AWARENESS OF COLORECTAL CANCER AND BARRIER OF ITS SCREENING AMONG YOUNG ADULTS IN HEALTH CAMPUS OF UNIVERSITI SAINS MALAYSIA

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SCHOOL OF HEALTH SCIENCES
UNIVERSITI SAINS MALAYSIA

2024

AWARENESS OF COLORECTAL CANCER AND BARRIER OF ITS SCREENING AMONG YOUNG ADULTS IN HEALTH CAMPUS OF UNIVERSITI SAINS MALAYSIA

by

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Dissertation submitted in partial fulfillment of
the requirements for the degree of
Bachelor in Nursing with Honours

August 2024

CERTIFICATE

This is to certify that the dissertation entitled AWARENESS OF COLORECTAL CANCER AND BARRIER OF ITS SCREENING AMONG YOUNG ADULTS IN HEALTH CAMPUS OF UNIVERSITI SAINS MALAYSIA is the bona fide record of research work done by Ms DING HUI TIN during the period from October 2023 to June 2025 under my supervision. I have read this dissertation and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation to be submitted in partial fulfilment for the degree of Bachelor of Nursing (Honours)

DECLARATION

I hereby declare that this dissertation is the result of my own investigation, except where otherwise stated and duly acknowledged. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at Universiti Sains Malaysia or other institutions. I grant Universiti Sains Malaysia the right to use the dissertation for teaching, research and promotional purposes.

ACKNOWLEDGEMENTS

First and foremost, I would like to sincerely thank and appreciate my supervisor, Dr. Norhasmah Mohd Zain, for helping me throughout the process of planning the research proposal until completing the dissertation. I am indeed in good luck that I was able to get a knowledgeable and helpful supervisor who gives me excellent supervision by responding to all my queries on time and providing suggestions promptly. Apart from that, she also helped me a lot in preparing dissertation, especially for the part with the grammar mistake to ensure that I was on the right track and did not delay my work.

Furthermore, I want to thank my parents for their full support and encouragement in completing this dissertation. Without their support, I would not be able to complete this dissertation. In addition, I also want to thank all the participants for cooperating with me during the data collection periods. Lastly, I would like to thank all my friends who gave me a lot of helping hands while completing this dissertation for their direct and indirect help.

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LIST OF ABBREVIATION

CRC = Colorectal Cancer

FOBT = Faecal Occult Blood Test

iFOBT = Immunochemical Faecal Occult Blood Test

Bowel CAM = Bowel Cancer Awareness Measure

UiTM = Universiti Teknologi Mara

ASR = Age Standardized Incidence Rate

SSP = Sessile Serrated Polyps

TSA = Traditional Serrated Adenomas

HBM = Health Belief Model

AWARENESS OF COLORECTAL CANCER AND BARRIER OF ITS SCREENING AMONG YOUNG ADULTS IN HEALTH CAMPUS OF UNIVERSITI SAINS MALAYSIA

ABSTRAK

Kanser kolorektal (CRC) telah menjadi salah satu punca utama kematian di seluruh dunia walaupun ia merupakan salah satu kanser yang boleh dicegah dan dirawat jika diagnosis awal dilakukan. Peningkatan dalam kejadian CRC telah mendorong banyak kajian dijalankan untuk mengkaji pengetahuan, kesedaran dan halangan kepada penyaringan berkenaan CRC di peringkat global. Kebanyakan kajian yang dilakukan di Malaysia mengkaji pengetahuan dan kesedaran tentang faktor risiko dan tanda-tanda amaran kanser kolorektal, namun tiada kajian yang menyiasat kesedaran CRC dan potensi halangan terhadap saringannya dalam kalangan pelajar universiti. Justeru, kajian keratan rentas telah dijalankan mulai Januari 2024 dan tamat pada Ogos 2024 untuk mengetahui tahap kesedaran kanser kolorektal dan halangan saringannya dalam kalangan golongan dewasa muda di Kampus Kesihatan Universiti Sains Malaysia. Seramai 228 pelajar Kampus Kesihatan Universiti Sains Malaysia telah menyertai kajian ini dengan menjawab soal selidik melalui pautan *Google Form* yang dihantar melalui e-mel. Data yang dikumpul dianalisis melalui SPSS versi 27.0. Faktor sosiodemografi, tahap kesedaran CRC dan potensi halangan dalam mendapatkan saringan CRC dibentangkan dalam statistik deskriptif. Selain itu, hubungan antara faktor sosiodemografi dan kesedaran CRC telah dianalisis dengan menggunakan *Pearson's Chi Square*. Kebanyakan pelajar Universiti Sains Malaysia mempunyai pengetahuan yang saksama tentang CRC. Terdapat perkaitan yang signifikan antara tahun pengajian dan kursus pengajian dengan

kesedaran tentang CRC. Walaubagaimanapun, tiada perkaitan yang signifikan antara umur, jantina, etnik, pendapatan bulanan keluarga, sejarah keluarga dengan kanser dan sumber maklumat kanser kolorektal dengan kesedaran tentang CRC. Selain itu, halangan pemeriksaan CRC di kalangan orang dewasa muda juga ditangani di mana, halangan umum yang paling dipersetujui adalah pesakit berpendapat tidak ada keperluan untuk membuat saringan untuk CRC, halangan kolonoskopi yang paling dipersetujui untuk pemeriksaan kolonoskopi adalah mahal dan halangan ujian darah najis okulta (FOBT) yang paling dipersetujui adalah peserta tidak tahu di mana untuk mendapatkan saringan FOBT. Kesedaran tentang CRC dan pilihan saringannya harus ditingkatkan supaya lebih ramai orang mengetahui CRC dan seterusnya membolehkan orang ramai mengambil rawatan yang sesuai untuk CRC.

AWARENESS OF COLORECTAL CANCER AND BARRIER OF ITS SCREENING AMONG YOUNG ADULTS IN HEALTH CAMPUS OF UNIVERSITI SAINS MALAYSIA

ABSTRACT

Colorectal cancer (CRC) has been one of the leading causes of death worldwide despite being one of the preventable and treatable cancers upon early diagnosis. The increase in the incidence of CRC has led to numerous studies being conducted to study the knowledge, awareness and barrier to screening regarding CRC globally. Most of the studies done in Malaysia studies the knowledge and awareness of risk factors and warning signs of CRC, however there are no study that investigates the awareness of CRC and potential barrier to its screening have been done among university students. Thus, cross-sectional studies have been carried out from January 2024 till August 2024 to determine the level of awareness of colorectal cancer and the barrier of its screening among young adults in Health Campus of Universiti Sains Malaysia. 228 students of Health Campus of Universiti Sains Malaysia participated in this study by answering the questionnaire through the link of Google Form that is sent via email. The data collected was analysed through SPSS version 27.0. Sociodemographic factors, level of awareness of CRC and potential barrier in getting CRC screening were presented in descriptive statistics. Besides, the association between sociodemographic factor and awareness of CRC was analysed by Pearson's Chi Square. Unexpectedly, most of the student of Universiti Sains Malaysia have fair knowledge of CRC. There are significant association between year of study and course of study with awareness of CRC. However, there is no significant association between age, gender, ethnicity, family's monthly income, family history with

cancer and source of information on CRC with awareness of CRC. Besides that, the barrier to CRC screening among young adults is also addressed, the most common general barrier is the patient thinks it is not necessary to screen for CRC, the most common colonoscopy barrier is colonoscopy screening is expensive and the most common faecal occult blood test (FOBT) barrier is participants do not know where to get FOBT screening. The awareness of CRC and its screening options should be increased so that more people know about CRC and thus enable the people to take appropriate treatment for CRC.

CHAPTER 1 INTRODUCTION

This chapter consists of the background of the study, problem statements, research questions, research objectives, research hypothesis, conceptual and operational definition, and significance of the study.

1.1 Background of the Study

Cancer which is also known as malignant tumours or neoplasms is the abnormal growth of cells which will then undergo metastasis where they invade and spread to other parts of the body (National Cancer Institute, 2021). Cancer which accounted for nearly 10 million deaths in 2020 is the leading cause of deaths worldwide, where the most common causes of cancer death were lung cancer (1.80 million deaths), colorectal and rectum cancer (916 000 deaths), liver cancer (830 000 deaths), stomach cancer (769 000 deaths) and breast cancer (685 000 deaths) (World Health Organization, 2022).

Colorectal cancer (CRC) is the second leading cause of deaths worldwide due to cancer-related issues where 1.9 million new cases of CRC are reported, and 930, 000 deaths are estimated to occur in 2020 (World Health Organization, 2023). Meanwhile, in Malaysia, CRC is the most common cancer (16.9%) and the second most common cancer (10.7%) among the male and female population respectively (Malaysia National Cancer Registry, 2019). According to the Ministry of Health Malaysia (2021), Age Standardized Incidence Rate (ASR) of the CRC, is higher among the male population (24.16 per 100, 000) when compared to the women (18.14 per 100, 000) and is highest among Chinese (27.35 per 100, 000) when compared to Malay (18.95 per 100, 000) and Indian (17.55 per 100, 000).

CRCs are more common among people with the age greater than 45, as the risk of CRC increases together with age, although CRC can occur in any stage of life (Centers for Disease Control and Prevention, 2022). According to Keivanlou et al. (2023), CRC occurs due to the interaction between hereditary, environmental, and individual factors. There is a strong linkage between modifiable lifestyle factors such as diet, physical activity, and smoking with CRC, which contributes to a considerable proportion of CRC (Yu et al., 2022). The risk of CRC increases when there is a lack of regular physical activity, low intake of fruits, vegetables, and fibre, high intake of fats and red or processed meat, overweight or obese, high intake of alcohol and usage of tobacco (Finlay, 2023).

Early stages of CRC are asymptomatic, where the individuals with CRC will experience unusual fatigue or unexplained anaemia and unexplained weight loss (Schult et al., 2021). When the tumours are in an advanced state, symptoms such as change in bowel habits (diarrhoea or constipation that lasts more than a few weeks), rectal bleeding (back passage bleeding) or blood in stool, lump in back passage or abdomen, tenesmus (urge for bathroom even after emptying the bowel), and abdominal or back passage pain can be observed (Cancer Research UK, 2023). According to Cancer Research UK (2023) also, CRC can block the bowel thus called bowel obstruction, where the individual might feel cramping pain in the abdomen, bloating, experience constipation and inability to pass wind.

CRC surveillance and CRC screening, which is recommended for those with the age between 45 to 70 years old, can reduce the morbidity and mortality rate of CRC (Zheng et al., 2023). Malaysia's CRC screening guidelines recommend that primary clinicians conduct opportunistic screening by the usage of an immunochemical faecal occult blood test (iFOBT) on asymptomatic clients with the age of 45 to 70 years old and do not have a family history of CRC (Ministry of Health Malaysia, 2021). Despite the

guidance from the Ministry of Health in the CRC screening pathway and the launching of iFOBT which is used to detect blood in stool, the common sign of CRC, less than 1% of eligible Malaysian populations have been screened even though there is increasing trend of screening uptake over years (Schliemann et al., 2022).

According to previous research done in Malaysia by Hatamian et al. (2021), the early diagnosis and barriers of CRC screening that were identified were lack of awareness, fear of the result, the belief that screening is not needed since they didn't experience any symptoms or didn't have a family history of having cancer, embarrassment from a colonoscopy procedure and fear of painful colonoscopy procedure. Besides that, according to Schliemann et al. (2022), factors that contribute to low CRC screening uptake were negative beliefs about cancer, financial concerns, and the absence of a doctor's recommendation.

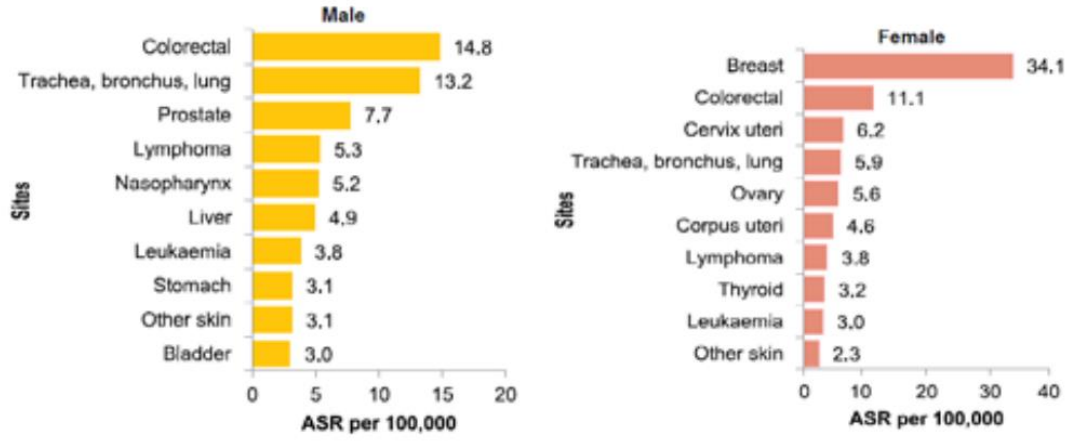

Figure 1. 1 Ten most frequent cancers in males and females, Malaysia, 2012-2016

(Source: Ministry of Health Malaysia, 2021)

1.2 Problem Statements

Colorectal cancer (CRC) has been one of the leading causes of death worldwide despite being one of the preventable and treatable cancers upon early diagnosis, however, more than 70% of CRC patients in Malaysia are diagnosed at a later stage namely stage III or stage IV where the survival rate is lower when compared to stage I and stage II (Ministry of Health Malaysia, 2021). Early detection of cancer needs to be done to increase the chance of survival, and it can be done through screening and early diagnosis (World Health Organization, 2023).

The increase in the incidence of CRC has led to numerous studies being conducted to study the knowledge, awareness and barrier to screening regarding CRC globally. However, most of the global studies are more focused either on knowledge and awareness of CRC among certain populations or on knowledge and barriers of screening toward colorectal cancer screening. While in Malaysia, similarly, the research was done to study the knowledge and awareness of risk factors and warning signs of colorectal cancer. It is observed that there are several issues and barriers have been identified to affect the early diagnosis and effectiveness of CRC screening among Malaysian citizens, namely, lack of awareness regarding colorectal cancer screening, stigma of completing immunochemical faecal occult blood test (iFOBT), lack of patient commitment, poor access to colonoscopy care, and follow up and data monitoring issues (Hatamian et al., 2021).

Although there are decreases in the incidence rates of CRC adults, the incidence rates of CRC doubled among adults with the age smaller than 50 years old in the world (Dharwadkar et al., 2022). Studies on awareness of colorectal cancer among nursing students has been done in Universiti Teknologi Mara (UiTM) Puncak Alam however so far, no study investigates the awareness of CRC and barrier to its screening have been

done among university students. Thus, this study aims to determine the awareness of colorectal cancer and the barrier of its screening among young adults in Health Campus of Universiti Sains Malaysia.

1.3 Research Questions

1. What is the level of awareness of colorectal cancer among young adults in Health Campus of Universiti Sains Malaysia?
2. What is the potential barrier in getting colorectal cancer screening among young adults in Health Campus of Universiti Sains Malaysia?
3. Is there any association between sociodemographic factors and awareness of colorectal cancer among young adults in Health Campus of Universiti Sains Malaysia?

1.4 Research Objectives

1.4.1 General Objective

To determine the awareness of colorectal cancer and barrier of its screening among young adults in Health Campus of Universiti Sains Malaysia.

1.4.2 Specific Objective

1. To identify the awareness of colorectal cancer among young adults in Health Campus of Universiti Sains Malaysia.
2. To identify potential barrier in getting colorectal cancer screening among young adults in Health Campus of Universiti Sains Malaysia.
3. To determine the association between sociodemographic factors and awareness of colorectal cancer among young adults in Health Campus of Universiti Sains Malaysia.

1.5 Research Hypothesis

H_0 : There is no association between sociodemographic factors and awareness of colorectal cancer of the young adults in Health Campus of Universiti Sains Malaysia

H_A : There is association between sociodemographic factors and awareness of colorectal cancer of the young adults in Health Campus of Universiti Sains Malaysia

1.6 Significance of the Study

Through this study, awareness of colorectal cancer and the barrier of its screening among young adults in Health Campus of Universiti Sains Malaysia has been addressed. This study increased the awareness of colorectal cancer and disclosed factor affecting the participation in colorectal cancer screening among young adults in Health Campus of Universiti Sains Malaysia. The awareness of colorectal cancer have a positive influence on an individual's decisions in participation in prevention of colorectal cancer and behaviours in colorectal cancer screening. This study aids in the intervention and implementation of solutions and strategies to overcome the barrier of colorectal screening and improve the participation of citizens in colorectal cancer screening. Early diagnoses of colorectal cancer through colorectal cancer screening greatly increase the chances of survival rate of patients with colorectal cancer. Besides that, the disclosure of colorectal cancer to participants who are future health workers is directly and indirectly beneficial to both the participants and their future clients as well.

1.7 Conceptual and Operational Definitions

TERMS	CONCEPTUAL DEFINITION	OPERATIONAL DEFINITION
Awareness	Awareness is perceiving, knowing, feeling, or being conscious of events, objects, thoughts, emotions, or sensory patterns (Hasa, 2016).	The Oxford Dictionary defines awareness as "knowledge or perception of a situation or fact." In this study, awareness refers to the adopted Bowel Cancer Awareness Measure (Bowel CAM) question, including one on age at risk, 9 prompted question on awareness of warning signs, and 10 prompted questions on risk factors.
Cancer	Cancer is a disease which occurs when abnormal body cell grows and multiply uncontrollably and metastases where they eventually spread to other parts of the body (National Cancer Institute, 2021).	In this case, the cancer that is discussed is colorectal cancer which is also known as colon cancer or rectal cancer. It is a disease where there is abnormal growth of cells that begin in a certain part of the large intestine, also known as the colon. Colorectal cancer often begins as small clumps of cells named polyps inside the colon. Since polyps don't cause symptoms, thus screening tests should be done regularly to enable

		early diagnosis and early treatment of colorectal cancer (Mayo Clinic, 2023).
Barrier in Colorectal Cancer Screening	Barrier is a natural formation or structure that prevents or hinders movement or action (Merriam-Webster Dictionary, 2023). Barriers in colorectal cancer screening are the characteristics of the colorectal cancer screening that would prevent the participant from taking part in the colorectal cancer screening (Anthony, 2015)	In this study, the barrier of colorectal cancer screening will be measured in Part 3 Colorectal Cancer Screening Barrier which is adopted from Imran et al. (2023) and consists of a section about the general barrier, colonoscopy-related barrier, and faecal occult blood test (FOBT) related barrier.
Young Adults	According to an explanation by Erik Erikson in stages of human development, a young adult ranges from the ages of 20 to 40 (Mcleod, 2023).	In this study, young adults would be undergraduate or postgraduate students in Health Campus of Universiti Sains Malaysia, whose ages is ranging from 20-40 years old.

CHAPTER 2 LITERATURE REVIEW

This chapter generally reviews the current literature related to awareness of colorectal cancer (CRC) and the barrier of its screening among young adults in Health Campus of Universiti Sains Malaysia. This chapter will also describe the theoretical and conceptual framework used in this study.

2.1 Colorectal Cancer

Colorectal cancer (CRC) which is also known as colon cancer or rectal cancer, starts growing as polyps in the inner lining of the colon or rectum and eventually turns into cancer after several years (Lotfollahzadeh, 2023). The chances of cancer developing from polyps depend on the type of polyps found, where polyps with higher risk of colorectal cancer are adenomatous polyps, sessile serrated polyps (SSP) and traditional serrated adenomas (TSA) while polyps which are not pre-cancerous are hyperplastic polyps and inflammatory polyps and (Meseeha, 2023).

The most common type of colorectal cancer are adenocarcinomas where the abnormalities of cells start in cells that are responsible in the production of mucus and lubrication of the inside of the colon and rectum (National Cancer Institute, 2023). Other less common types of tumours that also begin in the colon and rectum are carcinoid tumours, which starts in the cells that are responsible for hormone production in the colon and gastrointestinal stromal tumours, which occur in soft tissue sarcoma which it is available in the gastrointestinal tract but are rare in the colon.

Treatments for colorectal cancer are determined based on the types and progressions of the cancer and the person’s medical history, where early detection of colorectal cancer enables better treatment and outcome (World Health Organization,

2023). Computed tomography or magnetic resonance imaging of the abdomen, pelvic area or chest will be done to see the progression of cancer and to determine the stages of colorectal cancer. The stages of colon cancer are divided into 5 stages, where stage 0 represents cancer on the innermost layer of the intestine, stage I is cancer in the inner layer of the colon, stage II is cancer that spreads through the muscle of the colon, stage III is cancer that spread to the lymph node and stage IV is cancer that spread to other organs outside the colon.

The treatment for colorectal cancer includes surgery, the removal of cancer cells; radiotherapy, the usage of high-powered energy beams to kill cancer cells; chemotherapy, targeted drug therapy, the usage of the targeted drugs to focus on abnormalities of cancer cells; and immunotherapy, enabling the immune system to attack the cancer cell (Mayo Clinic, 2022). After those treatments, regular follow-up visits and surveillance such as physical examination, blood tests and imaging studies should be carried out to enable the physician to monitor for any recurrence or development of new cancer (World Health Organization, 2023).

Colorectal cancer can be prevented through the practice of a healthy lifestyle which includes regular and adequate physical activity, limitation of consumption of alcohol, maintenance of healthy weight, consumption of a diet rich in fruits and vegetables and low consumption of a diet with red and processed meat and not smoking tobacco (World Health Organization, 2023). Besides that, colorectal cancer screening seems to be able to reduce the incidence and mortality cases of colorectal cancer through early detection of colorectal cancer and early removal of polyps, the precancerous growths (Helsingen & Kalager, 2022).

It is suggested that screening for colorectal cancer starts at the age as early as 45 years old which is most recommended by major colorectal cancer guidelines (Centers for Disease Control and Prevention, 2022). Test for colorectal cancer screening include faecal test which detects the hidden blood in stool; sigmoidoscopy and colonoscopy, the examination of the inside of the colon; colon capsule endoscopy, ingestion of capsule containing video camera to obtain images of the colon; and computed tomographic colonography or virtual colonoscopy, usage of computed tomographic data to construct the image of bowel mucosa and to detect polyps (Ministry of Health et al., 2017).

Numerous studies observed the knowledge and awareness of colorectal cancer where it reported that the knowledge and awareness are low among the public (Warner et al., 2023 & Xu et al., 2022 & Alaqel et al. 2021). Besides that, several studies observe the knowledge and awareness together with a barrier in colorectal cancer screening (Hatamian et al., 2021). Among those, only one research studies the correlation between knowledge and the barrier of screening (Elshami et al., 2019). According to Imran et al. (2016), half of the students obtain information regarding colorectal cancer through curriculum, which shows that the role of social media and public health is still insufficient in raising awareness of the population.

2.2 Awareness of Colorectal Cancer

Numerous studies observe the knowledge and awareness of colorectal cancer where generally, the knowledge and awareness are low among the public. According to Xu et al. (2022), it is shown the majority of the participants had limited awareness of the colorectal cancer risk factors and colorectal cancer screening, which is aligned with the research done in Pakistan, where only 59.9% of college students knew the risk factor of colorectal cancer (Hussain et al., 2020). In the study done by Nasaif and Qallaf (2018), it

was also found that there is poor knowledge and awareness among Bahrainis regarding the signs and symptoms of colorectal cancer.

According to Lamees et al. (2021), most participants have good knowledge about the symptoms of colon cancer especially about the presence of blood in stool and abdominal pain. However, according to Imran et al. (2023), it is shown that the participant has low knowledge and awareness of colorectal cancer where only one-third of the participants managed to identify the main warning signs of colorectal cancer, which is the presence of blood in stool, chronic abdominal pain, fever, and unexplained weight loss. This is further shown in the studies done by Alsayed et al. (2019), where it is found that only 21.6% of participants are aware of the symptoms of colorectal cancer which include blood in stool, weight loss, and abdominal pain. According to Mhaidat et al. (2018), it was found that the feeling of incomplete bowel emptying was the least recognized symptom, as the participants mistook that the feeling of incomplete bowel emptying was due to the consequence of constipation.

According to Gu et al. (2018), 46% of the participant claim that common risk factors of colorectal cancer, include, smoking, drinking alcohol, being overweight or obese with a body mass index greater than 30.0kg/m^2, physical inactivity, having a low intake of vegetable, low fruit intake, and having a high intake of red and processed meat. According to Lucafò et al. (2021), the main risk factors identified are genetic and family history of colorectal cancer and inflammatory bowel disease. Stress was chosen by 61.9% of the participants as the risk factor for colorectal cancer and then followed by a family history of colorectal cancer (50.3%) and the usage of tobacco (40.4%) (Alaqel et al., 2021). According to studies done by Imran et al. (2023), less than half of the participants attributed the risk factor of colorectal cancer to the increase in age, presence of family

history of colorectal cancer, presence of chronic colon infection, and lack of physical activity.

Participants with low awareness are unable to identify cancer risk factors, thus health promotion or awareness programs regarding colorectal cancer should be done (Xu et al., 2022). Undergraduate students, especially medical-related specialities students, should be encouraged to spread their knowledge to their family members and people surrounding them as well as other students. These should be done to increase the participation of the high-risk participants in screening colorectal cancer and thus enable early detection of colorectal cancer. In these studies, the awareness of colorectal cancer including the opinion of the participant on the "possible age of developing colorectal cancer", "confidence in detecting the signs and symptoms of colorectal cancer", "sign and symptoms of colorectal cancer" and "risk factor of colorectal cancer" was observed.

2.3 Potential Barrier of the Colorectal Cancer Screening

Several research have been done previously to investigates the barrier to the colorectal cancer screening among public communities, but only two of the research are carried out in Malaysia. The barrier that hinders the action of undergoing colorectal cancer screening should be identified as soon as possible so that the barrier can be solved, thus encouraging the high-risk population to undergo colorectal cancer screening. According to Alsmkari et al. (2017), 46.8% confessed that they would not undergo a screening test even if they had any signs and symptoms or risk factors, whereas 26% of the participants chose colonoscopy as the preferred screening method. Aligned with it, Ahmed and Alrashidi (2020) state that 83.59% of the respondents have chosen colonoscopy as a screening tool as well, however, 58.59% of the participants claimed that they would undergo the screening only if they did experience the symptom.

The factor that encourages participation in colorectal cancer screening includes awareness of colorectal cancer screening while the barrier to colorectal cancer screening would be the negative attitude and belief of the participant which include fear or denial from knowing the results of colorectal screening, embarrassment or shame, inability to access to medical checkups, and financial barriers (Basch et al., 2016). Besides that, the most barrier reported in the study of Alaqel et al. (2021) was the fear of diagnosis or denial of colorectal cancer and delay for administerial reasons. In the study done by Imran et al. (2023), it was reported that poor awareness about FOBT might be the reason why most of the participants stayed neutral (52.3%) towards the items which asked about the FOBT barrier.

According to Hatamian et al. (2021), lack of knowledge of colorectal cancer screening among Malaysians such as the unknown purpose of screening for colorectal cancer, inability to distinguish the purpose of screening test from any other tests where screening is done on a healthy person, would lead to low participation of colorectal cancer screening. The poor knowledge of screening for colorectal cancer together with the lack of belief in the benefit of screening is the primary reason the respondents are not willing to undergo colorectal screening (Khayyat & Ibrahim, 2014). Although 59.9% claim that colorectal cancer is a serious disease and 65.9% of the participants knew that colorectal cancer can be cured only if detection of colorectal cancer is done in the early stage, almost half of the participants confess that they never heard about any test or examination that can be used to detect colorectal cancer (Huang et al, 2021). This is aligned with studies done in Singapore and Saudi, where the awareness of colorectal cancer screening is poor (Imran et al., 2023).

Participants confessed that they were demotivated to do colorectal cancer screening since they didn’t know what test of colorectal cancer was available, where to

do the test and how to do the test since they did not understand the procedure (Bie & Brodersen, 2018). According to the studies done in Saudi Arabia, it is reported that one of the most common barriers would be a lack of physician recommendations about colorectal screening for high-risk patients (Alduraywish et al., 2020). Aligned with the study done by Al-Naggar et al. (2015), the barrier of participation of FOBT (35.3%) and flexible sigmoidoscopy (28.3%) was that there is no recommendation by the physician and 40.6% of the participants think that it is not necessary to do the screening since they do not have any health problem. According to research done by Al-Naggar et al. (2015), it is found that Malaysians have poor knowledge of colorectal cancer where the participants had no idea about what colonoscopy (94.1%) and FOBT (96.8%) is and only 5.9% of the participants know what flexible sigmoidoscopy is. Yong et al. (2016) reported that only 24.8% of the participants were aware of the colorectal cancer screening technique such as colonoscopy or FOBT.

Efforts such as educational and screening promotion should be made to address the misbelief toward colorectal cancer and it's screening thus removing the obstacles or barriers to colorectal cancer screening. This should be done to encourage participation in colorectal cancer screening which enables early detection of colorectal cancer and higher chances of survival. Besides that, encouragement of discussions between patients and healthcare providers that are capable to advocate for patients, to undergo colorectal cancer screening can enhance the participation of those with a high risk of colorectal cancer. Since there are only two research that have been done to identify the barrier of colorectal screening among public communities in Malaysia in 2012 and 2015, thus in these studies, the barrier of colorectal screening will be investigated among the young adults in Health Campus of Universiti Sains Malaysia.

2.4 Association Between the Sociodemographic Factor with the Awareness of Colorectal Cancer

Numerous studies determine the association between sociodemographic factors with the awareness of colorectal cancer. According to the studies done by Abdulmenan et al. (2021) and Selim et al. (2021), it is identified that there is an association between the awareness of CRC of participants with the sociodemographic factors such as level of education, family history of CRC, gender, and family's monthly income. According to Lamees et al. (2021), the participants with sociodemographic factors of female, high age and have a high educational background have higher knowledge of colorectal cancer.

Zubaidi et al. (2015) found that participants who are greater in age, especially those with the age greater than 50 years old, had better knowledge and awareness about colorectal cancer and the screening methods. In a study done by Mhaidat et al. (2018), participants with the age greater than 20 years old have higher awareness scores when compared to those with the age smaller than 20 years old. Higher awareness among participants who are older than 20 years old, may be because the higher age of participants indicates them having a higher educational level during their studying courses.

According to Lamees et al. (2021), female participants are reported to not having a higher score of CRC awareness and there is no correlation between gender and level of education, especially considering risk factors and symptoms. According to Xu et al. (2022), this might be due to the ratio of the male-to-female ratio being 1.5, which it reflects the gender ratio of CRC patients in China. However, according to Alsmkari et al. (2017), it is found that gender influences the level of knowledge where females are more knowledgeable in the aspect of signs and symptoms and risk factors of colorectal cancer, and when to undergo screening for colorectal cancer. The difference in the awareness of

CRC between genders might be because females outnumbered the males in those studies or there might be early exposure of females to health education that is related to cancer, or the females obtain information due to concern on reproductive health or females having desired discussion since they are giving more attention to their health (Abdulmenan et al., 2021)

According to Sindhu (2019), it is observed that there is no significant difference between the awareness of CRC among ethnicity such as Malay, Chinese, Indian and others population. However, according to Loh et al. (2013), it is found that Chinese had poorer recognition of CRC symptoms when compared to other ethnic. This might occur because the sample size of Chinese ethnicity in studies done by Sindhu (2019) is too small.

Participants with higher levels of education are observed to have higher awareness than those with lower levels of education (Selim et al., 2021). According to Alaqel et al. (2021) where the participants consist of those who are illiterate, primary secondary, university and postgraduate, the higher the level of education of the participants, the higher the level of knowledge that is related to colorectal cancer. Studies done in Jordan among medical and non-medical related students at a university show that the association between the participant's education group with colorectal cancer awareness for warning signs and risk factors of colorectal cancer is most significant (Mhaidat et al., 2018). According to Sindhu (2019), the study in Malaysia shows that participants who received tertiary education had a higher awareness of warning signs and symptoms of CRC when compared to participants who did not receive any primary or secondary education.

Besides that, it is shown that the groups with a lower level of financial support had deficient CRC awareness which may be due to inability to access knowledge or due

to the absence of financial support (Xu et al., 2022). According to the studies that are done in South-West Ethiopia and Malaysia, participants with high income had higher levels of awareness of CRC when compared with those who had low income (Yan et al., 2017). It might be because the participant who earns better monthly income are feeling more satisfied with their income, thus they have extra time and effort to initiate gathering information to take care of their health on social media such as YouTube and Instagram.

Participants with a CRC family history where their family member or friend has had colorectal cancer are observed to have higher awareness than those without a family history of CRC family history (Selim et al., 2021). In the studies done by Mhaidat et al. (2018) and Imran et al. (2016), it is shown that students who had previous experience with cancer are more aware of signs and symptoms of colorectal cancer but not the risk factors and have more confidence in noticing the cancer symptom. This might be due to the chances of them hearing about colorectal cancer from their family member or friends thus increasing their awareness of colorectal cancer (Al-Naggar et al., 2015). However, according to Sindhu (2019), there is no significant difference between participants who experienced cancer by themselves or through relatives or friends with the awareness of colorectal cancer. This might be due to participants refusing to learn more about the disease or still in the stage of denial.

Thus, in this studies, sociodemographic factor studied are the “age”, “gender”, “ethnicity”, “level of education”, “family’s monthly income”, and “family history of cancer”.

2.5 Theoretical and Conceptual Framework of the Study

The theoretical framework that is used are Health Belief Model (HBM) where health behaviours are predicted and evaluated for prevention, symptoms, and diagnoses of disease as well as medical adherence (Champion & Skinner, 2008). According to HBM, for an individual to act in the pretence of avoiding a disease, the individual should have a perceived threat which consists of perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. An individual would only take preventive action if he or she believes that the probability of getting or being susceptible to the disease is high and that the disease will create serious consequences and impact on the individual's life. The individual will only perform the preventive action if they know how the action can benefit them by reducing the susceptibility or severity of the situation. The perceived barrier which is opposed to perceived benefit is one of the important psychological barriers that will somehow affect and discourage the preventive action of an individual.

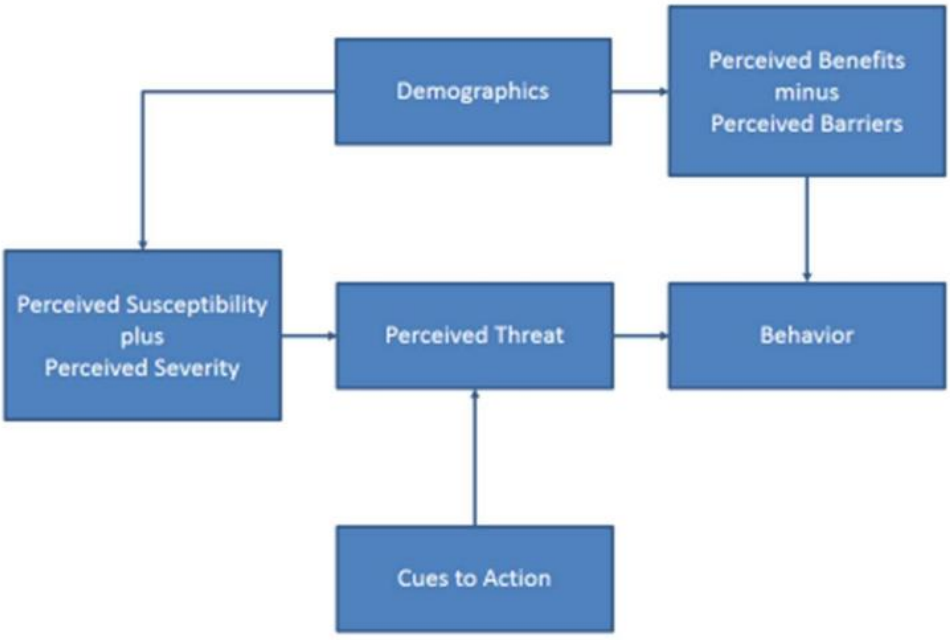

Figure 1. 2 Theoretical Framework of the Health Belief Model
(Rosenstock, 1974)

Figure 1.2 illustrates the Health Belief Model which it suggests that human behaviour is directly influenced by the net difference between benefits and barriers and perceived threat such as perceived susceptibility and perceived severity. Sociodemographic factors can affect the individual's perceptions of the four major constructs namely perceived susceptibility, severity, benefits, and barriers, meanwhile, the perceived threats are affected by exogenous cues to action.

According to the HBM, perceived threat, which is the combination of perceived susceptibility and severity, is necessary for an individual to take any action. Perceived susceptibility refers to the situation where an individual will only perform certain behaviour only if they believe that it is highly likely that the condition of the behaviour can happen to them. In these studies, an individual would only initiate action to prevent colorectal cancer only if the individual is aware and believed that they are the population that is at high risk of getting colorectal cancer. Next is perceived severity which it stresses the seriousness of a situation if no action is taken (Champion & Skinner, 2008). An individual will engage in specific behaviour if they perceive that the situation will worsen or will have great impact on their life. In these studies, an individual will only take certain actions only if they know that the rate of survival of colorectal cancer is low especially when the colorectal cancer is detected at a later stage.

Besides that, perceived benefits emphasize the individual's perception of preventive behaviour which it corresponds to the individual's belief about the effectiveness of the health behaviour. The individual will only perform the preventive behaviour if they believe that it will benefit them by reducing the threat of the condition. For example, in this case, the individual will only perform certain actions only if it can prevent colorectal cancer or enable early diagnosis of colorectal cancer which can increase the survival rate of colorectal cancer. Finally, is the perceived barrier where an

individual believes that certain characteristics of the behaviour would prevent the individual from taking part in the certain behaviour. For example, in this case, to the individual, the colorectal cancer screening is inconvenient, expensive, unpleasant, painful, or upsetting.

Next are the exogenous variable named “cues to action” which are modifying factors and can instigate or initiate the perceived threat and catalyse the individual’s behaviour response (Rosenstock, 1974). In these studies, the “cues to action” could be the presentation of signs and symptoms of colorectal cancer or the public health awareness that aims to increase the awareness of colorectal cancer.

Using the HBM, this study explores modifying factors which are awareness of colorectal cancer and sociodemographic factors that include “age”, “gender”, “ethnicity”, “marital status”, “year of study”, “course of study”, “family’s monthly income”, “family history of cancer”, and “have you ever been diagnosed with a disease related to colon” ,and “source of information about bowel cancer”. Overall, this concept is available to determine the awareness of colorectal cancer and barrier of its screening among young adult in Health Campus of Universiti Sains Malaysia.

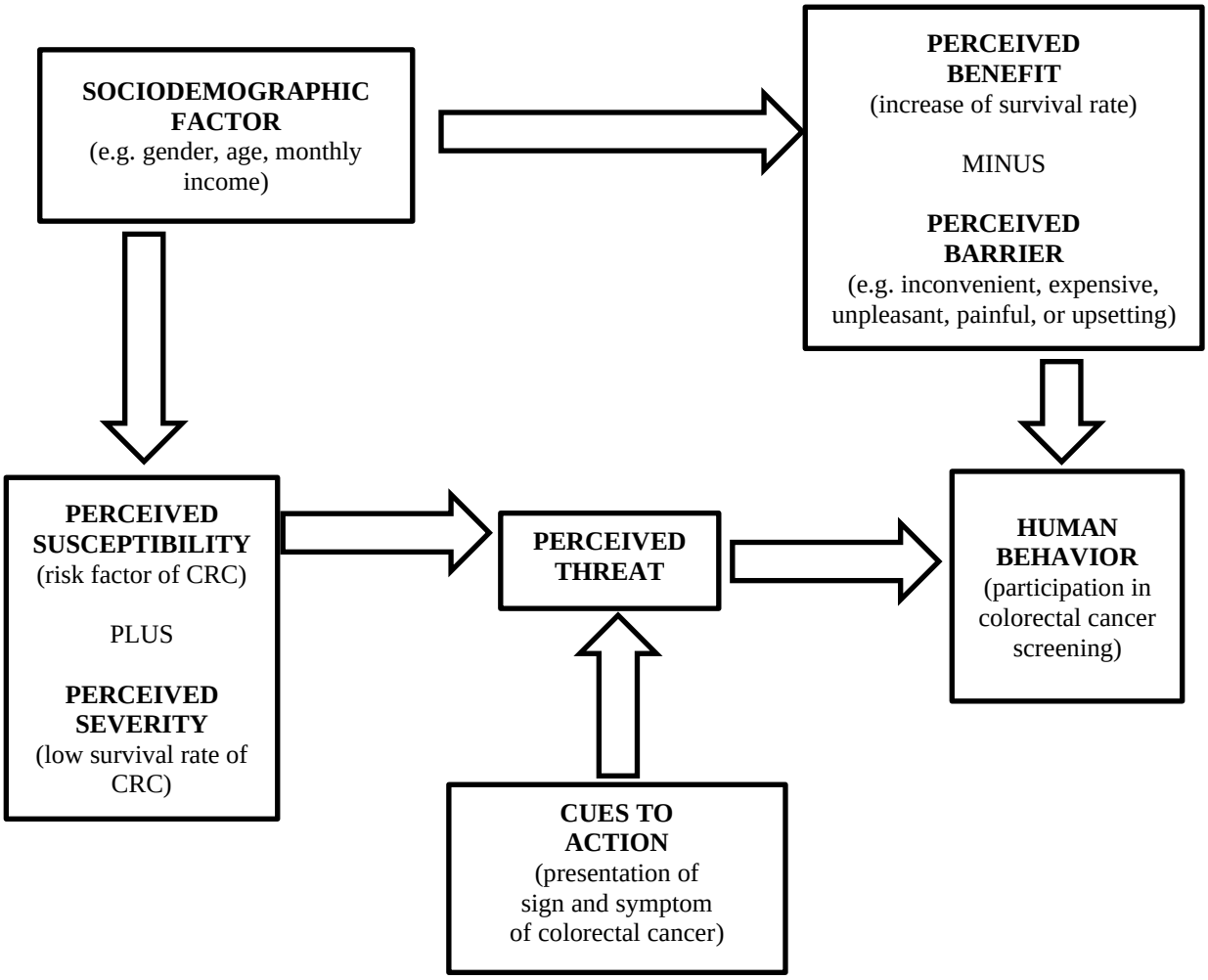

Figure 1. 3 Conceptual Framework adopted from Health Belief Model

CHAPTER 3 RESEARCH METHODOLOGY

This chapter discuss the research design, location, duration, population, subject criteria, sampling size estimation, sampling method, research instrument, variables, ethical considerations, data collection plan, data analysis, and expected research outcome.

3.1 Research Design

The study used a cross-sectional study design. Cross-sectional study design is a type of observational study design where the exposure and outcome are assessed at the same time (Setia, 2016). Often the association between the exposure and outcome is studied.

3.2 Study setting and population

This study was conducted at Health Campus of Universiti Sains Malaysia, Kubang Kerian, Kelantan. Universiti Sains Malaysia is one of the public universities of Malaysia which have 3 campuses, namely Main Campus, Engineering Campus, and Health Campus.

This study was conducted among students in Health Campus of Universiti Sains Malaysia within the data collection period that fulfilled the inclusion and exclusion criteria. Universiti Sains Malaysia consist of diploma students, undergraduate students, and postgraduate students, which are further divided into 3 schools, namely, School of Medical Sciences, School of Dental Sciences and School of Health Sciences. However, diploma students are excluded since they do not fit into the age requirement. All students from the School of Medical Sciences and Year 3 and Year 4 Degree Nursing students from the School of Health Sciences are also excluded from the studies since they learned about cancer in their studies during their academic years.

3.3 Sampling Plan

3.3.1 Sample Criteria

Inclusion Criteria	Exclusion Criteria
Undergraduate and postgraduate students of Health Campus of Universiti Sains Malaysia	Non-Malaysian
Students from the School of Dental Sciences and the School of Health Sciences	Year 3 and Year 4 Degree Nursing Student
Age ranging from 20 to 40 years old	Students from the School of Medical Sciences

3.3.2 Sample Size Estimation

The sample size for objectives 1, 2 and 3 were calculated. The reasonable sample size is taken as the study sample size.

Objective 1: To identify awareness of colorectal cancer among young adults in Health Campus of Universiti Sains Malaysia)

Objective 1 used a single proportion formula and the population proportion taken based on a previous study conducted by (Selim et al., 2021). The prevalence of good awareness of colorectal cancer was 15.9%. Thus,

$$\mathbf{n= \left[\frac{z}{\Delta}\right]^2 p\ (1-p)}$$