

## Are Australian general practice patients appropriately screened for colorectal cancer? A cross-sectional study

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### RESEARCH

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### ABSTRACT

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#### Background

Australia has one of the highest rates of colorectal cancer (CRC) in the world. Data from the National Bowel Cancer Screening Program (NBCSP) suggests that only one third of Australians eligible for CRC screening are up-to-date with CRC screening; however screening occurring outside the program is not captured.

#### Aims

This study examines the self-reported CRC screening practices of general practice patients, and the factors associated with being under-screened for CRC.

#### Methods

A cross-sectional study conducted in five general practice clinics in NSW from 2015-2017. Participants were aged 50–

75 and at average risk of CRC. Participants reported whether they had a faecal occult blood test (FOBT) in the past two years, including the source of FOBT; and whether they had a colonoscopy in the past five years and the reason for colonoscopy.

#### Results

Forty-nine per cent of participants completed a FOBT in the past two years. Of these, 62 per cent sourced their FOBT from the NBCSP and 25 per cent from their general practitioner. Thirty-seven per cent of participants reported colonoscopy in the past five years. Of these, 29 per cent received potentially inappropriate colonoscopy. Thirty-two per cent of the samples were classified as under-screened. Older adults were less likely to be under-screened.

#### Conclusion

CRC screening rates were higher than those reported by the NBCSP, however a significant proportion of participants remain under-screened. Over one-quarter of participants reporting colonoscopy in the past five years may have undergone unnecessary colonoscopy. These findings indicate that more needs to be done at a general practice level to facilitate risk-appropriate CRC screening.

#### Key Words

Colorectal cancer, screening, general practice

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#### What this study adds:

##### 1. What is known about this subject?

CRC is a leading cause of cancer mortality in Australia. CRC screening improves health outcomes. Reported CRC screening rates in Australia (37 per cent) are suboptimal.

##### 2. What new information is offered in this study?

Thirty-two per cent of general practice patients in the sample were under-screened. Of those receiving

colonoscopy in the past five years, 29 per cent were potentially over-screened.

### 3. What are the implications for research, policy, or practice?

Under- and over-screening for CRC is an issue requiring urgent attention. Interventions to support general practitioners in promoting appropriate CRC screening are required.

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## Background

### The problem

Australia has one of the highest rates of colorectal cancer (CRC) in the world.<sup>1</sup> CRC is the second leading cause of cancer death in Australia, with incidence predicted to increase in the coming years.<sup>2</sup> Early detection of CRC increases survival dramatically. Those diagnosed and treated at the earliest stage have a five-year survival rate of 90 per cent<sup>3</sup>, while those detected in the later stages have a five-year survival rate of 5 per cent.<sup>3</sup>

### Australian screening guidelines

The Australian National Health and Medical Research Council (NHMRC) guidelines recommend biennial faecal occult blood test (FOBT) for those aged 50 and over at 'average or slightly above average risk of CRC' (herein after referred to as average risk).<sup>4</sup> Those at average risk have no personal history of CRC, and, either no close relatives with CRC or one first-degree or second-degree relative diagnosed with CRC at age 55 or older.<sup>4</sup> The majority of Australians (98 per cent) are considered to be at average risk.<sup>5</sup> Colonoscopy is only recommended in limited circumstances for people at average risk, such as for those presenting with symptoms, or as a surveillance test following adenoma removal.<sup>6</sup>

Australia has had a population-based CRC screening program since 2006.<sup>7</sup> The program has been rolled out in phases with full roll-out expected by 2019.<sup>7</sup> The National Bowel Cancer Screening Program (NBCSP) mails individuals aged 50-74 an invitation to participate in the program and an immunochemical FOBT (iFOBT) with instructions. Completed tests are sent to a central processing laboratory.<sup>8</sup> Uptake rates in the program have plateaued at 37 per cent.<sup>7</sup>

No single data source exists that reports all CRC screening occurring in the Australian population. The uptake rate of 37 per cent refers only to those who complete a kit in response to an invitation from the NBCSP. Therefore this figure is likely to under-estimate screening uptake in the community. FOBTs may be obtained from a variety of

sources outside of the NBCSP, including general practitioners (GPs), pharmacies and community organisations such as Rotary. Further, those for whom FOBT is unsuitable, such as those with a diagnosis of CRC, or those at greater than average risk of CRC are included in the denominator used to calculate uptake in response to a NBCSP invitation.<sup>7</sup>

### Why examine screening in general practice?

The Royal Australian College of General Practitioners' guidelines recommend that GPs facilitate delivery of preventive care, including CRC screening.<sup>9</sup> GPs are well placed to provide screening advice given that they routinely see a high proportion of those in the target age range for CRC screening. On average, those aged 50 years and over see their GP 6.5 times per year, and those aged 65 years and over see their GP 10 or more times a year.<sup>10</sup> Therefore, we can be confident that general practice patients are representative of the target population for CRC screening. Furthermore, patients expect GPs to provide them with information about preventive care.<sup>11</sup> Given GPs' identified role in CRC screening, it may be expected that a large proportion of general practice patients would be up-to-date with screening.

### What have previous studies found?

Previous Australian studies have assessed self-reported CRC screening participation rates in general practice and community settings. Data collected on CRC screening practices of 532 participants at average risk of CRC and aged 50 years and over from the Australasian Colorectal Cancer Family Register in 1999-2001 showed that only 0.75 per cent of this sub-sample screened in accordance with NHMRC guidelines.<sup>12</sup> More recently, Courtney et al.'s<sup>13</sup> community-based study reported that 20 per cent of average risk individuals aged 56-88 had undergone FOBT in the past two years (data from 2009); while another community study reported that 21 per cent of participants aged 50-74 years across all risk categories had undergone FOBT in the past three years (data from 2010).<sup>14</sup> A study of 5671 general practice patients aged 50 and older (data from 2010/11) found that 40 per cent<sup>15</sup> of participants reported that they had completed FOBT in the past three years. Given the increased attention on CRC screening in recent years as well as the continued roll out of the NBCSP, it is timely to assess current uptake rates of FOBT in the primary care setting.

Individuals who do not participate in CRC screening in accordance with guidelines may be under- or over-screened. Under-screening occurs when an individual

participates less often than recommended; over-screening is when screening occurs more frequently than recommended, or the screening test used is more intensive than recommended. For example, colonoscopy in the absence of heightened familial risk or clinical indicators such as symptoms or positive FOBT.<sup>5</sup> Courtney et al. found 14 per cent of those at average risk and asymptomatic had a colonoscopy in the past five years.<sup>13</sup> Zajac et al., found that 33 per cent of participants (no risk category defined) had completed colonoscopy within the past five years.<sup>14</sup> Exploring the reasons for colonoscopy referral will provide insight into potential rates of over-screening.

Demographic factors such as lower education level and younger age are associated with CRC under-screening.<sup>14,15</sup> Further exploration of the factors which are associated with CRC under-screening can assist in identifying the sub-groups of individuals where additional education and encouragement to screen may be required. International research has found higher levels of CRC knowledge relate to higher CRC screening rates.<sup>16-18</sup> The extent that CRC knowledge impacts CRC screening participation has not been examined in Australia. It may be expected that the increased public awareness and mass media campaigns focused on CRC screening in recent years have improved public knowledge, subsequently impacting on screening rates.

The purpose of the current study was to examine, among Australian general practice patients aged 50–75 and at average risk of colorectal cancer (CRC), the proportion of patients who report:

- 1) Completing a FOBT within the past two years and the source of their most recent FOBT;
- 2) Undergoing colonoscopy within the past five years and the reasons for undergoing this test; and
- 3) The extent to which patient sociodemographic characteristics and CRC knowledge are associated with undergoing neither FOBT within the past two years nor colonoscopy within the past five years.

## Method

### Study design

Cross-sectional survey conducted with general practice patients attending five general practice clinics in New South Wales, Australia. This study was conducted as part of a larger study examining knowledge and experiences in relation to CRC screening among general practice patients aged at least 18 years.

### Recruitment methods

**Practices:** A convenience sample of general practice clinics

was recruited. To ensure adequate throughput, eligible practices were required to have at least two full-time equivalent GPs. General practice managers were sent an invitation and information statement via email. Non-responding practices were followed up by telephone. Five of eight invited practices agreed to participate and provided informed written consent.

**Participants:** Consecutive eligible patients presenting for an appointment with their GP were invited by a research assistant to participate in the larger study. Patients were eligible for the larger study if they were: 1) aged between 18 and 85; 2) English speaking; 3) able to complete a touchscreen survey; and 4) provided written informed consent. Patients were ineligible if they were too unwell. The gender and age group of non-consenters was recorded.

Participants meeting the following criteria were asked to complete the questions on CRC screening which are the focuses of this study: 1) aged 50–75; 2) with no personal history of CRC or inflammatory bowel disease; 3) at average risk of CRC. Three survey questions determined average risk as defined by NHMRC criteria<sup>4</sup>: 1) Have any of your first-degree relatives been diagnosed with bowel cancer before age 55? (yes/no); 2) Have two or more of your first-degree relatives been diagnosed with bowel cancer at any age? These may be from either side of the family (yes/no); 3) Have one of your first-degree relatives and one of your second-degree relatives on the same side of the family been diagnosed with bowel cancer at any age? (yes/no). First degree relatives were described as mother, father, brother, sister, child. Second-degree relatives were described as grandparent, aunt, uncle, nephew, niece or half-sibling. Those responding 'no' to these questions were considered to be at average risk of CRC.

### Measures

**Previous FOBT:** Participants were asked to report when they undertook their most recent FOBT. Response options included: never had an FOBT; in the last year; 1–2 years ago; 2–3 years ago, 4–5 years ago; more than 5 years ago; not sure.

**Source of most recent FOBT:** Participants who reported having an FOBT in the past two years were asked where they had obtained their most recent FOBT from: I received it in the mail from the National Bowel Cancer Screening Program; Rotary Bowelscan; my GP gave it to me; other – please specify.

**Previous Colonoscopy:** Participants were asked to report

their most recent colonoscopy: never had a colonoscopy; in the past five years; more than five years ago; not sure. Those that reported they had a colonoscopy in the past five years were asked: “why were you referred for a colonoscopy?” Participants could select multiple options from the following: I have a family history of bowel cancer; I had symptoms suggestive of bowel cancer; I had a positive FOBT result; I had an abnormal x-ray or CT scan; I have previously had colorectal adenomas/polyps; other – please specify.

**Explanatory variables:** *Sociodemographic items:* Age, gender, marital status, highest level of education, employment status, private health insurance coverage, health care concession card holder status were self-reported.

*Knowledge items:* CRC knowledge was assessed by five multiple choice questions. The questions were prefaced with: “The following questions use the term people at 'average risk' of bowel cancer. People at 'average risk' of bowel cancer will not have a personal history of cancer, and no strong history of bowel cancer in their family”. Questions or responses regarding CRC screening tests included a description of each test in lay terms. Participants could select one response for each of the following questions: 1) “at what age do you think people at average risk of bowel cancer should start screening?” (40; 50; 60; 70; I don't know); 2) “what do you think is the recommended screening test for people at 'average risk' of bowel cancer?” (sigmoidoscopy; faecal occult blood test (FOBT); colonoscopy; I have not heard of these screening tests; I don't know); 3) “how often do you think a person at 'average risk' of bowel cancer should have a faecal occult blood test (FOBT)?” (once only, every year; every two years; every five years; every ten years); 4) “a positive faecal occult blood test (FOBT) result means” (that a person has cancer; that a person does not have cancer; that traces of blood have been found in their faeces (poo); I don't know); 5) “the following may or may not increase a person's chance of developing bowel cancer. Please select all the option/s you might think increase risk of developing bowel cancer” (smoking; being over 50 years of age; being overweight; not eating enough fibre; drinking alcohol regularly; I don't know). For questions 1–4, one point was awarded for each correct response. For question five, one point was awarded for every risk factor selected (maximum of five points). The total maximum score possible was nine.

#### Data collection and analysis

Data were collected from December 2015–March 2017.

Consenting participants completed a touch screen survey in the practice waiting room prior to their appointment. The survey was administered using QuON survey software.<sup>19</sup> Participants who were called in to their appointment prior to completing survey were logged out and were able to log in again after their appointment by using their unique identification code to complete the survey.

The gender and age group of consenting and non-consenting patients were compared using chi-squared tests.

Descriptive statistics including frequencies and percentages were calculated for each sociodemographic variable of interest. Individual knowledge scores were summed and expressed as a total score out of nine. Proportions were calculated (with 95 per cent confidence intervals) of those reporting screening with: 1) FOBT within the last two years, and the source of their FOBT kit, and 2) colonoscopy within the last five years, and the reason for this colonoscopy. Participants reporting neither FOBT in the past two years nor colonoscopy in the past five years were classified as under-screened.

Multivariable logistic regression analyses were performed to determine whether age, gender, marital status, highest level of education, employment status, private health insurance coverage, health care concession card holder, and knowledge scores were independent predictors of under-screening. Missing data were handled using multiple imputation. All analysis variables were used as predictor variables in the imputation models and 18 imputed datasets were created. The multivariable logistic regression models were estimated on each of the imputed datasets, and regression coefficients pooled using Rubin's method. Pooled odds ratios, 95 per cent confidence intervals and Wald based p-values are presented. All analyses were conducted using Stata IC 11.3 (Statacorp, College Station, TX). p-values of <0.05 were considered significant.

#### Results

A total of 727 participants were assessed for eligibility, of whom 510 were eligible for the larger study (70 per cent eligible). Of the eligible participants, 411 consented to participate (81 per cent consent rate). There was no significant difference in gender between the consenters and non-consenters ( $\chi^2(1) = 1.29, p = 2.54$ ). There were fewer consenters in the 55–64 year group and more consenters in the over 74 year group ( $\chi^2(5) = 12.36, p = 0.03$ ). A further 221 of the consenting participants were excluded from the current study for the following reasons: 1) did not commence the survey (n=4); 2) were aged <50 or >75

(n=159); had a diagnosis of CRC of inflammatory bowel disease (n=19); were at greater than average risk of CRC (n=39). One-hundred and ninety participants commenced the survey, of these 179 responded to both the FOBT and colonoscopy questions and were included in the analyses. The demographic characteristics and knowledge scores of the sample are reported in Table 1.

#### **The proportion who report being screened with FOBT within the past two years**

87 (49 per cent; 95 per cent CI 41–56 per cent) participants reported completing an FOBT in the past two years. Of the remaining 92 participants, 44 (25 per cent; 95 per cent CI 18–32 per cent) had never completed a FOBT, 47 (26 per cent; 95 per cent CI 20–33 per cent) had completed a FOBT >2 years ago, 1 could not recall (0.5 per cent; 95 per cent CI 0.01–3 per cent).

#### **Source of most recent FOBT**

The majority of the 87 participants that completed FOBT in the past two years reported sourcing their FOBT from the NBCSP, n=54 (62 per cent; 95 per cent CI 51–72 per cent). A further 22 (25 per cent; 95 per cent CI 16–36 per cent) reported receiving their most recent FOBT from the GP. The remaining participants reported sourcing their FOBT from Rotary Bowelscan, n=5 (6 per cent; 95 per cent CI 2–13 per cent) and other sources n=6 (6 per cent; 95 per cent CI 2–13 per cent)(pathology n=2; pharmacy n=1; specialist n=2; research project n=1; unknown n=1).

#### **Colonoscopy use within the past 5 years**

66 (37 per cent; 95 per cent CI 30–44 per cent) participants reported colonoscopy in the past five years. All of these participants provided the reason they were referred for colonoscopy (see Table 2). 19 (29 per cent; 95 per cent CI 17–40 per cent) cited family history of CRC or routine screening as reasons for colonoscopy referral, indicating potential over-screening. However, one of these participants selected both symptoms suggestive of CRC and routine screening, so may possibly have been appropriately screened.

#### **Variables associated with undergoing neither FOBT within the past two years nor colonoscopy within the past five years (Table 3).**

58 (32 per cent; 95 per cent CI 26–40 per cent) participants were classified as under-screened (i.e., reported neither screening with FOBT in the past two years nor colonoscopy in the past five years). For every year increase in age there

was an 8 per cent decrease in the odds of being under-screened ( $p=0.008$ ).

## **Discussion**

Nearly half of participants reported FOBT completion in the past two years (n=88, 49 per cent). This is substantially more than the 37 per cent FOBT completion rate reported by the NBCSP monitoring report<sup>7</sup> and previous Australian research investigating self-reported FOBT completion in general practice (40 per cent).<sup>15</sup> However, the latter study reported data which was collected between 2010 and 2011. Since that time there has been an increased focus on media campaigns to promote CRC screening such as ‘a gift for living’,<sup>20</sup> ‘bowel cancer awareness month’<sup>21</sup> and ‘red apple day’<sup>22</sup> and the Cancer Council’s [bowelcancer.org.au](http://bowelcancer.org.au) awareness campaign.<sup>23</sup> It is likely that these campaigns have increased public awareness of CRC and the need for CRC screening. Close to one third of those reporting FOBT in the past two years sourced their FOBT kit from outside of the NBCSP, with most of these obtaining a kit from their GP. This highlights the important role of the GP in promoting and providing CRC screening.

Thirty-seven per cent of participants reported colonoscopy in the past five years, a higher rate than that reported in previous research.<sup>13,14</sup> This could be due to the high proportion of participants with private health insurance (66 per cent) which has been found to be a predictor of unnecessary colonoscopy in other Australian research<sup>12</sup> and the general trend of increasing colonoscopy use in Australia.<sup>24</sup> Close to 1/3 (29 per cent) of participants reporting colonoscopy in the past five years (i.e., 11 per cent of our total sample) indicated that they received a colonoscopy due to routine screening and family history. Given that the inclusion criteria for our study required that all participants were at average risk, it is likely that those reporting colonoscopy as a routine screening test or due to family history were over-screened. Our results indicate a similar rate of potential over-screening as Australian data which reported 13 per cent of people aged 50–75 were over-screened using colonoscopy.<sup>5</sup> Australian Medicare Benefits Schedule data indicates that in the ten years from 2000/2001–2009/2010 the overall number of colonoscopies performed in Australia increased by 84 per cent.<sup>24</sup> We cannot determine appropriateness of colonoscopy from these data, however it is reasonable to expect that some of this increase is due to unnecessary colonoscopy, a pattern evident in other regions including Europe and the United States.<sup>25</sup> Unnecessary colonoscopy exposes patients to potential clinical and economic burden.<sup>26,27</sup> Further, it reduces the capacity of the health care system to provide

timely care to those with a genuine need for colonoscopy.<sup>28</sup> A GP educational intervention in Italy resulted in a three-fold decrease ( $p < 0.001$ ) of inappropriate colonoscopy.<sup>29</sup> Similar interventions may have potential to reduce the prevalence of inappropriate colonoscopy in Australia.

Just under one third of the sample were under-screened for CRC, reporting neither FOBT in the past two years nor colonoscopy in the past five years. The regression model identified increasing age as being significantly associated with a decrease in the odds of under-screening. This is consistent with published research.<sup>16-18</sup> GP recommendation of CRC screening is a consistent predictor of positive screening behaviours.<sup>30,31</sup> Strategies to support GPs to recommend CRC screening such as reminders embedded in practice software have increased screening participation in several studies.<sup>32</sup> In addition, the Australian government is in the process of building a national cancer register from which the NBCSP will operate.<sup>33</sup> The register is expected to support clinical-decision making by GPs by allowing direct access to their patients' CRC screening participation within the NBCSP via practice management software,<sup>34</sup> a function that is currently not available to GPs. In addition to this it is anticipated that GPs will be able to order and record FOBT via the register and receive reminders for patients that are overdue for CRC screening.<sup>33</sup> Finally, newer types of faecal testing are becoming available in Australia (such as faecal DNA). There is potential that these could lead to increased screening participation as early evidence suggests they may be more acceptable to screeners than iFOBT.<sup>35</sup>

### Limitations

Self-reported screening may be affected by recall bias, however a recent meta-analysis found moderate agreement between self-reported and registered CRC screening.<sup>35</sup> Due to the brevity of familial history questions used to determine CRC risk category, it is possible that a small number of participants at average risk may have been classified as greater than average risk and vice-versa. We cannot determine the type of FOBT sourced outside of the NBCSP (i.e., guaiac or immunochemical), however the majority of pharmacies and pathology labs in Australia supply iFOBT.<sup>36</sup> These data were collected from a small number of general practices and therefore may not be generalizable to the broader population, however both rural and urban practices were represented in this study.

### Implications and future directions

High rates of FOBT participation in general practice suggest the potential to further capitalise on the GP's role in CRC screening. Future research should focus on interventions

that can be delivered in general practice to identify and target those overdue for CRC screening. This could include interventions such as tools to assess familial risk and screening status, point-of-care FOBT and GP endorsement of appropriate screening tests.

Our results suggest that there may be over-screening via colonoscopy among general practice patients. Strategies to support GPs to identify and manage those screening outside of guidelines may lead to decreases in unnecessary colonoscopy. Promotion of appropriate CRC guideline adherence amongst GPs may be facilitated by documents such as the National Prescribing Service MedicineWise initiative<sup>5</sup>, as well as educational interventions<sup>25,29</sup>.

Somewhat surprisingly, the odds of under-screening were not associated with CRC screening knowledge scores. This suggests that other factors besides knowledge may be stronger drivers for CRC screening. Future studies should explore whether other factors, such as attitudes towards screening, and personal experience with cancer among family or friends may be associated with screening.

### Conclusion

Screening rates reported in the NBCSP have plateaued at 37 per cent. Our study indicates that CRC screening rates in the general practice setting may be higher than this but there is still room for improvement. 25 per cent of those completing FOBT in the past two years sourced their FOBT from their GP, highlighting the important role GPs have in providing screening advice. In addition, a substantial proportion of general practice patients appear to have undergone unnecessary colonoscopy. GPs need to be better supported to deliver appropriate CRC screening to their patients.

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## PEER REVIEW

Not commissioned. Externally peer reviewed.

## CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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## ETHICS COMMITTEE APPROVAL

This study received ethics approval from the University of Newcastle Human Research Ethics Committee (H-2014-0198).



**Table 1: Demographic characteristics and knowledge scores (n=179)**

Characteristic	Category	n (%)
Age group	50-59	47 (26%)
	60-69	86 (48%)
	70-75	46 (26%)
Gender	Female	103 (58%)
	Male	76 (42%)
Marital status	Non-married (divorced/widowed/single)	53 (30%)
	Married (de-facto/living with partner)	123 (70%)
Education	Tertiary	54 (31%)
	Non-tertiary (high school or below/ trade/diploma/vocation)	122 (69%)
Employment	Employed (full-time and part-time)	54 (31%)
	Non-employed (carers, home duties, students, out of work)	16 (9%)
	Disability pension	14 (8%)
	Retired	92 (52%)
Private health insurance	Yes	96 (66%)
	No	50 (34%)
Healthcare concession card	Yes	88 (60%)
	No	58 (40%)
Knowledge scores	0	7 (4%)
	1	7 (4%)
	2	15 (8%)
	3	25 (14%)
	4	28 (16%)
	5	28 (16%)
	6	25 (14%)
	7	30 (17%)
	8	13 (7%)
9	1 (0.5%)	

nb: not all variables total 179 due to missing data.

**Table 2: Self-reported reasons for colonoscopy in the past five years (n=66 participants)**

Reason for colonoscopy	Proportion*
Previous polyps/adenoma	14 (21%)
Symptoms suggestive of CRC	17 (26%)
Other medical conditions	9 (14%)
Follow-up of positive FOBT	7 (11%)
Abnormal CT/X-ray	1 (2%)
Perceived strong family history of CRC	6 (9%)
Routine screening	13 (20%)
Can't remember	2 (3%)

\*Proportions sum to >100% due to some participants selecting more than one option

**Table 3: Multivariable logistic regression showing variables associated with under-screening (n=179)**

Variable	Sub-group	OR for being under-screened (95% CI)	p value
Age	N/A (continuous)	0.92 (0.87-0.98)	0.008
Gender	Female	-	0.63
	Male	0.84 (0.41-1.72)	
Marital status	Non-married (divorced/widowed/single)	-	0.80
	Married (de-facto/living with partner)	1.11 (0.50-2.45)	
Education	Tertiary	-	0.95
	Non-tertiary (high school or below/trade/diploma/vocation)	0.98 (0.45-2.12)	
Employment	Employed	-	0.65
	Unemployed (carers, home duties, students, out of work)	1.34 (0.38-4.72)	
	Disability	1.25 (0.31-5.00)	
	Retired	0.87 (0.34-2.2)	
Private Health	No	-	0.41
	Yes	0.70 (0.31-1.61)	
Health care card	No	-	0.55
	Yes	1.30 (0.55-3.07)	
Knowledge score	N/A (continuous)	0.87 (0.74-1.03)	0.10