

# Barriers to Colorectal Cancer Screening in Jordan: A nationwide survey

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## Abstract

**Background:** Colorectal cancer is among the leading malignancies around the globe and, in Jordan, carries significant morbidity and mortality. It can be detected early through screening; nonetheless, the uptake of colorectal cancer screening in Jordan is substantially low due to unexplored causes.

**Aim:** This study sought to determine the underlying barriers that prevent Jordan's general population from undergoing colorectal cancer screening.

**Methods:** Using a self-administered questionnaire, this cross-sectional study evaluated the barriers and attitudes towards colorectal cancer screening in adults aged 45 and above living in Jordan.

**Results:** Of the 1477 study participants, 29.1% reported that the lack of information about screening was a major barrier, followed by the fear of potential complications arising from the performed test (10%), embarrassment associated with colonoscopy (7.8%) and fear of the results (7.4%). Only 9% of our study population underwent colonoscopy for colorectal cancer screening.

**Conclusion:** Lack of information and knowledge about colorectal cancer screening, misperceptions about the nature of available modalities, and embarrassment drive the low uptake of colorectal cancer screening in Jordan. A nationwide educational and awareness programme on colorectal cancer screening is warranted, with an emphasis on overcoming the barriers identified in this study.

Keywords: colorectal cancer, screening programmes, public health, colonoscopy

## Background

Colorectal cancer (CRC) is one of the most common cancers: it was the third most common cancer and second leading cause of cancer-related deaths worldwide for both genders in 2020 (1). CRC notably affects males more commonly, with a male: female ratio of 1.25:1. In Jordan, CRC is the second most common cancer, accounting for 10.7% of cancer cases in Jordan and for 9.8% of all cancer-related deaths in Jordan in 2016 (2).

CRC usually develops from a pre-existing non-malignant polyp that generally requires 5-15 years for malignant transformation. Because of this prolonged time interval, CRC is known to be one of the few malignancies that may be prevented through multiple processes, including modification of lifestyle and early detection. Multiple methods exist to screen for CRC, including faecal occult blood test (FOBT), flexible sigmoidoscopy and colonoscopy. For example, annual FOBT screening has been shown to decrease CRC mortality significantly (3). Additionally, screening by flexible sigmoidoscopy substantially reduced CRC incidence (4). Furthermore, CRC screening has been shown to reduce overall health care costs (5).

Despite well-established evidence of the benefits of screening, which has resulted in many countries adopting a national CRC screening programme, many barriers remain. For example, in the

United Kingdom, anticipated pain and embarrassment are among the most commonly cited reasons for aversion to screening (6). In Finland, males and individuals younger than 60 years tend to refuse screening more often than older individuals (7).

Even though CRC ranks highly in Jordan in both incidence and mortality, there is no national CRC screening programme, partly due to lack of data on the barriers to screening among the at-risk Jordanian population.

### ***Objective***

This study aimed to identify the key barriers that prevent individuals from undergoing CRC screening and colonoscopy in Jordan. The results may provide insight to policy-makers towards establishing a national CRC screening programme in Jordan.

## **Methodology**

A population-based cross-sectional study using a self-administered questionnaire was conducted across Jordan by enrolling participants from the Northern, Central and Southern regions of the country. Our exclusion criteria included participants younger than 45 years, in addition to those with an active or previous history of colorectal cancer.

The questionnaire was distributed by qualified health care workers, who underwent comprehensive data collection training for cross-sectional studies. The questionnaire was distributed across most of the Jordanian provinces and considered the population distribution across the regions. Potential participants were approached in a variety of settings, including mosques, hypermarkets, parks, schools and governmental institutions via a simple random convenience sampling method.

Verbal consent was obtained from the participants after explaining the concept and aim of the study and the right of the individual to withdraw from participation at any time. The health care workers were readily available to the participants during the questionnaire process to respond to any concerns. The study was conducted ethically in accordance with the World Medical Association Declaration of Helsinki in addition to obtaining an IRB approval from the IRB board of the Abdali Hospital (2021900001).

### ***Questionnaire***

The questionnaire was built in a multiple-step process. A review of similar studies was initially done before producing a preliminary questionnaire, which was reviewed by a gastroenterologist and a medical research expert. A pilot of 30 samples of the questionnaire was distributed to a population of different backgrounds to ensure that all participants understood every question. The final version of the questionnaire in Arabic was approved for the study, along with an English version for non-Arabic-speaking participants.

The questionnaire consisted of 27 questions: 25 multiple-choice and 2 fill-ins (date of birth and name of city/village/camp of residence). The questions were about demographics, presence of comorbidities, smoking status, family history of colon cancer, knowledge of screening modalities, and barriers that might interfere with or prevent participation in colorectal cancer screening.

### ***Study population***

The age of the target population was set at 45 years or older, as recent guidelines by the American Society of Gastroenterology recommend screening from the age of 45 rather than 50 (8). The population size of this age range was 1 806 880, according to Jordan's estimated population in 2019.

The sample size calculation was done with confidence level set at 95%, confidence interval set at 3; the determined sample size was 1066.

Our minimal expected sample size for the study was 1066. Accordingly, we approached 2000 participants, of whom 1607 agreed to enrol in the study, with a participation rate of 80.4%. Among the participants, 130 were excluded because their age was below 45 or they refused to finish the questionnaire. Consequently, 1477 participants were enrolled. At this sample size, the confidence interval was 2.55.

### ***Outcomes***

The aim of this study was to obtain data on the barriers to colorectal cancer screening among Jordan's population. We also aimed to gain insight into the population's awareness of screening modalities. This was done in relation to factors such as marital status, employment, educational level, insurance and gender. The study also assessed which factors could have influenced screening in those who underwent colorectal cancer screening. The attitude of participants towards screening methods was also studied.

### ***Data analysis***

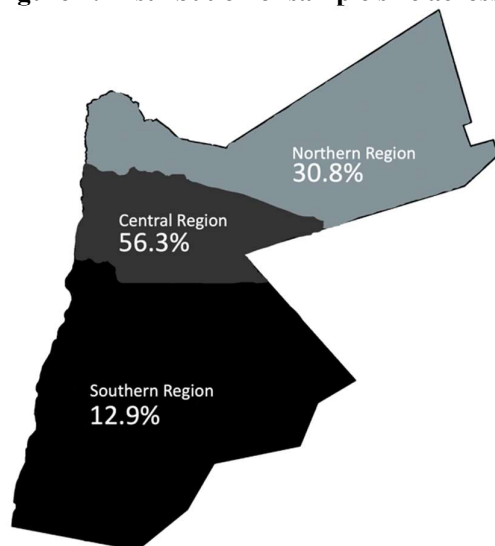
Data from 1477 questionnaires were obtained and a descriptive analysis was performed. All categorical data, such as age group, gender and other factors were presented as counts and percentages. The mean and standard deviation were calculated for continuous data, such as age. Chi-square ( $\chi^2$ ) tests were done to investigate the proportional differences. The significant association was set at  $P \leq 0.05$ . IBM SPSS Statistics for Windows 25.0 (Armonk, NY) was used for the analysis.

## **Results**

### ***Demographics***

In our sample, 942 (62.6%) participants were male, with a mean age of  $57.2 \pm 8.23$  years. More than half of the participants (831, or 56.3%) were from the Central region of Jordan, whereas 30.8% and 12.9% were from Northern and Southern regions of the country, respectively (see Figure 1).

**Figure 1: Distribution of sample size across regions in Jordan**



Notably, 87.3% of the participants were married at time of enrolment and were more likely to be an employer/employee (43.1%, n=637) or a retiree (23.8%, n=352). The predominant educational level among participants was bachelor's degree.

Although the most common type of insurance coverage in our sample was that provided by the ministry of health (41.3%, n=610) followed by Royal Medical Services (19.6%, n=290), 17.1% (n=253) of our participants were not medically insured.

### ***Knowledge of screening***

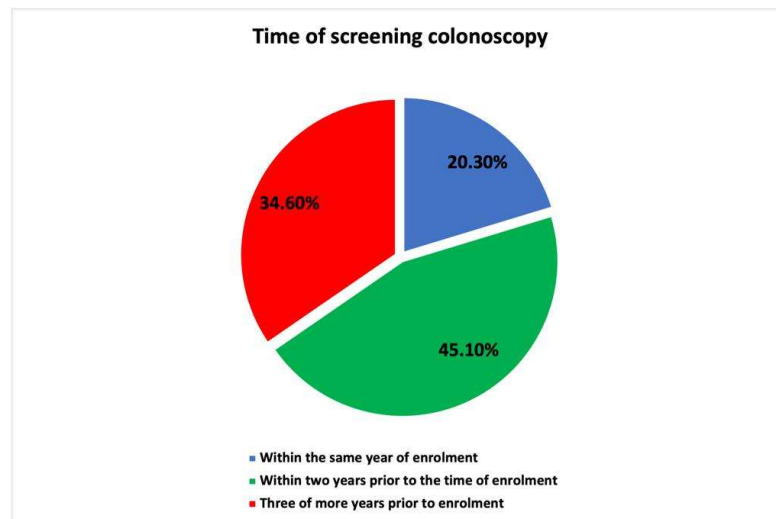
The majority of participants (61.7%, n=911) were unaware of the availability of screening tools for early CRC detection and prevention. Of those who knew, 39.6% (n= 224) were informed by a physician, 23.7% (n=134) by a friend or relative, and 35.7% (n=202) through awareness campaigns.

Among participants who were knowledgeable about CRC screening, their level of education was significantly associated: individuals with a postgraduate degree and those with a bachelor's degree were most likely to be aware of screening tools for CRC ( $P<0.001$ ). Additionally, males were more likely to be informed by a physician, in contrast to females, who tend to be informed through awareness campaigns ( $P<0.001$ ).

### ***Participants who underwent screening colonoscopy***

Among participants, 9% (n=133) underwent screening colonoscopy. Most of those who underwent screening colonoscopy had done it within two years prior to enrolment in our study (45.1%), whereas 20.3% had done it within the same year of enrolment, and 34.6% three or more years prior to enrolment (see Figure 2).

**Figure 2: Time of screening colonoscopy**



Our findings also reveal that individuals who had a postgraduate degree were most likely to undergo a screening colonoscopy compared to participants with lower educational levels ( $P<0.001$ ). Individuals with a family history of CRC were significantly associated with previously undergoing a screening colonoscopy ( $P=0.005$ ). Participants who have had a screening colonoscopy were also more likely to have medical insurance ( $P=0.014$ ).

Moreover, individuals who have had a screening colonoscopy were significantly more knowledgeable about the availability of CRC screening tools ( $P<0.001$ ) and more often informed about CRC screening by a physician ( $P=0.001$ ). However, there was no significant difference based

on gender and employment status. Table 1 summarizes the characteristics of patients who underwent screening colonoscopy in comparison to those who did not. Table 2 summarizes the relationship between the level of education and the presence of prior knowledge of screening and its modalities in association with the key reported barriers.

[Note for layout: place Tables 1 and 2 near here]

### *Attitudes towards screening colonoscopy*

Among participants who answered, “I do not have enough information” (29.1%) when asked if they would undergo a screening colonoscopy, employment status was statistically significant: unemployed individuals and housewives were more likely to choose this answer.

Prior CRC screening knowledge was also significant: participants who were unaware of the availability of CRC screening tools were more likely to choose this answer ( $P<0.001$ ). However, there was no significant association with gender or educational status (see Table 3).

[Note for layout: place Table 3 near here]

There was a statistically significant association between refusal to undergo screening colonoscopy due to “fear of the results” and gender: females were more likely to fear the results of the screening test ( $P<0.001$ ). On the contrary, there was no significant association between fear of test results and region, marital status, educational level or prior knowledge about screening colonoscopy (see Table 4).

[Note for layout: place Table 4 near here]

Among participants who refused screening colonoscopy because of embarrassment, there was a significant lack of prior knowledge of screening ( $P=0.003$ ). There were no significant associations between embarrassment of colonoscopy and gender, marital and educational status (see Table 5).

[Note for layout: place Table 5 near here]

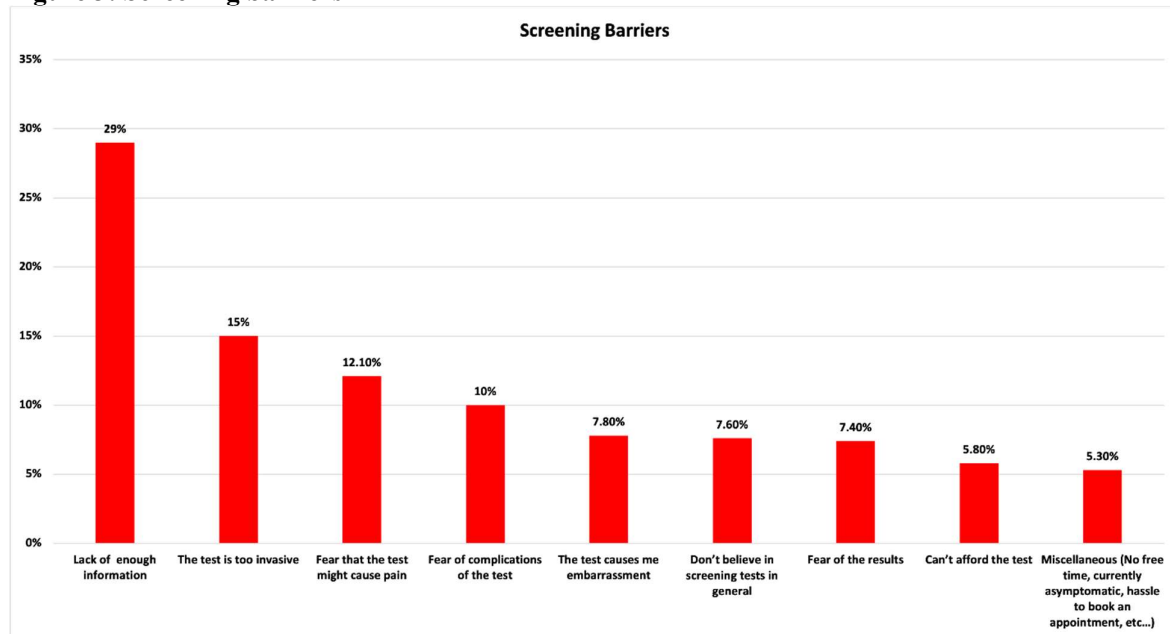
Among participants who answered, “I fear complications of the procedure” when asked if they would undergo a screening colonoscopy (10%), educational status was significant: participants who only finished primary/elementary school were more likely to refuse screening colonoscopy due to fear of complications compared to college graduates ( $P<0.001$ ).

Participants with no previous knowledge of CRC screening were also more likely to fear complications ( $P<0.001$ ) (see Table 6).

[Note for layout: place Table 6 near here]

Figure 3 shows all of the reported barriers to CRC screening and their prevalence among the participants.

**Figure 3: Screening barriers**



### ***Faecal occult blood test as a screening tool***

Of the study participants, 6.5% (n=94) had previously undergone FOBT for CRC screening purposes. These participants were found to be more knowledgeable and aware of the role of screening in the prevention of CRC ( $P<0.001$ ). The key barriers to using FOBT as a screening tool were identified as lack of knowledge and awareness of FOBT, fear of the test, particularly in individuals with no prior knowledge about screening modalities, lack of belief in the benefit of screening, and inability to afford the test.

## **Discussion**

Jordan lacks an established CRC screening programme or well-structured and comprehensive awareness campaigns targeted towards CRC. There are many reasons for the absence of these vital healthcare initiatives and programmes.

An insufficient number of studies have been conducted in Jordan that tackle the barriers associated with CRC screening. Those studies also targeted age groups that were partially or fully out of the scope of CRC screening at the time of the study and, in some instances, only included a small sample size (9–11). Coupled with the fact that Jordan is a lower-middle-income country with limited resources, these factors may help explain the lack of comprehensive national screening and awareness programmes.

Our study included 1477 participants from all Jordanian regions, exceeding previous studies in Jordan, and provides a more general indication of the barriers to CRC screening in the country (9,10).

In Jordan, knowledge of the availability of CRC screening methods is low (around 20%) (9–11). However, approximately 38.3% of study participants said they were aware of CRC screening, with 42.4% aware of both colonoscopy and FOBT as screening tools. Our sample's CRC screening knowledge, despite being higher than previous studies in Jordan, is lower than in developed countries, such as Spain and the United States (12,13).

Our study revealed a positive association between the level of education and an individual's awareness of CRC screening. Those with a higher educational status were more knowledgeable about CRC screening, thus conflicting with Taha et al. results (9), which found no such association.

Despite the fact that 30.9% of our sample was knowledgeable about the availability and use of colonoscopy as a screening tool, only 9% of the participants underwent screening colonoscopy. This suggests that many factors in a complex process – other than lack of knowledge – prevent individuals from undergoing screening.

A study in neighbouring West Bank also yielded very low participation rates for CRC screening; only 7% of their sample had previously undergone screening colonoscopy. Similar participation rates elsewhere in the Eastern Mediterranean region are expected due to significant overlap and resemblance of sociocultural practices.

Turkey's engagement rate (20-30%) in CRC screening practices is substantially higher than Jordanian and Palestinian participation rates, but lower than some European countries (14); for instance, 43% has been reported in the United Kingdom (15). However, in Germany only 2-3% of individuals eligible for screening colonoscopy undergo the procedure (16). These rates reinforce the notion that participation in CRC screening, particularly colonoscopy, is limited due to various barriers.

One of the widely noted barriers to CRC screening is the lack of sufficient knowledge of the availability of screening modalities (17–20). Similarly, approximately 29% of our sample lack sufficient knowledge and adequate information about CRC screening. One way to overcome this is through educational programmes using videos to improve awareness and knowledge of screening (21).

Another barrier, particularly among females, is fear of the potential results of the procedure. This could be due to a desire to learn about colorectal malignancy only at the onset of symptoms, as any positive results from testing could trigger anxiety (17,21). This finding is consistent with both regional and international studies, which indicate that an individual's fear of positive results is a major barrier to CRC screening (14,22,23). However, we did not find any studies indicating a compelling association between gender and fear of results.

Embarrassment is another barrier that prevents individuals from undergoing colonoscopy, as the procedure involves exposure of intimate body parts; this embarrassment is particularly significant in individuals who are aware only of colonoscopy as a screening tool for CRC. This finding can be further explained by the fact that Jordan is a conservative country that regards the exposure of intimate body parts, even for medical purposes and objectives, as repulsive. Embarrassment associated with colonoscopy is a universal barrier to CRC screening due to the nature of the procedure and, in some instances, measures taken to prepare the bowel (24).

Unlike FOBT, colonoscopy is an invasive procedure that can result in serious complications in very rare instances, primarily perforation and post-colonoscopy bleeding (25). Despite the rarity of such events, one of the anxiety-triggering factors among individuals undergoing colonoscopy is the fear of complications. A systematic review revealed that around 53% of individuals undergoing colonoscopy reported a fear of complications. Among those who refused colonoscopy, 21-32% reported that fear and anxiety about developing complications after the procedure was the deciding factor in avoiding the colonoscopy (25,26). This was also observed to a lesser extent in our study, where 148 (10%) participants said they would refuse to undergo screening colonoscopy due to fear of complications following the procedure.

Individuals who are only knowledgeable about colonoscopy as a screening method are also likely to refuse screening due to fear of complications. This indicates a lack of proper understanding of the

procedure and its setting; the incidence of complications following colonoscopy is approximately 0.05% with an even lower prevalence in colonoscopies conducted for screening purposes (25). Furthermore, individuals who would still refuse colonoscopy, despite having accurate information about the procedure, might benefit from learning about FOBT, as it is non-invasive.

Our study revealed that participants who underwent colonoscopy for screening purposes (9%) were significantly more knowledgeable about CRC screening and had a higher educational level than those who did not undergo colonoscopy, further highlighting the importance of knowledge and education. A previous study in Jordan conducted by Taha et al. (9) reported similar results, where pre-existing knowledge of CRC and available screening tools were significantly associated with undergoing CRC screening.

We also found a significant relationship between participants who underwent screening colonoscopy and those who are informed about CRC methods by a physician. This aligns with the findings of Honein-AbouHaidar et al. (24), which indicated that primary care physicians' advice and recommendations positively influence CRC screening uptake.

We also identified a strong association between participation in screening colonoscopy and a positive family history, which is consistent with findings from several studies indicating higher participation rates in CRC screening among first-degree relatives of CRC patients; Mack et al. (27) reported a participation rate of approximately 70% among first-degree relatives (27–31).

### ***Limitations***

The study may be limited by the use of a self-administered questionnaire and its quantitative nature rather than a qualitative or combined study design. Furthermore, our sample was predominantly male. However, our study design was principally driven by a cultural aspect of Jordan, where asking direct questions to individuals involving privacy or embarrassment is unacceptable. Accordingly, a quantitative study design with a self-administered questionnaire was determined to be the most culturally appropriate. The male-to-female ratio of our sample can be explained by the same rationale. The focus of this study was predominantly on colonoscopy as a screening modality rather than other available screening tests, mostly due to its higher sensitivity.

### **Conclusion**

Our findings show that, in addition to the lack of knowledge of CRC screening, there is also an apparent perceived fear of the results of the screening methods and complications that could arise following colonoscopy, and a feeling of embarrassment from the procedure. Nonetheless, these limitations could be successfully tackled with nationwide awareness campaigns. Accordingly, our results could provide the basis for establishing effective awareness campaigns and screening programmes.



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**Table 1: Characteristics of participants who underwent screening colonoscopy compared to those who did not**

\* Not all participants answered this question.

Variable	Category	Colonoscopy (%)	No Colonoscopy (%)	N (%)	P value
<b>N</b>	Total	133(9%)	1344(91%)	1477(100%)	
<b>Gender</b>		133(9%)	1344(91%)	1477(100%)	0.066
	Male	93(69.9%)	831(61.8%)	924(62.2%)	
	Female	40(30.1%)	513(38.2%)	553(37.4%)	
<b>Marital status*</b>		133(9%)	1336(91%)	1469(100%)	0.245
	Single	2(1.5%)	59(4.4%)	61(4.2%)	
	Married	123(92.5%)	1167(87.4%)	1290(87.9%)	
	Divorced	1(0.8%)	29(2.2%)	30(2%)	
	Widowed	7(5.3%)	81(6.1%)	88(6%)	
<b>Education*</b>		132(9%)	1342(91%)	1474(100%)	<0.001
	Primary/elementary	17(12.9%)	321(23.9%)	338(22.9%)	
	High school diploma	24(18.2%)	266(19.8%)	290(19.7%)	
	College diploma	22(16.7%)	248(18.3%)	2700(18.3%)	
	Bachelor's degree	42(31.8%)	390(29.1%)	432(29.3%)	
	Master's/PhD	27(20.5%)	117(8.7%)	144(9.8%)	
<b>Employment*</b>		133(9%)	1342(91%)	1475(100%)	0.607
	Office job	62(46.6%)	575(42.8%)	637(43.2%)	
	Tradesperson	12(9%)	90(6.7%)	102(6.9%)	
	Unemployed	7(5.3%)	53(3.9%)	60(4.1%)	
	Housewife	23(17.3%)	254(18.9%)	277(18.8%)	
	Retired	25(18.8%)	427(24.4%)	352(23.9%)	
	Unemployed due to illness	4(3%)	43(3.2%)	47(3.2%)	
<b>Family history of CRC</b>		43(32.3%)	294(21.9%)	337(22.8%)	0.005
<b>Prior screening knowledge*</b>		108(81.2%)	458(34.2%)	566(38.4%)	<0.001
<b>Knowledge method*</b>		104(18.6%)	456(81.4%)	560(100%)	0.001

	Physician	59(56.7%)	165(36.2%)	224(40%)	
	Friend/relative	18(17.3%)	116(25.4%)	134(23.9%)	
	Awareness campaign	27(26%)	175(38.4%)	202(36.9%)	
<b>Insurance*</b>		132(9%)	1342(91%)	1474(100%)	0.014
	No insurance	14(10.6%)	239(17.8%)	253(17.2%)	
	Ministry of health	53(40.2%)	557(41.5%)	610(41.4%)	
	Military	25(18.8%)	265(19.7%)	290(19.7%)	
	University hospitals	12(9.1%)	52(3.8%)	64(4.3%)	
	Private companies	28(21.2%)	229(17.1%)	257(17.4%)	

**Table 2: Relationship between level of education and prior knowledge of screening modalities in association with the key reported barriers**

\* Not all participants answered this question.

Variable	Category	N (%)	Yes (%)	No (%)	P value
<b>Lack of information as a barrier to screening:</b>					
<b>Education*</b>		1474(100%)	429(29.1%)	1045(70.9%)	0.204
	Primary/elementary	338(22.9%)	116(27%)	222(21.2%)	
	High school diploma	290(19.7%)	79(18.4%)	211(20.2%)	
	College diploma	270(18.3%)	75(17.5%)	195(18.7%)	
	Bachelor's degree	432(29.3%)	121(28.2%)	311(29.8%)	
	Master's/PhD	144(9.8%)	38(8.9%)	106(10.1%)	
<b>Prior screening knowledge*</b>		566(100%)	110(25.6%)	456(43.7%)	<0.001
<b>Knowledge method*</b>		560(100%)	108(19.3%)	452(80.7)	0.045
	Physician	224(40%)	33(30.6%)	191(42.3%)	
	Friend/relative	134(23.9%)	26(24.1%)	108(23.9*)	
	Awareness campaign	202(36.2%)	49(45.4%)	153(33.8%)	
<b>Fear of the results as a barrier to screening:</b>					
<b>Education*</b>		1474(100%)	109(7.4%)	1365(92.6%)	0.077
	Primary/elementary	338(22.9%)	17(15.6%)	321(23.5%)	
	High school diploma	290(19.7%)	29(26.6%)	261(19.1%)	
	College diploma	270(18.3%)	21(19.3%)	249(18.2%)	
	Bachelor's degree	432(29.3%)	36(33%)	396(29%)	
	Master's/PhD	144(9.8%)	6(5.5%)	138(10.1%)	
<b>Prior screening knowledge*</b>		566(100%)	42(38.5%)	524(38.4%)	0.981
<b>Knowledge method*</b>		560(100%)	42(7.5%)	518(92.5%)	0.917

	Physician	244(40%)	17(40.5%)	207(40%)	
	Friend/relative	134(23.9%)	9(21.4%)	125(24.1%)	
	Awareness campaign	202(36.1%)	16(38.1%)	186(35.9%)	
<b>Embarrassment from colonoscopy as a barrier to screening:</b>					
<b>Education*</b>		1474(100%)	115(7.8%)	1359(92.2%)	0.267
	Primary/elementary	338(22.9%)	26(22.6%)	312(23%)	
	High school diploma	290(19.7%)	29(25.2%)	261(19.2%)	
	College diploma	270(18.3%)	25(21.7%)	245(18%)	
	Bachelor's degree	432(29.3%)	27(23.5%)	405(29.8%)	
	Master's/PhD	144(9.8%)	8(7%)	136(10%)	
<b>Prior screening knowledge*</b>		566(100%)	59(51.3%)	507(37.3%)	0.003
<b>Knowledge method*</b>		560(100%)	57(10.2%)	503(89.8%)	0.109
	Physician	224(40%)	30(52.6%)	194(38.6%)	
	Friend/relative	134(23.9%)	12(21.1%)	122(24.3%)	
	Awareness campaign	202(36.9%)	15(26.3%)	187(37.2%)	
<b>Fear of complications as a barrier to screening:</b>					
<b>Education*</b>		1474(100%)	148(10%)	1326(90%)	<0.001
	Primary/elementary	338(22.9%)	59(39.9%)	279(21%)	
	High school diploma	290(19.7%)	27(18.2%)	263(19.8%)	
	College diploma	270(18.3%)	15(10.1%)	255(19.2%)	
	Bachelor's degree	432(29.3%)	37(25%)	395(29.8%)	
	Master's/PhD	144(9.8%)	10(6.8%)	134(10.1%)	
<b>Prior screening knowledge*</b>		566(100%)	35(23.6%)	531(40.1%)	<0.001
<b>Knowledge method*</b>		560(100%)	34(6.1%)	526(93.9%)	0.095
	Physician	224(40%)	13(38.2%)	211(40.1%)	
	Friend/relative	134(23.9%)	13(38.2%)	121(23%)	
	Awareness campaign	202(36.1%)	8(23.5%)	194(36.9%)	

**Table 3: Characteristics of the participants who reported the lack of information as a barrier to screening.**

\* Not all participants answered this question.

Variable	Category	Yes(%)	No(%)	N (%)	P value
<b>Gender</b>		429(29.1%)	1048(70.9%)	1477(100%)	0.178
	Male	257(59.9%)	667(63.6%)	924(62.5%)	
	Female	172(40.1%)	381(36.4%)	553(37.4%)	
<b>Education*</b>		429(29.1%)	1045(70.9%)	1474(100%)	0.204
	Primary/Elementary	116(27%)	222(21.2%)	338(22.9%)	
	High School Diploma	79(18.4%)	211(20.2%)	290(19.7%)	

	College Diploma	75(17.5%)	195(18.7%)	270(18.3%)	
	Bachelor's Degree	121(28.2%)	311(29.8%)	432(29.3%)	
	Master's/PhD	38(8.9%)	106(10.1%)	144(9.8%)	
<b>Employment*</b>		429(29.1%)	1045(70.9%)	1475(100%)	0.016
	Office Job	169(39.4%)	468(44.7%)	637(43.2%)	
	Tradesman	33(7.7%)	69(6.6%)	102(6.9%)	
	Unemployed	26(6.1%)	34(3.3%)	60(4.1%)	
	Housewife	94(21.9%)	183(17.5%)	277(18.8%)	
	Retired	91(21.2%)	261(25%)	352(23.9%)	
	Unemployed due to illness	16(3.7%)	31(3%)	47(3.2%)	
<b>Prior screening knowledge*</b>		110(25.6%)	456(43.7%)	566(100%)	<0.001
<b>Knowledge method*</b>		108(19.3%)	452(80.7)	560(100%)	0.045
	Physician	33(30.6%)	191(42.3%)	224(40%)	
	Friend/Relative	26(24.1%)	108(23.9*)	134(23.9%)	
	Awareness Campaign	49(45.4%)	153(33.8%)	202(36.2%)	

**Table 4: Characteristics of participants who reported fear of the results as a barrier to screening**

\* Not all participants answered this question.

Variable	Category	Yes(%)	No(%)	N (%)	P value
<b>Gender</b>		109(7.4%)	1368(92.6%)	1477(100%)	<0.001
	Male	48(44%)	876(64%)	942(62.6%)	
	Female	61(56%)	492(36%)	553(37.4%)	
<b>Education*</b>		109(7.4%)	1365(92.6%)	1474(100%)	0.077
	Primary/elementary	17(15.6%)	321(23.5%)	338(22.9%)	
	High school diploma	29(26.6%)	261(19.1%)	290(19.7%)	
	College diploma	21(19.3%)	249(18.2%)	270(18.3%)	
	Bachelor's degree	36(33%)	396(29%)	432(29.3%)	
	Master's/PhD	6(5.5%)	138(10.1%)	144(9.8%)	
<b>Employment*</b>		109(7.4%)	1366(92.6%)	1475(100%)	0.031
	Office job	45(41.3%)	592(43.3%)	637(43.2%)	
	Tradesperson	5(4.6%)	97(7.1%)	102(6.9%)	
	Unemployed	4(3.7%)	56(4.1%)	60(4.1%)	
	Housewife	33(30.3%)	244(17.9%)	277(18.8%)	
	Retired	21(19.3%)	331(24.2%)	352(23.9%)	

	Unemployed due to illness	1(0.9%)	46(3.4%)	47(3.2%)	
<b>Family history of CRC*</b>		23(21%)	314(23%)	337(100%)	0.657
<b>Prior screening knowledge*</b>		42(38.5%)	524(38.4%)	566(100%)	0.981
<b>Knowledge method*</b>		42(7.5%)	518(92.5%)	560(100%)	0.917
	Physician	17(40.5%)	207(40%)	244(40%)	
	Friend/relative	9(21.4%)	125(24.1%)	134(23.9%)	
	Awareness campaign	16(38.1%)	186(35.9%)	202(36.1%)	

**Table 5: Characteristics of participants who reported embarrassment from colonoscopy as a barrier to screening**

\* Not all participants answered this question.

<b>Variable</b>	<b>Category</b>	<b>Yes (%)</b>	<b>No (%)</b>	<b>N (%)</b>	<b>P value</b>
<b>Gender</b>		115(7.8%)	1362(92.2%)	1477(100%)	0.233
	Male	68(57.4%)	858(63%)	942(62.6%)	
	Female	49(42.6%)	504(37%)	553(37.4%)	
<b>Education*</b>		115(7.8%)	1359(92.2%)	1474(100%)	0.267
	Primary/elementary	26(22.6%)	312(23%)	338(22.9%)	
	High school diploma	29(25.2%)	261(19.2%)	290(19.7%)	
	College diploma	25(21.7%)	245(18%)	270(18.3%)	
	Bachelor's degree	27(23.5%)	405(29.8%)	432(29.3%)	
	Master's/PhD	8(7%)	136(10%)	144(9.8%)	
<b>Employment*</b>		115(7.8%)	1360(92.2%)	1475(100%)	0.013
	Office job	38(33%)	599(44%)	637(43.2%)	
	Tradesperson	13(11.3%)	89(6.5%)	102(6.9%)	
	Unemployed	3(2.6%)	57(4.2%)	60(4.1%)	
	Housewife	33(28.7%)	244(17.9%)	277(18.8%)	
	Retired	26(22.6%)	326(24%)	352(23.9%)	
	Unemployed due to illness	2(1.7%)	45(3.3%)	47(3.2%)	

<b>Prior screening knowledge*</b>		59(51.3%)	507(37.3%)	566(100%)	0.003
<b>Knowledge method*</b>		57(10.2%)	503(89.8%)	560(100%)	0.109
	Physician	30(52.6%)	194(38.6%)	224(40%)	
	Friend/relative	12(21.1%)	122(24.3%)	134(23.9%)	
	Awareness campaign	15(26.3%)	187(37.2%)	202(36.9%)	

**Table 6: Characteristics of participants who reported fear of complications as a barrier to screening**

\* Not all participants answered this question.

<b>Variable</b>	<b>Category</b>	<b>Yes (%)</b>	<b>No (%)</b>	<b>N (%)</b>	<b>P value</b>
<b>Gender</b>		148(10%)	1329(90%)	1477(100%)	0.317
	Male	87(58.8%)	837(63%)	924(62.6%)	
	Female	61(41.2%)	492(37%)	553(37.4%)	
<b>Education*</b>		148(10%)	1326(90%)	1474(100%)	<0.001
	Primary/elementary	59(39.9%)	279(21%)	338(22.9%)	
	High School diploma	27(18.2%)	263(19.8%)	290(19.7%)	
	College diploma	15(10.1%)	255(19.2%)	270(18.3%)	
	Bachelor's degree	37(25%)	395(29.8%)	432(29.3%)	
	Master's/PhD	10(6.8%)	134(10.1%)	144(9.8%)	
<b>Employment*</b>		148(10%)	1327(90%)	1475(100%)	<0.001
	Office job	71(48%)	566(42.7%)	637(43.2%)	
	Tradesperson	11(7.4%)	91(6.9%)	102(6.9%)	
	Unemployed	6(4.1%)	54(4.1%)	60(4.1%)	
	Housewife	34(23%)	243(18.3%)	277(18.8%)	
	Retired	14(9.5%)	338(25.5%)	352(23.9%)	
	Unemployed due to illness	12(8.1%)	35(2.6%)	47(3.2%)	
<b>Family history of CRC</b>		27(18.2%)	310(23.3%)	337(100%)	0.162
<b>Prior screening knowledge*</b>		35(23.6%)	531(40.1%)	566(100%)	<0.001
<b>Knowledge method*</b>		34(6.1%)	526(93.9%)	560(100%)	0.095
	Physician	13(38.2%)	211(40.1%)	224(40%)	



	Friend/relative	13(38.2%)	121(23%)	134(23.9%)	
	Awareness campaign	8(23.5%)	194(36.9%)	202(36.1%)	