AWARENESS, KNOWLEDGE AND ATTITUDE TOWARD COLORECTAL CANCER AMONG STUDENTS IN UNIVERSITI TUNKU ABDUL RAHMAN (UTAR), KAMPAR, PERAK.

By

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A project report submitted to the Department of Allied Health Sciences

Faculty of Science

Universiti Tunku Abdul Rahman

in partial fulfilment of the requirements for the degree of Bachelor of Science (Hons) Dietetics

October 2023

ABSTRACT

AWARENESS, KNOWLEDGE AND ATTITUDE TOWARD COLORECTAL CANCER AMONG STUDENTS IN UNIVERSITI TUNKU ABDUL RAHMAN (UTAR), KAMPAR, PERAK.

LIM PEH NEE

The incidence of colorectal cancer (CRC) ranks third among all cancers worldwide. Colorectal cancer was the second most common cancer in Malaysia between 2012 and 2016, accounting for 13.5% of new cases. Due to nutrition, environmental, and lifestyle changes, young people were diagnosed with advanced CRC at a higher rate. Lack of CRC awareness and information delays diagnosis. The aim of this study was to determine the awareness, knowledge of CRC and attitude about colorectal cancer screening (CRCS) among students from Universiti Tunku Abdul Rahman, Kampar, Perak. Seven sections of a survey questionnaire that were taken from pertinent literature were administered as part of the study process. Utilizing SPSS for data analysis, tests including the Mann-Whitney U and Kruskal Wallis tests were used to evaluate differences in awareness, knowledge, and attitude (AKA) according to sociodemographic factors. Pearson's Chi-square test and Fisher Exact test were used to examine the relationship between sociodemographic variables, CRC incidence age knowledge, and warning signs knowledge and confidence in CRC warning sign

detection. Most of the 196 respondents had good awareness (47.4%), warning indicators knowledge (49.5%), and a positive attitude (59.2%). However, 38.3% of respondents knew nothing about CRC risk factors. In the study population, females had significantly higher awareness, warning sign knowledge, risk factor knowledge, and CRCS attitude scores than males ($p = 0.014$; $p = 0.004$; $p = 0.001$; $p = 0.016$). Additionally, health science students had a considerably higher AKA score ($p < 0.001$ for all variables). Significant differences were seen between age groups in understanding warning indicators ($p = 0.004$) and risk factors ($p < 0.001$). Higher education levels were associated with higher awareness, knowledge, and risk factor scores ($p = 0.002$, $p = <0.001$, $p < 0.001$). Better monthly income respondents scored better on knowledge ($p = 0.043$; 0.012) and attitude ($p = 0.004$). Except for warning sign knowledge, CRC family history was associated with higher AKA scores ($p = 0.007$; $p = 0.015$; $p = 0.001$; $p = 0.036$). Only 10% were very confident in warning sign detection. CRC incidence age knowledge was correct for about 40% of respondents. Gender, age, and study field significantly affected warning sign detection confidence. Age, year of study, monthly income, and CRC family history were correlated with age-related CRC incidence knowledge. The majority of respondents in this study had a good awareness of CRC, good knowledge of CRC warning signs, and a positive attitude toward CRCS, but their knowledge of risk factors was poor, indicating that CRC risk factor education and information should be greatly promoted, especially in males and those under 20 years old, from non-health science background, lower year of study, lower monthly income, and without CRC family history.

ACKNOWLEDGEMENTS

I would like to extend my sincere appreciation to all individuals who have made significant contributions towards the successful completion of this final year project. My sincere gratitude goes out to the following people and organisations for their steadfast support and guidance throughout this journey, which has been both difficult and incredibly rewarding.

First and foremost, I would like to express my sincere gratitude to the Universiti Tunku Abdul Rahman, as well as its faculty and staff, for their provision of resources, facilities, and an intellectually stimulating academic atmosphere that has fostered my intellectual development.

I extend my profound gratitude to my thesis supervisor, Dr. Chee Huei Phing, for her exceptional expertise, unwavering support, and remarkable patience, which have proven to be invaluable throughout the course of this research endeavour. The provided valuable feedback, unwavering commitment, and guidance have significantly influenced the development of this work and my progression as a researcher.

Finally, I would like to convey my gratitude to all individuals who have made contributions, whether significant or minor, to this undertaking, either through direct involvement or indirectly. The assistance, motivation, and confidence provided by you all have played a crucial role in attaining this significant achievement.

DECLARATION

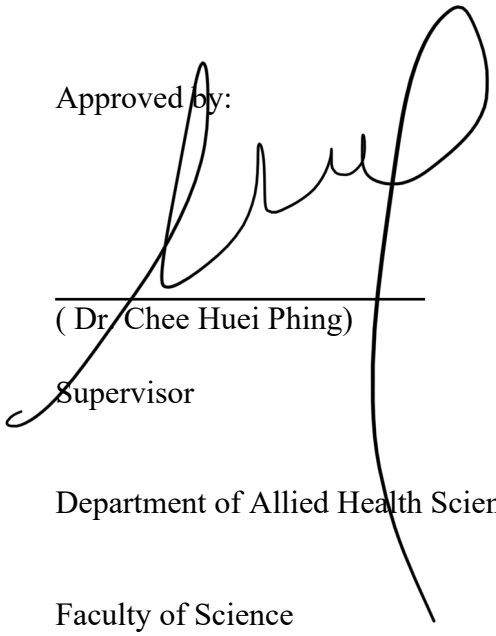
I hereby declare that this final year project report is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTAR or other institutions.

LIM PEH NEE

APPROVAL SHEET

This final year project report entitled **"AWARENESS, KNOWLEDGE AND ATTITUDE TOWARD COLORECTAL CANCER AMONG STUDENTS IN UNIVERSITI TUNKU ABDUL RAHMAN (UTAR), KAMPAR, PERAK."** was prepared by LIM PEH NEE and submitted as partial fulfilment of the requirements for the degree of Bachelor of Science (Hons) Dietetics at Universiti Tunku Abdul Rahman.

Approved by:



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UNIVERSITI TUNKU ABDUL RAHMAN

Date: 12th September 2022

PERMISSION SHEET

It is hereby certified that **LIM PEH NEE** (ID No: **20ADB04113**) has completed this final year project report entitled " AWARENESS, KNOWLEDGE AND ATTITUDE TOWARD COLORECTAL CANCER AMONG STUDENT IN UNIVERSITI TUNKU ABDUL RAHMAN (UTAR), KAMPAR, PERAK." under the supervision of Dr. Chee Huei Phing from the Department of Allied Health Sciences, Faculty of Science.

I hereby give permission to the University to upload the softcopy of my final year project report in PDF format into the UTAR Institutional Repository, which may be made accessible to the UTAR community and public.

Yours truly,

(LIM PEH NEE)

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LIST OF ABBREVIATIONS

AKA	Awareness, knowledge and attitude
CRC	Colorectal cancer
CRCS	Colorectal cancer screening
ETB	Ethiopian Birr (currency)
IGFs	Insulin-like growth factor
T2DM	Type 2 diabetes mellitus
UTAR	Universiti Tunku Abdul Rahman

Chapter 1

INTRODUCTION

1.1 Research Background

Colorectal cancer (CRC) also known as colon cancer or rectal cancer, is a malignancy that affects the colon (large intestine) or rectum, depending on the site of origin. CRC is caused due to abnormal and damaged cell proliferation. It leads to lumps of tissue which are referred to as polyps. Some polyps can become cancerous over time, but not all. But once cancer cells are synthesized, the cancer cell will embed in the mucosa, the innermost layer, and be able to spread outward through all layers of colorectal and reach blood vessels or lymph vessels. From there, they can travel to nearby lymph nodes or distant body parts. The likelihood of a polyp developing into cancer is influenced by the type of polyp that is present. Therefore, numerous distinct varieties of polyps are present (CDC, 2019; American Cancer Society, 2020).

CRC is the third most prevalent cancer in the world. In terms of cancer-related mortality, it is the second most common cancer in women and the third most common cancer in men globally (WCRF International, n.d.). Due to increasing populations, shifting demographics, and the adoption of Western lifestyle habits, the incidence of cases of CRC worldwide has been rising at an alarming rate (Wong et al., 2019). In 2020, it was predicted that over 1.9 million people would receive a diagnosis diagnosed with colorectal cancer, and over 930,000 people death because of this disease, and the incidence and mortality rates vary greatly

across countries (WHO, 2023). According to Veettil et al. (2017), a significant proportion of individuals in Malaysia diagnosed with colorectal cancer present at an advanced stage, resulting in a 5-year relative survival rate that is comparatively lower than that observed in developed Asian nations. The reason behind this is the current level of public awareness regarding the increasing prevalence of colorectal cancer and the corresponding rates of participation in colorectal cancer screening are relatively insufficient.

According to Wong et al. (2019), the rising prevalence and incidence of CRC pose a significant threat to public health in Asian countries. In comparison to other Asian countries, China, Japan, Korea, Malaysia, Singapore, and Turkey all had higher prevalence rates over a five-year period. According to the Ministry of Health Malaysia (2021), CRC is the second most common cancer in Malaysia. Besides, the prevalence of CRC in males is higher than in females. Based on ethnicity, the Chinese population has the highest incidence then followed by the Malay and Indian populations, the incidence rate also increases with age. Furthermore, Siegel et al. (2017) reported that the death rates for CRC declined by 34% among individuals aged 50 years and older from 2000 to 2014, while there was a 13% increase in death rates for CRC among individuals younger than 50 years old. The incidence rates of colon and rectal cancer among individuals aged 20-29 exhibited a notable increase from 1980 to 2016 (Loomans-Kropp and Umar, 2019). Young patients tend to exhibit more advanced stages of disease at the time of diagnosis in comparison to their older counterparts (O'Connell et al., 2004). The delayed diagnosis and unfavourable outcomes can be partially

attributed to the public's failure to recognize the early signs and symptoms of cancer and the attitude toward seeking medical assistance (Macleod et al., 2009).

In addition, the correlation between the improved socioeconomic level and the adoption of a westernized lifestyle in developing Asian countries, such as Malaysia, may potentially lead to a rise in the occurrence of colorectal cancer. Malaysia is currently experiencing a demographic shift characterized by an ageing population. This phenomenon is accompanied by a rise in income and a higher frequency of risk factors associated with colorectal cancer, including the adoption of a westernized diet, obesity, and smoking (Veettil et al., 2017). Therefore, to reduce the incidence of CRC, it is significant of understanding these risk factors is crucial as being aware of such information can contribute to the reduction of the occurrence and frequency of the modifiable risk factors (Rocke, 2019). Additionally, Lim (2014) indicated that according to Malaysian statistics, there is a notable disparity in the prevalence of early-stage disease, with a significantly smaller percentage observed, while a substantial proportion of individuals exhibit late-stage disease. These are derived from the general population in Malaysia still not aware and familiar with the warning signs of CRC, associated risk factors, and available screening methods for early detection.

1.2 Problem Statement

Due to the rise of CRC incidence, there are numerous studies related to awareness, knowledge and attitude regarding CRC being studied globally. However, most of the studies are more focused either on knowledge and awareness of CRC among certain populations or the knowledge and attitude

toward CRC screening. In Malaysia, there are quite similar scenarios, the majority of previous research investigated more toward the awareness of CRC and knowledge regarding CRC warning signs and risk factors and studies that assess the knowledge and attitude toward CRCS in Malaysia. Sindhu et al. (2019) and Suan, Mohammed and Hassan (2016) showed that the awareness level of CRC among the population in urban areas, whereas Karikalan et al. (2021) demonstrated the awareness level among the semi-urban population in Malaysia. Besides, Su et al. (2013) study the population who live in a rural area, Perak. Based on the study done by Paramasivam et al. (2022), the study carried out that the majority of CRC research was conducted in the urban area, followed by sub-urban areas and some involved participants from the urban and rural areas. The study's population age of that study is around 51.1 ± 16.9. Furthermore, there is a study carried out on the young generation who is at the age of 21.2 ± 1.4 years old, but that study examined the level of knowledge and the factors influencing awareness of colorectal cancer screening among young individuals (Al-Naggar et al., 2015). Therefore, the aim of this study is twofold. The first is to assess the awareness and knowledge level of CRC among Universiti Tunku Abdul Rahman (UTAR) students in Kampar, Perak campus, who are between 18 to 30 years old and currently studying in rural areas in Malaysia. The second is to determine the attitude toward CRC screening among this population. Based on the result, we can better understand contemporary young people's awareness, knowledge and attitude of colorectal cancer, so that timely intervention can be taken, because it is always preferable to prevent disease than to treat it.

1.3 Significance of Study

The aim of the study is to assess the level of awareness, knowledge and attitude toward CRC among UTAR students in Kampar campus. The results serve to provide insight for UTAR students and relevant health authorities. To act as an indicator to have a better understanding of students' awareness, knowledge, and attitude toward CRC. So that, effective policy, health programs and additional action can be designed to improve the awareness, knowledge, and attitude among UTAR students, to prevent and reduce the occurrence of CRC effectively in the future. Apart from that, this study can provide useful information related to CRC, thereby contributing to the advancement of future research in this field.

1.4 Research Objective

1.4.1 General objective

The general objective of this research project is to assess the awareness and knowledge of colorectal cancer (CRC) and attitude toward colorectal cancer screening (CRCS) among university students at Universiti Tunku Abdul Rahman (UTAR), Kampar, Perak.

1.4.2 Specific objective

1. To examine the disparity between sociodemographic factors and CRC awareness, knowledge and CRCS attitude.
2. To determine the association between sociodemographic factors and the confidence of warning signs detection.
3. To determine the association between sociodemographic factors and knowledge related to CRC incidence age.

4. To determine the association between knowledge of CRC warning signs and the confidence in detecting its early signs.

1.5 Research Question

1. What is the level of awareness regarding CRC among UTAR students in Kampar campus?
2. What is the knowledge level of UTAR Kampar students about CRC warning signs?
3. What is the knowledge level of UTAR Kampar students about CRC risk factors?
4. What is the attitude of UTAR Kampar students toward CRC screening?
5. Is there any difference between socio-demographic characteristics and awareness, knowledge and attitude scores of CRC among UTAR students?
6. Is there any association between sociodemographic characteristics and confidence in detecting CRC signs and symptoms?
7. Is there any association between sociodemographic characteristics and the knowledge related to CRC incidence age?
8. Is there any association between knowledge of warning signs and confidence in CRC warning signs detection?

1.6 Hypothesis

Hypothesis 1: The awareness, knowledge and attitude toward CRC among UTAR students in Kampar is good.

Hypothesis 2: There are significant differences between sociodemographic characteristics and scores of awareness, knowledge and attitude.

Hypothesis 3: There is a significant association between sociodemographic characteristics and confidence in detecting CRC warning signs.

Hypothesis 4: There is a significant association between sociodemographic characteristics and knowledge related to CRC incidence age.

Hypothesis 5: There is a significant relationship between knowledge of warning signs and confidence level to detect CRC warning signs.

Chapter 2

LITERATURE REVIEW

2.1 Prevalence of Colorectal Cancer

Colorectal cancer (CRC) poses a significant public health burden across the globe, with a growing impact on populations residing in Asian countries. Even though there were fewer reported cases of colorectal cancer in Asia than in Western nations, Asia still had the greatest total number of cases. In the year 2018, Asia exhibited the highest percentage of incidence (51.8%) and death (52.4%) cases of CRC per 100,000 individuals across all genders and age groups globally. Also, there has been an upward trajectory observed in the prevalence of this disease in several regions in Asia during past decades, and demonstrating certain geographic disparities (Onyoh et al., 2019). Furthermore, Malaysia has been reported to have higher 5-year prevalence rates compared to other Asian nations (Wong et al., 2019). According to the findings of the GLOBOCAN project report 2020, the overall incidence of CRC in Malaysia ranked as third among the countries in South East Asia, with a rate of 18.30 per 100,000 individuals and this trend keeps rising (Abu Hassan et al., 2016).

2.2 Awareness Level of Colorectal Cancer

The study reported by Aga Syed Sameer et al. (2021) found that there is a notable lack of awareness regarding CRC among health and allied students at our Health Sciences University in Saudi Arabia. The majority of the respondents were unaware of the CRC and that it is a preventable disease. However, most students

were aware of the signs and symptoms of CRC. The findings of the study indicated a statistically significant relationship between gender and college attendance in relation to awareness of CRC. The results of the study indicate that female students exhibited a higher level of awareness regarding CRC in comparison to their male counterparts. Additionally, students pursuing a medical degree demonstrated a greater awareness of CRC when compared to students enrolled in other fields of study.

Al-Sharif et al. (2018) indicated that the surveyed population demonstrates a significant deficiency in awareness about CRC. The findings showed that individuals who were older and had completed their university education exhibited a higher level of awareness regarding CRC compared to younger respondents with lower levels of education. The level of awareness regarding CRC was found to be higher among married participants compared to their single counterparts. Besides, males have a higher awareness compared to female respondents

In a 2013 study, Loo et al. found that undergraduate students in Malaysia had generally low levels of awareness and knowledge regarding cancer. However, it was observed that females exhibited markedly superior scores in the domains of awareness, knowledge, and attitude as compared to their male counterparts. Additionally, students from private universities had significantly higher scores than public university students in the knowledge section, but their scores in the awareness and attitude sections did not differ significantly. Sciences students

had significantly higher awareness, knowledge, and attitude scores compared to students from non-science faculties.

To sum up, a number of studies carried out in diverse countries, including Malaysia and Saudi Arabia, have consistently shown that students are worrisomely unaware of CRC. This lack of awareness highlights the necessity of focused educational initiatives to increase comprehension and knowledge regarding CRC, prevention, and early detection.

2.3 Knowledge of Colorectal Cancer regarding Warning Signs and Risk Factors

In light of the findings of Elshami et al. (2022), it was observed that a minority of the participants in Palestine possessed an adequate level of knowledge regarding the signs and symptoms associated with colorectal cancer. The research carried out that participants residing in the West Bank and Jerusalem, who are older, have higher monthly income, and have more chronic diseases exhibited higher levels of knowledge compared to those in the Gaza Strip. Additionally, variables such as close contact with individuals affected by cancer and frequent visits to hospitals were found to be positively associated with heightened levels of awareness. Additionally, significant disparities in educational level and occupation were observed between participants from the West Bank and Jerusalem in contrast to those from the Gaza Strip.

According to Loh et al. (2013), the research found that the respondents, regardless of their ethnic background, displayed a low level of knowledge regarding symptoms associated with CRC. In terms of sociodemographic factors,

the study discovered that higher warning symptom scores were significantly correlated with younger ages who are 18 to 24 years old, females, higher education, and higher income groups. Yet, there was no significant association found between marital status and higher socioeconomic status (SES) and greater understanding.

Apart from knowledge of warning signs, Hashim et al. (2022) reported that the majority (92.7%) of surveyed students at universities in the United Arab Emirates (UAE) reported good knowledge scores in regard to CRC risk factors. Besides, the researcher also mentioned that those who are single are at twice the risk of having inadequate knowledge of CRC, while those who are studying medicine have a 55% reduced risk of such ignorance. In addition, the risk of having inadequate CRC knowledge was 42% higher among undergraduates than among graduates. The likelihood of having low knowledge was 35% higher among people with low monthly income.

In addition, Al Wutayd (2015), a Saudi Arabi researcher demonstrated that 90% of the respondents either had no idea or low perception of the disease risk, and the mean score revealed by the respondents was 2.6 ± 0.9, indicating a low level of knowledge of CRC risk factors. Besides, the research further showed that individuals with higher levels of education, a family history of CRC, regular participation in physical activity, change of behaviour due to fear of contracting the disease, and knowledge of the accurate definition of CRC were factors that influenced the provision of correct responses for risk factors. Likewise, the study also indicated no statistically significant correlation between the level of

knowledge and sociodemographic variables, including age, gender, marital status, and income.

Rocke (2019) discovered there was a general lack of knowledge and awareness regarding CRC and its associated risk factors among university students in the Caribbean. The study revealed that only 38.5% of the participants possessed a satisfactory level of knowledge regarding CRC, while just 29.5% demonstrated a satisfactory level of knowledge regarding its associated risk factors. Comparatively, to men, women were found to have a higher level of knowledge about CRC and its risk factors in this study. Furthermore, the research revealed a positive correlation between academic level and knowledge of CRC, as senior students displayed higher scores regarding their level of knowledge compared to their junior counterparts. However, the variable of age did not emerge as a statistically significant predictor of CRC knowledge.

Taha et al. (2016) demonstrated that the level of knowledge about CRC was low among the study participants. Only 7.6% of males and 9.6% of females correctly identified all seven CRC symptoms in the survey. In addition, 65% of males and 66% of females knew nothing about the signs and symptoms. Regarding risk factors, the study found that 45% of the male and 46% of female participants exhibited a lack of knowledge of CRC risk factors. Furthermore, the study also found no significant differences in signs and symptoms knowledge between male and female participants, males still have a higher knowledge based on the percentage mentioned above. On the other hand, the researcher reported that there is a significant association was observed between an elevated level of

knowledge scores and sociodemographic variables higher educational level, older age group, higher monthly income, having a chronic disease, having a family history of CRC, previously knowing someone who had CRC, and being previously asked by the doctor about CRC family history.

Mhaidat et al. (2016) indicated that the majority of the studied subjects posed a fair knowledge level of warning signs and risk factors respectively. Researchers found that 52.9% had a moderate understanding of CRC signs and symptoms, followed by 32.8% of good understanding and 14.3% of poor knowledge. Also, it was found that 36.1% of respondents exhibited a deficiency in knowledge, while 47.4% possessed a moderate level of knowledge, and 16.5% demonstrated a high level of knowledge pertaining to risk factors associated with CRC.

Sindhu et al. (2019) reported that the knowledge of CRC risk factors and warning signs is generally poor among the urban population of Klang Valley, Malaysia. The study found that 3.3% of respondents scored zero for the total knowledge score for CRC, while 8.2% and 8.5% of respondents had zero knowledge scores for warning signs and risk factors, respectively The research has further shown a significant positive correlation between the knowledge score related to warning signs and the degree of confidence in identifying said warning signs. There is no significant association observed between the rest variables, such as gender, age, monthly income, and previous experience with CRC.

In another Malaysia study carried out by Yan et al. (2017), this study displays a large portion of the respondents had a solid understanding of the CRC's risk

factors and warning signs. The level of public awareness and understanding of CRC in Serdang Hospital was considered satisfactory. A significant association between age groups and the level of income with the level of knowledge on warning signs was observed, the majority of them come from 30-39 years old group and higher income group. However, based on the knowledge regarding risk factors, the study concluded that this variable is not significantly associated with age, gender, ethnicity, level of income, and level of education.

Based on research study by Karikalan et al. (2021), the study revealed that the semi-urban population in Perak, Malaysia possesses a moderate level of knowledge regarding symptoms and risk factors associated with CRC. Also, the research indicated a positive correlation between participants' level of education and their knowledge regarding the signs and symptoms and possible risks associated with CRC. Nevertheless, a significant lack of disparity was observed between males and females with regard to their knowledge of the warning signs and risk factors related to CRC.

In overall, these studies highlight the significance of focused educational programs aimed at enhancing knowledge of CRC. It is apparent that sociodemographic factors influence knowledge levels within different populations. Therefore, these findings support the development of a tailored intervention designed specifically to address the knowledge gaps of particular populations, thereby promoting knowledge of colorectal cancer.

2.4 Attitude toward Colorectal Cancer Screening

The research carried out by Sessa et al. (2008) found that overall attitudes regarding colorectal cancer (CRC) prevention and screening within the study sample were mostly positive. The participants provided a high rating for the effectiveness of CRC prevention screening, as indicated by a mean score of 8.3 out of 10. A variety of variables have been discovered as having a statistically significant association with a positive attitude towards colorectal cancer (CRC) screening. There was a positive association observed between higher levels of education (OR = 1.08; 95% CI 1.03–1.13) and a more positive attitude. Furthermore, individuals who had a higher perception of their susceptibility to contracting colorectal cancer (CRC) (coefficient = 0.11, $t = 3.65$, $p < 0.001$) and those who held the belief that CRC is preventable (coefficient = 1.13, $t = 6.87$, $p < 0.001$) demonstrated a greater inclination towards adopting a positive attitude towards screening too.

Based on Loo et al. (2013), the study indicated a notable level of positive attitude among undergraduate students towards cancer and cancer prevention. Apart from that, there is a statistically significant disparity in attitude scores between female students compared to their male counterparts. Science faculty students also showed a significant positive attitude in contrast to students from other faculties. The researchers found that females exhibit a higher tendency to display positive attitudes, which might be due to their elevated motivation to participate in cancer prevention and detection activities. Whereas, greater attitude observed among science faculty students, as compared to non-science students, could be linked to their increased exposure to health information.

Al-Naggar et al. (2015) demonstrated that just 10.2% of the study participants did not perceive their likelihood of developing CRC as being elevated. The research stated that male participants exhibited a more positive attitude towards CRC screening compared to their female counterparts. Additionally, respondents with higher income levels displayed a more positive inclination towards CRC screening in contrast to individuals with lower income levels.

Besides that, Huang et al. (2019), cross-sectional study consisted of individuals who had previously been diagnosed with cancer and had achieved a state of remission for a minimum duration of two years. Additionally, these individuals had a medical history of malignancies other than colorectal cancer. The vast majority of cancer survivors (85.5%) plan to get colon cancer screenings in the future. The intention to undergo screening was more commonly expressed by younger survivors, aged 21 to 50 years in comparison to older survivors, those aged 51 to 80 years. Furthermore, in this study individuals who achieved higher levels of education and household income exhibited an increased willingness to undergo screening, in contrast to those with lower education levels and who were lower-income counterparts. Besides, having a CRC family history and a higher knowledge of CRC symptoms also showed a significant association with the attitude toward CRC screening. On the other hand, the study failed to discover an association between CRC screening intent and demographic factors like gender, marital status, income, or previous cancer history.

To summarize, these studies collectively highlight the significance of education, perceptions of risk, gender, income, and survivor demographics in influencing

attitudes towards CRC screening. And providing valuable insights for the development of healthcare strategies and interventions.

Chapter 3

MATERIAL AND METHODOLOGY

3.1 Study Design

This study used a cross-sectional methodology and was carried out at the Kampar Campus of Universiti Tunku Abdul Rahman (UTAR Kampar). The study was conducted between October 2022 and October 2023, and data collection was from April 2023 to June 2023. Due to time, money, and labour constraints, a non-probability sampling strategy (convenience sampling) was used to select participants for this study. The researcher was able to efficiently reach the sample population through the use of convenience sampling. Appendix A shows that approval from the university's ethical review board was requested before any data was collected. In this study, students at UTAR Kampar were surveyed using a self-administered English structure online questionnaire designed to assess their awareness, knowledge, and attitude toward colorectal cancer. Each participant agreed upon an informed consent form after being given an overview of the study's rationale. Additionally, it was made clear to the respondents that all information gathered would be kept private and would not be disclosed to the general public or any other unapproved parties. The data was handled and analysed solely by the researcher and supervisor.

3.2 Inclusion and Exclusion Criteria

The inclusion criteria for this study encompass foundation and undergraduate students from UTAR who are aged between 18 to 30 and do not have a mental disorder, such as depression, anxiety disorder, eating disorder and so on. On the other hand, the exclusion criteria involve students who cannot read and understand English and those specifically from the Sungai Long campus. These criteria define the target group for the research, ensuring that participants meet certain qualifications and excluding individuals who do not fit the specified parameters.

3.3 Sample Size

The sample size calculation was based on the formula by Cochran (1977).

$$n = \frac{Z^2 pq}{e^2}$$

where,

n = estimated sample size

Z = Z-score at a desired confidence level

p = proportion of the population

q = 1- p

e = margin error

According to the Malaysian National Cancer Registry Report 2007-2011, the prevalence of colorectal cancer (CRC) in Malaysia is 13.5%. Calculated sample size with 13.5% prevalence, 95% confidence level and 6% margin error, the sample size required for this study was 142 respondents, which included a 10% of drop-off rate.

The sample size calculation was demonstrated as below:

$$n = \frac{1.96^2\ (0.14)(0.86)}{0.06^2}$$

$$n = 128.5$$

$$n \approx 129$$

With an additional 10% drop-off rate,

$$n \approx 129 + 10\%$$

$$n = 141.9$$

$$n \approx 142$$

3.4 Questionnaire Development

The questionnaire consisted of seven sections, Section A: Demographic characteristics questionnaire; Section B: Awareness of CRC questionnaires; Section C: Knowledge of CRC warning signs questionnaire; Section D: Confidence to detect CRC warning signs questionnaire; Section E: Knowledge of CRC risk factors questionnaire; Section F: Knowledge on age-related CRC

incidence questionnaire; Section G: Attitude toward CRC screening questionnaire. The questionnaire used in this study was developed using information gleaned from similar studies and scholarly works, guaranteeing a high level of validity. The questionnaire can be found in Appendix B.

The online questionnaire for knowledge of warning signs, knowledge of risk factors, confidence to detect early signs, and knowledge of age-related CRC incidence (Section C to Section F) used in this research was adapted from Mhaidat et al. (2016) and Sindhu et al. (2019). Additionally, the questionnaire was derived from a standardized Cancer Awareness Measure (CAM) that was originally developed by Cancer Research UK, University College London, Kings College London, and Oxford University in the Years 2007- 2008 to assess the knowledge regarding CRC. Besides that, the questionnaire for awareness (Section B) and attitude (Section G) of CRC and CRC screening originated from the works of Alotaibi, Mujtaba and Alshammari (2020).

3.4.1 Section A: Socio-demographic questionnaire

Section A consisted of dichotomous and multiple-choice questions pertaining to sociodemographic characteristics, encompassing information regarding gender, age, nationality, ethnicity, year of study, study field, monthly income and family history of CRC.

3.4.2 Section B: Awareness of CRC questionnaire

Section B comprised of 3 closed-ended questions, the questions included “Have you ever heard about colorectal cancer (CRC)?”, “Do you think that CRC is

commonly found in Malaysia?" and "Have you ever heard about any tests or examinations that are used in the detection of colon cancer? (For example: Digital rectal examination, Colonoscopy, Barium enema and so on.)". A score of 1 mark was awarded for each yes response, while a score of 0 marks was given for those who answered no and did not know. Based on the score range interpretation from Neni et al. (2020), the total score range is 0.0 to 1.0. Therefore, in these questions, the level of awareness was categorized into 3 groups, low awareness when the score range is below 0.33, moderate awareness is observed when the score falls within the range of 0.34 to 0.66, and good awareness when the score exceeds 0.67 as Table 3.1 shown.

3.4.3 Section C: Knowledge of CRC warning signs questionnaire

There was a total of 9 closed-ended questions regarding signs and symptoms in this section. The warning signs included back passage bleeding, abdominal pain, bowel habits changes, bowel not emptying, bloody stool, pain in the back passage, lump, tiredness/anemia and unexplained weight loss. For that question, respondents need to answer " yes", "no", and " do not know" regarding CRC warning signs based on their knowledge. Each correct answer "yes" was awarded a score of one point, while an incorrect response "no" and "do not know" received a score of zero (Mhaidat et al., 2016); (Su et al., 2013). This resulted in a cumulative knowledge score between 0 and 9. According to Mhaidat et al. (2016), the total scores were classified into three distinct categories: poor knowledge (scores ranging from 0 to 2), fair knowledge (scores ranging from 3 to 5), and good knowledge (scores ranging from 6 to 9) as Table 3.2 shown.

3.4.4 Section D: Confidence to detect CRC warning signs questionnaire

In this section, only consists of one four-point Likely scale question, namely "Not at all confident", "Not very confident", "Fairly confident", and "Very confident. The question was "How confident for you to identify CRC symptoms?", and no marks for the question.

3.4.5 Section E: Knowledge of CRC risk factors questionnaire

There were a total of 10 closed-ended questions related to knowledge of risk factors in this section. The risk factors included in this study include drinking alcohol, eating less than 5 portions of fruit and vegetables, eating red or processed meat, low fibre intake, being overweight, being over 70 years old, family history, physical inactivity, having other bowel disease, and having diabetes. The responses were categorized into five levels, namely "strongly disagree", "disagree", "not sure", "agree", and "strongly agree". Referring to Mhaidat et al., (2016) and Su et al., (2013), a scoring system was used to assess knowledge of risk factors, each correct response (Agree or Strongly agree) received one point, and each unsatisfactory response (Strongly disagree, Disagree, and Do not sure) received zero points. The total knowledge score encompassed a range of values from 0 to 10, which were further divided into three distinct categories: poor knowledge, denoted by scores ranging from 0 to 3; fair knowledge, indicated by scores ranging from 4 to 6; and good knowledge, represented by scores ranging from 7 to 10, according to Mhaidat et al. (2016) as Table 3.3 shown.

3.4.6 Section F: Knowledge related to CRC incidence age questionnaire

A multiple-choice questionnaire was designed to assess the knowledge of age-related CRC incidence. Four option " 20 years old", "40 years old", "50 years old" and " Not related to age" was given in this question. And the correct answer is 60 years old. Additionally, only those who answered correctly was given a mark.

3.4.7 Section G: Attitude toward CRC screening questionnaire

Section G consisted of three inquiries that evaluated the participants' disposition towards colorectal cancer screening. The questions were presented in closed-ended questions, with each question offering three answer options "Agree", "Disagreed" and "Do not know". Those who answered "Agree" received one mark, while those who answered no or did not know received no mark. The score range is for 3 questions is 0.0 to 1.0 according to the interpretation of the score range provided by Neni et al. (2020). Additionally, attitude was divided into three levels based on the range of responses to those questions, negative attitude was defined as a score of 0.33 or lower, indifferent attitude was defined as a score of 0.34 to 0.66, and positive attitude was defined as a score of 0.67 or higher as Table 3.1 shown.

Table 3.1 Level of classification in awareness and attitude (Neni et al., 2020).

Level of Classification	Score range (0.0 – 0.1)
Poor/ Negative	<0.33
Fair/ Indifferent	0.34 – 0.66
Good/ Positive	>0.67

Table 3.2 Level of classification for knowledge of warning signs (Mhaidat et al., 2016).

Level of Classification	Score range
Poor	0 - 2
Fair	3 - 5
Good	6 - 9

Table 3.3 Level of classification for knowledge of risk factors (Mhaidat et al., 2016).

Level of Classification	Score range
Poor	0 – 3
Fair	4 - 6
Good	7 - 10

3.5 Pilot Test

In this study, the researcher performed a preliminary assessment, which consisted of 15 students from UTAR Kampar in March of 2023. The main goal of conducting this pilot test is to evaluate the reliability of the questionnaires. As a result, the participants were able to comprehend and respond appropriately to the questions.

3.6 Data Collection

The final questionnaires were been distributed to students who student at Universiti Tunku Abdul Rahman (UTAR) during the data collection period, and it was collected online through messages on Microsoft Teams, WhatsApp and Instagram and physically in UTAR, Kampar campus. In the end, A total of 196 responses were collected during the specified data collection period.

3.7 Statistical Analysis

After data collection was completed, the data obtained through Google Forms were subsequently exported into Microsoft Office Excel Mac OS and analysed using IBM Statistical Package for the Social Sciences (SPSS) version 26.0. In this study, descriptive analysis was utilised to report the frequency and percentage of sociodemographic characteristics, awareness, knowledge and attitude variables. The scores derived from the AKA variables were then classified and graded, based on Table 3.1, Table 3.2 and Table 3.3 shown above. Percentages (%) and frequency (n) were used to express categorical variables, whereas the mean, median (M) and interquartile (IQR) were used for presenting numerical variables. All continuous variables were tested for normality, and the data reported the data are not normally distributed, as Appendix C shown. Therefore, the Mann- Whitney U test was performed to examine the disparity between AKA variables and sociodemographic characteristics which consisted of 2 groups, while the Kruskal Wallis test was used to test the difference between KAP variables and sociodemographic characteristics of more than 3 groups. Pearson's Chi-Square test and Fisher Exact test were applied to determine the association between knowledge of warning signs and confidence level in detecting CRC early signs, the relationship between sociodemographic characteristics on the confidence level in CRC detection and age-related knowledge of CRC incidence.

Chapter 4

RESULTS

4.1 Sociodemographic Characteristics of Respondents

Table 4.1 illustrates the socio-demographic characteristics of the respondents involved in this research, as well as displaying the frequency and percentage distribution for each respective category. Among 196 respondents from the survey, the majority 67.9% of them consist of female 133 respondents, and the other 32.1% consist of 63 males. The participants' ages ranged from 18 to 27 years old, with a mean age of 20.85 years old ±1.593, and the majority (74.5%) were above 20 years old, with 25.5% below 20 years old. Regarding nationality, the vast majority (98.5%) of participants were Malaysian, with a small percentage (1.5%) being non-Malaysian. In terms of ethnicity, 98.0% of participants were Chinese, while 2.0% identified as Indian. When looking at the participants' courses of study, we found that 44.4% of them were enrolled in health science courses, while 55.6% were enrolled in courses that were not related to health science. Regarding the year of study, the distribution was fairly even, with 18.9% in the foundation year, 25.5% in Year 1, 12.8% in Year 2, 31.1% in Year 3, and 11.7% in Year 4.

According to the distribution of monthly income among the respondents, 76.0% of people gave less than RM1000, 17.3% gave between RM1000 and RM1499, and 6.6% gave more than RM1500. Besides, 18.4% of the participants reported

a history of colorectal cancer (CRC) in their families, while 81.6% reported having no such history in their families.

Table 4.1 Sociodemographic of respondents (N= 196)

Socio-demographics characteristic	Frequency (n)	Percentage (%)
Gender		
Male	63	32.1
Female	133	67.9
Age* 20.85 ± 1.593		
Below 20 years old	50	25.5
Above 20	146	74.5
Nationality		
Malaysia	193	98.5
Non- Malaysia	3	1.5
Ethnicity		
Chinese	192	98.0
Indians	4	2.0
Course		
Health science	87	44.4
Non-health science	109	55.6
Year of study		
Foundation	37	18.9
Year 1	50	25.5
Year 2	25	12.8
Year 3	61	31.1
Year 4	23	11.7
Monthly income		
< RM1000	149	76
RM1000- RM1499	34	17.3
> RM1500	13	6.6
Family history of CRC		
Yes	36	18.4
No	160	81.6

*Mean ± standard deviation

4.2 Awareness, Knowledge and Attitude toward Colorectal Cancer

4.2.1 Awareness of colorectal cancer

Table 4.2 indicates the awareness responses toward CRC among UTAR students, in Kampar campus. In relation to the level of awareness about CRC, this study found that 67.3% of the participants were aware of its existence, while 26.5% reported having never heard of it, and 6.1% expressed uncertainty regarding their awareness. Regarding the perception of the prevalence of CRC in Malaysia, a majority of respondents 67.3% expressed the belief that CRC is prevalent in Malaysia. Whereas, a smaller proportion 26.5% held the opposing view, while a minority 6.1% remained uncertain about the matter. When investigating the familiarity with tests or examinations used in the detection of CRC, 48.5% of the participants demonstrated some awareness regarding the screening method. Whereas 34.2% lacked awareness in this area and the remaining 17.3% expressed uncertainty

Table 4.2 Awareness regarding CRC (*N*= 196)

Questions	Frequency (n)	Percentage(%)
Have you ever heard about CRC?		
Yes	132	67.3
No	53	26.5
Do not know	12	6.1
Do you think that CRC commonly found in Malaysia?		
Yes	132	67.3
No	47	26.5
Do not know	12	6.1
Have you ever heard about any tests or examination that are used in the detection of CRC? (For example: Digital rectal examination, Colonoscopy, Barium enema and so on.)		
Yes	95	48.5
No	67	34.2
Do not know	34	17.3

4.2.2 Knowledge of colorectal cancer warning signs

Table 4.3 illustrates the respondents' knowledge of early warning signs regarding CRC. Abdominal pain was the most identified CRC symptom, 68.9% of respondents recognized it correctly, while 31.1% answered incorrectly. Then followed by unexplained weight loss, as a total of 66.8% of individuals answered correctly. The third most identified CRC symptom is a bloody stool, 61.2% of the respondents correctly recognized it as a warning sign. While, 44.9% recognized back passage bleeding as a potential sign of CRC, but 54.1% did not. Besides, a majority of 59.7% of individuals accurately associated alterations in bowel habits with CRC, while a minority of 40.3% held incorrect answers. Furthermore, 41.8% of respondents correctly identified the significance of "bowel not emptying" whereas 58.2% did not. Apart from that, a total of 49.0% of participants reported recognising a lump as a symptom, whereas the remaining 51.0% did not report such identification. Conversely, pain in the back passage was correctly identified by 52% of participants, while 48.0% were incorrect. Additionally, a substantial number of respondents 54.6% provided a correct answer for “tiredness and anemia” regarding the CRC warning signs, while 45.4% of them held an incorrect answer.

Table 4.3 Knowledge regarding CRC warning signs (*N*= 196)

Warning sign	Correct percentage % (n) (Yes)	Incorrect percentage % (n) (No, Do not know)
Abdominal pain	68.9 (135)	31.1 (61)
Back passage bleeding	44.9 (90)	54.1 (106)
Bowel habit changes	59.7 (117)	40.3 (79)
Bowel not emptying	41.8 (82)	58.2 (114)
Bloody stool	61.2 (120)	38.8 (76)
Lump	49.0 (96)	51.0 (100)
Unexplained weight loss	66.8 (131)	33.2 (65)
Pain in the back passage	52.0 (102)	48 (94)
Tiredness/ anemia	54.6 (107)	45.4 (89)

4.2.3 Knowledge of colorectal cancer risk factors

Table 4.4 provides information about respondents' knowledge of risk factors associated with CRC When it comes to alcohol consumption, 56.1% believe that drinking more than one unit per day is a risk factor for CRC. Meanwhile, 46.4% weren't aware of eating less than one portion of fruits and vegetables each day as a risk of CRC, while 53.6% recognized the risk. Regarding red and processed meat consumption, 46.9% identified it as a risk factor, but 53.1% disagreed. Additionally, a majority of individuals, specifically 60.7% of the surveyed demonstrated an understanding of the importance of consuming a low amount of dietary fibre toward CRC risk factors, whereas a smaller proportion, accounting for 39.3%, expressed disagreement with this view. Being overweight or obese as a risk factor was acknowledged by 48.5% of participants, but 51.5% disagreed. Apart from that, 38.3% recognized being over 70 years old as a risk

factor, while 61.7% did not. Next, the acknowledgement of the influence of a close relative with bowel cancer was reported by 50% of respondents, while the remaining 50% expressed disagreement. 44.9% of respondents agreed that low physical activity posed a risk, while 55.1% opposed it. A majority of 54.6% of individuals knew the presence of a bowel disease as a risk factor, whereas 44.4% conveyed disagreement with it. Lastly, the detection of diabetes as a risk factor was supported by 37.8% of the participants, while 62.2% stated conflict.

Table 4.4 Knowledge regarding CRC risk factors (*N*= 196)

Risk factor	Correct percentage(%) (Agree, Strongly agree)	Incorrect percentage(%) (Disagree, Undecided, Disagree, Strong Disagree)
Drink more than 1 unit alcohol a day	56.1 (110)	43.9 (86)
Eating less than 1 portion of f & v a day	53.6 (105)	46.4 (91)
Eating red and processed meat once a day or more	46.9 (92)	53.1 (104)
Low fibre intake	60.7 (119)	39.3 (77)
Being overweight or obese	48.5 (95)	51.5 (101)
Being over 70 years old	38.3 (75)	61.7 (121)
Having a close relative with bowel cancer	50.0 (98)	50.0 (98)
Low physical activity	44.9 (88)	55.1 (108)
Having a bowel disease	55.6 (109)	44.4 (97)
Having diabetes	37.8 (74)	62.2 (122)

4.2.4 Attitude toward colorectal cancer screening

Table 4.5 provides an overview of the attitudes of the respondents regarding colorectal cancer screening (CRCS). A notable proportion (83.2%) of participants agreed on the possible benefits of CRCS to facilitate the timely detection of cancer and enhance treatment outcomes, whereas 16.8% of respondents didn't agree with such an opinion. In a similar vein, it was found that 78.1% of participants agreed the lowest survival rate associated with late-stage bowel cancer, while 21.9% of them disagreed. Besides, regarding being willing to undergo CRCS in the absence of symptoms, 69.4% of individuals expressed a willingness to do so, whereas the remaining 30.6% did not exhibit such a willingness.

Table 4.5 Attitude toward CRCS (*N*= 196)

Questions	Positive (%) (Agree)	Negative (%) (Disagree, Do not know)
CRC screening can help in detecting cancer early and cause treatment more effective.	83.2 (163)	16.8 (33)
Late detection of late stage of bowel cancer has the lowest survival rate.	78.1 (153)	21.9 (43)
Willing to have a CRCS test, even without any signs and symptoms.	69.4 (136)	30.6 (60)

4.3 Level of Awareness, Knowledge and Attitude toward Colorectal Cancer

Table 4.8 demonstrates the level of awareness, knowledge and attitude toward CRC among university students in UTAR, Kampar. With respect to the study variable "Awareness," overall, 47.4% of participants showed good awareness, while 31.1% showed poor awareness, and 21.4% showed fair awareness in this study. As for knowledge of warning signs, 49.5% showed good knowledge, while poor and fair knowledge indicated 26.0% and 24.5% respectively. Additionally, regarding the knowledge level of risk factors regarding CRC, it was found that 25.5% and 36.2% of participants possessed a fair and good level of knowledge, while 38.3% demonstrated a low level of knowledge. As for attitude, 59.2% were positive, 19.4% were neutral, and 21.4% were negative. Hence, based on Table 4.7, the majority of UTAR Kampar students have a good awareness, knowledge of colorectal cancer warning signs, positive attitude toward CRC screening prevention and poor knowledge regarding CRC risk factors.

Table 4.6 Level of awareness, knowledge and attitude toward CRC (*N*= 196)

Variable	Classification (%, n)		
	Poor	Fair	Good
Awareness	31.1 (61)	21.4 (42)	47.4 (93)
Knowledge of warning sign	24.5 (48)	26.0 (51)	49.5 (97)
Knowledge of risk factors	38.3 (75)	25.5 (50)	36.2 (71)
Attitude	21.4 (42)	19.4(38)	59.2 (116)

4.4 Confidence to Detect Colorectal Cancer Warning Signs

Table 4.7 illustrates the respondents' self-reported confidence levels concerning their understanding of CRC warning signs. A substantial proportion of participants reported low confidence levels, with 28.6% expressing that they were "Not at all confident," and 34.7% stating they were "Not very confident." In contrast, 27.0% of respondents reported feeling "Fairly confident," while a smaller but notable 9.7% indicated they were "Very confident" in detecting CRC earlier signs and symptoms.

Table 4.7 Level of confidence in detecting colorectal cancer symptoms (*N*= 196)

Confidence Level	Percentage (%)	Frequency (n)
Not at all confident	28.6	56
Not very confident	34.7	68
Fairly confident	27.0	53
Very confident	9.7	19

4.5 Knowledge Related to Colorectal Cancer Incidence Age

Table 4.8 provides insights into respondents' age-related knowledge of CRC incidence. When asked about who they believed was more likely to develop CRC in the next year, a significant portion of participants, 38.8% correctly identified that individuals aged 60 years old were at higher risk of diagnose CRC in the next year. However, 28.6% of respondents erroneously believed that CRC is not related to age. Additionally, 23.0% of participants thought that 40-year-olds were more likely to develop CRC, and a smaller percentage, 9.7% indicated 20-year-olds as being at higher risk.

Table 4.8 Age-related knowledge of colorectal cancer incidence (*N*= 196)

Question	Percentage (%)	Frequency (n)
Who do you think is more likely to develop CRC in the next year?		
20 years old	9.7	19
40 years old	23.0	45
60 years old (correct answer)	38.8	76
CRC is not related to age	28.6	56

4.6 Difference between Sociodemographic Characteristics and AKA Variables

4.6.1 Sociodemographic characteristics differences toward awareness of CRC

Table 4.9 presents a summary of the results related to the disparity in colorectal cancer awareness across various sociodemographic factors. The table includes the mean score, median score (M) and interquartile range (IQR) of awareness scores, as well as the test statistic and associated p-values. Among the sociodemographic variables, gender displayed a statistically significant difference in awareness, with females (M = 3, IQR = 2) exhibiting higher awareness compared to males (M = 3, IQR = 2; p = 0.014). In a similar vein, there was a notable disparity observed among students from different study fields. In particular, health science students (M = 3, IQR = 1) exhibited a higher level of awareness compared to non-health science students (M = 2, IQR = 3, p < 0.001). Besides, the results indicated that there were significant differences observed among the year of study. Foundation students (M = 0, IQR = 3) had significantly lower awareness compared to Year 2 (M = 2, IQR = 3), Year 3(M = 3, IQR = 1), and Year 4 (M = 3, IQR = 1) students (p = 0.025, p = 0.002, p <

0.001, respectively). Furthermore, Year 4 (M = 3, IQR = 1), had significantly better awareness of CRC than peers from Year 1 (M = 2, IQR = 3; p = 0.032). Besides, individuals with CRC family history showed a significantly higher score of awareness of CRC (M = 3, IQR = 1) than those without a family history (M = 2, IQR = 3; p = 0.007). While other variables, including age, nationality, ethnicity, and monthly income, did not demonstrate statistically significant differences in CRC awareness.

Table 4.9 Sociodemographic differences towards the awareness of CRC (*N*= 196)

Variable	Awareness			
	Mean score	**Median score (IQR)**	**Test Statistic**	**p-value**
Gender				
Male	85.13	2 (3)	U= 3347	0.014*
Female	104.83	3 (2)		
Age				
Below 20 years old	79.55	2 (3)	U= 3184.5	0.058
Above 20 years old	104.99	2 (2)		
Nationality				
Malaysian	98.68	2 (3)	U= 255	0.703
Non- Malaysian	87.00	2 (3)		
Ethnicity				
Chinese	99.33	2 (3)	U= 225.5	0.128
Indian	58.88	0 (2)		
Study field				
Health science	119.7	3 (1)	U= 2893.5	<0.001*
Non-health science	81.55	2 (3)		

U= Mann Whitney U test; F= Kruskal Wallis Test;

*p-value <0.05 indicate significant differences

Table 4.9 Sociodemographic differences towards the awareness of CRC (cont'd)

Variable	Awareness			
	Mean score	Median score (IQR)	Test Statistic	p-value
Year of study				
Foundation	72.11	0 (3)	F=16.532	0.002*
Year 1	95.60	2 (3)		
Year 2	100.46	2 (2)		
Year 3	106.18	3 (1)		
Year 4	124.76	3 (1)		
Foundation vs Year 1			714	0.050
Foundation vs Year 2			315.5	0.025*
Foundation vs Year 3			728.5	0.002*
Foundation vs Year 4			208	<0.001*
Year 1 vs Year 2			591.5	0.686
Year 1 vs Year 3			1365	0.303
Year 1 vs Year 4			412.5	0.032*
Year 2 vs Year 3			710.5	0.591
Year 2 vs Year 4			208	0.66
Year 3 vs Year 4			558	0.107
Monthly income				
<RM1000	93.56	2 (3)	F= 5.487	0.064
RM1000-RM1499	114.66	3 (1)		
>RM1499	112.88	3 (1)		
< Rm1000 vs RM1000- RM1499			1993	0.037*
<RM1000 vs >RM1499			772	0.195
RM1000- RM1499 vs >RM1499			211.5	0.797
Family history of CRC				
Yes	120.00	3 (1)	U= 2106	0.007*
No	93.66	2 (3)		

U= Mann Whitney U test; F= Kruskal Wallis Test;

*p-value <0.05 indicate significant differences

4.6.2 Sociodemographic characteristics differences toward knowledge of CRC regarding warning signs

Table 4.10 demonstrates the associations between the participants' socio-demographic characteristics and knowledge of CRC warning signs. Gender emerged as a significant differentiator in knowledge levels, with females (M = 7, IQR = 5) displaying significantly higher knowledge of CRC warning signs compared to males ((M = 3, IQR = 5; $p < 0.001$). Individuals under the age of 20 (M = 3, IQR = 7) had significantly less knowledge than those over the age of 20 (M = 6, IQR = 4; $p = 0.004$). Health science students (M = 7, IQR = 4) had significantly better knowledge of CRC warning signs than their non-health science peers (M = 6, IQR = 6; $p < 0.001$), indicating that the study field was a significant factor associated with knowledge level. Besides, the year of study was also a significant factor as well ($F = 22.405$, $p < 0.001$). Students in the foundation year (M = 2, IQR = 6) had lesser knowledge compared to students in the third year (M = 6, IQR = 5; $p < 0.001$), and the fourth year (M = 7, IQR = 3; $p< 0.001$). In addition, Year 2 (M = 4, IQR = 5) students showed significantly less knowledge than either Year 3 or Year 4 students ($p = 0.035$; $p = 0.005$, respectively). Apart from that, the monthly income also displayed a significant association with knowledge of warning signs ($F = 6.283$, $p < 0.043$). Specifically, income between RM1000 to RM1499 individuals (M = 7, IQR = 4) showed better knowledge compared to those with RM1000 monthly income (M = 5, IQR = 6; $p = 0.013$). However, the study found that there were no significant differences in knowledge among individuals based on sociodemographic factors such as nationality, ethnicity, and family history of CRC.

Table 4.10 Sociodemographic differences towards the CRC warning sign knowledge (*N*= 196)

Variable	Knowledge of CRC warning signs			
	Mean score	Median score (IQR)	Test Statistic	p-value
Gender				
Male	63.15	3(5)	U= 1986	<0.001*
Female	115.06	7 (5)		
Age				
Below 20 years old	79.55	3 (7)	U= 2602.5	0.004*
Above 20 years old	104.99	6 (4)		
Nationality				
Malaysian	98.55	5 (5)	U= 280	0.922
Non- Malaysian	95.33	5 (9)		
Ethnicity				
Chinese	99.09	5.5 (5)	U= 270	0.306
Indian	70.00	1.5 (7)		
Study field				
Health science	130.01	7 (4)	U= 2000.5	<0.001*
Non-health science	73.35	4 (6)		
Year of study				
Foundation	66.20	2 (6)	F=22.405	<0.001*
Year 1	102.02	6 (6)		
Year 2	85.00	4 (5)		
Year 3	109.93	6 (5)		
Year 4	127.43	7 (3)		
Foundation vs Year 1			609	0.050
Foundation vs Year 2			346	0.090
Foundation vs Year 3			613	<0.001*
Foundation vs Year 4			178	<0.001*
Year 1 vs Year 2			525.5	0.259
Year 1 vs Year 3			1415.5	0.512
Year 1 vs Year 4			445	0.118
Year 2 vs Year 3			542.5	0.035*
Year 2 vs Year 4			153	0.005*
Year 3 vs Year 4			547.5	0.117

U= Mann Whitney U test; F= Kruskal Wallis Test;

**p*-value <0.05 indicate significant differences

Table 4.10 Sociodemographic differences towards the CRC warning sign knowledge (cont'd)

Variable	Knowledge of CRC warning signs			
	Mean score	Median score (IQR)	Test Statistic	p-value
Monthly income				
<RM1000	93.20	5 (6)	F= 6.283	0.043*
RM1000-RM1499	119.75	7 (4)		
>RM1499	103.62	5 (7)		
< Rm1000 vs RM1000- RM1499			1845.5	0.013*
<RM1000 vs >RM1499			867	0.528
RM1000- RM1499 vs >RM1499			186	0.395
Family history of CRC				
Yes	114.22	6 (4)	U= 2314	0.063
No	93.66	5 (6)		

U= Mann Whitney U test; F= Kruskal Wallis Test;

**p*-value <0.05 indicate significant differences

4.6.3 Sociodemographic characteristics differences toward knowledge of CRC regarding risk factors

Table 4.11 displays the difference between the respondents' socio-demographics and their knowledge of CRC risk factors. Significantly, gender was found to have a notable impact on the knowledge of CRC risk factors. Specifically, males (M = 3, IQR = 6) exhibited a comparatively lower level of comprehension in comparison to their female counterparts (M = 5, IQR = 5; p < 0.001). Besides, significant disparities in knowledge levels were observed among different age cohorts. The findings indicate that individuals who were below the age of 20 (M = 3, IQR = 4) exhibited a lower level of understanding regarding CRC risk factors compared to those who were above the age of 20 (M = 6, IQR = 5; p <

0.001). Students majoring in health sciences (M = 6, IQR = 5) performed better knowledge than their non-health science counterparts (M = 4, IQR = 6; $p < 0.001$). Apart from that, The results show that the year of study had a significant impact on the comprehension of CRC risk factors ($F = 35.179$, $p < 0.001$). Particularly, foundation students (M = 2, IQR = 5) demonstrated a lower understanding of CRC risk factors compared to Year 2 (M = 5, IQR = 6), Year 3 (M = 5, IQR = 6), and Year 4 students (M = 6, IQR = 6; $p< 0.001$, $p < 0.001$, $p = 0.002$, respectively). Additionally, it was observed that Year 3 students and Year 4 students exhibited a higher level of knowledge compared to Year 1 students (M = 4, IQR = 6; $p< 0.001$, $p = 0.037$, respectively). The monthly income of participants was found to be statistically significant ($F = 8.859$, $p = 0.012$). Specifically, individuals with incomes below RM1000 (M = 5, IQR = 6) demonstrated a lower level of understanding compared to those with incomes within the RM1000-RM1499 range (M = 6.5, IQR = 6; $p = 0.016$). Participants who had a familial history of CRC demonstrated a significantly higher knowledge of CRC risk factors (M = 6, IQR = 7) compared to those without such a history (M = 5, IQR = 6 ; $p = 0.015$).

Table 4.11 Sociodemographic differences towards CRC risk factors knowledge (*N*= 196)

Variable	Knowledge of CRC risk factors			
	Mean score	Median score (IQR)	Test Statistic	p-value
Gender				
Male	78.77	3 (6)	U= 2946.5	0.001*
Female	107.85	5 (5)		
Age				
Below 20 years old	68.23	3 (4)	U= 2136.5	<0.001*
Above 20 years old	108.87	6 (5)		
Nationality				
Malaysian	97.70	5 (6)	U= 136	0.113
Non- Malaysian	149.67	9 (0)		
Ethnicity				
Chinese	99.17	5 (6)	U= 255.5	0.250
Indian	66.38	3 (3)		
Study field				
Health science	115.33	6 (5)	U= 3277.5	<0.001*
Non-health science	85.06	4 (6)		
Year of study				
Foundation	61.59	2 (5)	F=35.179	<0.001*
Year 1	82.75	4 (6)		
Year 2	106.86	5 (6)		
Year 3	124.98	7 (4)		
Year 4	112.78	6 (6)		
Foundation vs Year 1			704.5	0.055
Foundation vs Year 2			220	<0.001*
Foundation vs Year 3			428.5	<0.001*
Foundation vs Year 4			223	0.002*
Year 1 vs Year 2			470.5	0.081
Year 1 vs Year 3			845.5	<0.001*
Year 1 vs Year 4			401	0.037*
Year 2 vs Year 3			595.5	0.110
Year 2 vs Year 4			266.5	0.663
Year 3 vs Year 4			632.5	0.486

U= Mann Whitney U test; F= Kruskal Wallis Test;

**p*-value <0.05 indicate significant differences

Table 4.11 Sociodemographic differences towards CRC risk factors knowledge (cont'd)

Variable	Knowledge of CRC risk factors			
	Mean score	Median score (IQR)	Test Statistic	p-value
Monthly income				
<RM1000	91.78	5 (6)	F= 8.859	0.012*
RM1000-RM1499	119.63	6.5 (6)		
>RM1499	122.85	7 (7)		
< Rm1000 vs RM1000- RM1499			1833.5	0.012*
<RM1000 vs >RM1499			667	0.062
RM1000- RM1499 vs >RM1499			206	0.719
Family history of CRC				
Yes	114.22	6 (7)	U= 2137	0.015*
No	94.96	5 (6)		

U= Mann Whitney U test; F= Kruskal Wallis Test;

**p*-value <0.05 indicate significant differences

4.6.4 Sociodemographic characteristics differences toward the attitude of CRC screening

Table 4.12 illustrates the differences in respondents' socio-demographics and attitudes toward CRCS. Gender was found to have a significant impact on attitudes towards CRC screening, with males (M = 2, IQR = 2) displaying a less favourable attitude compared to females (M = 3 IQR = 1; p = 0.016). In this study, The study field has been observed as a notable factor in influencing attitudes towards CRCS. Health science students (M = 3, IQR = 1) exhibited a significantly more positive attitude towards CRCS in comparison to non-health science students (M = 2, IQR = 2; p < 0.001). The monthly income levels showed statistical significance (F = 11.238, p = 0.004). The study found that participants

with incomes below RM1000 had more negative attitudes (M = 3, IQR = 1) compared to those in the RM1000-RM1499 group (M = 3, IQR = 0; p = 0.001). Furthermore, those with incomes of more than RM1500 (M = 2, IQR = 2) were also found to have less positive attitudes than those with incomes of RM1000-RM1499 (p = 0.006). Participants who had a family history of CRC (M = 3, IQR = 1) displayed more positive attitudes towards CRCS in comparison to those without a family history (M = 3, IQR = 1; p = 0.034). For several sociodemographic variables, including age, nationality, ethnicity and year of study, no statistically significant differences in attitudes toward CRCS were observed in this study.

Table 4.12 Sociodemographic differences towards the attitude of CRCS (*N*= 196)

Variable	Attitude toward CRC screening			
	Mean score	Median score (IQR)	Test Statistic	p-value
Gender				
Male	78.77	3 (6)	U= 3386.5	0.016*
Female	107.85	5 (5)		
Age				
Below 20 years old	68.23	3 (4)	U= 3160	0.109
Above 20 years old	108.87	6 (5)		
Nationality				
Malaysian	97.70	5 (6)	U= 168	0.161
Non- Malaysian	149.67	9 (0)		
Ethnicity				
Chinese	99.17	5 (6)	U= 226	0.112
Indian	66.38	3 (3)		

U= Mann Whitney U test; F= Kruskal Wallis Test;

**p*-value <0.05 indicate significant differences

Table 4.12 Sociodemographic differences towards the attitude of CRCS (cont'd)

Variable	Attitude toward CRC screening			
	Mean score	Median score (IQR)	Test Statistic	p-value
Study field				
Health science	115.33	6 (5)	U= 3153.5	<0.001*
Non-health science	85.06	4 (6)		
Year of study				
Foundation	61.59	2 (5)	F=7469	0.113
Year 1	82.75	4 (6)		
Year 2	106.86	5 (6)		
Year 3	124.98	7 (4)		
Year 4	112.78	6 (6)		
Foundation vs Year 1			716.5	0.047*
Foundation vs Year 2			373	0.166
Foundation vs Year 3			820	0.073
Foundation vs Year 4			241.5	0.013*
Year 1 vs Year 2			597.5	0.718
Year 1 vs Year 3			1455.5	0.635
Year 1 vs Year 4			525.5	0.480
Year 2 vs Year 3			760	0.983
Year 2 vs Year 4			246.5	0.318
Year 3 vs Year 4			598.5	0.211
Monthly income				
<RM1000	91.78	5 (6)	F=11.238	0.004*
RM1000-RM1499	119.63	6.5 (6)		
>RM1500	122.85	7 (7)		
< Rm1000 vs RM1000- RM1499			1754	0.001*
<RM1000 vs >RM1500			851.5	0.428
RM1000- RM1499 vs >RM1500			133	0.006*
Family history of CRC			U= 2309	0.036*
Yes	114.22	6 (7)		
No	94.96	5 (6)		

U= Mann Whitney U test; F= Kruskal Wallis Test;

*p-value <0.05 indicate significant differences

4.7 Association between Sociodemographic Characteristics and Colorectal Cancer-Related Incidence Age

Table 4.13 outlines the relationship between CRC incidence age and demographic variables, indicating significant associations for (p= 0.032, χ^2= 4.615), year of study (p= 0.025, χ^2= 11.164), monthly income variable (p= 0.010, χ^2= 9.206) and family history of CRC variable (p= 0.002, χ^2= 9.267). Non-significant associations are observed for gender, nationality, ethnicity and study field.

Table 4.13 Association between sociodemographic characteristics and knowledge related to CRC incidence age (*N*= 196)

Variable	CRC incidence age % (n)		P value	χ^2
	Incorrect	Correct #		
Gender				
Male	42 (21.4)	21 (10.7)	0.282^a	1.158
Female	78 (39.8)	55 (28.1)		
Age				
Below 20 years old	37 (18.9)	13 (6.6)	032^a*	4.615
Above 20 years old	83 (42.3)	63 (32.1)		
Nationality				
Malaysian	120 (61.2)	73 (37.2)	0.570^b	2.188
Non-Malaysian	0	3 (1.5)		
Ethnicity				
Chinese	117 (59.7)	75 (38.3)	1.000^b	0.570
Indian	3 (1.5)	1 (0.5)		

* p< 0.05 indicates a significant association.
^{a} Pearson Chi-Square test, ^{b}Fisher Exact test
correct answer: 60 years old

Table 4.13 Association between sociodemographic characteristics and knowledge related to CRC incidence age (cont'd)

Variable	CRC incidence age % (n)		P value	χ^2
	Incorrect	Correct #		
Study field				
Health science	49 (25.0)	38 (19.4)	0.208^a	1.584
Non-health science	71 (36.2)	38 (19.4)		
Year of study				
Foundation	24 (12.8)	12 (6.1)	0.235^a*	11.164
Year 1	39 (19.9)	11 (5.6)		
Year 2	12 (6.1)	13 (6.6)		
Year 3	29 (14.8)	29 (14.8)		
Year 4	11 (5.6)	11 (5.6)		
Monthly income				
<RM1000	100 (51)	49 (25)	0.010^a*	9.206
RM1000-RM1499	16 (7.7)	19 (9.7)		
>RM1500	5 (2.6)	8 (4.1)		
Family history of CRC				
Yes	14 (7.1)	22 (11.2)	0.002^a*	9.267
No	106 (54.1)	54 (27.6)		

* p< 0.05 indicates a significant association.
^{a} Pearson Chi-Square test, ^{b}Fisher Exact test
correct answer: 60 years old

4.8 Factors Association between Confidence to Detect CRC Warning Signs

4.8.1 Association between sociodemographic characteristics and confidence to detect CRC warning signs

The association between confidence levels in CRC warning signs detection and numerous sociodemographic characteristics is thoroughly analysed in Table 4.14. There were multiple variables when statistically significant correlations were found. First, a statistically significant relationship between gender and confidence levels was discovered (p= 0.007, χ^2= 12.207). The link between age and confidence was also significant (p= 0.004, χ^2= 13.070). Last but not least, the study field revealed a strong relationship with confidence levels (p< 0.001, χ^2= 19.247).

Table 4.14 Association between sociodemographic characteristics and confidence level to detect CRC warning signs (*N*= 196)

Variable	Confidence level to detect CRC warning signs (n,%)				P value	χ^2
	#1	#2	#3	#4		
Gender						
Male	26 (13.3)	24 (12.2)	9 (4.6)	4 (2)	0.007^{a}*	12.207
Female	30 (15.3)	44 (22.4)	44 (22.4)	15 (7.7)		
Age						
Below 20 years old	16 (8.2)	24 (12.2)	4 (2.0)	6 (3.1)	0.004^{a}*	13.070
Above 20 years old	40 (20.4)	44 (22.4)	49 (25.0)	13 (6.6)		

* p< 0.05 indicates a significant association.

^{a} Pearson Chi-Square test, ^{b}Fisher Exact test

1: Not at all confident, 2: Not very confident, 3:Fairly confident, 4: Very confidence

Table 4.14 Association between sociodemographic characteristics and confidence level to detect CRC warning signs (cont'd)

Variable	Confidence level to detect CRC warning signs (n,%)				P value	χ^2
	#1	#2	#3	#4		
Nationality						
Malaysian	55 (28.1)	67 (34.2)	43 (27)	18 (9.2)	0.347^b	2.866
Non-Malaysian	1 (0.5)	1 (0.5)	0	1 (0.5)		
Ethnicity						
Chinese	56 (28.6)	66 (33.7)	52 (26.5)	18 (9.2)	0.397^b	2.858
Indian	0	2 (1.0)	1 (0.5)	1 (0.5)		
Study field						
Health science	15 (7.7)	28 (14.3)	36 (18.4)	8 (4.1)	$< 0.001^a*$	19.247
Non-health science	41 (20.9)	40 (20.4)	17 (8.7)	11 (5.6)		
Year of study						
Foundation	12 (6.1)	19 (9.7)	2 (1.0)	4 (2.0)	0.114^a	18.042
Year 1	17 (8.7)	16 (8.2)	13 (6.6)	4 (2.0)		
Year 2	7 (3.6)	10 (5.1)	7 (3.6)	1 (0.5)		
Year 3	14 (7.1)	18 (9.2)	21 (10.7)	8 (4.1)		
Year 4	6(3.1)	5(2.6)	10(5.1)	2(1.0)		

* p< 0.05 indicates a significant association.

^{a} Pearson Chi-Square test, ^{b}Fisher Exact test

1: Not at all confident, 2: Not very confident, 3:Fairly confident, 4: Very confidence

Table 4.14 Association between sociodemographic characteristics and confidence level to detect CRC warning signs (cont'd)

Variable	Confidence level to detect CRC warning signs (n,%)				P value	χ^2
	#1	#2	#3	#4		
Monthly income						
<RM1000	45 (23.0)	54 (27.6)	37 (18.9)	13 (6.6)	0.376^b	6.222
RM1000-RM1499	6 (3.1)	12 (6.1)	11 (5.6)	5 (2.6)		
>RM1500	5 (2.6)	2 (1.0)	5 (2.6)	1 (0.5)		
Family history of CRC						
Yes	6 (3.1)	13 (6.6)	12 (6.1)	5 (2.6)	0.301^a	3.659
No	50 (25.5)	55 (28.1)	41 (20.9)	14 (7.1)		

* p< 0.05 indicates a significant association.
^{a} Pearson Chi-Square test, ^{b}Fisher Exact test
1: Not at all confident, 2: Not very confident, 3:Fairly confident, 4: Very confidence

4.8.2 Association between knowledge of CRC warning signs and confidence in detecting CRC warning signs

Table 4.15 presents the association between knowledge levels and confidence levels in detecting CRC warning signs. A significant relationship was observed between these two variables, as determined by the chi-square test ($\chi^2 = 98.723$, $p < 0.001$). For individuals who reported feeling "Not at all confident," a substantial proportion had poor knowledge (17.9%), while smaller percentages had fair (6.1%) and good (4.4%) knowledge levels regarding CRC warning signs. Among those who were "Not very confident," there was a mix of knowledge levels, with 6.1% having poor knowledge, 15.3% having fair knowledge, and

13.3% possessing good knowledge. Interestingly, participants who felt "Fairly confident" all exhibited fair to good knowledge levels, with none reporting poor knowledge. Specifically, 4.1% had fair knowledge, while a significant majority (23.0%) displayed good knowledge. Lastly, among participants who expressed feeling "Very confident," a vast majority (8.7%) possessed good knowledge levels, with only negligible percentages having poor (0.5%) and fair (0.5%) knowledge.

Table 4.15 Association between knowledge level and confidence level to detect CRC warning signs (*N*= 196)

Confidence	Knowledge level regarding warning sign n (%)			P value	χ^2
	Poor	Fair	Good		
Not at all confident	35(17.9)	12(6.1)	9(4.6)	$< 0.001^a$	98.723
Not very confident	12(6.1)	30(15.3)	26(13.3)		
Fairly confident	0	8(4.1)	45(23.0)		
Very confident	1(0.5)	1(0.5)	17(8.7)		

^{a} Pearson Chi-Square test

* p< 0.05 indicates a significant association.

Chapter 5

DISCUSSION

5.1 Awareness of CRC

The current study showed that 47.4% of respondents have a good awareness of CRC, whereas 31.1% and 21.4% of them indicated poor and fair awareness respectively. Specifically, 67.3% of the participants in this study were aware of colorectal cancer (CRC) and its prevalence in Malaysia. This finding is parallel with Saudi Arabia and local studies (Alotaibi, Mujtaba and Alshammari, 2020; Suan, Mohammed and Hassan, 2016) which reported a significant proportion of the participants (81%) demonstrated awareness of CRC and a majority (87.5%) of those surveyed in that study were aware CRC was one of Malaysia's top three cancers. Besides, in the current study, slightly less then 50 percent of participant heard colorectal cancer screening (CRCS) before. This is in the line with previous study done by Alotaibi, Mujtaba and Alshammari (2020) and Lewandowski et al. (2020) that demonstrated that majority of surveyed were unaware of the tests or examinations utilized for the detection of colon cancer. According to Brandt et al. (2012), a significant proportion of participants (91%) demonstrated awareness of CRC. Among the individuals who were aware of colon cancer, a significant proportion (96%) demonstrated awareness of colorectal cancer (CRC) screening. Based on the findings in this study, increase the awareness of CRC play a vital role in CRC prevention and better prognosis, because a better awareness might lead to increased rates of doctor visits, greater likelihood of referrals for medical investigations, and earlier diagnoses of the

disease (Power and Wardle, 2015). Hence, efforts should be made over a longer period of time to raise awareness of CRC through the implementation of ongoing educational initiatives, lectures, and campaigns aimed at promoting early detection of CRC Mhaidat et al. (2016).

5.1.1 Awareness of CRC among gender and age

In the current study, females (M = 3, IQR = 2) showed a significantly higher awareness of CRC compared to males (M = 2, IQR = 3). This result is parallel with previous studies(Hamza, Argaw and Gela, 2021; Aga Syed Sameer et al., 2021; Loo et al., 2013; Imran et al., 2016; Alaqel et al., 2021). One potential clarification for this finding is the majority of cancer prevention campaigns in Malaysia mainly focus on female-specific health issues such as breast cancer (Omar and Tamin, 2011), and the campaigns lead female to exhibit a higher levels of involvement in cancer detection endeavours and increase their awareness of certain cancer (Simon et al., 2010).

Furthermore, in this study, respondents aged 20 and above (Mean score = 104.99, M = 2, IQR = 2) reported having a better awareness of CRC than their counterparts (Mean score = 79.55, M = 2, IQR = 3), although there are significant disparity between these two groups. This finding is not consistent with Al-Sharif et al. (2018) with carried out respondents in the age group of 50-59 years demonstrating a significantly higher level of awareness of CRC. One possible explanation for this observation's inconsistency could be attributed to the variation in the demographic composition of the study participants, as the study conduct by Al-Sharif et al. involve a larger age range from 10 to 59 years old.

5.1.2 Awareness of CRC among study fields and year of study

In the study, respondents who studying in the health science (M = 3, IQR = 1) field demonstrated higher score of awareness regarding CRC compared to their non-health science students (M = 2, IQR = 3). This results is in line with earlier studies (Aga Syed Sameer et al., 2021; Loo et al., 2013; Imran et al., 2016), which reported that science faculty student, health science student and medical students showed a significant better awareness of CRC, respectively. The possible explanation for health science students may have a better awareness is that they may have been more exposed to health-related information which would account for their higher scores of awareness when compared to non-health science students (Loo et al., 2013).

Besides, in the present study, the results exhibited that higher education level individual tend to have a higher score of awareness compared to individual from lower education level. In particularly, second year (M = 2, IQR = 3), third year (M = 3, IQR = 1) and forth year degree (M = 3, IQR = 1) students indicated a better awareness of CRC compared to foundation students (M = 0, IQR = 3). Besides, Year 4 students also demonstrated a better awareness than year 1 (M = 2, IQR = 3) student. A similar finding was reached by Aga Syed Sameer et al. (2021), Al-Sharif et al. (2018), Hamza, Argaw and Gela (2021) and Schliemann et al. (2018), as higher education level individuals show a better awareness of CRC. One possible justification for this phenomenon could be that individuals who have pursued higher education, that may acquire knowledge about CRC through their academic curriculum and practical experiences. Consequently, this

heightened awareness of CRC may contribute to a greater awareness of CRC (Hamza, Argaw and Gela, 2021).

5.1.3 Awareness of CRC among monthly income and family history

Apart from that, in the present study, participants with a higher monthly income (> RM1500 income group) showed a higher awareness toward CRC compared to their counterparts, although the finding is not statical significant. However, the finding is contrary to previous studies (Hamza, Argaw and Gela, 2021), as those respondents whose monthly income was 3,000 ETB or more were more likely to be aware of CRC than those whose income was less than 3,000 ETB. This inconsistency may be due to the range of attitude scores in the current study is small, which could make it possible for different groups to get similar scores even if they are different in other ways.

Furthermore, the current study found that participants with CRC family history indicated a significantly higher score of awareness than those without a family history. This result accords with earlier studies conducted in South-West Ethiopia and local (Hamza, Argaw and Gela, 2021; Al-Naggar et al., 2015). This observation may be related to the association between respondents who possess a familial background of CRC and their degree of knowledge about CRC, as well as their raised level of awareness regarding CRC, in comparison to individuals without a familial history of CRC (Hamza, Argaw and Gela, 2021).

5.2 Knowledge of CRC warning signs

In this study, 49.5% of respondents showed a good knowledge of colorectal cancer (CRC) warning signs, whereas respondents with poor and fair knowledge are 24.5% and 26% respectively. This finding is parallel with the studies conducted in Serdang Hospital, Malaysia by Yan et al. (2017) which indicated that the majority (91.9%) of the respondents showed a good knowledge of CRC warning signs. In contrast to the previous findings done in Lebanon (33%), Palestine (40%) and Saudi Arabia (41.1%), only a minority of the respondents showed a good knowledge regarding warning signs of CRC (Tfaily et al., 2019; Elshami et al., 2022; Aga Syed Sameer et al., 2021). Despite international studies, this finding is also not consistent with the other three studies done by Malaysian researchers (Sindhu et al., 2019; Karikalan et al., 2021), as the majority of the participating respondents displayed poor and fair warning sign knowledge of CRC. A possible explanation for this finding is the target population for this study were university student, which is more likely to have a higher education level compared to previous studies which involved the public from a variety of education background.

In this study, abdominal pain (68.9%) was the most identified warning sign of CRC. This finding is in line with Sindhu et al. (2019), as the most frequently mentioned warning sign and symptom to be remembered in the unprompted and prompted question was "abdominal pain". This result might be due to the fact that due to the anatomical location, abdominal pain may have been interpreted by the population as being associated with colorectal cancer (Sindhu et al., 2019).

Besides, most unidentified three warning signs by the respondents in this survey are bowel not emptying (41.8%), back passage bleeding (44.9%) and lump (49%). Anaemia, along with its associated symptoms such as rectal haemorrhage, was shown to be the most prevalent clinical presentation (Rashid et al., 2009). The result of this study illustrated that only slightly over half (54.6%) of individuals recognised anaemia possible symptom of colorectal cancer. Additionally, based on Elshami et al. (2022a), that study mentioned that men and those without knowing someone with cancer were less likely than their counterparts to recognise warning signs of bleeding from the back passage and lump. The primary factor contributing to the delay in seeking medical attention, which accounted for 58.5% of cases, was a lack of knowledge regarding the signs and symptoms a sign of cancer (Abu-Helalah et al., 2015). For this reason, it is crucial that future public health campaigns place a premium on increasing and maintaining an elevated level of knowledge of the warning signs and symptoms of CRC because enhanced knowledge of cancer symptoms will facilitate early medical intervention, thereby reducing cancer-related delays and reducing mortality rates (Simon et al., 2010).

5.2.1 Knowledge of CRC warning signs among gender and age

From this study, the knowledge score of warning signs regarding CRC in females (M = 7, IQR = 5) was significantly higher than in male counterparts (M = 3, IQR = 5). This finding is consistent with previous studies done by Elshami et al. (2022), Mhaidat et al. (2016) and Loo et al. (2013). A Palestine study observed that male participants exhibited a lower likelihood compared to female participants in recognising three out of four signs and symptoms of colorectal

cancer (CRC) that were of a non-specific nature (Elshami et al., 2022). Another similar study conducted among university students in Jordan revealed the scores of female participants were found to be significantly higher than those of male participants when compared to the warning signs of CRC (Mhaidat et al., 2016). Loo et al. (2013) support the findings of this study by reporting significantly better knowledge among female respondents. Contrary to the findings of Sindhu et al. (2019) and Taha et al. (2016), as gender was not shown statically significant in the study. This phenomenon can be explained by the higher utilisation of health care services by females, which leads to more frequent interactions with health care providers than males. Additionally, a study conducted in Korea indicated that women demonstrated a greater degree of health literacy than men when it came to interpreting medical forms, medication bottle directions, and textual material provided by healthcare practitioners (Lee, Lee and Kim, 2014).

Moreover, the current study demonstrated that respondents who are older than 20 years old (M = 6, IQR = 4) have significantly higher knowledge of CRC warning sign than those who are below 20 years old (M = 3, IQR = 7). Similar with this study, research conducted by Mhaidat et al. (2016) found that individuals aged 20 years and older exhibited a greater level of knowledge compared to their younger peers with regard to warning signs. Elshami et al.'s 2022 work reported that the elderly indicate a higher knowledge compared to their counterparts, as 45 years of age or older exhibited a greater probability of recognising "anaemia" as an alert sign of CRC compared to participants between the ages of 18 and 44. Yet it cannot be consistent with this study, because the study's target participants were public which includes a very wide age range.

However, the result also contrary to the findings of Sindhu et al. (2019), the present study did not find a significant difference between the age range 18 to more than 60, and reported those between 40 to 49 years old had the highest knowledge mean.

5.2.2 Knowledge of CRC warning signs among study fields and year of study

In addition, the study carried out that health-science students (M = 7, IQR = 4) significantly scored better than non-health-science students (M = 4, IQR = 6). The finding is consistent with previous studies done by Loo et al. (2013), Aga Syed Sameer et al. (2021) and Imran et al. (2016), as medical students student always have a notable better knowledge related to CRC warning signs. A possible finding explanation for this finding might be that health alliance students have more opportunities to be exposed to health-related information (Loo et al., 2013).

Apart from that, the result showed a significant difference between year of study, specifically foundation students (M = 2, IQR = 6) displayed a significantly lower knowledge of warning signs compared to Year 3 students (M = 6, IQR = 5), and Year 4 (M = 7, IQR = 3). Besides, Year 3 and Year 4 students in this study indicated a significantly higher knowledge than Year 2 (M = 4, IQR = 5) peers. This finding is supported by Sindhu et al. (2019) and Su et al. (2013), which indicate that respondents with higher education levels exhibit a higher degree of comprehension regarding symptoms and indicators of CRC than their counterparts. A Jordan study revealed a significant association between

knowledge level and education level (Taha et al., 2016). A possible explanation for this finding is the ability of individuals to obtain and comprehend health information, as well as utilise it for the purpose of maintaining their well-being, can be linked to their cognitive and social attitudes (Lynch and Franklin, 2019).

5.2.3 Knowledge of CRC warning signs among monthly income and family history

Besides that, the study reported that respondents with higher monthly income showed significantly higher knowledge compared with their counterparts. In particularly, monthly income below RM1000 (M = 5, IQR = 6) is significantly lower score of warning signs knowledge compared to monthly income group between RM1000- RM1499 (M = 7, IQR = 4). This finding parallels with Elshami et al. (2022a) and Taha et al. (2016). This results may be explained by the fact that a higher-income population may possess a greater capacity to access private healthcare facilities (Hamza, Argaw and Gela, 2021).

In addition, in the study, those participants with a CRC family history (M = 6, IQR = 4) have a higher knowledge of warning signs than their counterparts (M = 5, IQR = 6), and this finding does not show any significant differences. This result is consistent with the study done by Sindhu et al. (2019). On the contrary, Elshami et al. (2022a) stated that participants who knew someone with cancer and those recruited from hospitals were more likely to recognize all CRC signs and symptoms of a non-specific nature. A possible explanation for this might be that individuals who have been in close proximity to ill family members or patients tend to experience heightened levels of personal concern and

intimidation in relation to the disease. Consequently, they are more willing to actively seek out information pertaining to health-related subjects (Elshami et al., 2022a).

5.3 Knowledge of CRC risk factors

In this study, 38.3% of the respondents demonstrated poor knowledge regarding colorectal cancer (CRC) risk factors, followed by 36.2% good knowledge and 25.5% fair knowledge. This finding shows a parallel with Jeddah, Palestine and the United Kingdom (Abu Hassan et al., 2016; Elshami et al., 2022; Power et al., 2011). Whereas the results match with those earlier research studies by Malaysian researchers (Harmy et al., 2011; Sindhu et al., 2019). Harmy et al. (2011) indicated that there was a wide distribution of correct responses to questions about possible risks, ranging from 9.7% to 66.0%. Sindhu et al. (2019) reported a notable lack of knowledge among the subjects, as evidenced by the fact that 8.5% of those surveyed obtained a score of zero. In contrast, another two Malaysian studies indicated good knowledge and moderate knowledge (Yan et al., 2017; Karikalan et al., 2021, respextively). Furthermore, Hashim et al. (2022) carried out a result against with findings of this study, as a significant proportion (92.7%) of the participants demonstrated an adequate amount of knowledge regarding risk factors associated with CRC**.** Besides, Taha et al. (2016) illustrated no one in the study was knowledgeable that being overweight, not getting enough exercise, living a sedentary lifestyle, being older than 50, and drinking excessively are all risk factors for CRC. However, the respondents (60.7%) from the current study reported that low fibre intake is the most recognized risk factor, followed by excessive alcohol consumption and medical

history related to bowel. This finding is in line with Su et al. (2013). A possible explanation for this result is sufficient fibre intake was one of the fundamental health promotion messages highlighted in the World Cancer Research Fund Report (2007) and represents the most pressing issues that need to be taken up in a public health setting (Sindhu et al., 2019). Consumption of a diet rich in dietary fibre, specifically derived from cereals or grains and fruits, has been linked to a decreased likelihood of developing colorectal adenoma and carcinoma (Song et al., 2015; Park et al., 2005; Ben et al., 2014). Diabetes was the CRC risk factor that this study's respondents knew the least about (37.8%). This finding aligns with the results from a study conducted in the United Kingdom and Palestine, where were reported that a mere 25.8% and 34.2% of the participants demonstrated awareness of diabetes as a risk factor for CRC (Power et al., 2011; Elshami et al., 2022b). Type 2 diabetes mellitus (T2DM) has been identified as a risk factor for CRC by epidemiological studies. The hyperinsulinemia and the insulin-like growth factor (IGFs) axis, hyperglycemia, inflammation caused by adipose tissue dysfunction, gastrointestinal motility disorder, and impaired immunological surveillance are the underlying biological factors that link T2DM to colorectal cancer (Yu et al., 2022).

5.3.1 Knowledge of CRC risk factors among gender and age

The current study found that female (M = 5, IQR = 5) is significantly more knowledgeable on CRC risk factors compared to their male counterparts (M = 3, IQR = 6). This finding is contrary to previous studies done in Malaysia (Sindhu et al., 2019; Yan et al., 2017; Su et al., 2013), which found that there are no differences between gender. However, this result shows a parallel with other

international studies (Aga Syed Sameer et al., 2021; Elshami et al., 2022b; Mhaidat et al., 2016). This consistency may females were more health literate than males, when it came to comprehending written information provided by healthcare providers, medical forms, and prescription bottle instructions (Lee, Lee and Kim, 2014).

Furthermore, the results of this study show indicate that individuals aged 20 years and older (M = 6, IQR = 5) had a greater level of awareness compared to their younger counterparts (M = 3, IQR = 4) in relation to CRC risk factors. The finding is consistent with Mhaidat et al. (2016) as individuals aged 20 years and older exhibited a greater level of knowledge compared to their younger counterparts in relation to warning sign knowledge.

5.3.2 Knowledge of CRC risk factors among study fields and year of study

Moreover, this study demonstrated health science students (M = 6, IQR = 5) are more knowledgeable compared to their non-health science counterparts (M = 9, IQR = 0). This finding are in accord with earlier studies (Aga Syed Sameer et al., 2021; Hashim et al., 2022; Elshami et al., 2022b; Imran et al., 2016; Mhaidat et al., 2016), as students who study in science-related courses showed a higher knowledge regarding CRC risk factors. A possible explanation for this might be that students in health science departments are more exposed to health information and they might be more interested in health-related topics, which might encourage them to seek out information about cancer prevention (Loo et al., 2013).

In this study, the researcher reported that second-year degree students (M = 5, IQR = 6) and third-year students (M = 7, IQR = 4) had significantly higher knowledge regarding risk factors than foundation students (M = 2, IQR = 5) . Apart from that, compared to Year 1 degree (M = 4, IQR = 6) students , Year 3 (M = 7, IQR = 4) and Year 4 (M = 6, IQR = 6) students showed a significantly higher knowledge of CRC risk factors. This finding is in line with earlier studies done in Saudi Arabia, Palestine, Sharjah, United Arab Emirates and Malaysia (Khayyat and Ibrahim, 2014; Elshami et al., 2022b; Hashim et al., 2022, Su et al., 2013). These studies carried out that higher educated participants were linked to higher odds of being knowledgeable about CRC risk factors. A possible explanation for this finding is higher higher-educated individuals have better cognitive and social abilities, which allow them to seek out and process health information, as well as put that knowledge to use in order to keep themselves healthy (Jaafar et al., 2021).

5.3.3 Knowledge of CRC risk factors among monthly income and family history

The findings of this study indicated that respondents with a higher monthly income had better knowledge scores of CRC risk factors compared to other monthly income groups, specifically RM1000- RM1499 monthly income group (M = 6.5, IQR = 6) had a higher knowledge than those income below RM1000 (M = 5, IQR = 6). This finding is comparable to studies performed by Hashim et al. (2022) and Su et al. (2013). However, the finding is exactly counter to the idea carried out by Elshami et al. (2022b), Sindhu et al. (2019) and Yan et al. (2017) which indicated that there are no significant differences between different

monthly income groups. A possible explanation for these findings in the current study might be due to individuals with low incomes were less likely to look for health information or incorporate healthcare professionals as their first source of health information. Another possible explanation is that the lower-income population may experience more trouble comprehending the information they did find (Tang et al., 2019).

In addition, those with a family history of CRC (M = 6, IQR = 7) is significantly more likely to have a better knowledge of CRC risk factor compared to their counterparts (M = 5, IQR = 6). The result is consistent with Su et al. (2013) and Elshami et al. (2022b). The presence of a familial history of CRC may be significantly correlated with a heightened knowledge of risk factors, as individuals with such a history are more likely to possess a greater sense of risk and exhibit stronger motivation to engage in preventive measures against the illness. Prom-Wormley et al. (2021) mentioned family history increases the perceived threat and is a significant genetically informative instrument that facilitates the lookup of health-related information. Therefore, the inclusion of family history into community-based health education programmes will probably be positively welcomed by participants because such knowledge is connected with their desire to obtain this type of health information.

5.4 Attitude toward CRC screening

The majority of the respondents (59.2%) in our study were shown to have a positive attitude toward CRCS prevention, which is a positive indication in facilitating the motivation of individuals in the implementation of screening

programmes. While 21.4% and 19.4% of them indicated a negative and indifferent attitude respectively. This result is comparable with another study conducted in Malaysia (Loo et al., 2013), which demonstrated a high attitude score (76.9%) in that study. Besides, some international studies also illustrated a positive attitude toward CRCS among their participants (Sessa et al., 2008; Guerra, Dominguez and Shea, 2005; Almadani et al., 2022; Al Wutayd, 2015). In contrast to earlier findings done by Harmy et al. (2011) which reported that only 3.3% show a positive attitude toward CRCS. While Al Wutayd (2015) reported the majority of the respondents expressed the opinion that screening equipment plays a valuable role in the prevention and control of CRC. This finding is in accord with the result of the current study, as a majority of participants (83.2%) exhibited a positive attitude on the question regarding CRCS will aid in the early diagnosis and eventually enhance survival. This finding is directly in line with Almadani et al. (2022) and Al Wutayd (2015). Besides, the current study found that 69.4% of the surveyed answered with a positive attitude toward their willingness to undergo CRCS. This finding is contrary to the results of Tfaily et al. (2019) and Khayyat and Ibrahim (2014) which reported majority of the surveyed refuse to undergo CRC screening. According to Harmy et al. (2011), despite the potential benefits of regular screening in reducing the incidence and death rates associated with colorectal cancer, the current screening rate across West Malaysia remains below the desired level. CRCS uptake among the target group is below 3% despite recommendations and free opportunistic screening (Tamin et al., 2020). The efficacy of a screening programme is heavily dependent upon individuals' attitudes and willingness to engage in the initiative. Thus, it is vital to increase

the perception of CRC as a serious health concern, the belief in the significance of maintaining good health and the confidence of the government's implementation of national screening programmes to promote the attitude and willingness to undergo CRCS (Douma, Uiters and Timmermans, 2018). Besides, raising awareness can improve attitudes and dispel myths about the disease, both of which have a favourable effect on the number of people who choose to undergo screening (McCaffery, Wardle and Waller, 2003).

5.4.1 Attitude toward CRC screening among gender and age

In the study, female respondents (M = 3, IQR = 1) reported a significantly higher attitude score compared to the male respondents (M = 2, IQR = 1). This finding is comparable to the study done by Al-Naggar et al. (2015) and Loo et al. (2013) in Malaysia, which mentioned females had a better attitude toward CRC screening. One potential explanation is that women are consistently advised to have routine cervical and breast screenings either annually or biannually and this recommendation may influence their perception of colorectal cancer screening (CRCS) and increase their willingness to participate in such screenings (Champion et al., 2020).

Besides, in the present study, those with age above 20 years old (M = 3, IQR = 1) are more likely to have a better attitude toward CRCS, although the result was not statistically significant. The result is not consistent with the finding reported by numerous studies done previously (Tfaily et al., 2019; McCaffery, Wardle and Waller, 2003; Christou and Thompson, 2012), as elderly showed a significantly higher attitude toward CRCS compared to their counterparts. One

explanation for this finding may be the different population involved in the research, as those studies include a wider age range from 25 to 50 years old and above, 16 to 74 years old and 35 to 65 years old and above, respectively.

5.4.2 Attitude toward CRC screening among study fields and year of study

The results of this study show indicate that health science (M = 3, IQR = 1) university students reported a significant positive attitude toward CRC than non-health science (M = 2, IQR = 2) counterparts. This finding might due to there is a modest positive correlation was observed between individuals' level of cancer knowledge and their attitudes towards cancer (Kim and Kim, 2012). Besides that, research related to CRCS attitude on study fields parameter is limited. Hence, further investigation is necessary to substantiate the relationship between individuals' attitudes towards CRCS and their study field background.

Contrary to the findings of McCaffery, Wardle and Waller (2003), Gimeno Garcia et al. (2014) and Christou and Thompson (2012), the present study did not find any significant disparities among different education levels on the attitude of CRCS, although year 4 students still indicated a higher score pf attitude toward CRCS. A possible explanation for this might be that the attitude score range for the current study is limited, and it might lead to a potential to result in comparable scores among various groups, even in the presence of underlying disparities.

5.4.3 Attitude toward CRC screening among monthly income and family history

Furthermore, in the current study, the monthly income below RM1000 group (M = 3, IQR = 1) reported a significantly lower attitude score than RM1000-RM1499 income groups (M = 3, IQR = 0) and the latter group is a notably higher attitude score than group with income more than RM1500 (M = 2, IQR = 2). This result is comparable with the study performed by Christou and Thompson at 2012, as higher income groups have a better attitude toward CRCS. These results may be explained by the fact that people with low income might face financial barriers regarding CRCS. As mentioned in Biddell et al. (2021), the study found that 72% of low-income women in North Carolina disclosed financial barriers to screening services due to concerns about clinic appointments and treatment costs. In Malaysia, a study conducted by Suan, Mohammed and Hassan in 2016 reported that a mere 37.5% of participants expressed a willingness to personally finance an early colonoscopy, while a minority of respondents indicated an unwillingness to undergo the procedure altogether.

Apart from that, with a CRC family history (Mean score = 120, M = 3, IQR = 1) is a significant determinant toward CRCS. In the study, surveyed with a CRC family history demonstrated a higher score of attitude than their counterparts (Mean score = 93.66, M = 3, IQR = 1). This result match those observed in earlier studies (Tfaily et al., 2019; Christou and Thompson, 2012). This finding is not that surprising due to individuals who had close acquaintances affected by CRC, might possessed a higher level of comprehensive knowledge and awareness of bowel cancer and its screening test, as well as an elevated level of self-assurance

and perceived susceptibility regarding the disease, evidence by Tfaily et al. (2019) that mentioned a notable proportion of that study, namely 13%, who had a familial history of CRC exhibited a higher level of knowledge regarding CRC and also demonstrated an increased willingness to engage in screening activities, such as colonoscopy, compared to individuals without a familial history of CRC. Besides, the likelihood of individuals' obeying screening measures is expected to increase when they receive feedback from acquaintances, family members, or colleagues who have successfully recovered from colorectal cancer (West et al., 2009).

5.5 Confidence level to detect CRC warning signs

In this study, it was observed that a mere minority, specifically 10% of the participants, expressed a high level of confidence in detecting early signs of CRC. Conversely, the majority of respondents displayed varying degrees of low confidence, with 29.4% indicating no confidence at all, 32.8% expressing a lack of confidence, and 27.8% demonstrating a moderate level of confidence. This result is similar with the earlier Malaysian research done by Su et al. at 2013 and Sindhu et al. in 2019. A possible explanation for this might be that Malaysians lack adequate knowledge regarding CRC warning signs (Sindhu et al., 2019; Loo et al., 2013; Karikalan et al., 2021). In the absence of sufficient knowledge, individuals may fail to identify potential symptoms when they appear. Another possible explanation for this finding is that the majority of the respondents in the current study are from non-health science study fields. Therefore, their opportunity to expose health-related information is limited. Besides, compared

with the elderly, university students are more tend to have inadequate experience and self-efficacy in detecting warning signs.

5.5.1 The association between knowledge level of warning signs and confidence level in detecting CRC warning signs

According to the results of the current study, participants' level of knowledge about CRC warning signs significantly influenced their level of confidence in spotting those signs ($p < 0.001$*, $\chi^2 = 93.089$). This result corroborates the findings of a great deal of the previous works (Christou and Thompson, 2012; Sindhu et al., 2019; Su et al., 2013), as individuals who exhibited greater confidence in identifying warning signs of CRC demonstrated a correspondingly higher level of knowledge regarding these warning signs.

5.5.2 The association between sociodemographic characteristics and confidence level in detecting CRC warning signs

According to the results of the present study, the CRC earlier signs detection confidence was significantly impacted by gender, age, and study field. In contrast, there is no observed correlation between the year of study, monthly income, and family history. These findings exhibit partial agreement with the study conducted by Mhaidat et al. (2016), which found a significant correlation between self-reported confidence in recognising the signs and symptoms of CRC and both the study field and prior CRC experience. Despite that, these results are parallel with the findings in the current study, which carried out there are significant disparities in warning sign scores among different genders, age

groups and fields of study and a notable relationship between warning signs level and confidence level to detect CRC signs.

5.6 Knowledge-related CRC incidence age

In the current study, the results indicated that 39.4% of the surveyed from this study answered correctly in this section. In the comparison of this finding with those other studies (Mhaidat et al., 2016; Sindhu et al., 2019; Yan et al., 2017), the current study demonstrated a greater proportion of correct selections made by participants. One potential explanation for this observation is that the sample population in the present study consists of university students, who may possess higher levels of education. Besides, young population are greater familiarity with accessing information from online sources (Ofcon, 2017), in contrast to previous studies that encompass a broader age range and include elderly individuals. Another possible expiation for this result is due to the smaller sample size of this study, the percentage ratio might be affect too.

5.6.1 The association between sociodemographic characteristics and knowledge related to CRC incidence age

Furthermore, variables such as year of study, monthly income, and having a family history of CRC were found to have a significant association with the knowledge of the age at which the highest risk is encountered. This discovery is consistent with the research conducted by Mhaidat et al. (2016), which shown that both personal experience with colorectal cancer (CRC) and educational attainment had a notable influence on individuals' understanding of the age-related occurrence of CRC.

5.7 Strengths and Limitations of Study

The strength of this study lies in its pioneering nature, as it is the first of its kind to assess the awareness and knowledge of colorectal cancer (CRC), and attitudes toward CRC screening specifically among university students in rural areas of Malaysia. This focus provides valuable insights into a demographic that has received limited attention in the context of CRC awareness, knowledge and attitude. In addition, the Bowel Cancer Awareness Measure (CAM) questionnaire was used, which is a validated and standardized tool developed by the University College London and Cancer Research UK, guaranteeing the reliability and comparability of our results with broader population studies. Achieving a 100% response rate also highlights the participants' commitment and hard work, which strengthens the validity and representativeness of our findings. These strengths not only add to the existing body of awareness and knowledge on CRC and attitudes toward CRCS, but also lay the groundwork for future research and interventions aimed at improving CRC awareness, knowledge and attitude among university students in Malaysia.

Furthermore, it is important to note that no study is without limitations. Firstly, the cross-sectional study design is inherently susceptible to several biases, such as recall bias and social desirability bias. Secondly, the use of convenience sampling might limit the generalizability of the study's findings. The sample utilized in this study may not comprehensively reflect the wide range of university students in rural regions of Malaysia. Furthermore, the research applied an online self-administered survey, which poses the potential for contamination as participants may engage in information sharing or discuss their

responses with others. Lastly, the presence of non-normally distributed data can affect the reliability of statistical analyses. These limitations should be taken into account when interpreting the results and organizing future research in this field, even though they are inherent to the study's design and methodology.

5.8 Future Recommendation

Future studies are recommended to consider expanding the sample size significantly. By having a larger and more diverse group of students from different universities in Malaysia take part in the study, the researchers will be able to get data that is comparable and representative of the whole population. This enhanced diversity will allow for more robust analyses, improved generalizability, and gain insight into how different populations view on CRC awareness, knowledge and attitude toward CRCS. Besides, to ensure comprehensive insights into CRC awareness and screening attitudes among Malaysian university students, future studies should actively seek to include a more ethnically diverse participant pool. A more balanced representation of different ethnicities will facilitate more accurate assessments of CRC awareness, knowledge and attitude disparities and enable the development of targeted interventions tailored to specific cultural contexts. Lastly, it is suggested that paper surveys be used in future data collection initiatives and to administer the respondents under supervision. This approach can help mitigate potential response bias, data errors, and survey fraud. Because under supervision, participants are more likely to provide accurate and consistent responses, thus enhancing the reliability and validity of the data collected.

Chapter 6

CONCLUSION

From this study, the results revealed a good awareness of colorectal cancer (CRC) and good knowledge of CRC warning signs with a positive CRC screening attitude of a sample of university students in Univerity Tunku Abdul Rahman (UTAR), Kampar, Perak, but the knowledge level of CRC risk factors among the respondents were not up to mark. Besides, females, those individuals who were aged 20 and above, studying in health science field, had higher education level, higher monthly income and with a CRC family history showed a better awareness, knowledge of CRC and attitude toward CRCS. Therefore, it is very crucial to provide more education and spread relevant information to those people with low awareness, knowledge and attitude of CRC, especially knowledge regarding CRC risk factors, because the primary factors contributing to CRC are not limited to family history and aging. Diet, environmental and lifestyle changes can also play a significant risk factor that leads to an increase in CRC incidence, particularly among younger individuals. Furthermore, in this study, the knowledge of the warning signs is significantly associated with the confidence level in CRC earlier sign detection which might impact the duration of medical seeking. Therefore, it is critical importance to enhance and sustain awareness, knowledge, and attitude regarding CRC among students at UTAR, Kampar because an earlier diagnosis might have a better prognosis and prevention is always better than cure.

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Appendix A

UNIVERSITI TUNKU ABDUL RAHMAN DU012(A)
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Re: U/SERC/122/2023

17 May 2023

Dr Teh Lai Kuan
Head, Department of Allied Health Sciences
Faculty of Science
Universiti Tunku Abdul Rahman
Jalan Universiti, Bandar Baru Barat
31900 Kampar, Perak.

Dear Dr Teh,

Ethical Approval For Research Project/Protocol

We refer to the application for ethical approval for your students' research projects from Bachelor of Science (Honours) Dietetics programme enrolled in course UDDN3108. We are pleased to inform you that the application has been approved under Expedited Review.

The details of the research projects are as follows:

No	Research Title	Student's Name	Supervisor's Name	Approval Validity
1.	Association Between Dietary Pattern with Academic Performance and Mental Health Among UTAR Students	Lee Jun Kent	Dr Chee Huei Phing	17 May 2023 – 16 May 2024
2.	Knowledge, and Awareness of Colorectal Cancer (CRC), Risk Factors and Symptoms Among University Students UTAR, Kampar	Lim Peh Nee		
3.	Evaluation on Knowledge and Attitude Related to Anemia Among Female UTAR Undergraduate Students: A Cross-Sectional Study	Lock Yee Sin		
4.	Knowledge, Attitude and Practices (KAP) of UTAR Undergraduate Students Towards Mediterranean Diet and Its Association with Body Mass Index (BMI)	Wong En Li		

The conduct of this research is subject to the following:

(1) The participants' informed consent be obtained prior to the commencement of the research;

(2) Confidentiality of participants' personal data must be maintained; and

(3) Compliance with procedures set out in related policies of UTAR such as the UTAR Research Ethics and Code of Conduct, Code of Practice for Research Involving Humans and other related policies/guidelines.

(4) Written consent be obtained from the institution(s)/company(ies) in which the physical or/and online survey will be carried out, prior to the commencement of the research.

Kampar Campus : Jalan Universiti, Bandar Barat, 31900 Kampar, Perak Darul Ridzuan, Malaysia
Tel: (605) 468 8888 Fax: (605) 466 1313
Sungai Long Campus : Jalan Sungai Long, Bandar Sungai Long, Cheras, 43000 Kajang, Selangor Darul Ehsan, Malaysia
Tel: (603) 9086 0288 Fax: (603) 9019 8868
Website: www.utar.edu.my

Should the students collect personal data of participants in their studies, please have the participants sign the attached Personal Data Protection Statement for records.

Thank you.

Yours sincerely,

Professor Ts Dr Faidz bin Abd Rahman
Chairman
UTAR Scientific and Ethical Review Committee

c.c Dean, Faculty of Science
Director, Institute of Postgraduate Studies and Research

Kampar Campus : Jalan Universiti, Bandar Barat, 31900 Kampar, Perak Darul Ridzuan, Malaysia
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Tel: (603) 9086 0288 Fax: (603) 9019 8868
Website: www.utar.edu.my

Appendix B

Awareness, Knowledge and Attitude toward Colorectal Cancer (CRC) among students in UTAR, Kampar.

Dear respondent,

I am **Lim Peh Nee**, Year 3 Student from Bachelor of Science (Hons) Dietetics in University Tunku Abdul Rahman (UTAR) Kampar campus.

I am currently conducting my Final Year Project (FYP) entitled "**Knowledge, Attitude and Awareness of Colorectal Cancer (CRC) among University Students UTAR, Kampar**." I would like to invite you to participate in my Final Year Project(FYP) research study by completing this questionnaire.
The **purpose of my study** is to assess UTAR students' awareness of CRC, knowledge of CRC risk factors, and warning signs and attitudes regarding CRC screening.
This questionnaire consists of 5 **sections**:

Section A: Demographic Characteristics
Section B: Awareness of CRC
Section C: Knowledge of CRC Warning Signs
Section D: Confidence to Detect CRC Warning Signs
Section E: Knowledge of CRC risk factors
Section F: Knowledge related to CRC incidence age
Section G: Attitude toward CRC screening

Estimation time for completion: 5-10 minutes

If you have any inquiries regarding this questionnaire, please feel free to drop an email to me via: penny1101@1utar.my

OR

Whatsapp me through:016-5205735

NOTICE: Please consent that your participation in this survey is voluntary. All of the responses and information will only be used for academic purposes, it will be kept private and confidential.

* Indicates required question

Notice:

1. The purposes for which your personal date may be used are inclusive but not limited to: -

- For assessment of any application to UTAR
- For processing any benefits and services
- For communication purposes
- For advertorial and news
- For general administration and record purposes
- For enhancing the value of education
- For educational and related purposes consequential to UTAR
- For replying any responds to complaints and enquiries
- For the purposes of our corporate governance
- For consideration as a guarantor for UTAR staff/ student applying for his/her scholarship/ study loan

2. Your personal data may be transferred and/or disclosed to third party and/or UTAR collaborative partners including but not limited to the respective and appointed outsourcing agents for purpose of fulfilling our obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.

3. Any personal information retained by UTAR shall be destroyed and/or deleted in accordance with our retention policy applicable for us in the event such information is no longer required.

4. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal date shall not be used for political and commercial purposes.

Consent
By submitting or providing your personal data to UTAR, you had consented and agreed for your personal data to be used in accordance to the terms and conditions in the Notice and our relevant policy.

If you don not consent or subsequently withdraw your consent to the processing and disclosure of your personal data, UTAR will not be able to fulfill your obligations or to contact you or to assist you in respect of the purposes and/or for any other purposes related to the purpose.

1. UTAR email *

2. Phone Number *

   The aim of collecting your telephone number is to contact you promptly when intending to clear tl doubts regarding your response in this survey.

3. By clicking "Agree" below, you have fulfilled all the criteria and have read and understood thi consent form and agree to participate in this research study.

   Criteria:
   a) Currently a UTAR(Kampar campus) foundation & degree student
   b) Aged between 18 to 30
   c) Without a mental disorder

   Mark only one oval.

   - ◯ Agree
   - ◯ Disagree

4. By participating in this study, you agree that your participation is voluntary. Any information provided will be kept confidential and be used for academic purpose only.

   Mark only one oval.

   - ◯ Agree
   - ◯ Disagree

Personal Data Protection Notice

Please be informed that in accordance with Personal Data Protection Act 2010 ("PDPA") which came into force on 15 November 2013, University Tunku Abdul Rahman("UTAR") is hereby bound to make notice and require consent in relation to collection, recording, storage, usage and retention of personal information.

5. Acknowledgement of Notice *

Mark only one oval.

- ◯ I have been notified and that I hereby understood, consented and agreed per UTAR above notice.
- ◯ I disagree, my personal data will not be processed.

Personal Information

In this section, your personal information will be collected. Please fill in correctly. Thank you !

6. Name *

_____

7. Gender *

Mark only one oval.

- ◯ Male
- ◯ Female

8. Age *

_____

9. Nationality *

Mark only one oval.

- ◯ Malaysian
- ◯ Non-Malaysian

10. Ethnicity *

Mark only one oval.

- ◯ Malays
- ◯ Chinese
- ◯ Indians
- ◯ Other: _____

11. Course *

Mark only one oval.

- ◯ Health Science
- ◯ Non- health science

12. Year of study *

Mark only one oval.

- ◯ Foundation
- ◯ Year 1
- ◯ Year 2
- ◯ Year 3
- ◯ Year 4
- ◯ Other: _____

13. Monthly income *

Mark only one oval.

- <RM1000
- RM1000-RM1500
- RM1500-RM2000
- RM2000-Rm2500
- >RM2500

14. Family history of CRC *

Mark only one oval.

- Yes
- No

Awareness of CRC

There are 3 questions for this section. Please choose your answer based on your awareness on CRC

15. Have you ever heard about colorectal cancer (CRC)? *

Mark only one oval.

- Yes
- No
- Do not know

16. Do you think that CRC commonly found in Malaysia? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Do not know

17. Have you ever heard about any tests or examinations that are used in the detection of colon cancer? (For example: Digital rectal examination, Colonoscopy, Barium enema and so on.)

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Do not know

Knowledge of CRC signs and symptoms

Under this section, 9 questions regarding CRC signs and symptoms will be asked. Choose your answers according to your knowledge of CRC.

18. Back passage bleeding *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Do not know

19. Abdominal pain *

Mark only one oval.

- Yes
- No
- Do not know

20. Bowel habits changes *

Mark only one oval.

- Yes
- No
- Do not know

21. Bowel not emptying *

Mark only one oval.

- Yes
- No
- Do not know

22. Bloody stool *

Mark only one oval.

- Yes
- No
- Do not know

23. Pain in the back passage *

Mark only one oval.

- Yes
- No
- Do not know

24. Lump *

Mark only one oval.

- Yes
- No
- Do not know

25. Tiredness/anemia *

Mark only one oval.

- Yes
- No
- Do not know

26. Unexplained weight loss *

Mark only one oval.

- Yes
- No
- Do not know

Confidence in noticing a CRC symptoms

There is only 1 question under this section. Choose your answers based on your confidence, there are no right or wrong for this question.

27. How confident for you to identify CRC symptoms? *

Mark only one oval.

	1	2	3	4	
Not	◯	◯	◯	◯	Very confident

Knowledge of CRC risk factor

In this section, there are a total of 10 questions regarding the knowledge of CRC risk factors. You are required to rate the statement below according to the following to the Likert Scale given.

28. Drinking more than 1 unit of alcohol a day *

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly agree

29. Eating less than 5 portions of fruit and vegetables a day *

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly agree

30. Eating red or processed meat once a day or more *

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly agree

31. *

Having a diet low in fibre

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly agree

32. Being overweight or obese *

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly agree

33. Being over 70 years old *

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly agree

34. Having a close relative with bowel cancer *

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly agree

35. Doing less than 30 minutes of moderate physical activity 5 times a week *

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly agree

36. Having a bowel disease *

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly agree

37. Having diabetes *

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly agree

Age-related bowel cancer incidence

Under this section, only 1 question is asked. Please select the answers according to your knowledge

38. Who do you think is more likely to develop CRC in the next year? *

Mark only one oval.

- 20 years old
- 40 years old
- 60 years old
- CRC is not related to age

Attitude toward CRC screening

There are 3 questions for this section. Please choose your answer based on your attitude.

39. Late detection of late stage of bowel cancer has the lowest survival rate. *

Mark only one oval.

- Agree
- Disagree
- Do not know

40. CRC screening can help in detecting cancer early and cause treatment more effective. *

Mark only one oval.

- Agree
- Disagree
- Do not know

41. You are willing to have a screening test for bowel cancer, even without any symptoms? *

Mark only one oval.

- ◯ Agree
- ◯ Disagree
- ◯ Do not know

Thank you !

Appendix C

Normality Test in SPSS Software

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Awareness_score	.284	196	.000	.732	196	.000
WarningSignKowledge_score	.129	196	.000	.895	196	.000
RiskFactorKowledge_score	.109	196	.000	.925	196	.000
Attitude_score	.356	196	.000	.719	196	.000

a. Lilliefors Significance Correction

Appendix D

Universiti Tunku Abdul Rahman			
Form Title : Supervisor's Comments on Originality Report Generated by Turnitin for Submission of Final Year Project Report (for Undergraduate Programmes)			
Form Number: FM-IAD-005	Rev No.: 1	Effective Date: 3/10/2019	Page No.: 1of 1

UTAR
UNIVERSITI TUNKU ABDUL RAHMAN
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FACULTY OF SCIENCE

Full Name(s) of Candidate(s)	Lim Peh Nee
ID Number(s)	20ADB04113
Programme / Course	Bachelor of Science (Honours) Dietetics
Title of Final Year Project	Awareness, Knowledge and Attitude toward Colorectal Cancer among Student in Universiti Tunku Abdul Rahman, Kampar, Perak.

Similarity	**Supervisor's Comments (Compulsory if parameters of originality exceeds the limits approved by UTAR)**
Overall similarity index: 13 **%** **Similarity by source** Internet Sources: 11 % Publications: 8 % Student Papers: N/A %	OK
Number of individual sources listed of more than 3% similarity: 0	OK

Parameters of originality required and limits approved by UTAR are as follows:
(i) Overall similarity index is 20% and below, and
(ii) Matching of individual sources listed must be less than 3% each, and
(iii) Matching texts in continuous block must not exceed 8 words
Note: Parameters (i) – (ii) shall exclude quotes, bibliography and text matches which are less than 8 words.

Note Supervisor/Candidate(s) is/are required to provide softcopy of full set of the originality report to Faculty/Institute

Based on the above results, I hereby declare that I am satisfied with the originality of the Final Year Project Report submitted by my student(s) as named above.

Signature of Supervisor
Name: DR. CHEG KWEE PHANG
Date: 12/9/2023

Signature of Co-Supervisor
Name: _____
Date: _____

Appendix E

Turnitin Originality Report

Processed on: 11-Sep-2023 00:58 +08
ID: 2159748255
Word Count: 16986
Submitted: 3

Awareness, Knowledge and Attitude toward Colorectal Cancer among Students in Universiti Tunku Abdul Rahman, Kampar, Perak. By Peh Nee Lim

Chee Hp
12/9/2023 @ 12pm

Similarity Index	Similarity by Source
13%	Internet Sources: 11% Publications: 8% Student Papers: N/A

1% match (Internet from 20-Apr-2023)
https://www.researchgate.net/publication/339984628_Awareness_of_Colorectal_Cancer_among_the_Urban_Population_in_the_Klang_Valley

1% match (Internet from 30-Mar-2023)
http://eprints.utar.edu.my/4928/1/fyp_2022_DT_THN.pdf

1% match (Internet from 04-Sep-2019)
https://link.springer.com/article/10.1007%2Fs13187-016-1142-y

1% match (Internet from 23-Jun-2023)
https://files.eric.ed.gov/fulltext/EJ1365276.pdf

< 1% match (Internet from 16-Mar-2023)
https://www.researchgate.net/publication/322129596_Knowledge_Attitudes_Preventive_Practices_and_Screening_Intention_about_Colorectal_C

< 1% match (Internet from 18-May-2023)
https://www.researchgate.net/figure/Participants-socio-demographic-data_tbl1_336893489

< 1% match (Internet from 24-Feb-2023)
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