RESEARCH ARTICLE

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Sociodemographic and Clinical Predictors of Colonoscopy Utilization in Oman: A Call to Action within a Population-Based Cross-Sectional Study

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Abstract

Objective: Colorectal cancer (CRC) is the second leading cause of cancer mortality in Oman, yet structured screening remains absent. Most cases are diagnosed at advanced stages, highlighting the need to understand predictors of colonoscopy uptake to inform national screening strategies. This study aimed to identify sociodemographic, perceptual, and healthcare-related factors associated with colonoscopy utilization whether for screening or diagnostic purposes among Omani adults. **Methods:** A nationwide, cross-sectional online survey was conducted using a structured questionnaire adapted from the Health Information National Trends Survey (HINTS) between March and August 2023. Recruitment was carried out using non-probability convenience sampling through digital platforms (Instagram, Facebook, Twitter, WhatsApp) and health networks. Data collected included sociodemographic factors, CRC risk perceptions, awareness, and healthcare interactions. Chi-square tests and multivariate regression analysis were used to identify predictors of colonoscopy uptake. **Results:** Of the 1,060 respondents, only 137 participants (12.9%) reported ever undergoing colonoscopy; the majority (67.2%) did so due to symptoms rather than for screening. Uptake was significantly higher among men, participants aged >40 years, those who were married, and those who were employed ($P < 0.05$). Colonoscopy recipients were more likely to perceive themselves at higher risk for CRC and report frequent worry about the disease ($P < 0.001$). Multivariable analysis identified three strong predictors of colonoscopy uptake: 1. Clinical indication (presence of symptoms; OR 63.9, 95% CI: 45.6–89.1); 2. Physician recommendation (OR 9.5, 95% CI: 2.9–30.0); 3. Perception of test effectiveness [trend-level association ($P = 0.054$)]. **Conclusion:** Colonoscopy utilization in Oman remains low and is largely symptom-driven. Uptake was higher among men aged over 40 years, those who were married, and those who were employed, indicating that socioeconomic and life-stage factors influence engagement with colorectal health services. Physician recommendation emerged as the strongest determinant of colonoscopy uptake. These findings highlight the urgent need for a national CRC screening program that integrates the Fecal Immunochemical Test (FIT) within physician-led pathways to promote early detection and prevention.

Keywords: Colorectal cancer- Screening- Colonoscopy- Predictors- Oman

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Introduction

Colorectal cancer (CRC) is a major global health issue, ranking as the third most commonly diagnosed malignancy and the second leading cause of cancer-related mortality worldwide [1]. The global burden is projected to rise, with an estimated 3.2 million new cases and 1.6 million deaths annually by 2040 [2]. This trend is driven by population aging, unhealthy lifestyles, and inadequate screening infrastructure, particularly in low- and middle-income countries [3]. Effective CRC screening programs have emerged as a critical strategy to curb both incidence and mortality by enabling early detection and removal of precancerous lesions [4]. Globally, the utilization of colonoscopy for CRC screening and early detection varies significantly. In high-income countries, such as the United States and Germany, colonoscopy is widely adopted as the primary screening modality and has contributed to observed declines in CRC mortality [5]. However, in low- and middle-income countries, uptake is often constrained by limited healthcare infrastructure, financial barriers, and a lack of organized screening programs, leading to significant disparities in early detection [6,7].

The Middle East, particularly Gulf Cooperation Council (GCC) countries, has witnessed a steady increase

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in CRC incidence over recent decades. Collectively, CRC accounts for roughly 14% of all cancer deaths in the region [4, 8–10]. Yet survival outcomes remain poor compared to Western countries, largely due to late-stage presentation and the absence of structured national screening programs. While initiatives such as Qatar's national screening program demonstrate regional feasibility, most GCC states, including Oman rely on patients' initiation in early detection of CRC.

In Oman, CRC is the second most common cancer among both men and women and remains the leading cause of cancer-related mortality. Alarmingly, over 90% of CRC cases in Oman are diagnosed at advanced stages, with only 5% detected at stage I, limiting opportunities for curative intervention [11–13]. The lack of a national screening program, limited use of the Fecal Immunochemical Test (FIT), and low public awareness exacerbate this pattern. Opportunistic screening occurs inconsistently, often targeting older adults with chronic disease, and colonoscopy services face capacity constraints and long waiting times [14].

Several barriers hinder CRC screening uptake in Oman and across the GCC. At the individual level, fear of diagnosis, embarrassment surrounding colonoscopy, and cultural or religious concerns are prominent constraints. Provider-related barriers include limited physician engagement; with many patients reporting they had never received a screening recommendation. System-level issues, including shortages of endoscopy capacity, long waiting lists, and urban–rural disparities in access, further impede screening. Gender differences have also been observed, with men reporting greater awareness than women [13–15].

Previous studies in Oman have primarily explored knowledge and attitudes rather than actual screening behavior. For example, a Muscat-based survey found that only half of respondents would accept colonoscopy if recommended, citing fear, embarrassment, and religious concerns as barriers [13, 15]. Another study revealed that while nearly 94% of adults had never been screened, around 70% expressed willingness if advised by a healthcare provider, despite widespread unawareness of screening modalities [13]. These findings underscore the potential role of physician recommendation in shaping patient decisions, but evidence on real-world utilization of colonoscopy remains scarce.

Addressing this knowledge gap is essential for shaping effective, culturally appropriate interventions. This study therefore aims to quantify colonoscopy utilization among Omani adults, whether performed for screening or diagnostic purposes, and identify its sociodemographic, perceptual, and healthcare-related predictors. By focusing on actual uptake rather than stated attitudes, the findings can directly inform public health strategies to improve early CRC detection and guide the development of a national screening framework in Oman.

Materials and Methods

Study design and setting

This was a nationwide cross-sectional study conducted among Omani adults across all governorates between March and August 2023. The study adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. Ethical approval was granted by the College of Medicine and Health Sciences at Sultan Qaboos University (MREC#2326). The study aimed to recruit a demographically diverse cohort representative of geographic and socio-economic variations in the country. Electronic informed consent was obtained from all participants prior to survey initiation.

Study population and sampling

The required sample size was calculated using the formula for estimating a population proportion: $n = Z^2p(1-p)/d^2$, where Z is the critical value for the desired confidence level (1.96 for 95% CI), p is the expected proportion of adults aware of colonoscopy screening (estimated at 35% based on national population data) [16, 17], and d is the margin of error (0.05). This yielded a minimum sample size of 350 participants. To account for a potential 20% non-response rate, 420 participants were required. The final sample consisted of 1060 responses across all 11 governorates in Oman exceeding the calculated sample size.

Inclusion criteria

(1) Omani citizenship; (2) age ≥18 years; (3) ability to read and understand Arabic or English; (4) current residence in one of the 11 Omani governorates; and (5) access to digital platforms (smartphone or computer with internet connectivity).

Exclusion criteria

(1) non-Omani nationals; (2) age <18 years; (3) individuals with a prior diagnosis of colorectal cancer or familial polyposis syndromes; (4) inability to provide informed consent; and (5) individuals unable to communicate in Arabic or English.

Recruitment was conducted using a non-probability convenience sampling strategy through digital platforms (Instagram, Facebook, Twitter, WhatsApp) and professional health networks to maximize outreach, recognizing that over 90% of Oman's population uses social media [16]. Regional health directorates facilitated dissemination by engaging healthcare providers in primary and secondary care.

Data collection tool

Data were collected anonymously through a structured, self-administered online questionnaire adapted from the U.S. National Cancer Institute's Health Information National Trends Survey (HINTS) [18]. Permission for adaptation was formally obtained. The instrument comprised three domains:

A. Sociodemographic variables characteristics (age, sex, marital status, education, employment, governorate, family size, household tobacco exposure, family history of cancer).

B. Perceived personal risk of CRC (six items on perceived likelihood, comparative risk, worry, and survival expectations).

C. Knowledge and beliefs regarding CRC screening (eight items on awareness, recommended age and frequency of colonoscopy, perceived barriers, and perceived test effectiveness).

Responses were captured using multiple-choice formats and 5-point Likert scales (1= strongly agree, 5= strongly disagree).

Translation and validation

The English version of the survey underwent a rigorous translation and validation process following the guidelines for cross-cultural adaptation of self-report measures recommended by Beaton et al. (2000) [19]. The process consisted of five stages:

1. Initial translation: two bilingual medical professionals independently translated the survey from English to Arabic. One translator was aware of the study objectives, while the other was an independent translator, ensuring the detection of subtle linguistic nuances.

2. Synthesis: the two translators met to resolve discrepancies and synthesize a common Arabic draft.

3. Back-translation: two other independent translators, blinded to the original English version, back-translated the final version draft into English to verify that the original meaning was maintained.

4. Expert committee review: A committee comprising the translators, a public health specialist, and a linguist reviewed all reports to ensure semantic, idiomatic, and conceptual equivalence. This resulted in the pre-final version of the Arabic questionnaire.

5. Pre-testing and validation: A pilot study was conducted with 25 Omani adults selected via purposive sampling to represent diverse educational and age groups. Cognitive interviewing techniques were used to assess face validity and clarity [20]. Participants were asked to paraphrase items to confirm comprehension. Minor wording adjustments were made based on this feedback. Finally, internal consistency was assessed using Cronbach's alpha, which exceeded 0.70, indicating acceptable reliability [21].

Outcome definition

The primary outcome was self-reported history of colonoscopy utilization, assessed via the question: "Have you ever had a CRC screening colonoscopy?" To differentiate intent, participants were asked to specify the main reason: "routine check-up," "colon-related symptoms," or "other." This allowed classification into probable screening versus diagnostic colonoscopy, although misclassification remains an issue.

Statistical analysis

Descriptive statistics were expressed as percentages including the binary dependent variable (undergoing colonoscopy: Yes or No). All statistical tests were two sided and at a significance level of 0.05. Independent variables in the questionnaire were grouped as socio-demographics, and perceptions on: a) risk factors for CRC, and b) screening for CRC and healthcare variables. Univariate relationships were explored using chi-square analyses between the dependent binary variable of ever having a colonoscopy "Have you ever had a CRC screening colonoscopy" and the independent variables. Potentially significant associations with P values <0.05 were further analyzed using binary logistic regression. Some categories of several variables were collapsed to ensure sufficient power for the regression models and adequate numbers in all categories.

For example, age was dichotomized using mean value (in years) of ≤40 vs >40, Muscat vs other governorate, married vs unmarried, high diploma or less vs more than high diploma, employed vs un-employed, and family size of ≤6 vs >6. Other variables were all categorized as presented in Table 1,2 and 3. Initially, all independent variables with P-values <0.05 in the univariate analysis were entered into a binary logistic regression model. While backward stepwise elimination was used to identify a set of predictors, final model fit selection was guided by both statistical significance and theoretical relevance based on significant model with the largest adjusted R2 criterion (Table 4).

Data protection

Participation was voluntary, responses were anonymous, and no personally identifying data were collected. Data were stored securely at Sultan Qaboos University and are available upon reasonable request, subject to institutional approval.

Results

A total of 1060 Omani adults completed the online questionnaire. The majority of respondents were male [n=703, (66.3%)] and aged ≤40 years [n=738, (69.6%)]. Most were married [n=799, (75.4%)], held education levels above a high diploma [n=665, (62.7%)], and were employed [n=743, (70.1%). Approximately 339 (32%) of them resided in Muscat, and the average family size was six members. Table 1 describes the sociodemographic characteristics of the respondents.

While the online approach allowed wide reach, it inherently favored younger, urban, and digitally literate individuals, potentially limiting generalizability to older adults or rural populations. To assess representativeness, demographic characteristics were compared with the 2025 national census [16]. The median age in the sample (≤40 years in 69.6%) approximated the national median age (29.7 years). The gender distribution (66.3% male) was also similar to the national profile (~62% male). However, the study may have underrepresented urban areas (32% vs. 89% nationally).

Colonoscopy uptake

Overall, only 137 participants (12.9%) reported ever undergoing colonoscopy. Among these 92 (67.2%), cited colon-related symptoms as the reason (diagnostic intent), 17 (12.4%) reported routine check-up (screening intent), and 28 (20.4%) cited other reasons (e.g., family history or general medical advice). This indicates that colonoscopy in Oman remains predominantly symptom-driven.

Univariate analysis

As shown in Table 1, colonoscopy uptake differed significantly across demographic and perceptual variables. Uptake was higher among men (76.6% vs. 64.8% in non-recipients, P= 0.006), participants aged >40 years (47.4% vs. 27.8%, P< 0.001), married individuals (85.4% vs. 73.9%, P= 0.004), and employed respondents (77.4% vs. 69.0%, P= 0.046). No significant associations were found for education, governorate of residence, or family size. Participants who underwent colonoscopy were significantly more likely to rate their CRC risk as "high" compared to those who did not undergo colonoscopy (19.7% vs. 6.5%; P< 0.001), perceive themselves at greater risk than peers (27.0% vs. 11.3%; P< 0.001), at risky age (27.0 vs.11.3; P< 0.001) and reported frequent worry about CRC (30.7% vs. 11.7%; P< 0.001) (Table 2).

Table 3 shows that colonoscopy uptake was linked to patient contact with health professionals, knowledge about screening, and perceptions of test effectiveness and cost, whereas fear and perceived ease of screening were not clearly associated with having a colonoscopy.

Healthcare advice and discussions

Awareness of colonoscopy was very high among those who had been screened (95.6%) compared with about two-thirds of non-recipients (64.8%, P<0.001), while lack of awareness was much more common in the non-screened group [n=319, (34.6%)].

Receiving any advice to have a CRC screening test was substantially more frequent among recipients (38.7% vs. 3.1%, P<0.001), and an explicit recommendation for colonoscopy was reported by 67.2% of recipients compared with only 4.8% of non-recipients (P<0.001).

Discussions about CRC screening were also more recent and more common among those who had a colonoscopy, with most non-recipients reporting that the topic had never been discussed (96.9% vs. 51.1%, P<0.001), highlighting the important role of provider engagement.

Knowledge of age and interval

Respondents who underwent colonoscopy showed more accurate knowledge about when to start screening; they more often selected 30-50 years as the starting age (29.9% vs 25.0%), while non-recipients more frequently answered "I don't know" (16.5% vs 9.5%) or "no specific age" (25.5% vs 20.4%) (P=0.017). Knowledge of how often colonoscopies should be repeated also differed significantly (P<0.001): recipients were less likely to say "I don't know" and more likely to select specific multi-year intervals (such as every 2-3 or 3-5 years), whereas non-recipients more often indicated uncertainty "I don't know" (27.8% vs 8.8%).

Beliefs about effectiveness and fear

Beliefs about test effectiveness varied by uptake. A higher proportion of recipients believed that some tests were more effective than others (54.0% vs. 31.6%, P<0.001) and identified colonoscopy as the most effective test (72.3% vs. 43.1%, P<0.001), while non-recipients more frequently stated that they did not know which test is best (49.5% vs 22.6%).

In contrast, fear of discovering cancer did not differ significantly between groups (P=0.154). Similar proportions in both groups agreed (47.4% vs 43.9%), were unsure (5.1% vs 10.3%), or disagreed (47.4% vs 45.8%) with the statement "You are afraid of finding out you have colon cancer if you are screened," suggesting that fear of diagnosis alone does not explain differences in colonoscopy uptake.

Fecal blood test awareness and use

Awareness of fecal blood testing was higher among colonoscopy recipients (57.7% vs. 28.4%, P<0.001), and they were more likely to have been advised to undergo this test in the past 12 months (22.6% vs. 3.8%, P<0.001). Actual use of fecal blood testing was also strongly associated with colonoscopy uptake [34.3% of recipients reported ever having a fecal blood test compared with only 2.4% of non-recipients (P<0.001)], indicating a broader pattern of engagement in CRC screening among those who have had colonoscopy.

Perceived ease and cost

Perceived ease of screening did not differ significantly between groups (P=0.069), with similar proportions agreeing (53.3% vs 44.9%), being unsure (10.2% vs 17.0%), or disagreeing (36.5% vs 38.1%) that "getting screened for colon cancer would be easy for you," suggesting comparable perceived logistical difficulty.

Perceived cost, however, showed a significant difference [55.5% of colonoscopy recipients strongly agreed or agreed that colon cancer screening is very expensive, compared with 40.1% of non-recipients (P<0.001)], while non-recipients were more often "not sure" about cost (32.5% vs. 10.9%). This pattern implies that people who have undergone colonoscopy were more aware of financial burdens, possibly due to direct experience with fees and related expenses, whereas many non-recipients remain uncertain about the actual costs.

Multivariate regression analysis

A binary logistic regression was performed to identify factors associated with having a colonoscopy (coded as 1) versus not having colonoscopy (coded as 0). The final model was statistically significant, (Omnibus Tests of Model Coefficients Chi-square= 635.99, P<0.001). The model included three independent predictors of colonoscopy uptake: 1) What is the main reason for having a colonoscopy?, 2) What colon cancer screening test did your doctor, nurse, or other health professional recommend?, and 3) Do you think these tests are equally effective for detecting colon cancer, or is one more effective than the others? (Table 4). The final model was statistically significant (Omnibus χ^2= 635.99, P< 0.001) and explained a substantial proportion of variance in colonoscopy uptake (78%).

Participants citing colon symptoms were over 63 times more likely to have had a colonoscopy compared to the reference group who reported undergoing the procedure as part of a routine check-up (95%CI 45.6-89.1; P< 0.001). Similarly, participants selecting "other reasons" (e.g.,

Table 1. Crosstabulation of Colonoscopy Uptake (Yes/No) Across Socio-Demographic Variables and Reasons for Colonoscopy Uptake

Total population: 1060	Have you ever had a CRC screening colonoscopy?		P-Value
N (%)	Yes=137(12.9)	No=923(87.1)	
Gender			0.006
Male=703(66.3)	105 (76.6)	598 (64.8)	
Female=357(33.7)	32 (23.4)	325 (35.2)	
Age			<0.001
≤40=738(69.6)	72 (52.6)	666 (72.2)	
>40=322(30.4)	65 (47.4)	257 (27.8)	
Current marital status			0.004
Currently married=799(75.4)	117 (85.4)	682 (73.9)	
Currently un-married=261(24.6)	20 (14.6)	241 (26.1)	
Education			0.087
High diploma or less=395(37.3)	42 (30.7)	353 (38.2)	
More than high diploma=665(62.7)	95 (69.3)	570 (61.8)	
Occupation			0.046
Currently employed=743(70.1)	106 (77.4)	637 (69.0)	
Currently un-employed=317(29.9	31 (22.6)	286 (31.0)	
Governorate			0.108
Muscat=339(32.0)	52 (38.0)	287 (31.1)	
Other governorate=721(68.0)	85 (62.0)	636 (68.9)	
Family size (number of members/family)			0.96
≤6=524(49.4)	68 (49.6)	456 (49.4)	
>6=536(50.6)	69 (50.4)	467 (50.6)	
What is the main reason for having a colonoscopy?			<0.001
Part of a routine checkup=915(86.3)	17 (12.4)	898 (97.3)	
Due to colon problem=104(9.8)	92 (67.2)	12 (1.3)	
Another reason=41(3.9)	28 (20.4)	13 (1.4)	

family history, general medical advice) had significantly higher odds of colonoscopy uptake (95%CI 32.5-83.5, P< 0.001).

Compared to those who did not discuss screening with a healthcare provider, only colonoscopy-specific recommendations significantly increased screening uptake by 9.5 times (95% CI 2.9-30.0, P< 0.001). Recommendations for other tests (e.g., sigmoidoscopy or stool tests) was not statistically significant (P= 0.6).

Compared to those who did not know about test effectiveness (reference group, 62.5% of the sample, 40.1% of whom had a colonoscopy), awareness of test effectiveness [OR= 1.16, 95% CI 0.5- 2.8, P= 0.75] did not strongly predict colonoscopy uptake, though a marginal trend suggested skepticism about equal effectiveness may reduce screening [OR= 0.18, 95% CI 0.03-1.4, P= 0.054]. This indicates that those who believed tests were equally effective were 82% less likely to have had a colonoscopy.

Cronbach's alpha for internal consistency in the current study population 0.689, indicating acceptable reliability.

Discussion

This nationwide study in Oman found a very low colonoscopy uptake (12.9%), with most procedures performed for diagnostic rather than screening purposes. This pattern reflects a reactive, symptom-driven approach to CRC detection and indicates missed opportunities for early, asymptomatic diagnosis. This low CRC screening uptake reflects broader patterns in GCC countries, where participation in screening remains suboptimal despite varying policy efforts [8–10, 14, 22–27]. In Saudi Arabia, the absence of a national program contributes to screening rates of only 6-7% among at-risk adults, while in the UAE, organized guidelines recommending annual FIT from age 40 have achieved uptake of just 9.1% [24–26]. Kuwait and Bahrain have established screening programs but still face low participation, driven by limited provider engagement, poor public awareness, and sociocultural barriers such as modesty norms, fear of diagnosis, and stigma around colorectal procedures [8–10, 23, 26]. In contrast, Qatar's population-based program, initiated in 2016 with biennial FIT for adults aged 50-74 years followed by colonoscopy, has reported adenoma detection rates exceeding 40%, whereas Oman's national CRC screening guidelines (issued April 2023) await full program implementation.

Healthcare interactions as the primary driver of colonoscopy uptake

Healthcare interactions, particularly physician

Table 2. Crosstabulation of Colonoscopy Uptake (Yes/No) Across Perceptions on Risk Factors for Colorectal Cancer

Total population: 1060	Have you ever had a CRC screening colonoscopy?		P-Value
N (%)	Yes=137 (12.9)	No=923 (87.1)	
How likely do you think you are to develop colon cancer in the future?			<0.001
High=87(8.2)	27 (19.7)	60(6.5)	
Moderate=349(32.9)	60 (43.8)	289 (31.3)	
Low=624(58.9)	50 (36.5)	574 (62.2)	
Do you live in the same household as someone who uses tobacco products?			
Yes=168(15.8)	20 (14.6)	148 (16.0)	
No=892(84.2)	117 (85.4)	775 (84.0)	
Has anyone in your family had colon cancer?			0.232
Yes=105(9.9)	19 (13.9)	86 (9.3)	
No=632(59.6)	80 (58.4)	552 (59.8)	
Don't Know=323(30.5)	38 (27.7)	285 (30.9)	
Compared to the average person your age, would you say your risk for CRC is:			<0.001
More likely=141(13.3)	37 (27.0)	104 (11.3)	
Same likelihood=459(43.3)	61 (44.5)	398 (43.1)	
Less likely=460(43.4)	39 (28.5)	421 (45.6)	
How often do you worry about colon cancer?			<0.001
All the time & often=150(14.2)	42 (30.7)	108 (11.7)	
Sometimes=417(39.3)	74 (54.0)	343 (37.2)	
Rarely=493(46.5)	21 (15.3)	472 (51.1)	
The risk of developing colon cancer is highest when a person is:			0.34
<40=54(5.1)	9 (6.6)	45 (4.9)	
40-60=725(68.4)	98 (71.5)	627 (67.9)	
>60=281(26.5)	30 (21.9)	251 (27.2)	
In general, how many people who get colon cancer do you think survive and live at least 5 years after diagnosis?			0.491
<25%=271(25.6)	29 (21.2)	242 (26.2)	
~25%=208(19.5)	23 (16.8)	185 (20.0)	
~50%=288(27.2)	43 (31.4)	245 (26.5)	
~75%=185(17.5)	27 (19.7)	158 (17.1)	
Almost all of them=108(10.2)	15 (10.9)	93 (10.1)	

recommendation, were the strongest predictors of colonoscopy uptake. Nearly all colonoscopy recipients had heard of the procedure (95.6%) compared with about two-thirds of non-recipients (64.8%, P<0.001). A direct physician recommendation was reported by 67.2% of those who underwent colonoscopy versus only 4.8% of non-recipients (P<0.001). Physician recommendation has consistently been identified as a key driver of CRC screening in various settings [28–30]. Likewise, a multi-country analyses also show that individuals receiving specific test recommendations from providers are more than twice as likely to complete screening than those exposed only to general discussions, while a study from Hong Kong found that family physician advice increased CRC screening compliance 21-fold [31–33]. The dominant role of provider referral in Oman suggests that without systematic screening programs, CRC detection occurs primarily after warning signs arise, rather than through proactive prevention [34, 35].

Knowledge and beliefs about screening effectiveness

Consistent with previous research, a significantly higher proportion of colonoscopy recipients correctly identified colonoscopy as the most effective test for CRC detection (72.3% vs. 43.1%, P<0.001) [5, 8, 9]. Recipients also showed better awareness of the recommended starting age and screening interval, with fewer reporting uncertainty regarding guidelines. However, general beliefs about whether all tests are equally effective did not significantly predict colonoscopy uptake, in contrast to some earlier studies. This discrepancy may reflect the complexity of screening decisions. Van der Heide et al. [36] noted that informed cancer screening choices depend not only on knowledge but also on interaction with healthcare providers, weighing benefits and harms, and aligning decisions with personal values. Health literacy research further suggests that individuals with lower health literacy are less likely to seek screening information independently and rely more heavily on provider communication .

Table 3. Crosstabulation of Colonoscopy Uptake (Yes/No) Across Perceptions on Screening for Colorectal Cancer and Health Care Variables

Total population: 1060	Have you ever had a CRC screening colonoscopy?		P-Value
N (%)	Yes=137 (12.9)	No=923 (87.1)	
Have you ever heard of a colonoscopy?			<0.001
Yes=735(69.3)	131 (95.6)	598 (64.8)	
No=325(30.7)	6 (4.4)	319 (34.6)	
Has your doctor, nurse, or other health professional advised you to have a colon cancer screening test?			<0.001
Yes=82(7.7)	53 (38.7)	29 (3.1)	
No=978(92.3)	84 (61.3)	894 (96.9)	
Has a doctor, nurse, or other health professional advised you to have a colonoscopy?			<0.001
Yes=136(12.8)	92 (67.2)	44 (4.8)	
No=924(87.2)	45 (32.8)	879 (95.2)	
Think about the last time a doctor, nurse, or other health professional told you that you should have a colon cancer screening test. When did that discussion take place?			<0.001
The topic has not been discussed=964(90.9)	70 (51.1)	894 (96.9)	
1-2=14(1.3)	29 (21.2)	18 (2.0)	
2-5=34(3.2)	26 (19.0)	8 (0.9)	
>5 years=15(1.4)	12 (8.8)	3 (0.3)	
When you were last told you should be tested for colon cancer, did your doctor, nurse, or other health professional recommend any specific test?			<0.001
Yes=58(5.5)	41 (29.9)	17 (1.8)	
No=1002(94.5)	96 (70.1)	906 (98.2)	
What colon cancer screening test did your doctor, nurse, or other health professional recommend?			<0.001
Topic not discussed=919(86.7)	42 (30.7)	877 (95.0)	
Colonoscopy=100(9.4)	83 (60.6)	17 (1.8)	
Other (Sigmoidoscopy or stool examination) =51(3.9)	12 (8.0)	30 (3.3)	
At what age should people start getting colonoscopies?			0.017
I don't Know=165(15.6)	13 (9.5)	152 (16.5)	
No specific age=263(24.8)	28 (20.4)	235 (25.5)	
When Doctor request=207(19.5)	26 (19.0)	181 (19.6)	
<30years=82(7.7)	19 (13.9)	63 (6.8)	
30-50 years=272(25.7)	41 (29.9)	231 (25.0)	
>50years=71(6.7)	10 (7.3)	61 (6.6)	
In general, once people start having colonoscopies, how often should they have them?			<0.001
I don't know=269(25.4)	12 (8.8)	257 (27.8)	
When Doctor/Health care provider says=127(12	18 (13.1)	109 (11.8)	
Depends on previous test=187(17.6)	13 (9.5)	174 (18.9)	
Only when there is a problem=64(6.0)	11 (8.0)	53 (5.7)	
More than once a year=57(5.4)	7 (5.1)	50 (5.4)	
Every 1-2 years=164(15.5)	22 (16.1)	142 (15.4)	
Every 2-3 years=62(5.8)	19 (13.9)	43 (4.7)	
Every 3- 5 years=79(7.5)	19 (13.9)	60 (6.5)	
≥5=51(4.8)	16 (11.7)	35 (3.8)	
You are afraid of finding out you have colon cancer if you are screened.			0.154
Strongly agree and agree=470(44.3)	65 (47.4)	405 (43.9)	
Not sure=102(9.6)	7 (5.1)	95 (10.3)	
Strongly disagree and disagree=488(46.0)	65 (47.4)	423 (45.8)	
Do you think these tests are equally effective for detecting colon cancer, or is one more effective than the others?			<0.001
I don't Know=662(62.5)	55 (40.1)	607 (65.8)	
Some are more effective than others=366(34.5)	74 (54.0)	292 (31.6)	
Equally effective=32(3.0)	8 (5.8)	24 (2.6)	

Table 3. Continued

Total population: 1060	Have you ever had a CRC screening colonoscopy?		P-Value
N (%)	Yes=137 (12.9)	No=923 (87.1)	
Which test(s) do you think is most effective in finding colon cancer?			<0.001
I don't Know=488(46.0)	31 (22.6)	457 (49.5)	
Colonoscopy=497(46.9)	99 (72.3)	398 (43.1)	
Sigmoidoscopy or Stool Blood test =75(7.1)	7 (5.1)	68 (7.4)	
Have you ever heard of a fecal blood test for colon cancer?			<0.001
Yes=341(32.2)	79 (57.7)	262 (28.4)	
No=719(67.8)	58 (42.3)	661 (71.6)	
In the past 12 months, has a doctor, nurse, or other health professional advised you to have a fecal blood test to screen for colon cancer?			<0.001
Yes=66(6.2)	31 (22.6)	35 (3.8)	
No=994(93.8)	106 (77.4)	888 (96.2)	
Have you ever had a fecal blood test as a colon cancer screening test?			<0.001
Yes=69(6.5)	47 (34.3)	22 (2.4)	
No=991(93.5)	90 (65.7)	901 (97.6)	
Getting screened for colon cancer would be easy for you.			0.069
Strongly agree and agree=487(45.9)	73 (53.3)	414 (44.9)	
Not sure=171(16.1)	14 (10.2)	157 (17.0)	
Strongly disagree and disagree=402(37.9)	50 (36.5)	352 (38.1)	
Colon cancer screening is very expensive			<0.001
Strongly agree and agree=446(42.1)	76 (55.5)	370 (40.1)	
Not sure=315(29.7)	15 (10.9)	300 (32.5)	
Strongly disagree and disagree=299(28.2)	46 (33.6)	253 (27.4)	
Strongly disagree and disagree=82(7.7)	8 (5.8)	74 (8.0)	

Table 4. Binary Logistic Regression Modeling Predictors of Colonoscopy Uptake

N (%)	Yes: Had colonoscopy 137 (12.9)	Exp(B)	95% C.I for EXP(B)	Sig.
1-What is the main reason for having a colonoscopy?				
Part of a routine checkup=915(86.3)	17 (12.4)	Ref		<0.001
Due to colon problem=104(9.8)	92 (67.2)	63.9	45.6-89.1	<0.001
Another reason=41(3.9)	28 (20.4)	52.5	32.5-83.5	<0.001
2-What colon cancer screening test did your doctor, nurse, or other health professional recommend?				
Topic not discussed=919(86.7)	42 (30.7)	Ref		0.002
Colonoscopy=100(9.4)	83 (60.6)	9.5	2.9-30.0	<0.001
Other (Sigmoidoscopy or stool examination) =41(3.9)	12 (8.0)	5.4	0.01-38.6	0.6
3-Do you think these tests are equally effective for detecting colon cancer, or is one more effective than the others?				
I don't Know=662(62.5)	55 (40.1)	Ref		0.1
Some are more effective than others=366(34.5)	74 (54.0)	1.16	0.5-2.8	0.7
Equally effective=32(3.0)	8 (5.9)	0.177	0.03-1.4	0.054

Psychological and logistical barriers

Contrary to expectations from previous literature, fear of discovering cancer and perceived ease of screening did not differ significantly between colonoscopy recipients and non-recipients [37]. This contrasts with studies where fear and anxiety about diagnosis were major barriers to screening. Several explanations are possible [38]. First, cultural differences in the expression and reporting of fear may shape survey responses. Second, as Goodwin et al. (2023) highlighted in a systematic review, anticipatory anxiety can have bidirectional effects: it may encourage screening through heightened risk perception in some individuals while discouraging it through avoidance in others [39, 40]. Third, in contexts where screening is largely provider-driven rather than patient-initiated, emotional barriers may be less influential than system-level factors such as access, appointment availability, and referral practices [38, 41–43].

Cost perceptions as a post-procedure realization

Colonoscopy recipients were more likely to report cost as a barrier than non-recipients, while non-recipients more frequently stated they were unsure about screening costs (32.5% vs. 10.9% reporting "not sure"). This pattern suggests that cost concerns may arise from direct experience rather than acting as a primary deterrent to initial uptake [44, 45]. This interpretation is consistent with evidence from high-income countries, where out-of-pocket costs can remain substantial even when screening is nominally free, and indirect costs such as lost work time, caregiver time, and travel further add to the burden.

Public health and policy implications

These findings support the urgent establishment of a national CRC screening program in Oman. A cost-effective model would include annual or biennial FIT for adults aged 50 to 75 years, with colonoscopy reserved for those with positive results, as used in the United Kingdom, South Korea, and Qatar. Implementation will require expanding endoscopy capacity, training providers, and embedding electronic prompts in health records to identify unscreened patients. Provider and patient reminders using digital systems can substantially increase participation, and making both FIT and follow-up colonoscopy free at the point of care would help reduce financial barriers observed locally and internationally [6, 25, 29, 30, 32]. Public education and culturally tailored communication campaigns are also crucial to raise awareness and normalize CRC screening.

Strengths and limitations

This study has several strengths, including a large, geographically diverse sample from all Omani governorates and the use of both descriptive and multivariable analyses. Adapting a validated instrument from the HINTS survey strengthens its methodological rigor. However, limitations should be noted. First, the cross-sectional design precludes causal inference. Second, convenience-based online sampling may have introduced selection bias by over-representing younger, digitally connected participants and under-representing older adults and rural residents. Third, reliance on self-reported screening behaviour may have led to recall or desirability bias, and the absence of medical record verification may have affected outcome validity. Residual confounding from unmeasured factors such as health literacy, quality of provider communication, and physical access to endoscopy services is possible. Furthermore, the inability to clearly distinguish diagnostic from preventive colonoscopies limits interpretation of screening intent. Despite efforts to manage multicollinearity and sparse data, some odds ratios in the multivariable analysis appeared inflated, probably due to quasi-complete separation, in which a predictor almost perfectly classifies a relatively rare outcome such as having undergone colonoscopy in this sample.

In conclusion, this study reveals low utilization of colonoscopy for colorectal cancer (CRC) screening among Omani adults, largely driven by medical necessity and physician advice rather than preventive intent. The findings reflect a reactive healthcare model, where screening is primarily symptom-prompted rather than preemptive. To address this gap, national public health strategies should prioritize the implementation of an organized CRC screening program. Future research should focus on designing and evaluating multilevel intervention models that integrate clinical, community, and policy-level solutions to promote equitable access to CRC screening across the population.

Author Contribution Statement

Adhari Al Zaabi: conceptualizing and designing the study, overseeing project administration, coordinating and managing data collection, and critically revising the manuscript. Thamra Al Ghafri: data collection, data management, and statistical analysis, drafting and manuscript preparation and data analysis with interpretation. Ahmed AlHabsi, Mundher AlZiedi, and Abdulmalik AlSarmi: data collection, review of results and general facilitation of the project. All authors read and approved the final version of the manuscript and agreed to be accountable for all aspects of this paper.

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Ethical Considerations

The study received ethical approval from the Medical Research Ethics Committee, Sultan Qaboos University (MREC #2326). An electronic informed consent was obtained from all participants prior to survey initiation. Participation was voluntary, data were collected anonymously, and no personal identifiers were recorded. Data were stored securely and analyzed only in aggregate form.

Availability of data

Data is available upon request and institutional approval.

Competing interests

All authors declare no competing interests

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