KNOWLEDGE, ATTITUDE, AND PERCEPTION TOWARDS BREAST CANCER AND BREAST SELF-EXAMINATION AMONG NON-MEDICAL PRIVATE UNIVERSITY STUDENTS

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**KNOWLEDGE, ATTITUDE, AND PERCEPTION TOWARDS
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AMONG NON-MEDICAL PRIVATE UNIVERSITY STUDENTS**

By

FOO JES MYNN

A Research project submitted to the Department of Physiotherapy,

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KNOWLEDGE, ATTITUDE, AND PERCEPTION TOWARDS BREAST CANCER AND BREAST SELF-EXAMINATION AMONG NON-MEDICAL PRIVATE UNIVERSITY STUDENTS

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ABSTRACT

Background and Objective: Breast cancer is the second most common cancer in the world and one of the most important non-communicable diseases in Malaysia. It poses a huge challenge to countries and causes irreversible effect on the individual. BC screening and health care services is still low in utilization and thus could be due to low BC knowledge, perception, and attitude towards Breast Self-Examination. Therefore, the aim of this study was to determine the knowledge, perception and attitude towards breast cancer and breast self-examination and to identify the factors associated with knowledge of breast cancer in non-medical private university students as it is most effective to start from the early ages of individuals.

Methods: The sampling method used in the study was convenience sampling and the sample size was calculated to be at 405 students. An adapted questionnaire to assess the Breast cancer Knowledge level, Perception and Attitude towards Breast Self-Examination was distributed to all reachable UTAR students through Microsoft Teams, Whatsapp platform, and approached physically in campus. The data collected were then analyzed using Chi-square test and Logistic Regression on the factors assessed which are Age, Sex, Race, Programme of Study, Year of Study, Living area, Family income and Relationship status in IBM SPSS software statistics version 20.

Results: The total participants recruited were 405 students and all responses were processed. The students consist of 42.2% male and 57.8% female which have mean age of 20 ± 1.62. Race was the only significant factor [$\chi2$ (1, n=21) = 6.550, p=0.010] detected to be associated with BC knowledge level and a predictor of BC Knowledge level in the logistic regression model $\chi2(7) = 9.891$, P=0.195 with 6.1% variance (Nagelkerke R Square). 93.1% of students were having poor, 6.9% were having medium, and none were having good BC Knowledge level. Social media was the most common source of information (62%) for BC, 45.9% heard of BSE, 48.4% agree that BSE early detection will increase chance of long-term survival, and 47.4% never

attended any demonstration of BSE.

Conclusion: In conclusion, the overall findings shows that the non-medical Private university students are having poor levels of BC knowledge. The second major findings from the current study are that race is the only significant factor that is found to affect their level of BC knowledge. The perception and attitude of BSE were explored and suggest the need for improvement in the educational programme.

ACKNOWLEDGEMENTS

APPROVAL SHEET

This Research project entitled "**KNOWLEDGE, ATTITUDE AND PERCEPTION TOWARDS BREAST CANCER AND BREAST SELF-EXAMINATION AMONG NON-MEDICAL PRIVATE UNIVERSITY STUDENTS"** was prepared by FOO JES MYNN and submitted as partial fulfilment of the requirements for the degree of Bachelor of Physiotherapy (HONOURS) at Universiti Tunku Abdul Rahman.

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PERMISSION SHEET

It is hereby certified that **FOO JES MYNN** (ID No: **20UMB00721**) has completed this Research project entitled "KNOWLEDGE, ATTITUDE, AND PERCEPTION TOWARDS BREAST CANCER AND BREAST SELF-EXAMINATION AMONG NON-MEDICAL PRIVATE UNIVERSITY STUDENTS" under the supervision of MR. SATHISH KUMAR SADAGOBANE (Supervisor) from the Department of Physiotherapy, Faculty of Medicine and Health sciences

Yours truly,

(FOO JES MYNN)

DECLARATION

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

Name: FOO JES MYNN

Date: 23 December 2022

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BC   Breast Cancer

LMIC   Low Middle Income Countries

HL   Health Literacy

BSE   Breast Self-Examination

HRT   Hormone replacement therapy

MCO   Movement control order

CHAPTER 1: INTRODUCTION

1.1 Chapter overview

This chapter includes the background of the study, putting forth the overview of the overall research context before introducing the research objectives, hypotheses, operational definition as well as the brief structure of this research project.

1.2 Background of study

1.2.1 Prevalence of Breast Cancer

Breast cancer (BC) is the second most common cancer in the world and it is the most prevalent cancer in women worldwide and the highest BC incidents are reported in Australia, New Zealand and Northern Europe (Sham et al., 2022). 1.67 million of BC new cases are reported worldwide, accounting for 25% of all cancers in 2012. BC incidence, mortality and survival rates would be rather different in respective countries. The rate of BC increases drastically over the years with the age-standardised incidence rate ranging from 95 per 100,000 in more advanced countries to 20 per 100,000 in less advanced countries. According to Momenimovahed & Salehiniya (2019), approximately 24 % of the whole BC population are in the Asia-Pacific region, of which China is rated the highest, followed by Japan and Indonesia. In 2012, there were an estimated 277,054 BC diagnosed cases in East Asia. By 2050, the incidence rate may increase up to 3.2 million, which is double that from year 2012 incidence rate. The survival rate is strongly associated with accessibility

to BC screening and therapeutic programs. For instance, the 1-year survival rate of BC in European countries, Scotland and Italy are 94.1% and 97.1% respectively. In the other way round, due to delayed diagnosis and treatment of BC provided, there are lower BC survival rates in African BC women. In terms of mortality rate, BC reported as the fifth leading cause of cancer death worldwide in 2012. BC is also the most common cause of death in less developed countries.

BC is a multifactorial disease which most of the associated factors are not sufficient to cause BC by its own. These may be explained by advanced countries women who tend to be imposed by BC risk factors such as early menarche, nulliparity at giving first birth at older age, having lower parity and late menopause, usually after 50 years old (Bray et al., 2004).

1.2.2   Breast Cancer in Malaysia

According to Director General of Health Malaysia, Tan Sri Dato' Seri Noor Hisham Bin Abdullah, cancer is one of the most important non-communicable diseases (NCDs) over the country due to its high prevalence over the years due to the ageing and unhealthy lifestyle of Malaysians. Furthermore, cancer has remained as one of five principal factors of national mortality for the past twenty years in Malaysia. The rate of cancer mortality increased from 9.34% to 11.82% in 2003 to 2018 (Ministry of Health Malaysia, 2021).

BC increased rapidly in the past three decades and has become an underlying threat to females. For instance, approximately one in 19 females in Malaysia are facing lifetime risk, as compared to one in 8 in Europe and the

United States (Edib et al., 2016). This may be due to the accessibility of healthcare facilities and services and the advancement in early detection of BC. Thus, it is not surprising that BC was rated the first among the common cancers in Malaysia. The age-standardised incidence rate for BC of females in 2016 was 34.1 per 100,000 and specifically 21,634 females were diagnosed with BC. Among all the BC patients, most of them reported stage II (34.5%), followed by stage III (25.1%), stage IV (22.8%) and stage I (17.5%) at time of diagnosis. It is observed that the majority of BC are detected at later stages which prompts that early diagnosis of female BC is needed.

1.2.3 Consequences of Breast Cancer to the community

Well-financed cancer treatment is a huge challenge towards developed and developing countries. Economic income available to the community also decreased due to cancer and the economic burden of cancer affects individual well-being, family, and society (Mustapha, 2015). BC plays a detrimental role in country development as women play an important role in family and social well-being. The major effect of BC towards the individual includes the productivity and income effect. The direct and indirect cost is strongly associated with the decline in an individual's productivity and income level. Direct cost meant the treatment cost and health service expenditures of BC, while the indirect cost is the impact of illness towards their employment including hours of work lost, decrease in output per hour for the individual, labour supply loss and caregiver's assistance given to BC patients. Garau et al. (2015) explained how productivity is affected by the loss of labour-hours due to the illness and side effects of treatment, or even may be caused by BC premature mortality. Research done on the BC population in the United States

states that the price of productive lost days per woman is within USD 680 and USD 5169 for older and younger sample populations respectively (Slater, 2020). It is not surprising that the highest age-standardised BC mortality is highest in sub-Saharan Africa (SSA). BC individuals in SSA cause disease burden, poverty rise, gender inequality, as well as maternal and neonatal mortality (Azubuike et al., 2018). Since SSA is one of the poorest countries, the disease-related-poverty will be the top burden and priority for the government to eradicate so that the fund can then be used in developing the countries' infrastructures, making the country a developing country (Odilovich & Najibullah ,2021).

Individual wise, BC causes irreversible effects on individuals physically and mentally in the long term. Although it is controlled with various treatment methods, the patients are still hampered by the disease. There are notable negative effects in conjunction with cancer because the treatment itself is expensive, quality of life decreases, and cancer often leads to death (Mustapha, 2015). This is supported by the findings reported by Montazeri et al. in 2014, which suggests that even with cancer treatments being there for managing the disease, problems in terms of quality of life, pain, arm symptoms, and body image were still reported. Patients are also stagnant in functional scoring. Another study from Saudi Arabia (2022) also portrays low overall global quality of life among BC survivors. The low scoring shows the impact of BC and its treatment on all aspects of their daily life, particularly in physical, psychological, social and spiritual. Hassan et al. (2015) also reports that prevalence of depression and anxiety are high in Malaysia BC patients,

especially in those who are younger, having low monthly income, and lacking financial and social support.

1.2.4 Threats and Measures taken by the Malaysia Government

Through empowerment and awareness campaigns such as the National Strategic Plan for Cancer Control Programme (NSPCCP) (2016-2020), Malaysians are expected to have a basic understanding of BC. Prevention, screening, early diagnosis, treatment, rehabilitation, and survivorship were aimed to educate the public.

There were a few threats identified by MOH Malaysia which for instance were the uneven numbers of oncologists in the public and private sector, financial catastrophe faced by 45% of the cancer patients, service inequity for secondary and tertiary care such as rural areas, especially in Sabah and Sarawak, and not forgetting the crucial factor for the high cases of BC, which is the low awareness of breast cancer in public (Ministry of Health Malaysia, 2021). Although the government has taken initiative in this issue, the uptake of opportunities in BC screening introduced by the Ministry of Health policy is still low and implementation being difficult due to lack of awareness in BC screening and struggles in accessing health care services, especially in rural areas (Htay et al., 2021).

1.2.5 Concluding Remarks

In conclusion, this study assesses the factors associated with knowledge level in BC. Furthermore, it also investigates the perception and attitude towards breast self-examination (BSE) that is important to observe for

reflection and possible revision in the programmes to encourage practices of BSE which is beneficial for overall treatment of BC.

1.3 Research objectives

1. To determine the knowledge level of breast cancer in non-medical university students.

2. To identify the factors associated with the level of knowledge of breast cancer in non-medical university students.

3. To examine the perception towards BSE in non-medical university students

4. To examine the attitude towards BSE in non-medical university students.

1.4 Hypotheses

H0i) The factors associated with the knowledge level of breast cancer cause a significant difference in the non-medical university students.

H1i) The factors associated with the knowledge level of breast cancer does not cause a significant difference in the non-medical university students.

1.5 Operational definition

a) Knowledge level is the score of the participants on their knowledge in BC in terms of general knowledge on BC, knowledge of risk factors of BC, and knowledge of symptoms of BC. The correct responses selected

for each domain will equate towards a score of "1" and "0" for those wrong or missed out responses. The total score for each domain will be calculated and those less than 50% will be categorised into poor knowledge, 50-75% for medium knowledge and greater than 75% classified into good knowledge (Birhane et al., 2017)..

b) Perception towards BSE is the responses the participants select based on the domain general knowledge towards BSE and attitude towards BSE will be assessed through a different set of questions adapted specifically for it. The response with the most and least selection will reveal findings regarding the current perception towards breast cancer screening which may warrant further education or awareness to increase the overall knowledge in breast cancer screening. The attitude towards BSE can be known as well.

c) Factors associated with knowledge of BC will be factors such as Age, Gender, Race, Living area, Year of study, Family income and relationship status that may or may not have a significant effect on the differences in each domain of knowledge of BC among non-medical UTAR students.

d) University students will be academically active non-MK FMHS UTAR students that's aged 18-26 years old without family history of BC at time of recruitment, and without history of lumps or cyst found around their breast region.

1.6 Structure of research project

In this research, Chapter 1 mainly will give the overview of study background which comprises research questions, research objectives, hypotheses and operational definition. Chapter 2 consists of literature review which reviews the relevant information of past research studies. Chapter 3 listed the research design, ethical approval, sampling design, research instrument, procedure of data collection and data coding. Chapter 4 includes the result of data collection and analysis as well as the hypothesis testing. Chapter 5 summarised the discussion of study findings, study limitations and suggestions to improve for future research.

CHAPTER 2: LITERATURE REVIEW

2.1 Chapter overview

This chapter will review the available resources online to make comparison between the findings and current knowledge on varied small topics derived from my research title. I will also try to identify and address the gap and extract the theories and arguments on relevant topics so that a good framework of my research is designed.

2.2 Factors associated with knowledge of Breast Cancer

2.2.1 Sex

In case of the association of sex with knowledge of BC, there are a few studies that reported different findings. For instance, in one study done by Lee et al., in 2022, it was reported that there was no significant difference in awareness level between males and females in BC. This study has similar findings with another study in Iran and India, which states that the similarity of the level of knowledge between two sexes may be due to the majority of females in both Iran and India having poor education, limited access to medical facilities and having low socioeconomic status. Females that have less formal education in the United States also reported lower knowledge regarding BC (Farsi et al., 2020). Similarly, research done by Sayed et al. in 2019 states that 27% of women and 40% men know two or more BC signs and only 29% women and 45% men heard of mammography, clinical breast examination (CBE) and BSE. These results are surely correlated to nearly half of the women

in the study population who do not receive any formal education and nearly all only attended primary school.

On the flip side, there are few more studies supporting the statement that females have more BC knowledge (Elmore et al. 2005; Senthilvel et al. 2018; Farsi et al., 2020). Statistically, higher levels of consciousness were observed among female populations when comparing awareness of BC detection methods. This may be also due to lower prevalence of male BC globally compared to female populations. Another study done in the undergraduate student population portrays that female demonstrated higher awareness, knowledge, and attitude scores compared to males. The score differences between genders may be since females are more involved in cancer detection actions, particularly because cancer prevention campaigns have focused mainly on breast and cervical cancers which involve only females (Loo et al., 2013). Still, it is crucial to know because both genders share common risk factors for getting BC (Ly et al. 2013; White et al. 2011)

2.2.2 Age

Generally, age is directly proportional to the knowledge level of BC. For example, in the research done by Al-Dubai et al. (2011), it was revealed that women aged 18- 29 years and 30-44 years on average had 2.9 score lower in knowledge compared to women aged more than 44 years. This study found that younger women had lower knowledge on BC in comparison to older ones. Amin et al. (2009) reported similar findings among Saudi women. This phenomenon may be explained by older age group women being at higher risk

of breast cancer and so it is anticipated that a higher percentage of them are keener to know about BC and how to perform BSE regularly (Karayurt et al., 2008).

2.2.3 Race

Malaysia is a multiracial country and races should not be neglected when it comes to the factors affecting the knowledge of BC. There is a contradiction between two journal articles published which are both set in Malaysia. Al-Dubai et al. (2011) states that Indians had higher knowledge compared to Malay and Chinese. But there is no further clarification in this issue. On the other hand, another study published by Loo et al. in 2013, states that Chinese students in this study had significantly higher knowledge on cancer risk factors as compared to Indians and Malays. This result is consistent with that of Tan et al. (2010). The score differences across the ethnic groups may be explained by the difference in tradition, beliefs, and lifestyles. Chinese students may inquire more knowledge on cancer risk factors as cancer is more predominant among the Chinese than the other ethnic groups. This could cause Chinese students to be more concerned and seek more information on cancer prevention.

2.2.4 Financial status

In terms of financial status, Liu et al. (2014) determined that awareness and knowledge of BC were associated with age, education level, occupation, marital status and household annual income. This research study is similar to

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the finding of Altintas et al. (2016) in which women in the population of 25-35 years old, having high educational levels and annual family income tend to be more aware of this information. Mean BSE self-efficacy scores of women whose income are more than expenses are significantly higher than those lower than their expenses.

2.2.5 Educational Level

Study done by Al-Dubai et al. in 2011 reported that highly educated women are more likely to have higher knowledge on BC than less educated women. This finding was found consistent with findings of researchers in Iran, Saudi Arabia and the United States (Yavari & Pourhoseingholi, 2004; Amin et al., 2009; & Eileen, 2004). Only a tertiary level of education is able to predict the increasing awareness and practice of BC screening (Al-Dubai et al., 2011).

2.2.6 Academic type

When we look at the perspective of academics, it is not surprising that students from the medical campus were more knowledgeable about BC risk factors compared with those from the Fine Arts and Design campuses. This may be attributable to the topics studied in the medical campus. Students from medical and health science faculty have higher exposure towards health information and this could explain the higher score when compared to non-medical and health science students (Boulos & Ghali, 2014). Non-medical and health science students may score low due to less knowledge in signs and symptoms listed due to them not being commonly seen and they may not understand the medical and anatomical terms in the questionnaire such as the

'retraction of nipple'. Thus, if the questionnaire is simplified in a more layman term, the non-medical students might have more understanding of the question and give a better score.

2.2.7 Family history of Breast Cancer

In a study by Steven et al. (2018), the knowledge level of women regarding inheritance characteristics of BC and its risk reduction strategies was moderate in the study. However, more than half of the women would like to learn more information about the topic. Quillin et al. (2011) reported that a majority of women with daughters with BC had used outside resources to gain information about genetic patterns of BC and only 6% of them had talked to a genetic counsellor about their risk. A possible explanation for a strong relationship between practice of BSE and family history of BC might be that when women who have relative with breast cancer become more aware and this will encourage them to know more about BC and how to detect it early (Hassan et al., 2017). In conclusion, those studies including population having BC family history illustrated the occurrence of high knowledge and self-awareness towards BC. Hence, this population may induce response bias which will indirectly influence survey response as a whole and lower the accuracy and reliability of the research.

2.3 Source of information

Before moving on to BC screening, we can first look at the literature relating to the BC source of information. It is also important that we investigate

this section so that awareness and knowledge may be spread in the correct mass media more efficiently. A study conducted in 2019 in Klang Valley, Malaysia, states that the populations' main source of information for BC is through printed media (books, brochures and magazines) (56.7%). Television and radio is the second source followed by health professionals and friends and neighbours (Lee et al., 2022). When the target population is changed to university students however, social media such as Facebook, Twitter and Instagram may become their primary source of information.

University students are more prone to be social media users. A study conducted in the University of Sharjah, United Arab Emirates states that 74.7% of the target population have social media as their source of information for BC. Television, and other mass media are their second choice of source of information which occurs due to the young undergraduate students' frequent usage of the Internet for entertainment and study purposes (Rahman et al., 2019). It is important to validate the sources of information for university students in Malaysia so that the BC awareness campaign can be coordinated in a more holistic approach for different populations.

2.4 Breast Cancer Screening

Next, early detection and emphasis on education of professionals and the public was attributed to progressive decline in mortality rate for BC in the United States (Vogel, 2000). On the other hand, inadequate knowledge on BC and its screening methods is said to be the primary factors of delay of BC detection. Currently, there are three types of widely practised BC screening methods in early detection of BC, which are mammography, CBE and BSE

(Lam et al., 2008). Since this study is focusing on the knowledge, attitude and perception of BSE, the literature review will only cover the scope of BSE. Despite being an easy and self-administered examination, in the research done by Boulos & Ghali in 2014, only 1.3% practice BSE regularly every month and 6.1% reported that they performed it irregularly.

2.4.1 Breast Self-Examination (BSE)

Up till today, BC is not a vaccine-preventable disease with no immunisation discovered, but it is possible to diagnose and treat earlier with the aid of BSE (Sani et al., 2016). According to Dagne et al. (2019), BSE is one of the ways of early detection of BC which the woman observe and palpate herself in front of mirror with any of the signs and symptoms of breast changes for example, possible mass, bloody discharge, swelling, dimpling, retraction of nipples and other abnormalities. Since it is a non-invasive adjuvant, painless, easy to conduct, and cost efficient screening alternatives, it is recommended by the American Cancer Society and the European Commission to women over 20 years of age to do BSE once a month (Sani et al., 2016). Research shows women who do BSE monthly in the correct way are more likely to detect lumps at early stages of development.

Early diagnosis of BC had a great influence on early treatment of BC (Okobia et al., 2006). Regarding the sensitivity and specificity, BSE's sensitivity and specificity are 58.3% and 87.4%, whereas mammography has 56% sensitivity and 14% specificity (Sani et al., 2016). According to the systematic review and meta-analysis on BSE among female university students in Ethiopia done by Kassie et al. in 2021, she states that BSE is an important

method of screening to take in consideration especially in resource limited settings in low-middle income countries (LMICs) due to its feasible nature and easy execution by the targeted population. Sani et al. (2016) mentioned BSE is still the most effective way in detecting the BC when mammography is not affordable and available to LMICs population, especially in rural areas. Furthermore, BSE promotes quality of life and decreases morbidity and mortality because it creates BC awareness and improves self-responsibility for one's healthcare (Sani et al., 2016; Dagne et al., 2019).

2.4.2 Perception and Attitude towards Breast Self-Examination

According to Suh et al. (2012), 74.2% of the sample population in developing country Cameroon, Africa heard about BSE. Around 59.2% of them know how to perform BSE with 35% of them doing it regularly(once a month) and 12.5% doing it once in 6 months. Surprisingly there are up to 40% of the sample population who have not done BSE before. Furthermore, Parsa et al. (2011) reported 90% of the participants heard about BSE, but only 19% of them performed BSE on every month. The prevalence of regular BSE practice among university students in Ethiopia ranges from 0% up to 26.4%. The random-effects model analysis has revealed that in this meta-analysis the estimated pooled prevalence of regular BSE practice among female university students in Ethiopia was 11.23% (Kassie et al, 2021). This finding is in line with a study finding among female university students across 24 LMICs which has reported that 9.1% of students were practising BSE monthly. According to the study, the higher practice of monthly BSE (above 20%) was observed in Nigeria and Laos, and the lowest that is below 2% was found in India, Singapore, Russia, Bangladesh, and South Africa. This difference might

emerge from the countries' health care policy because it is known that cancer in general is not a priority health problem for many LMICs (Parsa et al.,2011). Another systematic review and meta-analysis done in Ethiopia with female healthcare workers are having higher pooled prevalence of BSE practice (56.31%) as compared to a study among female university students by Kassie et al. in 2021 (Mekonnen, 2020). The finding (56.31%) in Ethiopia is shown to be lower in Nigeria (77.6%), this might be due to difference in settings of the study, which meta-analysis done in Ethiopia involves urban and rural area whereas Nigeria completed survey in urban area where there are better access in BC information. The differences may also be caused by different sociocultural values and religious beliefs.

Looking into Malaysia, a study done by Al-Naggar et al (2011) states that more than half of the respondents (55.4%) reported they had ever practised BSE. Another study done in Malaysia by Akhtari-Zavare et al. (2013), more than 70% of them felt that BSE is not time consuming or troublesome but almost 50% also felt that it is not necessary for them to do and the need is not there since they do not have any breast problems at that point of time. The poor practice could be contributed by the apparently unconvincing and somewhat contradicting perceptions towards BSE found in this study. However, it is assured to find that the majority of them would have done BSE had they known the benefits.

Looking into the perspective of irregular BSE respondents, the prevalence of irregular BSE practice reported in the Ethiopia universities ranges from 15.5% to 83.4%. In this meta-analysis, the estimated pooled

prevalence of those who have ever practised BSE among university students was 33.28%. This finding is consistent with the study finding of the Ugandan study that 30% of the participants had performed BSE irregularly at least once. Similarly, the study conducted among female university students across 24 LMICs has indicated that 31.6% of the students had irregular self-breast-examination practices. According to the authors, the differences may be due to the differences in the discipline of study participants in medical and art streams. Study done by Dagne et al. (2019) states that although the majority of the respondents in Ethiopia scored high in BC knowledge questions (77.4%) and having a positive attitude towards this issue, they still do not practise BSE regularly. Up to 17.3% respondents admit that they do perform BSE irregularly.

Moving on to the awareness of BSE, Suh et al. (2019) states that 25.6% of the participants are not aware of BSE (they never heard BSE, do not know how to perform and do not practise BSE) ; 39.2% are partially aware (heard of BSE, had some idea on how to perform BSE however do not often practise it); and 35% are substantially aware of BSE (heard of BSE, had some idea on how to perform it and practised it often) (Suh et al., 2012). Another study done in Nigeria had the same results of a high proportion of the study population (75%) being aware of BSE, but only 10.1% of them practised BSE for BC early-detection purposes (Suh et al., 2012).

Furthermore, Akhtari-Zavare et al. (2013) states that there were significant differences between knowledge of BSE between those who practise BSE and those who did not practise BSE. Surprisingly, the mean knowledge

score for those who did not practise BSE is higher than those who practised BSE. The results show to be aligned with Mafuvazde et al (2012) in their study among USA female college students reported 66% having knowledge of BSE, but only 50% of these students indicated that they practised BSE. This may be explained by the fact the awareness of breast cancer among the respondents could be attributed to the level of education of the respondents. Most of the participants also state that they forgot and feel BSE is unnecessarily to be done unless there are any suspicious signs and symptoms over the breast. They declare to practise BSE if they are aware of the importance of BSE. This just shows that understanding is very vital in disseminating knowledge.

Thus, having knowledge does not equate to good practice, it must be combined with positive perception and attitude towards its benefits.

2.4.3 General Perceptions and Common Barriers in Breast Cancer Screening

Generally, there are few factors that form the barrier and refrain women from doing BC screening. Common barriers of BC screening include inconvenience, worries, embarrassment, fear of pain, belief that mammography is unnecessary in the absence of symptoms and lack of knowledge of recommended guidelines (Naim, 2014).

Sayed et al. (2019) mentioned that LMICs women such as Kenya usually had poor level of knowledge of signs of BC due to various barriers that restrict them from accessing BC healthcare. Those include socioeconomic status, religious and cultural issues, health care systems and infrastructure. For instance, research done by Sayed et al., in 2019 listed the possible reasons and

barriers of women in Kenya not practising BSE, lack of knowledge about BSE (45%) takes up most frequent reason not practising BSE, followed by the perceptions and assumptions of not having any obvious breast problems (39%). The result of poor knowledge is the main barriers of low BC screening practice as reported by Naim (2014), Godfrey et al., (2016) and Doumit et al. (2017) as well.

Rakhshkhorshid et al. (2018) reported that limited health literacy (HL) is associated with low knowledge of breast cancer. Since the LMICs women generally are not having good social economic status, they are having low HL, which is a limited ability to get the available sources for information and services to make health-related decisions. Since some Kenya women are struggling in understanding the health-related information and having low education, they will share their health issues with their husband, usually relying on their husband making decisions for them (Sayed et al., 2019). Although there are no studies assessing the level of BC knowledge in Kenya men, the study done by Sayed et al. in 2019 proclaimed that 94% of husbands will still seek help for a breast lump either from clinician or traditional healer and 90% will give emotional support to their wives at the same time.

Nonetheless, it is still good to know that the majority of the Malaysian population's HL is rated slightly higher than average score (35.5) in the healthcare, disease prevention and health promotion domain (49.1%, 44.2%, 47.5%). The lower HL population includes those who are older (49.5%), lower educational level (64.8%), and lower household income (49.5%). Overall HL status for Malaysia was classified as lower sufficiency level (Jaafar et al., 2021).

Furthermore, women are having underlying insecurities and fear of being ditched by their husbands and replaced by others after being diagnosed as BC. Minorities are still scared of social rejection in BC diagnosis and BC treatment such as mastectomies (Sayed et al.2019). Schliemann et al. (2022) also reported that the most common barrier of BC screening in the Malaysian women population is fear of cancer diagnosis.

Women that are believed to have BC due to witchcraft or curse have limited decision-making autonomy to visit a proper healthcare facility, they usually are forced to meet traditional healers instead. They also think that traditional healers are more affordable and are more accessible since they are near to their house as compared to the recommended healthcare facility which is also a barrier to BC screening. Most of the interviewed women in Kenya said they must get permission from their husband or mother-in-law before visiting any healthcare facilities (Sayed et al.2019). Compared to Malaysia, married women that have childcare concerns complain that they would not have time spare for breast screening. Minorities of the Malay women reported that they do not get consent and approval from their husband to show their private parts to male clinician and healthcare providers (Schliemann et al., 2022). This strongly suggests the need for men to also be targeted in BC education and screening programmes because husbands are left out of breast health related issues and are needed to encourage their wives to have regular BSE once they find out any signs and symptoms of BC (Sayed et al.2019).

In the study done by Sayed et al. (2019), some families from Kenya preferred traditional healers when they thought BC is involved in aes. They have a misconception of the level of trust in the health care system among the

community volunteers than the traditional healers. They doubted the actual objective of BC community outreach activity due to previous experience. On the other hand, Malaysia having a minority of the population from rural areas raises the issue of language barriers, where the health care provider does not speak in their primary language, which restricts them to understand their own condition, do further screening and accept any healthcare management (Schliemann et al., 2022).

Lastly, Sayed et al. (2019) mentioned that people in Kenya are constrained by the limited BSE educational programmes. It also stated that the BC early detection programme is not held at the correct place such as the antenatal clinic, which has a high visitors flowrate.

CHAPTER 3: METHODS

3.1 Chapter overview

This chapter will list the research methodology applied to this research project, including the study design, setting, sampling size, population, sampling method, inclusion and exclusion criteria and research instruments in detail.

3.2 Research design

The research design for this study was cross-sectional. Survey was done online and physically through distribution of the questionnaire to potential participants. Online questionnaire (Google Forms) was distributed to participants through Microsoft Teams and Whatsapp. Due to the poor response from online platforms, most of the participants were recruited physically at Universiti Tunku Abdul Rahman, KB block to target non-medical students. The target participants were Universiti Tunku Abdul Rahman students that were currently still active in their studies and the sampling method will be convenience sampling where the potential participants are be approached for recruitment of the study.

3.3 Ethical approval

This study had obtained ethical approval from the Scientific and Ethical Review Committees (SERC) of UTAR. *(Appendix A)*

3.4 Sampling Design

According to quotations from Divisions of Admissions and Credit Evaluation of UTAR, the amount of non-M. Kandiah Faculty of Medicine and Health Sciences (non-**MK FMHS**) students in Sg. Long Campus is 8,456. By using Krejcie and Morgan (1970) table (Appendix B), which determined the sample size of the study will be 368 participants. The target total sample size will be added by 10 percent, resulting in 405 (368+ 10%) participants to account for the dropout rate during the data collection process, reducing the error.

3.6 Inclusion and Exclusion criteria

Participants will be included if they meet the following criteria:

1. Individuals aged from 18-year-old - 26-year-old
2. Cooperative foundation, undergraduate or postgraduate students enrolled in certified courses in UTAR Sungai Long campus.
3. Individuals who can read and write English.

Participants will be excluded if they meet the following criteria:

1. Had comorbid conditions (Presence of breast lump and breast cyst)
2. Family history of BC

All these criteria should be avoided to minimise the bias that will affect the accuracy of results of the study.

3.5 Research instrument

The structured questionnaire in English versions consist of five different sections as following:

Section I: Introduction to the research. An introductory overview regarding the research is displayed for the participants with information about the researcher and the objectives of research.

Section II: Personal data protection act and Consent form. UTAR personal data protection act and consent form is attached for review by the participants which is followed by the acknowledgement of notice and signature that is to be provided by the participants to continue with the survey.

Section III: Demographic data questionnaire. It requires the participants to fill in information of their age, gender, race/ethnicity, faculty, living area, year of study, family income, relationship status and if they have family history of breast cancer or any comorbidities (Presence of breast lump or cyst). Living areas will be whether they are in rural or urban areas. Family income level will be based on the B40, M40 and T20 categories with B40 group pertaining to those that is reporting below RM4850 family income per month; M40 between RM4851 and RM10971 family income per month; T20 more than RM10971 family income per month (Romeli, 2021). Presence of comorbidities will be a multiple-choice question regarding if the patient has any history of presence of breast lump or cyst.

Section IV: Adapted questionnaire on Knowledge about Breast cancer which is further divided into general knowledge about breast cancer, risk factors for breast cancer, symptoms of breast cancer, and their source of information for breast cancer is presented (Al-Dubai et al., 2011; Rahman et al., 2019).

Section V: Adapted survey on the Perception towards Breast cancer screening which is further divided into perception about BSE, attitude towards BSE and barriers towards BSE is presented. (Birhane et al., 2017; Habib et al., 2010).

Proposed questionnaire may be referred in *Appendix C.*

3.6 Procedure

After the approval to conduct the research is received from the SERC of UTAR, the data collection process has begun. The questionnaire link generated in QR code has been shared through social media platforms such as the Microsoft Teams and WhatsApp, as well as printed QR code shown to the eligible participant. The participants should read through the Personal Data and Protection Statement and all the information in the first section before providing their signature and informed consent. Respondents were required to answer all the questions according to instructions. Email and contact number of the researcher are attached in the questionnaire if there were any enquiries.
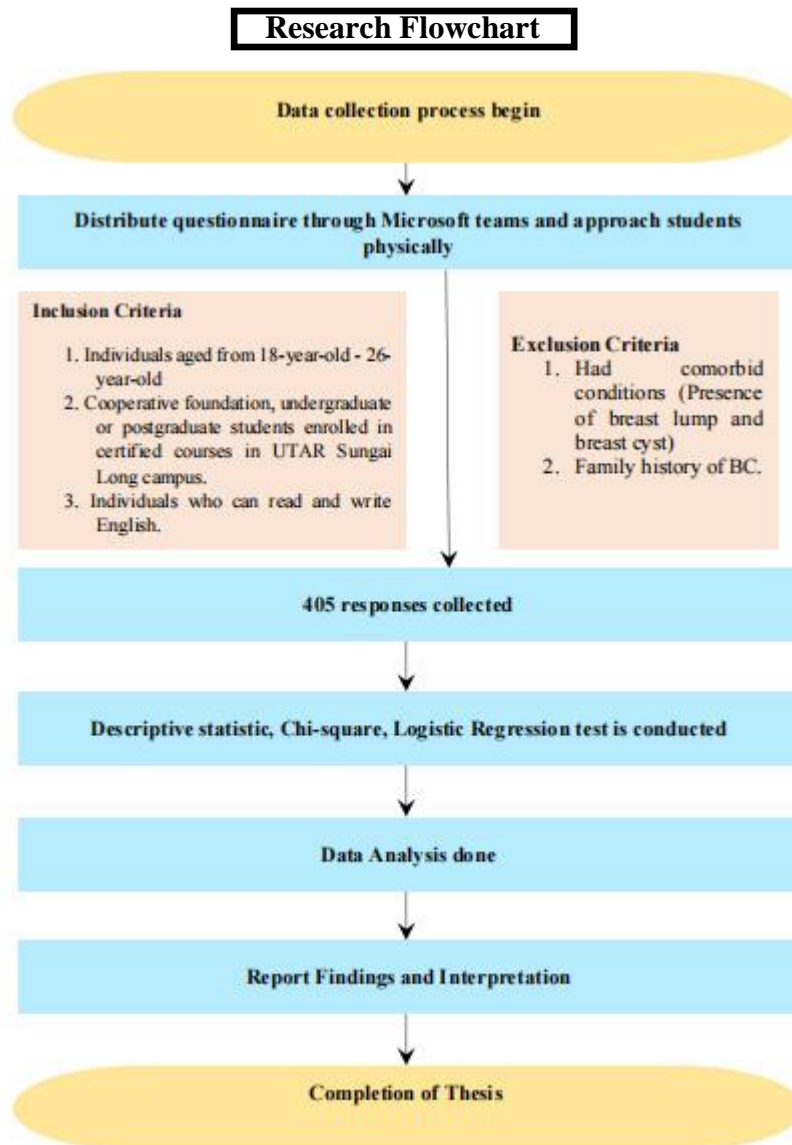
The data collected from the questionnaire was transferred to Microsoft Excel for data processing. Data editing and data coding will be done in Microsoft Excel whereas data analysis will be done in IBM SPSS Version 20.

3.7 Data analysis

IBM SPSS Version 20 was used to statistically analyse the data collected. Descriptive statistics (first level of analysis) were used where mean

and standard deviation will be derived for the knowledge score of breast cancer and frequency and percentage will be calculated for demographic data and relevant variables. Chi-square test will be used to assess for significant difference in score of knowledge level of breast cancer among the students in terms of all the independent variables. Logistics regression will be employed to further evaluate the overall effects of all independent variables on the knowledge level of breast cancer among the students.

Therefore, for purposes of the data analysis, the independent variables (Age, Sex, Race, Faculty, Family income, living area, Year of Study & Relationship status) were recoded into dichotomous variables as tabulated in the following results section. Age was categorized into age groups (18-20 years old and 21-26 years old); Race was categorized into Non-chinese (Malay, Indian, and others) and Chinese; Faculty was changed to programme of study by categorizing the students into Foundation and Degree programme; Family income was categorized into low income (B40) and high income (M40 and T20); Year of study was categorized into Year 1 and Non-Year 1.

Research Flowchart

Data collection process begin

Distribute questionnaire through Microsoft teams and approach students physically

Inclusion Criteria

1. Individuals aged from 18-year-old - 26-year-old
2. Cooperative foundation, undergraduate or postgraduate students enrolled in certified courses in UTAR Sungai Long campus.
3. Individuals who can read and write English.

Exclusion Criteria

1. Had comorbid conditions (Presence of breast lump and breast cyst)
2. Family history of BC.

405 responses collected

Descriptive statistic, Chi-square, Logistic Regression test is conducted

Data Analysis done

Report Findings and Interpretation

Completion of Thesis

Figure 3.1 Research Flowchart

CHAPTER 4: RESULTS

4.1 Chapter overview

The following chapter features the findings after the data collection process for the research project. Demographic data of participants is presented first. Following that, the score and grouping of the BC Knowledge Level, results of the statistical tests and lastly hypothesis testing is elaborated. The results are being presented in the sequence of the descriptions first, then table and lastly the graphs if any. Of the 405 responses collected, there were no duplicate data, and all responses were included for analysis.
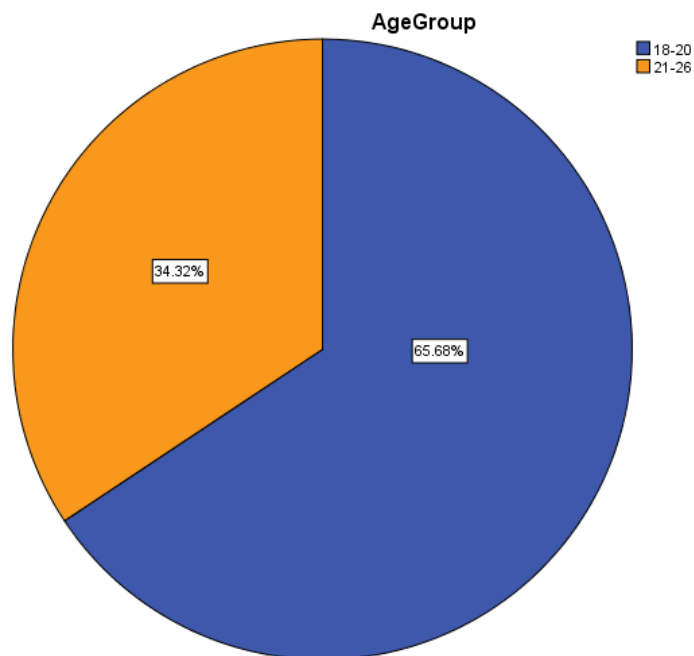
4.2 Demographic of population

This subsection highlights the demographic data of the participants in form of graphs, descriptions, and tables summarizing the overall subsection.

4.2.1 Age group

As shown in Figure 4.1, 266 (65.68%) of the respondents were in the 18-20 years old age group while the remaining 139 (34.32%) were 21-26 years old. The mean of age is 20 and its standard deviation is shown to be 1.62 (Table 4.1).

Table 4.1: Age

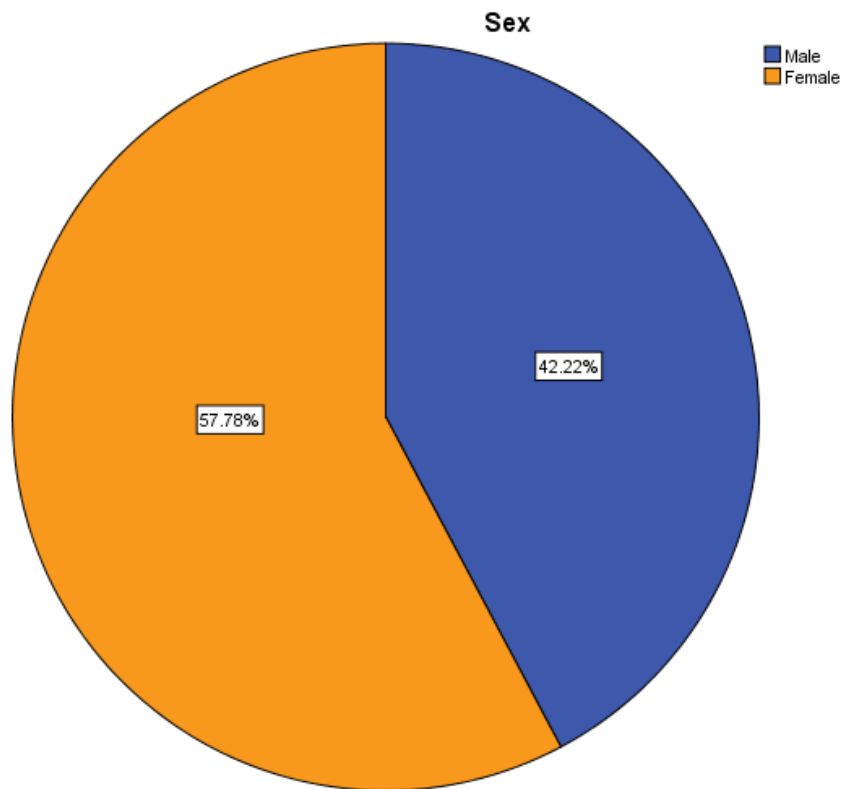|	N (%)	Mean (SD)
Age		20 (1.62)
18-20	266 (65.7)	
21-26	139 (34.3)	

Figure 4.1: Age group of participants.

4.2.2 Sex

According to Table 4.2, it shows 57.78% (n=234) female and 42.22% (n=171) of male participants were recruited in this research.

Table 4.2: Sex

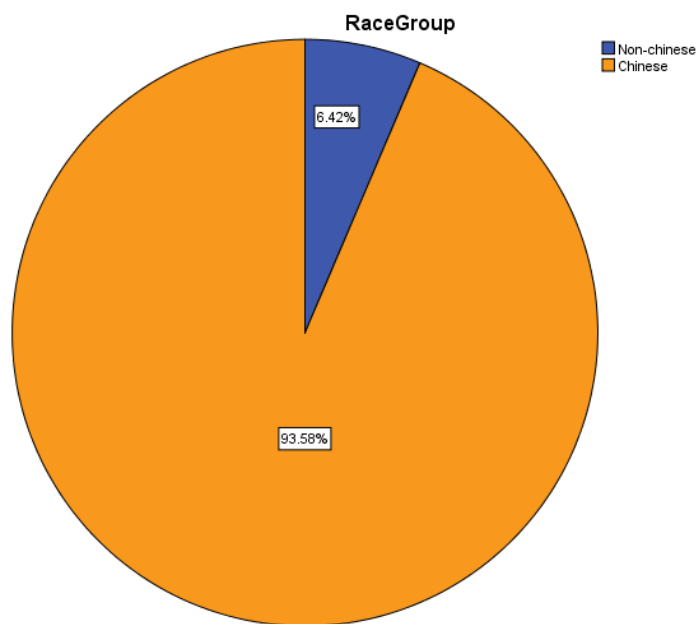|	N (%)
Sex	
Male	171 (42.22)
Female	234 (57.78)

Figure 4.2: Sex of participants.

4.2.3 Race

According to Figure 4.3, there are 6.42% non-Chinese and 93.58% Chinese participated in this study.

Table 4.3: Race

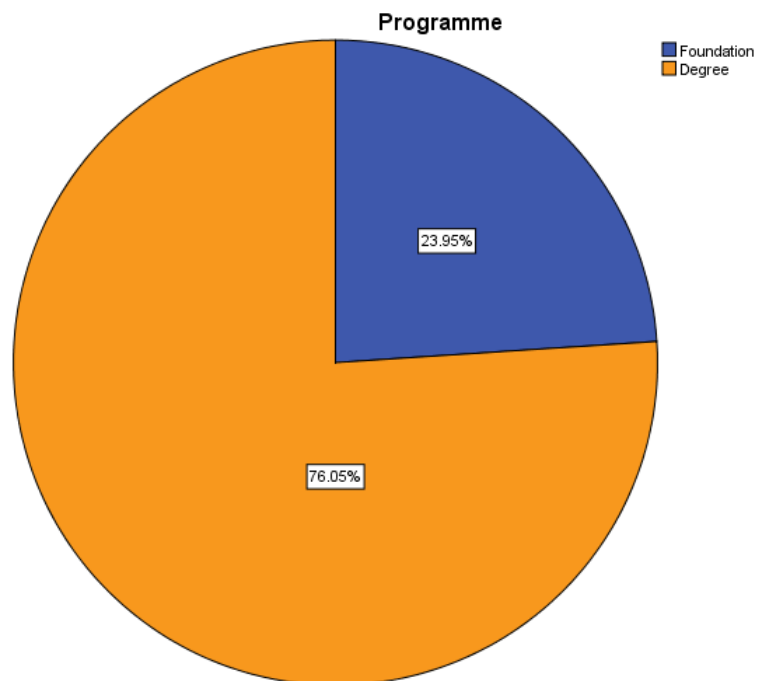|	N (%)
Race	
Non-chinese	26 (6.42)
Chinese	379 (93.58)

Figure 4.3: Racial distribution of participants.

4.2.4 Programme

There are only approximately one fifth of participants (n=97) taking Foundation and other 76.05% (n=308) taking their degree at this point of the survey period.

Table 4.4: Programme of participants

	N (%)
Programme	
Foundation	97 (23.95)
Degree	308 (76.05)

Figure 4.4: Programme of participants.
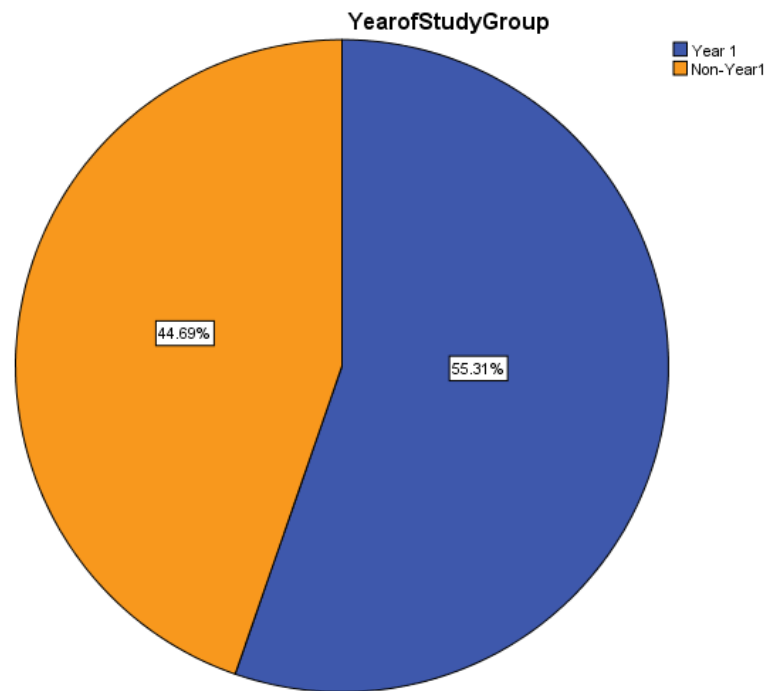
4.2.5 Year of Study

From the perspective of year of study, almost half of the participants (n=224) are in Year 1 and the rest of 44.69% (n=181) are not from Year 1.

Table 4.5: Year of Study of participants.

	N (%)
Year of Study	
Year 1	224(55.31)
Non-Year 1	181(44.69)

Figure 4.5: Year of Study of participants.
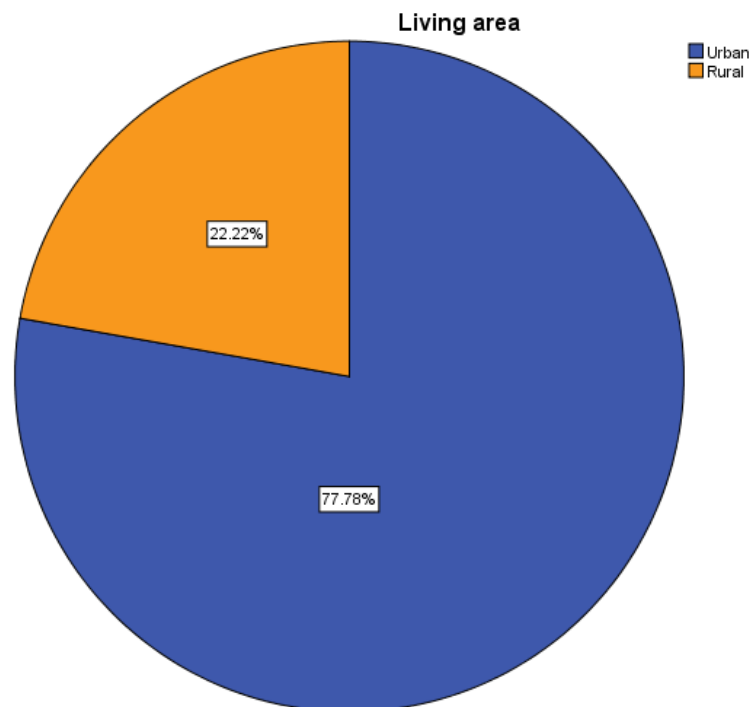
4.2.6 Living Area

Surprisingly, there are still around 22.22% (n=90) of the participants claiming that they are living in rural areas while 77.78% (n=315) of participants live in urban areas.

Table 4.6: Living area of participants.

	N (%)
Living Area	
Urban	315(77.78)
Rural	90(22.22)

Figure 4.9: Living area of participants.

4.2.7 Family income

However, in terms of family income distribution, there are more people from low-income families than high income families. For instance, there are 52.84% (n=214) participants from low-income families and 47.16% (n=191) participants from high income families.

Table 4.7: Family income of participants.

	N (%)
Family Income	
Low income	214 (52.84)
High income	191 (47.16)

Figure 4.7: Family income of participants

4.2.8 Relationship status

Since the target population is university students, most of their relationships are single rather than married. Only 0.49% (n=2) are married out of 405 people, 99.51% (n=403) of respondents are single.

Table 4.8: Relationship status of participants

	N (%)
Relationship Status	
Single	403 (99.51)
Married	2 (0.49)

Figure 4.8: Relationship status of participants

Table 4.9: Demographic data of participants

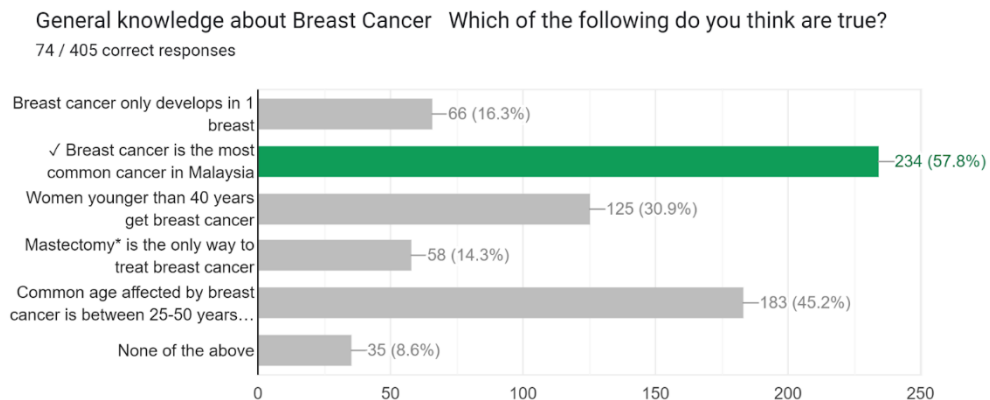| Demographic data	Frequency (%)	Mean (SD)
Age		20 (1.62)
18	82 (20.2)	
19	102 (25.2)	
20	82 (20.2)	
21	55 (13.6)	
22	57 (14.1)	
23	18 (4.4)	
24	5 (1.2)	
25	3 (0.7)	
26	1 (0.2)	
Sex		
Male	171 (42.2)	
Female	234 (57.8)	
Race		
Malay	2 (0.5)	
Chinese	379 (93.6)	
Indian	17 (4.2)	
Others	7 (1.7)	
Faculty		
FAM	51 (12.6)	
FAS	2 (0.5)	
FBF	1 (0.2)	
FCI	107 (26.4)	
FEG	1 (0.2)	
FICT	1(0.2)	
Foundation	97 (24.0)	
FS	8 (2.0)	
LKCFES	137 (33.8)	
Year of study		
Year 1	224 (55.43)	
Year 2	90 (22.2)	
Year 3	53 (13.1)	
Year 4	38 (9.4)	
Living area		
Urban	315 (77.8)	
Rural	90 (22.2)	
Family income		
B40	214 (52.8)	
M40	171 (42.4)	
T20	20 (4.9)	
Relationship status		
Single	403 (99.5)	
Married	2(0.5)	

4.3 BC Knowledge Level

This subsection presents the scores of the participants in each subsection questions as well as the corresponding grouping. Descriptions, graphs, and a summarizing table will be included.
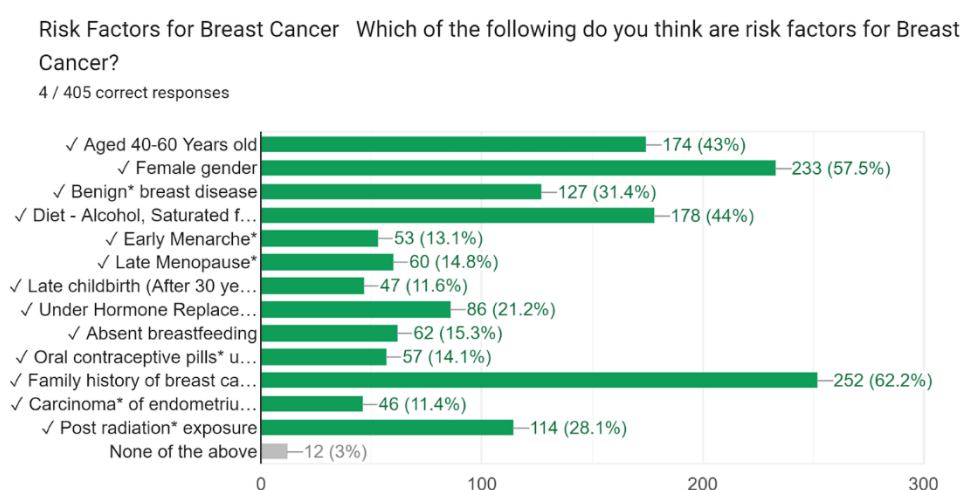
4.3.1 General Knowledge about BC

According to Figure 4.9, 57.8% (n=234) identified the only correct answer "BC is the most common cancer in Malaysia" from all the selection from this section, which is the highest selection being chosen. Although the others are incorrect, there are still quite several people who assume the statements are correct. For instance, most of them 183(45.2%) thought that the common age affected by BC is between 25-50 years old. Other than that 125 (30.9%) mistaken that women younger than 40 years old get BC. 66(16.3%) and 58(14.3%) answered "BC only develops in one breast" and "mastectomy is the only way to treat BC" respectively. There are 8.6% (n=35) of the minority who do not agree with any one of the statements listed.

Figure 4.9: General Knowledge of BC
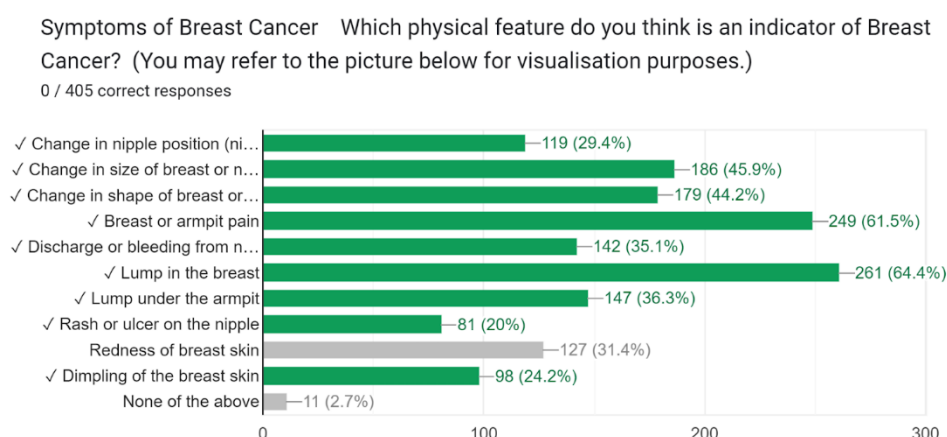
4.3.2 Risk factor of BC

As for this section, family history and female are the only two having more than 50% correct responses. Family history has the most people getting the correct answer 252(62.2%). Second most identified risk factor of BC by the respondents is female gender, 233(57.5%). Furthermore, 44% (n=178) states that a diet that includes alcohol, saturated fat and smoked meat are the risk factors of BC. 43% (n=174) indicates that those aged between 40-60 years old are the risk factors of BC. There are only 31.4% (n=127) respondents acknowledging that benign breast disease is a risk factor of BC. The other risk factors such as early menarche, late menopause, late childbirth, under Hormone Replacement Treatment (HRT), absent breastfeeding, oral contraceptive pills usage, carcinoma of endometrium or uterus and post radiation exposure is not having correct response of over 30%. Carcinoma of endometrium or uterus have the lowest correct response among all the listed statements. There are 3% (n=12) identifying none of the above as the risk factor of BC.

Risk Factors for Breast Cancer   Which of the following do you think are risk factors for Breast Cancer?
4 / 405 correct responses

Risk Factor	Value
✓ Aged 40-60 Years old	174 (43%)
✓ Female gender	233 (57.5%)
✓ Benign* breast disease	127 (31.4%)
✓ Diet - Alcohol, Saturated f…	178 (44%)
✓ Early Menarche*	53 (13.1%)
✓ Late Menopause*	60 (14.8%)
✓ Late childbirth (After 30 ye…	47 (11.6%)
✓ Under Hormone Replace…	86 (21.2%)
✓ Absent breastfeeding	62 (15.3%)
✓ Oral contraceptive pills* u…	57 (14.1%)
✓ Family history of breast ca…	252 (62.2%)
✓ Carcinoma* of endometriu…	46 (11.4%)
✓ Post radiation* exposure	114 (28.1%)
None of the above	12 (3%)

Figure 4.10: Risk Factor of BC

40

4.3.3 Symptoms of BC

Looking at symptoms of BC, out of the 10 statements, there is only one statement listed as wrong. The most identified symptom of BC is 'lump in the breast' (64.4%, n=261). 61.5% (n=249) choose 'breast or armpit pain' and 45.9% (n=186) choose 'change in size of breast or nipple'. 36.3% (n=147) states that 'lump under the armpit' is the symptoms of BC while 35.1% (n=142) reports 'Discharge or bleeding from nipple' is one of the symptoms of BC. The only wrong statement in Figure 4.11, 'redness of breast skin' having 31.4%(n=127) acknowledges that it is the symptom of BC. Other options have less than 30% of correct responses, including 'change in nipple position', 'rash or ulcer on the nipple' and 'dimpling of the breast skin'. 2.7% (n=11) states that none of listed statement is the symptoms of BC

Figure 4.11: Symptoms of BC
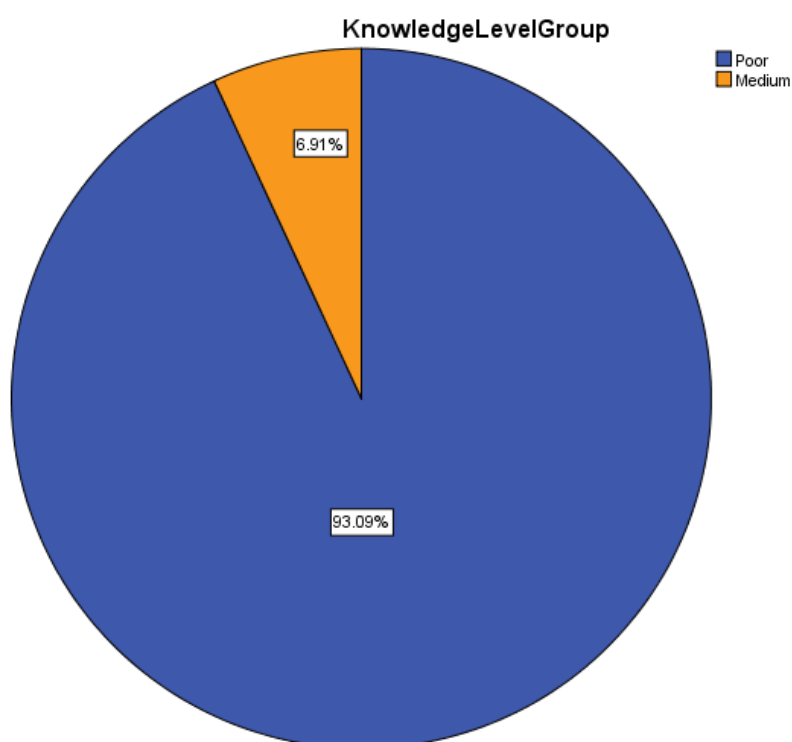
4.3.4 Overall BC Knowledge Score and Level

After analysis, 377 (93.09%) of our participants were in the poor knowledge group, 28 (6.91%) were in the medium knowledge group and none of them were in the good knowledge group when it comes to BC knowledge. The mean and standard deviation for the knowledge score was 6.98 and 3.39 respectively.

Table 4.10: BC Knowledge Score and Level of participants

	Freq (%)	Mean (SD)
BC Knowledge Score		6.98(3.39)
Poor	377 (93.1)	
Medium	28 (6.9)	

Figure 4.12: BC Knowledge level of participants

4.3.5 Inferential analysis

This subsection will outline the inferential analysis conducted for the research project which includes Chi-square test and Logistic regression to test for the factors associated with BC Knowledge level and subsequent hypothesis testing.

4.3.5.1 Factors associated with BC Knowledge Level

Chi-square test (Table 4.10) was conducted to identify the factors associated with BC knowledge. Of all the factors, only race [χ^2 (1, n=21) = 6.550, p=0.010] was found to be significantly associated with BC Knowledge level. The non-Chinese students were found to be 0.271 times more likely to be less knowledgeable than the Chinese students.

Age group [χ^2 (1, n=251) = 1.956, p=0.162]; Sex [χ^2 (1, n=163) = 2.298, p=0.130]; Programme [χ^2 (1, n=91) = 0.105, p=0.746]; Living area [χ^2 (1, n=292) = 0.332, p=0.565]; and Family income [χ^2 (1, n=197) = 0.749, p=0.387] were all found to not be significantly associated with BC Knowledge level.

Table 4.11: Chi-square test results

| | Knowledge level of BC | |
	Poor n (%)	Medium n (%)
Age group		
18-20	251 (94.4)	15 (5.6)
21-26	126 (90.6)	13 (9.4)
χ^2	1.956	
p-value	0.162	
Sex		
Male	163 (95.3)	8 (4.7)
Female	214 (91.5)	20 (8.5)
χ^2	2.298	
p-value	0.130	
Race		
Non-Chinese	21 (80.8)	5 (19.2)
Chinese	356 (93.9)	23 (6.1)
χ^2	6.550	
p-value	**0.010****	
Programme		
Foundation	91 (93.8)	6 (6.2)
Degree	286 (92.9)	22 (7.1)
χ^2	0.105	
p-value	0.746	
Living Area		
Urban	292 (53.8)	23 (7.3)
Rural	85 (94.4)	5 (5.6)
χ^2	0.332	
p-value	0.565	
Family income		
Low income	197 (92.1)	17 (7.9)
High income	180 (94.2)	11 (5.8)
χ^2	0.749	
p-value	0.387	

4.3.5.2 Predictors of BC Knowledge Level

Logistic regression (Table 4.11) was further conducted to look at the overall effect each of the factors have on the student. After analysis, the model $\chi^2(7) = 9.891$, P=0.195 with 6.1% variance (Nagelkerke R Square) was found to be insignificant with race still being the only factor detected. Non-Chinese students were 3.244 times more likely of having poorer knowledge towards BC than Chinese students.

Table 4.12: Logistic regression results.

	OR	p-value	95% CI for OR	
			Lower	Upper
Age	0.991	0.860	0.322	2.574
Sex	0.552	0.175	0.2.33	3.962
Race	3.244	0.039**	1.059	9.935
Programme	1.275	0.674	0.410	3.962
Year of study	0.523	0.236	0.179	1.527
Living area	1.375	0.546	0.489	3.971
Family income	1.446	0.374	0.641	3.262

Logistic Regression: Reference for Age (18-20 years old), Sex (Male), Race (Non-Chinese), Programme (Foundation), Year of study (Year 1), Living Area (Urban), Family income (Low income) are as indicated.
**Statistics are significant at p<0.05
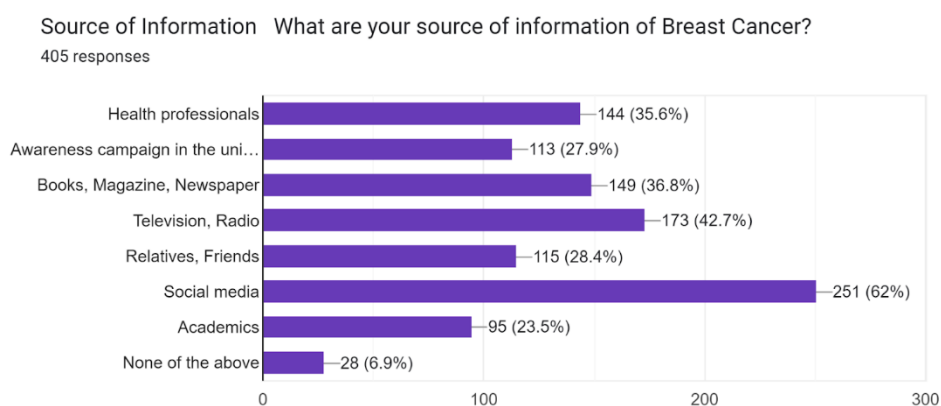
4.3.5.3 Hypothesis Testing

H0i) The factors associated with the knowledge level of breast cancer does not cause a significant difference in the non-medical university students.

H1i) The factors associated with the knowledge level of breast cancer does cause a significant difference in the non-medical university students.

The chi-square test (p=0.010) and logistic regression (0.039) conducted reveals a statistically significant association between race and BC Knowledge level. Therefore, the null hypothesis is rejected in favour of the alternate hypothesis where the factors associated with the knowledge level of breast cancer does cause a significant difference in the non-medical university students.
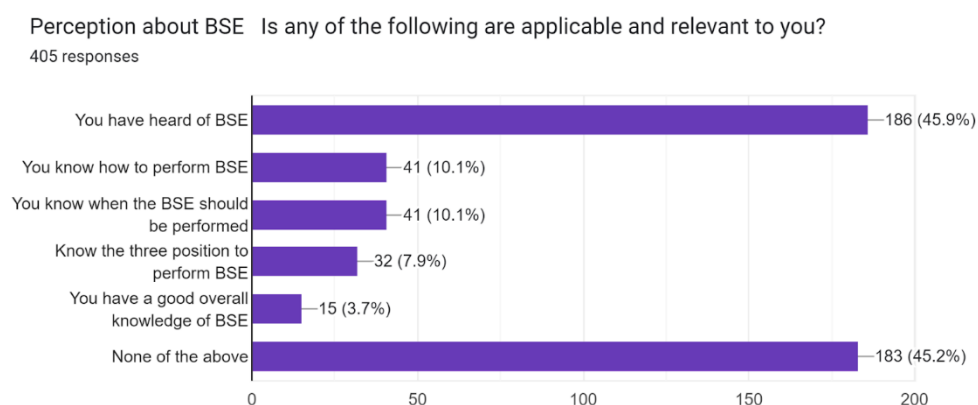
4.4 Source of Information

When it comes to the sources of information for BC, 144 (35.6%) of our participants indicated it is through health professionals, 113 (27.9%) through awareness campaign in the university, 149 (36.8%) through books, magazines, and newspapers, 173 (42.7%) through television and radio, 115 (28.4%) through relatives and friends, 251 (62%) through academics and 28 (6.9%) indicated it was not through any of the listed sources. Academics was the most common source as shown by more than half of our participants.

Source of Information   What are your source of information of Breast Cancer?
405 responses

Source	Value
Health professionals	144 (35.6%)
Awareness campaign in the uni…	113 (27.9%)
Books, Magazine, Newspaper	149 (36.8%)
Television, Radio	173 (42.7%)
Relatives, Friends	115 (28.4%)
Social media	251 (62%)
Academics	95 (23.5%)
None of the above	28 (6.9%)

Figure 4.13: Source of BC Information
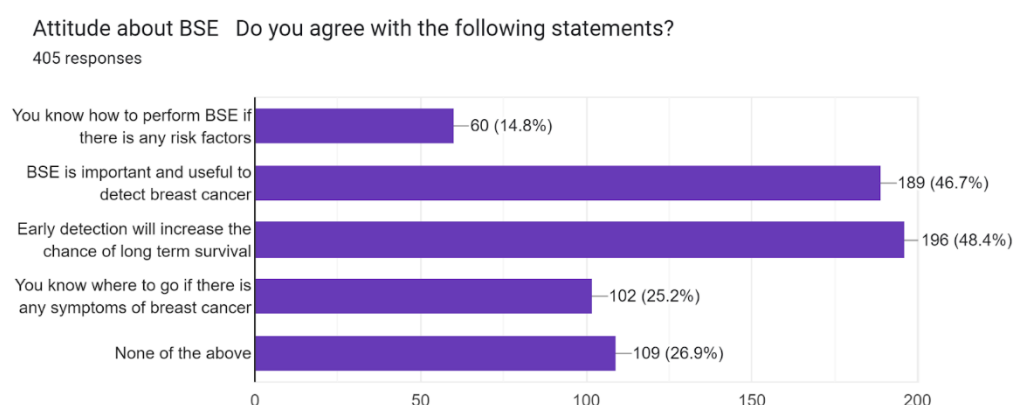
4.5 Perception of BSE

Moving on to perception of BSE, 45.9% (n=186) of them heard of BSE, 10.1% (n=41) of them know the way and appropriate timing to perform BSE, 7.9% (n=32) know the three position to perform BSE, 3.7% (n=15) believe that they are having good overall knowledge of BSE. However, nearly half of the respondents do not think any of the statements above are relevant and applicable to them. It can be said that this result is very contradictory because nearly half of the respondents heard about BSE, but half of them never had any ideas of BSE. Those who have some basic ideas of BSE are said to be having quite complete BSE knowledge and information from other sources because they know how and when to perform BSE, but not all of them have confidence in themselves because they did not think they had a good overall knowledge of BSE.

Perception about BSE   Is any of the following are applicable and relevant to you?
405 responses

Figure 4.14 Perception of BSE

48

4.6 Attitude towards BSE

Next, the participants' attitudes about BSE are analysed and drafted in Figure 4.15. 14.8% (n=60) know how to perform BSE if there are any risk factors, 46.7% (n=189) of them agree that BSE is important and useful to detect BC. Other than that, 48.4% (n=196) admit that early detection will increase the chance of long-term survival, 25.2% (n=102) know where to visit when they find out any BC symptoms and 26.9% (n=109) participants do not agree on any of the statement above. Almost half of them know the importance of BSE because they know the BSE is vital in early detection and increases the long-term survival rate. However, from the bar chart (Figure .12), we can know that not all of the people who know the importance of BSE will know how to perform BSE and know how to get medical assistance from professionals. Lastly, there are quarter of participants having a negative attitude towards BSE, bias attitude towards BSE will definitely cause a barrier towards early detection of BC.
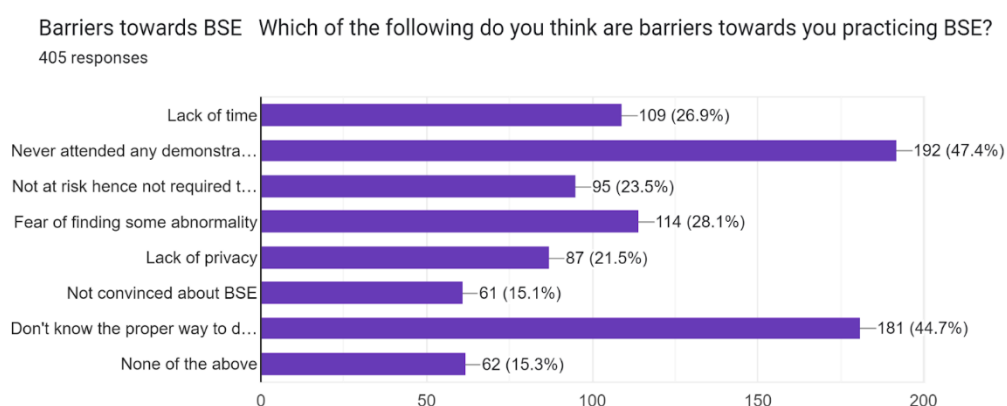

Attitude about BSE   Do you agree with the following statements?
405 responses

Figure 4.15 Attitude about BSE

4.6 Barriers towards BSE

Besides, the respondents also provided their feedback on barriers towards practising BSE. 26.9% (n=109) states that they are lacking time to practise BSE, 47.4%(n=192) does not do BSE because they never attended any demonstrations of BSE before, 23.5% (n=95) of them states that they are not practising because they think they are not at risk of getting BC. Moreover, 28.1% (n=114) being afraid of finding abnormality related to BC, 21.5% (n=87) thinks that BSE causes lack of privacy to them, 15.1%(n=61) are not convinced about BSE, 44.7% (n=181) do not know the proper way to do it. 15.3% (n=62) acknowledge that none of the statements above is a barrier to them in practising BSE. Overall, the biggest barrier of BSE practice is they never attended any demonstration classes of BSE. Maybe BSE is a professional practice for them, they do not have the confidence and fear to practise it unless they had attended a tutorial class physically. Other than lack of knowledge in BSE, fear of finding some abnormality and lack of time are the second most reported barriers. These results have been aligned in Schliemann et al. (2022) which reported that the most common barrier of BC screening in the Malaysian women population is fear of cancer diagnosis.

Figure 4.16 Barriers towards BSE

CHAPTER 5: DISCUSSION

5.1 Chapter overview

This chapter will further discuss the findings from the results and meet with the research objectives. Limitation of the study, recommendation for future study as well as a conclusion is included as well in this chapter.

5.2 Discussion

5.2.1 Demographic characteristics

In the current study, the mean age of the respondents is shown to be 20 with the standard deviation of 1.62. This quite aligns with another study targeting female undergraduate medical students in Taif, Saudi Arabia with mean age of 19.9 years and standard deviation of 1.5 years (Nemenqani et al., 2014). The research targets the young adult population because BC and BSE awareness are more ideal to have in young age before they reach the age of risk of BC (Alaudeen & Ganesan, 2019).

Other than that, male and female are both included in current study to improve the variation. Most of the studies did not include the male population and hence were lacking male non-medical perspective about level of knowledge of BC. Aludeen & Ganesan (2019) also mentioned male should not be restricted as the target population as that they may aid their wives, friends, relatives or even themselves which could suffer from BC in their community. Men usually play an important role in giving full support as well as their wives will be going through emotional and physical changes due to BC (Ghazi et al., 2017) .

Non-medical students are chosen in this study because there is a lack of study on non-medical students and there might be some response bias on medical students since they have some medical background.

5.2.2 Breast Cancer Knowledge Level

Current study revealed that the respondents have an unsatisfying level of BC knowledge. Approximately only 6.91% are classified as the medium level of the BC knowledge group while the others (93.09%) are categorised in the poor level of the BC knowledge group. Surprisingly, not even one respondent has a good level of BC knowledge. With the similar target population, (female non-medical students), Hassan et al. (2017) reported a contradicting result with the current study. 45.3% of them have a good BC knowledge level while 54.7% have a poor BC knowledge level. This might be due to the target population of Hassan et al. in 2017 is only female and females are generally more knowledgeable than the mixed population in terms of BC. This justification aligns with the current study results where there is almost two-fold of females (8.5%) being more knowledgeable when compared to male (4.7%).

Looking into another perspective, study done within female medical students shows 78.5% of overall good BC knowledge level (Alaudeen & Ganesan, 2019). Another research conducted among female staff of public universities in Malaysia, there are still more than half (50.9%) reported to have low overall knowledge scoring (Nor Afiah et al., 2011). The latter shows a similar finding with the current study. Thus, the programme of study is

important when investigating the level of BC knowledge as medical students have generally higher BC knowledge.

From experiences during the data collection process, there are a few things that are worth mentioning that might be the reasons for getting unsatisfying BC knowledge results. Firstly, even though a glossary part is included in the questionnaire with explanation of the terms, there are still quite several people who still do not understand the meaning of the words which might be due to the low English proficiency in the participants or the lack of professional or anatomical medical phrases learnt. Secondly, there were a minority of men when approached which do not take this study/matter seriously and laugh at the title/concept because they think they do not have the risk of getting BC and mock the study. Thirdly, the programme structure and syllabus of non-medical students may not include much information about BC and their social media content may not extend to medical information.

5.2.2.1 Risk Factors of Breast Cancer

Family history of BC has the highest correct response in present study (62.2%). Family history of BC is also the highest risk factor identified by over 90% of respondents in research done by Alaudeen & Ganesan in 2019. The result may be contributed by Malaysian women becoming more aware of genetic inheritance as a risk factor of BC. The current study revealed that the least risk factor of BC chosen the by respondents were carcinoma of endometrium and uterus. This might be because non-medical students think that the distance of the breast with endometrium and uterus are far from each

other which would no have an association when in fact carcinoma of endometrium or uterus are closely related to breast cancer.

Current study shows disappointing results with only family history of BC and females having more than 50% of correct responses. It is worth noting that statements related to menstrual history, breastfeeding history and pregnancy history have lower response rates (early menarche, late menopause, late childbirth, absent breast feeding, oral contraceptive pill usage). This finding is similar to results reported by Al-Dubai et al. (2011) and Akhtari-Zavare et al. (2011) which were both carried out in Malaysia. This might be due to the relationship status of the current research population where almost all of them are still not married and do not understand the effects or relationship of those phenomenon stated on the human body. For instance, single undergraduate female students probably do not consume oral contraceptive pills and thus do not know the side effects of oral contraceptive pills being a risk factor for BC (Akhtari-Zavare et al., 2011).

In addition, Alaudeen & Ganesan in 2019 reported that 58.5% of people are conscious of diets high in saturated fat as the emerging risk factor of BC. A slightly lesser percentage were found in the current study (44%) but it is slightly higher than the study done in Egypt (36.3%) (Abdel-Fattah et al., 2000). The slight increment may be due to people being more promoted and aware of the importance of a healthy lifestyle in social media nowadays. But in fact, nutrigenomics, which is a newly introduced domain of nutrition, is said to be investigating the influence of fatty acids on mammary gland development and BC (MacLennan & Ma, 2010).

5.2.2.2 Symptoms of Breast Cancer

Looking into symptoms of BC, 'bloody discharge from nipple' were chosen by a lesser percentage of respondents correctly(35.1%). On the contrary, results from Alaudeen & Ganesan (2019), Al-Dubai et al. (2011) and Nemenqani et al. (2014) states that bloody discharge from nipple is the most identified symptom with 50.2%, 71.2%, and 50% respectively. These research above only involve female women. The contradicting finding may be due to the male respondents having lesser awareness on nipple discharge on BC as they may feel their own nipple would not discharge any liquid. This aligns with the results reported by Ghazi et al. (2017) where male postgraduate and undergraduate students only have 40.4% of correct response on nipple discharge.

The most identified symptom of BC is 'lump in the breast' (64.4%, n=261) which is the same with other studies with 48%, 66.7% and 90.8% respectively (Nemenqani et al., 2014; Akhtari-Zavare et al., 2011; Al-Dubai et al., 2011). Lump in the breast is most easily identified by the respondent regardless of their study population demographic characteristics because people in general have a basic assumption of cancer is a condition where a cell grows uncontrollably. This links to the option of lump formation. This justification also applies to the high correct response in the change in shape and size of breast in the current study (45.9%, 44.2%) because lump formation affects the size of breast.

There are fewer people who could identify the change in nipple position, dimpling of breast skin and rashes or ulcer on nipple as the symptoms of BC in

the current study which aligned with other research results (Parsa et al., 2008; Nemenqani et al. 2014).

5.2.3 Factors associated with Breast Cancer Knowledge Level

Based on the findings of this study, race is the only factor that has shown to be having a significant effect on the level of BC knowledge [χ^2 (1, n=21) = 6.550, p=0.010]. The non-Chinese students were found to be 0.271 times more likely to be knowledgeable than the Chinese students. Similar findings had been found in both Loo et al. (2013) and Tan et al. (2010). But on the other hand, a study done by Al-Dubai et al. (2011) states that Indians had an average of 2.17 score higher compared to Malay and Chinese. The difference in knowledge level across the ethnic groups may be justified by the difference in tradition, beliefs, and lifestyles. Chinese students are more knowledgeable on cancer risk factors as cancer is more predominant among the Chinese than the other ethnic groups. This could cause Chinese students to be more concerned and seek more information on cancer prevention (Loo et al., 2013).

However, another study conducted within male students in Malaysia states that there is no association between race and the level of BC knowledge (Ghazi et al.,2017). The authors gave clarification that it may be due to the imbalance of races among respondents since there are lesser Chinese students (3.5%) in this study as compared to Malay (62.6%) and Indian (28.3%) (Ghazi et al.,2017). It is interesting to note that the current study is also having the imbalance of race respondents where the Chinese are the predominant participants. Future studies may look further into the effect of race on BC knowledge level.

There are no other factors found to have significant effect on level of BC knowledge in current study, however it is still necessary to look into findings of other researchers. Firstly, age is often being tied with level of education. As age increases, the level of education will generally increase as well. Research done in Saudi Arabia has shown results of women with higher levels of education having higher BC knowledge and older women having higher BC knowledge level (Amin et al., 2009). The findings are consistent in research done in Malaysia (Al-Dubai et al. ,2011; Ghazi et al., 2017). However, a study done in Mumbai, India, found that younger women are more knowledgeable than older women. This might be because of the poverty conditions experienced by older women in India during their younger years and cause them to not have the chance of getting education and ended up with the their low level of knowledge now.

Moving on to family income, similar findings from Ghazi et al. (2017) states that they found no association between family income and knowledge level in Malaysia. Contradictorily, women with higher levels of income had more knowledge than those who live in economically deprived and underprivileged populations in India (Ghazi et al., 2017). India has a Gini Coefficient of 64.3, whereas Malaysia has 58.9 (World Economics, n.d.). The Gini coefficient is an index where when nearer to zero, the income status of an individual or household within an economy deviates lesser from a perfectly equal distribution. Thus, Malaysia is said to have a more equal distribution of income, so they may have a more similar knowledge level from each other.

5.2.4 Source of Breast Cancer Knowledge

Current study shows social media is the main source of information for BC (62%) which aligns with a study done in University of Sharjah, United Arab Emirates where 74.7% of the target population have social media as their source of information for BC (Rahman et al., 2019). However, in a study conducted in 2011, Shah Alam, Malaysia, it was stated that the populations' main source of information for BC is through printed media such as books, brochures, and magazines (56.7%) (Al-Dubai et al., 2011). Although both study settings are in Malaysia, the current population has been affected by the Covid-19 Movement Control Order (MCO) period. In fact, Communications and Multimedia Ministry Secretary General mentioned that the number of social media usage had increased by two million from the year 2020 which coincided with the commencement of pandemic period and implementation of MCO which forced residents of Malaysia to stay at home to complete their work or classes online (TheStar, 2021). Malaysia's social media usage were reported to increase up to 86% of the total population in January 2021 (TheStar, 2021). Thus, high usage of social media for prolonged periods for entertainment and study purposes leads to higher chance of exposure to BC information through social media.

In the present study, following social media, mass media such as television, radio, books, magazines, newspaper, and health professionals are the common sources of information listed (42.7%, 36.8%, 35.6%). This is in consonance with findings from Rahman et al. (2019) and Ghazi et al. (2017). This might be because the younger generation is not as dependent on mass media as the older generation before them.

There are slightly fewer people who have BC sources of information from academics and awareness campaigns in the university (23.5%, 27.9%). This is probably because they are non-medical students, so their syllabus does not include information for BC. Other than that, non-medical students may have lesser interest in medical topics because usually the awareness campaigns are not comprehensive enough for them to understand. The terms used may be foreign to them and this disinterest them and acts as a barrier for them to gain new information.

5.2.5 Perception towards Breast Self-Examination

In current research, both the perceptions of 'heard of BSE' and 'none of the statements above' have more than 50% of people agreeing on it. 45.9% (n=186) respondents heard about BSE while 45.2% indicate that they have not heard about BSE before. However, in previous studies, most of them had results of more than two-third of the respondents hearing about BSE before (88.2%, 69.4%, 63.4%) (Hassan et al., 2017; Rahman et al., 2019; Boulos & Ghali, 2014). This may be due to the current research including male as the study population and giving a bigger picture on the perception of BSE. Other than that, they do not have any medical background and thus there is a higher probability that they have not heard about BSE before.

Unexpectedly, only less than 10% of respondents have basic understanding of BSE (when to perform, how to perform, positions to perform). A study conducted in the United Arab Emirates shows a higher percentage of understanding towards BSE (40.7%) (Rahman et al., 2019). This might be due to the lesser participants having heard of BSE and not all of them have interest

to know more about BSE when they are first introduced to BSE. Another possibility is that they do not have confidence in their understanding and did chose any statement regarding understanding of BSE.

5.2.6 Attitude towards Breast Self-Examination

In present study, nearly half of the respondents recognise the importance of BSE in early detection of BC and in its effect of increasing the long-term survival rate of individuals (46.7%, 48.4%). More than two-third of positive attitude findings (73.3%, 67%) were also portrayed in another study done in Terengganu, Malaysia (Rosmawati, 2010; Nemenqani et al., 2014). This good attitude of theirs is very promising in improving their BC knowledge and BSE practice. This will spark an interest in BC and in turn make them to be more enthusiastic in participating in upcoming BC awareness campaigns and workshop.

The current study sets off an alarm about community and society because even though they know the importance of BC, less than a quarter of respondents indicated that they know the proper way to perform BSE when they are at risk and do not know where to seek medical help from health professionals. This highlights the shortcoming of previous BC awareness campaign which may not have discussed and covered BSE thoroughly and failed to educate the proper and important aspects of BSE to the public.

Around a quarter of people (26.9%) stated that 'none of the above' applies to their current situation. This phenomenon might be due to the continuation of ignorance towards the topic of BC or that BC is a sensitive and shameful issue to be discussed further by the conservative community.

5.2.7 Barriers towards Breast Self-Examination

Results from Nemenqani et al. (2014) states that up to 45.7% of the female medical students do not perform BSE because they think they have no problem in their breast and only 23.5% from the current research do not perform BSE because they think they do not have BC risk. From my point of view, the barrier for medical students mostly is they do not discover any problem in their breast; thus, they are not doing. But in current study, non-medical students refrain from practising BSE mostly because they do not know the proper way to do it (44.7%) and never attended any demonstrations of BSE (47.4%). Similar results are shown in research done by Hassan et al. (2017) in female non-medical students. The population states that not knowing how to perform is the greatest barrier in performing BSE (40.7%). Thus, this shows the importance of education and campaigns of BSE to be held to increase their BSE knowledge and how to perform them.

The most common reason that women cited for not performing BSE is that they "forgot" and did not know the optimal time for doing a BSE (32%) (Akhtari-Zavare et al., 2011). Present study has similar results as well (26.9%). This might be due to both the study populations being undergraduate and postgraduate students. They usually are assigned with a lot of assignments and exams to be completed in each semester. Thus, some of them complained they have no time to do BSE as they need to focus on academics, and this may cause them to unconsciously forget about BSE.

In addition, around 28.1% of the respondents in the current study reported to be afraid of finding some abnormality in their breast. This situation

is faced during the data collection process where some eligible participants hesitated to fill in the questionnaire because they fear that they may get negative outcome from BSE after they came to know about BSE.

5.3 Limitation of study

The current study is limited by a few criteria. Firstly, this study is a cross sectional study design which is conducted at a certain point of time and is not a fitting source when examining any cause-and-effect relationship. This study also involves self-reporting responses by the participants so it might cause recall bias in between. Ambiguous or invalid answer should be expected because some of them do not understand some of the medical terms. The method of data collection through self-administered questionnaires was acceptable with respect to such personal and sensitive topics that involve BSE (Alaudeen & Ganesan, 2019). It also causes limitation to generalisation, meaning that the data collected from the non-medical student sample population does not represent the whole university non-medical students,

5.4 Recommendation for future research

Due to time constraints, this study is not done in depth, future study may work on the association of knowledge of BSE and level of practice of BSE in non-medical university students which involve male population. To my current reading and research, the latest published research on relating information is around the year 2017. Future research may also focus on other factors to investigate the causes of low knowledge level among non-medical students. Further research can also investigate factors in differences between knowledge and practice of BSE in non-medical population.

5.5 Conclusion

In conclusion, the overall findings shows that the non-medical Private university students are having poor levels of BC knowledge. The second major findings from the current study are that race is the only significant factor that is found to affect their level of BC knowledge. Other than that, social media is the major source of information for BC. An interesting finding from their perceptions towards BC was that nearly half of the respondents heard about BSE, but half of them don't have any ideas of BSE. Most of the respondent however are having a positive attitude, knowing the importance of BSE in early detection. The most common barrier that stops them from practising BSE regularly is that they do not know how to perform, and they are stating that they never attended any proper BSE demonstration before.

All the findings above suggested the need of giving a lifelong public health educational programme in BC which in-turn with a more positive attitude in BC and BSE. This wide gap of BC knowledge and BSE knowledge could be addressed by awareness campaigns being conducted in a more holistic way, targeting non-medical students. The relevant medical society should take initiative to organise more BSE workshop by inviting experienced speakers to teach BSE technique in a simpler manner.

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APPENDIX A – ETHICAL APPROVAL FORM

UTAR **UNIVERSITI TUNKU ABDUL RAHMAN**
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Re: U/SERC/224/2022

4 November 2022

Mr Muhammad Noh Zulfikri Bin Mohd Jamali
Head, Department of Physiotherapy
M. Kandiah Faculty of Medicine and Health Sciences
Universiti Tunku Abdul Rahman
Jalan Sungai Long
Bandar Sungai Long
43000 Kajang, Selangor

Dear Mr Muhammad Noh,

Ethical Approval For Research Project/Protocol

We refer to your application for ethical approval for your students' research project from Bachelor of Physiotherapy (Honours) programme enrolled in course UMFD3026. We are pleased to inform you that the application has been approved under <u>Expedited Review</u>.

The details of the research projects are as follows:

33.	Tibial Torsion and Leg Length Discrepancy in Idiopathic Scoliosis Among UTAR Students	Khoo Wan Qi	Pn Nadia Safirah Binti Rusli	
34.	Prevalence of Patellofemoral Pain Among University Students	Khoo Wen Han		
35.	Prevalence of Varicose Veins Among Fast Food Employees in Cheras, Selangor: A Cross Sectional Study	Ropheca Phuah Su Hui		
36.	The Effect of Unstable Modified Wall Squat on Dynamic Balance Among Recreational Athletes	Chu Sin Jiet	Mr Sathish Kumar Sadagobane	
37.	Knowledge, Perception, and Attitude Towards Breast Cancer and Breast Self-Examination (BSE) Among Non-medical Private University Students	Foo Jes Mynn		
38.	Perception, Knowledge and Attitude Towards the Impact of Daytime Nap on the Risk of Stroke Among Non-Healthcare Undergraduate Students: A Cross-Sectional Study	Chan Chi Kuan	Mr Tarun Amalnerkar Co-Supervisor: Ms Swapneela Jacob	4 November 2022 – 3 November 2023
39.	Awareness, Knowledge and Attitude Toward Orthostatic Hypotension Among Elderlies	Ch'ng Hui Kee		

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

Thank you.

Yours sincerely,

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

c.c   Dean, M. Kandiah Faculty of Medicine and Health Sciences
        Director, Institute of Postgraduate Studies and Research

APPENDIX B – KERJCIE AND MORGAN (1980) TABLE

TABLE 1
Table for Determining Sample Size from a Given Population

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—N is population size.
S is sample size.

APPENDIX C – QUESTIONNAIRE

KNOWLEDGE, PERCEPTION & ATTITUDE TOWARDS BREAST CANCER & BREAST SELF-EXAMINATION AMONG NON-MEDICAL PRIVATE UNIVERSITY STUDENTS

Hello there, you are invited to participate in a research study conducted by Foo Jes Mynn (20UMB00721), a student currently pursuing Bachelor of Physiotherapy (HONS) in Universiti Tunku Abdul Rahman (UTAR) Sungai Long campus. The purpose of the study is to determine the Knowledge, Perception & Attitude towards Breast Cancer & Breast Self-Examination among Non-Medical Private University students, your participation is highly valued and sought after.

Participation

The research study will require you to complete the following questionnaire which would take a roughly 10-15 minutes time at the maximum. Your participation in the study is completely voluntary and any withdrawal from any point of the study is allowed. You will need to be a UTAR student, aged 18-25 years old and is not a medical student (MK FMHS) to participate.

Confidentiality

The data and information provided will be kept confidential and only used for research purposes. All collected data will be abolished whenever possible.

Should you have any enquiries regarding the research study, I am contactable at jesmynn@1utar.my or 012-7381700. Please indicate your willingness to participate in the study by the questions below. Thank you and have a nice day.

Section A

Personal Data Protection Notice and Consent Form

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

1. Personal data refers to any information which may directly or indirectly identify a person which could include sensitive personal data and expression of opinion. Among others it includes:
   a) Name
   b) Identity card
   c) Place of Birth
   d) Address
   e) Education History
   f) Employment History
   g) Medical History
   h) Blood type
   i) Race
   j) Religion
   k) Photo
   l) Personal Information and Associated Research Data

2. The purposes for which your personal data may be used are inclusive but not limited to:
   a) For assessment of any application to UTAR
   b) For processing any benefits and services
   c) For communication purposes
   d) For advertorial and news

e) For general administration and record purposes
f) For enhancing the value of education
g) For educational and related purposes consequential to UTAR
h) For replying any responds to complaints and enquiries
i) For the purpose of our corporate governance
j) For the purposes of conducting research/ collaboration
3. Your personal data may be transferred and/or disclosed to third party and/or UTAR collaborative partners including but not limited to the respective and appointed
outsourcing agents for purpose of fulfilling our obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.
4. Any personal information retained by UTAR shall be destroyed and/or deleted in accordance with our retention policy applicable for us in the event such information is no longer required.
5. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

Consent:
1. By submitting or providing your personal data to UTAR, you had consented and agreed for your personal data to be used in accordance to the terms and conditions in the Notice and our relevant policy.
2. If you do not consent or subsequently withdraw your consent to the processing and disclosure of your personal data, UTAR will not be able to fulfill our obligations or to contact you or to assist you in respect of the purposes and/or for any other purposes related to the purpose.
3. You may access and update your personal data by writing to jesmynn@1utar.my or whatsapp at +60127381700

Acknowledgement of notice

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

Are you willing to participate in the study?

☐ Yes
☐ No

Please provide your signature down below

_____

Date of participation

Section B (Demographic data)

Age		Year of study	☐ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4
Gender	☐ Male ☐ Female	Family income	☐ <RM4850 ☐ >RM4850 & <RM10970 ☐ >RM10971
Race	☐ Malay ☐ Chinese ☐ Indian ☐ Others _____	Relationship status	☐ Single ☐ Married
Faculty	☐ LKCFES ☐ FEG ☐ FICT ☐ FS ☐ FAM ☐ FBF ☐ FAS ☐ FCI	Do you have family history of breast cancer?	☐ Yes ☐ No
Living area	☐ Rural ☐ Urban		
Do you have any of the following before?		☐ I have breast lump* before ☐ I have breast cyst* before	

Glossary
1. Breast lump: Mass that develops in your breast
2. Breast cyst: Non-cancerous (Benign), fluid-filled sac in the breast

Section C (Knowledge about Breast Cancer)

General Knowledge about Breast Cancer

Which of the following do you think are true?	☐ Breast cancer only develops in 1 breast ☐ Breast cancer is the most common cancer in Malaysia ☐ Women younger than 40 years old get breast cancer ☐ Mastectomy is the only way to treat breast cancer

Risk Factors for Breast Cancer

Which of the following do you think are risk factors for Breast Cancer?	☐ Aged 40-60 years old ☐ Female gender ☐ Have benign breast disease ☐ Unhealthy diet habits – Drink alcohol, Eat saturated fat or smoked meat ☐ Early menarche* ☐ Late menopause* ☐ Late childbirth (After 30 years/Nulliparity*) ☐ Under Hormone Replacement Therapy (HRT)* ☐ Absent breastfeeding ☐ Oral contraceptive pills* usage ☐ Family history of breast cancer ☐ Carcinoma* of endometrium* or uterus* ☐ Post radiation* exposure

Glossary for Risk Factors of Breast Cancer
1. **Benign**: unusual growths or other changes in the tissue that are not cancer
2. **Menarche**: the first occurrence of menstruation
3. **Menopause**: the time that marks the end of your menstrual cycles
4. **Nulliparity**: condition or state in which a woman has never given birth to a child or has never carried a pregnancy.
5. **Hormone Replacement Therapy (HRT)**: treatment that supplies women with hormones that are lost during the menopausal transition. It is used to relieve symptoms of the menopause.
6. **Oral Contraceptive pills**: Birth control pills. It is medications you take by mouth to prevent pregnancy.
7. **Carcinoma**: Carcinoma is cancer that forms in epithelial tissue. Epithelial tissue lines most of your organs, the internal passageways in your body (like your esophagus), and your skin.
8. **Endometrium**: The layer of tissue that lines the uterus.
9. **Uterus**: The hollow, pear-shaped organ in a woman's pelvis. The uterus is where a fetus (unborn baby) develops and grows. Also called womb.

10. **Radiation:** Energy emitted from a source is generally referred to as radiation. Examples include heat or light from the sun, microwaves from an oven, X rays from an X-ray tube and gamma rays from radioactive elements. Ionizing radiation can remove electrons from the atoms, i.e. it can ionize atoms.

Symptoms of Breast Cancer

Which physical feature do you think is an indicator of Breast Cancer? (You may refer to the picture below for visualisation purposes.)	☐ Change in nipple position (Nipple retraction or inversion) ☐ Change in size of breast or nipple ☐ Change in shape of breast or nipple ☐ Breast or armpit pain ☐ Discharge or bleeding from nipple ☐ Lump in the breast ☐ Lump under the armpit ☐ Rash or ulcer on the nipple ☐ Redness of breast skin ☐ Dimpling of the breast skin

Source of Information

What is your source of information for breast cancer?	☐ Health professionals ☐ Awareness campaign in the university ☐ Books, Magazine, Newspaper ☐ Television, Radio ☐ Relatives, Friends ☐ Social media ☐ Academics

Section D [Breast Self-Examination (BSE)]

Perception about BSE

Is any of the following applicable and relevant to you?	☐ You have heard of BSE ☐ You know how to perform BSE ☐ You know when the BSE should be performed ☐ You know the three position to perform BSE ☐ You have a good overall knowledge of BSE

Attitude about BSE

Do you agree with the following statements?	☐ You know how to perform BSE if there are any risk factors ☐ BSE is important and useful to detect breast cancer ☐ Early detection will increase the chance of long-term survival ☐ You know where to go if there is any symptoms of breast cancer

Barriers about BSE

Which of the following do you think are barriers towards you practicing BSE?	☐ Lack of time ☐ Never attended any demonstrations of BSE ☐ Not at risk hence not required to do so ☐ Fear of finding some abnormality ☐ Lack of privacy ☐ Not convinced about BSE ☐ Don't know the proper way to do it

Here is the end of the questionnaire.
Thank you for your time!

APPENDIX D – TURNITIN REPORT

Turnitin Originality Report

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Knowledge, Perception, and Attitude towards B...
By Foo Jes Mynn

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Tahir Mehmood Khan, Jamie Pik Yan Leong, Long Chiau Ming, Amer Hayat Khan. "Association of Knowledge and Cultural Perceptions of Malaysian Women with Delay in Diagnosis and Treatment of Breast Cancer: a Systematic Review", Asian Pacific Journal of Cancer Prevention, 2015

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CHAPTER 1: INTRODUCTION 1.1 Chapter overview This chapter includes the background of the study, putting forth the overview of the overall research context before introducing the research objectives, hypotheses, operational definition as well as the brief structure of this research project. 1.2 Background of study 1.2.1 Prevalence of Breast Cancer Breast cancer (BC) is the second most common cancer in the world and it is the most prevalent cancer in women worldwide and the highest BC incidents are reported in Australia, New Zealand and Northern Europe (Sham et al., 2022). 1.67 million of BC new cases are reported worldwide, accounting for 25% of all cancers in 2012. BC incidence, mortality and survival rates would be rather different in respective countries. The rate of BC increases drastically over the years with the age-standardised incidence rate ranging from 95 per 100,000 in more advanced countries to 20 per 100,000 in less advanced countries. According to Momenimovahed & Salehiniya (2019), approximately 24 % of the whole BC population are in the Asia-Pacific region, of which China is rated the highest, followed by Japan and Indonesia. In 2012, there were an estimated 277,054 BC diagnosed cases in East Asia. By 2050, the incidence rate may increase up to 3.2 million, which is double that from year 2012 incidence rate. The survival rate is strongly associated with accessibility to BC screening and therapeutic programs. For instance, the 1-year survival rate of BC in European countries, Scotland and Italy are 94.1% and 97.1% respectively. In the other way round, due to delayed diagnosis and treatment of BC provided, there are lower BC survival rates in African BC women. In terms of mortality rate, BC reported as the fifth leading cause of cancer death worldwide in 2012. BC is also the most common cause of death in less developed countries. BC is a multifactorial disease which most of the associated factors are not sufficient to cause BC by its own. These may be explained by advanced countries women who tend to be imposed by BC risk factors such as early menarche, nulliparity at giving first birth at older age, having lower parity and late menopause, usually after 50 years old (Bray et al., 2004). 1.2.2 Breast Cancer in Malaysia According to Director General of Health Malaysia, Tan Sri Dato' Seri Noor Hisham Bin Abdullah, cancer is one of the most important non- communicable diseases (NCDs) over the country due to its high prevalence over the years due to the ageing and unhealthy lifestyle of Malaysians. Furthermore, cancer has remained as one of five principal factors of national mortality for the past twenty years in Malaysia. The rate of cancer mortality increased from 9.34% to 11.82% in 2003 to 2018 (Ministry of Health Malaysia, 2021). BC increased rapidly in the past three decades and has become an underlying threat to females. For instance, approximately one in 19 females in Malaysia are facing lifetime risk, as compared to one in 8 in Europe and the United States (Edib et al., 2016). This may be due to the accessibility of healthcare facilities and services and the advancement in early detection of BC. Thus, it is not surprising that BC was rated the first among the common cancers in Malaysia. The age-standardised incidence rate for BC of females in 2016 was 34.1 per 100,000 and specifically 21,634 females were diagnosed with BC. Among all the BC patients, most of them reported stage II (34.5%), followed by stage III (25.1%), stage IV (22.8%) and stage I (17.5%) at time of diagnosis. It is observed that the majority of BC are detected at later stages which prompts that early diagnosis of female BC is needed. 1.2.3 Consequences of Breast Cancer to the community Well-financed cancer treatment is a huge challenge towards developed and developing countries. Economic income available to the community also decreased due to cancer and the economic burden of cancer affects individual well-being, family, and society (Mustapha, 2015). BC plays a detrimental role in country development as women play an important role in family and social well-being. The major effect of BC towards the individual includes the productivity and income effect. The direct and indirect cost is strongly associated with the decline in an individual's productivity and income level. Direct cost meant the treatment cost and health service expenditures of BC, while the indirect cost is the impact of illness towards their employment including hours of work lost, decrease in output per hour for the individual, labour supply loss and caregiver's assistance given to BC patients. Garau et al. (2015) explained how productivity is affected by the loss of labour-hours due to the illness and side effects of treatment, or even may be caused by BC premature mortality. Research done on the BC population in the United States states that the price of productive lost days per woman is within USD 680 and USD 5169 for older and younger sample populations respectively (Slater, 2020). It is not surprising that the highest age-standardised BC mortality is highest in sub- Saharan Africa (SSA). BC individuals in SSA cause

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that the highest age-standardised BC mortality is highest in sub- Saharan Africa (SSA). BC individuals in SSA cause disease burden, poverty rise, gender inequality, as well as maternal and neonatal mortality (Azubuike et al., 2018). Since SSA is one of the poorest countries, the disease-related-poverty will be the top burden and priority for the government to eradicate so that the fund can then be used in developing the countries' infrastructures, making the country a developing country (Odilovich & Najibullah ,2021). Individual wise, BC causes irreversible effects on individuals physically and mentally in the long term. Although it is controlled with various treatment methods, the patients are still hampered by the disease. There are notable negative effects in conjunction with cancer because the treatment itself is expensive, quality of life decreases, and cancer often leads to death (Mustapha, 2015). This is supported by the findings reported by Montazeri et al. in 2014, which suggests that even with cancer treatments being there for managing the disease, problems in terms of quality of life, pain, arm symptoms, and body image were still reported. Patients are also stagnant in functional scoring. Another study from Saudi Arabia (2022) also portrays low overall global quality of life among BC survivors. The low scoring shows the impact of BC and its treatment on all aspects of their daily life, particularly in physical, psychological, social and spiritual. Hassan et al. (2015) also reports that prevalence of depression and anxiety are high in Malaysia BC patients, especially in those who are younger, having low monthly income, and lacking financial and social support. 1.2.4 Threats and Measures taken by the Malaysia Government Through empowerment and awareness campaigns such as the National Strategic Plan For Cancer Control Programme (NSPCCP) (2016-2020), Malaysians are expected to have a basic understanding of BC. Prevention, screening, early diagnosis, treatment, rehabilitation, and survivorship were aimed to educate the public. There were a few threats identified by MOH Malaysia which for instance were the uneven numbers of oncologists in the public and private sector; financial catastrophe faced by 45% of the cancer patients, service inequity for secondary and tertiary care such as rural areas, especially in Sabah and Sarawak, and not forgetting the crucial factor for the high cases of BC, which is the low awareness of breast cancer in public (Ministry of Health Malaysia, 2021). Although the government has taken initiative in this issue, the uptake of opportunities in BC screening introduced by the Ministry of Health policy is still low and implementation being difficult due to lack of awareness in BC screening and struggles in accessing health care services, especially in rural areas (Htay et al., 2021). 1.2.5 Concluding Remarks In conclusion, this study assesses the factors associated with low awareness in BC. Furthermore, it also investigates the perception and attitude towards breast self-examination (BSE) that is important to observe for reflection and possible revision in the programmes to encourage practices of BSE which is beneficial for overall treatment of BC. 1.3 Research objectives 1. To determine the knowledge level of breast cancer in non-medical university students. 2. To identify the factors associated with the level of knowledge of breast cancer in non-medical university students. 3. To examine the perception towards BSE in non-medical university students 4. To examine the attitude towards BSE in non-medical university students. 1.4 Hypotheses H0i) The factors associated with the knowledge level of breast cancer cause a significant difference in the non-medical university students. H1i) The factors associated with the knowledge level of breast cancer does not cause a significant difference in the non-medical university students. 1.5 Operational definition a) Knowledge level is the score of the participants on their knowledge in BC in terms of general knowledge on BC, knowledge of risk factors of BC, and knowledge of symptoms of BC. The correct responses selected for each domain will equate towards a score of "1" and "0" for those wrong or missed out responses. The total score for each domain will be calculated and those less than 50% will be categorised into poor knowledge, 50-75% for medium knowledge and greater than 75% classified into good knowledge (Birhane et al., 2017).. b) Perception towards BSE is the responses the participants select based on the domain general knowledge towards BSE and attitude towards BSE will

be assessed through a different set of questions adapted specifically for it. The response with the most and least selection will reveal findings regarding the current perception towards breast cancer screening which may warrant further education or awareness to increase the overall knowledge in breast cancer screening. The attitude towards BSE can be known as well. c) Factors associated with knowledge of BC will be factors such as Age, Gender, Race, Living area, Year of study, Family income and relationship status that may or may not have a significant effect on the differences in each domain of knowledge of BC among non-medical UTAR students. d) University students will be academically active non-MK FMHS UTAR students that's aged 18-26 years old without family history of BC at time of recruitment, and without history of lumps or cyst found around their breast region. 1.6 Structure of research project In this research, Chapter 1 mainly will give the overview of study background which comprises research questions, research objectives, hypotheses and operational definition. Chapter 2 consists of literature review which reviews the relevant information of past research studies. Chapter 3 listed the research design, ethical approval, sampling design, research instrument, procedure of data collection and data coding. Chapter 4 includes the result of data collection and analysis as well as the hypothesis testing. Chapter 5 summarised the discussion of study findings, study limitations and suggestions to improve for future research. CHAPTER 2: LITERATURE REVIEW 2.1 Chapter overview This chapter will review the available resources online to make comparison between the findings and current knowledge on varied small topics derived from my research title. I will also try to identify and address the gap and extract the theories and arguments on relevant topics so that a good framework of my research is designed. 2.2 Factors associated with knowledge of Breast Cancer 2.2.1 Sex In case of the association of sex with knowledge of BC, there are a few studies that reported different findings. For instance, in one study done by Lee et al., in 2022, it was reported that there was no significant difference in awareness level between males and females in BC. This study has similar findings with another study in Iran and India, which states that the similarity of the level of knowledge between two sexes may be due to the majority of females in both Iran and India having poor education, limited access to medical facilities and having low socioeconomic status. Females that have less formal education in the United States also reported lower knowledge regarding BC (Farsi et al., 2020). Similarly, research done by Sayed et al. in 2019 states that 27% of women and 40% men know two or more BC signs and only 29% women and 45% men heard of mammography, clinical breast examination (CBE) and BSE. These results are surely correlated to nearly half of the women in the study population who do not receive any formal education and nearly all only attended primary school. On the flip side, there are few more studies supporting the statement that females have more BC knowledge (Elmore et al. 2005; Senthilvel et al. 2018; Farsi et al., 2020). Statistically, higher levels of consciousness were observed among female populations when comparing awareness of BC detection methods. This may be also due to lower prevalence of male BC globally compared to female populations. Another study done in the undergraduate student population portrays that female demonstrated higher awareness, knowledge, and attitude scores compared to males. The score differences between genders may be since females are more involved in cancer detection actions, particularly because cancer prevention campaigns have focused mainly on breast and cervical cancers which involve only females (Loo et al., 2013). Still, it is crucial to know because both genders share common risk factors for getting BC (Lv et al. 2013; White et al. 2011) 2.2.2 Age Generally, age is directly proportional to the knowledge level of BC. For example, in the research done by Al-Dubai et al. (2011), it was revealed that women aged 18- 29 years and 30-44 years on average had 2.9 score lower in knowledge compared to women aged more than 44 years. This study found that younger women had lower knowledge on BC in comparison to older ones. Amin et al. (2009) reported similar findings among Saudi women. This phenomenon may be explained by older age group women being at higher risk of breast cancer and so it is anticipated that a higher percentage of them are keener to know about BC and how to perform BSE regularly (Karayurt et al., 2008). 2.2.3 Race Malaysia is a multiracial country and races should not be neglected when it comes to the factors affecting the knowledge of BC. There is a contradiction between two journal articles published which are both set in

Malaysia. Al-Dubai et al. (2011) states that Indians had higher knowledge compared to Malay and Chinese. But there is no further clarification in this issue. On the other hand, another study published by Loo et al. in 2013, states that Chinese students in this study had significantly higher knowledge on cancer risk factors as compared to Indians and Malays. This result is consistent with that of Tan et al. (2010). The score differences across the ethnic groups may be explained by the difference in tradition, beliefs, and lifestyles. Chinese students may inquire more knowledge on cancer risk factors as cancer is more predominant among the Chinese than the other ethnic groups. This could cause Chinese students to be more concerned and seek more information on cancer prevention. 2.2.4 Financial status In terms of financial status, Liu et al. (2014) determined that awareness and knowledge of BC were associated with age, education level, occupation, marital status and household annual income. This research study is similar to the finding of Altintas et al. (2016) in which women in the population of 25-35 years old, having high educational levels and annual family income tend to be more aware of this information. Mean BSE self-efficacy scores of women whose income are more than expenses are significantly higher than those lower than their expenses. 2.2.5 Educational Level Study done by Al-Dubai et al. in 2011 reported that highly educated women are more likely to have higher knowledge on BC than less educated women. This finding was found consistent with findings of researchers in Iran, Saudi Arabia and the United States (Yavari & Pourhoseingholi, 2004; Amin et al., 2009; & Eileen, 2004). Only a tertiary level of education is able to predict the increasing awareness and practice of BC screening (Al-Dubai et al., 2011). 2.2.6 Academic type When we look at the perspective of academics, it is not surprising that students from the medical campus were more knowledgeable about BC risk factors compared with those from the Fine Arts and Design campuses. This may be attributable to the topics studied in the medical campus. Students from medical and health science faculty have higher exposure towards health information and this could explain the higher score when compared to non- medical and health science students (Boulos & Ghali, 2014). Non-medical and health science students may score low due to less knowledge in signs and symptoms listed due to them not being commonly seen and they may not understand the medical and anatomical terms in the questionnaire such as the 'retraction of nipple'. Thus, if the questionnaire is simplified in a more layman term, the non-medical students might have more understanding of the question and give a better score. 2.2.7 Family history of Breast Cancer In a study by Steven et al. (2018), the knowledge level of women regarding inheritance characteristics of BC and its risk reduction strategies was moderate in the study. However, more than half of the women would like to learn more information about the topic. Quillin et al. (2011) reported that a majority of women with daughters with BC had used outside resources to gain information about genetic patterns of BC and only 6% of them had talked to a genetic counsellor about their risk. A possible explanation for a strong relationship between practice of BSE and family history of BC might be that when women who have relative with breast cancer become more aware and this will encourage them to know more about BC and how to detect it early (Hassan et al., 2017). In conclusion, those studies including population having BC family history illustrated the occurrence of high knowledge and self-awareness towards BC. Hence, this population may induce response bias which will indirectly influence survey response as a whole and lower the accuracy and reliability of the research. 2.3 Source of information Before moving on to BC screening, we can first look at the literature relating to the BC source of information. It is also important that we investigate this section so that awareness and knowledge may be spread in the correct mass media more efficiently. A study conducted in 2019 in Klang Valley, Malaysia, states that the populations' main source of information for BC is through printed media (books, brochures and magazines) (56.7%). Television and radio is the second source followed by health professionals and friends and neighbours (Lee et al., 2022). When the target population is changed to university students however, social media such as Facebook, Twitter and Instagram may become their primary source of information. University students are more prone to be social media users. A study conducted in the University of Sharjah, United Arab Emirates states that 74.7% of the target population have social media as their source of information for BC. Television, and other mass media are their second choice of source of information which occurs due to the young undergraduate students' frequent usage of the Internet for entertainment and study purposes (Rahman et al., 2019). It is important to validate the sources of information for university students in Malaysia so that the BC awareness campaign can be coordinated in a more holistic

approach for different populations. 2.4 Breast Cancer Screening Next, early detection and emphasis on education of professionals and the public was attributed to progressive decline in mortality rate for BC in the United States (Vogel, 2000). On the other hand, inadequate knowledge on BC and its screening methods is said to be the primary factors of delay of BC detection. Currently, there are three types of widely practised BC screening methods in early detection of BC, which are mammography, CBE and BSE (Lam et al., 2008). Since this study is focusing on the knowledge, attitude and

perception of BSE, the literature review will only cover the scope of BSE. Despite being an easy and self-administered examination, in the research done by Boulos & Ghali in 2014, only 1.3% practice BSE regularly every month and 6.1% reported that they performed it irregularly. 2.4.1 Breast Self-Examination (BSE) Up till today, BC is not a vaccine-preventable disease with no immunisation discovered, but it is possible to diagnose and treat earlier with the aid of BSE (Sani et al., 2016). According to Dagne et al. (2019), BSE is one of the ways of early detection of BC which the woman observe and palpate herself in front of mirror with any of the signs and symptoms of breast changes for example, possible mass, bloody discharge, swelling, dimpling, retraction of nipples and other abnormalities. Since it is a non-invasive adjuvant, painless, easy to conduct, and cost efficient screening alternatives, it is recommended by the American Cancer Society and the European Commission to women over 20 years of age to do BSE once a month (Sani et al., 2016). Research shows women who do BSE monthly in the correct way are more likely to detect lumps at early stages of development. Early diagnosis of BC had a great influence on early treatment of BC (Okobia et al., 2006). Regarding the sensitivity and specificity, BSE's sensitivity and specificity are 58.3% and 87.4%, whereas mammography has 56% sensitivity and 14% specificity (Sani et al., 2016). According to the systematic review and meta-analysis on BSE among female university students in Ethiopia done by Kassie et al. in 2021, she states that BSE is an important method of screening to take in consideration especially in resource limited settings in low- middle income countries (LMICs) due to its feasible nature and easy execution by the targeted population. Sani et al. (2016) mentioned BSE is still the most effective way in detecting the BC when mammography is not affordable and available to LMICs population, especially in rural areas. Furthermore, BSE promotes quality of life and decreases morbidity and mortality because it creates BC awareness and improves self-responsibility for one's healthcare (Sani et al., 2016; Dagne et al., 2019). 2.4.2 Perception and Attitude towards Breast Self-Examination According to Suh et al. (2012), 74.2% of the sample population in developing country Cameroon, Africa heard about BSE. Around 59.2% of them know how to perform BSE with 35% of them doing it regularly(once a month) and 12.5% doing it once in 6 months. Surprisingly there are up to 40% of the sample population who have not done BSE before. Furthermore, Parsa et al. (2011) reported 90% of the participants heard about BSE, but only 19% of them performed BSE on every month. The prevalence of regular BSE practice among university students in Ethiopia ranges from 0% up to 26.4%. The random-effects model analysis has revealed that in this meta-analysis the estimated pooled prevalence of regular BSE practice among female university students in Ethiopia was 11.23% (Kassie et al 2021). This finding is in line with a study finding among female university students across 24 LMICs which has reported that 9.1% of students were practising BSE monthly. According to the study, the higher practice of monthly BSE (above 20%) was observed in Nigeria and Laos, and the lowest that is below 2% was found in India, Singapore, Russia, Bangladesh, and South Africa. This difference might emerge from the countries' health care policy because it is known that cancer in general is not a priority health problem for many LMICs (Parsa et al.,2011). Another systematic review and meta- analysis done in Ethiopia with female healthcare workers are having higher pooled

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prevalence of BSE practice (56.31%) as compared to a study among female university students by Kassie et al. in 2021 (Mekonnen, 2020). The finding (56.31%) in Ethiopia is shown to be lower in Nigeria (77.6%), this might be due to difference in settings of the study, which meta-analysis done in Ethiopia involves urban and rural area whereas Nigeria completed survey in urban area where there are better access in BC information. The differences may also be caused by different sociocultural values and religious beliefs. Looking into Malaysia, a study done by Al-Naggar et al (2011) states that more than half of the respondents (55.4%) reported they had ever practised BSE. Another study done in Malaysia by Akhtari-Zavare et al. (2013), more than 70% of them felt that BSE is not time consuming or troublesome but almost 50% also felt that it is not necessary for them to do and the need is not there since they do not have any breast problems at that point of time. The poor practice could be contributed by the apparently unconvincing and somewhat contradicting perceptions towards BSE found in this study. However, it is assured to find that the majority of them would have done BSE had they known the benefits. Looking into the perspective of irregular BSE respondents, the prevalence of irregular BSE practice reported in the Ethiopia universities ranges from 15.5% to 83.4%. In this meta-analysis, the estimated pooled prevalence of those who have ever practised BSE among university students was 33.28%. This finding is consistent with the study finding of the Ugandan study that 30% of the participants had performed BSE irregularly at least once. Similarly, the study conducted among female university students across 24 LMICs has indicated that 31.6% of the students had irregular self-breast-examination practices. According to the authors, the differences may be due to the differences in the discipline of study participants in medical and art streams. Study done by Dagne et al. (2019) states that although the majority of the respondents in Ethiopia scored high in BC knowledge questions (77.4%) and having a positive attitude towards this issue, they still do not practise BSE regularly. Up to 17.3% respondents admit that they do perform BSE irregularly. Moving on to the awareness of BSE, Suh et al. (2019) states that 25.6% of the participants are not aware of BSE (they never heard BSE, do not know how to perform and do not practise BSE) ; 39.2% are partially aware (heard of BSE, had some idea on how to perform BSE however do not often practise it); and 35% are substantially aware of BSE (heard of BSE, had some idea on how to perform it and practised it often) (Suh et al., 2012). Another study done in Nigeria had the same results of a high proportion of the study population (75%) being aware of BSE, but only 10.1% of them practised BSE for BC early- detection purposes (Suh et al., 2012). Furthermore, Akhtari-Zavare et al. (2013) states that there were significant differences between knowledge of BSE between those who practise BSE and those who did not practise BSE. Surprisingly, the mean knowledge score for those who did not practise BSE is higher than those who practised BSE. The results show to be aligned with Mafuvazde et al (2012) in their study among USA female college students reported 66% having knowledge of BSE, but only 50% of these students indicated that they practised BSE. This may be explained by the fact the awareness of breast cancer among the respondents could be attributed to the level of education of the respondents. Most of the participants also state that they forgot and feel BSE is unnecessarily to be done unless there are any suspicious signs and symptoms over the breast. They declare to practise BSE if they are aware of the importance of BSE. This just shows that understanding is very vital in disseminating knowledge. Thus, having knowledge does not equate to good practice, it must be combined with positive perception and attitude towards its benefits. 2.4.3 General Perceptions and Common Barriers in Breast Cancer Screening Generally, there are few factors that form the barrier and refrain women from doing BC screening. Common barriers of BC screening include inconvenience, worries, embarrassment, fear of pain, belief that mammography is unnecessary in the absence of symptoms and lack of knowledge of recommended guidelines (Naim, 2014). Sayed et al. (2019) mentioned that LMICs women such as Kenya usually had poor level of knowledge of signs of BC due to various barriers that restrict them from accessing BC healthcare. Those include socioeconomic status, religious and cultural issues, health care systems and infrastructure. For instance, research done by Sayed et al., in 2019 listed the possible reasons and barriers of women in Kenya not practising BSE, lack of knowledge about BSE (45%) takes up most frequent reason not practising BSE, followed by the perceptions and assumptions of not having any obvious breast problems (39%). The result of poor knowledge is the main barriers of low

BC screening practice as reported by Naim (2014), Godfrey et al., (2016) and Doumit et al. (2017) as well. Rakhshkhorshid et al. (2018) reported that limited health literacy (HL) is associated with low knowledge of breast cancer. Since the LMICs women generally are not having good social economic status, they are having low HL, which is a limited ability to get the available sources for information and services to make health-related decisions. Since some Kenya women are struggling in understanding the health-related information and having low education, they will share their health issues with their husband, usually relying on their husband making decisions for them (Sayed et al., 2019). Although there are no studies assessing the level of BC knowledge in Kenya men, the study done by Sayed et al. in 2019 proclaimed that 94% of husbands will still seek help for a breast lump either from clinician or traditional healer and 90% will give emotional support to their wives at the same time. Nonetheless, it is still good to know that the majority of the Malaysian population's HL is rated slightly higher than average score (35.5) in the healthcare, disease prevention and health promotion domain (49.1%, 44.2%, 47.5%). The lower HL population includes those who are older (49.5%), lower educational level (64.8%), and lower household income (49.5%). Overall HL status for Malaysia was classified as lower sufficiency level (Jaafar et al., 2021). Furthermore, women are having underlying insecurities and fear of being ditched by their husbands and replaced by others after being diagnosed as BC. Minorities are still scared of social rejection in BC diagnosis and BC treatment such as mastectomies (Sayed et al.2019). Schliemann et al. (2022) also reported that the most common barrier of BC screening in the Malaysian women population is fear of cancer diagnosis. Women that are

believed to have BC due to witchcraft or curse have limited decision-making autonomy to visit a proper healthcare facility, they usually are forced to meet traditional healers instead. They also think that traditional healers are more affordable and are more accessible since they are near to their house as compared to the recommended healthcare facility which is also a barrier to BC screening. Most of the interviewed women in Kenya said they must get permission from their husband or mother-in-law before visiting any healthcare facilities (Sayed et al.2019). Compared to Malaysia, married women that have childcare concerns complain that they would not have time spare for breast screening. Minorities of the Malay women reported that they do not get consent and approval from their husband to show their private parts to male clinician and healthcare providers (Schliemann et al., 2022). This strongly suggests the need for men to also be targeted in BC education and screening programmes because husbands are left out of breast health related issues and are needed to encourage their wives to have regular BSE once they find out any signs and symptoms of BC (Sayed et al.2019). In the study done by Sayed et al. (2019), some families from Kenya preferred traditional healers when they thought BC is involved in aes. They have a misconception of the level of trust in the health care system among the community volunteers than the traditional healers. They doubted the actual objective of BC community outreach activity due to previous experience. On the other hand, Malaysia having a minority of the population from rural areas raises the issue of language barriers, where the health care provider does not speak in their primary language, which restricts them to understand their own condition, do further screening and accept any healthcare management (Schliemann et al., 2022). Lastly, Sayed et al. (2019) mentioned that people in Kenya are constrained by the limited BSE educational programmes. It also stated that the BC early detection programme is not held at the correct place such as the antenatal clinic, which has a high visitors flowrate. CHAPTER 3: METHODS 3.1 Chapter overview This chapter will list the research methodology applied to this research project, including the study design, setting, sampling size, population, sampling method, inclusion and exclusion criteria and research instruments in detail.

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3.2 Research design The research design for this study was cross-sectional. Survey was done online and physically through distribution of the questionnaire to potential participants. Online questionnaire (Google Forms) was distributed to participants through Microsoft Teams and Whatsapp. Due to the poor response from online platforms, most of the participants were recruited physically at Universiti Tunku Abdul Rahman, KB block to target non-medical students. The target participants were Universiti Tunku Abdul Rahman students that were currently still active in their studies and the sampling method will be convenience sampling where the potential participants are be approached for recruitment of the study. 3.3 Ethical approval This study had obtained ethical approval from the Scientific and Ethical Review Committees (SERC) of UTAR. (Appendix A) 3.4 Sampling Design According to quotations from Divisions of Admissions and Credit Evaluation of UTAR, the amount of non-M. Kandiah Faculty of Medicine and Health Sciences (non-MK FMHS) students in Sg. Long Campus is 8,456. By using Krejcie and Morgan (1970) table (Appendix B), which determined the sample size of the study will be 368 participants. The target total sample size will be added by 10 percent, resulting in 405 (368+ 10%) participants to account for the dropout rate during the data collection process, reducing the error. 3.6 Inclusion and Exclusion criteria Participants will be included if they meet the following criteria: 1. Individuals aged from 18-year-old - 26-year-old 2. Cooperative foundation, undergraduate or postgraduate students enrolled in certified courses in UTAR Sungai Long campus. 3. Individuals who can read and write English. Participants will be excluded if they meet the following criteria: 1. Had comorbid conditions (Presence of breast lump and breast cyst) 2. Family history of BC All these criteria should be avoided to minimise the bias that will affect the accuracy of results of the study. 3.5 Research instrument The structured questionnaire in English versions consist of five javascript:void(0); following: Section I: Introduction to the research. An introductory overview regarding the resea─ ─is displayed for the participants with information about the researcher and the objectives of research. Section II: Personal data protection act and Consent form. UTAR personal data protection act and consent form is attached for review by the participants which is followed by the acknowledgement of notice and signature that is to be provided by the participants to continue with the survey. Section III: Demographic data questionnaire. It requires the participants to fill in information of their age, gender, race/ethnicity, faculty, living area, year of study, family income, relationship status and if they have family history of breast cancer or any comorbidities (Presence of breast lump or cyst). Living areas will be whether they are in rural or urban areas. Family income level will be based on the B40, M40 and T20 categories with B40 group pertaining to those that is reporting below RM4850 family income per month; M40 between RM4851 and RM10971 family income per month; T20 more than RM10971 family income per month (Romeli, 2021). Presence of comorbidities will be a multiple-choice question regarding if the patient has any history of presence of breast lump or cyst. Section IV: Adapted questionnaire on Knowledge about Breast cancer which is further divided into general knowledge about breast cancer, risk factors for breast cancer, symptoms of breast cancer, and their source of information for breast cancer is presented (Al-Dubai et al., 2011; Rahman et al., 2019). Section V: Adapted survey on the Perception towards Breast cancer screening which is further divided into perception about BSE, attitude towards BSE and barriers towards BSE is presented. (Birhane et al., 2017; Habib et al., 2010). Proposed questionnaire may be referred in Appendix C. 3.6 Procedure After the approval to conduct the research is received from the SERC of UTAR, the data collection process has begun. The questionnaire link generated in QR code has been shared through social media platforms such as the Microsoft Teams and WhatsApp, as well as printed QR code shown to the eligible participant. The participants should read through the Personal Data and Protection Statement and all the information in the first section before providing their signature and informed consent. Respondents were required to answer all the questions according to instructions. Email and contact number of the researcher are attached in the questionnaire if there were any enquiries. The data collected from the questionnaire was transferred to Microsoft Excel for data processing. Data editing and data coding will be done in Microsoft Excel whereas data analysis will be done in IBM SPSS Version 20. 3.7 Data analysis IBM SPSS Version 20 was used to statistically analyse the data collected. Descriptive statistics (first level of analysis) were used where mean and standard deviation will be derived for the knowledge score of breast cancer and frequency and percentage will be calculated for demographic data and relevant variables. Chi-square test will be used to assess for significant difference in score of knowledge level of breast cancer among the students in terms of all the independent variables. Logistics regression will be employed to further evaluate the overall effects of all independent variables on the knowledge level of breast cancer among the students. Therefore, for purposes of the data analysis, the independent variables (Age, Gender, Race, Faculty, Family income, living area, Year of Study & Relationship status) were recoded into dichotomous variables as tabulated in the following results section. CHAPTER 4: RESULTS 4.1 Chapter overview The following chapter features the findings after the data collection process for the research project. Demographic data of participants is presented first. Following that, the score and grouping of the BC Knowledge Level, results of the statistical tests and lastly hypothesis testing is elaborated. The results are being presented in the sequence of the descriptions first, then table and lastly the graphs if any. Of the 405 responses collected, there were no duplicate data, and all responses were included for analysis. 4.2 Demographic of population This subsection highlights the demographic data of the participants in form of graphs, descriptions, and tables summarizing the overall subsection. 4.2.1 Age group As shown in Figure 4.1, 266 (65.68%) of the respondents were in the 18-20 years old age group while the remaining 139 (34.32%) were 21-26 years old. The mean of age is 20 and its standard deviation is shown to be 1.62 (Table 4.1) Table 4.1: Age N (%) Mean (SD) Age 20 (1.62) 18-20 266 (65.7) 21-26 139 (34.3) Figure 4.1: Age group of participants. 4.2.2 Sex According to Table 4.2, it shows 57.78% (n=234) female and 42.22% (n=171) of male participants were recruited in this research. Table 4.2: Sex N (%) Sex Male 171 (42.22) Female 234 (57.78) Figure 4.2: Sex of participants. 4.2.3 Race According to Figure 4.3, there are 6.42% non-Chinese and 93.58% Chinese participated in this study. Table 4.3: Race N (%) Race Non-chinese 26 (6.42) Chinese 379 (93.58) Figure 4.3: Racial distribution of participants. 4.2.4 Programme There are only approximately one fifth of participants (n=97) taking Foundation and other 76.05% (n=308) taking their degree at this point of the survey period. Table 4.4: Programme of participants N (%) Programme Foundation 97 (23.95) Degree 308 (76.05) Figure 4.4: Programme of participants. 4.2.5 Year of Study From the perspective of year of study, almost half of the participants (n=224) are in Year 1 and the rest of 44.69% (n=181) are not from Year 1. Table 4.5: Year of Study of participants. N (%) Year of Study Year 1 224(55.31) Non-Year 1 181(44.69) Figure 4.5: Year of Study of participants. 4.2.6 Living Area Surprisingly, there are still around 22.22% (n=90) of the participants claiming that they are living in rural areas while 77.78% (n=315) of participants live in urban areas. Table 4.6: Living area of participants. N (%) Living Area Urban 315(77.78) Rural 90(22.22) Figure 4.9: Living area of participants. 4.2.7 Family income However, in terms of

family income distribution, there are more people from low- income families than high income families. For instance, there are 52.84% (n=214) participants from low-income families and 47.16% (n=191) participants from high income families. Table 4.7: Family income of participants. N (%) Family Income Low income 214 (52.84) High income 191 (47.16) Figure 4.7: Family income of participants 4.2.8 Relationship status Since the target population is university students, most of their relationships are single rather than married. Only 0.49% (n=2) are married out of 405 people, 99.51% (n=403) of respondents are single. Table 4.8: Relationship status of participants N (%) Relationship Status Single 403 (99.51) Married 2 (0.49) Figure 4.8: Relationship status of participants Table 4.9: Demographic data of participants Demographic data Frequency (%) Mean (SD) Age 20 (1.62) 18 82 (20.2) 19 102 (25.2) 20 82 (20.2) 21 55 (13.6) 22 57 (14.1) 23 18 (4.4) 24 5 (1.2) 25 3 (0.7) 26 1 (0.2) Sex Male 171 (42.2) Female 234 (57.8) Race Malay 2 (0.5) Chinese 379 (93.6) Indian 17 (4.2) Others 7 (1.7) Faculty FAM 51 (12.6) FAS 2 (0.5) FBF 1 (0.2) FCI 107 (26.4)

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FEG 1 (0.2) FICT 1(0.2) Foundation 97 (24.0) FS 8 (2.0) LKCFES 137 (33.8) Year of study Year 1 224 (55.43) Year 2 90 (22.2) Year 3 53 (13.1) Year 4 38 (9.4) Living area Urban 315 (77.8) Rural 90 (22.2) Family income B40 214 (52.8) M40 171 (42.4) T20 20 (4.9) Relationship status Single 403 (99.5) Married 2(0.5) 4.3 BC Knowledge Level This subsection presents the scores of the participants in each subsection questions as well as the corresponding grouping. Descriptions, graphs, and a summarizing table will be included. 4.3.1 General Knowledge about BC According to Figure 4.9, 57.8% (n=234) identified the only correct answer "BC is the most common cancer in Malaysia" from all the selection from this section, which is the highest selection being chosen. Although the others are incorrect, there are still quite several people who assume the statements are correct. For instance, most of them 183(45.2%) thought that the common age affected by BC is between 25-50 years old. Other than that 125 (30.9%) mistaken that women younger than 40 years old get BC. 66(16.3%) and 58(14.3%) answered "BC only develops in one breast" and "mastectomy is the only way to treat BC" respectively. There are 8.6% (n=35) of the minority who do not agree with any one of the statements listed. Figure 4.9: General Knowledge of BC 4.3.2 Risk factor of BC As for this section, family history and female are the only two having more than 50% correct responses. Family history has the most people getting the correct answer 252(62.2%). Second most identified risk factor of BC by the respondents is female gender, 233(57.5%). Furthermore, 44% (n=178) states that a diet that includes alcohol, saturated fat and smoked meat are the risk factors of BC. 43% (n=174) indicates that those aged between 40-60 years old are the risk factors of BC. There are only 31.4% (n=127) respondents acknowledging that benign breast disease is a risk factor of BC. The other risk factors such as early menarche, late menopause, late childbirth, under Hormone Replacement Treatment (HRT), absent breastfeeding, oral contraceptive pills usage, carcinoma of endometrium or uterus and post radiation exposure is not having correct response of over 30%. Carcinoma of endometrium or uterus have the lowest correct response among all the listed statements. There are 3% (n=12) identifying none of the above as the risk factor of BC. Figure 4.10: Risk Factor of BC 4.3.3 Symptoms of BC Looking at symptoms of BC, out of the 10 statements, there is only one statement listed as wrong. The most identified symptom of BC is 'lump in the breast' (64.4%, n=261). 61.5% (n=249) choose 'breast or armpit pain' and 45.9% (n=186) choose 'change in size of breast or nipple'. 36.3% (n=147) states that 'lump under the armpit' is the symptoms of BC while 35.1% (n=142) reports 'Discharge or bleeding from nipple' is one of the symptoms of BC. The only wrong statement in Figure 4.11, 'redness of breast skin' having 31.4%(n=127) acknowledges that it is the symptom of BC. Other options have less than 30% of correct responses, including 'change in nipple position', 'rash or ulcer on the nipple' and 'dimpling of the breast skin'. 2.7% (n=11) states that none of listed statement is the symptoms of BC Figure 4.11: Symptoms of BC 4.3.4 Overall BC Knowledge Score and Level After analysis, 377 (93.09%) of our participants were in the poor knowledge group, 28 (6.91%) were in the medium knowledge group and none of them were in the good knowledge group when it comes to BC knowledge. The mean and standard deviation for the knowledge score was 6.98 and 3.39 respectively. Table 4.10: BC Knowledge Score and Level of participants Freq (%) Mean (SD) BC Knowledge Score Poor Medium 377 (93.1) 28 (6.9) 6.98(3.39) Figure 4.12: BC Knowledge level of participants 4.3.5 Inferential analysis This subsection will outline the inferential analysis conducted for the research project which includes Chi-square test and Logistic regression to test for the factors associated with BC Knowledge level and subsequent hypothesis testing. 4.3.5.1 Factors associated with BC Knowledge Level Chi-square test (Table 4.10) was conducted to identify the factors associated with BC knowledge. Of all the factors, only race [$\chi 2$ (1, n=21) = 6.550, p=0.010] was found to be significantly associated with BC Knowledge level. The non-Chinese students were found to be 0.271 times more likely to be less knowledgeable than the Chinese students. Age group [$\chi 2$ (1, n=251) = 1.956, p=0.162]; Sex [$\chi 2$ (1, n=163) = 2.298, p=0.130]; Programme [$\chi 2$ (1, n=91) = 0.105, p=0.746]; Living area [$\chi 2$ (1, n=292) = 0.332, p=0.565]; and Family income [$\chi 2$ (1, n=197) = 0.749, p=0.387] were all found to not be significantly associated with BC Knowledge level. Table 4.11: Chi-square test results Knowledge level Poor Medium n (%) n (%) Age group 18-20 21-26 $\chi 2$ p-value Sex Male Female $\chi 2$ p-value Race Non-Chinese Chinese $\chi 2$ p-value Programme Foundation Degree $\chi 2$ p-value Living Area Urban Rural $\chi 2$ p-value Family income Low income High income $\chi 2$ p-value 251 (94.4) 126 (90.6) 1.956

0.162 163 (95.3) 214 (91.5) 2.298 0.130 21 (80.8) 356 (93.9) 6.550 0.010** 91 (93.8) 286 (92.9) 0.105 0.746 292 (53.8) 85 (94.4) 0.332 0.565 197 (92.1) 180 (94.2) 0.749 0.387 15 (5.6) 13 (9.4) 8 (4.7) 20 (8.5) 5 (19.2) 23 (6.1) 6 (6.2) 22 (7.1) 23 (7.3) 5 (5.6) 17 (7.9) 11 (5.8) 4.3.5.2 Predictors of BC Knowledge Level Logistic regression (Table 4.11) was further conducted to look at the overall effect each of the factors have on the student. After analysis, the model $\chi 2(7)$ = 9.891, P=0.195 with 6.1% variance (Nagelkerke R Square) was found to be insignificant with race still being the only factor detected. Non-Chinese students were 3.244 times more likely of having poorer knowledge towards BC than Chinese students. Table 4.12: Logistic regression results. OR p-value 95% CI for OR Lower Upper Age Sex Race Programme Year of study Living area Family income 0.991 0.860 0.322 2.574 0.552 0.175 0.2.33 3.962 3.244 0.039** 1.059 9.935 1.275 0.674 0.410 3.962 0.523 0.236 0.179 1.527 1.375 0.546 0.489 3.971 1.446 0.374 0.641 3.262 Logistic Regression: Reference for Age (18-20 years old), Sex (Male), Race (Non-Chinese), Programme (Foundation), Year of study (Year 1), Living Area (Urban), Family income (Low income) are as indicated. **Statistics are significant at p<0.05 4.3.5.3 Hypothesis Testing H0i) The factors associated with the knowledge level of breast cancer does not cause a significant difference in the non-medical university students. H1i) The factors associated with the knowledge level of breast cancer does cause a significant difference in the non-medical university students. The chi-square test (p=0.010) and logistic regression (0.039) conducted reveals a statistically significant association between race and BC Knowledge level. Therefore, the null hypothesis is rejected in favour of the alternate hypothesis where the factors associated with the knowledge level of breast cancer does cause a significant difference in the non-medical university students. 4.4 Source of Information When it comes to the sources of information for BC, 144 (35.6%) of our participants indicated it is through health professionals, 113 (27.9%) through awareness campaign in the university, 149 (36.8%) through books, magazines, and newspapers, 173 (42.7%) through television and radio, 115 (28.4%) through relatives and friends, 251 (62%) through academics and 28 (6.9%) indicated it was not through any of the listed sources. Academics was the most common source as shown by more than half of our participants. Figure 4.13: Source of BC Information 4.5 Perception of BSE Moving on to perception of BSE, 45.9% (n=186) of them heard of BSE, 10.1% (n=41) of them know the way and appropriate timing to perform BSE, 7.9% (n=32) know the three position to perform BSE, 3.7% (n=15) believe that they are having good overall knowledge of BSE. However, nearly half of the respondents do not think any of the statements above are relevant and applicable to them. It can be said that this result is very contradictory because nearly half of the respondents heard about BSE, but half of them never had any ideas of BSE. Those who have some basic ideas of BSE are said to be having quite complete BSE knowledge and information from other sources because they know how and when to perform BSE, but not all of them have confidence in themselves because they did not think they had a good overall knowledge of BSE. Figure 4.14 Perception of BSE 4.6 Attitude towards BSE Next, the participants' attitudes about BSE are analysed and drafted in Figure 4.15. 14.8% (n=60) know how to perform BSE if there are any risk factors, 46.7% (n=189) of them agree that BSE is important and useful to detect. Other than that, 48.4% (n=196) admit that early detection will increase the chance of long-term survival, 25.2% (n=102) know where to visit when they find out any BC symptoms and 26.9% (n=109) participants do not agree on any of the statement above. Almost half of them know the importance of BSE because they know the BSE is vital in early detection and increases the long-term survival rate. However, from the bar chart (Figure .12), we can know that not all of the people who know the importance of BSE will know how to perform BSE and know how to get medical assistance from professionals. Lastly, there are quarter of participants having a negative attitude towards BSE, bias attitude towards BSE will definitely cause a barrier towards

early detection of BC. Figure 4.15 Attitude about BSE 4.6 Barriers towards BSE Besides, the respondents also provided their feedback on barriers towards practising BSE. 26.9% (n=109) states that they are lacking time to practise BSE, 47.4%(n=192) does not do BSE because they never attended any demonstrations of BSE before, 23.5% (n=95) of them states that they are not practising because they think they are not at risk of getting BC. Moreover, 28.1% (n=114) being afraid of finding abnormality related to BC, 21.5% (n=87) thinks that BSE causes lack of privacy to them, 15.1%(n=61) are not convinced about BSE, 44.7% (n=181) do not know the proper way to do it. 15.3% (n=62) acknowledge that none of the statements above is a barrier to them in practising BSE. Overall, the biggest barrier of BSE practice is they never attended any demonstration classes of BSE. Maybe BSE is a professional practice for them, they do not have the confidence and fear to practise it unless they had attended a tutorial class physically. Other than lack of knowledge in BSE, fear of finding some abnormality and lack of time are the second most reported barriers. These results have been aligned in Schliemann et al. (2022) which reported that the most common barrier of BC screening in the Malaysian women population is fear of cancer diagnosis. Figure 4.16 Barriers towards BSE CHAPTER 5: DISCUSSION 5.1 Chapter overview This chapter will further discuss the findings from the results and meet with the research objectives. Limitation of the study, recommendation for future study as well as a conclusion is included as well in this chapter. 5.2 Discussion 5.2.1 Demographic characteristics In the current study, the mean age of the respondents is shown to be 20 with the standard deviation of 1.62. This quite aligns with another study targeting female undergraduate medical students in Taif, Saudi Arabia with mean age of 19.9 years and standard deviation of 1.5 years (Nemenqani et al., 2014). The research targets the young adult population because BC and BSE awareness are more ideal to have in young age before they reach the age of risk of BC (Alaudeen & Ganesan, 2019). Other than that, male and female are both included in current study to improve the variation. Most of the studies did not include the male population and hence were lacking male non-medical perspective about level of knowledge of BC. Aludeen & Ganesan (2019) also mentioned male should not be restricted as the target population as that they may aid their wives, friends, relatives or even themselves which could suffer from BC in their community. Men usually play an important role in giving full support as well as their wives will be going through emotional and physical changes due to BC (Ghazi et al., 2017) . Non-medical students are chosen in this study because there is a lack of study on non- medical students and there might be some response bias on medical students since they have some medical background. 5.2.2 Breast Cancer Knowledge Level Current study revealed that the respondents have an unsatisfying level of BC knowledge. Approximately only 6.91% are classified as the medium level of the BC knowledge group while the others (93.09%) are categorised in the poor level of the BC knowledge group. Surprisingly, not even one respondent has a good level of BC knowledge. With the similar target population, (female non-medical students), Hassan et al. (2017) reported a contradicting result with the current study. 45.3% of them have a good BC knowledge level while 54.7% have a poor BC knowledge level. This might be due to the target population of Hassan et al. in 2017 is only female and females are generally more knowledgeable than the mixed population in terms of BC. This justification aligns with the current study results where there is almost two-fold of females (8.5%) being more knowledgeable when compared to male (4.7%). Looking into another perspective, study done within female medical students shows 78.5% of overall good BC knowledge level (Alaudeen & Ganesan, 2019). Another research conducted among female staff of public universities in Malaysia, there are still more than half (50.9%) reported to have low overall knowledge scoring (Nor Afiah et al., 2011). The latter shows a similar finding with the current study. Thus, the programme of study is important when investigating the level of BC knowledge as medical students have generally higher BC knowledge. From experiences during the data collection process, there are a few things that are worth mentioning that might be the reasons for getting unsatisfying BC knowledge results. Firstly, even though a glossary part is included in the questionnaire with explanation of the terms, there are still quite several people who still do not understand the meaning of the words which might be due to the low English proficiency in the participants or the lack of professional or anatomical medical phrases learnt. Secondly, there were a minority of men

when approached which do not take this study/matter seriously and laugh at the title/concept because they think they do not have the risk of getting BC and mock the study. Thirdly, the programme structure and syllabus of non-medical students may not include much information about BC and their social media content may not extend to medical information. 5.2.2.1 Risk Factors of Breast Cancer Family history of BC has the highest correct response in present study (62.2%). Family history of BC is also the highest risk factor identified by over 90% of respondents in research done by Alaudeen & Ganesan in 2019. The result may be contributed by Malaysian women becoming more aware of genetic inheritance as a risk factor of BC. The current study revealed that the least risk factor of BC chosen the by respondents were carcinoma of endometrium and uterus. This might be because non-medical students think that the distance of the breast with endometrium and uterus are far from each other which would no have an association when in fact carcinoma of endometrium or uterus are closely related to breast cancer. Current study shows disappointing results with only family history of BC and females having more than 50% of correct responses. It is worth noting that statements related to menstrual history, breastfeeding history and pregnancy history have lower response rates (early menarche, late menopause, late childbirth, absent breast feeding, oral contraceptive pill usage). This finding is similar to results reported by Al-Dubai et al. (2011) and Akhtari-Zavare et al. (2011) which were both carried out in Malaysia. This might be due to the relationship status of the current research population where almost all of them are still not married and do not understand the effects or relationship of those phenomenon stated on the human body. For instance, single undergraduate female students probably do not consume oral contraceptive pills and thus do not know the side effects of oral contraceptive pills being a risk factor for BC (Akhtari-Zavare et al., 2011). In addition, Alaudeen & Ganesan in 2019 reported that 58.5% of people are conscious of diets high in saturated fat as the emerging risk factor of BC. A slightly lesser percentage were found in the current study (44%) but it is slightly higher than the study done in Egypt (36.3%) (Abdel-Fattah et al., 2000). The slight increment may be due to people being more promoted and aware of the importance of a healthy lifestyle in social media nowadays. But in fact, nutrigenomics, which is a newly introduced domain of nutrition, is said to be investigating the influence of fatty acids on mammary gland development and BC (MacLennan & Ma, 2010). 5.2.2.2 Symptoms of Breast Cancer Looking into symptoms of BC, 'bloody discharge from nipple' were chosen by a lesser percentage of respondents correctly(35.1%). On the contrary, results from Alaudeen & Ganesan (2019), Al-Dubai et al. (2011) and Nemenqani et al. (2014) states that bloody discharge from nipple is the most identified symptom with 50.2%, 71.2%, and 50% respectively. These research above only involve female women. The contradicting finding may be due to the male respondents having lesser awareness on nipple discharge on BC as they may feel their own nipple would not discharge any liquid. This aligns with the results reported by Ghazi et al. (2017) where male postgraduate and undergraduate students only have 40.4% of correct response on nipple discharge. The most identified symptom of BC is 'lump in the breast' (64.4%, n=261) which is the same with other studies with 48%, 66.7% and 90.8% respectively (Nemenqani et al., 2014; Akhtari-Zavare et al., 2011; Al-Dubai et al., 2011). Lump in the breast is most easily identified by the respondent regardless of their study population demographic characteristics because people in general have a basic assumption of cancer is a condition where a cell grows uncontrollably. This links to the option of lump formation. This justification also applies to the high correct response in the change in shape and size of breast in the current study (45.9%, 44.2%) because lump formation affects the size of breast. There are fewer people who could identify the change in nipple position, dimpling of breast skin and rashes or ulcer on nipple as the symptoms of BC in the current study which aligned with other research results (Parsa et al., 2008; Nemenqani et al. 2014). 5.2.3 Factors associated with Breast Cancer Knowledge Level Based on the findings of this study, race is the only factor that has shown to be having a significant effect on the level of BC knowledge [χ2 (1, n=21) = 6.550, p=0.010]. The non- Chinese students were found to be 0.271 times more likely to be knowledgeable than the Chinese students. Similar findings had been found in both Loo et al. (2013) and Tan et al. (2010). But on the other hand, a study done by Al-Dubai et al. (2011) states that Indians had an average of 2.17 score higher compared to Malay and Chinese. The difference in knowledge level across the ethnic groups may be justified by the difference in tradition, beliefs, and

(3.5%) in this study as compared to Malay (62.6%) and Indian (28.3%) (Ghazi et al.,2017). It is interesting to note that the current study is also having the imbalance of race respondents where the Chinese are the predominant participants. Future studies may look further into the effect of race on BC knowledge level. There is no other factors found to have significant effect on level of BC knowledge in current study, however it is still necessary to look into findings of other researchers. Firstly, age is often being tied with level of education. As age increases, the level of education will generally increase as well. Research done in Saudi Arabia has shown results of women with higher levels of education having higher BC knowledge and older women having higher BC knowledge level (Amin et al., 2009). The findings are consistent in research done in Malaysia (Al-Dubai et al., 2011; Ghazi et al., 2017). However, a study done in Mumbai, India, found that younger women are more knowledgeable than older women. This might be because of the poverty conditions experienced by older women in India during their younger years and cause them to not have the chance of getting education and ended up with the their low level of knowledge now. Moving on to family income, similar findings from Ghazi et al. (2017) states that they found no association between family income and knowledge level in Malaysia. Contradictorily, women with higher levels of income had more knowledge than those who live in economically deprived and underprivileged populations in India (Ghazi et al., 2017). India has a Gini Coefficient of 64.3, whereas Malaysia has 58.9 (World Economics, n.d.). The Gini coefficient is an index where when nearer to zero, the income status of an individual or household within an economy deviates lesser from a perfectly equal distribution. Thus, Malaysia is said to have a more equal distribution of income, so they may have a more similar knowledge level from each other. 5.2.4 Source of Breast Cancer Knowledge Current study shows social media is the main source of information for BC (62%) which aligns with a study done in University of Sharjah, United Arab Emirates where 74.7% of the target population have social media as their source of information for BC (Rahman et al., 2019). However, in a study conducted in 2011, Shah Alam, Malaysia, it was stated that the populations' main source of information for BC is through printed media such as books, brochures, and magazines (56.7%) (Al-Dubai et al., 2011). Although both study settings are in Malaysia, the current population has been affected by the Covid-19 Movement Control Order (MCO) period. In fact, Communications and Multimedia Ministry Secretary General mentioned that the number of social media usage had increased by two million from the year 2020 which coincided with the commencement of pandemic period and implementation of MCO which forced residents of Malaysia to stay at home to complete their work or classes online (TheStar, 2021). Malaysia's social media usage were reported to increase up to 86% of the total population in January 2021 (TheStar, 2021). Thus, high usage of social media for prolonged periods for entertainment and study purposes leads to higher chance of exposure to BC information through social media. In the present study, following social media, mass media such as television, radio, books, magazines, newspaper, and health professionals are the common sources of information listed (42.7%, 36.8%, 35.6%). This is in consonance with findings from Rahman et al. (2019) and Ghazi et al. (2017). This might be because the younger generation is not as dependent on mass media as the older generation before them.

There are slightly fewer people who have BC sources of information from academics and awareness campaigns in the university (23.5%, 27.9%). This is probably because they are non-medical students, so their syllabus does not include information for BC. Other than that, non-medical students may have lesser interest in medical topics because usually the awareness campaigns are not comprehensive enough for them to understand. The terms used may be foreign to them and this disinterest them and acts as a barrier for them to gain new information. 5.2.5 Perception towards Breast Self-Examination In current research, both the perceptions of 'heard of BSE' and 'none of the statements above' have more than 50% of people agreeing on it. 45.9% (n=186) respondents heard about BSE while 45.2% indicate that they have not heard about BSE before. However, in previous studies, most of them had results of more than two-third of the respondents hearing about BSE before (88.2%, 69.4%, 63.4%) (Hassan et al., 2017; Rahman et al., 2019; Boulos & Ghali, 2014). This may be due to the current research including male as the study population and giving a bigger picture on the perception of BSE. Other than that, they do not have any medical background and thus there is a higher probability that they have not heard about BSE before. Unexpectedly, only less than 10% of respondents have basic understanding of BSE (when to perform, how to perform, positions to perform). A study conducted in the United Arab Emirates shows a higher percentage of understanding towards BSE (40.7%) (Rahman et al., 2019). This might be due to the lesser participants having heard of BSE and not all of them have interest to know more about BSE when they are first introduced to BSE. Another possibility is that they do not have confidence in their understanding and did chose any statement regarding understanding of BSE. 5.2.6 Attitude towards Breast Self-Examination In present study, nearly half of the respondents recognise the importance of BSE in early detection of BC and in its effect of increasing the long-term survival rate of individuals (46.7%, 48.4%). More than two-third of positive attitude findings (73.3%, 67%) were also portrayed in another study done in Terengganu, Malaysia (Rosmawati, 2010; Nemenqani et al., 2014). This good attitude of theirs is very promising in improving their BC knowledge and BSE practice. This will spark an interest in BC and in turn make them to be more enthusiastic in participating in upcoming BC awareness campaigns and workshop. The current study sets off an alarm about community and society because even though they know the importance of BC, less than a quarter of respondents indicated that they know the proper way to perform BSE when they are at risk and do not know where to seek medical help from health professionals. This highlights the shortcoming of previous BC awareness campaign which may not have discussed and covered BSE thoroughly and failed to educate the proper and important aspects of BSE to the public. Around a quarter of people (26.9%) stated that 'none of the above' applies to their current situation. This phenomenon might be due to the continuation of ignorance towards the topic of BC or that BC is a sensitive and shameful issue to be discussed further by the conservative community. 5.2.7 Barriers towards Breast Self-Examination Results from Nemenqani et al. (2014) states that up to 45.7% of the female medical students do not perform BSE because they think they have no problem in their breast and only 23.5% from the current research do not perform BSE because they think they do not have BC risk. From my point of view, the barrier for medical students mostly is they do not discover any problem in their breast; thus, they are not doing it. But in current study, non-medical students refrain from practising BSE mostly because they do not know the proper way to do it (44.7%) and never attended any demonstrations of BSE (47.4%). Similar results are shown in research done by Hassan et al. (2017) in female non-medical students. The population states that not knowing how to perform is the greatest barrier in performing BSE (40.7%). Thus, this shows the importance of education and campaigns of BSE to be held to increase their BSE knowledge and how to perform them. The most common reason that women cited for not performing BSE is that they "forgot" and did not know the optimal time for doing a BSE (32%) (Akhtari-Zavare et al., 2011). Present study has similar results as well (26.9%). This might be due to both the study populations being undergraduate and postgraduate students. They usually are assigned with a lot of assignments and exams to be completed in each semester. Thus, some of them complained they have no time to do BSE as they need to focus on academics, and this may cause them to unconsciously forget about BSE. In addition, around 28.1% of the respondents in the current study reported to be afraid of finding some abnormality in their breast. This situation is faced during the data collection process

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where some eligible participants hesitated to fill in the questionnaire because they fear that they may get negative outcome from BSE after they came to know about BSE. 5.3 Limitation of study The current study is limited by a few criteria. Firstly, this study is a cross sectional study design which is conducted at a certain point of time and is not a fitting source when examining any cause-and-effect relationship. This study also involves self-reporting responses by the participants so it might cause recall bias in between. Ambiguous or invalid answer should be expected because some of them do not understand some of the medical terms. The method of data collection through self-administered questionnaires was acceptable with respect to such personal and sensitive topics that involve BSE (Alaudeen & Ganesan, 2019). It also causes limitation to generalisation, meaning that the data collected from the non-medical student sample population does not represent the whole university non-medical students, 5.4 Recommendation for future research Due to time constraints, this study is not done in depth, future study may work on the association of knowledge of BSE and level of practice of BSE in non-medical university students which involve male population. To my current reading and research, the latest published research on relating information is around the year 2017. Future research may also focus on other factors to investigate the causes of low knowledge level among non-medical students. Further research can also investigate factors in differences between knowledge and practice of BSE in non-medical population. 5.5 Conclusion In conclusion, the overall findings shows that the non-medical Private university students are having poor levels of BC knowledge. The second major findings from the current study are that race is the only significant factor that is found to

affect their level of BC knowledge. Other than that, social media is the major source of information for BC. An interesting finding from their perceptions towards BC was that nearly half of the respondents heard about BSE, but half of them don't have any ideas of BSE. Most of the respondent however are having a positive attitude, knowing the importance of BSE in early detection. The most common barrier that stops them from practising BSE regularly is that they do not know how to perform, and they are stating that they never attended any proper BSE demonstration before. All the findings above suggested the need of giving a lifelong public health educational programme in BC which in-turn with a more positive attitude in BC and BSE. This wide gap of BC knowledge and BSE knowledge could be addressed by awareness campaigns being conducted in a more holistic way, targeting non-medical students. The relevant medical society should take initiative to organise more BSE workshop by inviting experienced speakers to teach BSE technique in a simpler manner.

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