly completed. Unsatisfactory tests refer to those tests that could not be processed due to a problem with the kit (for example, an expired kit, kit samples that have been taken more than 2 weeks apart, or a kit that has taken more than 1 month in transit to arrive). Participants with FOBTs that are not correctly completed are requested to complete another FOBT. See Appendix B for details of the participant screening pathway.

FOBT result: FOBT results are classified by pathologists as either:

1. positive (blood is detected in at least one of two samples)
2. negative (blood is not detected)
3. inconclusive (the participant is asked to complete another kit).

histopathology: The microscopic study of the structure and composition of tissues and associated disease.

incidence: The number of new cases (of an illness or event, and so on) occurring during a given period. Compare with prevalence (AIHW 2010a).

Indigenous: A person of Aboriginal and/or Torres Strait Islander descent who identifies as Aboriginal and/or Torres Strait Islander and is accepted as such by the community with which he or she is associated (AIHW 2010a).

invitee: A person who has been invited to participate in the National Bowel Cancer Screening Program.

lymph node: Mass of lymphatic tissue, often bean-shaped, that produces adaptive immune system cells and through which lymph filters. These nodes are located throughout the body.

malignant: Abnormal changes consistent with cancer.

metastasis: The process by which cancerous cells are transferred from one part of the body to another to form a secondary cancer, for example, via the lymphatic system or the bloodstream.

mortality: Death. For this publication specifically, see *Cancer death*.

neoplasm: An abnormal ('neo', new) growth of tissue. Can be benign (not a cancer) or malignant (a cancer). Same as tumour (AIHW 2010a).

opt off: Invitees who do not wish to participate in the National Bowel Cancer Screening Program now or in the future may opt off the Program. Invitees will not be contacted again. Invitees may elect to opt back on at a later date.

participant: A person who has agreed to participate in the National Bowel Cancer Screening Program by returning a completed FOBT kit and Participant Details form.

positive predictive value: Proportion of people with a positive FOBT screen who have adenomas or cancer detected at colonoscopy and confirmed by histopathology.

positivity rate: Number of positive FOBT results as a percentage of the total number of valid FOBT results.

prevalence: The number or proportion (of cases, instances, and so forth) in a population at a given time. Compare with incidence (AIHW 2010a).

primary health care practitioner: Classified by DoHS as a general practitioner or other primary health care provider. This may include remote health clinics or specialists providing general practitioner services.

primary health care practitioner follow-up rate: The proportion of people who were sent a positive FOBT result and who subsequently visit a primary health care practitioner.

prognosis: The likely outcome of an illness.

Program: The National Bowel Cancer Screening Program.

radiation therapy: The treatment of disease with any type of radiation, most commonly with ionising radiation, such as X-rays, beta rays and gamma rays.

Register: National Bowel Cancer Screening Program Register maintained by DoHS.

screening: Repeated testing, at regular intervals, of apparently well people to detect a medical condition at an earlier stage than would otherwise be the case. Screening tests are not diagnostic (for example, see *false positive*, *false negative* and *positive predictive value*); therefore, people who receive a positive screening result require further assessment and diagnosis to determine whether or not they have the disease or risk marker being screening for.

sigmoidoscopy: Inspection of last portion of the bowel through either a rigid or flexible hollow tube.

significant difference: Where rates are referred to as significantly different, or one rate is deemed significantly higher or lower than another, these differences are statistically significant. Rates are deemed statistically significantly different when their confidence intervals do not overlap, since their difference is greater than what could be explained by chance. See 'Confidence intervals' in Appendix D for more information.

socioeconomic status: See Appendix C for details.

suspend: Invitees who would like to participate in the National Bowel Cancer Screening Program but are unable to do so at this time. Invitees will be contacted once the nominated suspension period has elapsed.

target population: For the NBCSP, Australians turning 55 or 65 between 1 May 2006 and 30 June 2008 (Phase 1), or Australians turning 50, 55 or 65 between 1 January 2008 and 31 December 2010 (Phase 2).

tumour: See *neoplasm*.

underlying cause of death: The condition, disease or injury initiating the sequence of events leading directly to death, that is, the primary, or main cause (AIHW 2010a).

valid results: Only FOBT results that are either positive or negative are classified as valid results. Inconclusive results are excluded.

References

ABS (Australian Bureau of Statistics) 2006. Causes of death, Australia, 2004. Cat. no. 3303.0 Canberra: ABS.

ABS 2009. Experimental estimates and projections, Aboriginal and Torres Strait Islander Australians, 1991 to 2021. ABS Cat. No. 3238.0. Canberra: ABS.

ACN (Australian Cancer Network) Colorectal Cancer Guidelines Revision Committee 2005. Clinical practice guidelines for the prevention, early detection and management of colorectal cancer. Sydney: Cancer Council Australia and Australian Cancer Network.

Ahnen DJ & Macrae FA 2008. Approach to the patient with colonic polyps. Waltham: UpToDate Inc. Viewed 10 April 2009, <www.uptodate.com/contents/approach-to-the-patient-with-colonic-polyps >.

AHTAC (Australian Health Technology Advisory Committee) 1997. Colorectal cancer screening. Canberra: Publications Production Unit, Department of Health and Family Services.

AIHW (Australian Institute of Health and Welfare) 2009. National Bowel Cancer Screening Program: annual monitoring report 2009. Cat. no. CAN 45. Canberra: AIHW

AIHW 2010a. Australia's health 2010. Australia's health no. 12. Cat. no. AUS 122. Canberra: AIHW.

AIHW 2010b. National Bowel Cancer Screening Program: annual monitoring report 2009 data supplement 2010. Cat. no. CAN 53. Canberra: AIHW.

AIHW 2011. Mandatory folic acid and iodine fortification in Australia and New Zealand: baseline report for monitoring. Cat. no. PHE 139. Canberra: AIHW.

AIHW & AACR (Australasian Association of Cancer Registries) 2010. Cancer in Australia: an overview, 2010. Cancer series no. 60. Cat. no. CAN 56. Canberra: AIHW.

Ananda SS, McLaughlin SJ, Chen F, Hayes IP, Hunter AA, Skinner IJ, Steel MCA, Jones IT, Hastie IA, Rieger NA, Shedda S, Compston DJ & Gibbs P 2009. Initial impact of Australia's National Bowel Cancer Screening Program. Medical Journal of Australia 191(7):378-381.

APHDPCSS (Australian Population Health Development Principal Committee Screening Subcommittee) 2008. Population based screening framework. Canberra: Commonwealth of Australia.

Cappell MS 2005. The pathophysiology, clinical presentation, and diagnosis of colon cancer and adenomatous polyps. Medical Clinics of North America 89(1):1-42.

Christou A, Katzenellenbogen J & Thompson S 2010. Australia's National Bowel Cancer Screening Program: does it work for Indigenous Australians? BMC Public Health 10(1):373.

Ciatto S, Martinelli F, Castiglione G, Mantellini P, Rubeca T, Grazzini G, Bonanomi AG, Confortini M & Zappa M 2007. Association of FOBT-assessed faecal Hb content with colonic lesions detected in the Florence screening programme. British Journal of Cancer 96(2):218–221.

Cole SR, Smith A, Wilson C, Turnbull D, Esterman A & Young GP 2007. An advance notification letter increases participation in colorectal cancer screening. Journal of Medical Screening 14(2):73–75.

Cole SR, Young GP, Tucker G, Lane J, Byrne S 2011. Cancer downstaging as a consequence of the Australian National Bowel Cancer Screening Program. Submitted for publication.

DoHA (Department of Health and Ageing) 2005. The Australian Bowel Cancer Screening Pilot Program and beyond: final evaluation report. Screening monograph no. 6/2005. Canberra: DoHA.

DoHA 2008. Bowel Cancer Screening Program: screening with a faecal occult blood test (FOBT). Canberra: DoHA. Viewed 29 April 2009, <www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/fobt>.

DoHA (Department of Health and Ageing) & AIHW 2008. National Bowel Cancer Screening Program monitoring report 2008. Cancer series no. 40. Cat. no. CAN 40. Canberra: AIHW.

Dobson AJ, Kuulasmaa K, Eberle E & Scherer J 1991. Confidence intervals for weighted sums of Poisson parameters. Statistics in Medicine 10:457–62.

Grazzini G, Ventura L, Zappa M, Ciatto S, Confortini M, Rapi S, Rubeca T, Visioli CB & Halloran SP 2010. Influence of seasonal variations in ambient temperatures on performance of immunochemical faecal occult blood test for colorectal cancer screening: observational study from the Florence district. Gut 59(11):1511-1515.

Gregory T, Wilson C, Duncan A, Turnbull D, Cole S & Young G 2011. Demographic, social cognitive and social ecological predictors of intention and participation in screening for colorectal cancer. BMC Public Health 11(1):38.

Herrmann W & Obeid R. 2011. The mandatory fortification of staple foods with folic acid: a current controversy in Germany. Deutsches Aerzteblatt international 108(15):249-54.

Hirsch S, Sanchez H, Albala C, de la Maza MP, Barrera G, Leiva L & Bunout D. 2009, Colon cancer in Chile before and after the start of the flour fortification program with folic acid. European Journal of Gastroenterology & Hepatology 21(4):436-439.

Jemal A, Bray F, Center MM, Ferlay J, Ward E & Forman D 2011. Global Cancer statistics, 2008. CA: A Cancer Journal for Clinicians 61:69–90.

Kim YI. 2004. Will mandatory folic acid fortification prevent or promote cancer? American Journal of Clinical Nutrition 80(5):1123-1128.

Mason JB, Dickstein A, Jacques PF, Haggarty P, Selhub J, Dallal G, Rosenberg IH. 2007. A temporal association between folic acid fortification and an increase in colorectal cancer rates may be illuminating important biological principles: a hypothesis. Cancer Epidemiology. Biomarkers & Prevention 16(7):1325-1329.

Morris M, Lacopetta B & Platell C 2007. Comparing survival outcomes for patients with colorectal cancer treated in public and private hospitals. Medical Journal of Australia 186(6):296–300.

NBCSP–QWG (National Bowel Cancer Screening Program–Quality Working Group) 2008. Proposals from the Quality Working Group for the National Bowel Cancer Screening Program draft report. Canberra: DoHA. Viewed 1 April 2009, <http://www.health.gov.au/internet/screening/publishing.nsf/Content/D64721320298052FCA2574EB007F7524/$File/draft-qwg.pdf>.

O'Connell JB, Maggard MA & Ko CY 2004. Colon cancer survival rates with the new American joint committee on cancer sixth edition staging. Journal of the National Cancer Institute 96(19):1420–1425.

Paddison JS & Yip MJ 2010. Exploratory study examining barriers to participation in colorectal cancer screening. Australian Journal of Rural Health 18(1):11-15.

Severino G, Wilson C, Turnbull D, Duncan A & Gregory T 2009. Attitudes towards and beliefs about colorectal cancer and screening using the faecal occult blood test within the Italian-Australian community. Asian Pacific Journal of Cancer Prevention 10(3):387-394.

Stryker SJ, Wolff BG, Culp CE, Libbe SD, Ilstrup DM & MacCarty RL 1987. Natural history of untreated colonic polyps. Gastroenterology 93(5):1009–1013.

van Rossum LG, van Rijn AF, van Oijen MG, Fockens P, Laheij RJ, Verbeek AL, Jansen JB & Dekker E 2009. False negative fecal occult blood tests due to delayed sample return in colorectal cancer screening. International Journal of Cancer 125(4):746–750.

WCRF/AICR (World Cancer Research Fund/American Institute for Cancer Research) 2011. Continuous Update Project Interim Report Summary. Food, Nutrition, Physical Activity, and the Prevention of Colorectal Cancer. Viewed 15 August 2011, <http://www.wcrf.org/PDFs/Colorectal-cancer-report-summary-2011.pdf>

Weber M, Banks E, Smith D, O'Connell D & Sitas F 2009. Cancer screening among migrants in an Australian cohort; cross-sectional analyses from the 45 and Up Study. BMC Public Health 9(1):144.

Weitz J, Koch M, Debus J, Hohler T, Galle PR & Buchler MW 2005. Colorectal cancer. Lancet 365:153-165.

Winawer SJ, Fletcher RH, Miller L, Godlee F, Stolar MH, Mulrow CD, Woolf SH, Glick SN, Ganiats TG, Bond JH, Rosen L, Zapka JG, Olsen SJ, Giardiello FM, Sisk JE, Van Antwerp R, Brown-Davis C, Marciniak DA & Mayer RJ 1997. Colorectal cancer screening: clinical guidelines and rationale. Gastroenterology 112(2):594-642.

Winawer SJ, Zauber AG, Ho MN, O'Brien MJ, Gottlieb LS, Sternberg SS, Waye JD, Schapiro M, Bond JH, Panish JF, Ackroyd F, Shike M, Kurtz RC, Hornsby-Lewis L, Gerdes H, Stewart ET, et al. 1993. Prevention of colorectal cancer by colonoscopic polypectomy. The National Polyp Study Workgroup. New England Journal of Medicine 329(27):1977-1981.

Wolin KY, Yan Y & Colditz GA 2011. Physical activity and risk of colon adenoma: a meta-analysis. British Journal of Cancer 104(5):882-885.

List of tables

List of figures

Related publications

This report, *National Bowel Cancer Screening Program Monitoring report: Phase 2, July 2008–June 2011*, is part of a series. Earlier editions and any published subsequently can be downloaded for free from the AIHW website <www.aihw.gov.au/publications>. The website also includes information on ordering printed copies.

For those requiring further detail, additional Internet-only data tables are available at the AIHW *National Bowel Cancer Screening Program Monitoring report: Phase 2, July 2008–June 2011 Supplementary tables* webpage. This can also be downloaded for free from the AIHW website <www.aihw.gov.au/publications>.

The following AIHW publications relating to cancer and cancer screening may also be of interest:

- AIHW 2011. Cervical screening in Australia 2008–2009. Cancer series no. 61. Cat. no. CAN 57. Canberra: AIHW.
- AIHW 2011. BreastScreen Australia monitoring report 2008–2009. Cancer series no. 63. Cat. no. CAN 60. Canberra: AIHW.
- AIHW & AACR (Australasian Association of Cancer Registries) 2010. Cancer in Australia: an overview, 2010. Cancer series no. 60. Cat. no. CAN 56. Canberra: AIHW.