

KNOWLEDGE ON GASTRIC CANCER, ATTITUDE ON  
SCREENING FOR GASTRIC CANCER AND SCREENING  
BEHAVIOR OF GASTRIC CANCER AMONG OUT  
PATIENTS IN HOSPITAL UNIVERSITI SAINS MALAYSIA

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by

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**Kajian Mengenai Pengetahuan tentang Kanser Gastrik, Sikap Terhadap  
Pemeriksaan Kanser Gastrik dan Tingkah Laku Saringan  
Kanser Gastrik Dalam Kalangan Pesakit Luar di Hospital USM**

**ABSTRAK**

Kanser gastrik adalah penyakit heterogen atau multifaktorial yang menjejaskan kesejahteraan fizikal dan psikososial manusia dan menjadi punca morbiditi, kematian, beban ekonomi di kedua-dua negara maju dan membangun. Kajian ini bertujuan untuk mengetahui pengetahuan, sikap saringan, tingkah laku saringan kanser gastrik dan faktor-faktor yang berkaitan dengan pengetahuan dan tingkah laku saringan dalam kalangan pesakit luar di Hospital Universiti Sains Malaysia. Tinjauan keratan rentas telah dijalankan menggunakan satu set soal selidik yang ditadbir sendiri. Kajian ini menggunakan kaedah persampelan mudah dan jumlah saiz sampel ialah 219 sampel yang diambil daripada objektif 2. Soal selidik yang digunakan dalam kajian ini diadaptasi dan diterima pakai daripada (Liu et al., 2019; Huang et al., 2022). Data dianalisis menggunakan SPSS versi 26. Kebanyakan responden menunjukkan pengetahuan yang lemah tentang kanser gastrik dan majoriti responden mempunyai sikap yang baik terhadap saringan kanser gastrik. Jantina dan tahap Pendidikan mempunyai perkaitan yang signifikan dengan pengetahuan ( $p < 0.05$ ). Kesimpulannya, kebanyakan pesakit luar di HUSM kurang pengetahuan mengenai kanser gastrik. Oleh itu, terdapat keperluan untuk lebih pendidikan, kesedaran tentang saringan kanser gastrik.

**Knowledge on Gastric Cancer, Attitude on Screening for Gastric Cancer and  
Screening Behaviour of Gastric Cancer**

**Among Out Patients in Hospital Universiti Sains Malaysia**

**ABSTRACT**

Gastric cancer is heterogenous or multifactorial disease which is it affects the human physical and psychosocial well-being and leading cause of morbidity, mortality, economic burden in both developed and developing countries. This study aims to determine the knowledge, attitude of screening, screening behaviour of gastric cancer and factors associated with knowledge and screening behaviour among out patients in Hospital Universiti Sains Malaysia. A cross-sectional survey was carried out using a set of self-administered questionnaires. This study was used convenient sampling method and the total sample size was 219 samples which taken from objective 2. The questionnaire used in this study was adapted and adopted from (Liu et al., 2019; Huang et al., 2022). The data was analysed using SPSS version 26. Most of the respondent showed that had poor knowledge of gastric cancer and majority of respondent had a good attitude towards screening for gastric cancer. The gender and educational level had significant association with knowledge ( $p < 0.05$ ). In conclusion, most out-patient in HUSM had lack of knowledge regarding gastric cancer. Hence, there is need for more education, awareness on screening for gastric cancer.

# CHAPTER 1:

## INTRODUCTION

### 1.1 Background of Study

The International Agency for Research on Cancer (IARC) stated that gastric cancer (GC) is one of the most common cancers and a globally important disease which is the fifth most diagnosed malignancy in the world after lung, breast cancer, prostate cancer, and colorectal cancers based on its GLOBOCAN 2012 project data (Rajadurai et al., 2018). GC is known as a heterogeneous or multifactorial disease which is it affects the human physical and psychosocial well-being and a leading cause of morbidity, mortality, and economic burden in both developed and developing countries (Rahman et al., 2014). The age-standardized incidence rate (ASR) of gastric cancer is two times higher in men than in women (Rajadurai et al., 2018). More than 60% of world total cases occurs in Eastern Asia which highest incidence rates when about 32.1 per 100000 in men and 13.2 per 100000 in women (Lou et al., 2020).

Since gastric cancer is a heterogeneous disease its essential for careful surveillance to prevent, and timely diagnosis because precaution is a vital approach in managing cancer as well as reducing the mortality rates of GC (Jia et al., 2016). However, most people have insignificant and lack of knowledge on learning the risk factors, symptoms including the nature or extent of variation, and strategies for early detection of GC (Schliemann et al., 2020). Based on several studies, stated that a lack of knowledge and awareness about risk factors, signs and symptoms are more likely to contribute to a delay in help-seeking, diagnosis, and treatment which can lead to poor survival outcomes

of health (Yusefi et al., 2018); Fock, 2014; Liu et al., 2019; Aldosari et al., 2020). Therefore, an adequate knowledge of risk factors for GC is a key for creating an effective approach, monitoring, and evaluating the national and regional plans for controlling the GC. Besides, the risk factors of GC are recognized can be an effective step in preventing and reducing the burden of the disease worldwide (Yusefi et al., 2018). The risk factors of gastric cancer were identified including unhealthy diet, lifestyle, genetic predisposition, family history, *Helicobacter pylori* (*H. pylori*) infection, demographic characteristics, and treatment of medical conditions (Smyth et al., 2020; Yusefi et al., 2018). The facts confirm that food intake and lifestyle influence the stomach the most, however, without awareness counteractive action will never prevail at the primary spot (Saari et al., 2019).

Countries with high prevalence rates of gastric cancer such as China, Japan, and Korean had made an important contribution to better understanding the pathogenesis of gastric cancer and early detection through endoscopic screening to reduce the mortality and prevalence rate (Xia & Aadam, 2022). Early screening for gastric cancer has a significantly better prognosis than advanced gastric cancer (Jun et al., 2017). Early detection of GC can be resulting in the outcome of 5-year survival. However, the early detection of GC is difficult, and only systematic population screening has been shown to increase early detection and confer a survival advantage (Rahman et al., 2014). In Malaysia, those patients are usually diagnosed in the advanced stages, thus it caused a narrowing of the treatment options and made the surgery nearly impossible for successful curative resection. A failure to identify high-risk patients then lead to a delay in early screening which contributed to the delay in the diagnosis of GC (Tata et al., 2014).

## 1.2 Problem Statement

Nowadays, gastric cancer is regarded as a major case of health issue for human beings where the metastasis of gastric cancer is the main reason for death accounting for at least 90% of mortality (Yu et al., 2021). According to (Nduma et al., 2022) stated that, from 2020 worldwide estimates by the Global Cancer Observatory (GLOBOCAN), gastric cancer accounted for nearly to 0.8 million of death which reflecting about 7.7 % of all death related to cancer. GC is the third leading cause of cancer-related death in both sexes worldwide which is about 723,000 deaths (Rajadurai et al., 2018). GC occurs mainly in individuals above 50 years old. The statistics in Malaysia showed that more than hundreds of people are suffering from gastric cancer each year which has led to fatal death was about 3.3% data from the reported Penang Cancer registry in the Malaysian National Cancer Registry Report 2007-2011 (Azimah et al, 2019).

Although the incidence and mortality rates of GC differ significantly by region, population, and race distribution this impacted on the healthcare systems, health resources and socio-economic may greatly affect the GC prevention and screening programs (K. S. Choi & Suh, 2014). Thus, the knowledge of the risk factor of GC is still critical to raise through health promotion to increase people's awareness and screening strategies of GC. Countries with high prevalence rates of GC including Japan, China, and Korea have achieved improvements in cure and survival rates due to the implementation of screening programs for GC including endoscopic, biomarkers and indirect upper gastrointestinal series (UGIS) (Jun et al., 2017). But, in Malaysia, the nationwide GC screening programs still lack for the population (Azimah, 2019).

Therefore, many patients are still not aware that early detection of GC had a significantly better prognosis than advanced GC. This happens due to a delay in diagnosis which is it could be a lack of awareness and knowledge of risk factors or symptoms of

GC are a vital aspect in developing cancer risk perception, thus impacting and influencing participation which lead to negative attitude towards screening gastric cancer. Other than that, an unhealthy diet, intake of salt, smoking, and other risk factors can cause gastric cancer because they may not well educate about the disease. Furthermore, many patients did not notice having gastric cancer because the symptoms are often difficult to distinguish from the benign disease and almost everyone has abdominal discomfort at least once in their lifetime and because of this, they will seek a primary health care centers (Gurunathan & Palayan, 2013).

GC is a serious problem because it could affect people in many aspects of life especially related to health issues and quality of life. (Yu et al., 2021) suggest that gastric cancer can be prevented through better surveillance, treatment, detection, improved understanding of gastric cancer etiology, and understanding of the progress of heterogeneous cancer. Early screening and diagnosis of GC are conducive to illness management which is the gastroscopy is an important to advance the diagnostic accuracy (Speechley et al., 2017). The low compliance in cooperative of examination directly hinders the development of early GC screening. Therefore, how to increase the compliance of GC patients with screening is an urgent problem (Yang et al., 2022). Besides, there is a shortage in managed cancer screening programs in most of the countries which resulting in poor prognosis due to delayed in diagnosis (Jun et al., 2017). However, due to the limited number of prospective studies conducted in Malaysia, there is no data on awareness and attitudes screening towards gastric cancer has been recorded nationally especially in Kelantan. But a few studies that had been done in different states in Malaysia.

### **1.3 Research Questions**

1. What is the level of knowledge towards gastric cancer among out patients in Hospital Universiti Sains Malaysia (HUSM)?
2. What is the level of attitude towards screening for gastric cancer among out patients in HUSM?
3. What is the patient's screening behavior towards gastric cancer in HUSM?
4. Is there any association between related factors (age, gender, ethnicity, educational level, health status, and disease with the upper gastrointestinal tract) with knowledge of gastric cancer among out patients in HUSM?
5. Is there any association between related factors (knowledge, attitude, monthly income, occupational, field of occupational, health status, and disease with the upper gastrointestinal tract) with screening behavior of gastric cancer among out patients in HUSM?

## **1.4 Research Objectives**

### **1.4.1 General Objectives**

To determine knowledge, attitude, screening behavior of gastric cancer and factors associated with knowledge and screening behavior among out patients in HUSM.

### **1.4.2 Specific Objectives**

1. To identify the level of knowledge on gastric cancer among out patients in HUSM.
2. To identify the level of attitude towards screening for gastric cancer among out patients in HUSM.
3. To identify the screening behavior of gastric cancer among out patients in HUSM.
4. To determine the association between the related factors (age, gender, ethnicity, educational level, health status, and disease with the upper gastrointestinal tract) with knowledge on gastric cancer among out patients in HUSM.
5. To determine the association between related factors (knowledge, attitude, monthly income, occupational, field of occupational, health status, and disease with the upper gastrointestinal tract) with screening behavior of gastric cancer among out patients in HUSM.



## **1.5 Research Hypothesis**

### **Hypothesis 1**

**H<sub>A</sub>:** There is significant association between related factors (age, gender, ethnicity, educational level, health status, and disease with the upper gastrointestinal tract) with level of knowledge on gastric cancer among out patients is HUSM.

**H<sub>0</sub>:** There is no significant association between related factor (age, gender, ethnicity, educational level, health status, and disease with the upper gastrointestinal tract) of knowledge on gastric cancer among out patients is HUSM.

### **Hypothesis 2**

**H<sub>A</sub>:** There is significant association between related factors (knowledge, attitude, monthly income, occupational, field of occupational, health status, and disease with the upper gastrointestinal tract) with screening behaviour toward gastric cancer among out patients is HUSM.

**H<sub>0</sub>:** There is no significant association between related factor (knowledge, attitude, monthly income, occupational, field of occupational, health status, and disease with the upper gastrointestinal tract) with screening behaviour toward gastric cancer among out patients is HUSM.

## 1.6 Conceptual and Operational Definitions

**Table 1.1:** Conceptual and Operational Definition of Study

<b>TERMS</b>	<b>CONCEPTUAL DEFINITION</b>	<b>OPERATIONAL DEFINITION</b>
Gastric Cancer	Gastric cancer is triggered when cells in the stomach lining begins to develop uncontrollably which cancer may grow from the stomach to different pieces of body and cancerous cells in stomach will harming the different tissues and organs (Saari et al., 2019).	In this study, it refers to types, sign and symptoms, risk factors, treatments, and screening method of gastric cancer among patient in Hospital USM.
Knowledge	Information that is organized, synthesized and summarized to increase comprehension, understanding and awareness (Bolisani & Bratianu, 2018).	In this study, it refers to patient's knowledge regarding gastric cancer that includes risk factors, symptoms, and screening method that was measured using self-administered questionnaire in section B.
Attitude	A belief or opinion that often held by many people and based on how to evaluates things seem either positively or negatively (Vargas-Sánchez et al., 2016)	In this study, it refers to patient's attitudes regarding the screening of gastric cancer and screening behaviour that indicate a positive or negative attitude that was measured using self-administered questionnaire in section C.
Screening behaviour	Screening is fundamental concept that is associated with clinical practice in individual or public health practice and assessment performed using a universal behavioural health screening and assessment tool, approved for use by the department of education to identify factors that place people at higher risk for behavioural health condition, determine treatment and the need for referral for appropriate services (Speechley et al., 2017).	In this study, behaviour towards screening pf gastric cancer was assessed by using a set of questionnaires in section D.
Out patient	A patient who are receives treatment at Hospital as in emergency room or clinic but not hospitalized (Bovonratwet et al., 2017).	In this study, it refers to out-patient that attended Hospital Universiti Sains Malaysia for receive further treatment or with appointment.

## 1.7 Significance of the Study

There are various factors such as unhealthy food, *H. pylori* infection, a sedentary lifestyle practiced by the community, and low socio-economic status which can lead to gastric cancer. GC is a complicated health problem that it caused by an individual and thus caused mental wellbeing becomes worst, has low quality of life, and causes mortality.

According to (Fock, 2014), GC can be prevented at three levels including first prevention is by reducing the risk of exposure, second by screening for early detection and treatment of disease and third prevention refers to the treatment, rehabilitation, and palliative care to improve the outcomes of illness within affected people. Besides, GC also can be prevented by *H. pylori* eradication and changes the lifestyle such as increasing the intake of healthy food, avoiding harmful use of alcohol and smoking, and increasing physical activity.

Therefore, by conducting this study, we could collect data to assess the level of knowledge, level of attitudes and screening behaviour GC which focuses on out patients that attended in clinics at HUSM. Then we can be estimating their knowledge in order for healthcare services to create an effective approach to treatment and prevention programs to increase their knowledge and awareness about GC. Thus, to reduce the morbidity and mortality of GC, it would be demanded to diagnose GC at an early stage and seek cancer prevention. Moreover, promote more health awareness campaigns to increase knowledge, awareness of GC and screening strategies for GC. Poor knowledge regarding GC and prevention of GC may have an ineffective treatment and increase the number of patients with GC.

## **CHAPTER 2:**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

In this literature review, previous research related to this topic will be discussed and elaborate to broaden the researcher knowledge regarding this topic. Therefore, the outcomes of the research may help to increase the knowledge of risk factors, attitudes, and screening behaviour towards gastric cancer among general patients in HUSM.

The research engines used to obtain relevant information are various such as Google Scholar, Science Direct, and Mendeley. The keyword used in this finding information for the relevant article is gastric cancer, gastric adenocarcinoma, stomach cancer, awareness, knowledge, attitude, and screening. There is limitation year is set for finding a related article there are 80 of articles were identified.

#### **2.2 Gastric Cancer**

Gastric cancer is known as a multifactorial process that is related to an interaction of modifiable factor such as infection of *H. pylori*, lifestyle and diet. The histopathological features of gastric cancer are usually lymphoma of mucosa-associated lymphoid tissues (MALT) (Conteduca et al., 2013). Generally, there is a precancerous cascade where the gastric mucosa undergoes a series of changes that result in an atrophic gastric that leads to little or no secretion of acid and alters the gastric microbiome before developing into gastric cancer. There are two types of GC which are cardia (proximal) and non-cardia (distal) with different epidemiological and clinical features. Lauren has classified the non-cardia to the cardia GC into two histologic types which are intestinal and diffuse. The intestinal type consists of cohesively a group of neoplastic cells that

develop distinct polarized gland-like tubular structures with well-defined lumina which it can be found in the prepyloric antrum. While diffuse is in which the cell cohesion is missing and commonly arises in the fundus and dwelt its infiltrating neoplastic cell that thickens the stomach wall without forming glandular structures (Fock, 2014)

*Helicobacter pylori* has been identified as the main cause of gastric cancer that affected the epithelial cell in the lining of the stomach and living in the human body for decades by inhibiting the immune system response and also inducing chronic inflammatory system responses (Holmes et al., 2021). At least about half of the worldwide adult has carried *H. pylori* and has a high prevalence in some population (80%). *H. pylori* infection is recognized as the main reason the organism for gastric ulcer disease which can lead to gastric cancer and mucosa that is associated with lymphoid tissue (MALT) lymphoma and has been classified as a group 1 carcinogen (Yap et al., 2015).

A previous study by (Gurunathan & Palayan, 2013) reported that about 86 patients of 112 patients were diagnosed with stomach cancer where the oldest gastric cancer patient was 91 years old and the youngest was 19 years old. About 56.3% of gastric cancer group in males and 43.7% in women. Based on the ethnic distribution of these patients, Chinese was the highest incidence in both males and females at 55.0% followed by Indian was 27.8% and Malay was 16.6%. Malays in Kelantan showed to have half the rate of gastric cancer similar to Malays in Penang and have the lowest rates of stomach cancer worldwide (Lim & Palayan, 2019).

For non-cardia of GC, the risk factors have been identified including low socioeconomic status, unhealthy diet such as high in salt or nitrates, preserved food, smoked food intake, low consumption of fruit and vegetables, smoking and a family

history of GC also increase the risk of GC (Conteduca et al., 2013). The clinical manifestation of gastric cancer is usually silent at an early stage until the patients have advanced cancer at diagnosis (Graham, 2015). Patients with GC commonly present with vague symptoms such as dyspepsia at early stages while the presence of an abdominal lump, abdominal fullness, pain, weight loss, and anorexia are warning symptoms in advanced stages (Aldosari et al., 2020). Various diagnostic tools exist, but biopsy and endoscopy are commonly needed to make a diagnosis.

### **2.3 Knowledge of Gastric Cancer**

Concerning knowledge on GC, there are various aspects of knowledge has been assessed over various region of the world and between different population including groups that lack knowledge of risk factors, warning symptoms, complication, methods of prevention, the importance of early diagnosis, and treatment (Huang et al., 2022).

A recent study from (Liu et al., 2019) reported that a lack of knowledge of risk factors about GC and have naturally influenced participation in cancer screening. Knowledge about risk factor play important role in prerequisite to healthy behaviours and knowledge about warning symptoms of gastric cancer could resulted in earlier diagnosis and effective approaches. From that study concluded that about 14 studies had been conducted to investigate public knowledge of risk factors or clinical manifestation of GC whereas Korea and Iran reported a general lack of knowledge. A cross-sectional study showed poor knowledge of GC, the mean knowledge score was 8.85 (SD 6.48). 1200 participants were involved in the study, about 564 (47.0%) had low, 347 (28.9%) had moderate and 289 (24.1%) has high knowledge of gastric cancer (Liu et al., 2019).

A study in South Korea population showed poor awareness of risk factors associated with GC where stress was regarded as the most powerful risk factor, with

73.5% of participants believed that the probability of development of gastric cancer due to stress, while the presence of gastric lesions including chronic gastritis was 72.1% gastric ulcer were 71.2% and a previous gastrectomy history was 68.7%. Other than that, risk factors included a diet of charred foods 67.3% followed by a salty diet 65.1%, alcohol consumption 65.3%, smoking 64.3% and *H. pylori* infection 57.5%. about 60.4% of participants believed that GC can be prevented by lifestyle modification and 72.1% believed that regular screening could prevent all GCs. Besides, only 54% of participants did not receive regular screening due to lack of symptoms GC (Jun et al., 2017).

Another cross-sectional study conducted with 3457 participants included 2599 (75.2%) females and 875 (24.8%) males also support the above statement of poor knowledge of GC with the mean knowledge score of respondents was  $5.05 \pm 1.37$  about the risk factors of GC,  $4.39 \pm 1.99$  regarding the signs and symptoms of GC,  $6.0 \pm 1.22$  for the preventive strategies and  $1.6 \pm 1.16$  about the treatment (Liu et al., 2019). From the study stated that physicians and nurses were the most knowledgeable and the participants who are not occupied were the least knowledgeable groups. About 109 (3.2%) of the participants shared that they received their information on awareness of GC from radio, 1114 (54.5%) from TV, 398 (11.5%) participants from magazines, 77 (2.2%) got the knowledge from the physicians, 54 (1.6%) from internet and 604 (17.5%) from friends. People who had used magazines as the source of information had higher knowledge score ( $18.69 \pm 3.56$ ) and participants who had received their information from friends were the least knowledgeable ( $16.78 \pm 3.82$ ) ( $P < 0.0001$ ) (Mansour-Ghanaei et al., 2012).

## **2.4 Attitude of Screening on gastric cancer**

Although the trends of declined incidence, GC remains a major global public health problem that causes death in all types of malignant tumours, except for lung cancer. Approximately three-quarters of all new cases and deaths from GC occur in Asian countries such as China, Japan, and Korea (Jun et al., 2017). The lack of warning symptoms in the early stages of GC makes it difficult to know and treat the disease in a time which is could help to reduce the mortality of GC. Early detection, diagnosis of GC, and treatment can be effective approaches to reducing the mortality of GC worldwide (Yuan, 2013). Even though early detection of gastric cancer seems difficult but only systematic mass screening by endoscopy as practiced in Japan and Korea which had showed a positive result in improving early detection and screening gastric cancer in an asymptomatic population has been proven to increase the detection of early gastric cancer (Smyth et al., 2020).

A cross-sectional study by (Liu et al., 2019) on attitude toward screening GC showed that about 84.7% of subjects thought that GC can be prevented, followed by 83.8% who believed GC could be detected early while only 15.2% thought early GC could not be cured. 1200 subjects were included in this study and 182 (15.2%) of the subject had undergone GC screening including 97 subjects aged older than 40 years. 1018 subjects did not follow GC screening due to there being no symptoms, fear of undergoing gastroscopy, and worried about screening results. For the most acceptable screening method for GC, about 60.2% of participants preferred blood testing as their first choice and only 29.8% chose endoscopy as the first option (Liu et al., 2019).

Another cohort study showed that 95.1% reported that GC can be asymptomatic, and 97.1% considered that GC has the potential curable if do early detection. For the mode of screening, the majority of respondents believed that GC was best diagnosed by



undergoing endoscopy, and 84% perceived that the asymptomatic interval was the best time to diagnose GC. However, only 52% of respondents felt that undergoing screening gastroscopy was worthwhile and 85% of respondents are more likely to undergo gastroscopy if tested positive for *H. pylori* infection and were willing to pay for the expensive cost of screening (Goh et al., 2012).

Next, a study on the perception of GC screening for an early diagnosis showed that 29.5% considered that early GC curability was 80~89% while 24.5% thought that early cancer curability will be 90~99% and 7.9% believed that early GC can be completely curable. For the regular screening reported that 61.4% of participants considered that regular screening was very helpful while 37.6% thought that regular screening was helpful for early detection (Oh et al., 2009).

## **2.5 Screening Behaviour**

Nation screening program have currently been implemented in regions with a high incidence of GC including Japan, China, and South Korea (Karimi et al., 2014a; Fock, 2014; Lim & Palayan, 2019). However, no nationwide screening of GC in the United States, Europe, and other countries including Malaysia and Thailand due to the low incidence of gastric cancer (Karimi et al., 2014). The union for International Cancer Control (UICC) has set some criteria for an effective screening program which include high sensitivity, economical such as practical and low cost, and non-invasive such as painless, and easy for the subject to accept (Yuan, 2013).

In Japan, the guidelines recommended for screening are photofluorography by using X-ray, gastroscopy, and biomarkers for an individual age 50 years (Eusebi et al., 2020). While Korea provides additional upper endoscopy and biopsies free of charge to NHI members and medical recipients in the lower 50% income bracket for people to

undergo the screening GC (Lee et al., 2011). Therefore, patients who attend the screening programs are more likely to be diagnosed at early GC which improved survival and cure rates (Eusebi et al., 2020).

Moreover, Korea started a nationwide GC screening program in 1999 as part of the National Cancer Screening Program (NSCP) which recommended both men and women who are age above 40 years must undergo GC screening every 2 years with the option of an upper gastrointestinal series (UGIS) or endoscopy (Jun et al., 2017). Based on a study conducted by (Jun et al., 2017) showed that the younger age group of 40 to 49 years was less likely to undergo the GC screening compared to those in the age 50 to 59 years age group.

In Malaysia, the screening programs recommended for patients including biomarkers, endoscopy, blood tests, and biopsy (Lim & Palayan, 2019). Based on the study conducted showed that only 3.6% of participants identified with early GC while 80% of the participants had stage 4 of GC. However, due to a lack of screening GC promotion, a lot of people fail in diagnosed GC at an early stage.

## **2.6 Factor Associated with Knowledge**

### **2.6.1 Age**

Off the eight studies included in this review, only three of the studies were looking at the prevalence of gastric cancer and age. Overall, the result of these studies indicated that GC was more prevalent after the age of 60 years, with the largest increase after 91 years (Rahman et al., 2014; Lim & Palayan, 2019). According to (Yusefi et al., 2018) found that age was positively associated with the risk of gastric cancer which is cardia and non-cardia. Based on a study conducted in Singapore stated that GC is rare in children and young adults. But the incidence begins to rise in middle-aged adults between 35 to 64 years in the population where it accounts for about 7.6% and 3.9% in men and women respectively (Rahman et al., 2014). Also, it becomes more common in the elderly with age 65 years and above which accounting for about 10.5% and 9.2% in the age group for men and women respectively. However, the incidence peaks in males over 80 years which approached 300 per 100000 per year (Lim & Palayan, 2019).

Other than that, the incidence rate of GC increases with age where between 2007 and 2011 about 6% of cases of GC occurred in individuals younger than age 45 in the United States which at least 70% of cases were diagnosed in aged 55 years to 84 years (Kim et al., 2016).

### **2.6.2 Gender**

A higher prevalence of GC among men was indicated in most of studies (Fock, 2014; Lim & Palayan, 2019; Rahman et al., 2014). Based on GLOBOCAN 2012 reported that the age-standardized rates of GC were two times higher in men than in women with 12.8% and 5.7% respectively. The ASR for gastric cancer in Penang showed that male has 6.9 higher rate than women 4.7 (Azimah et al, 2019). According to Singapore's cancer

registry shown an Age Standardized Rate (ASR) males in Chinese was 21.4, Indians was 7.8 and Malays was 6.6 per 100,00 populations while females has lower rate which is Chinese was 10.6, Indian was 6.1 and Malay was 3.8 per 100,000 populations (Karimi et al., 2014).

To support the facts that men have a higher risk of both cardia (5-fold) and non-cardia GC (2-fold) compared to women, (Karimi et al., 2014) stated that men have been linked to smoking tobacco products which can elevate rates in men seem to persist even in other countries that have the similar smoking pattern in both men and women. Generally, the gender differences may reflect the difference in physiologic where in women, delayed menopause or increase fertility can lower the risk of gastric cancer. Hormones such as estrogen can prevent GC during the fertile years of women.

### **2.6.3 Ethnicity**

Based on National Cancer Registry of Malaysia in 2006 recorded that the total incidence of stomach cancer in the country was about 3.9% and the incidence of gastric cancer varies among Chinese, Malay, and Indian people. However, the Chinese population has higher rates of GC compared with the Malay and Indian populations (Rajadurai et al., 2018). Besides, (Lim & Palayan, 2019) stated that the incidence rate in Malays had 4-5 times lower than Chinese and Indians where the Chinese had the highest incidence of GC.

### **2.6.4 Educational level**

There were studies have shown that highly educated individuals have higher knowledge regarding the risk factor of gastric cancer disorder. The study conducted in Japan showed that both men and women who are higher educated are more likely to have healthy lifestyles and diets such as avoiding smoking, consuming fruit and vegetables,

and being physically active compared to people with low educational levels (Fujino et al., 2002). Other than that, people with higher educational level was significantly inversely associated with risk factors of GC with the highest vs lowest education level being HR 0.64, 95% CI: 0.43-0.98 (Fujino et al., 2002). Moreover, (Yusefi et al., 2018) suggested that the risk of GC was lowest in people with higher educational levels.

### **2.6.5 Medical status**

Only a few studies had addressed that the family history of cancer and GC was positively associated with the risk factor of GC which can provide a piece of valuable information regarding the molecular genetic pathways of cancer that can increase understanding of the gastric carcinogenesis process (Saif et al., 2010). The studies found that the prevalence of GC was higher in people whose blood relatives are first-grade relatives that have stomach cancer (Safaei et al., 2012; Yusefi et al., 2018). In this regard, (Yaghoobi et al., 2004) stated that the risk of gastric cancer is more likely 2-10 times higher in people with a family history of cancer compared with other people.

There are few studies were looking at the prevalence of gastric cancer with medical status such as thyroid. Based on the finding of the study suggested that GC had possibly linked with thyroid abnormalities where the secretion of iodine may be play role in carcinogenesis in the stomach. So, the result of the study involving 61 GC patients and 55 healthy participants showed that the frequency of nodular goiter as significantly higher in the patients with GC compared with other participants (P=0.012) (Kandemir et al., 2005).

## **2.7 Factor Associated with Screening Behaviour**

### **2.7.1 Knowledge**

A vast number of studies done on knowledge and awareness of screening has significantly associated with screening behaviour. Women had better knowledge of GC screening than men because GC risk is approximately two times higher in men than women. Also, this can support the fact that women tend to be family caregivers and thus typically come into frequent contact with healthcare services and have more opportunities to learn and understand health-related knowledge. As a result showed that men who are being with a low level of education should be included in early GC screening programs or education (He et al., 2022). Based on the study suggested that the reasons why people lack knowledge of health-promoting information are due to the development of the internet and the spread of information into the new era in which mostly middle-aged and older adults still rely on traditional media including television and newspaper (He et al., 2022). Therefore, the information spreads should be emphasized so that all people get the information regarding the screening programs.

Other than that, the study conducted by (Liu et al., 2019) reported that participants who are from rural areas, less uneducated, or had primary education only, and participants who are worked as farmers showed poor knowledge or awareness about gastric gastric which more likely to have later stage of diagnosis.

### **2.7.2 Attitude**

Early diagnosis of gastric cancer is difficult in low to moderate incidence areas. The diagnosis of gastric cancer remains poor due to late presentation and delay in seeking treatment from medical health care (Gurunathan & Palayan, 2013). A retrospective cross-sectional study on time delay of diagnosis from first appearance of cancer symptoms to endoscopic procedure that conducted at Hospital Tuanku Ja'afar by (Gurunathan & Palayan, 2013) reported that the resulted of mean delay for cancer symptoms to primary care consultation was 15.2 weeks for gastric cancer patients and mean delay from health care to referral to surgical specialist clinic was 11.2 weeks. For mean waiting for specialist clinic appointment as 3.37 weeks followed by mean waiting time for endoscope procedure was 2.6 weeks. Therefore, the mean total for delay from the first appearance of cancer symptoms to OGDS procedure was 32.4 weeks for gastric cancer patients (Gurunathan & Palayan, 2013).

Besides, people who are had lower socioeconomic status also indicated with poorer knowledge which cause them to less likely to be screened (Liu et al., 2019).

### **2.7.3 Monthly income**

A few studies showed higher income are more likely to participate in GC screening programs Lim & Palayan, (2019). A study conducted in Korea reported that participant who is higher household income was associated with a higher odd ratio (OR) compared with the lowest income tertile with the highest income tertile was 1.36 (95% CI: 1.06-1.73) which was significantly associated to participation gastric cancer screening programs (Kwon et al., 2009).

Besides, the participants who are the lowest income were less likely to undergo GC screening compared with those are had higher income (OR 0.22; 95% CI 0.12 to

0.38). (Liu et al., 2019) suggested that the reasons for delay in seeking medical care due to lower socioeconomic status which it could be barriers to screening gastric cancer.

Moreover, a study by (Shin & Lee, 2012) reported that a lower income level was related to an unhealthy dietary habits where they are more likely to have frequent binge drinkers, current smokers were significantly not to undergo regular GC screening compared with people non-binge drinkers and non-smokers.

#### **2.7.4 Occupational**

Occupation positions play important role in the screening of gastric cancer. A study conducted in Japan showed that the rate of participants undergoing health check-ups is lower among unemployed people (49.2%) compared to people that engaged in any occupation (67.6%). The findings reported that people with GC and unemployed or manual laborers had lower access to screening programs compared to those employed people, which leads to more advanced disease at diagnosis and poor prognosis (Kuwahara et al., 2010).

Next, a study on employment conditions with screening participation conducted in Korea included 5626 participants and showed that wage workers (51.6%) had a higher screening rate for GC compared to the self-employed and unpaid family workers. Workers in construction were less likely to participate in regular GC screening while part-time workers (14.4%) had a lower rate of GC screening participation than full-time workers. Other than that, regular workers of all wage workers (64.5%) had a higher rate of GC screening compared with temporary and daily workers (48.4% and 38.9%) respectively (Shim et al., 2019).

Also, people who are white-collar employees were more likely to undergo GC screening compared with those in other occupations with an odd ratio (OR 4.88: 95% CI



2.04 to 11.72) (Liu et al., 2019). Therefore, the main reason for the poorer prognosis in unemployed people appeared to be the low rate of early cancer which resulting in a lower rate of participation in screening programs (Kuwahara et al., 2010).

### **2.7.5 Medical status**

A few studies had addressed that medical status is positively associated with screening behaviour (B. Choi et al., 2018; Shin & Lee, 2012; Liu et al., 2019). The study conducted by (B. Choi et al., 2018) reported that people who have a chronic disease with an odd ratio (OR) were 1.26 times more likely to undergo cancer screening while people who have average health status were more likely to participate in cancer screening compared to people has healthy status. But, analysis of propensity score matching (PSM) showed that people with chronic disease were 20% less likely to participate in cancer screening while unhealthy people were 1.11 times more likely to participate in cancer screening than healthy people (B. Choi et al., 2018).

Besides, participants without upper gastrointestinal disease were less likely to undergo GC screening compared with those who had this disease (OR 0.23; 95% CI 0.16 to 0.34) (Liu et al., 2019). Moreover, (Chang et al., 2015) stated that having gastric or duodenal ulcer history was associated with participation in GC screening. Again, a study from (Huang et al., 2022) reported that people with a family history of GC were more likely to undergo an endoscopy test compared to those without a history where endoscopies were more significantly with people with higher income and had a family history of GC.

## **2.8 Theoretical and Conceptual Framework of the Study**

The Health Belief Model (HBM) is an effective approach which utilized as conceptual framework in guiding this study. HBM was first introduced in early 1950s and most frequently used in health education and health promotion to represent the change and continuity of health-related behaviour as well as to conduct framework for understand human behaviour towards seeking health promotions such as immunization and screening (Farooqui et al., 2013).

HBM composed of four model key component which are perceived susceptibility, perceived severity, perceived benefit and perceived barriers. Cues to action is another component of HBM which helps in the understanding of actions that could trigger human behaviour. The combination of constructed HBM will provide a useful framework for designing both short and long term of behaviour changes strategies. Perceived susceptibility is the belief of how individual view about the probability to get sick while perceived severity is the individual judgment of the seriousness of health condition and how it impacts their life. Besides, perceived benefits it is the belief of positive outcome of health behaviour which influence an individual's willingness to take preventive measure. Perceived barrier is the belief about the hindrance of the health action while cue of action which readiness to take an action after the perceived susceptibility and benefit or self-efficacy that influence individual to execute the health behaviour that lead to positive outcome (Schopf, 2022).

HBM help to explores the modifying factors which are sociodemographic factors included age, gender, ethnic, marital status, educational level, occupation, household income as well as knowledge of gastric cancer among out patients. Furthermore, the HBM can determine if it moderated the relationship between mentioned variables and attitudes and screening behaviour towards gastric cancer. This exploratory study conducted to