

Original article

Factors associated with colorectal cancer screening decision-making among older adults at the Comprehensive Geriatric Clinic, King Chulalongkorn Memorial Hospital, Thai Red Cross Society

Chalisa Thanapura^{a, b} , Nawasiri Siriprasert^{a, b, c, d,*} , Thacha Pithayapibulpong^{a, b, e} ,
Bhorn-Ake Manasvanich^{a, b, c} , Vichai Viriyautsahakul^{a, b, f} 

^aDepartment of Family Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand

^bDepartment of Family Medicine, King Chulalongkorn Memorial Hospital, Thai Red Cross Society, Bangkok, Thailand

^cGeriatric Excellence Center, King Chulalongkorn Memorial Hospital, Thai Red Cross Society, Bangkok, Thailand

^dChulalongkorn University International Medical Program, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand

^eDivision of Academic Affairs, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand

^fDepartment of Internal Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand

Abstract

Background: The incidence of colorectal cancer (CRC) in Thailand is constantly increasing and is highest in individuals aged 60-75 years. However, the number of older individuals undergoing CRC screening remains suboptimal.

Objectives: This study aimed to identify factors associated with CRC screening decision-making among Thai older adults attending the Comprehensive Geriatric Clinic at King Chulalongkorn Memorial Hospital. The secondary objective was to identify factors associated with the choice of screening method—colonoscopy versus fecal occult blood testing.

Methods: A cross-sectional study was conducted using a data record form at the Comprehensive Geriatrics Clinic, King Chulalongkorn Memorial Hospital in Bangkok, Thailand, from September to October 2023. Participants aged 60-75 were interviewed to collect information about factors associated with CRC screening decision-making, which were categorized into five groups: demographic, health, psychological, physician, and social factors. Participants were classified into two groups based on their intention to undergo CRC screening. The factors preliminarily associations using the Chi-square test and the Mann-Whitney U test. The factors with a $P < 0.2$ were then analysed by a binary logistic regression for identifying factors that were significantly associated with the decision to undergo CRC screening as primary outcome and the choice of method as secondary outcome.

Results: A total of 424 valid responses were obtained, with 320 respondents intending to undergo CRC screening. The binary logistic regression analysis revealed significant associations between CRC screening decision and the following factors: high risk for CRC (aOR 6.05, 95%CI 2.42–15.13), positive attitude towards cancer screening (aOR 3.65, 95%CI 2.19–6.10), recognition of the importance of early detection (aOR 2.33, 95%CI 1.32–4.11), and being divorced, as compared to being married (aOR 0.06, 95%CI 0.01–0.49). The decision to undergo colonoscopy for the CRC screening was associated with an education level of having at least a bachelor's degree (aOR 0.43, 95%CI 0.24–0.75), being single, as compared to being married (aOR 2.08, 95%CI 1.20–3.58), and concerns about physical discomfort from CRC screening (aOR 0.41, 95%CI 0.19–0.90).

Conclusion: Factors associated with CRC screening decision-making uptake amongst older adults, attending a geriatric clinic in a tertiary care hospital in Bangkok, that can be promoted include having a positive attitude towards cancer screening and the recognition of the importance of early detection. Therefore, raising awareness and highlighting the importance of cancer screening may help increase the rates of CRC screening in Thailand in the future.

Keywords: Associated factors, colonoscopy, colorectal cancer screening, fecal occult blood, older adult.

*Correspondence to: Nawasiri Siriprasert, Department of Family Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok, 10330, Thailand.

Email: Nawasiri.S@chula.ac.th

Received: September 20, 2025

Revised: January 10, 2026

Accepted: February 20, 2026

The proportion of the older adult population, defined as individuals aged 60 years and older, is steadily increasing worldwide, leading to the emergence of aging societies. Thailand is experiencing a similar demographic shift; in 2022, the older population reached 12,519,926, accounting for 18.9% of the total population.⁽¹⁾ Consequently, preparing for the transition into old age is crucial. Promoting healthy aging is necessary to help older adults maintain their functional intrinsic capacity, thereby enabling them to remain socially active and independent and to achieve a high quality of life.⁽²⁾

The incidence of colorectal cancer (CRC) is currently increasing, especially in developing countries, including Thailand. At present, CRC ranks as the third most common cancer among males and the fourth among females⁽³⁾. In Thailand, the highest incidence of CRC is found in individuals aged 60–75 years,⁽³⁾ accounting for 50.0% of all CRC cases⁽³⁾. Moreover, most newly diagnosed cases of CRC in Thailand are detected at stages 3 (31.0%–37.0%) and stage 4 (32.0%–40.0%)⁽³⁾. These figures reveal that Thailand has a low rate of CRC screening, which results in many patients being diagnosed at stages where the disease may no longer be curable.

As the CRC screening rate among the Thai population has yet to meet standard benchmarks for fecal occult blood testing and colonoscopy,⁽⁵⁾ researchers are interested in studying factors influencing the decision to undergo CRC screening, as well as factors affecting the choice of screening method. The findings of this study are intended to enhance knowledge and promote CRC screening among service recipients.

The objectives of this study were to examine the factors associated with the decision to undergo CRC screening and choosing between colonoscopy and fecal occult blood testing as the screening method among older patients attending the Comprehensive Geriatric Clinic at King Chulalongkorn Memorial Hospital, Thai Red Cross Society.

Materials and methods

This is a cross-sectional study conducted at a specific point in time. It has been reviewed and approved by the Institutional Review Board (IRB no. 0738/66 issued in 2023), Faculty of Medicine, Chulalongkorn University.

Participants

The participants consisted of individuals aged 60–75 years who attended the Comprehensive Geriatric Clinic at King Chulalongkorn Memorial Hospital, Thai Red Cross Society, between September and October 2023. Decision-making regarding participation in CRC screening was established at the point of patient inclusion; the actual scheduling of the screening was not required for this classification. For participants who had previously undergone CRC screening, the result of their most recent screening must have been issued no more than 3 years before the interview date. In addition, the participants did not exhibit any of the following warning signs of CRC at the time of screening: iron-deficiency anemia, change in bowel habits, unexplained lower gastrointestinal bleeding, or significant weight loss accompanied by unexplained abdominal pain.

The minimum sample size for this study was calculated using the sampling formula previously described by Cochran W.G. for a known population proportion, with an additional 10% added to account for potential data loss. The minimum sample size was, therefore, 424 participants.

Research instrument

The instrument used in this study was a set of interviews and data-collection forms regarding factors associated with the decision to undergo CRC screening. The data-collection form was pilot-tested with 30 participants at the Comprehensive Geriatric Clinic, King Chulalongkorn Memorial Hospital, and consisted of two sections:

Section 1 of the interview was conducted with all participants (volunteers). It comprised three parts: 1) Questions regarding the participant's history of CRC screening and their decision to undergo the screening; 2) Questions designed to classify the population according to their risk of developing CRC; and 3) Questions concerning various factors, such as the participant's personal factors (i.e., age, sex, marital status, level of education, and socioeconomic status), health factors (i.e., history of any type of cancer diagnosis, their family's health history, and attitudes toward health problems requiring CRC screening), psychological factors (i.e., concerns about physical discomfort that might arise from CRC screening, concerns about potential side effects following screening, embarrassment or unease about undergoing screening, fear of being denied screening, the

perceived importance of early detection, level of fear of developing cancer and dying from cancer), factors regarding healthcare personnel (i.e., questions about trust in the physician's decision-making and confidence in the physician), and social factors (i.e., whether someone close to the participant has undergone CRC screening and prior exposure to information about CRC screening through various media channels).

Section 2 of the interview was conducted only with participants who indicated they had decided to undergo, or had previously undergone, CRC screening. This section focused on questions about the screening method they chose or had chosen for CRC, as well as the reasons that influenced their choice. The questions were in the form of rating scales (responses scored from 1 = least agreed to 5 = most agreed).

Statistical analysis

The researchers analyzed the data using IBM SPSS Statistics V29.0. Descriptive statistics were employed to describe the results from the sample group: frequency and percentage were used for qualitative data, whereas frequency, mean, median, and standard deviation (SD) were used for quantitative data.

For the analysis of associations, the chi-square test was used to evaluate the preliminary associations, and the Mann-Whitney U test for continuous variables. Factors with $P < 0.2$ were then included in a multivariable binary logistic regression analysis to identify factors that were associated with the outcome variable. Regression coefficients (β) and their standard errors (SE) were estimated using the maximum likelihood estimation method. Odds ratios (OR) and 95% confidence intervals (CI) were obtained by exponentiating the regression coefficients. $P < 0.05$ was considered statistically significant for the association with the decision to undergo CRC screening and the choice of screening method.

Results

Basic personal factors

A total of 424 participants were included in the study, comprising 124 males (29.2%) and 300 females (70.8%). The majority of participants were aged 71–75 years (37.6%). Regarding education, most participants had attained at least a bachelor's degree (74.5%), with most participants holding a bachelor's degree as their highest educational attainment (48.6%). Most participants were married at the time of the

interview (66.0%), and the average monthly household income was 53,301 baht (SD: 49,542) (**Table 1**).

Health factors

Among the 424 participants, the majority had an average risk of developing CRC (79.2%). When considering those at high risk, 15.1% of participants had a direct relative with a history of CRC.

The majority of participants, 376 (88.7%), had no history of cancer. Regarding family history, most participants (218 people, 51.4%) had a direct relative with a history of any cancer. As for attitudes toward cancer screening, most participants (280, 66.0%) believed that cancer screening can be done without waiting for a symptom to appear.

Regarding CRC screening status, 262 participants (61.8%) had previously undergone it. Among those who had never been screened, 104 participants (13.7%) reported an intention or likelihood of undergoing screening in the future (**Table 1**).

Psychological factors

Among the 424 participants, 334 (78.8%) placed high importance on early cancer detection. Most participants (222, 52.6%) expressed concern about physical discomfort that might arise from CRC screening. However, the majority, 352 people (83.0%), were not concerned about possible side effects following the screening, 376 participants (88.7%) did not feel embarrassed or uneasy about undergoing CRC screening, and 304 people (71.7%) were not afraid of being denied screening.

Regarding the level of fear of developing cancer, most participants reported a moderate fear, with an average score of 2.8 (SD 3.0) out of 5. However, most participants did not feel a significant fear of dying from cancer, with an average score of 1.8 (SD 1.1) out of 5 (**Table 1**).

Trust in physicians

Among the 424 participants, the majority (average score 4.3 [SD 0.7] out of 5) believed that their attending physicians would choose the best and most appropriate treatment for them. Regarding confidence in their attending physicians, most participants expressed the highest level of trust (51.4%), with an average score of 4.4 (SD 0.7) out of 5 (**Table 1**).

Table 1. Factors associated with CRC screening uptake among older individuals as analyzed by Chi-square and Mann-Whitney U tests.

Variables	Non-screening group		Screening group		χ^2	P-value
	(N)	(%)	(N)	(%)		
Sex					0	1
Male (n = 124)	30	24.2%	94	75.8%		
Female (n = 300)	74	24.7%	226	75.3%		
Age			0.163	0.922		
60–65 (n = 122)	29	23.8%	93	76.2%		
66–70 (n = 144)	37	25.7%	107	74.3%		
71–75 (n = 158)	38	24.1%	120	76.0%		
Highest level of education					3.297	0.069
Lower than a Bachelor's Degree (n = 108)	34	31.5%	74	68.5%		
At least a Bachelor's Degree (n = 316)	70	22.2%	246	77.9%		
Marital status					11.257	0.01
Single (n = 114)	22	19.3%	92	80.7%		
Married (n = 280)	68	24.3%	212	75.7%		
Widowed (n = 24)	10	41.7%	14	58.3%		
Divorced (n = 6)	4	66.7%	2	33.3%		
Average household income (THB) mean $\pm$ SD	45,098.1 $\pm$ 24,232.1		54,097.0 $\pm$ 55,202.8			0.411
Risk for developing CRC					17.627	<0.001
Moderate risk (n = 336)	98	29.2%	238	70.8%		
High risk (n = 88)	6	6.8%	82	93.2%		
History of any form of cancer					3.529	0.060
No (n = 376)	98	26.1%	278	73.9%		
Yes (n = 48)	6	12.5%	42	87.5%		
Having a direct relative with a history of any form of cancer					5.071	0.024
No (n = 206)	61	29.6%	145	70.4%		
Yes (n = 218)	43	19.7%	175	80.3%		
Cancer screening can be performed without the need for a symptom to be present					45.521	<0.001
Disagreed (n = 144)	63	43.8%	81	56.3%		
Agreed (n = 280)	41	14.6%	239	85.4%		
Recognizing the importance of early detection					20.555	<0.001
No (n = 90)	39	43.3%	51	56.7%		
Yes (n = 334)	65	19.5%	269	80.5%		
Concerns about physical discomfort that might arise from CRC screening					6.127	0.013
Not concerned (n = 222)	43	19.4%	179	80.6%		
Concerned (n = 202)	61	30.2%	141	69.8%		
Concerns about the potential side effects following CRC screening					1.332	0.248
Not concerned (n = 352)	82	23.3%	270	76.7%		
Concerned (n = 72)	22	30.6%	50	69.4%		
Feeling embarrassed or uneasy about undergoing CRC screening					12.006	<0.001
No (n = 376)	82	21.8%	294	78.2%		
Yes (n = 48)	22	45.8%	26	54.2%		
Being afraid of being denied CRC screening					15.941	<0.001
No (n = 304)	91	29.9%	213	70.1%		
Yes (n = 120)	13	10.8%	107	89.2%		

Table 1. (Cont.) Factors associated with CRC screening uptake among older individuals as analyzed by Chi-square and Mann-Whitney U tests.

Variables	Non-screening group		Screening group		χ^2	P-value
	(N)	(%)	(N)	(%)		
Level of fear of developing any form of cancer someday (scored mean $\pm$ SD)	2.7 $\pm$ 1.5		2.8 $\pm$ 1.4			0.677
Level of fear of dying from cancer someday (scored); mean $\pm$ SD	1.8 $\pm$ 1.1		1.8 $\pm$ 1.1			0.762
Confidence that the attending physician will choose the best and most appropriate treatment for them (scored); mean $\pm$ SD	4.2 $\pm$ 0.8		4.4 $\pm$ 0.7			0.067
Level of trust in the attending physician (scored); mean $\pm$ SD	4.2 $\pm$ 0.8		4.4 $\pm$ 0.7			0.011
Having a person close to them, a family member, or an acquaintance who has undergone CRC screening					6.868	0.006
No (n = 160)	51	48.1%	109	51.9%		
Yes (n = 264)	53	20.1%	211	79.9%		
Having had prior exposure to information about CRC screening through various media channels					1.223	0.269
No (n = 166)	46	27.7%	120	72.3%		
Yes (n = 258)	58	22.5%	200	77.5%		

CRC, colorectal cancer; SD, standard deviation.

Social factors

According to the survey, most participants, 264 people (62.3%), had a person close to them, a family member, or an acquaintance who had undergone CRC screening. In addition, 258 participants (60.9%) had previously received information about CRC screening through various media (**Table 1**).

Choice of CRC screening method and reasons for selection

According to a survey of participants who had previously undergone or intended to undergo CRC screening, the majority (230, 71.9%) chose colonoscopy as their preferred method.

When considering the reasons for choosing colonoscopy as the screening method, participants rated their level of agreement with various reasons on a scale from 1 (least agreement) to 5 (most agreement). The most common reason for choosing colonoscopy was that it was the method recommended by their physicians, over the fecal occult blood test, with an average score of 4.14 (SD 1.0).

Ten participants (4.4%) chose colonoscopy for reasons other than physician recommendation.

The reasons they cited were encouragement or persuasion from a person close to them (medical and non-medical), previous health check-ups revealing abnormally high carcinoembryonic antigen levels, concerns about not getting value from their health insurance, concerns about being unable to collect stool samples, and reluctance to bring stool samples for testing, and having independently researched that colonoscopy was considered the gold standard for screening. However, they were not sure of the specific reasons for this (**Table 2**).

Among participants who chose fecal occult blood testing as their screening method, the most common reason was that it did not cause the same sense of bodily intrusion as a colonoscopy. This reason had an average agreement score of 4.0 (SD 1.6).

Six participants (6.7%) chose fecal occult blood testing for other reasons. Their reasons included not having to wait as long for the test as for colonoscopy, not wanting to undergo the sedation required for colonoscopy, believing they did not need a colonoscopy because they were not at risk for CRC, and concerns about possible side effects from other screening methods (**Table 2**).

Table 2. Scores of reasons for choosing different methods of CRC screening.

Reasons for choosing colonoscopy as the method for CRC screening	Median (IQR 1, IQR 3)	Min	Max
Colonoscopy yields more accurate results than the fecal occult blood test.	4.0 (1, 5)	1	5
Colonoscopy requires less frequent screening compared to the fecal occult blood test.	1.0 (1, 3)	1	5
Colonoscopy is more commonly recommended by physicians compared to the fecal occult blood test.	5.0 (4, 5)	1	5
Reasons for choosing the fecal occult blood test as the method for CRC screening	Median (IQR 1, IQR 3)	Min	Max
The fecal occult blood test is more affordable than a colonoscopy.	1.0 (1, 3)	1	5
The fecal occult blood test requires less time for screening than a colonoscopy.	3.0 (1, 4)	1	5
The fecal occult blood test requires less specific preparation for screening than a colonoscopy.	3.0 (1, 5)	1	5
The fecal occult blood test does not cause as much embarrassment or unease as a colonoscopy.	1.0 (1, 2)	1	5
The fecal occult blood test does not cause the same sense of bodily intrusion as a colonoscopy.	5.0 (3, 5)	1	5
The fecal occult blood test does not require someone else to accompany the patient to the hospital on the day of the screening, unlike a colonoscopy.	1.0 (1, 3)	1	5
The fecal occult blood test is more commonly recommended by physicians compared to colonoscopy.	1.0 (1, 3)	1	5

CRC, colorectal cancer; IQR, interquartile range.

Association between various factors and the choice to undergo CRC screening

The researchers categorized all collected data into the following groups for analysis according to the study hypotheses: those who had undergone or decided to undergo CRC screening (screening group) and those who decided not to undergo screening (non-screening group). As the study aimed to examine factors associated with decision-making regarding CRC screening, individuals who had previously undergone screening were considered to have already demonstrated an intention to participate. Therefore, they were grouped with those who expressed an intention to undergo CRC screening, as both groups exhibit the same underlying intention to be screened. Preliminary association testing was performed using the chi-square test and the Mann-Whitney U test. Factors or variables with a $P < 0.2$ were then included in a binary logistic regression analysis to assess the associations between variables. Having considered the significant variables, those with a positive coefficient ($\text{Exp(B)} > 1$) were found to be associated with an increased likelihood of older individuals choosing to

undergo CRC screening, whereas those with a negative coefficient ($\text{Exp(B)} < 1$) were associated with a decreased likelihood of choosing to undergo screening.

Preliminary analysis using the chi-square test and Mann-Whitney U test revealed that the following variables were preliminarily associated with the decision to undergo CRC screening: highest education level ($P = 0.069$), marital status ($P = 0.01$), level of risk for developing CRC ($P < 0.001$), history of any type of cancer ($P = 0.06$), having a direct relative with a history of any type of cancer ($P = 0.024$), attitudes toward cancer screening ($P < 0.001$), importance placed on early detection ($P < 0.001$), concern about physical discomfort that might arise from CRC screening ($P = 0.013$), feelings of embarrassment or unease about screening ($P < 0.001$), fear of being denied screening ($P < 0.001$), belief that their attending physician would choose the best and most appropriate treatment ($P = 0.067$), confidence in their attending physician ($P = 0.011$), and having a person close to them, a family member, or an acquaintance who had undergone CRC screening ($P = 0.006$).

Table 3. Factors associated with CRC screening uptake among older individuals, analyzed using binary logistic regression.

Independent variables	β	S.E.	Wald	P-value	Adjusted odds ratio	95% CI
Status						
Marital status	Reference					
Single	0.204	0.302	0.455	0.500	1.226	0.68–2.22
Widowed	-0.643	0.474	1.841	0.175	0.525	0.21–1.33
Divorced	-2.79	1.048	7.08	0.008	0.061	0.01–0.49
Risk for developing CRC						
Moderate	Reference					
High	1.8	0.467	14.834	<0.001	6.052	2.42–15.13
Attitudes that cancer screening can be performed without the need for a symptom to be present						
Disagreed	Reference					
Agreed	1.295	0.262	24.502	<0.001	3.651	2.19–6.10
Recognizing the importance of early detection						
No	Reference					
Yes	0.846	0.289	8.571	0.003	2.33	1.32–4.11
Constant	-0.251	0.334	0.564	0.453	0.778	

CI, confidence interval; CRC, colorectal cancer; SE, standard error of the mean.

Multivariable logistic regression analysis was then conducted to identify the factors associated with the outcome variable. Regression coefficients and their SEs were estimated using maximum likelihood estimation. OR and 95%CI were obtained by exponentiating the regression coefficients. A $P < 0.05$ was considered significant.

Variables with preliminary associations were entered into a binary logistic regression model using the forward stepwise likelihood ratio method. Four variables were significant at the 95%CI level ($P < 0.05$): having a high risk for CRC (adjusted odds ratio (aOR) 6.05, 95%CI 2.42–15.13), having a positive attitude toward cancer screening (aOR 3.65, 95%CI 2.19–6.097), recognizing the importance of early detection (aOR 2.33, 95%CI 1.323–4.11), and being divorced, compared to being married (aOR 0.06, 95%CI 0.01–0.49) (Table 3).

Association between various factors and the choice of colonoscopy vs. fecal occult blood testing for CRC screening

Considering the participants who chose to undergo CRC screening, there were 320 individuals in total: 290 chose colonoscopy, and 90 chose the fecal occult blood test. When considering significant variables, it was found that those with a positive coefficient ($\text{Exp}(B) > 1$) were associated with a higher likelihood of older individuals choosing colonoscopy, whereas

variables with a negative coefficient ($\text{Exp}(B) < 1$) were associated with a lower likelihood of older individuals selecting colonoscopy as the screening method.

The analysis of preliminary associations using the chi-square test and the Mann-Whitney U test revealed that the following variables are preliminarily associated with the choice of CRC screening method: highest education level ($P = 0.004$), marital status ($P = 0.050$), risk level for developing CRC ($P = 0.194$), history of any cancer ($P = 0.175$), importance placed on early detection ($P = 0.158$), concerns about possible side effects following CRC screening ($P = 0.118$), level of fear of developing cancer in the future ($P = 0.191$), trust that their attending physician would choose the best and most appropriate treatment ($P = 0.147$), and confidence in their attending physician ($P = 0.117$) (Table 4).

When variables with preliminary associations were further analyzed using binary logistic regression through the forward stepwise likelihood ratio, three variables were found to be significant at the 95%CI level ($P < 0.05$): Having at least a bachelor's degree (aOR 0.428, 95%CI 0.24–0.75), being single compared to being married (aOR 2.075, 95%CI 1.20–3.58), and concerns about physical discomfort that might arise from CRC screening (aOR 0.409, 95%CI 0.19–0.90) (Table 5).

Table 4. Factors associated with the choice of CRC screening method analyzed by Chi-square and Mann-Whitney U Tests.

Variables	Colonoscopy		Fecal occult blood test		χ^2	P-value
	(N)	(%)	(N)	(%)		
Sex					0.28	0.506
Male (n = 94)	70	74.5%	24	25.5%		
Female (n = 226)	160	70.8%	66	29.2%		
Age					0.062	0.969
60-65 (n = 93)	67	72.0%	26	28.0%		
66-70 (n = 107)	76	71.0%	31	29.0%		
71-75 (n = 120)	87	72.5%	33	27.5%		
Highest level of education					8.161	0.004
Lower than a Bachelor's Degree (n = 74)	43	58.1%	31	41.9%		
At least a Bachelor's Degree (n = 246)	187	76.0%	59	24.0%		
Marital status					7.82	0.05
Single (n = 92)	57	62.0%	35	38.0%		
Married (n = 212)	162	76.4%	50	23.6%		
Widowed (n = 14)	9	64.3%	5	35.7%		
Divorced (n = 2)	2	100.0%	0	0.0%		
Average household income (THB) mean $\pm$ SD	56,240.0 $\pm$ 60,034.5		51,724.44 $\pm$ 40,424.3			0.985
Risk for developing CRC					1.688	0.194
Moderate risk (n = 238)	166	69.8%	72	30.3%		
High risk (n = 82)	64	78.1%	18	22.0%		
History of any form of cancer					1.844	0.175
No (n = 278)	204	73.4%	74	26.6%		
Yes (n = 42)	26	61.9%	16	38.1%		
Having a direct relative with a history of any form of cancer					0.102	0.749
No (n = 145)	106	73.1%	39	26.9%		
Yes (n = 175)	124	70.9%	51	29.1%		
Cancer screening can be performed without the need for a symptom to be present					0.604	0.437
Disagreed (n = 81)	55	67.9%	26	32.1%		
Agreed (n = 239)	175	73.2%	64	26.8%		
Recognizing the importance of early detection					1.993	0.158
No (n = 51)	32	62.7%	19	37.3%		
Yes (n = 269)	198	73.6%	71	26.4%		
Concerns about physical discomfort that might arise from CRC screening					0.000	1.000
Not concerned (n = 179)	129	72.1%	50	27.9%		
Concerned (n = 141)	101	71.6%	41	29.1%		
Concerns about the potential side effects following CRC screening					2.441	0.118
Not concerned (n = 270)	189	70.0%	81	30.0%		
Concerned (n = 50)	41	82.0%	9	18.0%		
Feeling embarrassed or uneasy about undergoing CRC screening					0.007	0.932
No (n = 294)	212	72.1%	82	27.9%		
Yes (n = 26)	18	69.2%	8	30.8%		
Being afraid of being denied CRC screening					0.011	0.915
No (n = 213)	154	72.3%	59	27.7%		
Yes (n = 107)	76	71.0%	31	29.0%		
Level of fear of developing any form of cancer someday (scored) mean $\pm$ SD	2.9 $\pm$ 1.4		2.6 $\pm$ 1.4			0.191
Level of fear of dying from cancer someday (scored) mean $\pm$ SD	1.8 $\pm$ 1.1		1.8 $\pm$ 1.1			0.875
Confidence that the attending physician will choose the best and most appropriate treatment for them (scored) mean $\pm$ SD	4.4 $\pm$ 0.7		4.3 $\pm$ 0.7			0.147

Table 4. (Cont.) Factors associated with the choice of CRC screening method analyzed by Chi-square and Mann-Whitney U Tests.

Variables	Colonoscopy		Fecal occult blood test		χ^2	P-value
	(N)	(%)	(N)	(%)		
Level of trust in the attending physician (scored) mean $\pm$ SD	4.5 $\pm$ 0.7		4.4 $\pm$ 0.7			0.117
Having a person close to them, a family member, or an acquaintance who has undergone CRC screening					0.557	0.456
No (n = 109)	75	68.8%	34	31.2%		
Yes (n = 211)	155	73.5%	56	26.5%		
Having had prior exposure to information about CRC screening through various media channels					0.004	0.949
No (n = 120)	87	72.5%	33	27.5%		
Yes (n = 200)	143	71.5%	57	28.5%		

CRC, colorectal cancer

Table 5. Factors associated with the choice of CRC screening method among older individuals, analyzed using binary logistic regression.

Independent variables	β	S.E.	Wald	P-value	Adjust odd ratio	95% CI
Highest level of education						
Lower than a Bachelor's Degree					Reference	
At least a Bachelor's Degree	-0.849	0.289	8.618	0.003	0.428	0.23–0.75
Marital status						
Married					Reference	
Single	0.730	0.278	6.902	0.009	2.075	1.20–3.58
Widowed	0.437	0.594	0.541	0.462	1.548	0.48–4.96
Divorced	-19.924	28420.721	0	0.999	0.000	0.00–0.00
Concerns about the potential side effects following CRC screening						
Not concerned					Reference	
Concerned	-0.895	0.404	4.898	10.027	0.409	0.19–0.90
Constant	-0.430	0.274	2.457	10.117	0.650	

CI, confidence interval; CRC, colorectal cancer.

Discussion

In this study, the participants were individuals attending the Comprehensive Geriatric Clinic at King Chulalongkorn Memorial Hospital, Thai Red Cross Society. The clinic provides health screening, health promotion, and comprehensive geriatric assessments, as well as advice and services focused on disease prevention and health promotion. As a result of these services, people who seek care at the Comprehensive Geriatric Clinic tend to be more health-conscious and more likely to attend activities for health promotion, disease prevention, and various screening programs than the general population. This may be the reason why the majority of participants in this study had already undergone or chose to undergo CRC screening, which contrasts with the generally low rate of screening observed nationwide in Thailand.⁽²⁾

This study found that the factor most strongly associated with undergoing CRC screening was the individual's risk of developing CRC. Specifically, older individuals at high risk of CRC were 6.1 times more likely to undergo screening than those at average risk. This finding is consistent with studies by Thomas M. Atkinson TM, *et al.*⁽³⁾ and Eunji Choi, *et al.*⁽⁴⁾, which found that a patient's awareness of their own level of risk for developing CRC was a significant factor promoting screening uptake. These results suggest that any intervention that increases older individuals' awareness of their personal risk of CRC is likely to have the greatest impact on their decision to undergo screening and may help increase screening rates.

The next most significant factors associated with CRC screening were attitudes toward screening and the importance placed on early detection. Older individuals with a positive attitude toward cancer

screening were 3.651 times more likely to undergo CRC screening than those without such attitudes. In addition, individuals who agreed that cancer screening could be performed without the need for symptoms were also 3.651 times more likely to undergo CRC screening. Similarly, older individuals who recognized the importance of early detection were 2.330 times more likely to undergo CRC screening than those who did not. These findings align with previous studies by Gimeno Garcia AZ, *et al.*⁽⁵⁾ and Sifri R, *et al.*⁽⁶⁾ which showed that having a positive attitude toward disease screening and awareness of its benefits were important factors in promoting CRC screening. These two factors clearly illustrate that when individuals have a positive attitude and are aware of the benefits of screening, they are more likely to take an active role in their own health care, including participating in various screening programs. Therefore, if positive attitudes toward, or awareness of, the benefits and importance of screening among older individuals can be promoted, this will likely increase uptake of CRC screening in this population.

Another factor associated with CRC screening among older individuals in this study was divorced marital status. Research by B. El-Haddad, *et al.*⁽⁷⁾ and Mie Agermose Gram, *et al.*⁽⁸⁾ similarly showed that patients who were divorced, never married, or widowed had lower rates of CRC screening than those who were married or partnered. This finding is consistent with the present study, which found that older individuals who were divorced were significantly less likely to undergo CRC screening than those who were married.

In addition, a factor associated with the choice of colonoscopy as the screening method among older individuals was a concern about possible side effects following CRC screening. Older individuals concerned about such side effects were 0.4 times as likely to choose colonoscopy as those not concerned about them. This can be explained by the fact that, when comparing fecal occult blood testing with colonoscopy, colonoscopy may carry side effects for patients. In contrast, fecal occult blood testing involves only submitting a stool sample and does not present such risks to patients.

Other factors associated with the choice of colonoscopy as the CRC screening method included higher education and single marital status. Specifically, among participants with the highest level of education, those with at least a bachelor's degree were only 0.428 times as likely to choose colonoscopy as those with lower levels of education. This finding may contrast

with most previous studies, such as the study by Chen CC, *et al.*⁽⁹⁾, which argued that individuals with higher education levels generally have greater health literacy and a better understanding of disease prevention and the CRC screening process and are therefore more likely to choose colonoscopy for screening. Similarly, Frederiksen BL, *et al.*⁽¹⁰⁾ reported that higher education was a positive factor for choosing colonoscopy. However, some studies have found higher uptake of colonoscopy among those with lower levels of education, such as the study by Hermann S, *et al.*⁽¹¹⁾ which found that those with only secondary education were more likely to choose colonoscopy than those with a bachelor's degree.

Furthermore, the majority of single participants were more likely to choose colonoscopy as the method for CRC screening than those who were married. This finding contrasts with previous studies by Stimpson JP, *et al.*⁽¹²⁾ and Anderson JC, *et al.*⁽¹³⁾ which reported that individuals who were single were less likely to undergo colonoscopy for CRC screening compared to those who were married or partnered.

However, a notable limitation of the present study is the very small sample size within certain categories. This may compromise the interpretability of the findings, thereby potentially leading to unstable statistical estimates and extreme ORs.

This research was conducted at a single point in time (a cross-sectional study). Therefore, the findings can only indicate the degree and direction of associations among various factors; they cannot establish causal relationships regarding the factors influencing older individuals' decisions to undergo CRC screening.

Because this study recruited participants from the Comprehensive Geriatric Clinic, which provides health promotion services, the data collected were specific to this group. Moreover, most patients at this clinic tend to have a relatively high socioeconomic status, reside in urban areas, and possess higher levels of education. These characteristics differ significantly from those of the average elderly population in Thailand. This discrepancy may reflect selection bias, as the study population is not fully representative of the broader national population. Consequently, the patterns of decision-making regarding CRC screening observed in this study may differ from those of the general older adult population.

For further application of these findings, it is important to note that the factors associated with older individuals' decisions to undergo CRC screening include modifiable and personal factors. The

modifiable factors identified in this study are attitudes toward cancer screening and recognition of the importance of early detection. Therefore, in addition to providing information about CRC screening, efforts to promote appropriate attitudes toward screening and raise awareness of the importance of early detection may help increase the CRC screening rate among the elderly population in Thailand.

As for recommendations for future studies, research should be conducted with a broader, more diverse group of older adults to ensure that the findings are representative of the national elderly population. In addition, clearly defined comparison groups should be included in the study to better establish causal relationships, in line with sound research methodology.

Conclusion

The factor most positively associated with the decision to undergo CRC screening was a high risk of CRC. This was followed by a positive attitude toward cancer screening and recognition of the importance of early detection. In contrast, a divorced marital status, compared to being married, was negatively associated with the decision to undergo CRC screening.

The positive factor influencing older individuals to choose colonoscopy as their CRC screening method was being single rather than married. However, the negative factors included at least a bachelor's degree and concerns about physical discomfort that might arise from the CRC screening procedure.

Author contributions

CT, NS, TP, BM, and VV contributed substantially to the study's concept and design. CT and NS contributed to the literature review, its analysis, and interpretation. CT, NS, and BM contributed substantially to data acquisition. CT and NS contributed to drafting the manuscript. CT and NS edited the manuscript critically for important intellectual content. All authors approved the final version submitted for publication and take responsibility for statements made in the published article.

Acknowledgments

The authors thank the patients who participated in this study and the healthcare personnel at the Comprehensive Geriatric Clinic, King Chulalongkorn Memorial Hospital, for their cooperation and support throughout the research process.

Conflicts of interest statement

The authors declare no conflict of interest.

Data sharing statement

Data are available from the corresponding author upon reasonable request for non-commercial purposes.

ORCID

Chalisa Thanapura  <https://orcid.org/0009-0005-5334-520X>

Nawasiri Siriprasert  <https://orcid.org/0009-0003-2106-0002>

Thacha Pithayapibulpong  <https://orcid.org/0000-0001-7102-1114>

Bhorn-Ake Manasvanich  <https://orcid.org/0009-0009-1820-3467>

Vichai Viriyautsahakul  <https://orcid.org/0000-0002-7720-8462>

References

1. Lohsiriwat V, Chaisomboon N, Pattana-Arun J. Current Colorectal Cancer in Thailand. *Ann Coloproctol* 2020;36:78–82.
2. Charoenkajornchai S, Sangrajang S, Dhamaraks S. Colorectal cancer screening in the Thai public health system. *Thai Cancer J* 2002;42:86–103.
3. Atkinson TM, Salz T, Touza KK, Li Y, Hay JL. Does colorectal cancer risk perception predict screening behavior? A systematic review and meta-analysis. *J Behav Med* 2015;38:837–50.
4. Choi E, Lee YY, Suh M, Park B, Jun JK, Kim Y, et al. Associations of perceived risk and cancer worry for colorectal cancer with screening behaviour. *J Health Psychol* 2018;23:840–52.
5. Gimeno Garcia AZ, Hernandez Alvarez Buylla N, Nicolas-Perez D, Quintero E. Public awareness of colorectal cancer screening: knowledge, attitudes, and interventions for increasing screening uptake. *ISRN Oncol* 2014;2014:425787.
6. Sifri R, Rosenthal M, Hyslop T, Andrel J, Wender R, Vernon SW, et al. Factors associated with colorectal cancer screening decision stage. *Prev Med* 2010;51:329–31.
7. El-Haddad B, Dong F, Kallail KJ, Hines RB, Ablah E. Association of marital status and colorectal cancer screening participation in the USA. *Colorectal Dis* 2015;17:O108–14.
8. Gram MA, Therkildsen C, Clarke RB, Andersen KK, Mørch LS, Tybjerg AJ. The influence of marital status and partner concordance on participation in colorectal cancer screening. *Eur J Public Health* 2021;31:340–6.

9. Chen CC, Basch CE, Yamada T. An evaluation of colonoscopy use: implications for health education. *J Cancer Educ* 2010;25:160–5.
10. Frederiksen BL, Jørgensen T, Brasso K, Holten I, Osler M. Socioeconomic position and participation in colorectal cancer screening. *Br J Cancer* 2010;103: 1496–501.
11. Hermann S, Friedrich S, Haug U, Rohrmann S, Becker N, Kaaks R. Association between socioeconomic and demographic characteristics and utilization of colonoscopy in the EPIC-Heidelberg cohort. *Eur J Cancer Prev* 2015;24:81–8.
12. Stimpson JP, Wilson FA, Watanabe-Galloway S, Peek MK. The effect of marriage on utilization of colorectal endoscopy exam in the United States. *Cancer Epidemiol* 2012;36:e325–32.
13. Anderson JC, Fortinsky RH, Kleppinger A, Merz-Beyus AB, Huntington CG 3rd, Lagarde S. Predictors of compliance with free endoscopic colorectal cancer screening in uninsured adults. *J Gen Intern Med* 2011;26:875–80.