



Colorectal Cancer Risk and Prevention Knowledge among Adults Attending Public Health Facilities in Obudu, Cross River State, Nigeria

Ugbe Maurice-Joel Ugbe^{1*}, Theresa Awa Mark¹ and Okoi Faith Ubi¹

¹Department of Public Health, University of Calabar, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. Author UMJU conceived this study, designed the instrument and carried out the fieldwork. Author TAM contributed to drafting the manuscript. Authors UMJU and OFU performed the data analysis and carried out a critical review of the manuscript. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJMAH/2020/v18i1030260

Editor(s):

(1) Dr. Nicolas Padilla-Raygoza, University of Celaya, Mexico.

Reviewers:

(1) Tsang Yi Po, Pamela Youde Nethersole Eastern Hospital, China.

(2) Tomas Koltai, Italy.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/62553>

Original Research Article

Received 20 August 2020
Accepted 24 October 2020
Published 13 November 2020

ABSTRACT

Background: Colorectal cancer (CRC) is the 5th most frequent cause of cancer-related deaths in Nigeria. As with other cancers, CRC risk is multifactorial, including issues such as poor diet, obesity, alcohol abuse, physical inactivity, age above 50 years, history of adenomatous polyps, inflammatory bowel disease, and family history of CRCs or polyps.

Aim: The study aimed to ascertain the level of knowledge of risk factors and preventive measures against CRC among adults attending health facilities in Obudu Local Government area Cross River State, Nigeria.

Study Design: A descriptive survey research design was used.

Place and Duration of Study: Urban health facilities in Obudu Local government area, Cross River state between 2017 and 2019.

Methodology: The sample of the study comprised 310 attendees of health facilities. A structured questionnaire was the main instrument used for data collection. Face validity was employed. The split-half method was used to establish the reliability of the instrument with thirty adults in a neighboring town.

*Corresponding author: E-mail: mauricejoelph@unical.edu.ng, mauricejoel01@gmail.com;

Results: Findings showed that males had better knowledge of risk factors (75.3%) than females (45.8%); and males had better knowledge of prevention of CRC (82.1%) than females (57.2%), hence showing a significant association ($P=.002$, $P=.003$) between gender with knowledge of risk factors and prevention of CRC respectively. There were also significant associations between age ($P=.007$, $.001$) and educational level ($P=.002$, $.006$) with knowledge of risk factors and prevention of CRC respectively. This showed that younger ages and higher education were associated with better knowledge of CRC.

Conclusions: Less knowledgeable women and persons with low educational level should be targeted with messages on CRC. Health educators should intensify their health education campaign on the importance of screening as the major preventive measure against CRC at the household level. Government and non-governmental organizations (NGOs) should sponsor the provision of resources and screening facilities.

Keywords: Colorectal cancer; tumor; risk factors; prevention; family history; education; age; gender.

1. INTRODUCTION

Although global mortality rates from communicable diseases have increased over the years, communicable diseases interventions have ensured that these maligning components are curtailed in society. This can hardly be said about cancer-related mortalities which have increased by almost 40% over the past 4 decades [1]. Projections have indicated that with the current trend of cancer prevalence, a 60% increase is expected in the coming years, with an estimated 13 million cancer-related mortalities by 2030 [1]. Malignant neoplasms from all cancers were the second leading cause of death after heart disease, while colorectal cancer (CRC) was reportedly the third most frequently diagnosed cancer in both sexes [2]. CRC is one of the most common cancers worldwide and its incidence is reported to be increasing in developing countries, partly due to the acquisition of a western lifestyle. It involves a malignant tumor that originates from the epithelial cells of the inner mucosa [3]. The tumor mass invasion of the intestinal walls is a result of the uncontrolled growth of cancerous cells which disrupt the function of nearby organs in the abdominal cavity [3]. This cancer is thought to develop from precancerous cells known as polyps, which by timely intervention can be eliminated before developing into an uncontrollable malignant state [3]. Familial Adenomatous Polyposis is a dominantly inherited disease affecting 1 in 7,000 persons [4]. Patients with this condition have reportedly developed thousands of colorectal tumors also referred to as adenomatous polyps during their 20 to 30 years of life [4]. The transitioning of these benign tumors into invasive or malignancy (cancer) is dependent on their quantity.

Forty years ago, Colorectal cancer was reportedly rare in Africa, a feat attributable to the

starchy, high-fiber, foods low in animal protein which most Africans consume [3]. This can however no longer be said of the region which has experienced major changes in diet culture assisted by the present day's fast food, restaurants, and eateries [3]. A longitudinal study of 36 patients of CRC in Ilorin, Nigeria reported that malignancies were found in the rectum of 60.2% of the cases, while the descending colon was regarded as the least affected site (1.2%) [5].

CRC is a major public health issue in Nigeria and is ranked among the top five cancers prevalent in the West African country [6]. According to Odukoya and Fayemi [6], the onset of CRC can be attributed not only diet, but also to physical inactivity, obesity, smoking, and alcohol abuse. Other factors mentioned by Adeoti et al [3] include age > 50, personal history of colorectal polyps, personal history of ulcerative colitis and Crohn's disease, family history of CRC, and inherited syndromes. Furthermore, an estimated 5-10% of people who develop CRC have inherited gene mutations that cause family cancer at unusually young ages [3]. The common signs of CRC include weight loss, change in bowel habits, intestinal obstruction, presence of blood in the stool, and anemia [3]. Signs such as abdominal pain and bloating and nausea are present in the late stages of the disease [3].

The consequences of colorectal cancer may vary with the extent of spread in the human body. The disease consists of 5 stages (stage 0 to stage 4) [7]. In the early stages, the tumor continues to spread from the mucosa to the outer layers of the colon or rectum with the process spreading to lymph nodes in the body. At the late stage (stage 4), the condition always requires surgery thereby involving the removal of large portions of the intestine and some parts of vital organs in the

body such as the liver [7]. At this point, the condition is said to be terminal.

However, it has been observed that most people lack knowledge about the consequences of engaging in certain lifestyle practices that lead to CRC. Urbanization is characterized by the adoption of these lifestyles such as eating processed foods, binge drinking, and tobacco smoking. It is to this end that the researcher should assess the knowledge of the risk factors and preventive practices of this disease among the adults in Obudu local government area, Cross River state.

2. MATERIALS AND METHODS

2.1 Study Design

For the achievement of the objectives of the study, a descriptive survey research design was adopted. This type of research also permits a description of phenomena in their natural settings. The successful application of this design by Agu et al. [8] investigating the demographic pattern of unhealthy lifestyles among secondary school students in Imo state suggests its application and possible success in its use for this study.

2.2 Study Area

Obudu Local Government Area is located at the Northern Senatorial district of the Cross River State. Its headquarters is Obudu. Obudu covers a large area of over 453 km² with a total population of 161,457 people comprising of 60,206 males and 101,251 females [9]. The distribution of health centers and hospital/clinics are such that the urban centers have a comparatively lower number while the rural areas a higher one. The access to these services was therefore determined partly by the location of the people. The occupations of the people in rural areas are predominantly fishing, trading, and farming. In Obudu, people engage more in hotel businesses and engineering.

2.3 Study Population

According to information gotten from the Ministry of Health Headquarters Calabar, Obudu L.G.A has 75 health facilities. 20 of these health facilities are in the urban area while 55 are in the rural area. The target population for the study is all adults attending health facilities in Obudu Local Government Area, Cross River state. The

accessible population for the study consisted of 6,360 adults attending the 20 urban health facilities. The rural health facilities were exempted from the study due to logistic problems and difficult terrains that characterized access routes to rural areas.

2.4 Sample Size Determination and Sampling Techniques

The sample for this study was determined using Lwanga and Lemeshow [10] formula given as:

$$n = Z^2 p(1-p) / d^2$$

Where

n= desired sample size

Z= standard normal variate of confidence level (95%)= 1.96

P= Estimated proportion in the population with characteristic of interest from previous study= 0.75 [3]

d= desired precision= 0.05

Therefore, the sample size calculated was 288. Finite population correction for population less than 10,000 was applied thus:

$$Nf = \frac{n}{1 + \frac{n}{N}}$$

Where

n= calculated sample size of 288 and N= study population of 6,360

Therefore

Nf= 275.5 approximately 276.

Adjusting for perceived non-response rate of 11%, n= 310.11 approximately 310.

Sample size for the study consisted of 310 adults attending health facilities in Obudu L.G.A. This represented 4.88 percent of the accessible population of 6,360 adults. A sampling frame was utilized for the selection of the wards, health facilities, and respondents. The study adopted a multi-stage sampling procedure. The first stage involved the use of a simple random sampling technique of balloting without replacement to select two wards out of the existing 10 political wards in Obudu Local government area. The selected political wards were Ward 1 (Urban I) and ward 2 (Urban II). In stage two, a simple

random sampling technique of balloting without replacement was also used to select 10 health facilities out of the available 20 health facilities in urban wards I and II of Obudu L.G.A. In the third stage, a convenience sampling technique was used to select the first thirty-one adults (both male and female) to arrive at each sampled health facility on the days of immunization and other existing days. At the end of these procedures, a total of 310 adults which were made up of male and female attendees were used for the study.

2.5 Instrument for Data Collection

The main instrument for data collection was a 19-item self-developed questionnaire to assess the knowledge of risk factors and preventive measures against CRC (KRPMMC). The questionnaire contained three parts namely: sections A, B, and C. Section A generated sociodemographic data; section B generated data on the respondents' knowledge regarding the risk factors of CRC and section C generated data on their knowledge regarding preventive measures against colorectal cancer. Demographic data contained respondents' age, gender, and level of education. Their knowledge regarding CRC was categorized into two groups; Risk factors (10 statements), in section B, and prevention (6 statements), in section C. All questions in sections B and C were patterned into a binary scale of yes and no.

2.6 Validity of the Instrument

The self-developed structured questionnaire was validated by two lecturers in the Department of Public Health, Madonna University, Elele. The validators examined the content of the instrument alongside the objectives, research questions, and hypotheses to confirm the instrument's relevance in terms of its clarity, appropriateness of language, and its ability to gain accurate information that is needed to enable the researcher to answer the research questions. Necessary modifications, corrections, and suggestions that helped in improving the quality of the instrument were made by the experts. The final copy of the instrument was produced based on the experts' suggestions, corrections, and inputs.

2.7 Reliability of the Instrument

The split-half method was employed to establish the reliability of KRPMMC. The instrument was

administered to thirty adults attending some of the urban health facilities that were not selected for the study. The test was administered once. The scores of the odd number items were correlated with the scores of the even-numbered items. This yielded a coefficient of 0.91.

2.8 Method of Data Collection

To gain access to the health facilities and reach the respondents, a letter of introduction was signed by and collected from the Head, Department of Public Health Madonna University Elele, Rivers state explaining the purpose of the study and introducing the researcher. This was submitted to the head of each sampled health facilities. The collection of data was done by administering the KRPMMC survey to the respondents on the spot. The researcher and nurses who served as research assistants administered the copies of questionnaires to the respondents.

In all, 310 copies of the questionnaire were distributed by the researcher and research assistants (nurses) to the subjects. Distribution and collection of questionnaires around the 10 different health facilities lasted for three days. Respondents were requested to drop completed copies of the questionnaire into the bag provided for them. This helped in ensuring the anonymity of the respondents.

2.9 Method of Data Analysis

Out of 310 copies of KRPMMC distributed and collected back, 298 were properly filled out and returned, thus, giving a 96.1 percent return rate. The data were analyzed on an item-by-item basis using SPSS. Frequency and percentage as well as inferential statistics of chi-square (χ^2) were used to analyze the data generated from sections B and C. The response options for sections B and C were a dichotomous format of 'Yes' or 'No'. The null hypotheses were rejected where the calculated Chi-square (χ^2) values were equal to or less than the critical value at the appropriate degrees of freedom. Conversely, the null hypotheses were accepted as stated where the calculated values were greater than the critical values.

3. RESULTS

Table 1 portrays the response to knowledge questions concerning the risk factors of colorectal cancer by gender. 75.3 percent of

Table 1. Frequency and percentage distribution of knowledge of risk factors of CRC among adults attending health facilities in Obudu L.G.A based on gender (n=298)

Items	Male (n=129) Yes f (%)	Gender No f (%)	Female (n=169) Yes f (%)	No f (%)
1. Diet high in red meats and processed foods are risk factors of CRC	109(84.5)	20(15.5)	78(46.2)	91(53.8)
2. Cooking meat at very high temperature creates chemicals that increase CRC risk	59(45.7)	70(54.3)	29(17.2)	140(82.8)
3. High fat consumption increases amounts of bile acids which enhance tumor growth	109(84.5)	20(15.5)	98(58)	71(42)
4. Cigarette smoking and tobacco use increase risk of CRC	129(100)	0 (0)	108(63.9)	61(36.1)
5. Heavy alcohol use plays a major role in CRC onset	100(77.5)	29(22.5)	88(52.1)	81(47.9)
6. Physical inactivity has a role in development of CRC	79(61.2)	50(38.8)	78(46.2)	91(53.8)
7. Fat distribution around the abdominal region as a result of obesity is a risk factor for CRC development	109(84.5)	20(15.5)	49(29)	120(71)
8. Advanced age is a predisposing factor for CRC risk	109(84.5)	20(15.5)	98(58)	71(42)
9. Family history of CRC and Inflammatory bowel disease have increased risk for CRC	109(84.5)	20(15.5)	99(58.6)	70(41.4)
10. People with type 2 diabetes have an Increased risk for CRC	59(45.7)	70(54.3)	49(29)	120(71)
% Average	75.3%	24.7%	45.8%	54.2%

male respondents indicated that they were knowledgeable generally on the risk factors of CRC while only 45.8 percent of females also indicated that they were knowledgeable on the issue. More females had poor knowledge of the risk factors of CRC (54.2%).

From Table 2, 66% of respondents within the age range of 15-24 years were knowledgeable of the risk factors associated with CRC, 67% of respondents within the age range of 25-34 years were also knowledgeable, 53.8% of respondents within the age range of 35-44 years were knowledgeable as well and only 42% of respondents above 44 years and above were knowledgeable. However, people above 44 years were the least knowledgeable about these risk factors.

Table 3 shows that respondents with no formal education were least knowledgeable of risk factors of CRC, 63.5 percent of respondents with primary education had the knowledge of risk factors of CRC, 51.2 percent of those with secondary education had knowledge of risk factors of colorectal cancer and 76.5 percent of

those with tertiary education had knowledge of risk factors of colorectal cancer.

On knowledge of preventive measures, Table 4 showed that 82.1% of male respondents were knowledgeable about CRC preventive measures while 57.2% of the female respondents were knowledgeable about the preventive measures of colorectal cancer.

Also, Table 5 shows that 72.9% of respondents between the age range of 15-24 years knew CRC preventive strategies, 72.5% between ages 25-34 years knew the preventive measures against CRC, 62.2% between ages 35-44 years knew the preventive measures against CRC and 63.3% of respondents aged 45 years and above also have knowledge of CRC preventive measures.

Table 6 presents the data on the knowledge of preventive measures against CRC by the level of education. Respondents who had not attained any formal education were the least knowledgeable of CRC preventive measures, 69.2% of those with primary education were

knowledgeable of CRC preventive measures, 64.3% of those with secondary education were also knowledgeable and 86.4% of those with tertiary education were knowledgeable of the preventive measures against CRC.

The formulated hypotheses were tested using Chi-square (χ^2). Table 7 indicates the calculated χ^2 values and their respective corresponding p-values for the indices of level of knowledge of risk factors of colorectal cancer based on gender. Since $P < .05$, the null hypothesis of no significant difference among male and female adults in their level of knowledge of risk factors of colorectal cancer, was, therefore rejected. The male gender had

better knowledge of the risk factors of colorectal cancer than their female counterparts. This implies that the level of knowledge of risk factors of colorectal cancer is dependent on gender.

Table 8 indicates the calculated χ^2 values and their respective corresponding p-values for the indices of the level of knowledge of risk factors for CRC by age. With $P < .05$, the null hypothesis of no significant difference among adults of various ages in their level of knowledge of risk factors of colorectal cancer, was, therefore rejected. The result showed that younger age groups had better knowledge than the older age groups. This implies that the level of knowledge of risk factors for CRC is dependent on age.

Table 2. Frequency and percentage distribution of knowledge of risk factors of colorectal cancer among adults based on age (n=298)

Items	Age									
	15-24 (n= 78)		25-34 (n=79)		35-44 (n=91)		45 & above (n=50)			
	Yes	No	Yes	No	Yes	No	Yes	No		
Item 1	58	20	59	20	50	41	20	40	50	60
Item2	29	49	29	50	30	61	0	0	50	100
Item 3	58	20	59	20	70	21	20	40	30	60
Item 4	78	0	59	20	50	41	50	100	0	0
Item 5	49	29	59	20	50	41	30	60	20	40
Item 6	58	20	29	36.7	70	21	0	0	50	100
Item 7	49	29	59	20	50	45.1	0	0	50	100
Item 8	58	20	59	20	70	21	20	40	30	60
Item 9	49	29	59	20	50	41	50	100	0	0
Item 10	29	49	59	20	0	91	20	40	30	60
% Average	66%	34%	67%	33%	53.8%	46.2%	42%	58%		

Table 3. Frequency and percentage distribution of knowledge of risk factors of colorectal cancer among adults based on their level of education (n= 298)

S/N	Items	Non-formal (n=49)		Level of education Primary (n=40)		Secondary (n=107)		Tertiary (n= 102)	
		Yes	No	Yes	No	Yes	No	Yes	No
1.	Item 1	0(0)	49(100)	30(75)	10(25)	69(64.5)	38(35.5)	88(86.3)	14(13.7)
2.	Item2	0(0)	49(100)	0(0)	40(100)	0(0)	107(100)	88(86.3)	14(13.7)
3.	Item 3	0(0)	49(100)	30(75)	10(25)	89(83.2)	18(16.8)	88(86.3)	14(13.7)
4.	Item 4	29(59.2)	20(40.8)	34(85.0)	6(15)	79(73.8)	28(26.2)	95(93.1)	7 (6.9)
5.	Item 5	29(59.2)	20(40.8)	34(85)	6(15)	59(55.1)	48(44.9)	0(0)	49(100)
6.	Item 6	0(0)	49(100)	0(0)	40(100)	69(64.5)	38(35.5)	88(86.3)	14(13.7)
7.	Item 7	10(20.4)	39(79.6)	32(80)	8(20)	24(22.4)	83(77.6)	92(90.2)	10(9.8)
8.	Item 8	0(0)	49(100)	30(75)	10(25)	89(83.2)	18(16.8)	88(86.3)	14(13.7)
9.	Item 9	29(59.2)	20(40.8)	34(85)	6(15)	50(46.7)	57(53.3)	95(93.1)	7(6.9)aa
10.	Item 10	0(0)	49(100)	30(75)	10(25)	20(18.7)	87(81.3)	58(56.9)	44(43.1)
	% Average	20%	80%	63.5%	36.5%	51.2%	48.8%	76.5%	23.5%

Table 4. Frequency and percentage distribution of knowledge of the preventive measures against colorectal cancer among adults attending health facilities in Obudu L.G.A based on their gender (n=298)

S/N	Items	Male (n=129) Yes f (%)	Gender No f (%)	Female (n=169) Yes f (%)	No f (%)
1.	Consumption of fresh fruits and vegetables help to prevent colorectal cancer	129(100)	0(0)	148(87.6)	21(12.4)
2.	Smoking cessation helps in prevention of Colorectal I cancer	129(100)	0(0)	88(52.1)	81(47.9)
3.	Alcohol cessation helps to prevent colorectal cancer	100(77.5)	29(22.5)	108(63.9)	61(36.1)
4.	Exercise and other physical activities help to prevent colorectal cancer	99(76.7)	30(23.3)	98(58)	71(42)
5.	Regular screening for colorectal polyps in individuals with family history of CRC helps in early detection of the disease	89 (69)	40(31)	69(40.8)	100(59.2)
6.	Regular screening for colorectal polyps in the elderly helps to prevent CRC	89(69)	40(31)	69(40.8)	100(59.2)
% Average		82.1%	17.9%	57.2%	42.8%

Table 5. Frequency and percentage distribution table of knowledge of preventive measures against colorectal cancer among adults based on their ages (n=298)

S/N	Items	Age							
		15-24		25-34		35-44		45 & above	
		Yes f	No f %	Yes f	No f %	Yes f	No f %	Yes f	No f %
11.	Item 11	78	100 0 0	79	100 0 0	70	76.9 21 23	50	100 0 0
12.	Item 12	78	100 0 0	59	74.7 20 25.3	50	54.9 41 45.1	30	60 20 40
13.	Item 13	49	62.8 29 37.2	59	74.7 20 25.3	50	54.9 41 45.1	50	100 0 0
14.	Item 14	78	100 0 0	29	36.7 50 63.3	70	76.9 21 23.1	20	40 30 60
15.	Item 15	29	37.2 49 62.8	59	74.7 20 25.3	50	54.9 41 45.1	20	40 30 60
16.	Item 16	29	37.2 49 62.8	59	74.7 20 25.3	50	54.9 41 45.1	20	40 30 60
% Average		72.9%	27.1%	72.5%	27.4%	62.2%	37.8%	63.3%	36.7%

Table 6. Frequency and percentage distribution of knowledge of preventive measures against CRC (n=298) by level of education

S/N	Items	Non-formal (n=49)		Primary (n=40)		Secondary (n=107)		Tertiary (n=102)	
		Yes f (%)	No f (%)	Yes f (%)	No f (%)	Yes f (%)	No f (%)	Yes f (%)	No f (%)
11.	Item 11	39(79.6)	10(20.4)	36(90)	4(10)	102(95.3)	5(4.7)	100(98)	2(2)
12.	Item 12	29(59.2)	20(40.8)	34(85)	6(15)	59(55.1)	48(44.9)	95(93.1)	7(6.9)
13.	Item 13	29(59.2)	20(40.8)	34(85)	6(15)	79(73.8)	28(26.2)	66(64.7)	36(35.3)
14.	Item 14	10(20.4)	39(79.6)	2(5)	38(95)	93(86.9)	14(13.1)	92(90.2)	10(9.8)
15.	Item 15	0(0)	49(100)	30(75)	10(25)	40(37.4)	67(62.6)	88(86.3)	14(13.7)
16.	Item 16	0(0)	49(100)	30(75)	10(25)	40(37.4)	67(62.6)	88(86.3)	14(13.7)
% Average		36.4%	63.6%	69.2%	30.8%	64.3%	35.7%	86.4%	13.6%

Table 9 indicates the calculated χ^2 values and their respective corresponding p-values for indices of the level of knowledge of risk factors of colorectal cancer based on educational level. With $P < .05$, the null hypothesis of no significant difference among adults of various levels of

education in their level of knowledge of risk factors of CRC, was, therefore rejected. Higher educational attainment was associated with better knowledge of risk factors for CRC. This implies that the level of knowledge of risk factors of colorectal cancer is dependent on the level of education.

Table 10 indicates the calculated χ^2 values and their respective corresponding p-values for of the level of knowledge of preventive measures against CRC by gender. With $P < .05$, the null hypothesis of no significant difference among male and female adults in their level of knowledge of preventive measures against CRC, was, therefore rejected. Males had better knowledge of preventive measures if CRC than their female counter parts. This implies that the level of knowledge of preventive measures against CRC was dependent on gender.

Table 11 indicates the calculated χ^2 values and their respective corresponding p-values for indices of the level of knowledge of preventive measures for CRC according to age. With $P < .05$, the null hypothesis of no significant difference among age groups of adults in their level of knowledge of preventive measures against colorectal cancer, was, therefore rejected. Younger age groups had better knowledge of colorectal cancer than older age groups. This implies that the level of knowledge of preventive measures against colorectal cancer was dependent on age.

Table 12 below indicates the calculated χ^2 values and their respective corresponding p-

values for indices of the level of knowledge of preventive measures against colorectal cancer based on educational level. With $P < .05$, the null hypothesis of no significant difference in the level of education of adults attending health facilities in Obudu L.G.A in their level of knowledge of preventive measures against colorectal cancer, was, therefore rejected. Higher educational attainment guaranteed better knowledge of preventive measures against colorectal cancer. This implies that the level of knowledge of preventive measures for CRC is dependent on the level of education.

4. DISCUSSION

This study assessed the knowledge level of attendees (15 years and above) of health facilities in Obudu LGA on the risk factors and preventive measures for CRC. The study also tested 6 hypotheses on the aforementioned subjects. These hypotheses focused on three main sociodemographic variables namely gender, age and educational level. A higher percentage of males (75.3%) had better general knowledge on the risk factors of colorectal cancer than their female counterparts. Male respondents also had better general knowledge (82.1%) on preventive measures against colorectal cancer than their female counterparts (57.2%). This result is consistent with a study by Odukoya et al [6] who found male urban respondents to be more knowledgeable than their female counterparts on the risk factors and prevention of CRC. This could be attributed to the better exposure of the male gender in the society as against the women who may be

Table 7. Observed and expected values of knowledge of risk factors for CRC among adults based on their gender

S/N	Items	Male (n=129)				Female (n=169)				2-cal	P-value	Dec
		Yes	No	O	E	Yes	No	O	E			
1.	Item 1	109	80.9	20	48.1	78	106.1	91	62.9	46.013	.001	**
2.	Item2	59	38.1	70	90.9	29	49.9	140	119.1	28.709	.001	**
3.	Item 3	109	89.6	20	39.4	98	117.4	71	51.6	24.234	.001	**
4.	Item 4	129	102.6	0	26.4	108	134.4	61	34.6	58.546	.001	**
5.	Item 5	100	81.4	29	47.6	88	106.6	81	62.4	20.345	.001	**
6.	Item 6	79	68	50	61	78	89	91	80	6.680	.010	**
7.	Item 7	109	68.4	20	60.6	49	89.6	120	79.4	90.474	.001	**
8.	Item 8	109	89.6	20	39.4	98	117.4	71	51.6	24.234	.001	**
9.	Item 9	109	90	20	39	99	118	70	51	23.309	.001	**
10.	Item 10	59	46.8	70	82.2	49	61.2	120	107.8	8.875	.003	**
Overall										33.1419	0.002	**

Table 8. Observed and expected values of knowledge of risk factors of colorectal cancer among adults based on their ages

Items	Age												2-cal	P-value	Dec				
	15-24 years (n=78)				25-34 years (n=79)				35-44 years (n=91)							>45 years (n=50)			
	Yes		No		Yes		No		Yes		No					Yes		No	
	O	E	O	E	O	E	O	E	O	E	O	E				O	E	O	E
Item1	58	48.9	20	29.1	59	49.6	20	29.4	50	57.1	41	33.9	20	31.4	30	18.6	22.753	0.001	**
Item2	29	23	49	55	29	23.3	50	55.7	30	26.9	61	64.1	0	14.8	50	35.2	25.618	0.001	**
Item3	58	54.2	20	23.8	59	54.9	20	24.1	70	63.2	21	27.8	20	34.7	30	15.3	24.746	0.001	**
Item4	78	62	0	16	59	62.8	20	16.2	50	72.4	41	18.6	50	39.8	0	10.2	67.871	0.001	**
Item 5	49	49.2	29	28.8	59	49.8	20	29.2	50	57.4	41	33.6	30	31.5	20	18.5	7.360	0.061	*
Item 6	58	41.1	20	36.9	29	41.6	50	37.4	70	47.9	21	43.1	0	26.3	50	23.7	99.909	0.001	**
Item 7	49	41.4	29	36.6	59	41.9	20	37.1	50	48.2	41	42.8	0	26.5	50	23.5	74.456	0.001	**
Item 8	58	54.2	20	23.8	59	54.9	20	24.1	70	63.2	21	27.8	20	34.7	30	15.3	24.746	0.001	**
Item 9	49	54.4	29	23.6	59	55.1	20	23.9	50	63.5	41	27.5	50	34.9	0	15.1	33.855	0.001	**
Item 10	29	28.3	49	49.7	59	28.6	20	50.4	0	33	91	58	20	18.1	30	31.9	102.585	0.001	**
Over all																	48.3899	0.007	**

Table 9. Observed and expected values of knowledge of risk factors of colorectal cancer for adults based on their educational level

Items	Educational Level												2-cal	P-value	Dec				
	Non-formal (n=49)				Primary (n=40)				Secondary (n=107)							Tertiary (n=102)			
	Yes		No		Yes		No		Yes		No					Yes		No	
	O	E	O	E	O	E	O	E	O	E	O	E				O	E	O	E
Item 1	0	30.7	49	18.3	30	25.1	10	14.9	69	67.1	38	39.9	88	64	14	38	31.11	0.001	**
Item2	0	14.5	49	34.5	0	11.8	40	28.2	0	31.6	107	75.4	88	30.1	14	71.9	239.958	0.001	**
Item 3	0	34	49	15	30	27.8	10	12.2	89	74.3	18	32.7	88	70.9	14	31.1	135.118	0.001	**
Item 4	29	39	20	10	34	31.8	6	8.2	79	85.1	28	21.9	95	81.1	7	20.9	26.930	0.001	**
Item 5	29	30.9	20	18.1	34	25.2	6	14.8	59	67.5	48	39.5	66	64.3	36	37.7	11.585	0.009	**
Item 6	0	25.8	49	23.2	0	21.1	40	18.9	69	56.4	38	50.6	88	53.7	14	48.3	151.245	0.001	**
Item 7	10	26	39	23	32	21.2	8	18.8	24	56.7	83	50.3	92	54.1	10	47.9	129.402	0.001	**
Item 8	0	34	49	15	30	27.8	10	12.2	89	74.3	18	32.7	88	70.9	14	31.1	135.118	0.001	**
Item 9	29	34.2	20	14.8	34	27.9	6	12.1	50	74.7	57	32.3	95	71.2	7	30.8	60.374	0.001	**
Item 10	0	17.8	49	31.2	30	14.5	10	25.5	20	38.8	87	68.2	58	37	44	65	86.890	0.001	**
Overall																	100.8	0.002	**

Table 10. Observed and expected values of knowledge of preventive measures against colorectal cancer among adults based on their gender

S/N	Items		Male (n=129)			Female (n=169)			2-cal	P-value	Dec	
			Yes	No	O	E	O	E				
1.	Item 11	129	119	0	9.1	148	157.1	21	11.9	17.245	0.001	**
2.	Item 12	129	93.9	0	35.1	88	123.1	81	45.9	84.907	0.001	**
3.	Item 13	100	90	29	39	108	118	61	51	6.432	0.011	**
4.	Item 14	99	85.3	30	43.7	98	111.7	71	57.3	11.486	0.001	**
5.	Item 15	89	68.4	40	60.6	69	89.6	100	79.4	23.297	0.001	**
6.	Item 16	89	68.4	40	60.6	69	89.6	100	79.4	23.297	0.001	**
Overall										27.8	0.003	**

sidelined by cultural norms. In other words, males are more likely to leave the boundaries of their households and have better access to knowledge at different works of life whereas the women are more confined to the home as housewives and may have minimal or no access to relevant information.

Out of 78 respondents that fell within the age bracket of 15-24, 66% were knowledgeable of the risk factors; those aged between 25-34 had the highest knowledge of risk factors of CRC 67%; respondents within the age range of 35-44 had a good knowledge of the disease while at 42%, respondents who indicated to be 45 years or older had the lowest level of knowledge. Also, respondents between ages 15-24 years had a higher knowledge of preventive measures against and were closely followed by respondents between ages 25-34. Respondents in the other age groups had a moderate knowledge of CRC. This implies that younger adults had better knowledge of the preventive measures against CRC. This was further supported by the hypotheses that found a significant association between age groups and their knowledge of risk factors and preventive measures against CRC. The findings of this study are consistent with Taha et al. [11] and Adeoti et al. [3] whom both found age to be associated with knowledge of CRC risks and prevention. Better knowledge at younger ages may be attributed to the advancement of information technology and the fact that the younger generations are the major users of modern gadgets that provide up to date information. It could also be attributed to the younger generations' willingness to associate and explore new things compared with the older generation. However, these findings contrast with studies by Koo et al. [12] and Taha et al. [11] who attributed better knowledge scores to an

older age. Furthermore, Odukoya et al. [6] found no associations between age and CRC knowledge.

Respondents, based on the level of education agreed that all outlined factors affected their level of knowledge of risk factors of colorectal cancer as follows; Non-formal education had the lowest level (20%), elementary education and high school education had a moderate level (63.5%) and (51.2%) respectively and tertiary education had the highest level at 76.5% (Table 5). This implies that people who have attained a higher level of education have a better knowledge of CRC. Respondents who had not attained any formal education had the lowest knowledge of the preventive measures against CRC, while those with the highest level of education (tertiary education) had a better knowledge of the preventive measures against CRC. This implies that people who had attained the highest level of education had the best knowledge of CRC prevention. The hypothesis also found significant associations between the level of education and knowledge of risk factors and prevention of CRC. This is consistent with studies by Galal et al. [13], Chong et al. [14], and Al Wutayd [15] who found higher educational attainment to be associated with higher knowledge of CRC. These findings can be attributed to the fact that persons who are exposed to the four walls of a learning institution are more likely to be enlightened.

This study was limited by logistic problems that were encountered and delimited the study only to the urban areas of Obudu L.G.A. Language was also an issue when explaining verbally to some of the respondents on how to answer questions on the survey. This was solved by a research assistant who speaks and understands the local language.

Table 11. Observed and expected values of knowledge of preventive measures for CRC among adults based on their ages

Items	15-24years (n=78)				25-34years (n=79)				35-44years (n=91)				> 45years (n=50)				Z-cal	P-value	Dec
	Yes	No	O	E	Yes	No	O	E	Yes	No	O	E	Yes	No	O	E			
Item 11	78	72.5	0	5.5	79	73.4	0	5.6	70	84.6	21	6.4	50	46.5	0	3.5	51.391	.001	**
Item 12	78	56.8	0	21.2	59	57.5	20	21.5	50	66.3	41	24.7	30	36.4	20	13.6	48.093	.001	**
Item 13	49	54.4	29	23.6	59	55.1	20	23.9	50	63.5	41	27.5	50	34.9	0	15.1	33.855	.001	**
Item 14	78	51.6	0	26.4	29	52.2	50	26.8	70	60.2	21	30.8	20	33.1	30	16.9	90.425	.001	**
Item 15	29	41.4	49	36.6	59	41.9	20	37.1	50	48.2	41	42.8	20	26.5	30	23.5	26.280	.001	**
Item 16	29	41.4	49	36.6	59	41.9	20	37.1	50	48.2	41	42.8	20	26.5	30	23.5	26.280	.001	**
Overall																	46.054	0.001	**

Table 12. Observed and expected values of knowledge of preventive measures against colorectal cancer among adults based on their level of education

Items	Non-formal (n=49)				Primary (n=40)				Secondary (n=107)				Tertiary (n=102)				Z-cal	P-value	Dec
	Yes	No	O	E	Yes	No	O	E	Yes	No	O	E	Yes	No	O	E			
Item 11	39	45.5	10	3.5	36	37.2	4	2.8	102	99.5	5	7.5	100	94.8	2	7.2	18.836	0.001	**
Item 12	29	35.7	20	13.3	34	29.1	6	10.9	59	77.9	48	29.1	95	74.3	7	27.7	45.772	0.001	**
Item 13	29	34.2	20	14.8	34	27.9	6	12.1	79	74.7	28	32.3	66	71.2	36	30.8	9.085	0.028	**
Item 14	10	32.4	39	16.6	2	26.4	38	13.6	93	70.7	14	36.3	92	67.4	10	34.6	159.431	0.001	**
Item 15	0	26	49	23	30	21.2	10	18.8	40	56.7	67	50.3	88	54.1	14	47.9	118.846	0.001	**
Item 16	0	26	49	23	30	21.2	10	18.8	40	56.7	67	50.3	88	54.1	14	47.9	118.846	0.001	**
Overall																	78.5	0.006	**

5. CONCLUSION

In conclusion, this study revealed that the level of knowledge of risk factors and preventive measures of CRC was high among participants in Obudu LGA. However, varying results were obtained among different sociodemographic groups where males were found to possess a better overall knowledge of CRC; people of younger ages were found to be more knowledgeable of CRC than the older persons, and a higher level of education determined the higher level of knowledge of CRC in the population.

Based on the findings, a portion of the sampled population still lacks knowledge of screening CRC. The results showed that all groups, but particularly minority groups, lack knowledge of cancer, CRC, and screening. They did not understand the concept of screening, had difficulty listing common cancer and CRC screening tests, and had trouble understanding simplified medical terms and procedure names. Much information regarding CRC has come to light in recent years due to the increased emergence of cases compared to other years. However, countless individuals have suffered the disease and the majority of cases presented in the late stage when cancer is no longer treatable. There is a general belief that CRC is a disease of the elderly whereas people of younger ages are also at risk of developing it. Families who have lost relatives to this disease may not know that they who are the family members are at increased risk of developing colorectal cancer.

Given the findings of this research, the following recommendations were made:

- Women and people of older ages should be targeted with interventions that ensure that they are knowledgeable about CRC.
- Interventions should reach the household which will ensure that those with no formal education can have a better knowledge of the disease.
- Efforts should be made by the government, Non-governmental organizations (NGOs), and health professionals to reach out to especially families that have identified cases of CRC and also to the general public.
- Efforts should be made to boost their knowledge on the major preventive measures (screening) and other lifestyle modifications such as diet adjustment,

quitting smoking, avoiding binge drinking, and engaging in physical activities.

- Screening facilities should be made available by the government and adequate personnel employed.
- Health is everyone's business, however, individuals should make efforts to attend already existing facilities and undergo screening exercises.

CONSENT

As per international standard informed and written participant consent has been collected and preserved by the authors.

ETHICAL APPROVAL

This research was approved by the Ethics and Research Committee of the Department of Public Health, Madonna University, Nigeria under the leadership of Dr. Bennedicta Agu (Ph.D.). It was further approved by the Ethics and Research Committee of the Cross River State Ministry of Health Headquarters, Calabar.

ACKNOWLEDGEMENTS

Maurice-Joel Ugbe acknowledges the support of all staff of the Department of Public Health, Madonna University, Nigeria for their support. Also, special thanks go to Dr. Samson Agbaje for his immense support in the course of the research and Theresa Awa Mark for her tireless efforts and Okoi Faith Ubi in the much enthusiasm shown in the course of this work.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Kuipers EJ, Grady WM, Lieberman D. Colorectal cancer. *Nature Reviews Disease Primers*. 2015;1:15065. DOI: 10.1038/nrdp.2015.65
2. Sessa A, Abbate R, Di Giuseppe G, Marinelli P, Angelillo IF. Knowledge, attitudes and preventive practices about colorectal cancer among adults in an area of Southern Italy. *BMC Cancer*. 2008;8:171. DOI: 10.1186/1471-2407-8-171
3. Adeoti M, Oguntola S, Olugbenga-Bello A, Oladimeji O, Jegede S. Colorectal cancer: Knowledge and risk factors among adults in a sub urban Nigeria community. *J Med Sci Clin Res*. 2016;4(9):1247.

4. Kinzler KW, Vogelstein B. Lessons from hereditary colorectal cancer. *Cell*. 1996;87(2):159-70.
DOI: 10.1016/s0092-8674(00)81333-1
5. Ibrahim O, Afolayan A, Adeniji K, Buhari O, Badmos K. Colorectal carcinoma in children and young adults in Ilorin, Nigeria. *West African Journal of Medicine*. 2011;30(3):202-205.
6. Odukoya O, Fayemi M. A rural-urban comparison of knowledge, risk- factors and preventive practices for colorectal cancer among adults in Lagos State. *Asian Pacific Journal of Cancer Prevention: APJCP*. 2019;20(4):1063-1071.
DOI: 10.31557/apjcp.2019.20.4.1063
7. Shaukat A, Mongin SJ, Geisser MS. Long-term mortality after screening for colorectal cancer. *New England Journal of Medicine*. 2013;369(12):1106-1114.
8. Agu BN, Ezedum CE, Agbaje OS. Demographic pattern of self-injurious behaviours among secondary school students in Imo State. *Science*. 2015;3(3): 321-330.
9. National Population Commission. The Nigeria Population Census 2006. 2006;23(2):2011.
10. Lwanga SK, Lemeshow S, Organization WH. Sample size determination in health studies: A practical manual. World Health Organization; 1991.
11. Taha H, Jaghbeer MA, Shteivi M, AlKhalidi S, Berggren V. Knowledge and perceptions about colorectal cancer in Jordan. *Asian Pacific Journal of Cancer Prevention: APJCP*. 2015;16(18):8479-86.
DOI: 10.7314/apjcp.2015.16.18.8479
12. Koo JH, Leong RW, Ching J. Knowledge of attitudes toward and barriers to participation of colorectal cancer screening tests in the Asia-Pacific region: A multicenter study. *Gastrointestinal Endoscopy*. 2012;76(1):126-35.
DOI: 10.1016/j.gie.2012.03.168
13. Galal YS, Amin TT, Alarfaj AK. Colon cancer among older Saudis: Awareness of risk factors and early signs and perceived barriers to screening. *Asian Pacific Journal of Cancer Prevention: APJCP*. 2016;17(4): 1837-46.
DOI: 10.7314/apjcp.2016.17.4.1837
14. Chong VH, Lim AG, Baharudin HN, Tan J, Chong CF. Poor knowledge of colorectal cancer in Brunei Darussalam. *Asian Pacific Journal of Cancer Prevention: APJCP*. 2015;16(9):3927-30.
DOI: 10.7314/apjcp.2015.16.9.3927
15. Al Wutayd O, Alamri F, Ali AM, Kassim KA, Ibrahim AK. Colorectal cancer risk factors: A study of knowledge, attitude and practice among adults in Riyadh, Saudi Arabia. *Cancer Research Journal*. 2015;3(5):94-99.

© 2020 Ugbe et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/62553>