

Public Awareness and Barriers to Seeking Medical Advice for Colorectal Cancer in the Gaza Strip: A Cross-Sectional Study

Mohamedraed Elshami, MD¹; Maha Alfaqawi, MD¹; Tamer Abdalghafoor, MD²; Ayoob A. Nemer²; Mohammed Ghuneim²; Hussien Lubbad²; Batool Almahallawi²; Mosab Samaan²; Abdallah Alwali²; Ahmad Alborno²; Deyaa Al-kafarna²; Aseel Salah²; Karam Shihada²; Mohammed Abo Amona²; Amira Al-Najjar²; Rana Abu Subha²; Basma Alhelu²; Israa Abujayyab²; Loai Albarqouni, MD, MSc, PhD³; and Bettina Bottcher, MD, PhD²

PURPOSE Raising awareness of colorectal cancer (CRC) symptoms for early recognition, reduction of modifiable risk factors, and removing barriers to seeking medical help could lower its mortality. This study aimed to assess the level of public awareness of CRC in the Gaza Strip.

MATERIALS AND METHODS This was a cross-sectional study conducted at three hospitals and 10 high schools between September and October 2017. The Arabic version of the validated Bowel Cancer Awareness Measure (BoCAM) questionnaire was used to evaluate awareness of CRC symptoms and risk factors, and barriers to seeking medical help. Adults (age ≥ 18 years) in three major hospitals and adolescents (ages 15 to 17 years) in 10 schools were recruited for face-to-face interviews to complete the BoCAM.

RESULTS Of 3,172 potential participants, 3,080 completed the BoCAM (response rate, 97.1%). Among these, 1,578 (51.2%) were adults and 1,614 (52.4%) were females. Persistent abdominal pain was the most commonly recognized CRC symptom ($n = 1,899$; 61.7%), whereas anorectal pain was the least common ($n = 1,056$; 34.3%). In total, 2,177 (70.7%) were not confident in recognizing CRC symptoms or signs. Having a bowel disease was the most frequently recognized CRC risk factor ($n = 1,456$; 47.3%) and diabetes the least recognized ($n = 591$; 19.2%). The overall mean scores \pm standard deviations for recalling and recognizing CRC symptoms were 1.2 ± 1.3 and 4.3 ± 2.3 , respectively (out of 9 points). The overall mean scores \pm standard deviations for recalling and recognizing CRC risk factors were 0.7 ± 0.8 and 8.0 ± 3.1 , respectively (out of 16 points). Emotional barriers were the most commonly reported barriers to seeking medical help, with feeling worried about what a doctor might find as the most common barrier ($n = 1,522$; 49.4%).

CONCLUSION Public awareness of CRC is suboptimal in Gaza. Improving CRC awareness with educational interventions is needed, including in local schools.

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INTRODUCTION

Globally, colorectal cancer (CRC) is the third most common malignancy and the fourth most frequent cause of cancer-related deaths.¹ In Gaza, CRC is the most common cancer among males, accounting for 15.5% of their cancers, and second to breast cancer in women, accounting for 11.2% of their cancers.²

This is higher than a worldwide estimate of 10.6% of CRC among all patients with cancer in 2018.³ It also has incidence rates of 11.5 and 10.3 per 100,000 of male and female populations, respectively, in Gaza and is the second most frequent cause of cancer-related deaths, responsible for 11.0% of total cancer-related deaths.⁴ Such high mortality rates could be a result of diagnosis at advanced stages due to low awareness levels of CRC symptoms and risk factors, and difficult access to health care facilities.

Greater public awareness of CRC symptoms may lead to less delay before seeking medical advice that, in turn, will facilitate early detection of CRC, increase survival rates, and improve outcomes.⁵⁻⁷ Furthermore, the lack of a CRC screening program in Gaza necessitates raising CRC awareness among the general population.²

Generally, women are believed to display more health-related behaviors than men in Palestine. However, recent studies have shown increasing smoking rates among female university students and higher obesity rates among women.^{8,9} Moreover, a previous study on breast cancer awareness in Gaza showed significantly higher awareness among adult women, compared with adolescent females,¹⁰ despite health education being part of the school curriculum. Exploring the health awareness of adolescents on a variety of issues is important because this might shape their

Author affiliations and support information (if applicable) appear at the end of this article.

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CONTEXT

Key Objective

The increasing incidence and high mortality rates of colorectal cancer (CRC) in the Gaza Strip make it an important public health concern. Therefore, this study examined public awareness of symptoms and risk factors, as well as reported barriers to seeking medical help and compared these between men and women, as well as adults and adolescents.

Knowledge Generated

Poor public knowledge of CRC symptoms and risk factors, as well as the other reported barriers found in this study, may play a significant role in the diagnosis of CRC at advanced stages because of delays before patients see the doctor, ultimately leading to a lower survival rate.

Relevance

A systematic national education program to promote the public awareness of CRC tailored to suit all age groups is needed. In addition, an urgent need to establish a CRC screening program to facilitate its early detection exists.

health-related behavior in the future. In view of the high proportion of young people in the Palestinian population, with 39% younger than 15 years of age and 30% 15 to 29 years of age, it is an important long-term investment.^{11,12} Younger age groups (15 to 24 years and 25 to 34 years) represent 2.5% and 5.2%, respectively, of the total reported patients with CRC from 2009 to 2014 in Gaza.¹³

This study aimed to explore (1) public awareness of CRC symptoms and risk factors in Gaza, (2) public awareness of CRC age-related risk, (3) the potential barriers to seeking medical help, and (4) differences between population groups, such as men and women, as well as adults and adolescents.

MATERIALS AND METHODS

Study Design and Population

This was a cross-sectional study conducted from September 1 to October 31, 2017, using the Bowel Cancer Awareness Measure (BoCAM) questionnaire, which is a validated measurement for public awareness of CRC.¹⁴ Awareness levels were compared among different population groups, such as between men and women and between adolescents and adults. The questionnaire consists of five sections: (1) demographic data; (2) evaluation of knowledge of age-related CRC risk and confidence to detect its symptoms; (3) open-ended (recall) questions and (4) closed (recognition) questions with a comparison between the outcomes using both recall versus recognition; and (5) barriers to seeking medical advice. A 3-point scale, with answers yes, no, and I do not know, was used to evaluate the recognition of signs and symptoms of CRC, as well as to explore barriers to seeking medical help, that were further categorized into emotional, practical, and service barriers. A 5-point Likert scale was used to assess the recognition of CRC risk factors.

The BoCAM was translated from English to Arabic and then back-translated into English by several people proficient in

both languages. Before starting data collection, a pilot study was conducted with 92 respondents to test the clarity of the questions of the Arabic version of BoCAM. A reliability analysis was carried out on the perceived task values scale comprising 29 items. Cronbach's alpha (0.72) showed that the questionnaire reached acceptable reliability. Although it has not been validated, a similar questionnaire was used in some previous studies conducted in Arabic-speaking countries.^{11,15,16}

Sampling Methods

Health care services in the Gaza Strip are provided by the government, nongovernmental organizations, or private providers. Governmental hospitals are the main entry point for health care services in Gaza because they provide most basic health care at no or little cost to the insured population.¹⁰ Health care insurance is obtainable at low cost. Nongovernmental organization facilities often provide specialized health care in certain areas, such as burn care or limb reconstruction. The fees of private hospitals prohibit most people from accessing these services. Therefore, men and women 18 years of age or older admitted to or visiting governmental hospitals were the target population to get a broad representation of the general population. Patients or visitors to oncology departments were excluded from the study.

There are 13 governmental hospitals in Gaza.² From these, the largest three, located in separate geographic locations, were chosen for recruitment of participants by stratified sampling. This sampling area covered most of Gaza's population, producing a representative sample. Parallel to this, adolescents from 10 high schools (out of 147¹⁷), located in the same areas as the study hospitals, were recruited. High school students study health-related topics in their curriculum, which presented the opportunity to explore their awareness of CRC. Participants were invited for face-to-face interviews to complete the BoCAM.

Data collectors were trained to recruit participants, distribute the questionnaires, and facilitate completion. Before completing the questionnaire, a detailed explanation of the study, including its purpose, was given to the participants. Informed consent was obtained from the participants, and ethical approval was obtained from both the Palestinian Ministry of Health and the Ministry of Higher Education.

Statistical Analysis

Descriptive statistics were used to report the knowledge of age-related CRC risk. One unprompted open question and nine prompted closed questions assessed the knowledge of CRC signs and symptoms. The unprompted question asked participants to write down the CRC signs and symptoms they could remember, whereas the closed questions assessed knowledge on specific signs and symptoms. Every correctly recalled sign/symptom or correct answer in the closed questions (yes) was given 1 point, whereas incorrect answers (no and I do not know) received no points.

Another open question requested recall of CRC risk factors, and eight closed questions assessed recognition of CRC risk factors. Every correctly recalled risk factor was given 2 points. Answers to the eight closed questions were scored on a 5-point Likert scale. This was converted to a 3-point scale, because it was difficult for participants to distinguish between agree versus strongly agree and disagree versus strongly disagree; therefore, the response strongly agree was recoded to agree, and strongly disagree was recoded as disagree.¹⁰ Disagree was given no points, not sure was given 1 point, and agree was given 2 points. Cumulative scores were calculated for recognizing CRC signs and symptoms as well as risk factors and reported as mean \pm standard deviation out of the total score of 9 for signs and symptoms and 16 for risk factors. Furthermore, 10 questions were asked about barriers to seeking medical advice that were scored yes, no, and I do not know, and are reported as total numbers and percentages for each point.

The variable of interest was the overall awareness mean score for each section (signs/symptoms and risk factors), for which the one-sample *t* test was used. The two-sample *t* test was used to compare the total mean scores of recall and recognition and their percentages between male and female as well as adult and adolescent participants, which were normally distributed. The χ^2 test was used to compare the awareness of each CRC symptom and risk factor between these two subpopulations. Multiple logistic regression was used to test the association between sex and age group with recalling CRC symptoms and risk factors. It was also used to test their association with recognizing the symptoms and to test the relationship between this recognition and having barriers to seeking medical advice. Ordinal regression was used to test the association of age group and sex with recognizing risk factors. Data were

analyzed using Stata software version 15.0 (StataCorp, College Station, TX).

RESULTS

Characteristics of Participants

Of 3,172 invited participants, 3,080 completed the BoCAM questionnaire (response rate, 97.1%). Among these, 1,578 (51.2%) were adults, 1,502 (48.9%) were adolescents, and 1,614 (52.4%) were females. The mean age of all participants was 25.4 ± 12.1 years.

Knowledge and Confidence to Detect CRC Symptoms

A total of 442 participants (14.4%) were not confident at all about their ability to detect a symptom of CRC, whereas 1,735 (56.3%) were not confident. Generally, awareness of CRC signs and symptoms, as well as risk factors, was low when recall questions were used and higher with recognition questions. Abdominal pain was the most commonly recognized CRC symptom ($n = 1,899$; 61.7%), whereas anorectal pain was the least common ($n = 1,056$; 34.3%; [Table 1](#)). The overall mean scores for recalling and recognizing CRC symptoms were 1.2 ± 1.3 and 4.3 ± 2.3 , respectively, out of 9 possible points. Adults demonstrated higher awareness than adolescents (4.9 ± 2.3 v 3.8 ± 2.0 out of 9; $P < .001$). This was also true after adjusting for sex, where adults generally showed a significantly higher likelihood of recalling and recognizing CRC signs and symptoms, although they were less likely to recall abdominal pain (odds ratio [OR], 0.79; 95% CI, 0.69 to 0.92; $P = .002$), and there were no significant associations with recall of anorectal pain and abdominal mass ([Table 2](#)). Females had a significantly higher mean score than males (4.5 ± 2.3 v 4.2 ± 2.3 of 9; $P < .001$). However, after adjustment for age group, there was no independent association of sex with the recalled CRC signs and symptoms except anorectal pain, where females had a 57% decrease in the odds (OR, 0.43; 95% CI, 0.29 to 0.64; $P < .001$).

Awareness of CRC Risk Factors

Having bowel disease was the most frequently recognized CRC risk factor ($n = 1,456$; 47.3%), and diabetes was the least recognized ($n = 591$; 19.2%; [Table 3](#)). Only 918 participants (29.8%) gave a correct answer for CRC age-related risk, whereas 1,391 (45.2%) believed that it was unrelated to age. Out of 16 points, the overall mean scores for recalling and recognizing CRC risk factors were 0.7 ± 0.8 and 8.0 ± 3.1 , respectively. Adults demonstrated better recognition of every risk factor and a higher overall score compared with adolescents (8.7 ± 3.2 v 7.3 ± 2.8 of 16; $P < .001$). This was also evident after adjusting for sex, except for doing less physical activity, which did not have an association with age group. Females also had significantly higher awareness than males (8.3 ± 3.0 v 7.8 ± 3.2 of 16; $P < .001$). However, after adjustment for age group, females had significantly lower odds of recalling eating red or processed meat once a day or more (OR, 0.62; 95% CI,

TABLE 1. Summary of Awareness Scores for Colorectal Cancer Symptoms and Signs Between Adolescents Versus Adults and Between Males Versus Females

Sign and Symptom	Recall						Recognition					
	Adolescents v Adults			Males v Females			Adolescents v Adults			Males v Females		
	Total (N = 3,080)	Adolescents (n = 1,502)	Adults (n = 1,578)	Males (n = 1,466)	Females (n = 1,614)	P	Total (N = 3,080)	Adolescents (n = 1,502)	Adults (n = 1,578)	Males (n = 1,466)	Females (n = 1,614)	P
Abdominal pain	1,249 (40.6)	652 (43.4)	597 (37.8)	589 (40.2)	660 (40.9)	.002	1,899 (61.7)	886 (59.0)	1,013 (64.2)	884 (60.3)	1,015 (62.9)	.14
Change in bowel habit	793 (25.7)	313 (20.8)	480 (30.4)	354 (24.1)	439 (27.2)	< .001	1,653 (53.7)	709 (47.2)	944 (59.8)	753 (51.4)	900 (55.8)	.015
Bowel not emptying	77 (2.5)	25 (1.7)	52 (3.3)	42 (2.9)	35 (2.2)	.004	1,146 (37.2)	466 (31.0)	680 (43.1)	538 (36.7)	608 (37.7)	.58
Blood in stools	351 (11.4)	91 (6.1)	260 (16.5)	158 (10.8)	193 (12.0)	< .001	1,638 (53.2)	672 (44.7)	966 (61.2)	765 (52.2)	873 (54.1)	.29
Anorectal bleeding	202 (6.6)	39 (2.6)	163 (10.3)	94 (6.4)	108 (6.7)	< .001	1,279 (41.5)	522 (34.8)	757 (48.0)	563 (38.4)	716 (44.4)	.001
Anorectal pain	115 (3.7)	50 (3.3)	65 (4.1)	77 (5.3)	38 (2.4)	.25	1,056 (34.3)	451 (30.0)	605 (38.3)	509 (34.7)	547 (33.9)	.63
Abdominal mass	350 (11.4)	163 (10.9)	187 (11.9)	153 (10.4)	197 (12.2)	.38	1,820 (59.1)	784 (52.2)	1,036 (65.7)	798 (54.4)	1,022 (63.3)	< .001
Weight loss	285 (9.3)	98 (6.5)	187 (11.9)	120 (8.2)	165 (10.2)	< .001	1,587 (51.5)	641 (42.7)	946 (59.9)	721 (49.2)	866 (53.7)	.013
Pallor/tiredness	119 (3.9)	44 (2.9)	75 (4.8)	55 (3.8)	64 (4.0)	.009	1,244 (40.4)	500 (33.3)	744 (47.1)	591 (40.3)	653 (40.5)	.94
Overall mean ± SD score (of 9)	1.2 ± 1.3	1.0 ± 1.1	1.3 ± 1.4	1.1 ± 1.3	1.2 ± 1.3	< .001	4.3 ± 2.3	3.8 ± 2.0	4.9 ± 2.3	4.2 ± 2.3	4.5 ± 2.3	< .001
% overall mean score ± SD	12.8 ± 14.1	10.9 ± 12.7	14.6 ± 15.2	12.4 ± 14.2	13.1 ± 14.1	< .001	48.1 ± 25.1	41.7 ± 22.6	54.2 ± 25.8	46.4 ± 25.0	50.0 ± 25.0	< .001

NOTE: Data are No. (%) unless otherwise indicated.

Abbreviation: SD, standard deviation.

TABLE 2. The Association of Age Group and Sex With Recalling and Recognizing Colorectal Cancer Symptoms

Symptom/Sign	Recall (N = 3,080)				Recognition (N = 3,080)			
	Female Sex		Being Adult		Female Sex		Being Adult	
	Adjusted OR (95% CI)*	P	Adjusted OR (95% CI)†	P	Adjusted OR (95% CI)*	P	Adjusted OR (95% CI)†	P
Abdominal pain	1.04 (0.89 to 1.20)	.64	0.79 (0.69 to 0.92)	.002	1.11 (0.96 to 1.29)	.16	1.24 (1.08 to 1.44)	.003
Change in bowel habit	1.16 (0.99 to 1.37)	.07	1.66 (1.41 to 1.95)	< .001	1.18 (1.03 to 1.37)	.020	1.66 (1.44 to 1.92)	< .001
Bowel not emptying	0.74 (0.47 to 1.17)	.20	2.03 (1.25 to 3.28)	.004	1.03 (0.89 to 1.20)	.67	1.68 (1.45 to 1.95)	< .001
Blood in stools	1.10 (0.88 to 1.39)	.39	3.05 (2.38 to 3.92)	< .001	1.07 (0.92 to 1.23)	.37	1.95 (1.69 to 2.25)	< .001
Anorectal bleeding	1.03 (0.77 to 1.37)	.89	4.32 (3.02 to 6.17)	< .001	1.27 (1.10 to 1.47)	.001	1.73 (1.49 to 1.99)	< .001
Anorectal pain	0.43 (0.29 to 0.64)	< .001	1.27 (0.87 to 1.85)	.22	0.96 (0.82 to 1.11)	.56	1.45 (1.25 to 1.68)	< .001
Abdominal mass	1.19 (0.95 to 1.49)	.13	1.10 (0.88 to 1.38)	.40	1.44 (1.24 to 1.66)	< .001	1.75 (1.51 to 2.02)	< .001
Weight loss	1.26 (0.98 to 1.62)	.06	1.92 (1.49 to 2.48)	< .001	1.19 (1.03 to 1.37)	.020	2.01 (1.74 to 2.32)	< .001
Pallor/tiredness	1.05 (0.73 to 1.52)	.80	1.65 (1.13 to 2.41)	.009	0.99 (0.86 to 1.15)	.94	1.79 (1.55 to 2.07)	< .001

Abbreviation: OR, odds ratio.

*Adjusted for age group.

†Adjusted for sex.

0.48 to 0.79; $P < .001$) and having bowel disease (OR, 0.69; 95% CI, 0.52 to 0.92; $P = .010$; Table 4). In contrast, females had significantly higher odds of recognizing fiber-free diet (OR, 1.55; 95% CI, 1.36 to 1.76; $P < .001$), having a relative with CRC (OR, 1.42; 95% CI, 1.25 to 1.62; $P < .001$), and having bowel disease (OR, 1.25; 95% CI, 1.09 to 1.43; $P = .001$).

Barriers to Seeking Medical Advice

Overall, emotional barriers were the most commonly reported barriers to seeking medical help, with feeling worried about what a doctor might find as the most common barrier ($n = 1,522$; 49.4%; Table 5). This was also found among adults ($n = 773$; 49.0%) and females ($n = 859$; 53.2%).

However, insecurity in talking about CRC symptoms with a doctor was the most frequent barrier among adolescents ($n = 777$; 51.7%) and males ($n = 752$; 51.3%). Tables 6 and 7 list the relationships between recognizing CRC symptoms and risk factors and reporting a barrier to seeking medical advice.

DISCUSSION

CRC awareness in Gaza was found to be low. Adults displayed higher awareness than adolescents, and females demonstrated better knowledge than males. Emotional barriers were most commonly reported among the different groups. Insecurity in talking about CRC symptoms with a doctor was the most frequent barrier among adolescents and males, and concern about what a doctor might find was the most frequent barrier among adults and females.

The higher level of CRC awareness among women in this study is consistent with findings from previous studies.¹⁸⁻²⁰ Women are in contact with health care services more often

than men as a result of pregnancy, family planning, and childcare, and this might promote their health-related knowledge and encourage them to have more protective behaviors than men.²¹

Similar to other studies,^{18,19} adults in this study displayed a better awareness than adolescents. A reason for this may be higher education levels achieved by adults and experiences enabling them to recognize CRC signs and symptoms. Another factor could be that adults were recruited from hospitals and displayed a degree of health-seeking behavior, which might contribute to their greater knowledge.^{11,22} Therefore, targeting young people with educational interventions on modifiable risk factors and alarming symptoms could be especially beneficial. Previous studies conducted in Britain and Jordan found similar low cancer awareness among university students and adolescents.^{11,23} Kyle et al²⁴ reported that a school-based educational intervention program was effective in sustainably raising cancer awareness among adolescents. Therefore, cancer awareness—especially of common cancers like CRC—should receive more attention in the school curriculum, because it could have a potential life-long effect on encouraging early diagnosis.^{11,23} In addition, Power and Wardle²⁵ showed that awareness campaigns targeting adults could increase their awareness of CRC symptoms, thus reducing their time to seek medical advice. The lack of recognizing CRC symptoms in 51.9% of participants in this study is comparable to findings from other Arab countries, with 59.0% of Lebanese participants displaying poor knowledge,²⁶ 41.0% of participants displaying poor knowledge about CRC symptoms in Bahrain,¹⁶ 2.8% of participants in Saudi Arabia correctly recognizing CRC symptoms,²⁷ and 14.3% of Jordanian university students displaying poor knowledge.¹¹ This demonstrates poor

TABLE 3. Summary of Awareness Scores for CRC Risk Factors Between Adolescents Versus Adults and Between Males Versus Females

Risk Factor	Recall						Recognition						
	Adolescents v Adults			Males v Females			Adolescents v Adults			Males v Females			
	Total (N = 3,080)	Adolescents (n = 1,502)	Adults (n = 1,578)	P	Males (n = 1,466)	Females (n = 1,614)	Total (N = 3,080)	Adolescents (n = 1,502)	Adults (n = 1,578)	P	Males (n = 1,466)	Females (n = 1,614)	P
Fiber-free diet													
Agree	1,223 (39.7)	574 (38.2)	649 (41.1)	.10	567 (38.7)	656 (40.6)	1,309 (42.5)	557 (37.1)	752 (47.7)	< .001	527 (35.9)	782 (48.5)	< .001
Disagree	1,857 (60.3)	928 (61.8)	929 (58.9)		899 (61.3)	958 (59.4)	989 (32.1)	542 (36.1)	447 (28.3)		412 (28.1)	462 (28.6)	
Not sure	—	—	—		—	—	782 (25.4)	403 (26.8)	379 (24.0)		527 (35.9)	370 (22.9)	
Eating red or processed meat once a day or more													
Agree	260 (8.4)	108 (7.2)	152 (9.6)	.015	152 (10.4)	108 (6.7)	970 (31.5)	403 (26.8)	567 (35.9)	< .001	458 (31.2)	512 (31.7)	.86
Disagree	2,820 (91.6)	1,394 (92.8)	1,426 (90.4)		1,314 (89.6)	1,506 (93.3)	1,075 (34.9)	556 (37.0)	519 (32.9)		519 (35.4)	556 (34.4)	
Not sure	—	—	—		—	—	1,035 (33.6)	543 (36.2)	492 (31.2)		489 (33.4)	546 (33.9)	
Being overweight													
Agree	147 (4.8)	44 (2.9)	103 (6.5)	< .001	65 (4.4)	82 (5.1)	1,407 (45.7)	588 (39.1)	819 (51.9)	< .001	644 (43.9)	763 (47.3)	.16
Disagree	2,933 (95.2)	1,458 (97.1)	1,475 (93.5)		1,401 (95.6)	1,532 (94.9)	834 (27.1)	478 (31.8)	356 (22.6)		414 (28.2)	420 (26.0)	
Not sure	—	—	—		—	—	839 (27.2)	436 (29.0)	403 (25.5)		408 (27.9)	431 (26.7)	
Being > 70 years old													
Agree	58 (1.9)	3 (0.2)	55 (3.5)	< .001	27 (1.8)	31 (1.9)	867 (28.1)	303 (20.2)	564 (35.7)	< .001	407 (27.8)	460 (28.5)	.36
Disagree	3,022 (98.1)	1,499 (99.8)	1,523 (96.5)		1,439 (98.2)	1,583 (98.1)	1,099 (35.7)	600 (39.9)	499 (31.6)		510 (34.8)	589 (36.5)	
Not sure	—	—	—		—	—	1,114 (36.2)	599 (39.9)	515 (32.6)		549 (37.4)	565 (35.0)	
Having a relative with CRC													
Agree	202 (6.6)	30 (2.0)	172 (10.9)	< .001	89 (6.1)	113 (7.0)	901 (29.3)	296 (19.7)	605 (38.3)	< .001	368 (25.1)	533 (33.0)	< .001
Disagree	2,878 (93.4)	1,472 (98.0)	1,406 (89.1)		1,377 (93.9)	1,501 (93.0)	1,191 (38.6)	679 (45.2)	512 (32.4)		626 (42.7)	565 (35.0)	
Not sure	—	—	—		—	—	988 (32.1)	527 (35.1)	461 (29.3)		472 (32.2)	516 (32.0)	
Doing less than 30 minutes of moderate physical activity 5 times a week													
Agree	67 (2.2)	23 (1.5)	44 (2.8)	.017	28 (1.9)	39 (2.4)	917 (29.8)	439 (29.2)	478 (30.3)	.10	424 (28.9)	493 (30.5)	.61
Disagree	3,013 (97.8)	1,479 (98.5)	1,534 (97.2)		1,438 (98.1)	1,575 (97.6)	1,411 (45.8)	671 (44.7)	740 (46.9)		681 (46.5)	730 (45.2)	
Not sure	—	—	—		—	—	752 (24.4)	392 (26.1)	360 (22.8)		361 (24.6)	391 (24.3)	
Having a bowel disease													
Agree	209 (6.8)	93 (6.2)	116 (7.4)	.20	117 (8.0)	92 (5.7)	1,456 (47.3)	622 (41.4)	834 (52.9)	< .001	649 (44.3)	807 (50.0)	.004
Disagree	2,871 (93.2)	1,409 (93.8)	1,462 (92.6)		1,349 (92.0)	1,522 (94.3)	596 (19.4)	359 (23.9)	237 (15.0)		309 (21.1)	287 (17.8)	
Not sure	—	—	—		—	—	1,028 (33.3)	521 (34.7)	507 (32.1)		508 (34.6)	520 (32.2)	

(Continued on following page)

TABLE 3. Summary of Awareness Scores for CRC Risk Factors Between Adolescents Versus Adults and Between Males Versus Females (Continued)

Risk Factor	Recall						Recognition					
	Adolescents v Adults			Males v Females			Adolescents v Adults			Males v Females		
	Total (N = 3,080)	Adolescents (n = 1,502)	Adults (n = 1,578)	Males (n = 1,466)	Females (n = 1,614)	P	Total (N = 3,080)	Adolescents (n = 1,502)	Adults (n = 1,578)	Males (n = 1,466)	Females (n = 1,614)	P
Having diabetes												
Agree	12 (0.4)	6 (0.4)	6 (0.4)	6 (0.4)	6 (0.4)	.93	591 (19.2)	258 (17.2)	333 (21.1)	301 (20.5)	290 (18.0)	.20
Disagree	3,068 (99.6)	1,496 (99.6)	1,572 (99.6)	1,496 (99.6)	1,572 (99.6)		1,160 (37.7)	587 (39.1)	573 (36.3)	542 (37.0)	618 (38.3)	
Not sure	—	—	—	—	—		1,329 (43.1)	657 (43.7)	672 (42.6)	623 (42.5)	706 (43.7)	
Overall mean ± SD score (of 16)	0.7 ± 0.8	0.6 ± 0.7	0.8 ± 0.9	0.7 ± 0.8	0.7 ± 0.8	< .001	8.0 ± 3.1	7.3 ± 2.8	8.7 ± 3.2	7.8 ± 3.2	8.3 ± 3.0	< .001
% overall mean score ± SD	4.4 ± 5.1	3.7 ± 4.4	5.1 ± 5.6	4.4 ± 5.1	4.4 ± 5.1	< .001	50.0 ± 19.4	45.8 ± 17.5	54.2 ± 20.2	48.5 ± 19.7	51.6 ± 19.0	< .001

NOTE: Data are No. (%) unless otherwise specified.
Abbreviations: CRC, colorectal cancer; SD, standard deviation.

TABLE 4. The Association of Age Group and Sex With Recalling and Recognizing CRC Factors
Recall (N = 3,080) **Recognition (N = 3,080)**

Risk Factor	Female Sex			Being Adult			Female Sex			Being Adult		
	Adjusted OR (95% CI)*	P	Adjusted OR (95% CI)†	P	Adjusted OR (95% CI)†	P	Adjusted OR (95% CI)*	P	Adjusted OR (95% CI)†	P		
Fiber-free diet	1.08 (0.94 to 1.25)	.28	1.13 (0.98 to 1.30)	.10	1.55 (1.36 to 1.76)	< .001	1.49 (1.31 to 1.70)	< .001	1.49 (1.31 to 1.70)	< .001		
Eating red or processed meat once a day or more	0.62 (0.48 to 0.79)	< .001	1.39 (1.07 to 1.80)	.012	1.03 (0.90 to 1.17)	.67	1.34 (1.18 to 1.53)	< .001	1.34 (1.18 to 1.53)	< .001		
Being overweight	1.14 (0.81 to 1.59)	.45	2.31 (1.61 to 3.31)	< .001	1.13 (0.98 to 1.28)	.08	1.65 (1.44 to 1.88)	< .001	1.65 (1.44 to 1.88)	< .001		
Being > 70 years old	1.01 (0.59 to 1.70)	.98	18.04 (5.63 to 57.80)	< .001	0.97 (0.85 to 1.10)	.64	1.73 (1.52 to 1.97)	< .001	1.73 (1.52 to 1.97)	< .001		
Having a relative with CRC	1.14 (0.85 to 1.52)	.39	5.99 (4.04 to 8.89)	< .001	1.42 (1.25 to 1.62)	< .001	2.02 (1.77 to 2.31)	< .001	2.02 (1.77 to 2.31)	< .001		
Doing less than 30 minutes of moderate physical activity 5 times a week	1.26 (0.77 to 2.06)	.36	1.84 (1.10 to 3.06)	.019	1.06 (0.93 to 1.21)	.37	0.97 (0.85 to 1.10)	.60	0.97 (0.85 to 1.10)	.60		
Having a bowel disease	0.69 (0.52 to 0.92)	.011	1.21 (0.91 to 1.61)	.18	1.25 (1.09 to 1.43)	.001	1.64 (1.43 to 1.87)	< .001	1.64 (1.43 to 1.87)	< .001		
Having diabetes	0.91 (0.29 to 2.82)	.87	0.95 (0.31 to 2.96)	.93	0.91 (0.80 to 1.03)	.16	1.18 (1.03 to 1.34)	.015	1.18 (1.03 to 1.34)	.015		

Abbreviations: CRC, colorectal cancer; OR, odds ratio.

*Adjusted for age group.

†Adjusted for sex.

TABLE 5. Summary of Barriers to Seeking Medical Advice in Adolescents Versus Adults and Males Versus Females

Type of Barrier	Total (N = 3,080)	Adolescents (n = 1,502)	Adults (n = 1,578)	Males (n = 1,466)	Females (n = 1,614)	P
Emotional						
Embarrassment						
Yes	1,417 (46.0)	703 (46.8)	714 (45.3)	606 (41.3)	811 (50.2)	< .001
No	1,546 (50.2)	709 (47.2)	837 (53.0)	798 (54.4)	748 (46.3)	
I do not know	117 (3.8)	90 (6.0)	27 (1.7)	62 (4.3)	55 (3.5)	
Feeling scared						
Yes	1,477 (48.0)	713 (47.5)	764 (48.4)	641 (43.7)	836 (51.8)	< .001
No	1,438 (46.7)	678 (45.1)	760 (48.2)	740 (50.5)	698 (43.2)	
I do not know	165 (5.3)	111 (7.4)	54 (3.4)	85 (5.8)	80 (5.0)	
Wouldn't feel confident talking about symptom with doctor						
Yes	1,455 (47.2)	777 (51.7)	678 (43.0)	752 (51.3)	703 (43.6)	< .001
No	1,322 (42.9)	512 (34.1)	810 (51.3)	575 (39.2)	747 (46.3)	
I do not know	303 (9.8)	213 (14.2)	90 (5.7)	139 (9.5)	164 (10.1)	
Feeling worried about what a doctor might find						
Yes	1,522 (49.4)	749 (49.9)	773 (49.0)	663 (45.2)	859 (53.2)	< .001
No	1,265 (41.1)	533 (35.5)	732 (46.4)	665 (45.4)	600 (37.2)	
I do not know	293 (9.5)	220 (14.6)	73 (4.6)	138 (9.4)	155 (9.6)	
Service						
Feeling worried about wasting doctor's time						
Yes	552 (17.9)	279 (18.6)	273 (17.3)	263 (17.9)	289 (17.9)	.78
No	2,286 (74.2)	1,045 (69.6)	1,241 (78.6)	1,093 (74.6)	1,193 (73.9)	
I do not know	242 (7.9)	178 (11.8)	64 (4.1)	110 (7.5)	132 (8.1)	
Difficulty talking to doctor						
Yes	628 (20.4)	293 (19.5)	335 (21.2)	366 (25.0)	262 (16.2)	< .001
No	2,126 (69.0)	976 (65.0)	1,150 (72.9)	950 (64.8)	1,176 (72.9)	
I do not know	326 (10.6)	233 (15.5)	93 (5.9)	150 (10.2)	176 (10.9)	
Difficulty making an appointment with the doctor						
Yes	961 (31.2)	492 (32.8)	469 (29.8)	487 (33.2)	474 (29.4)	.045
No	1,847 (60.0)	816 (54.3)	1,031 (65.3)	846 (57.7)	1,001 (62.0)	
I do not know	272 (8.8)	194 (12.9)	78 (4.9)	133 (9.1)	139 (8.6)	

(Continued on following page)

TABLE 5. Summary of Barriers to Seeking Medical Advice in Adolescents Versus Adults and Males Versus Females (Continued)

Type of Barrier	Barrier	Total (N = 3,080)	Adolescents (n = 1,502)	Adults (n = 1,578)	P	Males (n = 1,466)	Females (n = 1,614)	P
Practical	Too busy to go to the doctor							
	Yes	1,085 (35.2)	534 (35.6)	551 (34.9)	< .001	491 (33.5)	594 (36.8)	.16
	No	1,750 (56.8)	789 (52.5)	961 (60.9)		856 (58.4)	894 (55.4)	
Having other things to do	I do not know	245 (8.0)	179 (11.9)	55 (4.2)		119 (8.1)	126 (7.8)	
	Yes	860 (27.9)	442 (29.4)	418 (26.5)	< .001	384 (26.2)	476 (29.5)	.11
	No	1,965 (63.8)	871 (58.0)	1,094 (69.3)		962 (65.6)	1,003 (62.1)	
Difficulty arranging transport to the doctor	I do not know	255 (8.3)	189 (12.6)	66 (4.2)		120 (8.2)	135 (8.4)	
	Yes	997 (32.4)	467 (31.1)	530 (33.6)	< .001	464 (31.7)	533 (33.0)	.70
	No	1,860 (60.4)	878 (58.5)	982 (62.2)		893 (60.9)	967 (59.9)	
	I do not know	223 (7.2)	157 (10.5)	66 (4.2)		109 (7.4)	114 (7.1)	

NOTE. Data are No. (%).

TABLE 6. The Relationships Between Recognizing Colorectal Cancer Symptoms by Study Participants and Their Barriers to Seeking Medical Advice

Recognized Symptom/Sign	Embarrassment (n = 2,963)		Feel Scared (n = 2,915)		Wouldn't Feel Confident Talking About Symptom With Doctor (n = 2,777)		Feel Worried About What Doctor Might Find (n = 2,787)		Feel Worried About Wasting Doctor's Time (n = 2,838)	
	Adjusted OR (95% CI)	P	Adjusted OR (95% CI)	P	Adjusted OR (95% CI)	P	Adjusted OR (95% CI)	P	Adjusted OR (95% CI)	P
Abdominal pain	0.98 (0.85 to 1.14)	.83	1.03 (0.88 to 1.19)	.74	0.96 (0.82 to 1.13)	.63	1.09 (0.93 to 1.28)	.27	0.86 (0.71 to 1.05)	.13
Change in bowel habit	0.99 (0.86 to 1.15)	.99	1.01 (0.87 to 1.16)	.95	0.99 (0.85 to 1.15)	.89	1.02 (0.88 to 1.19)	.81	0.79 (0.65 to 0.95)	.013
Bowel not emptying	1.12 (0.96 to 1.30)	.14	1.05 (0.90 to 1.22)	.52	1.00 (0.85 to 1.17)	.99	1.03 (0.88 to 1.20)	.73	1.02 (0.84 to 1.23)	.87
Blood in stools	1.01 (0.87 to 1.17)	.92	1.17 (1.01 to 1.35)	.038	0.97 (0.84 to 1.13)	.73	1.21 (1.04 to 1.41)	.012	0.82 (0.68 to 0.98)	.033
Anorectal bleeding	1.19 (1.02 to 1.37)	.024	1.21 (1.04 to 1.40)	.012	1.00 (0.86 to 1.17)	.99	1.14 (0.97 to 1.32)	.11	0.79 (0.65 to 0.96)	.017
Anorectal pain	1.02 (0.88 to 1.18)	.81	0.97 (0.83 to 1.13)	.71	0.91 (0.77 to 1.06)	.22	0.99 (0.85 to 1.16)	.90	0.90 (0.74 to 1.09)	.28
Abdominal mass	0.89 (0.77 to 1.04)	.16	0.97 (0.84 to 1.13)	.73	1.13 (0.97 to 1.32)	.13	0.99 (0.85 to 1.16)	.96	0.99 (0.81 to 1.19)	.88
Weight loss	1.13 (0.97 to 1.31)	.11	1.08 (0.93 to 1.25)	.30	1.11 (0.95 to 1.30)	.17	1.14 (0.98 to 1.33)	.09	0.96 (0.80 to 1.16)	.68
Pallor/tiredness	1.08 (0.93 to 1.25)	.32	1.08 (0.93 to 1.25)	.31	0.92 (0.79 to 1.07)	.28	0.94 (0.81 to 1.10)	.44	1.07 (0.89 to 1.30)	.47

Recognized Symptom/Sign	Difficulty Talking to Doctor (n = 2,754)		Difficulty Making Appointment With Doctor (n = 2,808)		Too Busy to Go to the Doctor (n = 2,835)		Have Other Things to Do (n = 2,825)		Difficulty Arranging Transport to Doctor (n = 2,857)	
	Adjusted OR (95% CI)	P	Adjusted OR (95% CI)	P	Adjusted OR (95% CI)	P	Adjusted OR (95% CI)	P	Adjusted OR (95% CI)	P
Abdominal pain	0.99 (0.83 to 1.20)	.99	0.89 (0.76 to 1.05)	.17	1.10 (0.94 to 1.29)	.23	0.96 (0.81 to 1.13)	.64	0.94 (0.80 to 1.10)	.41
Change in bowel habit	0.79 (0.66 to 0.94)	.009	0.93 (0.79 to 1.09)	.36	1.03 (0.88 to 1.20)	.75	0.98 (0.83 to 1.15)	.77	1.02 (0.87 to 1.19)	.86
Bowel not emptying	0.90 (0.75 to 1.08)	.27	1.02 (0.86 to 1.20)	.85	1.06 (0.91 to 1.25)	.44	1.24 (1.05 to 1.46)	.011	1.14 (0.98 to 1.34)	.10
Blood in stools	0.76 (0.64 to 0.92)	.004	0.95 (0.81 to 1.11)	.51	1.14 (0.98 to 1.33)	.09	0.99 (0.84 to 1.16)	.86	0.91 (0.78 to 1.06)	.23
Anorectal bleeding	0.82 (0.68 to 0.99)	.038	0.95 (0.81 to 1.11)	.52	1.13 (0.96 to 1.32)	.13	0.88 (0.75 to 1.04)	.13	0.87 (0.75 to 1.02)	.10
Anorectal pain	0.86 (0.71 to 1.04)	.12	0.84 (0.71 to 0.99)	.034	0.97 (0.83 to 1.14)	.70	1.12 (0.94 to 1.32)	.20	0.91 (0.77 to 1.06)	.23
Abdominal mass	0.85 (0.71 to 1.02)	.08	0.96 (0.82 to 1.13)	.66	1.04 (0.89 to 1.22)	.61	1.09 (0.93 to 1.29)	.30	1.14 (0.97 to 1.34)	.10
Weight loss	1.04 (0.87 to 1.24)	.69	0.84 (0.72 to 0.99)	.034	0.95 (0.82 to 1.11)	.55	0.97 (0.82 to 1.14)	.69	0.96 (0.82 to 1.12)	.60
Pallor/tiredness	1.01 (0.84 to 1.21)	.91	1.07 (0.91 to 1.25)	.44	1.06 (0.91 to 1.24)	.46	0.88 (0.74 to 1.04)	.12	1.11 (0.95 to 1.30)	.18

NOTE. ORs were adjusted for age and sex. To overcome nonlinear relationships, the middle group of each barrier (1 = I do not know) was dropped for easier interpretation. Abbreviation: OR, odds ratio.

knowledge of CRC symptoms in the region, which might be further compounded by a culture of not talking about symptoms that might be perceived as embarrassing, and this assumption is supported by the large proportion of participants reporting embarrassment as a main barrier in this study.

Abdominal pain was the most commonly recognized symptom, as in other studies, which could be attributed to its interference with daily activities.^{11,23,28} However, pallor/fatigability was the most recognized symptom in an Omani study,¹⁵ with 55.1% recognizing the symptom compared with 40.4% in Gaza. This difference could be caused by the comparably high prevalence of anemia in Gaza, with rates of 60.3% in patients with heart disease,²⁹ 35.8% among female adolescents,³⁰ and 33.1% among pregnant women,³¹ indicating that anemia is not normally recognized as a CRC sign.³²

Recognition of blood in stools as a CRC symptom by 53.2% in this study was comparable to 53.0% in the Omani study,¹⁵ 50.1% of the Jordanian undergraduate students,¹¹ and more than the 22.5% reported in a Spanish study.³³ This underlines the finding that people in Gaza are more alarmed by the obvious symptoms and signs of CRC, whereas common symptoms, such as pallor, and common deficiencies, such as anemia, are not always regarded as abnormal or unusual.

Al-Azri et al¹⁵ reported a higher recognition among Omani participants than among those from Gaza for CRC risk factors, such as doing less physical exercise (37.3% v 29.8%), having a relative with CRC (32.7% v 29.3%), and diabetes (24.9% v 19.2%). However, Gazans identified the low-fiber diet more frequently (42.5%) than people in Oman (38.7%) and Spain (29.5%).^{15,33}

The Omani participants reported a mixture of practical and emotional barriers as the most common barriers to seeking medical advice for CRC.¹⁵ However, despite the poor economic circumstances in Gaza, emotional barriers were most commonly reported, not service or practical barriers, as would be expected, and higher percentages were obtained especially among females. A possible explanation for this could be that women tend to display a fear of cancer, denial, and reliance on alternative therapies.^{23,34,35} The lack of female oncologists and surgical specialists in Gaza could be another reason, especially in the younger age groups, as found by Elshami et al,¹⁰ where feeling embarrassed was the most common barrier to seeing a doctor by female adolescents. This was also observed among American women who reported delays in seeking

care due to a perceived lack of female clinicians.³⁶ However, a study on CRC screening in the West Bank, Palestine, showed similar rates of embarrassment among men and women,²² which were also significantly lower, at 11.0% and 11.4%, than those in this study, at 41.3% and 50.2%, respectively. Higher numbers of female doctors and cultural differences might be the reason. This demonstrates the urgent need for more female surgeons and oncologists in Gaza. In addition, men and adolescents in Gaza did not feel confident talking about their symptoms to the doctor, reflecting poor doctor-patient relationships and leading to additional delays in presentation. Poor communication skills by health care professionals have also been shown to affect health care services in other studies from Gaza.^{10,37} Therefore, it is essential to systematically include communication skills and professionalism in undergraduate and postgraduate training in Gaza to make services more accessible, especially to younger people.

The strengths of this study are the large sample size, the high response rate, and the use of a validated instrument, the BoCAM. In addition, the inclusion of both adults and adolescents provides the opportunity for additional recommendations on prevention interventions.

Limitations of this study include the lack of sociodemographic data, such as level of education, that can influence the awareness of CRC. In addition, no additional exploration was performed on how much impact factors such as family history of CRC and familiarity with the disease through friends and neighbors had on participants' knowledge of the disease. Moreover, recruitment of adult participants from hospitals might have caused a degree of selection bias because they displayed health-seeking behavior, which adolescents, recruited from schools, did not.

In conclusion, poor public awareness of CRC symptoms was demonstrated, especially if symptoms were not affecting daily activities. In addition, the potential impact of some modifiable risk factors (such as obesity, lack of physical exercise, and Western diet) on increasing the risk of CRC was poorly understood. Interventions to improve public awareness of CRC, such as educational interventions in schools and the public domain, are warranted and should be tailored to each age group. Emotional barriers, especially among women, should be addressed by training more female clinicians and improving communication skills of existing physicians. Finally, a strategy to establish a CRC screening program in Gaza should be developed to facilitate early detection of CRC in the face of its increasing incidence.

AFFILIATIONS

¹Ministry of Health, Gaza, Palestine

²Islamic University of Gaza, Gaza, Palestine

³Bond University, Queensland, Australia

CORRESPONDING AUTHOR

Mohamedraed Elshami, MD, Faculty of Medicine, Islamic University of Gaza, Gaza, Palestine, 108; e-mail: dr.mohamed.raed@gmail.com.

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AUTHOR CONTRIBUTIONS

Conception and design: Mohamedraed Elshami, Loai Albarqouni, Bettina Bottcher

Collection and assembly of data: Mohamedraed Elshami, Maha Alfaqawi, Tamer Abdalghafoor, Ayoob A. Nemer, Mohammed Ghuneim, Hussien Lubbad, Batool Almahallawi, Mosab Samaan, Abdallah Alwali, Ahmad Alborn, Deyaa Al-kafarna, Aseel Salah, Karam Shihada, Mohammed Abo Amona, Amira Al-Najjar, Rana Abu Subha, Basma Alhelu, Israa Abujayyab

Data analysis and interpretation: Mohamedraed Elshami, Loai Albarqouni, Bettina Bottcher

Manuscript writing: All author

Final approval of manuscript: All authors

Accountable for all aspects of the work: All authors

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