

COLORECTAL CANCER: A SURVEY OF THE KNOWLEDGE, ATTITUDE AND RISK ASSESSMENT OF CLINIC ATTENDEES IN NIGERIA

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ABSTRACT

Background: Colorectal cancer (CRC) has become a disease of public health importance as a result of its increase and late presentation in Nigeria and West Africa. It is the second most common cause of cancer death worldwide.

Despite improvement in the screening and management of CRC, many patients still present in very late stages where curative resection is not possible. This survey was conducted to determine the knowledge, attitude, and risk assessment of CRC among clinic attendees in Nigeria.

Methods: Data was collected using a pretested structured questionnaire. Socio-demographic variables were summarized using frequency. Level of knowledge was assessed using a scoring system and level of risk was assessed by giving a score based on the number and type of risk factors present in each respondent. Chi-squared test was used to find the association between knowledge, risk of developing colorectal cancer and socio-demographic characteristics. A p-value less than 0.05 was considered significant throughout the analysis.

Results: Of the 371 respondents, 192(52%) are male while 179(48%) are female. Also, 56% had good knowledge while 44% had poor knowledge of CRC. Level of knowledge was statistically significant with marital status only.

Respondents generally had good knowledge of the symptoms of CRC as 75% and 80% said bloody stool and weight loss are respectively symptoms of CRC. Also, Knowledge of risk factors of CRC was generally good as 79% and 69% were aware that cigarette smoking and intake of fatty food respectively are risk factors of CRC. Eighty four percent (84%) had Low Risk while 16% had High Risk of developing CRC. The level of risk of developing CRC was statistically significant with Age, Occupation, Marital Status, and Level of education.

Conclusion: Changes in life style have created the constant increase in the risk of developing CRC among Nigerians and other Africans. Concerted efforts at every level are necessary to stop this trend.

Keywords: Knowledge, Nigeria, Outpatients, Risk assessment, Colorectal cancer

INTRODUCTION

Colorectal cancer (CRC) is the third most common type of cancer in males and the second most common type of cancer in females and accounts for mortality of 9.4% worldwide, being the second most common cause of cancer death worldwide.¹ Studies have shown a rising incidence of CRC in Sub-Saharan Africa and other economically transitioning countries. This increase has been attributed to changes in lifestyle and diet.^{2,3} In the last two decades in Nigeria, the incidence of CRC has increased significantly due to changes in diet.⁴ Also, recent data from the cancer registry of the University College Hospital, Ibadan, Nigeria, showed an incidence rate that triples what authors recorded in the same centre 20–40 years earlier.⁵

Patients with CRC present late in Nigeria. Though they see the symptoms early, some do not present to the

hospital, claiming it is “jedi-jedi”, a local diagnosis that consists of some or all of the following symptoms: passage of bloody/mucoid stools, constipation, anal protrusion, low back pain and loss of libido.⁶ The presence of various risk factors predisposes individuals to CRC at varying degrees. Age is an important risk factor for the development of CRC. In Nigeria and other African countries, 40 years is the average age of CRC diagnosis; hence it is recommended that the screening for CRC starts at 40 years.^{7,8,9} CRC is one of the preventable cancers when screened appropriately. CRC screening has been proven to lower the incidence of late-stage CRC by 40%.¹⁰ and prevent disease development by removing premalignant polyps.^{9,11}

Though there has been improvement in the screening and management of CRC in Nigeria, many patients with CRC still present in very late stages where curative resection is not possible. Factors contributing to poor compliance to screening and, subsequently, late presentation are poor health insurance schemes, superstitious beliefs, lack of trust in the health care system, low level of education and poor income.¹²

CRC has become a disease of public health importance due to its continuous increase and late presentation in Nigeria and West Africa.¹³ Because of the long course of the transformation from premalignant lesions to the development of CRC, it is thus amenable to screening. It is important to assess the knowledge of symptoms, risk factors, screening, and attitude towards screening and treatment. Late presentation of CRC leads to increased management costs, morbidity and poor patient outcomes. This study aims to assess the knowledge, attitude and risk of developing CRC among clinic attendees in Nigeria.

METHODS

Study design, participants and study location

The participants were surveyed using convenience sampling between September 2022 and October 2022. Only participants who were aged ≥ 18 years were eligible to participate.

The study participants are outpatients seeking medical or surgical healthcare services or their relatives accompanying them to the hospital.

The study was conducted among outpatients in one of Nigeria's foremost tertiary hospitals. The hospital receives high patronage of patients from all six (6) regions of the country and thus sees patients from diverse socio-demographic and socioeconomic backgrounds. The hospital has specialists in various fields of medicine and is a frontier for advancing medical education and research in the country.

Study material

The data collection process employed a self-administered structured questionnaire adapted from the study of Adeoti *et al.*⁶ Pretesting of the questionnaire was conducted among approximately 100 outpatients. Subsequently, based on feedback, suggestions, and thorough analysis, necessary corrections and refinements were made to create the final version of the questionnaire.

The questionnaire consisted of four sections, A to D. In Section A, socio-demographic details such as age, sex, religion, occupation, ethnic group, marital status and respondents' highest level of education were asked.

Section B assessed the knowledge of respondents on CRC. This section asked a total of 17 questions. These questions were placed under sub-sections that assessed: general knowledge of CRC, knowledge of signs and symptoms of CRC, knowledge of risk factors of CRC and knowledge of screening of CRC. Respondents must select either true or false to each statement assessing their knowledge. Section C assessed respondents' risk of developing CRC. This section assessed the presence of risk factors for developing CRC among the respondents. This section also included the BMI of the respondents calculated from their measured weights and heights. Section D assessed the respondents' attitude towards screening and treatment of CRC. A total of six statements were made from which patients could either select: strongly agree, agree, indifferent, disagree, or strongly disagree.

This research project has been reported in line with the CROSS criteria.¹⁴

Data analysis

Socio-demographic variables were summarized using frequency. To assess respondents' level of knowledge of CRC, a total of 17 questions were asked. A score of 1 or 0 was awarded when a question was answered correctly or wrongly, respectively. Hence, a total of 17 points was obtainable for each respondent in this section.

Having a total of 12 (the median score) and above points was categorized as having good knowledge, while having a total of 11 points and below was categorized as having poor knowledge.

The attitude of the respondents towards screening and treatment of CRC was assessed using six questions. A Likert scale was used to indicate their attitude toward each statement. Though the original Likert scale consisted of options such as strongly agree, agree, indifferent, disagree, and strongly disagree, during analysis, we categorized the options into agree (for responses such as strongly agree and agree) and disagree (for responses such as indifferent, disagree, and strongly disagree).

Responses in agreement with the following statement are considered positive: people with CRC can live long with early detection; I will undergo early screening for colon cancer if my doctor advised me to do so; I will present to the hospital if I notice symptoms of CRC; colorectal cancer can be completely treated or managed in the hospital. Responses of disagreement to the following statements are also considered positive: presence of blood in the stool is most likely due to

jedi-jedi and not necessarily colorectal cancer; perceived high cost is the reason I will not go for CRC screening. Responses in disagreement and agreement with the above group of statements, respectively, were considered negative.

The respondents were asked about the presence of any of 10 CRC risk factors, and their BMI were measured to determine their risk of developing CRC. A score of 1 point each was awarded for the presence of any of the following risk factors: age 40 and above, regular intake of alcoholic drinks greater than one unit per day, lack of engagement in regular/daily activities involving walking or exercise, currently smoke tobacco/cigarette, regular intake of red, processed meat such as meat from beef, horse meat, mutton, venison or boar, regular intake of high fatty and low fibre food, measured body mass index greater than or equal to 25.

Two points each were awarded for the presence of the following risk factors: diagnosed of inflammatory bowel disease or adenomatous polyps before, presence of a first-degree relative (father, mother, siblings, children) with CRC.

Three points each were awarded to the presence of the following risk factors: history of CRC, history of other types of cancer.

Each risk factor contributes to the development of CRC in varying degrees.

A total of 3 and below was arbitrarily considered a low risk of developing CRC, and having a total of 4 and above was considered a high risk of developing CRC.

Chi-squared test was used to find the association between knowledge, risk of developing colorectal cancer and socio-demographic characteristics. A p-value less than 0.05 was considered significant throughout the analysis.

RESULTS

Of the 410 respondents that filled the questionnaires, 371 were fit for analysis. Of the 371, 192 (52%) were male while 179(48%) were female. Christianity (74%) was the major religion the respondents practise, and about 73% were between 18 - 40 years old. Other details of the socio-demographic variables are shown in Table 1 below.

Table 1: General information about participants.

Characteristics of respondents	Frequencies (n)	Frequencies (%)
Age		
18-40	269	72.5
41 and above	102	27.5
Sex		
Male	192	51.7
Female	179	48.3
Religion		
Christianity	273	73.6
Islam	98	26.4
Occupation		
Artisan	23	6.2
Trading	86	23.2
Professional	140	37.7
Others	122	32.9
Ethnic Group		
Yoruba	318	85.7
Ibo	36	9.7
Hausa	3	0.8
Others	14	3.8
Marital Status		
Single	148	40.0
Married	208	56.1
Divorced	3	0.8
Separated	4	1.1
Widowed	8	2.2
Highest Level of Education		
Primary	10	2.7
Secondary	84	22.6
Tertiary	276	74.4
No Formal Education	1	0.3

Table 2: Knowledge of respondents on colorectal cancer

	Frequencies of Good Knowledge (%)	Frequencies of Poor Knowledge (%)	<i>p</i> value
Sex			0.734
Male	105(54.7)	87(45.3)	
Female	102(57)	77(43)	
Age			1.000
18-40	150(55.8)	119(44.2)	
41 and above	57(55.9)	45(44.1)	
Religion			1.000
Christianity	152(55.7)	121(44.3)	
Islam	55(56.1)	43(43.9)	
Occupation			0.172
Artisan	14(60.9)	9(39.1)	
Trading	39(45.3)	47(54.7)	
Professional	82(58.6)	58(41.4)	
Others	72(59)	50(41)	
Ethnic Group			0.387
Yoruba	183(57.5)	135(42.5)	
Ibo	17(47.2)	19(52.8)	
Hausa	1(33.3)	2(66.7)	
Others	6(42.9)	8(57.1)	
Marital Status			0.039
Single	83(56.1)	65(43.9)	
Married	118(56.7)	90(43.3)	
Divorced	0(0)	3(100)	
Separated	0(0)	4(100)	
Widowed	6(75)	2(25)	
Highest Level of Education			0.183
Primary	5(50)	5(50)	
Secondary	39(53.6)	45(46.4)	
Tertiary	162(58.7)	114(41.3)	
No Formal Education	1(100)	0(0)	

Table 3: Frequency of correct responses to questions on CRC

Question	Frequencies (n)	Frequencies (%)
General Knowledge of CRC		
Colorectal Cancer is a very rare type of cancer	60	16
Colorectal Cancer affects the colon and rectum	324	87
Colorectal cancer occurs mostly among adults over 40 years of age	265	71
Presence of blood in the stool could point to dysentery or colorectal cancer	257	69
<i>Which of the following are signs and symptoms of CRC?</i>		
Blood in the stool/feces	278	75
Feeling of incomplete emptying when defecating could be a symptom	259	70
Constipation (reduction in the number of times you stool/defecate overtime) or narrowing of the stool and could alternate with diarrhea	271	73
Unintended weight loss	295	80
Knowledge on the Risk Factors of CRC		
Family History does not predispose one to Colorectal cancer	161	43
Cigarette smoking is a risk factor for developing CRC	294	79
High intake of fatty foods like butter, pork meat etc. is a risk factor for CRC	255	69
Regular intake of low-fiber food e.g., noodles, spaghetti can contribute to the occurrence of CRC	164	44
Typical African diet like leafy, roots and cruciferous vegetables, fruits, roots, tubers and plantains, legumes, whole grains are protective against the occurrence CRC	293	78
Knowledge of Screening of Respondents on CRC		
CRC can be detected early by screening	344	93
CRC recovery rate/cure increases if screened and detected early	327	88
Early detection can be obtained by stool examination for blood.	280	75
Doing colonoscopy for everyone above 40 years of age is cost effective	197	53

Of the 371 respondents, 207 (56%) had good knowledge, while 164 (44%) had poor knowledge. Table 2 shows the statistical significance of the level of knowledge with socio-demographic characteristics.

Table 3 shows the frequency of correct responses to each statement assessing knowledge.

Figure 1 shows the graphical representation of respondents' sources of health information, including information about CRC.

Figure 2 shows the frequencies and percentages of respondents showing positive and negative attitudes towards screening and treatment of CRC.

Of the 371 respondents, 313 (84%) had low risk, while 58 (16%) had a high risk of developing CRC. Table 4 assessed the statistical significance of the level of risk of developing CRC with the socio-demographic characteristics of the respondents. Table 4 shows that the level of risk of developing CRC is statistically significant with age, occupation, marital status, and level of education.

Table 5 below shows the frequency of the respondents having each risk factor of developing CRC.

Figure 3 below shows a comparison of the proportion of respondents with different levels of knowledge and different level of risk of developing CRC.

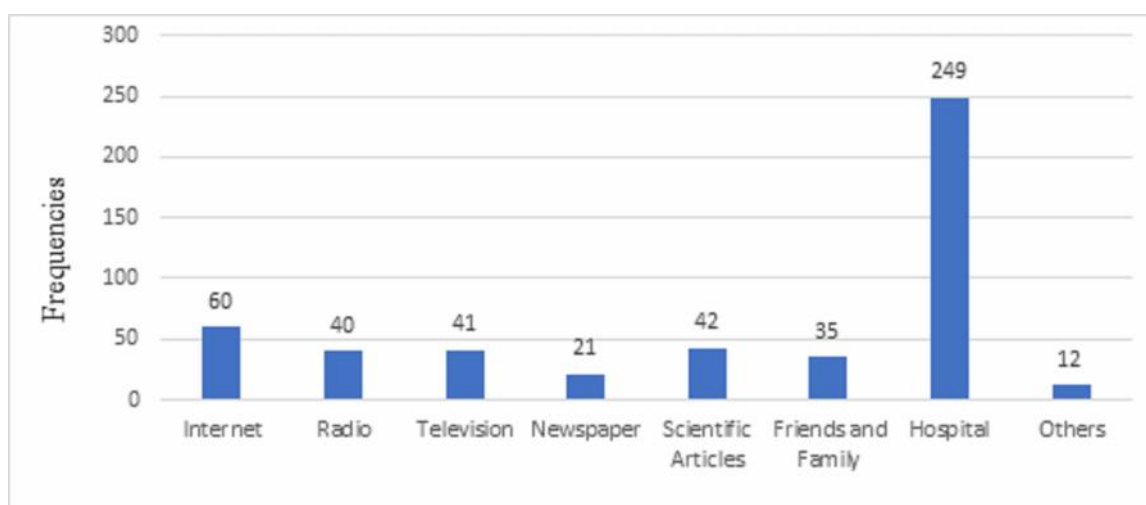


Fig. 1: Respondents' source of health information including information on CRC (n=371)

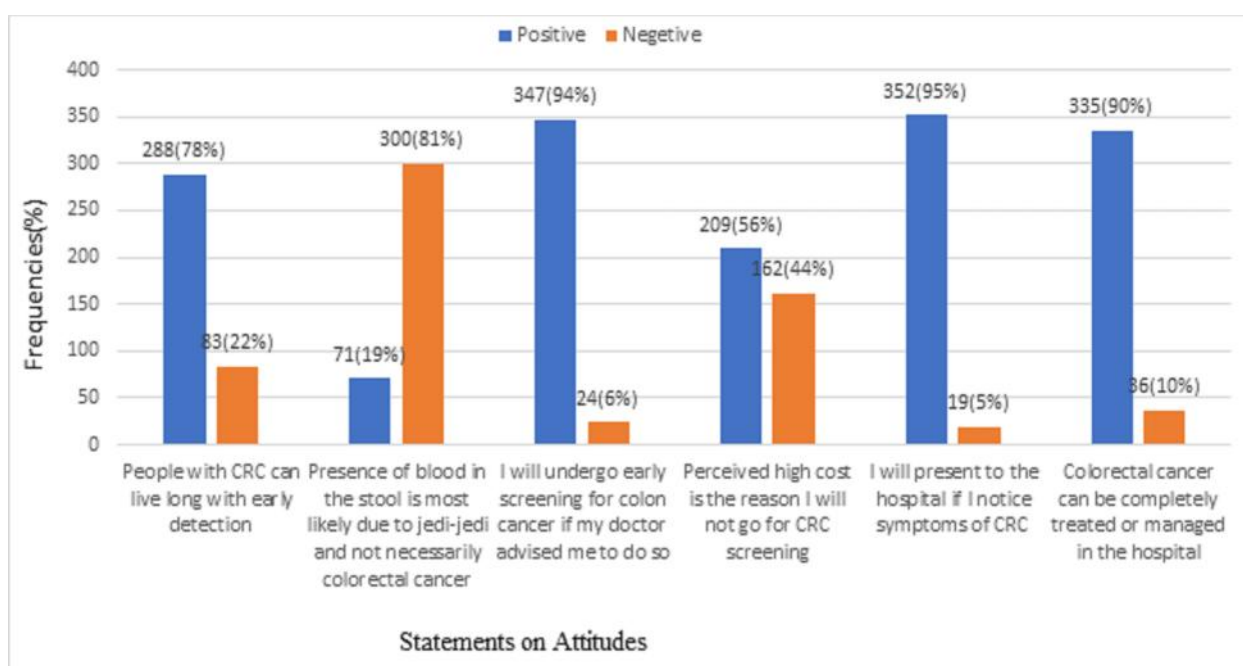


Fig. 2: Attitude of Respondents on Colorectal Cancer (n=371)

Table 4: Risk assessment of developing colorectal cancer

	Frequencies of Low Risk (%)	Frequencies of High Risk (%)	<i>p</i> value
Sex			0.117
Male	156(81.3)	36(18.7)	
Female	157(87.7)	22(12.3)	
Age			0.016
18-40	235(87.4)	34(12.6)	
41 and above	78(76.5)	24(23.5)	
Religion			0.790
Christianity	229(83.9)	44(16.1)	
Islam	84(85.7)	14(14.3)	
Occupation			0.029
Artisan	16(69.6)	7(30.4)	
Trading	67(77.9)	19(22.1)	
Professional	124(88.6)	16(11.4)	
Others	106(86.9)	16(13.1)	
Ethnic Group			0.318
Yoruba	266(83.6)	52(16.4)	
Ibo	31(86.1)	5(13.9)	
Hausa	2(66.7)	1(33.3)	
Others	14(100)	0(0)	
Marital Status			0.002
Single	132(89.2)	16(10.8)	
Married	169(81.3)	39(18.7)	
Divorced	3(100)	0(0)	
Separated	1(25)	3(75)	
Widowed	8(100)	0(0)	
Highest Level of Education			0.018
Primary	8(80)	2(20)	
Secondary	65(77.4)	19(22.6)	
Tertiary	240(87)	36(13)	
No Formal Education	0(0)	1(100)	

Table 5: Risk factors for developing colorectal cancer

Risks Factors	Frequencies (n)	Frequencies (%)
Age 40 and above	116	31
Regular intake of alcoholic drinks greater than one unit per day	46	12
Lack of engagement in regular/daily activities involve walking or exercise	54	14
Currently smoke tobacco/cigarette	21	6
Regular intake of red processed meat such as meat from beef, horse meat, mutton, venison, boar	195	52
Regular intake of high fatty and low fiber food	106	28
Measured Body Mass Index greater than or equal to 25	172	46
Diagnosed of inflammatory bowel disease or adenomatous polyps before	15	4
Presence of first degree relative (father, mother, siblings, children) with Colorectal cancer	19	5
History of Colorectal Cancer	15	4
History of other types of Cancer	5	1

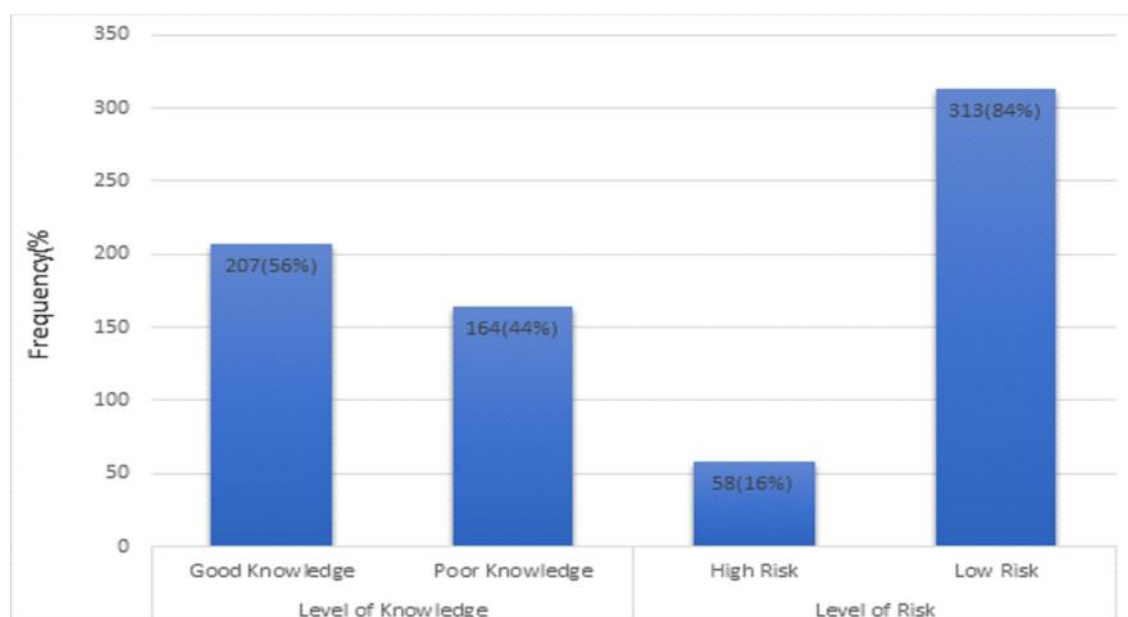


Fig. 3: Graph showing level of knowledge and level of risk (n=371)

Discussion

There has been a rising incidence of CRC in Nigeria and other economically transitioning countries, attributed to lifestyle and diet changes. This study was conducted to assess the knowledge and attitude of clinic attendees at one of Nigeria's foremost tertiary hospitals and assess their risk of developing CRC.

Of the 371 respondents, 56% (207) had good knowledge of CRC, which is similar (57%) to a study conducted by Adeoti *et al.* among adults in Ogbomoso, a metropolis located in the same state as the study's site.⁶ Having poor or good knowledge was statistically significant with marital status only. Marital status could have had an effect on the level of knowledge about CRC in several ways. Importantly, married individuals may be more likely to seek out information about health issues because they may have a partner who encourages them to do so or because they may have someone with whom they discuss health concerns. The proportion of females with good knowledge (57%) is higher than that of males with good knowledge (54.7%). This finding is similar to studies by Nasaif and Al Qallaf.¹⁵ This could be because females are generally more likely to seek information about their health.¹⁶ Similar to another study,¹⁵ older age groups are associated with more knowledge of CRC (55.9%) than the younger age groups (55.8%). However, this contrasts with Pan *et al.*'s findings.¹⁷ Only 16% of the respondents correctly answered that CRC is common. This is very small compared to findings from Adeoti *et al.*, where 36.4% of the respondents know that CRC is not rare.⁶ This finding is important as it shows that

most respondents in our study site are unaware that CRC is becoming a disease of public health concern.

When asked about symptoms, 75% correctly said bloody stool is a symptom of CRC. The proportion of our respondents who answered this question correctly is higher than other findings, which range from 22% to 45.1%.^{15,16,18,19,20} Similarly, 80% of our respondents answered that weight loss is a symptom of CRC, whereas findings in other studies reported less level of knowledge on this symptom of CRC.^{18,19,20} This could be because respondents in this study site generally attribute bloody stool or unintended weight loss to something grave like AIDS or cancer. Seventy eight percent (78%) of the respondents are aware that a typical African diet like leafy, root and cruciferous vegetables, fruits, roots, tubers and plantains, legumes, and whole grains are protective against the occurrence of CRC. Of the respondents, 79% and 69% answered that cigarette smoking and high intake of fatty foods are risk factors for developing CRC, respectively. The hospital (67%) and the internet (43%) are the major sources of health information (including information on CRC) for our respondents. Ninety three percent (93%) of our respondents know that CRC can be detected early by screening, and being cured of it increases if screened and detected early (88%). However, only 53% agreed that colonoscopy for everyone above 40 is cost-effective. This is quite different from a study conducted on adults with a mean age of over 40 in Saudi Arabia, where it was reported that colonoscopy was accepted as a screening test by most individuals (81%), and most of the

participants who had done screening used colonoscopy (72.73%).²¹ Less than 50% of our respondents know that family history and regular intake of low-fibre food predisposes to having CRC. This is consistent with findings from other studies.^{15,19}

Over 80% agreed that blood in the stool is most likely due to *jedi-jedi* and not necessarily colorectal cancer. This is similar to the findings (84.4%) of an earlier study conducted in Ogbomoso, Nigeria.⁶ *Jedi-jedi*, a local diagnosis that consists of symptoms such as the passage of bloody/mucoid stools, constipation, anal protrusion, low back pain and loss of libido, is not a medical diagnosis. Many locals take different herbal concoctions to treat it. This finding is very important. It shows that though our respondents know that blood in the stool may be due to CRC (75%), they agree that they would consider it *jedi-jedi* first (81%). This could be one of the reasons for the late presentation of CRC in the hospital. Over 70% agree that people with CRC can live long with early detection. Also, 95% of the respondents will present in the hospital if they notice symptoms of CRC and 94% will undergo early screening for colon cancer if their doctor advises them to do so. This is slightly higher than the proportion observed in a study by Al-Azri *et al.* (84.6%).²² However, only 56% of our respondents will not be discouraged by perceived high CRC screening costs. These results show they need a doctor's support and assurance of low-cost management to present at the hospital for screening.

Of the 371 respondents, 313 (84%) have low risk, while 58 (16%) have a high risk of developing CRC. This finding is quite different from the results of another study, where 49.8% of respondents had a high risk for developing colorectal cancer while 50.2% had a low risk for its development.⁶ The level of risk respondents had in developing CRC was statistically dependent on age, occupation, marital status and highest level of education (Table 4). In our study, people older than 40 years were about two times at a higher risk than those 40 years and lower. This finding is consistent with other studies showing that older age is generally associated with developing cancers. Less than 20% of our respondents possessed risk factors such as regular intake of alcoholic drinks, physical inactivity, tobacco or cigarette smoking, history of personal or family history of cancer and history of adenomatous polyps. This is similar to another study conducted in Nigeria⁶ and different from another study conducted on patients in Poland.²³ This is not surprising as all the respondents adhere to one of the two main religions in the country.

Forty six percent (46%) of our respondents have a BMI of 25 and greater. This finding is similar to another study conducted among women attending primary care clinics (41.8%)²⁴ and different from one conducted among patients in Poland.²³ Africans are now increasingly taking Western types of diets. This was reflected in our study as over 50% of the respondents are involved in the regular intake of red, processed meat, such as meat from beef, horse meat, mutton, venison, and boar. Also, 28% are involved in regular high-fatty and low-fibre food intake. According to a report from the World Cancer Research Fund, dietary intake is a primary risk factor for CRC, with the consumption of processed or red meat specifically being linked to an increased risk of the disease.²⁵ Hence, many Africans are constantly increasing their risk of cancer development due to their choice of diet.

The findings of this study provide several implications in Nigeria and other countries especially economically transitioning ones. Findings of the study underscore the need for public awareness campaign on CRC especially on the importance of early detection through screening among the appropriate demographic groups. Policy makers should ensure screening are affordable and essential comprehensive strategies are developed for reducing the burden of CRC to improve public health outcome.

A limitation of this study is that it relies on self-reported data, which may be subject to response bias and inaccuracies. Participants might not remember events accurately or may provide socially desirable answers, leading to potential distortions in the data. The sampling technique not being random is also a limitation.

This study was conducted in only one hospital, limiting the generalizability of the findings to the entire Nigerian population. Thus, a country-wide study in the future to assess similar objectives will be good. In the study, the division of the respondents into high and low-risk groups was done arbitrarily. Future studies should be conducted to create more appropriate criteria for the stratification of respondents into high or low-risk groups based on the number of risk factors for developing CRC possessed by respondents.

CONCLUSION

This survey highlights a rising incidence of colorectal cancer (CRC) in Nigeria, consistent with trends observed in other economically transitioning countries. The increase in CRC cases has been attributed to lifestyle and dietary changes.

The findings indicate that a considerable proportion of respondents demonstrated good knowledge of CRC, with marital status showing a significant association with knowledge level. Females and older age groups tended to exhibit higher levels of CRC knowledge, while misconceptions about CRC rarity and symptoms were observed among a significant portion of respondents.

The survey also revealed that although the majority of respondents were aware of the importance of early detection and screening for CRC, there were misconceptions about the risk factors associated with CRC development. Inadequate knowledge regarding the relationship between certain symptoms and CRC, as well as the misconception about Jedi-Jedi, may contribute to delayed presentation at healthcare facilities. Moreover, despite a relatively high willingness to undergo screening and seek medical advice for symptoms, perceived high-cost barriers could discourage some individuals from seeking CRC screening.

Risk assessment showed that a significant proportion of respondents had a low risk for developing CRC, with only a minority displaying risk factors associated with CRC development.

In light of these findings, there is a need for public health interventions and education campaigns to improve CRC knowledge, dispel misconceptions, and encourage early detection through screening.

REFERENCES

1. International Agency for Research on Cancer. (2020). GLOBOCAN 2020: Cancer Today. Available at https://gco.iarc.fr/today/online-analysis-pie?v=2020&mode=cancer&mode_population=continents&population=900&populations=900&key=total&sex=0&cancer=39&type=1&statistic=5&prevalence=0&population_group=0&ages_group%5B%5D=0&ages_group%5B%5D=17&nb_items=7&group_cancer=1&include_nmssc=1&include_nmssc_other=1&half_pie=0&donut=0 [Accessed 13 January 2023].
2. **Graham A**, Adedoye D, Grant L, *et al.* Estimating the incidence of colorectal cancer in Sub-Saharan Africa: A systematic analysis. *Journal of Global Health*. 2012; 2(2).
3. Center MM, Jemal A, Ward E. International trends in colorectal cancer incidence rates. *Cancer Epidemiology Biomarkers and Prevention*. 2009; 18(6), 1688–1694.
4. **Irabor DO**. Ethnic differences in Colon and Rectal Cancer incidence in Nigeria: a case of dietary determinants? *East Cent. Afr. J. Surg.* August 2012: 52–64.
5. **Irabor D**, Adedeyi OA. Colorectal cancer in Nigeria: 40 years on. A review. *Eur J Cancer Care (Engl)*. March 2009;18(2):110-115.
6. **Adeoti M**, Oguntola S, Olugbenga-Bello A, *et al.* Colorectal Cancer: Knowledge and Risk Factors among Adults in a Suburban Nigerian Community. *Journal of Medical Science and Clinical Research*. 2016; 12478–12491.
7. **Bakari AA**, Nggada H, Adamu AS, *et al.* Presentations and Management of Colorectal Cancer in under 40 Years of Age in the Sub-Saharan Africa/ : A Multi-Centre Study. *Singapore Medical Journal*. 2014; 3284–3289.
8. **Irabor DO**, Afuwape, OO, Ayandipo OO. The Present Status of the Management of Colon and Rectal Cancer in Nigeria. *Journal of Cancer Research*. 2014; 1–7.
9. Center MMM, Jemal A, Smith RP, Ward EP. Worldwide Variations in Colorectal Cancer. *Diseases of the Colon and Rectum* 2010; 53(7).
10. **Walpole AE**, *et al.* Nonbreast cancer incidence, treatment received and outcomes: are there differences in breast screening attendees versus non-attendees? *Journal of Medical Screening*. 2019; Volume 147, Issue 3. 856-865.
11. **Hewitson P**, Glasziou P, Irwig L, *et al.* Screening for colorectal cancer using the faecal occult blood test, Hemoccult. *Cochrane Database of Systematic Reviews*. 2007;
12. **Tammana V**, Laiyemo A. Colorectal cancer disparities: Issues, controversies and solutions. *World J Gastroenterol*. January 2014; 20(4): 869-876.
13. **Labacka EO**, Irabor AE, Irabor DO. Fecal Immunochemical Test as a Screening Method for Colorectal Cancer in University College Hospital, Ibadan, Nigeria original reports abstract. *Journal of Global Oncology*. 2020; 525–531.
14. **Sharma A**, *et al.* A Consensus-Based Checklist for Reporting of Survey Studies (CROSS). *J Gen Intern Med*. 2021 Oct;36(10):3179-3187.
15. **Nasaif HA**, Al Qallaf SM. Knowledge of Colorectal Cancer Symptoms and Risk Factors in the Kingdom of Bahrain: A Cross- Sectional Study. *Asian Pac J Cancer Prev*. 2018 Aug 24;19(8):2299-2304.
16. **Bidmon S**, Terlutter R. Gender Differences in Searching for Health Information on the Internet and the Virtual Patient-Physician Relationship in Germany: Exploratory Results on How Men and Women Differ and Why. *J Med Internet Res*. January 2015;17(6).
17. **Pan Y**, Chieng CY, Haris AAH, Ang SY. Assessment of the level of knowledge of colorectal cancer among public at outpatient clinics in Serdang Hospital: A survey based study. *The*

- Medical Journal of Malaysia. December 2017;72(6):338-344.
18. **Alshammari SA**, Alenazi HA, Alshammari HS. Knowledge, attitude and practice towards early screening of colorectal cancer in Riyadh. *J Family Med Prim Care*. May 2020;9(5):2273-2280.
 19. **Chong VH**, Lim AG, Baharudin HN, *et al*. Poor Knowledge of Colorectal Cancer in Brunei Darussalam. *Asian Pac J Cancer Prev*. 2015;16 (9): 3927-3930.
 20. **Alabdulkader AM**, Mustafa T, Almutailiq DA, *et al*. Knowledge and barriers to screening for colorectal cancer among individuals aged 40 years or older visiting primary healthcare clinics in Al-Khobar, Eastern Province. *Journal of Family and Community Medicine* 31(1): 25-35, Jan–Mar 2024.
 21. **Almadi MA**, Alghamdi F. The gap between knowledge and undergoing colorectal cancer screening using the Health Belief Model: A national survey. *Saudi J Gastroenterol*. 2019;25(1):27-39.
 22. **Al-Azri M**, Al-Khatiri S, Murthi Panchatcharam S. Attitudes toward and Knowledge of Colorectal Cancer Screening among an Omani Adult Population Attending a Teaching Hospital. *Asian Pac J Cancer Prev*. October 2020;21(10):3061-3068.
 23. **Lewandowska A**, Rudzki G, Lewandowski T, *et al*. Risk Factors for the Diagnosis of Colorectal Cancer. *Cancer Control*. 2022;29:10732748211056692.
 24. **Ogunbode A**, Ladipo M, Ajayi I, *et al*. Prevalence of obesity among women attending a Nigerian primary care clinic. March 2010 *Tropical Journal of Health Sciences* 17(1).
 25. **Kim M**, Park K. Dietary fat intake and risk of colorectal cancer: A systematic review and meta-analysis of prospective studies. *Nutrients*. 2018;10:1963.