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Title: Anticipated delay in help-seeking for cancer symptoms: findings from a nationwide study of Malaysian adults

Running title: Anticipated delayed help-seeking for cancer symptoms in Malaysia

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Abstract

Background: To investigate the relationship between anticipated delay in help-seeking and cancer symptom recognition and the extent to which this relationship varied according to socio-demographic and health-related characteristics.

Methods: A cross-sectional telephone survey was conducted of 1,895 adults aged ≥ 40 years who were randomly selected across Malaysia and interviewed using the validated Awareness and Beliefs about Cancer questionnaire. Logistic regression analysis was used to test the associations between anticipated delay for help seeking >2 weeks and socio-demographic and health-related variables.

Results: Delay in help-seeking was reported for persistent cough (19.3%), rectal bleeding (6.1%) and breast changes (2.5%). Difficulty in accessing a doctor was associated with delayed help-seeking for breast changes and rectal bleeding (adjusted ORs 7.58; 95% CI 1.98, 28.94 and 2.37; 95% CI 1.21, 4.66, respectively); not recognising symptoms as a cancer warning sign was associated with delayed help-seeking for rectal bleeding (adjusted OR 1.54; 95% CI 1.03, 2.31); and ethnicity was associated with anticipated delay for rectal bleeding and persistent cough.

Conclusions: Generally, anticipated delay to help seeking for cancer symptoms in Malaysia (a middle income country) appeared to be a less significant problem compared to other countries including high income countries. There appeared to be a significant association between social variation indicators in Malaysia and anticipated delay in help seeking.

Key words: anticipated delay, help-seeking, cancer, Malaysia, LMIC

Introduction

Early detection of cancer is of paramount importance to improve chances of survival [1,2]. In Malaysia, breast, colorectal and lung cancer are the most common cancers (ASR 34.1/100,000, 25.9/100,00 and 19.1/100,000 respectively) [3]. About 50% of breast cancer cases, over 70% of colorectal cancer cases and over 90% of lung cancer cases are diagnosed at stage 3 or 4; and contribute to increasing cancer mortality (9,466 in 2012 vs 11,966 in 2016) [3]. In addition, there were 5,257 non-medically certified cancer deaths in 2012 and 6,731 in 2016. The Ministry of Health recommends opportunistic screening for both breast and colorectal cancer for ≥ 50 year olds - there is no organised population-based cancer screening and screening of the asymptomatic at-risk population is minimal [4,5]. Limited population cancer screening statistics and studies suggest that 4% of the eligible population receive breast cancer screening [6] and $<1\%$ attend colorectal cancer screening [7]. At-risk populations need to be aware of common cancer symptoms, recognise their potential severity and seek medical help. Results from the few studies about the awareness of common cancer signs and symptoms in Malaysia are inconsistent. We have reported nation-wide awareness levels for the following cancer symptoms: ‘lump’ - 74.5%, rectal bleeding – 65.5% and ‘persistent cough’ – 55.4% [8] whereas other (albeit smaller) studies reported proportions ranging from 28% to 91% for awareness of lump as a breast cancer symptom [9–11] and between 34% and 72% for rectal bleeding as a colorectal cancer sign [12–14]. Awareness about lung cancer symptoms is largely unexplored [15]. Similarly, the association between specific cancer symptom awareness and socio-demographic factors and symptom awareness and the intention to seek help in Malaysia have been under investigated.

The time it takes to seek help is often referred to as ‘delayed help-seeking’ [16–18], although there is an argument for using terms such as ‘time to presentation’ or ‘prolonged help-seeking’ that have no negative connotation [19]. From here on, we use ‘delayed help-seeking’ to refer to the concept of prolonged time to seeking medical help after noticing a potential cancer symptom. Several qualitative studies describe psychosocial reasons for delayed help-seeking for breast cancer symptoms in Malaysia such as the negative influence of relatives, financial concerns, fatalistic beliefs about cancer and denial of the disease [20,21]. Nationwide, population-based research is sparse that investigates the association between socio-demographic variables and awareness of symptoms for different cancers in order to contribute to the identification at-risk groups for late presentation. Findings from the international benchmarking partnership survey suggested that people with better symptom awareness were 5-10% less likely to delay medical help-seeking [16]. The main objective of this research was to assess the association between breast, colorectal and lung cancer symptom recognition and anticipated delay in help-seeking in a nationwide population sample of Malaysian adults using an internationally validated measurement tool, the *Awareness and Beliefs about Cancer* (ABC) questionnaire [22]. Furthermore, we wanted to assess the relationship between symptom recognition and delay in help-seeking (for a key symptom related to breast, colorectal and lung cancer) with socio-demographic and health-related

characteristics. Symptom appraisal models or theories [23], principally the Model of Pathways to Treatment [24], was used to help conceptualise and plan the analysis. In brief, the study aimed to improve understanding about the factors that are associated with (i) cancer awareness among the Malaysian population and (ii) intention to seek help for given cancer symptoms.

Methods

A cross-sectional, nationwide telephone survey assessed cancer awareness and beliefs in line with the approach that has been used in the International Cancer Benchmarking Study; thereby enabling comparisons between Malaysia and higher income countries like UK and Canada [22,25]. The survey was conducted March-November 2014.

Study Setting and Population

The three main ethnic groups are Malays (69%), Chinese (23%) and Indians (7%) [26]. Participants were selected randomly to represent people living across Malaysia who met the inclusion criteria: able to understand and speak Melayu, Mandarin, Tamil or English, had a mobile phone number and were aged ≥ 40 years. Cancer incidence is increasing particularly for people aged 40 years and above (i.e. males ASR 35-39 y.: 1,454/100,000; 40-44 y.: 2,135/100,000 and females ASR 35-39 y.: 3,388/100,000; 40-44 y.: 5,089/100,000) [3].

Sampling

Mobile phone numbers were purchased by the research team from a company providing telephone numbers for research purposes. In total, 150,000 phone numbers were generated randomly taking into account operator prefixes. A sample of 55,000 phone numbers were retained after inactive numbers were removed, of which 10,000 numbers were randomly selected for the first calls. Two thousand of those numbers were allocated to each of five calling stations. It was not practicable to assess the eligibility of every holder of a phone number. Trained research assistants called 8,406 active phone numbers of which 4,913 phone calls were answered, 3,254 numbers belonged to people who met the inclusion criteria and 1,895/3,254 (58%) participants agreed to participate.

Measurement tool

The ABC questionnaire tool was previously validated and culturally adapted (i.e. through contextual translation and cognitive interviews to check respondents understanding) used to assess awareness and

beliefs about 11 different cancer symptoms. This study focused on awareness about three out of the 11 cancer symptoms, i.e. 'persistent cough or hoarseness', 'unexplained bleeding' and 'unexplained lump or swelling' [22] as indicators of the three most prevalent cancers in Malaysia (lung, colorectal and breast cancer). Participants were asked *'I'm now going to list some symptoms that may or may not be warning signs for cancer. For each one, can you tell me whether you think that it could be a warning sign for cancer?'* Participants were asked how long it would take them to go to a doctor from the first time they noticed a persistent cough, rectal bleeding or breast changes (as a way of assessing delay). The cancer awareness-assessed symptoms (i.e. persistent cough or hoarseness, unexplained bleeding and unexplained lump/swelling) varied slightly from the symptoms that were posed in the assessment of anticipated delay in help-seeking (i.e. persistent cough, rectal bleeding and breast changes), though symptoms in both assessments referred to lung, colorectal and breast cancer, respectively. Women, only, were asked about help-seeking for breast changes. The ABC survey included questions about socio-demographic and health care information.

Interviews

Telephone interviews were conducted by trained research staff with language skills in English, Melayu, Mandarin and/or Tamil. Respondents who agreed to participate were interviewed on first contact or appointments were arranged whenever respondents were busy or if a interviewer in the preferred language was unavailable. Telephone 'stations' comprised computer-assisted telephone interview (CATI) software (www.surveysystem.com/interviewing-cati.htm) with an uploaded ABC questionnaire.

Statistical analysis

Data entered in CATI was read automatically into an Excel spreadsheet which was transferred into Stata SE. Chi-square analyses examined univariate relationships between sociodemographic characteristics and >2 weeks anticipated delayed help-seeking for persistent cough, rectal bleeding and breast changes; and symptom recognition (persistent cough and hoarseness, unexplained bleeding and unexplained lump or swelling). Multivariable logistic regressions tested associations between anticipated delay and socio-demographic characteristics, i.e., sex, age, ethnicity, education, marital status as well as access to a doctor and recognition of the relevant symptom. We also performed a joint test (testparm) to test associations between variables with more than two categories and delayed help-seeking. No weights were applied to account for the sampling distribution. The >2 week interval that was employed in the analysis is the delay duration that is employed usually and its use facilitated comparisons with other studies [16,18].

Results

The survey was completed by 1,895 participants across Malaysia. The distribution of participants across the 13 states and three federal territories is shown in Supplementary Table 2. More males (57.1%) than females participated and the majority of participants were married (87.8%), ethnically Malay (48.8%) and Chinese (39.8%), completed secondary (55.5%) and tertiary education (34.5%) and reported that they had easy access to a doctor (95.8%). The mean age of the study population was 48.1 (SD 7.8, range 40-86) years and the majority was aged between 40-49 years (67.5%).

Most participants were aware that an unexplained lump or swelling could be a sign of cancer (74.5%), followed by unexplained bleeding (65.5%) and a persistent cough (55.4%) (**Table 1**). Females appeared to have better awareness than males about unexplained bleeding (68.3% vs 63.5%, $p=0.031$) and an unexplained lump or swelling (77.0% vs 72.6%, $p=0.031$) as potential cancer signs. Participants aged ≥ 60 years were least likely to be aware of any of the three symptoms. There were significant between-ethnic group differences in awareness about each symptom. In particular, the 'other' ethnic group category had the lowest recognition rates for unexplained bleeding and unexplained lump or swelling as a sign of cancer. The association between ethnic groups and symptom knowledge was not as apparent after the 'other' ethnic group was removed from the analysis. Participants without formal education were less likely to recognise any of the three symptoms compared to participants with formal education. Married participants were more likely to identify persistent cough or hoarseness as a cancer sign compared to non-married participants (56.6% vs 46.8% respectively, $p=0.005$). The number of participants who reported that they had difficulty accessing a doctor was small ($n=80$), however, those who did, were less likely to recognise unexplained bleeding as a cancer sign compared to participants with easy access (50.0% vs 66.2% respectively, $p=0.003$).

A minority of participants anticipated a delay in help-seeking of >2 weeks after noticing these symptoms (**Table 2**), particularly for breast changes (2.5%) and rectal bleeding (6.1%). However, almost 20% of participants reported that they would delay help-seeking for a persistent cough. There were significant ethnic group differences regarding anticipated delay in help-seeking of >2 weeks for the symptoms of persistent cough ($p=0.004$). Chinese were most likely to delay help-seeking (23.3%) and 'others' were least likely (13.5%). Ethnic group differences also persisted between ethnic groups for delay in help-seeking of >2 weeks for rectal bleeding ($p=0.004$). A higher proportion of Malays were likely to delay help-seeking for rectal bleeding (8.0%) compared to Indians (2.5%). A higher proportion of participants without formal education reported an anticipated delay in help-seeking for rectal bleeding and breast changes compared to participants who completed formal education (**Table 2**). More participants who reported that they experienced difficulty accessing a doctor also reported an anticipated delay in help-seeking for rectal bleeding and breast changes compared to participants with easy access (17.3% vs 5.6%, $p<0.001$ and 14.8% vs 2.1%, $p<0.001$, respectively).

Figure 1 shows small differences in anticipated delay in help-seeking for >2 weeks between participants who were aware and unaware of respective symptoms. Participants who were unaware that rectal bleeding was a sign of cancer were more likely to delay help-seeking for >2 weeks (8.6% vs 4.8%, $p=0.001$). There were no significant differences in delayed-help-seeking and symptom awareness for the other two symptoms, i.e. between respondents who were unaware that breast lump/swelling were a sign for breast cancer (1.6% vs yes 2.8%; $p=0.395$) and between respondents who were unaware that a persistent cough was a sign for lung cancer (20.4% vs yes 18.4%; $p=0.289$), respectively.

The logistic regression confirmed that ethnicity, education, access to a doctor and symptom recognition were associated with delayed help-seeking >2 weeks for some cancer symptoms (**Table 3**). Findings were similar in the unadjusted analysis (Supplementary Table 3). Chinese were more likely to delay help-seeking >2 weeks for persistent cough compared to Malays (adjusted OR 1.58, 95% CI 1.23, 2.03, $p<0.001$) and, both Chinese and Indians, were less likely to delay help-seeking >2 weeks for rectal bleeding compared to Malays (adjusted OR 0.58, 95% CI 0.37, 0.89, $p=0.014$ and adjusted OR 0.33, 95% CI 0.12, 0.93, $p=0.036$, respectively). Participants with no formal education were significantly more likely to delay help-seeking for >2 weeks for the symptom, rectal bleeding compared to respondents with tertiary education (adjusted OR 5.25, 95% CI 1.86, 14.83, $p=0.002$). There was a weak association between symptom recognition and anticipated delay in help-seeking >2 weeks for the symptom rectal bleeding (adjusted OR 1.54, 95% CI 1.03, 2.31, $p=0.036$). Participants without formal education were around five times more likely to delay help-seeking for rectal bleeding compared to respondents with tertiary education (adjusted OR 5.25, 95% CI 1.86, 14.83, $p=0.002$) and respondents who were unaware that rectal bleeding was a symptom of cancer were more likely to delay help-seeking compared to respondents who were aware of the cancer symptom (adjusted OR 1.54, 95% CI 1.03, 2.31, $p=0.036$). Difficulties accessing a doctor was associated with delayed help-seeking >2 weeks for rectal bleeding (adjusted OR 2.37, 95% CI 1.21, 4.66, $p=0.012$) and breast changes (adjusted OR 7.58, 95% CI 1.98, 28.94, $p=0.003$). Joint testing of the association between delayed help-seeking and variables with more than two categories confirmed that findings presented here. It also suggested that education was associated with a delay in help-seeking for breast changes (Supplementary Table 2).

Discussion

This was the first conducted nationwide study in Malaysia that investigated the association between cancer symptom awareness and anticipated delayed help-seeking for three different cancers. Participants who recognised the cancer symptoms of unexplained bleeding and unexplained lumps tended to view them as severe symptoms that required medical attention. Only a small number of participants indicated that they anticipated a delay in help-seeking if they experienced breast changes (2.5%) or rectal bleeding (6%) though 19.3% reported that they would wait for >2 weeks to seek medical

help for a persistent cough which was also the least recognised cancer symptom. Major public health programmes present a persistent cough as a key sign in lung cancer awareness-raising campaigns. A ‘persistent cough’ may be a symptom of other illnesses including minor illnesses or chronic illnesses such as asthma that participants may perceive as less urgent. These findings differ to a certain extent from findings from the International Cancer Benchmarking Study (ICBS) [16] where participants overall anticipated a longer delay to help-seeking (8.2%, 7.2% and 48.1% vs 2.5%, 6.1% and 19.3%). Findings from the ICBS also suggested that not recognising a symptom as a potential cancer sign was associated with an anticipated delay in help-seeking for all three symptoms; and a meta-analysis of studies from 22 different countries, which concluded that better symptom knowledge (OR=0.73, 95% CI 0.63, 0.84) and more positive beliefs about cancer (OR=0.70, 95% CI 0.52, 0.92) were associated with lower odds of a delay in help-seeking in healthy adult populations, universally [17]. Most studies were from the UK and other high-income countries. Low- and middle-income (LMICs) countries were represented, however, studies in LMICs were conducted mainly with patient- rather than healthy-populations. Findings suggested that higher income (inequality) was related to stronger protective effects in relation to cancer symptom knowledge [17]. The weak relationship between respondents with higher vs lower symptom awareness in the findings presented here may be due, partly, to the small number of participants who reported anticipated delayed help-seeking for >2 weeks for breast and colorectal cancer symptoms. This is the first nation-wide study to report anticipated delay to help-seeking in Malaysia and further research is required to confirm (or otherwise) the findings. The findings presented here may not be reflective of the general population. The anticipated prompt help-seeking in Malaysia compared to elsewhere may be related to differences between healthcare systems. For example, waiting times to see a doctor in England can be over two weeks [27], whereas there does not appear to be waiting, or to be only brief waiting, times in Malaysia and private and public primary care clinics appear to be accessible to patients and to be used regularly by the general population [28]. It is important to keep in mind when interpreting the results that the symptoms that were used to assess breast and colorectal cancer awareness were similar but they varied slightly from the symptoms that were used to assess perceived time to help-seeking. Each symptom tends to be targeted in national public health programmes as a key sign of a major cancer (breast and CRC respectively) and as a prompt to seek medical consultation but the formulation and presentation of the symptoms in relation to help-seeking in the present study may have been interpreted by respondents as relating to conditions other than cancer and to conditions that might not be deemed unusual or requiring urgent medical attention. [29,30]

Income was not assessed as part of this study. However, a lack of formal education and difficulties accessing a doctor appeared to be predictors of anticipated delay, which may point to the need to give greater attention to the potential impact of social disparities in Malaysia. A cross-sectional study in Perak, one of the states in Malaysia, suggested that participants with limited education and a low income

were more likely to anticipate a delay in help-seeking for colorectal cancer symptoms [31]. Furthermore, particular symptoms appeared to have more salience for specific ethnic groups, and ethnicity in relation to certain symptoms appeared to exert a differential influence on anticipated delay in help-seeking. The results did not differ significantly when different time intervals (1- and 4-week time cut-off points) were entered into the regression analysis and history of smoking did not confound the associations described between demographic variables and delayed help-seeking for a persistent cough (not presented here due to space limits but available on request).

It is likely that, in addition to socio-demographic factors, other psycho-social factors (that have not been assessed in this study) are important in terms of explaining anticipated delayed help-seeking. According to a systematic review of qualitative studies, ‘symptom awareness’, ‘symptom interpretation’ and ‘symptom monitoring’ were the most important themes in the help-seeking process for women with breast cancer symptoms [32]. This review and a second qualitative review [33] together concur with our results in terms of pointing to the importance of perceived inaccessibility of health services, particularly regarding breast changes and rectal bleeding. The second qualitative review [33] also found that lack of symptom awareness delayed presentation for lung cancer. Additional reported themes were social interactions and emotional reactions [32]. Findings from a large cross-sectional study in England that looked at diagnostic audits, reported that certain symptoms are diagnosed at an earlier stage and argued that most common cancer symptoms need to be promoted [34]. The findings reported here indicate that symptom recognition is only one (early) step in the help-seeking pathway [35]. A cross-sectional study of colorectal cancer patients in Malaysia suggested that about 60% of patients who experienced rectal bleeding delayed help-seeking and, therefore, other barriers beyond awareness may prevent prompt help-seeking when faced with the symptoms [36]. Factors such as access to health care and education also play a part in the decision to initiate help-seeking. Barriers such as financial concerns, lack of information online, perceived poor quality of care, negative influence of relatives, being too busy, fear and embarrassment appear to merit attention in terms of improving understanding about anticipated time to help-seeking for cancer [37–39].

Study strengths and limitations

Major strengths of this study include the fact that residents from all states in Malaysia were captured in the survey, the use of the validated ABC measurement tool and, therefore, the facility to make direct comparisons with international studies. Several potential methodical limitations need to be considered when interpreting the findings. It is important to bear in mind that the study was not powered to detect differences or associations whilst controlling for all covariates. Arguably, the way in which the validated ABC questionnaire assesses symptom awareness for ‘unexplained lump or swelling’ and ‘unexplained bleeding’ and the relationship with delayed help-seeking is not directly comparable to the

way it enquires about ‘breast changes’ and ‘rectal bleeding’. Although the relevant ABC items appear to represent expressions of similar symptoms, it is unclear whether it is valid to assume that awareness about ‘unexplained bleeding’ as a potential sign of cancer would prompt timely help-seeking for ‘rectal bleeding’. Furthermore, Chinese participants and males appeared to be overrepresented in the sample (Chinese 39.8% vs 23% and males 57.1% vs 51.6% according to population estimates) [26], and about 90% of participants completed either secondary or tertiary education (compared to 60% in the 2010 census [40]) and over 95% reported easy access to a doctor. The results suggest that there is a need to find alternative ways in which to reach those sections of the population with a low level of education and poor access to health-care.

Conclusion

There is a need to improve anticipated time to help-seeking for potential cancer symptoms among particular sections of the population in Malaysia, namely, people who are disadvantaged in terms of income and education. In this study, knowledge about cancer symptoms, help-seeking behaviour, socio-demographic factors and perceived easy access and/or structural factors to health care appear to explain variation in delay regarding the time of patient presentation and, subsequently, the detection and diagnosis of cancer in Malaysia. It is important to be mindful when interpreting the results and drawing conclusions about how subtle differences between the presentations of symptoms in questions relating to awareness compared to help-seeking may have affected responses. Nonetheless, the results appear to suggest that there is a need to give consideration to the development and investigation of multi-level interventions that are sensitive to the social needs of members of particular population groups and communities and that address symptom awareness as well as help-seeking behaviour [41]; and for public health efforts that aim to reduce help-seeking delay to take account of the differences that appear to persist for particular communities [42].

Ethical approval

Ethical approval was granted by the University of Malaya Medical Centre Ethics Committee (Reference Number 890.6). The review board approved the provision of verbal consent as informed consent. Consent to participate was given verbally and the participants could withdraw consent freely at any time during the interview.

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Conflict of interest

None.

Data availability

Data is available on request from the corresponding author Prof Tin Tin Su.

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Table legends

Table 1. Association between sociodemographic and health-care variables and recognition of each cancer warning sign

Table 2. Association between sociodemographic and health-care variables and anticipated delay to help-seeking (>2 weeks) for each cancer warning sign

Table 3. Predictors of help-seeking delay (anticipating >2 weeks) for a potential warning sign of cancer (n=1,836)

Figure legends

Figure 1. Symptom recognition and anticipated delay of help-seeking of >2 weeks for each related symptom (persistent cough/hoarseness, unexplained bleeding, and unexplained lump or swelling)

Supplementary materials

Supplementary Table 1. Distribution of participants by state/ territory in Malaysia

Supplementary Table 2. Joint-tested association of associations between delayed help-seeking and variables with more than two categories

Supplementary Table 3. Predictors of help-seeking delay (anticipating >2 weeks) for potential warning signs of cancer (unadjusted)

Table 1. Association between sociodemographic and health-care variables and recognition of each cancer warning sign

	Total	Persistent cough or hoarseness			Unexplained bleeding			Unexplained lump or swelling		
	n	n	%	p-value	n	%	p-value	n	%	p-value
All respondents (n=1895)		1049	55.4		1242	65.5		1413	74.5	
Gender										
Male	1082	593	54.8		687	63.5		786	72.6	
Female	813	456	56.1	0.578	555	68.3	0.031	626	77.0	0.031
Age groups										
40-49 years	1279	702	54.9		868	67.9		956	74.7	
50-59 years	427	255	59.7		268	62.8		331	77.5	
60+ years	189	92	48.7	0.033	106	56.1	0.003	125	66.1	0.011
Ethnicity										
Malay	925	541	58.5		594	64.2		708	76.5	
Chinese	754	398	52.8		517	68.6		552	73.2	
Indian	162	84	51.9		108	66.7		120	74.1	
Others ^a	54	26	48.1	0.055	23	42.6	0.001	32	59.3	0.026
Highest level of education										
No formal education	28	6	21.4		3	10.7		10	35.7	
Primary education	162	80	49.4		86	53.1		104	64.2	
Secondary education	1052	610	58.0		706	67.1		787	74.8	
Tertiary education	653	353	54.1	< 0.001	447	68.5	< 0.001	511	78.3	< 0.001
Marital status										
Married	1663	941	56.6		1099	66.1		1247	75.0	
Not married	231	108	46.8	0.005	142	61.5	0.167	165	71.4	0.245
Access to doctors										
Very easy to somewhat easy	1814	1007	55.5		1201	66.2		1355	74.7	
Very difficult to somewhat difficult	80	41	51.2	0.453	40	50	0.003	56	70	0.346

^a Findings from Chi-square test after excluding the 'other' ethnic group: persistent cough or hoarseness p=0.040; unexplained bleeding p=0.171; unexplained lump or swelling p=0.282

Missing variables: Marital status (n=1), Access to doctors (n=1)

Table 2. Association between sociodemographic and health-care variables and anticipated delay to help-seeking (>2 weeks) for each cancer warning sign

	Total	Persistent cough (n=1895)			Rectal bleeding (n=1895)			Breast changes (n=813)		
	n	n	%	p-value	n	%	P	n	%	p-value
All respondents (n=1895)		360	19.3		112	6.1		20	2.5	
Gender										
Male	1082	219	20.5		67	6.4		-	-	
Female	813	141	17.7	0.128	45	5.8	0.598	20	2.5	-
Age groups										
40-49 years	1279	238	18.8		70	5.6		13	2.3	
50-59 years	427	88	21.0		32	7.7		4	2.4	
60+ years	189	34	18.8	0.623	10	5.7	0.288	3	4.9	0.459
Ethnicity										
Malay	925	150	16.6		71	8.0		12	3.1	
Chinese	754	174	23.3		33	4.4		5	1.5	
Indian	162	29	18.1		4	2.5		1	1.7	
Others	54	7	13.5	0.004	4	7.8	0.004	2	11.1	0.054
Highest level of education										
No formal education	28	8	33.3		7	31.8		3	20	
Primary education	162	29	18.1		16	10.6		1	1.4	
Secondary education	1052	211	20.4		52	5.1		7	1.7	
Tertiary education	653	112	17.4	0.140	37	5.8	< 0.001	9	3.1	<0.001
Marital status										
Married	1663	311	19.0		98	6.1		19	2.7	
Not married	231	49	21.6	0.355	14	6.2	0.935	1	1.2	0.430
Access to doctors										
Very easy to somewhat easy	1814	344	19.3		99	5.6		16	2.1	
Very difficult to somewhat difficult	80	16	20.5	0.782	13	17.3	< 0.001	4	14.8	< 0.001

Missing variables: Anticipated delay to help-seeking for persistent cough n=29, Anticipated delay to help-seeking for rectal bleeding n=58, Anticipated delay to help-seeking for breast changes n=18

Table 3. Predictors of help-seeking delay (anticipating >2 weeks) for a potential warning sign of cancer

	Total	Anticipated delay for persistent cough (>2 weeks) (n=1864) (19.3% anticipated delay)			Anticipated delay for rectal bleeding (>2 weeks) (n=1836) (6.1% anticipated delay)			Anticipated delay for breast changes (>2 weeks) (n=795) (2.5% anticipated delay)		
	n	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
Sex										
Male	1082	<i>Reference</i>			<i>Reference</i>			-	-	-
Female	813	0.82	[0.65, 1.04]	0.104	0.90	[0.60, 1.34]	0.593	-	-	-
Age groups										
40-49 years	1279	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
50-59 years	427	1.13	[0.85, 1.50]	0.395	1.30	[0.83, 2.05]	0.258	0.95	[0.28, 3.15]	0.930
60+ years	189	0.91	[0.60, 1.39]	0.658	0.77	[0.37, 1.61]	0.483	1.07	[0.19, 5.97]	0.937
Marital status										
Married	1663	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Not married	231	1.25	[0.88, 1.78]	0.219	0.99	[0.54, 1.83]	0.971	0.30	[0.35, 2.51]	0.265
Ethnicity										
Malay	925	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Chinese	754	1.58	[1.23, 2.03]	<0.001	0.58	[0.37, 0.89]	0.014	0.65	[0.21, 1.95]	0.437
Indian	162	1.16	[0.74, 1.80]	0.518	0.33	[0.12, 0.93]	0.036	0.64	[0.08, 5.18]	0.673
Others	54	0.71	[0.31, 1.62]	0.414	0.64	[0.22, 1.92]	0.431	5.32	[0.99, 28.49]	0.051
Education										
No formal education	28	2.64	[1.07, 6.54]	0.036	5.25	[1.86, 14.83]	0.002	5.95	[0.86, 41.30]	0.071
Primary education	162	1.10	[0.68, 1.77]	0.693	1.64	[0.84, 3.18]	0.144	0.32	[0.35, 2.80]	0.300
Secondary education	1052	1.26	[0.97, 1.63]	0.087	0.82	[0.52, 1.27]	0.371	0.45	[0.16, 1.29]	0.139
Tertiary education	653	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Access to doctor										
Very easy to somewhat easy	1814	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Very difficult to somewhat difficult	80	1.20	[0.67, 2.14]	0.532	2.37	[1.21, 4.66]	0.012	7.58	[1.98, 28.94]	0.003
Do you think this is a symptom of cancer?										
No		1.10	[0.87, 1.39]	0.415	1.54	[1.03, 2.31]	0.036	0.41	[0.09, 1.81]	0.241
Yes		<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		

OR – odds ratio; CI – confidence interval

The odds ratios in the model were adjusted for sex, age groups, marital status, ethnicity, education, access to doctor and cancer symptom awareness.