PUBLIC HEALTH RESEARCH

Perspectives on Colorectal Cancer Screening in A Multiethnic Population in Kuala Lumpur using the Health Belief Model: A Qualitative Study

Nur Suhada Ramli[1,2], Azmawati Mohammed Nawi[1*], Mohd Rohaizat Hassan[1,3], Faiz Daud[1], Noor Azimah Muhammad[4], Wong Zhiqin[5], Muhamad Izwan Ismail[6], Emma Mirza Wati Mohamad[7,8], Arina Anis Azlan[7,8]

[1]Department of Public Health Medicine, Faculty of Medicine, Universiti Kebangsaan Malaysia, Jalan Yaakob Latif, 56000 Cheras, Kuala Lumpur Malaysia.
[2]Ministry of Health, Malaysia, Federal Government Administrative Centre, 62514 Putrajaya, Malaysia.
[3]University of Cyberjaya, Persiaran Bestari, Cyber 11, 63000 Cyberjaya, Selangor, Malaysia
[4]Department of Family Medicine, Faculty of Medicine, Universiti Kebangsaan Malaysia, Jalan Yaakob Latif, 56000 Cheras, Kuala Lumpur Malaysia.
[5]Gastroenterology Unit, Department of Medicine, Faculty of Medicine, Universiti Kebangsaan Malaysia, Jalan Yaakob Latif, 56000 Cheras, Kuala Lumpur Malaysia.
[6]Department of Surgery, Hospital Sultanah Aminah, Jalan Persiaran Abu Bakar Sultan, 80100 Johor Malaysia.
[7]Centre for Research in Media and Communication, Faculty of Social Sciences and Humanities, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia.
[8]UKM x UNICEF Communication for Development in Health, Faculty of Social Sciences and Humanities, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia.

**Corresponding: azmawati@hctm.ukm.edu.my*

ABSTRACT

Introduction	Colorectal cancer (CRC) carries a significant burden in most world regions. However, its screening uptake remains low. This study aimed to explore awareness and perspectives on CRC screening program in a multiethnic population and their preference for CRC screening decision aid.
Methodology	In-depth interviews were conducted until data saturation was reached. All interviews were audiotaped, transcribed verbatim, translated to English and analysed thematically using hybrid inductive and deductive approaches. 17 informants from three main ethnic groups (Malay, Chinese and Indian) with various levels of risk for developing CRC were recruited.
Results	Awareness on CRC screening program was found to be low. Majority of informants never heard of CRC screening program. Among 11 eligible informants, only five experienced CRC screening uptake. Thematic analysis of the transcripts yielded six major themes; *knowledge on CRC, screening process, authority's role, curability, willingness to screening* and *preference for decision aid,* and they were mapped onto the Health Belief Model. Specific multiethnic perspectives found included preference for traditional medicine coming from all ethnics, and reliance in God coming from Malay informants. Majority preferred short videos as CRC screening decision aid, in the form of animation and live-action screenplay.
Conclusion	Exploration of perspective of CRC screening helps in producing impactful decision aids. Future efforts should focus on developing short videos that incorporate population's perspectives and can be disseminated through electronic media.
Keywords	Colorectal Cancer; Screening; Decision Aid; Qualitative; Health Belief Model

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INTRODUCTION

Colorectal cancer (CRC) remains to be the third most common cause of cancer deaths in the world. [1] According to the World Health Organization, it is the third most common cancer among males, after lung and prostate cancers. While in females, CRC is the second most common cancer following breast cancer. CRC is largely attributed to westernisation of lifestyle.[2] As such, the disease burden is shifting towards low-income and middle-income countries as they become westernised.[3] The economic burden of CRC is substantial[4,5] and is likely to increase over time, owing to its current rising trend. In order to reduce the disease burden, many countries have been promoting CRC screening for average risk individuals, as this enables detection of early cancer pathology, and early medical intervention.[6,7] Despite that, evidences have shown there were suboptimal CRC screening uptakes and low recommendation made by physicians for CRC screening[8,9], indicating the necessity to intervene other preventive pathways such as encouraging health-seeking behaviours.

Based on Malaysia guidelines, CRC screening should be offered at the age of 50 years and continues until 75 years old for average risk population. Immunochemical faecal occult blood test (iFOBT) is the preferred method to screen for CRC in average risk population. If iFOBT result is positive, an early colonoscopy is necessary however, if iFOBT is negative, yearly test should be performed.[10]

In many socio-behavioural studies, health-seeking behaviour models have been proposed to understand how an individual reacts toward health-seeking behaviour. One of the well-known models is the Health Belief Model (HBM), which was developed in the early 1950s to help understanding human behaviour towards seeking health services such as cancer screening and immunisation.[11-13] The HBM uses conceptual frameworks in health behaviour research, which both explain change and maintenance of health-related behaviours and as a guiding framework to support health behaviour interventions. The model contains six constructs that predict the direction of health-seeking actions. These constructs include *perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action,* and most recently, *self-efficacy*. According to the HBM framework, an individuals' health behaviour depends upon the belief about the impact of the illness and its consequence actions.

In Malaysia, where most CRC patients were diagnosed at late stages, [14, 15] their five-year relative survival by stage were found to be lower compared to other developed Asian countries.[16] It was also recently reported that the accumulative screening uptake among Malaysians was only two percent as of 2018,[14] reflecting their low CRC screening awareness level.[17] While according to ethnic stratification, Chinese population carries the highest incidence rate, followed by Malay and Indian.[15] Hence, this highlights the need to accelerate progress of CRC screening promotion development among Malaysian population, using the HBM model as proxy to understand its multiethnic health-related behaviours. Hence, this study aimed at exploring awareness and perspective on CRC screening program among Malaysian adults and their preferences for CRC screening decision aid. CRC screening decision aids can act as one of the tools for awareness in promoting CRC screening at early stage according to national guideline.

METHODS

Study Design

This is a qualitative study utilising phenomenology as the methodology. In-depth interviews were used to collect qualitative data. Inductive and deductive approaches were used to map study findings to the HBM theory. This hybrid approach was applied due to its ability to demonstrate study rigor in thematic analysis,[18] and can reveal patterns across informants that might be difficult to discern through purely qualitative approaches.[19]

Participants and Settings

Potential participants aged 18 years and above without acute medical condition such as asthma attack, acute abdominal pain or no cognitive dysfunction were set as inclusion criteria. Through convenient and purposive sampling, informants were recruited so that they comprised of the three main Malaysian ethnics, which were Malay, Chinese, and Indian. They also represented both genders, and carried various levels of risk for CRC according to the Malaysian Clinical Practice Guidelines by Mahtas (2017) i.e. average risk is for individuals with no family history and age 50 to 75 years old, moderate risk is for individuals with positive family history and high risk is for individuals having hereditary CRC syndromes or inflammatory bowel diseases. Interviews were conducted at the Universiti Kebangsaan Malaysia Medical Centre (UKMMC) and informants were recruited while they were waiting for their clinic appointment at Gastroenterology Out-Patient Department (OPD) or waiting for their colonoscopy procedure at Endoscopy Unit as it was their preference. Informants at the Gastroenterology OPD were attending the clinic for medical condition follow up (of non-CRC), while those awaiting for colonoscopy procedure were either symptomatic of CRC or under surveillance for having inflammatory bowel diseases. The sampling frame was purposely selected from these settings to ensure inclusiveness and data richness. Potential informants were identified from the attendance records with the help of staff nurses in charge.

Study Tool

A semi-structured interview guide was used as study tool (Table 1). The interview guide was developed after an extensive literature search and a focus group discussion conducted among one expert group, consisting of three public health physicians, one family medicine physician, one gastroenterologist, one colorectal surgeon, and two media experts. Pre-testing interview was performed prior to the actual study to ensure comprehensibility of questions.

Interview Process and Data Evaluation

Between September and November 2020, interviews were conducted among 17 informants after obtaining their informed consent. Each informant was presented with a copy of interview questions to enable them to add context, to encourage descriptive and detailed responses, and to focus on the questions being asked. The principal investigator, NSR, conducted all interviews in either English or Malay, according to informants' preference. The duration of each session ranged from 25 to 40 min. One Malay research assistant was assigned to take field notes and to facilitate the interview process. Informants' basic socio-demographics and CRC screening-related data were obtained by using a questionnaire attached to the patient information sheet. Interviews were conducted until saturation was reached, in a way that was consistent with the research questions.[20]

All interviews were audiotaped and were transcribed verbatim by another research assistant specifically trained for this task. The transcripts were verified for accuracy by the principal investigator who listened to the tapes, and were sent to respective informants for approval. Each approved transcript was then undergone back-to-back translation by three investigators, NSR, AMN, NAM, and then was read by other investigators for member checking and data triangulation. Themes, subthemes, and codes were extracted from printed transcripts, mapped onto the HBM framework, and were discussed among all researchers to ensure reliability and trustworthiness. By doing so, study rigor was further ascertained in this study. A nominal token of RM50 was made to each informant recruited in recognition of their contribution to the study.

Patient and Public Involvement

Patients or public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

Ethics Statement

This study involved human participants and was approved by the Medical Research Ethics Committee of the Universiti Kebangsaan Malaysia (FF-2020-155).

Table 1 Semi-structured interview guide

Discussion topics from HBM construct	Examples of specific probes
Perceived susceptibility and severity	What do you know about CRC and its screening program? What do you think of susceptibility towards developing the disease? What do you think of the severity of the disease? How do you see the importance of doing CRC screening?
Perceived benefits of CRC screening	What were/will be your push factors for doing the procedure? How do see the benefit of doing CRC screening?
Perceived barriers to CRC screening	What were/will be your pull factors for not doing the procedure? How do you see barriers in doing CRC screening?
Self-efficacy	How keen you are to go for CRC screening? Based on your experience, how best can we promote CRC screening so that you would want to do a CRC screening?
Cues to action	What is the type of decision aid that you think you will be attracted to the most? If we want to produce a video on CRC screening, how best can we do it? Which do you prefer, animation or real acting or both? How long is the video duration should be? What language would you prefer? What are things we should include/should not include in the video?

Abbreviation: HBM=health belief model

RESULTS

In total, 17 key informants were recruited in the study (Table 2). Nine informants were recruited from the Gastroenterology OPD, while eight were from Endoscopy Unit. Majority of informants were Malay (n = 10), followed by Chinese (n = 4) and Indian (n = 3). Their age ranged from 20 to 66 years old, with mean age of 42 years old (SD 13.98). Ratio of both sexes were about similar. Among 11 informants who were eligible for CRC screening, five had experienced CRC screening while the remaining six claimed they never knew and never offered for screening. One informant (P05) who was not in the eligible group based on national guideline had experienced CRC screening procedure due to prolonged abdominal discomfort.

From thematic analysis, six themes for CRC decision aid content were identified; knowledge on CRC, screening program, authority's role, curability, willingness to screening and preference for decision aid.

Knowledge on CRC

Most informants hesitated and admitted they knew very little about the disease. They also thought that they were unlikely to be diagnosed with CRC in the future. Although most informants claimed to had limited knowledge on CRC, some were able to elicit few information such as its risk factors, staging, pathology, symptom and treatment.

i.Risk factors

About one quarter of informants thought that CRC was more prevalent in male than in female. One informant who recently had her father deceased from late stage CRC was unsure of her knowledge of the disease, however, she mentioned one risk factor, stating that CRC was more likely to affect males.

I don't know if my knowledge is accurate or just based on my personal experience. It affects more men. So I guess me being female, is unlikely to get it. (P15)

Other risk factors described by some other informants included practicing unhealthy diet and being elderly. It is also noticeable that more informants, consisting of all ethnics, regarded unhealthy diet as an important risk factor for CRC compared to other risk factors.

I think knowledge on CRC should be disseminated to all, especially to younger generation because their lifestyle today expose them to unhealthy diet. (P03)

ii.Staging

In term of CRC staging, although not confident, majority thought there were four cancer stages and that most patients were diagnosed at late stages.

Most patients were diagnosed at late stage, stage four, only then they knew it was cancer. (P03)

Table 2 Key informant participant sample

Informant	Ethnicity	Gender	Eligibility for CRC screening	Ever had CRC screening
P01	Malay	Male	[A]Yes	No
P02	Malay	Male	No	No
P03	Malay	Female	No	No
P04	Chinese	Male	No	No
P05	Chinese	Female	No	[2]Yes
P06	Malay	Female	[A]Yes	No
P07	Indian	Male	[A]Yes	No
P08	Indian	Female	[A]Yes	[1]Yes
P09	Chinese	Male	No	No
P10	Malay	Female	No	No
P11	Malay	Male	[B]Yes	No
P12	Malay	Female	[A]Yes	No
P13	Malay	Female	[B]Yes	No
P14	Malay	Male	[C]Yes	[2]Yes
P15	Malay	Male	[C]Yes	[2]Yes
P16	Indian	Female	[C]Yes	[2]Yes
P17	Chinese	Male	[A]Yes	[2]Yes

Abbreviation: CRC=colorectal cancer
[A]Average risk for CRC (age 50 to 75)
[B]Moderate risk for CRC (have family history)
[C]High risk for CRC (having diagnosis of inflammatory bowel disease)
[1]Fecal occult blood test (FOBT)
[2]Colonoscopy

iii.Pathology

Regarding pathology of disease, some informants described CRC as a harmful growth, while a few others regarded CRC as an ulcer in the stomach.

CRC is a growth in the large intestine. So we must discard it off our body, because it may cause harm to our body. (P02)

iv.Symptom

Five informants shared opinions on CRC symptom, while some others described it vaguely as merely 'ill'.

I think they discover the disease when they have serious symptoms, like stomach discomfort, or something like that. (P05)

v.Treatment

Finally, four informants mentioned about CRC treatment, despite their incorrect description on cancer anatomical site.

To remove the cancer, you may need to remove part of your duodenal, or if you can't and it spreads, then probably you'll need some chemotherapy. (P07)

Interestingly, some informants revealed their tendency in getting traditional treatment. According to one Malay informant, for many years she had refused modern medical treatment, and was adamant for traditional treatment. While another three informants – one Malay, one Chinese, and one Indian, they also shared their opinion that they would seek traditional medicine prior to attending to physicians. This highlighted the fact that traditional approach remained to be priority in some patients' effort in course of treatment of their disease.

I wanted to seek for an alternative traditional treatment, which is far more convenient. Because I thought, during our ancestors' time, there must be someone who suffered from this condition, and back then, there was no medical advancement, so there must be a cure for it. (P03)

Screening Program

Majority of informants thought they never heard of CRC screening program and were unable to recall being asked to do one by their physicians. Though had limited knowledge, some were able to elicit their perspectives pertaining to screening awareness, its availability, affordability and accessibility, fearfulness and screening uptake experiences.

i.Awareness

Majority of informants admitted that they never heard of CRC screening program. This was also true among some who already experienced colonoscopy uptake, which simply meant they could not associate it to CRC screening.

We need to improve awareness level on CRC screening in the population, because it is not well known actually. It is not as popular as breast cancer or heart disease. (P10)

ii.Availability, affordability and accessibility

In reality, important aspects in implementing health-screening services that must be considered were availability, affordability and accessibility. These points were uttered by some non-Malay informants.

If given the opportunity, I will just go. But how many patients will go? It depends on the availability of the screening, and the cost must be considered. (P07)

In another opinion, the difficulty in having the opportunity to undergo CRC screening in government's healthcare system was regarded as not easily accessible.

I think this CRC screening should be more accessible. I had to go through many processes like going to many clinics, get appointment at the hospital, see the specialist, and then only I was able to get the screened. (P05)

iii.Fearfulness

Feeling fear for colonoscopy procedure was uttered by many informants. One informant admitted that she felt fearful for colonoscopy procedure and that was her main barrier for not doing CRC screening much earlier.

If I can avoid this, I would rather avoid as much as I can, because I feel fear of colonoscopy. Now that I have so much pain, until I can no longer bear the pain, then only I have agreed to do this procedure. (P06)

In the context of cancer screening, where the disease status was not known, another informant shared his opinion that in general, human being were fearful of the unknown, such as screening result, hence demotivated them to know their actual CRC status.

As human being, we are always afraid of the unknown. If we have something, some pain or some discomfort, we will tell our mind that it is nothing. 'There's no need to go and check', so that we are comforting ourselves, because we are afraid of the unknown. (P07)

iv.Screening uptake experiences

Six informants who underwent CRC screening described their experiences on the screening uptake. Of five informants who underwent colonoscopy procedure, three shared their experiences that the procedure was tolerable.

Before the colonoscopy, I had to do the bowel preparation, where I need to take medication, so maybe there is a little discomfort, I have to keep staying near by the toilet. But I think it is not a big problem. (P05)

Meanwhile, two informants abled to recall their experience and perceived colonoscopy procedure as being painful.

During the procedure, I felt as if I was conscious and could feel what was being done. So it was a bad experience to me because I felt painful. (P01)

Authority's Role

Some informants also pointed out on government's roles towards maintaining peoples' health. To them, this was not merely the responsibility of health authority, but also the duty of the central government.

In general, the importance of health screening is for the people's benefit, and for us to see what our government can offer to its people. I advocate health authority to promote CRC screening because it is part of their responsibility. (P01)

Curability

Majority of informants expressed their concern that CRC can cause death and agreed that screening helped to detect early cancer stages that were still curable at most of time.

If you detect CRC early, chances of you saving the patient is very high, and it is still localized and wouldn't spread. So, chances of recovery is very high. (P07)

Some informants also added that an early cancer stage would be unlikely to cause negative impacts to life compared to a late stage.

If we do screening and found to have it, then we can catch it early, get treatment, and get cured. I think, our life will not be much affected if we are diagnosed with early stage of cancer. Therefore, it is important to do CRC screening, because then we know our health status. (P13)

Willingness to Screening

When informants were probed regarding their willingness to CRC screening uptake, they outlined three reasons for wanting to do the screening; wanting to be healthy, physician's recommendation, and medically indicated.

i. Wanting to be healthy

Three informants elicited their willingness for CRC screening uptake because they wanted to be healthy. Among the three, one Malay informant mentioned the word 'tawakkal', a word that is commonly uttered by many Moslems, referring to full reliance and trust in God.

I said to myself, I want to be healthy, so I agreed to undergo colonoscopy, and just tawakkal (put trust in God). (P06)

Similarly, another three mentioned that they did not want to be in poor health conditions.

If I have it, I would like to know at what stage it is, maybe it is still at early stage. If I never do this, it may progress to a late stage and my health condition will get worse. (P02)

ii. Physician's recommendation

Five informants highlighted the role of their physicians in making them willing for CRC screening uptake.

If the doctor advises for colonoscopy, then I will follow, because he knows best. (P04)

They also agreed to their physicians' recommendation, that doing colonoscopy could help them confirming the diagnosis.

The gastroenterologist told me, 'for us to know what is actually happening, we need to do a scope.' So I said yes, go ahead. (P07)

iii. Medically indicated

Few informants also shared how much they wanted to avoid colonoscopy procedure. However, they were willing to undergo colonoscopy eventually, due to abdominal pain that they could no longer bare.

I agreed to undergo colonoscopy because the abdominal pain was so bad. If there is a way I could avoid, I would avoid it as much as possible. (P06)

Preference for Decision Aid

In this final theme, all informants were asked to share their perspectives on their preferred type of decision aid. Codes of short video, mass media, presentation style and duration, and culturally tailored were extracted as elaborated below.

i. Short video

With regard to the type of tool for CRC screening decision aid, all 17 informants, regardless of their age and ethnics, chose short video.

To get people interested, it has to be interactive, or some kind of video, where they can watch. People would want to watch online video. So you can have a short video, it will be very useful. (P07)

Some also outlined that watching video could help viewers to comprehend the message better, compared with other type of decision aids.

Through video, people would watch and listen, involving both visual and audio processes. So we definitely could understand better. (P17)

ii. Mass media

Realising the powerful potential of mass media in disseminating information, all agreed that the short video needed to be shown in TVs, aired in radios, and get circulated in social media. This information hinted that electronic media was preferred than those non-electronic.

Promotion should be made in TVs and radios. Also, today is the era of social media. Videos can be shared in the social media like Facebook to attract greater audience. (P01)

Majority of informants also highlighted that nowadays, people no longer rely on printed materials to get information, but on social media, that was easily accessible from their mobile phones.

I think, it would be better to put it in Facebook or WhatsApp. Through my experience, I do a lot of magazines and book selling before, but nowadays, I

can't sell as many. When we ask our customers, they said 'We've got the news from the phones'. (P08)

iii. Presentation style and duration

Having majority of informants who opted short video as their favorite decision aid, opinion on whether they favoured animation or live action screenplay were sought. Interestingly, majority viewed that combination of both styles should be adopted into decision aid videos.

I would say both. Animation have the power to attract people. Live action will make people aware that it is serious and make them wanting to go screening. So having both styles is the best option. (P01)

Informants were also probed pertaining scenes that they think might be suitable for animation. Majority of them suggested animation as introduction with the most prominent CRC facts, yet, should be remained as minimal.

People would want to know how many are affected, how many have died, how much the country have spent for CRC patients. These can serve as eye-opener that CRC is something serious and it is burdensome. (P11)

When asked regarding the live action scenario that they would expect to see in the video, almost all informants shared their imagination of seeing one or two CRC survivors expressing their experience fighting the disease. According to one informant, such a scene can prompt people to do CRC screening.

Maybe a short clip on the suffering and the recovery, so that people know. If they see the suffering from somebody who has maybe five different symptoms, then another patient who has one or two symptoms out there, who may be in the early stage, will start thinking, 'I better go and check, because I also feel like this'. (P07)

With regard to video duration, most informants thought of commercial music video clips as reference that they would stay watching a health promotion video for about five minutes. More specifically, many agreed that the animation part should not be too long, while the live action part can be slightly longer to enable actors to delve into emotion while conveying their narration.

Animation will usually go straight to the point, so maybe should take around 2 to 3 minutes. Real actors will narrate with emotion. They take feelings into action, and these can really influence viewers' decision-making. So this may take a bit longer, around 3 to 4 minutes. (P10)

iv. Culturally tailored

Finally, some informants also mentioned the importance of incorporating local cultural values into CRC decision aid, as this could better attract targeted population, thus ensured wider acceptance.

Before developing the decision aid, you need to know the fundamentals. The video must portray our local people, local scenario, and local values. (P07)

Through inductive and deductive approaches, the six themes identified were matched with respective HBM constructs. They were summarised in Table 3.

Table 3 Summary of six themes matched onto HBM constructs

Theme	Subtheme	Code	HBM constructs
Knowledge on CRC	Risk factors	CRC affected more men	Perceived susceptibility
		Unhealthy diet was a risk factor	
		Old age was a risk factor	
	Staging	Most patients were diagnosed at late stages	Perceived severity
	Pathology	CRC was a harmful growth in large intestine	NA
	Symptom	Stomach pain was CRC symptom	NA
		Being ill was CRC symptom	
	Treatment	Surgery for localised cancer	NA
		Chemotherapy for metastasised cancer	
		Traditional medicine can cure cancer	
Screening program	Awareness	Never heard of CRC screening	Cues to action
	Availability, affordability, and accessibility	Screening participation depends on its availability	Cues to action
		Cost for screening must be considered	
		CRC screening should be accessible	
	Fearfulness	Fear of colonoscopy procedure	Perceived barrier
		Afraid of the unknown result	
	Screening uptake experiences	Colonoscopy procedure was tolerable	Self-efficacy and perceived barrier
		Colonoscopy procedure was painful	

Authority's role	Authority's role	Health authority was responsible to promote CRC screening	Cues to action
Curability	Curability	Early stages were curable	Perceived benefit
Willingness to screening	Wanting to be healthy	People were willing to do CRC screening because wanted to be healthy	Perceived benefit
	Physician's recommendation	Physicians advised for colonoscopy	Cues to action
	Medically indicated	People were willing to undergo colonoscopy if affected with CRC symptom	NA
Preference for decision aid	Short video	People preferred short video as decision aid Visual and audio enhanced message comprehension	Cues to action
	Mass media	Decision aid should be advertised in mass media Electronic mass media was preferred than non-electronic	Cues to action
	Presentation style and duration	Combination of animation and live-action was preferred Animation as introduction Live action showed experiences of cancer survivors Decision aid video should be around 5 minutes	Cues to action
	Culturally tailored	Decision aid should portray local people, local scenario and local values	Cues to action

Abbreviation: HBM=health belief model, NA=not applicable

DISCUSSION

This study aimed to explore awareness and perspective on CRC screening program in a multiethnic population and their preference for CRC screening decision aid. During the interview process, the HBM framework was used as guidance, due to its constructs' abilities to trigger perspectives on health-related issues. The study population was diverse in terms of age, ethnicity and CRC risk level. In general, CRC knowledge and screening awareness among study population was low since majority of informants admitted of not knowing much about CRC and its screening program. Though subsidised FOBT are available in most government's health clinics in Malaysia, none had neither heard nor received it, except for one. While colonoscopy was relatively more popular as many claimed have heard the procedure and that some have experienced it, informants were unable to associate it to CRC screening uptake, indicating their unawareness of the program.

Through inductive and deductive approaches, six themes were identified and were matched to six HBM constructs, to help explaining the population's low awareness and perspectives on CRC screening and their preferred decision aid.

Knowledge on CRC

As shown in the result, informants' limited knowledge on CRC were regarding to its risk factors, pathology, symptom and treatment. Of all these subthemes, risk factors, pathology and symptom complement the HBM constructs of perceived susceptibility and perceived severity.

Perceived susceptibility refers to an individual's view on subjective risks of contracting a condition, where individuals were believed to vary widely in their acceptance of personal susceptibility to a condition.[21] On the other hand, perceived severity are convictions concerning the seriousness of a given health problem, where this may be judged by the degree of emotional arousal created by the thought of a disease as well as by the kinds of difficulties the individual believes a given health condition will create for him.[21] An example shared in this study was informants' concern of unhealthy diet consumed by Malaysian population, in which they perceived younger generation would be at higher risk of getting CRC in the future.

Some scholars also described both perceived susceptibility and severity as having strong cognitive components and partly dependent on knowledge,[21] thus able to influence people's attitude to taking certain actions.[11, 22] This can be associated in a phenomenon seen in this study, where informants who claimed never heard of CRC screening, they never perceived themselves as being at risk of getting the disease. Similarly, this was coherent with findings in few studies, which concluded that perceived susceptibility and severity to CRC can predict one's screening behaviour.[23-25]

In the treatment subtheme, though not matched to any of the HBM construct, it has one noticeable feature – that is, some informants tended

to seek traditional treatment. Their avoidance of modern medicine was due to the belief that previous generation must have found some form of traditional treatment, and that traditional treatment was also effective. The same belief was shared in previous literatures that in general, many Asians still prefer traditional medical approach.[26,27]

Screening Program

Subtheme of awareness and availability, affordability and accessibility perfectly matched to cues to action. According to Rosenstock, this HBM construct refers to factors that can trigger appropriate actions, thus appeared to be necessary to be in the theory. [21] In Malaysia, although health authority has put efforts to promote CRC screening that could function as decision aid, many perceived it as still lacking, thereby contributing to their apparent low awareness and hence not being able to take the appropriate health-behavioural action. Similarly, if people are aware on available screening program and that it is deemed affordable and accessible, they will have the desire to take necessary action after believing they have the capacity to do so.

Meanwhile, 'fearfulness' subtheme seemed to be suitable for perceived barrier. This is another HBM construct that is defined as the negative aspect or psychological cost that serve as barrier to action and spark conflicting motives of avoidance. [21] It was further elaborated that if low readiness to act comes together with strong negative aspect, the negative aspect will act as barrier to action, and when readiness to act and barrier to action were equally great, the conflict was thought to be more difficult to resolve.[21] Most of time, perceived barrier exerts stronger influence that hinders action for health-seeking behaviour, as indicated by some informants in this study. This was also supported by findings in a multinational study, where higher perceived barriers were found to be an independent predictor for lower CRC screening participation.[26]

The final subtheme of screening uptake experiences made a good example for two HBM constructs; self-efficacy for easy and tolerable experiences, and perceived barrier for painful experience. Self-efficacy, the most recent addition to the HBM theory, refers to one's belief in their ability to successfully take action. As such, self-efficacy determines whether coping behaviours will be initiated, how much effort will be spent, and how long they will sustain in the face of obstacles and adverse experiences. [28] Such coping behaviour was shown by some informants who underwent CRC screening and regarded the procedures as tolerable. On the other hand, informants who felt painful during previous colonoscopy procedure would perceive it as barrier, and therefore would need stronger motivation to undergo health screening.

Authority's Role

The need for the central government and health authorities to play their roles in promoting health screening was an issue raised by some informants. This theme may be best associated to perceived benefit. According to the HBM theory, an action is likely to be seen as beneficial if it reduces one's susceptibility to or seriousness of an illness.[21] In the examples portrayed in this study, efforts to promote CRC screening must be done by health authorities, where in return, the benefits go back to Malaysian population, such as reduction of public health burden.

Curability

As in previous theme, the same HBM construct is applicable in curability theme. Rosenstock further described that perceived benefit can provide a preferred path of action. [21] Accordingly, some informants in this study perceived CRC screening as beneficial due to its effectiveness in early cancer detection, enabling them for early cancer treatment, and therefore higher survival chance.

Willingness to Screening

Perceived benefit is also applied in willingness to screening theme. As some informants mentioned their wishes to be healthy, they perceived that screening could help them with early cancer detection. Some also mentioned their willingness to undergo screening were due to symptoms they had and that they wanted to resolve the issues. These evidence signify the importance of perceived benefit towards screening behaviour, as shown in a recent study, where intention and completion of CRC screening were positively associated with perceived benefit. [29] While for the remaining subtheme, about one third mentioned that physicians' recommendation was their main motivation for CRC screening uptake, hence suitable for the HBM construct of cues to action. Obviously, from the interviews, their physicians would want to confirm the diagnosis or rule out other diseases, thus triggered their CRC screening uptake action.

One ethnic-related perception was found in some Malay informants where they put full reliance and trust in God upon agreement for screening uptake. In Malaysia, where all Malays are Moslems by religion, the word 'tawakkal' is commonly uttered in daily conversation. Intrinsically, this indicates that most Malays, who were able to take screening action, would have high belief in God.

Preference for Decision Aid

The HBM construct of cues to action is deemed suitable for this final theme, as it helps to provide strategies for promoting awareness by identifying factors that could trigger human action. In this study, majority of informants chose short video over other types of health promotion tools. They also

highlighted the role of electronic mass media (e-media) as being able to reach greater audience compared to printed materials. In current era of internet of things, information in the form of short videos is always disseminated via e-media and get circulated in the social media such as Facebook® and WhatsApp® application. The e-media platform was also scientifically proven to be more effective,[30] as it was able to trigger appropriate action for CRC screening uptake.

Combination of animation and live-action screenplay was preferred by majority of informants in this study. According to few studies, animation video was deemed appropriate for health education, being both appealing and useful, it should be incorporated into educational pedagogy. [31,32] On the other hand, live action drama approach has the ability to go beyond message dissemination and to actively repackage information through arts-based approaches with optimal appeal to suit the audiences. [33] What is more, a video with emotionally-invested narrators can strengthen audience intention to adopt risk-reducing behaviours more directly and positively. [34] With regard to video duration, majority suggested for 5 minutes, in which they thought this duration was adequate, as agreed in one study. [35] Since Malaysia is a multiethnic country, emphasis should be placed on local languages and made culturally tailored to ensure better acceptance.

Limitation

There are several limitations in this study. We acknowledged that informants were expected to speak on behalf of their ethnics but may had given their personal views on CRC screening. Some participants had less detailed understanding of CRC screening programs available than participants with personal experience who underwent screening. Together with that, there were also few strengths in this research. Although the study sample was limited to settings in Kuala Lumpur, the shared ethnic and religious background of Malaysian population were most likely to represent wider relevance. The various levels of risk for CRC of informants also justified the representativeness of the study. One ethnic-related perspective pattern was also found and discussed in this study.

CONCLUSION

In this exploratory study, we concluded that there is low awareness on CRC and its screening program among Malaysian multiethnic population in Kuala Lumpur. Themes identified indicated study population's perspectives and their hope to see CRC screening promotion takes place with effective decision aid to guide them. While decision aid has become a new mantra for healthcare providers to trigger knowledge and behavioural change towards health screening, information on population's preference for CRC decision aid is able to become cues to action. Knowing that decision aid video featuring both animation and live-action styles has emerged as the most popular option, therefore, future intervention should focus on developing an impactful CRC screening promotion video for Malaysian multi-ethnic population.

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Consent for publication

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Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to participant confidentiality but are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

Conceptualization by NSR, AMN, and NAM; Methodology by NSR, MRH, NAM, WZ and EMWM; Formal Analysis by NSR, AMN, MRH and NAM; Resources by WZ, MII, and AAA; Writing – Original Draft Preparation by NSR and AMN; Writing – Review & Editing by NAM, EMWM, FD and AAA; Supervision by AMN, MRH and NAM; Project Administration by NSR and MII. All authors have read and approved the manuscript.

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REFERENCES

1. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A & Bray F. 2021. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: A Cancer Journal for Clinicians, 71(3), 209-249.
2. Walker B, Jani CT, Liu W, Punjwani S, Kareff S, Ceglowski P, et al. Does a "Western Lifestyle" confer a higher burden

of colorectal cancer? A comparison of EU15+ countries versus global trends between 1990 and 2019. Cancers. 2024;16(12):2277.
3. Keum N, Giovannucci E. Global burden of colorectal cancer: Emerging trends, risk factors and prevention strategies. Nat Rev Gastroenterol Hepatol. 2019;16(12):713–732.
4. Azzani M, Roslani AC, Su TT. Financial burden of colorectal cancer treatment among patients and their families in a middle-income country. Support Care Cancer. 2016; 24:4423–4432.
5. Marti J, Hall PS, Hamilton P, Hulme CT, Jones H, Velikova G, et al. The economic burden of cancer in the UK: A study of survivors treated with curative intent. Psychooncology. 2016;25(1):77–83.
6. Schreuders EH, Ruco A, Rabeneck L, Schoen RE, Sung JJ, Young GP, et al. Colorectal cancer screening: A global overview of existing programmes. Gut. 2015;64(10):1637–1649.
7. Cole SR, Tucker GR, Osborne JM, Byrne SE, Bampton PA, Fraser RJ, et al. Shift to earlier stage at diagnosis as a consequence of the National Bowel Cancer Screening Program. Med J Aust. 2013;198(6):327–330.
8. Peterson EB, Ostroff JS, DuHamel KN, D'Agostino TA, Hernandez M, Canzona MR, et al. Impact of provider-patient communication on cancer screening adherence: A systematic review. Prev Med. 2016; 93:96–105.
9. Tamin NS, Razalli KA, Sallahuddin SN, Chan HK, Hassan MR. A 5-year evaluation of using stool-based test for opportunistic colorectal cancer screening in primary health institutions across Malaysia. Cancer Epidemiol. 2020; 69:101829.
10. Ministry of Health Malaysia (MOH). Clinical Practice Guidelines: Management of Colorectal Carcinoma. Putrajaya, Malaysia: Malaysia Health Technology Assessment Section (MaHTAS), Ministry of Health Malaysia; Putrajaya 2017.
11. Champion VL, Skinner CS. The health belief model. In: Glanz K, Rimer BK, Viswanath K, editors. Health behavior and health education: Theory, research, and practice. 4th ed. San Francisco: Jossey-Bass; 2008. p. 45–65.
12. Lau J, Lim TZ, Wong GJ, Tan KK. The health belief model and colorectal cancer screening in the general population: A systematic review. Prev Med Rep. 2020; 20:101223.
13. Wong RK, Wong ML, Chan YH, Feng Z, Wai CT, Yeoh KG. Gender differences in predictors of colorectal cancer screening uptake: A national cross-sectional study based on the health belief model. BMC Public Health. 2013;13(1):1–2.
14. Arunah Chandran D, Mustapha FI, Hassan RA. Overview of colorectal cancer screening programme in Malaysia. Med J Malaysia. 2020;75(3):235.
15. Ministry of Health Malaysia (MOH). Malaysia National Cancer Registry (MNCR) 2012–2016. Putrajaya: Ministry of Health Malaysia; 2019.
16. Veettil SK, Lim KG, Chaiyakunapruk N, Ching SM, Hassan MR. Colorectal cancer in Malaysia: Its burden and implications for a multiethnic country. Asian J Surg. 2017;40(6):481–489.
17. Su TT, Goh JY, Tan J, Muhaimah AR, Pigeneswaren Y, Khairun NS, et al. Level of colorectal cancer awareness: A cross-sectional exploratory study among multi-ethnic rural population in Malaysia. BMC Cancer. 2013;13(1):1–8.
18. Fereday J, Muir-Cochrane E. Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. Int J Qual Methods. 2006;5(1):80–92.
19. Nowell B, Albrecht K. A reviewer's guide to qualitative rigor. J Public Adm Res Theory. 2019;29(2):348–363.
20. Saunders B, Sim J, Kingstone T, Baker S, Waterfield J, Bartlam B, et al. Saturation in qualitative research: Exploring its conceptualization and operationalization. Qual Quant. 2018; 52:1893–1907.
21. Rosenstock IM. Historical origins of the health belief model. Health Educ Monogr. 1974;2(4):328–335.
22. Rosenstock IM, Strecher VJ, Becker MH. Social learning theory and the health belief model. Health Educ Q. 1988;15(2):175–183.
23. Koo JH, Leong RW, Ching J, Yeoh KG, Wu DC, Murdani A, et al. Knowledge of, attitudes toward, and barriers to participation of colorectal cancer screening tests in the Asia-Pacific region: A multicenter study. Gastrointest Endosc. 2012;76(1):126–135.
24. McQueen A, Vernon SW, Rothman AJ, Norman GJ, Myers RE, Tilley BC. Examining the role of perceived susceptibility on colorectal cancer screening intention and behavior. Ann Behav Med. 2010;40(2):205–217.

25. Atkinson TM, Salz T, Touza KK, Li Y, Hay JL. Does colorectal cancer risk perception predict screening behavior? A systematic review and meta-analysis. J Behav Med. 2015; 38:837–850.
26. Koo JH, Leong RW, Ching J, Yeoh KG, Wu DC, Murdani A, et al. Knowledge of, attitudes toward, and barriers to participation of colorectal cancer screening tests in the Asia-Pacific region: A multicenter study. Gastrointest Endosc. 2012;76(1):126–135.
27. McQueen A, Vernon SW, Rothman AJ, Norman GJ, Myers RE, Tilley BC. Examining the role of perceived susceptibility on colorectal cancer screening intention and behavior. Ann Behav Med. 2010;40(2):205–217.
28. Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. Adv Behav Res Ther. 1978;1(4):139–161.
29. Von Wagner C, Bonello B, Stoffel ST, Skrobanski H, Kerrison R, McGregor LM. Predictors of intention translation in flexible sigmoidoscopy screening for colorectal cancer. Health Psychol. 2019;38(12):1083.
30. Ramli NS, Manaf MR, Hassan MR, Ismail MI, Nawi AM. Effectiveness of colorectal cancer screening promotion using e-media decision aids: A systematic review and meta-analysis. Int J Environ Res Public Health. 2021;18(15):8190.
31. Ferguson N, Savic M, Manning V, Lubman DI. Related health promotion animation for people aged 55 and older. Public Health Res Pract. 2017;27(2).
32. Oomen-Early J, Early AD. Teaching in a millennial world: Using new media tools to enhance health promotion pedagogy. Pedagogy Health Promot. 2015;1(2):95–107.
33. Lohan M, Aventin Á, Oliffe JL, Han CS, Bottorff JL. Knowledge translation in men's health research: Development and delivery of content for use online. J Med Internet Res. 2015;17(1): e3881.
34. Tseng CH, Huang TL. Internet advertising video facilitating health communication: Narrative and emotional perspectives. Internet Res. 2016;26(1):236–264.
35. Sahin AN, Sahin AS, Schwenter F, Sebajang H. YouTube videos as a source of information on colorectal cancer: what do our patients learn? J Cancer Educ. 2019; 34:1160–1166.