FACTORS AFFECTING CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) RISK AWARENESS AMONG ADULTS EXPOSED TO ACTIVE AND SECOND-HAND SMOKE

BY

TEE JOO EER

WONG SIUW YING

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PREFACE

This study is very important for the completion of our undergraduate course which is Bachelor of Business Administration (Honours) Healthcare Management offered by Universiti Tunku Abdul Rahman. The topic of this study is "Chronic Obstructive Pulmonary Disease (COPD) Risk Awareness among Adults Exposed to Active and Second-Hand Smoke". Hence, this study is carried out to find out what factors can significantly influence the COPD risk awareness among adults exposed to active and second-hand smoke in Malaysia.

COPD is one of leading cause of death Malaysia. However, the burden of COPD is underestimated, and the risk awareness of COPD still remain low, especially among the high-risk groups, adults exposed to active and second-hand smoke. Therefore, every party including the governments, employers, healthcare providers, and other relevant stakeholders need to play their own role and help increase COPD risk awareness. This can be done by understanding factors affecting their awareness and conducting awareness raising activities.

Therefore, this study examines COPD risk awareness because it can reveal the awareness level and help in early detection. This study studies the influences of four factors, which are perceived severity of COPD, perceived benefits of health screening, perceived barriers, and perceived self-efficacy, on the COPD risk awareness among adults exposed to active and second-hand smoke. This study can offer important insights to the governments, employers, healthcare providers, and other relevant stakeholders into how they can improve COPD risk awareness among adults exposed to active and second-hand smoke.

ABSTRACT

Although the medical infrastructure and health literacy are more and more well-developed and discovered, the risk of being diagnosed with chronic disease, COPD, still lacks awareness. Therefore, several studies on smokers' COPD awareness have been carried out in different countries. However, even though studies found that smokers have low awareness of COPD risk, other categories of smokers that involve passively smoking are often overlooked. Hence, the Health Belief Model was utilized in this study to determine how the perceived severity of COPD, perceived benefits of health screening, perceived barriers, and perceived self-efficacy affect COPD risk awareness among adults exposed to active and second-hand smoke. The quantitative approach is conducted to collect and analyse data for the research. Respondents are being selected through cluster sampling, and 606 respondents among adults exposed to active and second-hand smoke answered the questionnaire distributed. Then, the Statistical Package for the Social Sciences (SPSS) version 30.0 was used to carry out a Multiple Linear Regression Analysis. The results of the study found that four independent variables, perceived severity of COPD, perceived benefits of health screening, perceived barriers, and perceived self-efficacy, are all significant to COPD risk awareness. Hence, in order to increase the awareness of COPD risk among adults exposed to active and second-hand smoke, it is recommended that governments, employers, healthcare providers, and other relevant stakeholders should further concentrate on the factors like perceived severity, perceived benefits, perceived barriers, and perceived self-efficacy and raise awareness on COPD chronic conditions that exposed to health problems.

(249 words)

Keywords: COPD, Perceived Severity, Perceived Benefits of Health Screening, Perceived Barriers, Perceived Self-Efficacy

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LIST OF ABBREVIATIONS

COPD	Chronic Obstructive Pulmonary Disease
COPDKB	COPD Knowledge Base
CSR	corporate social responsibility
DV	dependent variable
GOLD	Global Initiative for Chronic Obstructive Lung Disease
HBM	Health Belief Model
HCAB	Health Care Access Barriers Model
HICs	high-income countries
HSS	health-specific self-efficacy
IV	Independent variable
LMICs	low and middle-income countries
MOH	Ministry of Health
NCDs	Noncommunicable Diseases
NCSM	National Cancer Society of Malaysia
NGOs	non-governmental organizations
SDG	Sustainable Development Goal
SES	socioeconomic status
SPSS	Statistical Package for the Social Sciences
SRS	simple random sampling
VIF	variance inflation factor
WHO	World Health Organization

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CHAPTER 1: INTRODUCTION

1.0 Introduction

Firstly, chapter one discusses the research background and problem statement, which covers risk awareness for Chronic Obstructive Pulmonary Disease (COPD). The study's research objectives, questions, and hypotheses are then discussed. The significance of the study highlights research importance. Next, the chapter layout provides an outline of the report's structure and concludes briefly.

1.1 Research Background

Chronic Obstructive Pulmonary Disease (COPD) is a progressive condition that results in irreversible airflow limitation, affecting the lungs and airways, caused by abnormalities in airways and alveoli (Nationale VersorgungsLeitlinie COPD, 2021, as cited in Kahnert et al., 2023; Halpin, 2020, as cited in Yang et al., 2021). It consists of two main phenotypes: airway-type and emphysema-type, typically triggered by prolonged exposure to harmful particles or pollutants (Bakeer et al., 2020; Kahnert et al., 2023).

It can be traced back to Badham (1814, as cited in Petty, 2006), who introduced the term "catarrh" to define the fundamental symptoms of frequent coughing and phlegm

hypersecretion, which provided the foundation for our current clinical awareness of the chronic bronchitis link to COPD. In the 1960s to 1970s, the phrase "chronic bronchitis and emphysema" began to be replaced by the term "Chronic Obstructive Pulmonary Disease" (Watson & Pride, 2015). Current research networks are increasingly focused on COPD exacerbations to develop a longitudinal observational study on the clinical aspects of COPD (Jassens & Bafadhel, 2020, as cited in Mathioudakis et al., 2020). Additionally, recent research demonstrated the importance of improving exercise capacity for pulmonary rehabilitation in mild COPD patients, even would be beneficial in the early stages of chronic diseases (Fazleen & Wilkinson, 2020).

To raise awareness of the public in Malaysia about the COPD risk, there are several initiatives being done by different authorities. Malaysia's Ministry of Health (MOH) cooperates with the National Cancer Society of Malaysia (NCSM) to introduce initiatives, like mQuit, in enhancing public awareness on lung health while encouraging Malaysians to stop smoking, focusing on major health issues such as COPD ("MOH Launches Lung Health Initiative and MQUIT Amid Growing Concerns Over Respiratory Diseases," 2025). While one of the biggest Contract Research Organizations, IQVIA, brought out a white paper related to COPD in Malaysia, conducting research among countries to suggest COPD management for Malaysia (*Chronic Obstructive Pulmonary Disease (COPD) in Malaysia*, 2025). Besides, AstraZeneca also launched a programme called MyLUNG Health to focus on early COPD and lung cancer detection and distribute its strong commitment to addressing lung health issues in Malaysia ("AstraZeneca Enhances Lung Health Focus and Community Outreach on World Health Day 2024 – British Malaysian Chamber of Commerce (BMCC)," 2024).

The recent era of modernization has emphasized the public's need for epidemiology in addressing health issues. According to "Disease Gifcol" (2023, as cited in Oliveira, 2023), COPD is often curable and preventable, which crucially highlights the importance of epidemiological studies for this disease. In order to identify individuals

at high risk of exposure, other researchers also emphasize the significance of understanding long-term disease trajectories and the need for continuous assessments of pulmonary health and exposure to pollutants, starting as early in adulthood as possible ("COPD: A Complex, Multifactorial, but Preventable Disease?," 2022). However, currently, another group of researchers claims that COPD can only be managed, not cured, even with thorough research and clinical trials examining its roots and symptoms (Carbone et al., 2023).

1.2 Problem Statement

Chronic obstructive pulmonary disease (COPD), a common respiratory disorder, results from permanent damage to the lungs or airways, leading to inflammation that obstructs the airways and difficulty in breathing (World Health Organization, 2024; National Heart, Lung, and Blood Institute (NIH), 2024). COPD symptoms usually appear after age 35, with most cases diagnosed over age 50 (NHS inform, 2024). The development of COPD is significantly influenced by exposure to tobacco smoke, which impairs lung growth and function (Lu et al., 2024).

Three severity stages of COPD, which are mild, moderate, and severe, can be formally tested using spirometry (Mosenifar et al., n.d.). Patients with mild or moderate COPD often overlook common symptoms such as chronic cough, wheezing, chest tightness, and dyspnoea during the progression to severe COPD (Amin, 2023). In a study of 1,443 patients, 19.5% with mild COPD had dyspnoea exacerbations; however, their vulnerability and delayed intervention worsened their health-related quality of life (HRQoL) (Cherian et al., 2021). Comorbid mental illnesses, especially anxiety and depression, are common in COPD patients during COPD exacerbations and negatively affect the likelihood of recovery and overall health status of COPD patients (Santos et

al., 2022; Martínez-Gestoso et al., 2022; Sandra Martínez et al., 2022). Also, the overall health of COPD patients with anxiety and depression often worsens with exacerbations, dyspnoea, and reduced social or physical interactions (Sandra Martínez et al., 2022; Moretta et al., 2024).

In 2021, COPD was found to cause 3.5 million deaths, representing 5% of all global fatalities and ranking as the fourth most common cause of death globally (World Health Organization, 2024). The 2021 Global Burden of Disease Study reported a mortality rate of 45.2 per 100,000 population, with nearly 90% of deaths in people over 70 occurring in nations with low and middle-income (Institute for Health Metrics and Evaluation, 2024; World Health Organization, 2024). By 2030, COPD is expected to rank as the third most common cause of mortality globally (World Health Organization-Eastern Mediterranean Region, n.d.), and its deaths are estimated to exceed 5.4 million by 2060 due to aging populations and rising smoking rates (Global Initiative for Chronic Obstructive Lung Disease, 2023). Hence, Sustainable Development Goal (SDG) 3.4 of the United Nations aims to reduce early mortality from non-communicable diseases, such as COPD, by one-third by 2030 (Bennett et al., 2020).

The World Health Organization has included COPD in its Global Action Plan for the Prevention and Control of Noncommunicable Diseases (NCDs), emphasizing minimizing tobacco smoke exposure with programs such as Mobile Health for Tobacco Cessation (mTobacco Cessation) (World Health Organization, 2024). However, the COPD prevalence remains consistently high in low and middle-income countries (LMICs) due to widespread tobacco use and low disease awareness. For instance, India accounts for 23.9% of global tobacco users in 2022, but less than 1% show adequate COPD awareness in a national survey involving 5,420 participants (Adeloye et al., 2022; Ghorpade et al., 2021; Ghorpade & Salvi, 2024). In addition, COPD also burdens high-income countries (HICs), where tobacco causes over 70% of cases (World Health Organization, 2024). For instance, in Portugal, COPD prevalence and mortality rates are higher than those of many comparable nations, driven by smoking, weak tobacco

control, and the absence of a national COPD strategy (Respiratory Health Initiative, n.d.).

In Malaysia, COPD accounted for 20.4 deaths per 100,000 people in 2021 (World Health Organization, 2025). According to the World Health Organization (2025), it ranked among the top five causes of death in men, with a death rate of 25.6 per 100,000, as opposed to women's 14.9 per 100,000. By 2022, COPD was the seventh primary cause of mortality in Malaysia, with an estimated prevalence of 6.1%, representing about 548,000 individuals living with COPD. However, the true burden may be higher, as over 90% of cases remain undiagnosed (Mat Jaeb et al., 2025).

The annual economic burden of COPD in Malaysia is estimated at RM2.8 billion, reflecting its heavy financial impact across industries, especially in the public healthcare system, which manages 70% to 80% of patients (Ur Rehman et al., 2021). Data from 2018 to 2019 showed that total direct and indirect costs exceeded USD 2,200 per patient (Ur Rehman et al., 2021; Santoni et al., 2024). Beyond healthcare expenses, COPD also leads to significant productivity losses. Indirect costs, such as reduced work performance and premature death, are an average of RM7,020 per patient, equivalent to 34% of annual family income. Absenteeism and reduced work efficiency contribute to a 22% to 35% decline in work capacity, ultimately lowering national productivity (Mat Jaeb et al., 2025).

Although the government is concerned about COPD-related mortality, public awareness in Malaysia remains low. In Malaysia, smoking is the leading cause, with about 4.8 million smokers aged over 15 (Iskandar, 2024). Limited COPD literacy contributes to delayed diagnoses and worsened symptoms in later life (Ova, 2024). Awareness is also lacking among primary care providers, who often perform screenings only after multiple patient visits. Consequently, spirometry is underutilized, reducing diagnostic accuracy and leading to underdiagnosis (Mat Jaeb et al., 2025).

While the WHO notes that COPD can arise from multiple risk factors, smoking remains the leading cause, as the toxic substances in cigarette smoke significantly increase the likelihood of developing the disease over time (Song et al., 2021). Early symptoms such as cough and dyspnoea are often overlooked and are mistaken for normal signs of aging or smoking (American Lung Association, n.d.). However, these symptoms should not be dismissed as a simple smoker's cough, since COPD is a serious, life-threatening condition that impairs normal breathing (World Health Organization-Eastern Mediterranean Region, n.d.; Amin, 2023).

To estimate the risk of smoking-related health issues, Pack-years, which measure cumulative smoking exposure by combining the number of cigarette packs smoked daily with years of smoking, are commonly used (Pleasants et al., 2020). A study by Çolak et al. (2020) found that among 5,497 individuals under 50 with at least 10 pack-years, 4% already showed early COPD symptoms, and 24% of those later developed COPD within ten years. Similarly, Chung et al. (2023) reported that individuals with 10 to 20 pack-years had a 2.24 times higher risk of COPD than those with fewer than 10 pack-years. These findings highlight that while COPD is often diagnosed after age 50 (NHS inform, 2024), younger adults may also develop the disease following prolonged, heavy smoking exposure (Çolak et al., 2020; Diaz et al., 2025).

Hence, this study focuses on active and passive smokers, as the risk of developing COPD is 1.53 times higher in current and former smokers compared to non-smokers (Chung et al., 2023). Evidence from 15 studies also shows that second-hand smoke exposure increases COPD risk 2.25 times, particularly with more than five years of exposure (Chen et al., 2023). In Malaysia, over 80% of COPD patients have a smoking history, reflecting the increased COPD risk from active smoking (Mat Jaeb et al., 2025). However, awareness of the dangers of second-hand smoke, including its link to COPD, remains low despite frequent public exposure (Cheah et al., 2017; Lim et al., 2018).

Since passive smoking is a key risk factor, this lack of awareness may prevent individuals from recognizing their risk or taking preventive steps, leading to delayed diagnoses and underestimation of the disease burden.

In the past five years, COPD research in Malaysia has largely focused on clinical aspects (Chai et al., 2020; Pang et al., 2021; Loh et al., 2025) and patient supportive care (Liew et al., 2021; Parasuraman et al., 2021; Lim et al., 2025), particularly pulmonary rehabilitation (Chan et al., 2021; Chan et al., 2022; Chan et al., 2023). Although some studies have explored awareness, these mainly addressed other respiratory diseases or physicians' knowledge (Ng et al., 2022), rather than public awareness. In short, research in Malaysia emphasizes COPD prevalence and patient care, leaving a gap in studies on awareness among high-risk groups, especially active and passive smokers, to highlight the need for prevention-focused approaches over post-diagnosis care. It is considered an empirical gap. An empirical gap is a gap that addresses shortcomings in earlier research (Miles, 2017).

1.3 Research Objectives

1.3.1 General Objective

This study's main goal is to find out the factors affecting Chronic Obstructive Pulmonary Disease (COPD) risk awareness among adults exposed to active and second-hand smoke.

1.3.2 Specific Objectives

1. To assess whether a significant relationship exists between perceived severity of COPD and COPD risk awareness among adults exposed to active and second-hand smoke.

2. To assess whether a significant relationship exists between perceived benefits of health screening and COPD risk awareness among adults exposed to active and second-hand smoke.

3. To assess whether a significant relationship exists between perceived barriers and COPD risk awareness among adults exposed to active and second-hand smoke.

4. To assess whether a significant relationship exists between perceived self-efficacy and COPD risk awareness among adults exposed to active and second-hand smoke.

1.4 Research Questions

1.4.1 General Research Question

What are the factors affecting Chronic Obstructive Pulmonary Disease (COPD) risk awareness among adults exposed to active and second-hand smoke?

1.4.2 Specific Research Questions

1. Is there a significant relationship between perceived severity of COPD and COPD risk awareness among adults exposed to active and second-hand smoke?

2. Is there a significant relationship between perceived benefits of health screening and COPD risk awareness among adults exposed to active and second-hand smoke?

3. Is there a significant relationship between perceived barriers and COPD risk awareness among adults exposed to active and second-hand smoke?

4. Is there a significant relationship between perceived self-efficacy and COPD risk awareness among adults exposed to active and second-hand smoke?

1.5 Hypotheses of the Study

This section provided a brief overview of this study's potential hypothesis. It is aimed at determining the way an independent variable influences a dependent variable.

H1. There is a significant relationship between perceived severity of COPD and COPD risk awareness among adults exposed to active and second-hand smoke.

H2. There is a significant relationship between perceived benefits of health screening and COPD risk awareness among adults exposed to active and second-hand smoke.

H3. There is a significant relationship between perceived barriers and COPD risk awareness among adults exposed to active and second-hand smoke.

H4. There is a significant relationship between perceived self-efficacy and COPD risk awareness among adults exposed to active and second-hand smoke.

1.6 Significance of the Study

The study examines barriers influencing active and second-hand smokers to be aware of the risk of COPD. Identifying the factors that impact smokers' awareness of their risk for COPD can help raise public awareness of chronic lung disease, which is crucial for promoting in maintaining healthy lung conditions.

The study's findings improve the epidemiological understanding of COPD among different smokers. By identifying key barriers that influence awareness of COPD risk, this research broadens the current literature on how active and passive smokers perceive COPD. Additionally, the study provides the groundwork for future research by offering data-driven insights that can help to refine theoretical frameworks and create stronger health models in educational settings.

Understanding the key barriers to enhancing COPD awareness, corporations can partner with institutions to sponsor awareness campaigns while promoting the incorporation of health promotion into the sustainability plans of the business. Providing a platform to increase exposure for awareness activities tailored to smoke-exposed populations. Furthermore, the study’s findings can assist businesses in creating marketing plans associated with corporate social responsibility (CSR) to foster community health.

Other than that, governments can formulate specific regulations, draft a white paper, develop health blueprints, and offer subsidies to promote COPD awareness initiatives. Moreover, the study’s insights can assist the government in justifying resource

allocation in the country's preventive initiatives, forecasting long-term financing for healthcare related to active and passive smoking.

Through the study, non-governmental organizations can also collaborate with schools, healthcare providers, and relevant authorities for a COPD risk awareness joint program, especially to help align with certain NGOs' goals for national health. Additionally, the study's findings can support the foundation of knowledge in assisting with grassroots initiatives for NGOs to act against smoking behaviour, building community awareness in recognizing early COPD symptoms.

The Health Belief Model (HBM) is extended in this study to assess COPD risk awareness among adults exposed to active and second-hand smoke, offering notable theoretical contributions. The findings deliver valuable insights for future study and policy development in educational institution sustainability initiatives, and further our understanding of the theoretical framework surrounding the factors that influence COPD risk awareness.

1.7 Chapter Layout

Chapter one outlines the research background and the problem statement regarding the study, explaining the reason for choosing the research topic, while also highlighting the significance of the study and summarizing the objectives and questions of the study.

Chapter two provides a literature review on COPD risk awareness for the variables, accompanied by a theoretical framework, displaying the findings of other scholars in the research area and variables.

Chapter three describes the research methodology, then covers research pattern, data collection method, sampling patterns, techniques, and research instrument. After that, processing and analysing data.

Chapter four demonstrates the findings of the study, crucial to achieving the goals of the study. Descriptive analysis, scale measurement, and inferential analysis are presented.

Chapter five provides a summary of this study. A detailed explanation of the research findings is given. It addresses the study's limitations and recommendations for future research and for stakeholders' reference.

1.8 Chapter summary

In conclusion, among different chronic diseases in the world, COPD is undoubtedly one of those that one should be aware of. The chronic disease has globalized, which could be due to the negligence in maintaining health and ignorance of the risk of COPD. The participation of different stakeholders, such as the government and society, in fostering their awareness of COPD is important. In this case, organizations would also highly influence the awareness of the public about the risk of COPD as a chronic disease.

Overall, this study's main goal is to find out the factors affecting COPD risk awareness among adults who are exposed to active and second-hand smoke. To gain a greater understanding of the factors that affect COPD risk awareness among adults, chapter two will provide a further review of the related literature on COPD risk awareness.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

The second chapter will establish the literature review and look at previous research on the dependent variable and the four independent variables. Theoretical frameworks include a discussion of the theory, followed by a conceptual framework and hypothesis development.

2.1 Review of Literature

2.1.1 COPD risk awareness

Disease awareness refers to an individual's understanding of a health condition, its impact, and its consequences for life expectancy, based on how the patient interprets provided information (Corli et al., 2009, as cited in Baiardini et al., 2018). According to Baiardini et al. (2018), awareness goes beyond simply knowing a diagnosis. It requires a full understanding of the disease, its burden, and the importance of following a treatment plan. Chronic disease awareness refers to the public's understanding of long-term health conditions (Chimezie, 2023), including risk factors, prevention, early detection, and management strategies (Ranieri et al., 2022). Such awareness is crucial

for strengthening public health education and motivating individuals to adopt preventive behaviours that improve health outcomes (King, 2024).

Current research shows no standardized tool for measuring public awareness of COPD. However, various general tools are used, such as self-administered online questionnaire surveys and interviews. For example, Oliveira et al. (2024), Xing et al. (2024), and Mahmood et al. (2023) utilized online surveys. These tools are also used in cross-sectional surveys, which assess awareness in large populations, as seen in Alqahtani et al.'s (2023) use of a questionnaire survey nationwide survey of 15,000 adults in Saudi Arabia. Some studies use mixed methods. For instance, Fan et al. (2020) combined questionnaire surveys with physical examinations in 100 Chinese households, and Szymański et al. (2022) applied both questionnaires and interviews in a nationwide Polish study with 1,090 adults.

In recent years, improving disease awareness has become a key public health and medical priority for better detection and management of COPD (Baiardini et al., 2021), as global COPD-related deaths have risen sharply over the past three decades (Li et al., 2022). To address this, various initiatives such as awareness campaigns, educational programs, and advocacy efforts have been implemented in more than 50 countries (World COPD Day, 2021, 2022). Despite these efforts, Boehm et al. (2019) found that public awareness of COPD remains low, even among high-risk groups. Similarly, Koch et al. (2019) reported that fewer than 20% of high-risk individuals in China were aware of COPD. Di Marco et al. (2019) highlighted low awareness as a major barrier to early COPD management. Greater awareness can support timely diagnosis and treatment, particularly in settings where alternative therapies like Ayurveda are used (Patil et al., 2022). In short, improving COPD awareness, its treatment, and management is crucial for enhancing care and health outcomes (Kögler et al., 2010, as cited in Mahmood et al., 2023).

2.1.1 Perceived severity of COPD

Perceived severity can be known as the belief in the extent of harm from an acquired sickness or an adverse state as a result of a certain behaviour (Sukeri et al., 2020). According to Cao and Zheng (2024), mechanisms such as risk perception, along with perceived severity, are underlaid by knowledge regarding disease preventive intention. Here, Chronic Obstructive Pulmonary Disease (COPD) knowledge is linked to particular knowledge about the disease, enabling patients to manage their condition and potential exacerbations independently (Nakken et al., 2017). According to the study by Fischer et al. (2022), knowledge of COPD is connected to personal characteristics, such as educational background and prior involvement in COPD education initiatives. Regarding the measurement of people's knowledge levels about COPD, the COPD Knowledge Base (COPDKB) has been suggested across various data sources, offering integration and interoperability of data and instruments, which is often used in biomedical research (Cano et al., 2014). This facilitates biomedical research in COPD as a knowledge resource, accelerating research efforts and enhancing understanding of the disease.

Different studies reflect growing arguments for the significance of the perceived severity of COPD and COPD risk awareness. According to a study by Çelik et al. (2025), higher knowledge levels among the patient sample appeared to increase symptom awareness of COPD, resulting in more frequent healthcare visits, reflecting patients' ability to be aware of themselves regarding the risk of COPD, which shows a significant relationship and drives them to seek medical attention. Concerning the relationship between COPD risk awareness and COPD knowledge reflecting on perceived severity, some studies have opposed in developing countries. Two studies from early years to recent years conducted in Saudi Arabia both indicated that sociodemographic factors such as education, disease knowledge, and familiarity with

COPD terminology have no significance on reported symptoms (Gulbay et al., 2006; Almuzaini et al., 2023). This could be considered as Saudi Arabia had long-term insignificant findings for the claim that knowledge affects outcomes for COPD. However, in China, Su et al. (2024) claimed that knowledge had a direct and significant impact on practices for COPD, also associated with smoking status and educational level, emphasizing that levels of practice and understanding require specialized interventions. Another study also mentioned that due to a lack of knowledge about the complexity of COPD, personal knowledge and comprehension of the circumstances may have an impact on COPD awareness (Jannah et al., 2025). It puts additional stress on the complexity of understanding COPD, which may also be a barrier that affects an individual's awareness of the risk of diagnosing COPD.

The relationship between COPD risk awareness and the perceived severity of COPD is being examined using a different sample size. The sample size of the study by Jannah et al. (2025) was 618, while the study by Almuzaini et al. (2023) had 1306 valid responses. Furthermore, Alumzaini et al. (2023) utilized a mixed method for the study, but Jannah et al. (2025) used a 5-point Likert scale to conduct the questionnaire. In summary, previous research has shown diverse findings on the relationship between perceived severity of COPD and COPD risk awareness; some have shown a significant correlation, while some have not. These gaps may be because of the differences in sample size and country responding, or the method used to conduct the study.

2.1.3 Perceived benefits of health screening

Upon the foundation for health screening, the World Health Organization (WHO) addressed that only common and treatable diseases with natural histories, established suggestions for whom and when to use existing diagnostic tests and resources to treat

individuals who should be screened for (Wilson & Jungner, 1968, as cited in Yawn & Martinez, 2020). Regarding this, Yawn & Martinez (2020) claimed that COPD is a good fit for this. While health screening depends on personal willingness to practice, it considers perceived benefits towards the screening action. Health screening attitudes can be described by factors that encourage and discourage health screening participation (Chien et al., 2020). Narooi and Karazee (2015) mentioned that personality features influence conduct and behaviour, which in turn influences attitude as well. Since several patients are being underdiagnosed despite being symptomatic, screening such as spirometry, pulmonary function test, and other systematic assessments would be diagnostic for opportunistic cases (Lin et al., 2020; Global Initiative for Chronic Obstructive Lung Disease, 2018). However, the willingness and frequency of health screening still depend on personal attitudes toward receiving health assessments.

Studies are arguing the significance between health screening attitude and COPD risk awareness. The perceived benefits of personnel in doing health screening reflected their awareness of COPD risk. A study relating behavioural activities to personal attitudes, which mentioned that patients' behaviours related to lung disease are positively correlated with their attitudes toward the disease, such as how they perceive the importance of obtaining medical attention (Xu et al., 2024a). However, on the other hand, in China and Denmark, Xie et al. (2020) and Lindskörg et al. (2019) found that the GOLD classification staging of COPD severity does not directly affect the intention of the new GOLD risk assessment, nor does it significantly predict exercise in patients. When patients are at risk of developing COPD, their intention to undergo screening reflects their awareness of the condition. However, there are study proven that intention for screening still has a positive relationship with COPD risk awareness, especially when personality style could affect attitude. Sperry (2006) claimed that personality style is significant when affecting patients' decisions on keeping appointments or not, as shown in a study by Sikjær et al. (2018), which stated that 20% of research respondents "self-estimate" having spirometry test more than once; this gap could be a

result of personal bias or misunderstanding about the test. These two studies show that awareness of the risk of COPD could be low or high throughout the patient's decisions for health screening or even found that they misunderstood the screening type for COPD.

The relationship between COPD risk awareness and the perceived benefits of COPD screening is being studied using a different sample size and research method from previous studies. Xu et al. (2024a) conducted a study in China with a sample size of 397, conducting a questionnaire with a 5-point Likert scale through convenience sampling. On the other hand, the research done by Xie et al. (2020) in China was utilizing a dichotomous scale, which is "True", "False", and "I don't know" in a questionnaire, with 1138 valid responses. In conclusion, past research on the relationship between perceived benefits of health screening and COPD risk awareness has brought various results, with some finding significant results but some found that not correlated. Differences in sample size, research methodologies, and the countries chosen to conduct the studies could be the causes for inconsistencies.

2.1.4 Perceived barriers

Perceived barriers are described as a person's assessment of the obstructions that prevent them from adopting a recommended behaviour (Green et al., 2020), such as time, cost, or limited-service access (Wang et al., 2024). Carrillo et al. (2011, as cited in George et al., 2018) developed the Health Care Access Barriers Model (HCAB), which highlights some measurable and modifiable barriers, including financial, such as insurance and structural, such as waiting times, service availability, and transportation. Rural areas with fewer resources often face reduced healthcare access, increasing risks for both acute and chronic conditions (Sethna, 2012, as cited in Golestani et al., 2025).

Residents may need to travel long distances and spend more time receiving necessary care (Dolan et al., 2020, as cited in Golestani et al., 2025). For those with low socioeconomic status, financial difficulties can limit access to chronic disease screening (Biddell et al., 2021) and be further worsened by additional healthcare-related expenses (George et al., 2018).

Past studies show a significant link between perceived barriers and COPD risk awareness. Simoneau and Gaffin (2023) noted that socioeconomic status significantly influences access to healthcare, education, and health promotion. Supporting this, Alsajri et al. (2025) and George et al. (2018) found that financial strain in lower-income groups limits healthcare access and reduces COPD awareness. ALShakhs et al. (2025) reported that low income also hinders smoking cessation due to limited access to healthcare resources, while lack of intent to quit smoking further lowers COPD awareness since a person is not aware of the impact of smoking on COPD risk (Seo et al., 2015). Shatto et al. (2024) added that socioeconomic and geographic factors restrict access to spirometry tests and possibly hinder the community's COPD awareness. In short, financial barriers that restrict a person's ability to access care significantly affect COPD awareness (George et al., 2018).

However, some studies found no significant relationship. Collinsworth et al. (2018) observed that those who received standard care or participated in a structured education program did not show a significant relationship in hospital readmissions, suggesting that service access alone may not improve COPD awareness or disease management.

Other past studies also showed mixed results. Petrie (2022) reported that residence location affects healthcare access, especially in rural areas, while Hadakie et al. (2023) found no significant relationship between rural and urban areas and COPD awareness. Furthermore, Kim et al. (2016) showed that physician visits were not significantly related to access-to-care factors, indicating that service availability alone does not

ensure motivation or awareness. Nonetheless, they found that perceived access to care was linked to hospital services utilization, suggesting that seeking hospital care may reflect COPD awareness. Ghorpade et al. (2021) reported lower COPD awareness in rural populations, linking this to socioeconomic status, but found no significant correlation between geographic distance and COPD risk awareness.

Different sample sizes and study methods are used to study the connection between perceived barriers and COPD risk awareness. For instance, Collinsworth et al. (2018) conducted a prospective randomized pilot study with 308 participants, while Alsajri et al. (2025) surveyed 1,033 individuals using questionnaires. These differences in study design and sample size may account for the variations in their findings on the correlation between perceived barriers and COPD risk awareness.

2.1.5 Perceived self-efficacy

Perceived self-efficacy is an important factor in explaining differences in health behaviours (Çepni & Kitiş, 2016). Self-efficacy reflects an individual's evaluation of their ability to manage internal and external factors to adopt healthy behaviours and achieve desired outcomes (Wang et al., 2024). Health-specific self-efficacy (HSS) refers to one's capacity to recognize personal potential and available health resources, such as opportunities for well-being, and to act on them (Ungar, 2005, as cited in Sagone et al., 2020). This is reinforced by self-confidence gained through knowledge and skills that support cognitive, sensory, and psychomotor development, along with awareness of these abilities (Tabak, 2000, as cited in Çepni & Kitiş, 2016). Higher self-efficacy increases a person's likelihood of maintaining their health even in difficult conditions (Jackson et al., 2007, as cited in Çepni & Kitiş, 2016) and tends to be proactive in seeking health information (St. Hilaire, 2016, as cited in Zhang et al., 2019).

Most studies show a significant correlation between perceived self-efficacy and COPD awareness. Aliakbari et al. (2022) showed that self-efficacy, which transforms health literacy into action, significantly shapes self-care behaviours for COPD symptoms by motivating individuals to act on their knowledge. This suggests that awareness alone may not lead to behavioural change without trust in one's capacity to manage symptoms and seek care. Similarly, according to Al Bshabshe et al. (2023), perceived self-efficacy in recognizing COPD symptoms is significantly related to perceived self-efficacy, as those who believe in their capacity to detect health changes are more likely to notice and respond to symptoms. Low self-efficacy can reduce symptom recognition and reduce awareness, even if risk factors exist. Baiardini et al. (2018) further noted that doubts about treatment effectiveness can negatively influence treatment-seeking behaviour, thereby weakening both self-efficacy and COPD awareness. Other studies by Kusol and Kaewpawong (2023) and Bektas et al. (2021) confirmed that higher self-efficacy promotes preventive behaviours, healthy lifestyle adoption, and improved quality of life. Similarly, Deng and Liu (2017) and Xu et al. (2024b) stated that perceived self-efficacy is significantly related to health information-seeking, which is the disease preventive behaviour, supporting that strengthening health literacy and self-efficacy can enhance COPD awareness.

However, according to Zhang et al. (2019), there is no significant correlation between perceived self-efficacy and health information-seeking behaviour. A person might believe they can handle their health, but may still not actively seek out information about COPD risks, symptoms, or treatment options. As a result, their awareness of COPD remains limited.

The relationship between perceived self-efficacy and COPD risk awareness has been studied by previous research using different research methods and sample sizes. Zhang et al. (2019) used an online questionnaire survey in their study with 522 valid

respondents, while Xu et al. (2024b) used a purposive sampling method in their study and involved 274 participants. Past studies showed mixed results in the correlation between perceived self-efficacy and COPD risk awareness, which may be attributed to different sample sizes and methods used in studies.

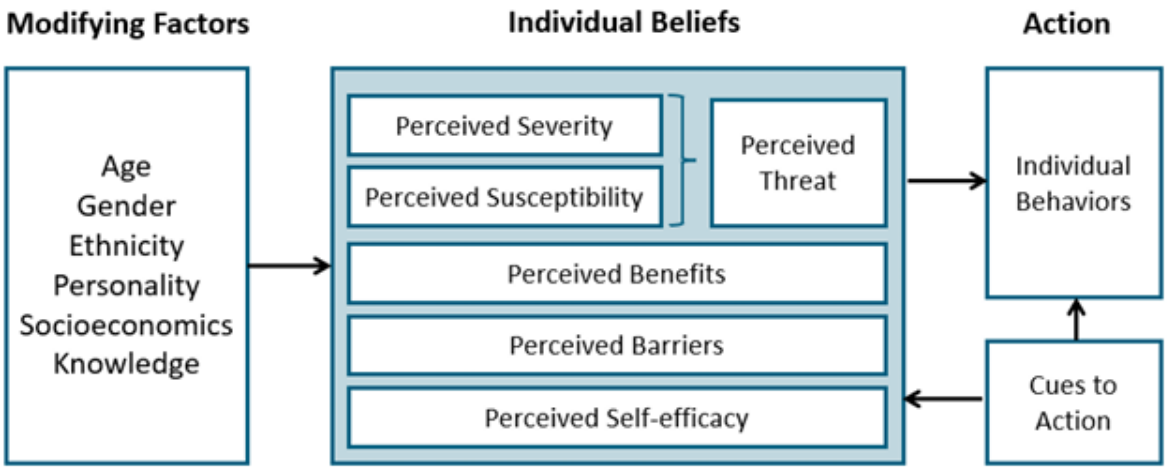
2.2 Theoretical framework

Previous research has established several theories regarding the factors that affect COPD risk awareness. The Health Belief Model is the theory in this study to be revised.

2.2.1 Health Belief Model

Figure 2.1

Health Belief Model (HBM)



Source: Adapted from Wethington et al. (2015), as cited in *Health Belief Model* (2023)

This study examines the factors affecting COPD risk awareness among adults exposed to active and second-hand smoke. It adopts the Health Belief Model, which is commonly used to examine how people make decisions concerning different health behaviours (Yarbrough, 2001, as cited in Alyafei & Easton-Carr, 2024). The Health Belief Model is widely employed to describe an individual's health-related behaviours. It posits that health behaviour is driven by six key factors, which are perceived severity and perceived susceptibility under perceived threat, perceived benefits, perceived barriers, perceived self-efficacy, and cues to action (Alyafei & Easton-Carr, 2024).

In this study, perceived susceptibility, cues to action, and perceived threats are not adopted into the conceptual framework. Perceived susceptibility refers to an individual's prediction of the likelihood of developing a disease or experiencing an undesirable health condition (Alyafei & Easton-Carr, 2024). However, since risk awareness for COPD is the dependent variable of the study, susceptibility would overlap conceptually with the risk awareness, which is not suitable and less meaningful to the study. Furthermore, cues to action describe a person's willingness affected by external or internal triggers to participate in a specific activity (Adiman et al., 2024). While this study focuses on cognitive perceptions influencing awareness, external triggers are not appropriate for application in the framework of the study. In addition, perceived threat combines an individual's evaluation of their susceptibility and the severity of a certain health issue, which is the fundamental stimulus for action (Green et al., 2020). Since perceived susceptibility is excluded from the model, including perceived threat would cause a misfocus of constructs. Thus, this study will employ perceived severity, perceived benefits, perceived barriers, and perceived self-efficacy to seek the significance related to COPD risk awareness.

According to Glanz et al. (2008), perceived severity is a person's assessment of the seriousness of a certain sickness or of being denied treatment, including clinical and

medical assessments. Additionally, perceived severity of COPD can be recognized, that people perceive the degree of risk and severity of certain disease prevalence, including belief support and scientific understanding of COPD (Sharifikia et al., 2019; Ji et al., 2019). It is also stated that knowledge level and perspectives can be regarding a particular disease's perceived severity, supporting health behaviour change (Jovanov et al., 2024). Research on knowledge and awareness of COPD has made significant use of perceived severity in the Health Belief Model (Ji et al., 2019).

Within the Health Belief Model, perceived benefits describe an individual's self-evaluation of the worthiness or feasibility of a novel habit in reducing the risk of diseases (Washburn, 2020). A range of disease-related activities, such as health assessment for disease risk, have been identified as benefits-barriers-behaviour relationships; in particular, the target behaviour must have the potential to prevent adverse health consequences (James et al., 2002; Orji et al., 2012). On top of that, people's perceptions regarding benefits reflected their preference level for screening (See et al., 2020). Other studies also often utilized perceived benefits from the Health Belief Model for COPD-related research (Simon, 2013; Huang et al., 2024).

Perceived barriers can be defined as the barriers to following health guidelines that could discourage someone from implementing it (Alyafei & Easton-Carr, 2024). Barriers to accessing health cannot be sufficiently characterised by people regarding health systems, which suggests that their perception of barriers to accessing health could affect health outcomes (Bauer et al., 2005). It is also mentioned that many people believe healthcare access disparities are considered unfair, especially in the pursuit of universal health coverage, showing that differences in medical interventions as well as other health outcomes are unequal for everyone (Hoven et al., 2023). Furthermore, the two perceived barriers most commonly were money and distance, which can further affect realization coverage for universal health and result in low awareness of personal health (Tamirat et al., 2020). Similarly, perceived barriers have been widely adopted in

different previous studies, connecting health access and COPD awareness (Simon, 2013; Ghorpade & Salvi, 2024).

The definition of self-efficacy is the degree to which an individual feels capable of reacting to difficult circumstances and handling any difficulties that may arise (Tarkang and Zotor, 2015, as cited in Adiman et al., 2024); in other words, they have faith in their own ability to act (Rosenstock, 1988, as cited in Adiman et al., 2024). Regarding the definition of self-efficacy, it can indicate that the level of self-efficacy is impactful on the action or behaviour of an individual. According to Rimal (2001), risk perception of disease can be caused by motivational factors such as self-protective behaviour, while the behaviour is supported by personal self-efficacy. Some researchers have implemented self-efficacy in the Health Belief Model in studies related to COPD, identifying self-efficacy as one of the drivers that could affect awareness of protective factors due to an individual's course of action (Selzler et al., 2019; Tsiligianni et al., 2020).

2.3 Conceptual framework

Figure 2.2

Conceptual framework

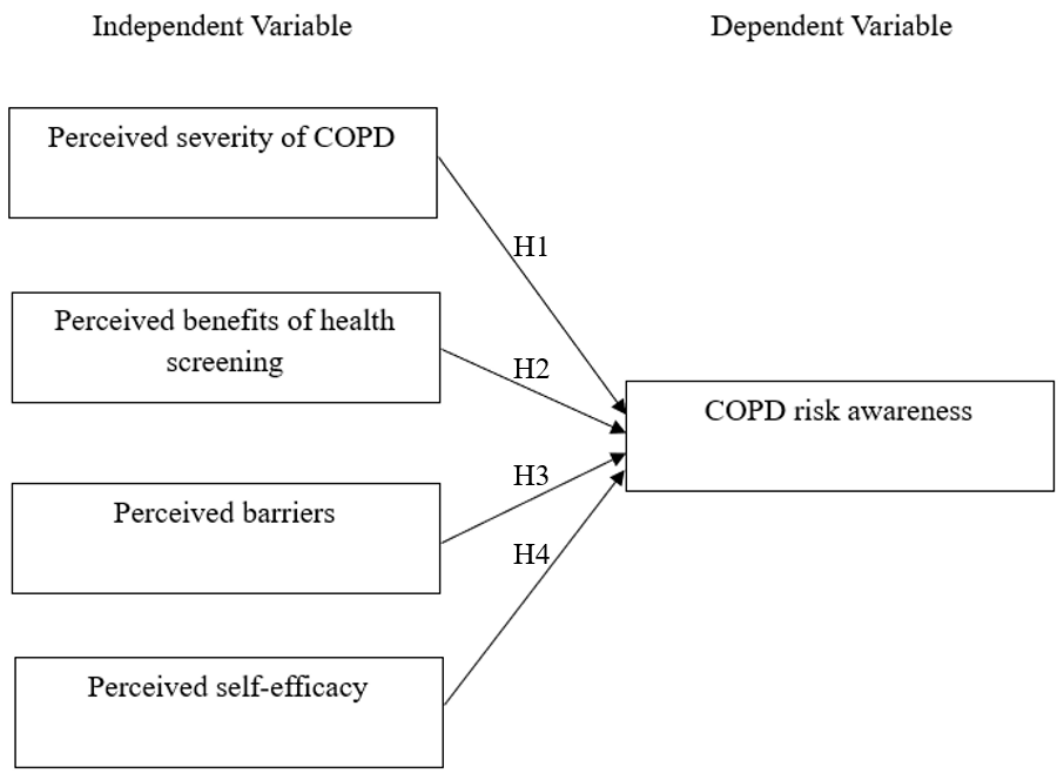


Figure 2.2 illustrates a developed conceptual framework for analysing adults exposed to active and second-hand smoke in terms of their risk awareness of COPD. There are four independent variables in this conceptual framework, including perceived severity of COPD, perceived benefits of health screening, perceived barriers, and self-efficacy.

A behavioural theory is integrated into this conceptual framework to demonstrate how the four independent variables affect COPD risk awareness:

- **Health Belief Model (HBM) (Rosenstock, 1974):**
  - **Perceived severity of COPD** reflects a person's **judgement of the prospective implications** and the severity of the disease, condition or undesirable outcome.
  - **Perceived benefits of health screening** refer to an individual's **perception of the advantage of** taking the **suggested plan** of action.
  - **Perceived barriers** are identified as an individual's evaluation of the factors that **discourage them from taking advantage of a particular**

action or new behaviour.

- **Perceived self-efficacy** indicates the extent to which a person **believes in their capability to perform** particular health-related behaviour.

2.4 Hypotheses Development

2.4.1 Perceived severity of COPD and COPD risk awareness

According to Jannah et al. (2025), they found that the perceived severity of COPD can affect an individual's COPD risk awareness. It is mentioned that higher awareness of medication and medical health support for COPD could be influenced by their knowledge level, highlighting the importance of their perception of the disease's significance and the health literacy related to COPD. Thus, an individual who lacks COPD knowledge, which reflects their perceived severity of the disease, might have low COPD risk awareness.

In addition, Su et al. (2024) found that COPD risk awareness is highly related to a person's particular perception of COPD severity. It claimed that risk perception, which is accompanied by evaluation of knowledge, is significant when influencing a person's behavioural practice of COPD, mentioning a direct relationship between the variables. In other words, COPD risk awareness might be low when a person's risk perception with knowledge is low.

The following hypothesis is established in considering prior research findings:

H1: There is a significant relationship between perceived severity of COPD and COPD risk awareness among adults exposed to active and second-hand smoke.

2.4.2 Perceived benefits of health screening and COPD risk awareness

Xu et al. (2024a) found that perceived benefits can influence an individual's COPD risk awareness. Individual behaviour, like clinical screening of individuals regarding COPD, can be reflected by personal attitudes that also affect health screening, concerning the benefits of health screening. There is a high possibility of refusing to receive health screening services when people perceive no benefits, resulting in low awareness of COPD risk.

Rather than that, previous research from Sikjær et al. (2018) found that COPD risk awareness could be affected by perceived benefits for health screening. Personal bias or misunderstanding about the test with self-attitude is significant for patients when they come to make decisions about their recommended treatment or appointments, such as health assessments. It means that patients' decision-making upon their perception of screening benefits will reflect their awareness of COPD risk as well.

The following hypothesis is established in considering prior research findings:

H2: There is a significant relationship between perceived benefits of health screening and COPD risk awareness among adults exposed to active and second-hand smoke.

2.4.3 Perceived barriers and COPD risk awareness

Alsajri et al. (2025) stated a significant connection between perceived barriers and COPD risk awareness. It emphasized the need to tackle socioeconomic inequalities in accessing health literacy. Individuals with lower income levels may have limited access to accurate health information, which can affect their awareness and management of chronic respiratory diseases like COPD.

Shatto et al. (2024) highlighted that limited access to services can hinder community awareness of COPD. The indicators of care accessibility were observed in the study, including spirometry testing, medication adherence, and pulmonary rehabilitation. In addition, individuals living in rural areas and those with lower socioeconomic status (SES) consistently experienced reduced access and poorer health outcomes. Differences in COPD risk awareness are reflected in higher COPD exacerbation rates, increased mortality, and greater hospital utilization.

The following hypothesis is established in considering prior research findings:

H3: There is a significant relationship between perceived barriers and COPD risk awareness among adults exposed to active and second-hand smoke.

2.4.4 Perceived self-efficacy and COPD risk awareness

Al Bshabshe et al. (2023) found that the level of COPD awareness can be influenced by perceived self-efficacy. The perceived ability to recognize the COPD symptoms of a person can influence confidence in managing the disease. Thus, it is more likely to

be aware of COPD risk and motivated to receive early disease detection and management.

Furthermore, Aliakbari et al. (2022) indicated a significant influence between perceived self-efficacy and COPD risk awareness. Higher self-efficacy encourages individuals to recognize symptoms, seek medical care, follow treatment plans, and adopt preventive behaviours. With greater knowledge and confidence, people are more motivated and aware of COPD, making them more likely to practice self-care and manage COPD early.

The following hypothesis is established in considering prior research findings:

H4: There is a significant relationship between perceived self-efficacy and COPD risk awareness among adults exposed to active and second-hand smoke.

2.5 Chapter Summary

This chapter describes the dependent and independent variables, explores the pertinent theoretical foundations, and presents the suggested conceptual framework. Additionally, two hypotheses are developed within this chapter.

CHAPTER 3: RESEARCH METHODOLOGY

3.0 Introduction

In Chapter 3, research methodology is thoroughly outlined. Initially, the research design is demonstrated in this chapter, continued by an explanation of the sampling design, techniques to collect data, and diagnosis design. An overview of data processing and data analysis then follows this. This current research employed a quantitative study method, implementing a cluster sampling technique to collect primary data via an online survey.

3.1 Research design

Research design is a chosen procedural plan that serves as a framework of approaches and tactics used in research to coordinate different aspects in a fairly logical way n order to effectively address the research problem (Khanday & Khanam, 2019). It can also help determine the types of analysis that could be performed to obtain the desired outcome (Asenahabi, 2019), which encompasses two primary research categories: qualitative and quantitative research.

This study adopts confirmatory research design. The construction of hypotheses about the relationships among a set of variables under quantitative control is the foundation

of the confirmatory approach, in which the variables can be identified, selected, and linked through research (Troisi & Grimaldi, 2022).

The quantitative research approach is used to examine the factors affecting COPD risk awareness among adults exposed to active and second-hand smoke. Statistical analysis and numerical measurement are components of this research method. Quantitative research focuses on gathering and evaluating structured data that can be interpreted quantitatively (Goertzen, 2017). This approach is effective at analysing significant numbers of people and extrapolating findings from the sample to a wider population (Swanson & Holton, 2009).

3.2 Data collection

It is a crucial phase to improve outcomes for research by minimizing errors in the process of the study. According to Mazhar et al. (2021), data can be gained from two methods: primary sources or secondary sources. In this study, the former method is chosen.

3.2.1 Primary Data

Primary data is gathered at the first hand by researchers (Rabianski, 2003). There are several methods that can be used to collect primary data, including surveys, observations, and interviews (Lowe & Zemliansky, 2011). The questionnaire approach is chosen, aiming to collect data quickly while shortening the time for data collection

in this study. To enhance ease for the study and respondents without physical presence, Google Forms is used to administer the questionnaire method.

3.3 Sampling Design

3.3.1 Target population

The term "target population" refers to the group of people who fulfil specific criteria and qualify to participate in a study; information from them is the key to research (Birigazzi et al., 2019). The research purpose is to study the factors affecting COPD risk awareness among adults exposed to active and second-hand smoke. Thus, the study's target population is the adults who are exposed to active and second-hand smoke.

3.3.2 Sampling Frame and Location

Sampling frame refers to a collection of elements from which to choose a target population sample (Coetzee et al., 2014). The sampling frame for the location is regarding the location for collecting the primary data. This study targets the population in Malaysia who are actively or passively being exposed to smoke.

3.3.3 Sampling Elements

The individuals of a population whose characteristics will be measured as sampling elements are those used to assess respondents' demographics that fit the target population. The sampling elements in this study are adults exposed to smoke either actively or passively; they would be varied in terms of their educational level, gender, age, occupation, residential area, and income.

3.3.4 Sampling Technique

Sampling techniques for research include probability sampling and non-probability sampling, where the former is used within a finite population, and the latter is used when the population has infinite elements (Alvi, 2016). There are several sampling methods under both techniques. This study employs a form of questionnaire that is distributed to the respondents to collect data.

In this study, cluster sampling from the probability sampling techniques has been selected. According to Singh and Masuku (2014), cluster sampling is the technique of selecting and comparatively including subgroups from a particular population in the sample. This strategy has also been applied to many studies related to COPD. The study by Chen et al. (2022) adopted a cluster sampling method to select participants who were suitable for their study relating to COPD monitoring. Furthermore, a study related to community health regarding COPD also implemented a cluster sampling method to seek awareness among different subgroups within the study population (Jarhyan et al., 2025). Additionally, James et al. (2024) mentioned that the contrast between clusters in a population can show differences to support the existence of COPD information and analysis between people. Therefore, cluster sampling could be applied to collect

enough data from target participants to carry out pilot and thorough studies, since our target population is the overall participants that exposed to health but subdivided into different categories of smoke exposure, which are active smoking and passive smoking.

3.3.5 Sampling Size

For cluster research in a population, according to Kulshreshtha (2013), the precision of estimates is necessary, and a wider sample size is also required to achieve the desired results. To incorporate the Design Effect in the cluster sampling technique, it is recommended to use a value of 1.50 for quantitative surveying ("Preparing the Sample WHO STEPS Surveillance," 2017).

Hence, the sampling size is calculated when the formula for cluster sampling is as follows:

$$N = n(srs) * DEFF$$

SRS = Simple Random Sampling size, the formula is:

$$n(SRS) = \frac{Z^2 \times p(1-p)}{d^2}$$

$$n(SRS) = \frac{Numerator}{Denominator}$$

According to Taherdost (2017; as cited in Mageto & Luke, 2025), a confidence level of 95% and a margin of error of 5% can be calculated for a simple random sampling size to assume reliable generalizations. The SRS common benchmark is:

$$Z = 1.96 \; for \; 95\% \; confidence$$

$$p = 0.5 \; (if \; data \; is \; initial \; and \; unknown)$$

$d = desired\ margin\ error\ (0.05\ for\ \pm 5\%)$

$If,$

$\therefore p = 0.5, d = 0.05, Z = 1.96$

$Thus,$

$$n_0 = \frac{1.96^2 \times 0.5(1 - 0.5)}{0.05^2}$$

$= 384.16$

$\therefore 384.16 \Rightarrow 385(round\ up)$

SRS baseline would be 385 respondents to estimate the proportion with 95% CI ±5% (p=0.5). By integrating SRS numbers into the formula of cluster sampling:

Adjust for cluster design,

$DEFF = 1.5(moderate\ clustering)$

$N = 385 \times 1.5 = 577.5$

$\therefore 577.5 \Rightarrow 578(round\ up)$

Therefore, a minimum of 578 respondents is needed for this study.

3.4 Research Instrument

3.4.1 Questionnaire

A questionnaire serves as the research method for conducting primary data collection in this study. According to Mathers et al. (2007), the questionnaire survey can be determined as the most widely used research instrument in social sciences and health services research. Quantitative data can be gathered in a standardized way with a questionnaire, providing consistent and straightforward data for analysis (Roopa & Rani, 2012). Whether completed by self or administered, these questionnaires are important for analysing factual data, understanding personal behaviours, assessing attitudes of a group, and monitoring or establishing baseline data for a longitudinal study (Kuphanga, 2022). The questionnaire is distributed via Google Forms, with additional paper copies to target respondents. This similar approach was carried out by Patil et al. (2022) and White et al. (2006) to study the drivers that affect COPD risk awareness.

The questionnaire consists of six sections in this study, and also a cover layout. Section A is to collect demographic information of respondents, including their gender, age, education, occupation, residence, and income range. Questions from Sections B to F are measured using a five-point Likert Scale. According to Taherdoost (2019), the Likert scale is convenient to construct and is likely to have a highly accurate scale outcome. Participants' point of view is hard to analyse and conclude. A previous study by Remr (2023) used a five-point Likert scale in the questionnaire to assess an individual's health consciousness.

3.4.2 Pre-Test

Before being distributed to target respondents, a questionnaire will be assessed by the supervisor.

3.4.3 Pilot Test

According to Renuse (2024), a pilot test is crucial before conducting thorough research, which can be considered a necessity in the trial of finding. To ensure the strong feasibility of the study, data are collected from a representative sample of adults who are exposed to active and second-hand smoke. The purpose of this pilot test is to evaluate the practicality and response rate regarding our research. It also improved the quality of the questionnaire, and considering possibilities to adjust questions which might not be suitable before being utilized in a larger scale of the study.

The pilot test will be carried out with 50 sets of responses on the questionnaire as the initial stage of the study for active and second-hand smokers. According to Luckas, Hair and Oritinau (2004; as cited in Sang et al., 2018), a pilot study with 50 participants is advised in order to enable effective implementation of statistical testing approaches. All of the data gathered will be processed and analysed using SPSS version 30.0 software to assess and evaluate the reliability of the questionnaire.

3.5 Constructs Measurement

Measurement is a descriptive and scientific process (Wilson, 2023) that evaluates the quality of data carried by the output (Mari et al., 2023, as cited in Wilson, 2023). The following questionnaire is designed and will be distributed, with construct measurement incorporated as a fundamental step to assure the legitimacy and consistency of the results and findings (Sekaran & Bougie, 2016).

3.5.1 Scale of measurement

The mathematical nature of the values attributed to each variable is shown by scales of measurement (Shukla, 2023). Three measurements are involved: nominal scale, ordinary scale, and interval scale.

3.5.1.1 Nominal Scale

The nominal scale classifies events or observations by assigning numbers to indicate groups with shared qualitative characteristics. Unlike other scales that use numbers quantitatively, the nominal scale applies them arbitrarily (Idika et al., 2023). In this study, it will be applied to questions 1, 3, 4, and 5 in Section A.

Example of nominal scale:

Gender: ( ) Male ( ) Female

3.5.1.2 Ordinal Scale

With an ordinal scale, items can be arranged according to a certain characteristic (Kemp & Grace, 2021). It classifies the differences between the variables in various categories and ranks the categories appropriately (Sekaran & Bougie, 2016) to show clear ordering in the data. This scale will be used in questions 2 and 7 in Section A.

Example of ordinal scale:

Age range (year): ( )18-30 ( ) 31-40 ( ) 41-50 ( ) 51-60 ( ) 61 and above

3.5.1.3 Interval Scale

An interval scale determines the degree of the differences in the factor being measured and possesses both nominal and ordinal scale measuring attributes (Sekaran & Bougie, 2016). Joshi et al. (2015) suggested that the Likert scale is categorized as an interval scale when integrating items to create a cumulative score of a group of items for various individuals. Thus, it will be utilized in this study with a set of response selections to allow respondents' opinions to be reflected correctly (Koo & Yang, 2025), and examples are shown below.

Example of interval scale:

Questionnaires for COPD risk awareness	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
I am aware that people with COPD may	1	2	3	4	5

experience shortness of breath.					

3.5.2 Origin of Construct

Table 3.1

Summary of Measurements of Items from Previous Studies

Variables	**Adapted from**	**Items**	**Scale**
Dependent Variable: COPD risk awareness	Al Bshabshe et al. (2023)	8 items	Strongly disagree (1) to Strongly agree (5)
Independent Variable 1: Perceived severity of COPD	Robertson et al. (2021)	6 items	Strongly disagree (1) to Strongly agree (5)
Independent Variable 2: Perceived benefits of health screening	Chien et al. (2020)	8 items	Strongly disagree (1) to Strongly agree (5)
Independent Variable 3: Perceived barriers	Hoseini-Esfidarjani et al. (2021)	6 items	Strongly disagree (1) to Strongly agree (5)
	Gordon et al. (2023)	2 items	
Independent Variable 4: Perceived self-efficacy	Delgadillo et al. (2014)	1 item	Strongly disagree (1) to Strongly agree (5)
	Khanian et al. (2020)	3 items	
	Zhang et al. (2013)	2 items	
	Schwarzer & Jerusalem (1995)	1 item	

3.5.3 Measurement of Independent Variables and Dependent Variable: Operational Definition

In this study, four elements can influence COPD risk awareness, which include perceived severity of COPD, perceived benefits of health screening, perceived barriers, and perceived self-efficacy. The questionnaire items use a five-point Likert scale, with "1" indicating "Strongly Disagree" and "5" indicating "Strongly Agree".

3.5.3.1 COPD risk awareness

Chronic disease awareness refers to the general public's understanding of long-term health conditions (Chimezie, 2023), and COPD is one of the chronic diseases.

COPD risk awareness is measured by the 8 items adapted from Al Bshabshe et al. (2023), with examples of items: "*I am aware that people with COPD may experience shortness of breath*", "*I recognize that coughing can be a symptom of COPD*", and "*I am not familiar with the symptoms of COPD*".

3.5.3.2 Perceived severity of COPD

While perceived severity is linked to COPD knowledge, COPD knowledge is linked to particular knowledge about the disease, enabling patients to manage their condition and potential exacerbations independently (Nakken et al., 2017).

Six questionnaire items are adapted from Robertson et al. (2021). For example, "*I know that COPD is a serious disease, even though it can be prevented*", "*I know that persistent coughs related to COPD can severely affect a person's daily life*", and "*I know that the symptoms of COPD can become severe without stopping smoking*".

3.5.3.3 Perceived benefits of health screening

When people have considered perceived benefits for a specific action, health screening attitudes can be described by factors that encourage and discourage health screening participation (Chien et al., 2020).

Eight items are altered from Chien et al. (2020). The sample items are "*I believe health screening could help me determine my current lung health status*", "*Participating in health screening can help detect early warning signs of the disease*", and "*I think health screening is a waste of time*".

3.5.3.4 Perceived barriers

Perceived barriers are the factors an individual believes hinder the adoption of a recommended behaviour, such as time, cost, limited-service access, or distance (Green et al., 2020; Wang et al., 2024; Dolan et al., 2020, as cited in Golestani et al., 2025).

Perceived barriers in this study are determined by six items from Hoseini-Esfidarjani et al. (2021) and two items adapted from Gordon et al. (2023). Example items are "*The distance from the health centres to my house is appropriate*", "*Getting to and from the health centre is easy for me*", and "*I have trouble paying for health screening*".

3.5.3.5 Perceived self-efficacy

Perceived self-efficacy is an individual's belief in their ability to manage challenges and adopt health behaviours to achieve desired outcomes (Wang et al., 2024).

Perceived self-efficacy in this study is measured by seven items, which are adapted separately from Delgadillo et al. (2014), Khanian et al. (2020), Zhang et al. (2013), and Schwarzer and Jerusalem (1995). The sample items include "*I believe I can identify smokers who represent COPD risk to me*", "*I am confident that I can identify the symptoms of COPD*", and "*It is difficult for me to keep updated with COPD information and protect myself from COPD*".

3.6 Data Processing

Data processing gathers raw data and converts it into the required information. Data becomes usable and readable information only after it has been processed, assessed, and interpreted (Vaughan et al., 2021). First, examine the questionnaire to identify and correct any illogical or conflicting information. In the coding stage, assign a code to each piece of data to represent an overall pattern or occurrence. The data will be analysed and tested for reliability by Statistical Package for the Social Sciences (SPSS) 30.0 software (Sekaran & Bougie, 2016).

3.6.1 Data Checking

Data checking helps to determine any missing, erroneous, or irrelevant data in the questionnaire to prevent minor mistakes (Bureau of Educational and Cultural Affairs & Evaluation Division, n.d.) and to ensure the data's validity before data analysis.

3.6.2 Data Editing

When interpreting information from respondents, there is a possibility of making mistakes, including inaccuracies, incompleteness, and misclassification (Palikhe & Phuyal, 2025). Therefore, data editing entails identifying and correcting errors, inconsistencies, invalid responses, or missing information in the data provided by study participants (Sekaran & Bougie, 2016) to improve study quality (Palikhe & Phuyal, 2025).

3.6.3 Data Coding

In the data coding stage, a number will be assigned to each participant's response so that it can be recorded into the database to reduce confusion, particularly when there are numerous questions in the questionnaire (Sekaran & Bougie, 2016). Thus, the assigned number that represents different responses will be keyed into SPSS 30.0 software. In this study, the number range from 1 to 11 will be coded to represent different responses in different questions, while 99 is used in coding missing responses.

Table 3.2

Coding for Section A

Q1	Gender	"Male" = 1 "Female" = 2
Q2	Age range (year)	"18 – 30" = 1 "31 – 40" = 2 "41-50" = 3 "51-60" = 4 "61 and above" = 5
Q3	Education level	"Primary school" = 1 "Secondary school" = 2 "Diploma" = 3 "Bachelors" = 4 "Masters" = 5 "PhD" = 6

Q4	Categories of exposure to smoke	"Current smoker" = 1 "Ex-smoker" = 2 "Second-hand smoker" = 3
Q5	Occupation	"Manager" = 1 "Professional" = 2 "Technician and associate professional" = 3 "Clerical support worker" = 4 "Service and sales worker" = 5 "Skilled agricultural, forestry, livestock and fishery worker" = 6 "Craft and related trades worker" = 7 "Plant and machine operator and assembler" = 8 "Elementary occupation" = 9 "Unemployed" = 10 "Retiree" = 11
Q6	Household income range	"RM2,000 and below" = 1 "RM2,001 to RM4,000" = 2 "RM4,001 to RM6,000" = 3 "RM6,001 to RM8,000" = 4 "RM8,001 to RM10,000" = 5 "RM10,001 and above" = 6

The coding for answers with a 5-point Likert scale in Sections B, C, D, E, and F is shown below:

- "Strongly Disagree" = 1
- "Disagree" = 2
- "Neutral" = 3
- "Agree" = 4

- "Strongly Agree" = 5

3.6.4 Data Transcribing

The final step is that the data that is being coded will be transcribed into readable information by SPSS 30.0 software (Sekaran & Bougie, 2016).

3.7 Data Analysis

In this study, SPSS 30.0 software will be used to analyse the collected questionnaire data. The analyses that will be performed include descriptive analysis, reliability analysis, multicollinearity test, normality test, and inferential analysis.

3.7.1 Descriptive Analysis

Descriptive analysis summarises data by outlining the sample's key features. It is commonly applied to present different sample characteristics, such as frequency distributions and measures of central tendency in table format, or as a figure (Fulk, 2023).

3.7.2 Reliability Analysis

Reliability analysis is essential to assess the data's reliability, consistency, and stability (Izah et al., 2023). Reliability measures the degree to which an instrument yields consistent and uniform findings under various circumstances (Cohen et al., 2022). Different types of reliability assessments can be included, such as internal consistency (Revelle & Condon, 2019, as cited in Izah et al., 2023). Based on Halimoon et al. (2021), Cronbach's alpha is usually for evaluating internal consistency. The reliability of internal consistency rises as Cronbach's alpha value approaches 1 (Sekaran & Bougie, 2016).

Table 3.3

Level of Reliability Index

Cronbach's Alpha value range	**Strength of association**
Less than 0.6	Poor
0.60 to less than 0.70	Moderate
0.70 to less than 0.80	Good
0.80 to less than 0.90	Very good
More than 0.90	Excellent

Note. From Sekaran & Bougie (2017) as cited in Hashim et al. (2020)

Table 3.4

Results of Reliability Test for Pilot Test

Name of variables	**Value of Cronbach's alpha**	**Indicators**

Dependent Variable: COPD risk awareness	0.849	Very good
Independent Variable 1: Perceived severity of COPD	0.922	Excellent
Independent Variable 2: Perceived benefits of health screening	0.697	Moderate
Independent Variable 3: Perceived barriers	0.693	Moderate
Independent Variable 4: Perceived self-efficacy	0.709	Good

3.7.3 Preliminary Data Screening

3.7.3.1 Multicollinearity

Multicollinearity occurs when several variables in a regression model show strong correlations both with the dependent variable and with each other (Shrestha, 2020). Multicollinearity increases the variance and standard error of the regression coefficient, which leads to a drop in the t-statistic value. A low t-statistic value indicates the insignificance of the regression coefficient (Kim, 2019).

Variance inflation factor (VIF) and its reciprocal, known as the tolerance value, are common indicators of multicollinearity (Kim, 2019). High multicollinearity exists if

the VIF is more than 10 (Dertli et al., 2024, as cited in Muthukrishnan & James, 2024) and the tolerance value is lower than 0.1 (Kyriazos & Poga, 2023).

3.7.3.2 Normality

Assessing the normality of data distribution is a fundamental step because it guides the selection of appropriate statistical tests and ensures the validity of the results (Ibrahim, 2024).

First, normality can be tested using skewness and kurtosis (Garren et al., 2021, as cited in Hatem et al., 2022). A skewness coefficient with a value equal to 0 indicates a normal distribution or symmetrical dataset (Weinstein, 2021, as cited in Hatem et al., 2022).

Second, a histogram can be utilised to assess normality. Creating a histogram prior to formal statistical testing allows for a visual inspection of the data distribution and potential outliers. With a sufficiently large sample size, a bell-shaped histogram generally indicates that the data follow an approximately normal distribution (Yang & Berdine, 2021).

3.7.3.3 Outlier Analysis

A value that significantly deviates from the rest of the data is called an outlier. Errors in data collection, measurement, processing, sampling, or volatility in the data can all lead to outliers (Dash et al., 2023). There are a few outlier detection methods, such as

the median z-score and box-plot method (Kolbaşı & Ünsal, 2021). In this study, the box-plot method is used because of its straightforward nature and avoidance of extreme potential outliers, which can skew the estimation of a variance measure and reduce the sensitivity to outliers (Schwertman et al., 2003).

Since outliers can create bias in statistical estimations, causing results that are either overestimated or underestimated, handling outliers is crucial (Kwak & Kim, 2017). Non-error outliers can be kept, deleted, or recoded using the winsorizing method, whereas error outliers can be eliminated or fixed (Dash et al., 2023).

3.7.4 Inferential Analysis

Inferential analysis involves drawing conclusions or generalisations about population characteristics based on the nature of a sample. It is commonly applied to evaluate research hypotheses (Mamman et al., 2022). In this study, it helps to draw the relationship between the dependent variable, COPD risk awareness, and the independent variables, perceived severity of COPD, perceived benefits of health screening, perceived barriers, and perceived self-efficacy.

3.7.4.1 Multiple Linear Regression Analysis

Multiple linear regression analysis assesses the proportionate impact of several independent variables on a dependent variable, to determine the significance of these relationships, and to make predictions (Shafi et al., 2024).

Multiple linear regression model (adapted from Li & Fan, 2022):

$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$

where:

β1, β2, β3, and β4 are the corresponding coefficients of four independent variables.

β0 = constant value

Y = COPD risk awareness

X1 = Perceived severity of COPD

X2 = Perceived benefits of health screening

X3 = Perceived barriers

X4 = Perceived self-efficacy

Ɛ = random error

3.8 Chapter Summary

In summary, this chapter presents the research methodology and design employed in the study, where primary data were obtained using questionnaires, with cluster sampling employed as the sampling technique. Moreover, at least 578 respondents are needed in this study. A pre-test and a pilot test were carried out before the full-scale survey, with a minimum of 50 respondents involved in the pilot test. Once sufficient data are obtained, the data will be processed and analysed using SPSS 30.0 software.

CHAPTER 4: RESEARCH RESULTS

4.0 Introduction

The procedure for data analysis is outlined. A descriptive analysis is performed to provide an overview of the data. Then, to ensure the measurement scales are comparable, a reliability test is conducted. Preliminary data screening is carried out to determine any issues with nonnormality and multicollinearity. Lastly, an analysis of multiple regression is applied. Every analysis is performed by using SPSS version 30.0.

4.1 Descriptive Analysis

Beginning with an analysis of the demographic data gathered in Section A, then continuing with Sections B, C, D, E, and F. Pie charts and tables were made to effectively collect and present the survey data.

4.1.1 Respondents' Demographic Profile

This study looks at six types of demographics. All of these factors are examined separately.

4.1.1.1 Gender

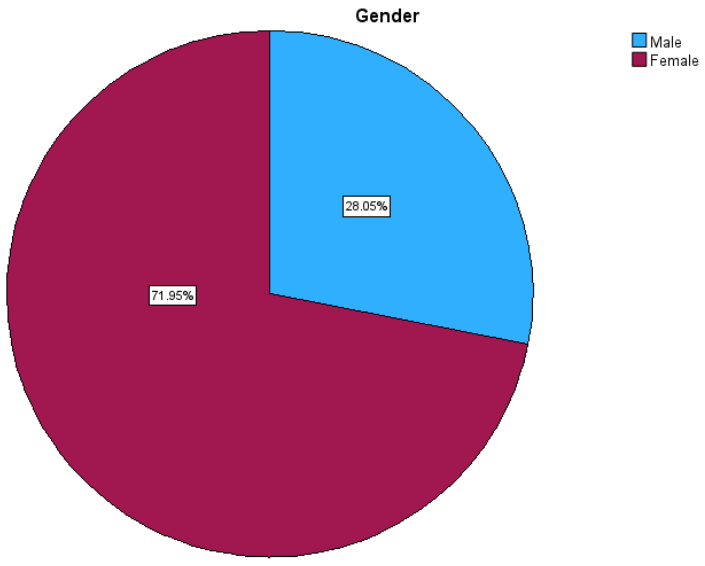
Table 4.1

Descriptive Analysis for Gender

Gender	Frequency	Percentage (%)	Cumulative frequency	Cumulative percentage (%)
Male	170	28.1	170	28.1
Female	436	71.9	606	100.0

Figure 4.1

Descriptive Analysis for Gender



Gender is the first category. The pie chart above demonstrates a total number of 606 respondents, including females and males in our study population. 170 are males

(28.1%) and 436 respondents are female (71.9), which shows that female respondents account for a large percentage.

4.1.1.2 Age range

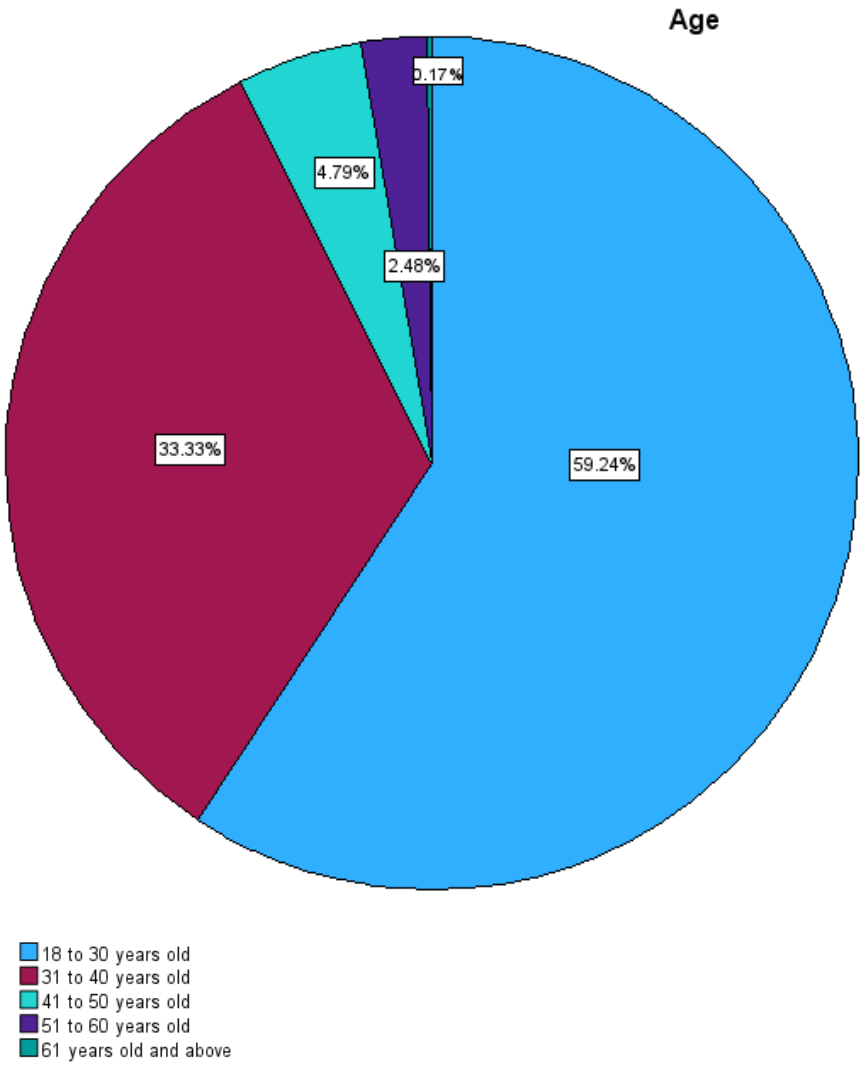
Table 4.2

Descriptive Analysis for Age Range

Age range	**Frequency**	**Percentage (%)**	**Cumulative frequency**	**Cumulative percentage (%)**
18 to 30 years old	359	59.2	359	59.2
31 to 40 years old	202	33.3	561	92.6
41 to 50 years old	29	4.8	590	97.4
51 to 60 years old	15	2.5	605	99.8
61 years old and above	1	0.2	606	100.0

Figure 4.2

Descriptive Analysis for the Age Range



According to the analysis above, it shows that majority of the respondents are aged from 18 to 30 years old, a total of 359, which accounts to 59.2 % in the survey. Following by 202 respondents (33.3) aged between 31 and 40 years old, which is the second largest proportion of the age range. There is only 1 respondent in the age range of 61 years old and above, account to 0.2% among age range. 29 respondents (4.8%) are between 41 to 50 years old, and 15 respondents (2.5%) are between 51 to 60 years old.

4.1.1.3 Education level

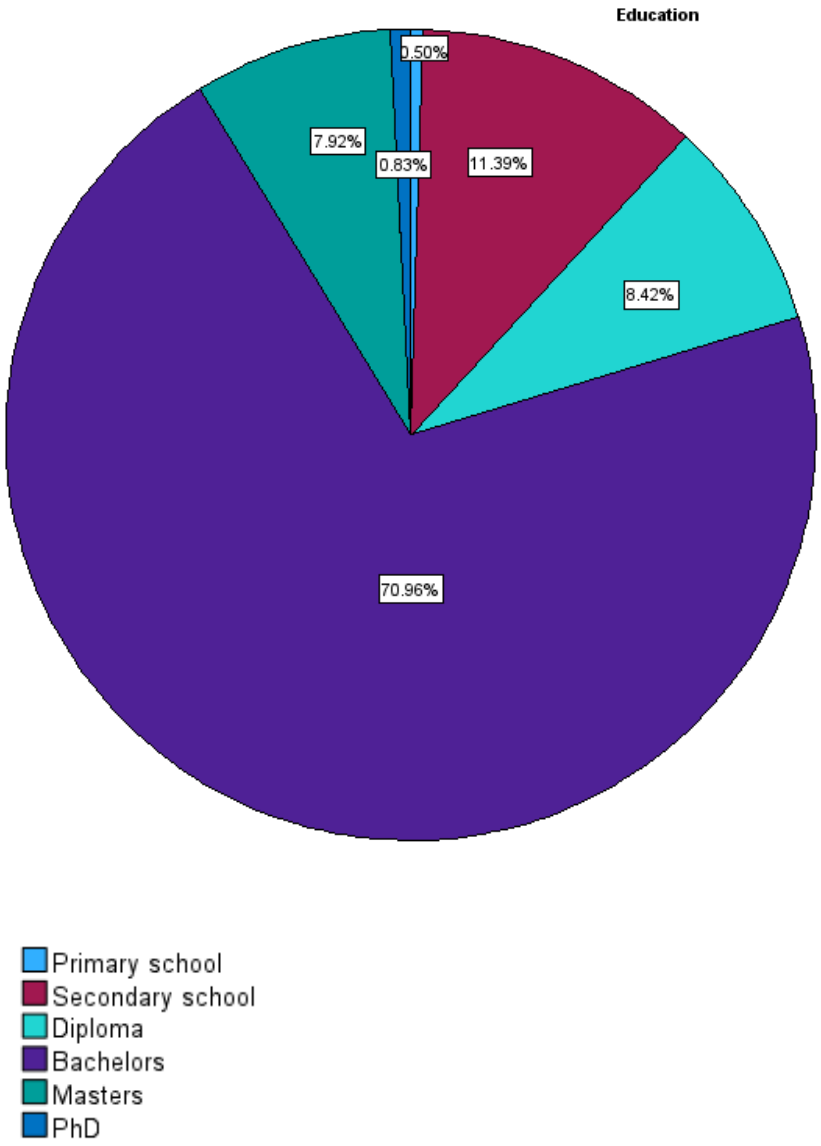
Table 4.3

Descriptive Analysis for Education Level

Education level	**Frequency**	**Percentage (%)**	**Cumulative frequency**	**Cumulative percentage (%)**
Primary school	3	0.5	3	0.5
Secondary school	69	11.4	72	11.9
Diploma	51	8.4	123	20.3
Bachelors	430	71.0	553	91.3
Masters	48	7.9	601	99.2
PhD	5	0.8	606	100.0

Figure 4.3

Descriptive Analysis for the Education Level



Based on the data analysed in the section on education level, it is found that 430 of the respondents (71.0%) are in bachelor's, which represents the largest proportion in education level. The least respondents for education level are primary school, only 3 individuals (0.5%) are found in the study. The remaining individuals, 69 respondents (11.4%), were educated till secondary school, 51 respondents (8.4%) were educated till diploma degree, 48 respondents (7.9%) have a master's degree, while 5 respondents (0.8%) hold a PhD.

4.1.1.4 Categories of exposure to smoke

Table 4.4

Descriptive Analysis for Categories of Exposure to Smoke

Categories of exposure to smoke	**Frequency**	**Percentage (%)**	**Cumulative frequency**	**Cumulative percentage (%)**
Current smoker	101	16.7	101	16.7
Ex-smoker	181	29.9	282	46.5
Second-hand smoker (A non-smoker who involuntarily inhales tobacco smoke.)	324	53.5	606	100.0

Figure 4.4

Descriptive Analysis for Categories of Exposure to Smoke

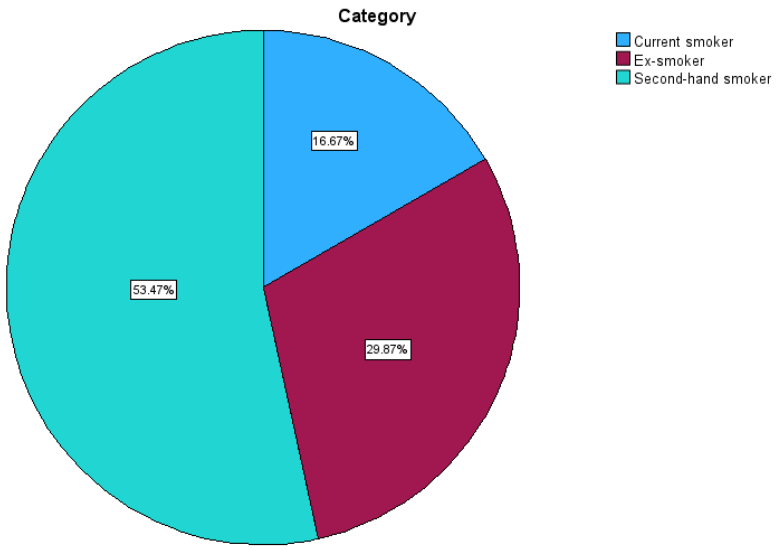


Table 4.4 and Figure 4.4 demonstrate statistics for categories of exposure to smoke. It shows that 101 respondents (16.7%) are current smokers, 181 respondents (29.9%) are ex-smokers, while 324 respondents (53.5%) are second-hand smokers who involuntarily inhale tobacco smoke. Among the categories of smokers, second-hand smokers have the highest proportion of the categories in the types of smokers.

4.1.1.5 Occupation

Table 4.5

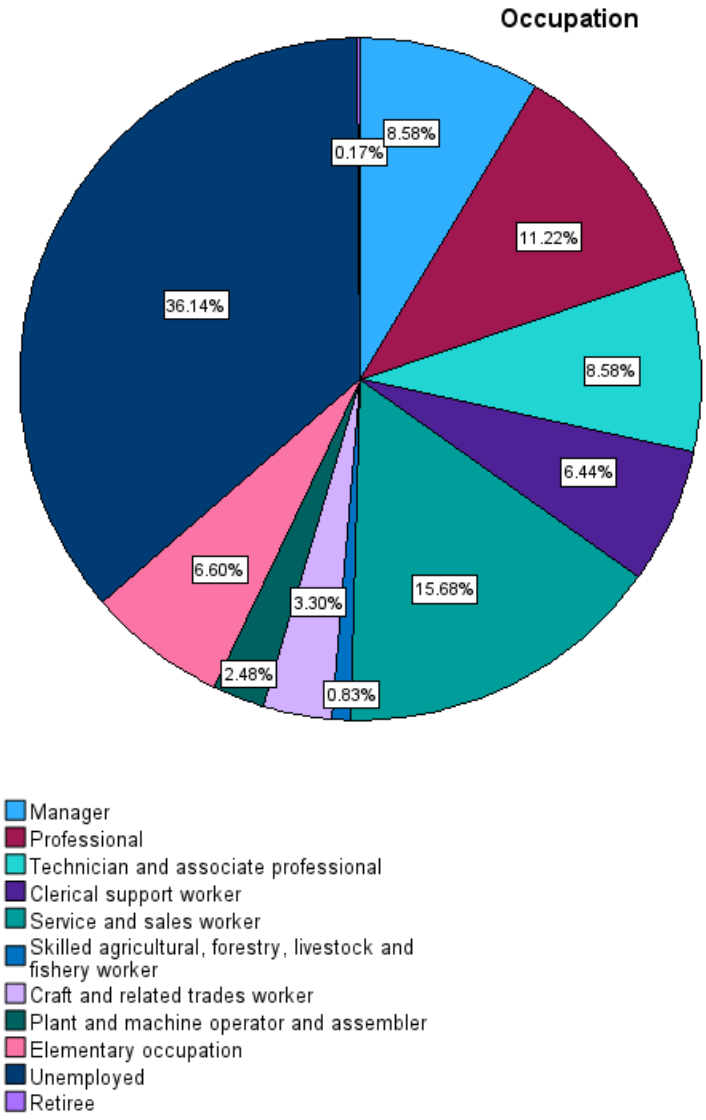
Descriptive Analysis for Occupation

Occupation	**Frequency**	**Percentage (%)**	**Cumulative frequency**	**Cumulative percentage (%)**
Manager	52	8.6	52	8.6
Professional	68	11.2	120	19.8
Technician and associate professional	52	8.6	172	28.4
Clerical support worker	39	6.4	211	34.8
Service and sales worker	95	15.7	306	50.5
Skilled agricultural, forestry, livestock and fishery worker	5	0.8	311	51.3
Craft and related trades worker	20	3.3	331	54.6

Plant and machine operator and assembler	15	2.5	346	57.1
Elementary occupation (Perform simple, routine and non-systematic tasks.)	40	6.6	386	63.7
Unemployed	219	36.1	605	99.8
Retiree	1	0.2	606	100.0

Figure 4.5

Descriptive Analysis for Occupation



Based on the chart above, it is shown that unemployed respondents have the largest proportion in the study, which is 219 of them (36.1%). Respondents who had retired only accounted for 0.2 %, 1 individual. The second largest proportion of respondents (15.7%) is in the service and sales industry, and the third largest proportion of respondents (11.2%) work as professionals. On the other hand, there are only 5 respondents (0.8%) from skilled agricultural, forestry, livestock, and fishery, which is the second least number of categories in occupation.

4.1.1.6 Household income range

Table 4.6

Descriptive Analysis for Household Income Range

Household income range	**Frequency**	**Percentage (%)**	**Cumulative frequency**	**Cumulative percentage (%)**
RM2,000 and below	112	18.5	112	18.5
RM2,001 to RM4,000	160	26.4	272	44.9
RM4,001 to RM6,000	113	18.6	385	63.5
RM6,001 to RM8,000	113	18.6	498	82.2
RM8,001 to RM10,000	50	8.3	548	90.4
RM10,001 and above	58	9.6	606	100.0

Figure 4.6

Descriptive Analysis for Household Income Range

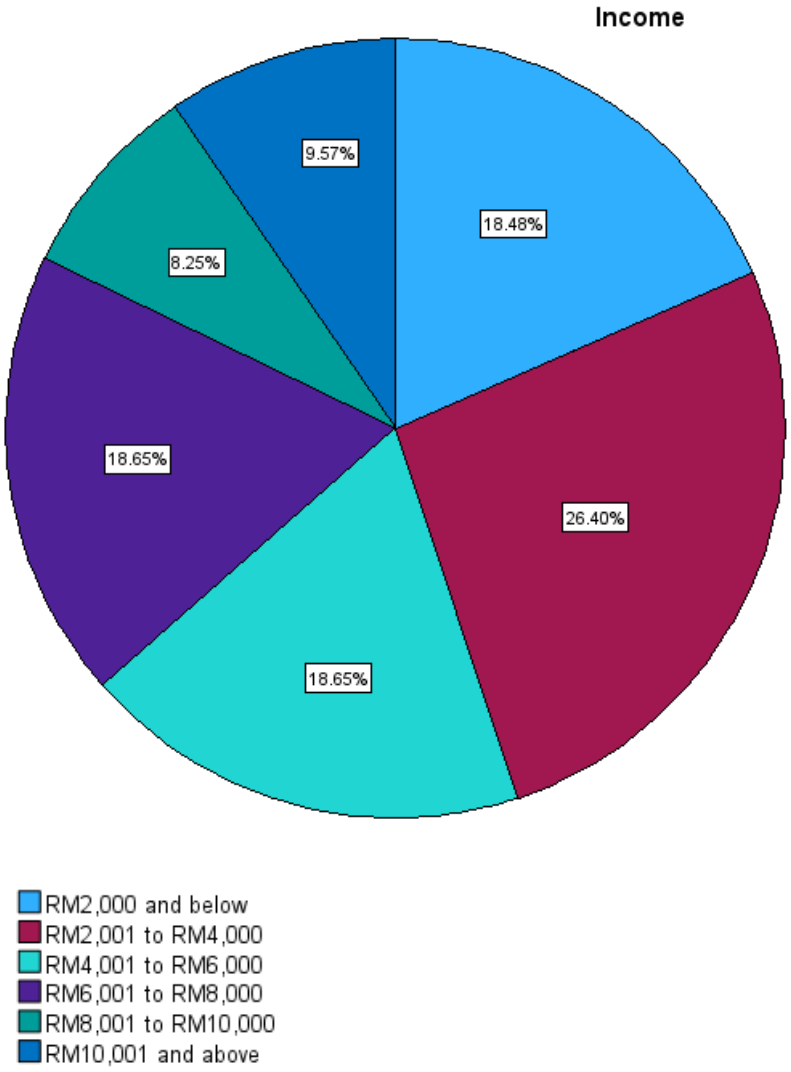


Figure 4.6 demonstrates that there are 160 respondents (26.4%) having income between RM2,001 to RM4,000, the highest percentage of the income group. Secondly, it is followed by the income group of RM4,001 to RM6,000 and RM6,000 to RM8,000, both of which have the same number of respondents, 113 individuals for each, and each accounting to 18.6%. The least income group respondents are RM8,001 to RM10,000; 50 individuals (8.3%) are from this group.

4.1.2 Central Tendencies and Dispersion Measurement of Constructs

The responses to the dependent and independent variable questions provided in Sections B, C, D, E, and F are examined in this section. The analysis includes assessments of central tendency (mean) and dispersion (standard deviation).

Table 4.7

Central Tendencies Measurement of COPD risk awareness

Question	Statement	Sample size, N	Mean	Standard deviation	Mean ranking	Standard deviation ranking
DV1	I am aware that people with COPD may experience shortness of breath.	606	4.24	0.858	1	6
DV2	I recognize that coughing can be a symptom of COPD.	606	4.21	0.869	2	5
DV3	I am aware that persistent sputum could be a sign of COPD risk. (Sputum is a mixture of saliva and mucus that is coughed up from	606	4.14	0.924	5	3

	the respiratory tract.)					
DV4	I realize that wheezing may indicate a risk of COPD. (Wheezing is a high-pitched, whistling sound that can occur during breathing when the airways in the lungs become narrowed or blocked.)	606	4.12	0.949	6	1
DV5	I recognize that having chest pain or tightness may be related to COPD.	606	4.20	0.911	3	4
DV6	I understand that unusual fatigue may signal a risk for COPD.	606	4.09	0.942	8	2
DV7R	I am not aware that unexplained weight loss can be linked to COPD.	606	4.15	0.733	4	8
DV8R	I am not familiar with the symptoms of COPD.	606	4.11	0.740	7	7

Table 4.7 demonstrates the central tendency measurement for COPD risk awareness items. DV1 scored the highest in mean (M= 4.24), ranked sixth in standard deviation (SD= 0.858). DV7R has the fourth highest mean score and the lowest standard deviation (M=4.15, SD= 0.733). DV4 has the highest standard deviation score but slightly lower in mean score (M= 4.12, SD= 0.949). In short, the results suggest that respondents symptomatic of COPD are linked to COPD risk awareness.

Table 4.8

Central Tendencies Measurement of Perceived Severity of COPD

Question	Statement	Sample Size, N	Mean	Standard deviation	Mean ranking	Standard deviation ranking
Severity1	I know that COPD is a serious disease, even though it can be prevented.	606	4.22	0.722	6	4
Severity2	I know that persistent coughs related to COPD can severely affect a person's daily life.	606	4.37	0.755	3	2
Severity3	I know that the symptoms of COPD can become severe without stopping smoking.	606	4.39	0.771	2	1

Severity4	I know that regular exposure to smoke puts people at serious risk of COPD.	606	4.44	0.706	1	6
Severity5	People with COPD are at serious risk of complications if they do not receive pneumonia vaccination.	606	4.24	0.708	5	5
Severity6	People with COPD face serious health consequences because they are more likely to develop frequent chest infections.	606	4.33	0.743	4	3

Table 4.8 shows the measures of central tendency for the Perceived Severity of COPD items. Severity4 has the highest mean with the lowest standard deviation value (M= 4.44, SD= 0.706), demonstrating respondents' strong and solid agreement. Severity3 has the second-highest mean value but the highest standard deviation value (M= 4.39, SD= 0.771). Severity5 and Severity1 are reported to have slightly lower mean scores (M= 4.24, SD= 0.708; M= 4.22, SD= 0.722). Overall, the results reflected that people aware of COPD risk are similarly aware of its severity.

Table 4.9

Central Tendencies Measurement of Perceived Benefits of Health Screening

Question	Statement	Sample size, N	Mean	Standard deviation	Mean ranking	Standard deviation ranking
Benefits1	I believe health screening could help me determine my current lung health status.	606	4.43	0.712	1	7
Benefits2	Participating in health screening can help detect early warning signs of the disease.	606	4.39	0.819	4	5
Benefits3	I think that early detection and treatment of COPD are beneficial.	606	4.42	0.773	3	6
Benefits4	I believe attending health screening, even without symptoms, could help me protect my health in the long term.	606	4.43	0.705	1	8
Benefits5R	I am afraid that health screening	606	2.79	1.412	8	3

	may reveal that I already have a lung problem.					
Benefits6R	I think health screening is a waste of time.	606	3.62	1.475	5	1
Benefits7R	I think health screening procedures are too complicated for me.	606	3.28	1.391	7	4
Benefits8R	I will avoid health screening because it causes me fear, anxiety, and discomfort.	606	3.34	1.472	6	2

In Table 4.9, there are two items ranked first in mean scoring, which are Benefits1 and Benefits4. Both items score M= 4.43, Benefits4 (SD= 0.705) has the lowest standard deviation, while Benefits1 (SD= 0.712) has the second lowest standard deviation. Benefits6R has the highest standard deviation but the fifth-highest mean score (M= 3.62, SD= 1.475). The findings suggest that belief in the benefits of health screening supports awareness of COPD risk.

Table 4.10

Central Tendencies Measurement of Perceived Barriers

Question	Statement	Sample size, N	Mean	Standard deviation	Mean ranking	Standard deviation ranking

Barriers1	The general medical services I need are provided at the health centre.	606	4.30	0.724	1	8
Barriers2	The distance from the health centres to my house is appropriate.	606	4.22	0.869	3	5
Barriers3	The time required to reach the health centre is appropriate.	606	4.24	0.862	2	6
Barriers4	Getting to and from the health centre is easy for me.	606	4.08	0.926	6	3
Barriers5	The expected time to receive the services I need is appropriate.	606	4.09	1.009	5	1
Barriers6	The working hours of the public health centre are suitable for receiving services from these centres.	606	4.01	0.986	8	2
Barriers7R	I have trouble paying for health screening.	606	4.11	0.744	4	7

Barriers8R	Due to cost restraints, I have delayed or did not receive health screening although I needed it.	606	4.06	0.903	7	4

Table 4.10 presents the central tendency measures for items of Perceived Barriers. Barriers1 scored the highest mean (M= 4.30) and the lowest number of standard deviations (SD= 0.724), expressing a strong connection between the supply of medical services and perceptions on barriers. Followed by Barriers3 (M= 4.24, SD= 0.862). Barriers5 has the highest standard deviation value (M= 4.09, SD= 1.009). In short, the central tendencies result demonstrates that perceptions of barriers to accessing health are positively affecting COPD risk awareness.

Table 4.11

Central Tendencies Measurement of Perceived Self-Efficacy

Question	Statement	Sample size, N	Mean	Standard deviation	Mean ranking	Standard deviation ranking
Self_efficacy1	I believe I can identify smokers who represent COPD risk to me.	606	3.95	1.080	4	4
Self_efficacy2	I am confident that I can avoid	606	4.00	1.063	3	5

	harmful behaviours that lead to COPD.					
Self_efficacy3	I am confident that I can identify the symptoms of COPD.	606	3.86	1.113	6	3
Self_efficacy4	I am confident that I can receive the health screening when I have COPD symptoms.	606	3.90	1.132	5	2
Self_efficacy5	I am confident that I can get COPD-related information through the Internet or medical books.	606	4.17	0.923	1	7
Self_efficacy6	I am confident that I will consult with medical	606	4.15	0.966	2	6

	staff when I have questions about COPD symptoms.					
Self_efficacy7R	It is difficult for me to keep updated with COPD information and protect myself from COPD.	606	3.09	1.397	7	1

In Table 4.11, items of Perceived Self-Efficacy are measured for central tendency. Self_efficacy5 scored the highest among the items in mean score but lowest standard deviation (M= 4.17, SD= 0.923), indicating a strong belief in self-efficacy to handle individual health conditions. Then, it was followed by Self_efficacy6, with the second-highest mean score and second-lowest standard deviation (M= 4.15, SD= 0.966). Self_efficacy7R is reported to have the highest standard deviation but the lowest mean score (M= 3.09, SD= 1.397), showing a wider range of responses.

4.2 Scale Measurement

4.2.1 Reliability Test

Table 4.12

Cronbach's Alpha Reliability Analysis

No.	Type of the variable	Name of the variable	Number of items	Cronbach's Alpha	Reliability test
1	Dependent variable	COPD risk awareness	8	0.807	Very good
2	Independent variable	Perceived severity of COPD	6	0.714	Good
3	Independent variable	Perceived benefits of health screening	8	0.658	Moderate
4	Independent variable	Perceived barriers	8	0.752	Good
5	Independent variable	Perceived self-efficacy	7	0.726	Good

Cronbach's alpha values for the dependent variable and independent variables in our study are displayed in the table above. The dependent variable, COPD risk awareness, has the greatest Cronbach's alpha value (0.807). The three independent variables' Cronbach's alpha values fall between 0.70 to 0.80, which are perceived severity of COPD (0.714), perceived barriers (0.752), and perceived self-efficacy (0.726), respectively, showing a good reliability. While the second independent variable, perceived benefits of health screening, has a Cronbach value of 0.658, indicating moderate reliability. Since all variables' Cronbach's alphas are greater than 0.60, this indicates that all variables are reliable.

4.3 Preliminary Data Screening

To ensure the validity of the study's conclusions, initial data analysis is carried out before inferential analysis. Two preliminary data analyses were carried out, including the test for normality and multicollinearity.

4.3.1 Multicollinearity Test

When two or more independent variables have a roughly linear relationship, this is known as multicollinearity (Chan et al., 2022). If multicollinearity occurs, estimates are unstable and hence reduce the precision of the findings by making them unreliable (Alin, 2010, as cited in Chan et al., 2022). To check the existence of multicollinearity, the variation inflation factor (VIF) and tolerance value are employed. An independent variable's multicollinearity is suspiciously high if its VIF is higher than 10 (Tsagris & Pandis, 2021) or its tolerance value is less than 0.1 (Kutner et al., 2005, as cited in Kyriazos & Poga, 2023).

Table 4.13

Variance Inflation Factor (VIF) and Tolerance Value

Independent variables	**Collinearity statistics**	
	VIF	**Tolerance**
Perceived severity of COPD	0.734	1.362
Perceived benefits of health screening	0.962	1.039
Perceived barriers	0.765	1.307
Perceived self-efficacy	0.788	1.269

Based on Table 4.13, all independent variables demonstrated tolerance values in excess of 0.1 and VIF values below 10. This shows that the multicollinearity problem does not exist.

4.3.2 Normality Test

To evaluate whether the data is normal, normality tests are performed following a multicollinearity analysis. This study uses a histogram together with skewness and kurtosis analysis to evaluate the data's normality.

Table 4.14

Normality Test Result

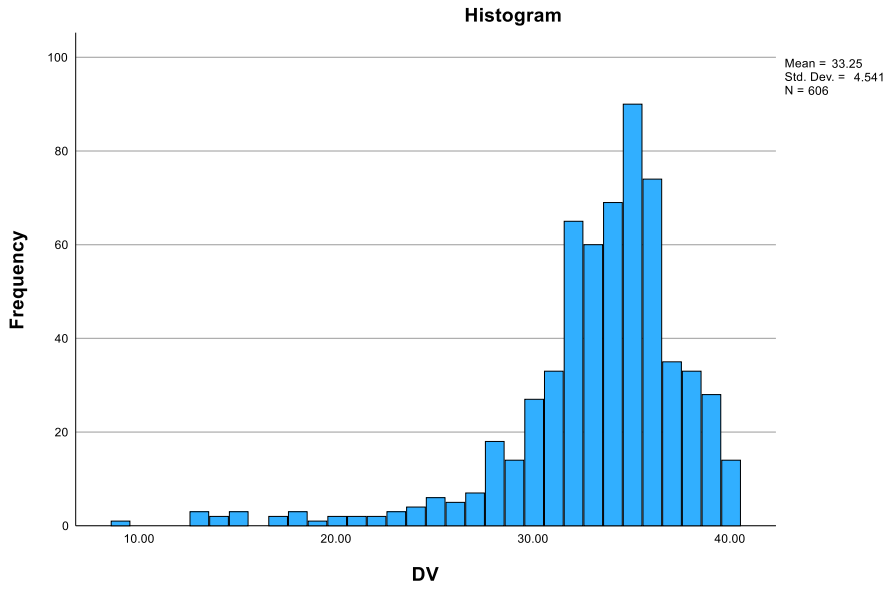
Variables	**Skewness**	**Kurtosis**
Dependent Variable: COPD risk awareness	(1.887)	5.492
Independent Variable: Perceived severity of COPD	(1.426)	4.228
Independent Variable: Perceived benefits of health screening	(0.069)	(1.090)
Independent Variable: Perceived barriers	(0.828)	0.739
Independent Variable: Perceived self-efficacy	(1.012)	1.073

To check for normality, the skewness and kurtosis of the data are first looked at. When all variables have values of skewness between -2 and +2, and kurtosis values range

between -7 and +7, it indicates that the normality assumption is fulfilled, as mentioned by Hair et al. (2010) and Bryne (2010) (as cited in Demir, 2022). The variable with the highest skewness value is perceived benefits of health screening, which is -0.069, and the lowest value of skewness is COPD risk awareness, with a value of -1.887. The kurtosis value for COPD risk awareness is 5.492, which is the highest, while the lowest value for kurtosis is perceived benefits of health screening, which is -1.090. The variables' data are assumed to be normally distributed based on Table 4.14, as all the variables met the requirements for a normal distribution value of skewness and kurtosis.

Figure 4.7

Histogram



Second, the data's compliance with the normality assumption is evaluated using a histogram. A histogram provides a reliable approximation of the underlying probability density curve (Scott, 1992). Figure 4.7 above displays the histogram produced using the data collected from our dependent variable, representing COPD risk awareness. The skewness value of -1.887 and the kurtosis value of 5.492 are reported. According to Hatem et al. (2022), if the skewness score is less than -1 or larger than 1, the data are strongly skewed, and the distribution has heavier tails when the kurtosis is greater than

zero. Therefore, the values from Figure 4.7 indicate a highly skewed and heavy-tailed distribution. It is a negatively skewed histogram, indicating that the mean and the median are less than the mode.

4.3.3 Outlier Analysis

Figure 4.8

Box-plot for 1st item (DV1) of Dependent Variable

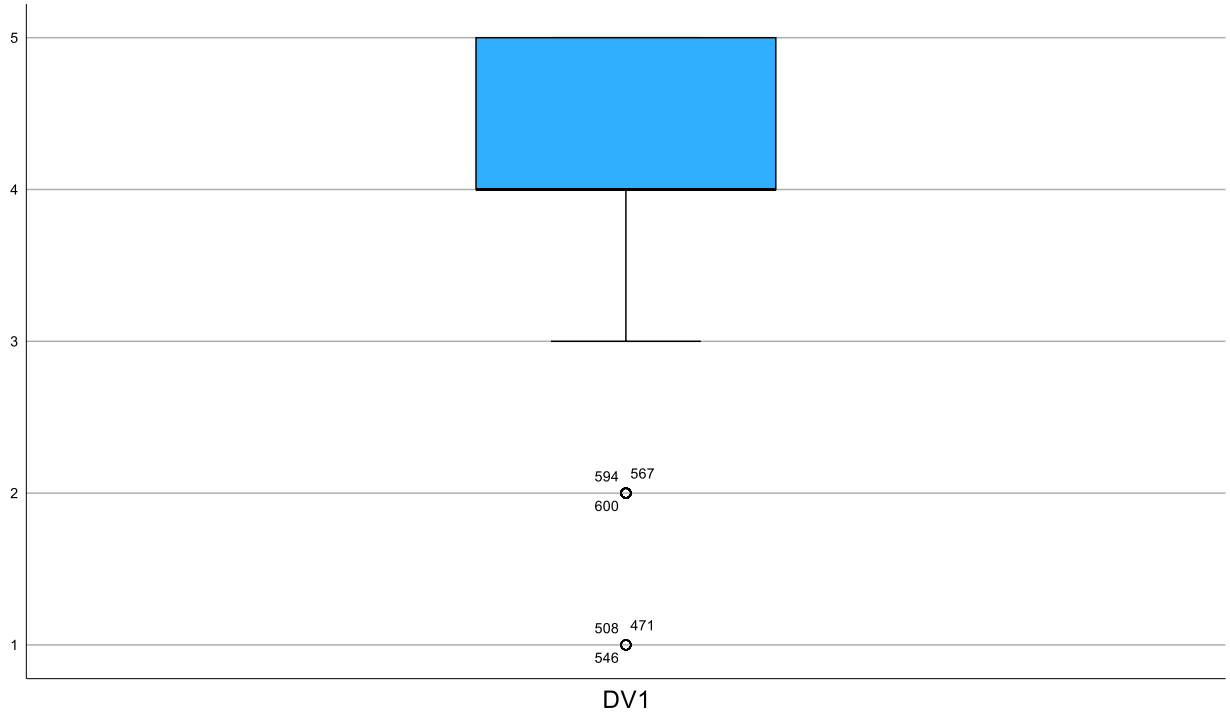


Figure 4.9

Box-plot for 2nd item (DV2) of Dependent Variable

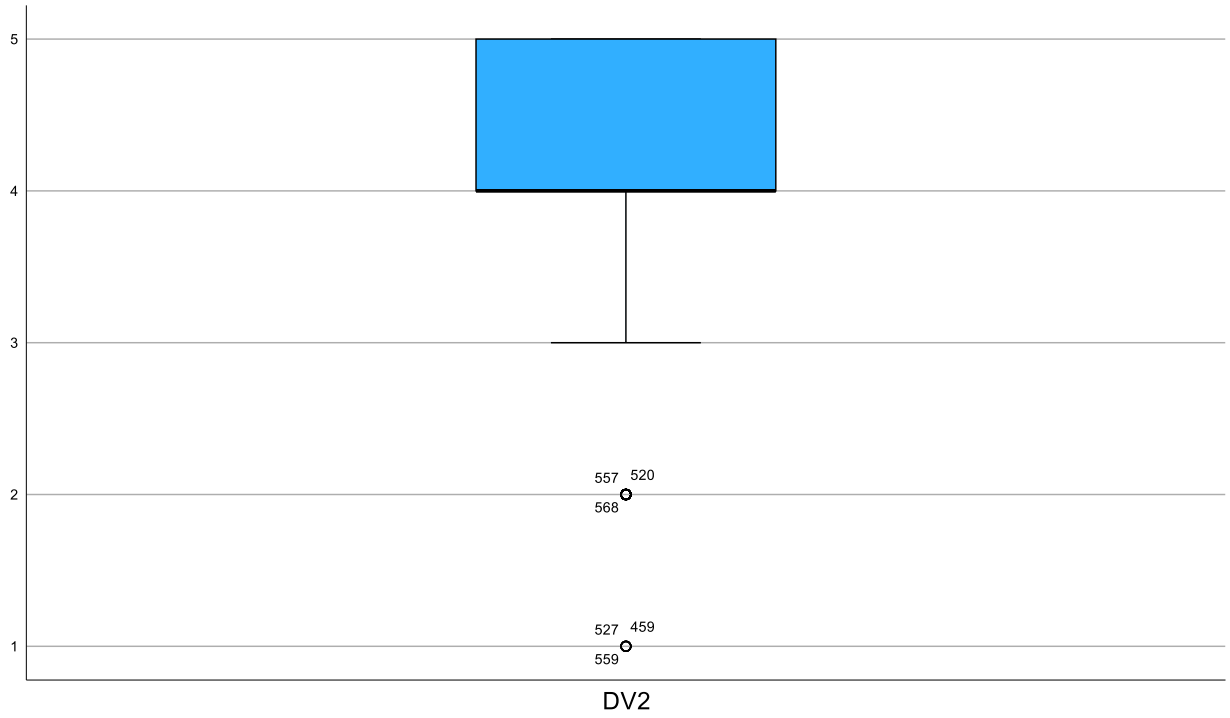


Figure 4.10

Box-plot for 3rd item (DV3) of Dependent Variable

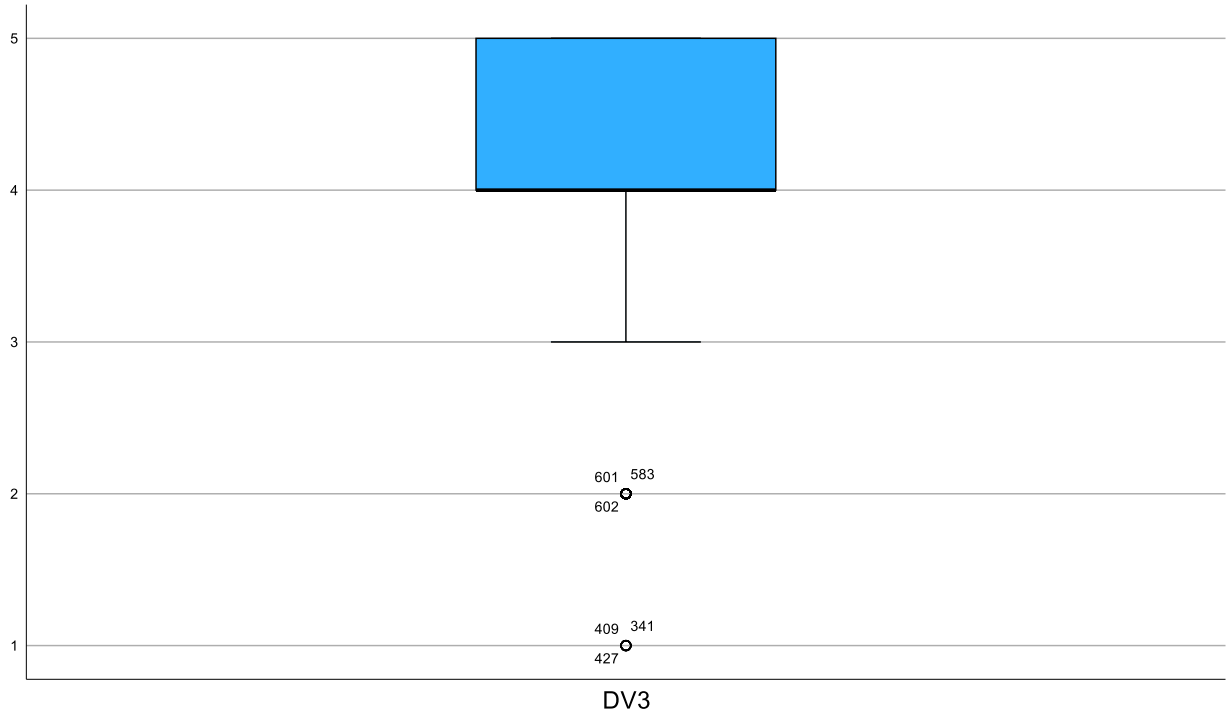


Figure 4.11

Box-plot for 4th item (DV4) of Dependent Variable

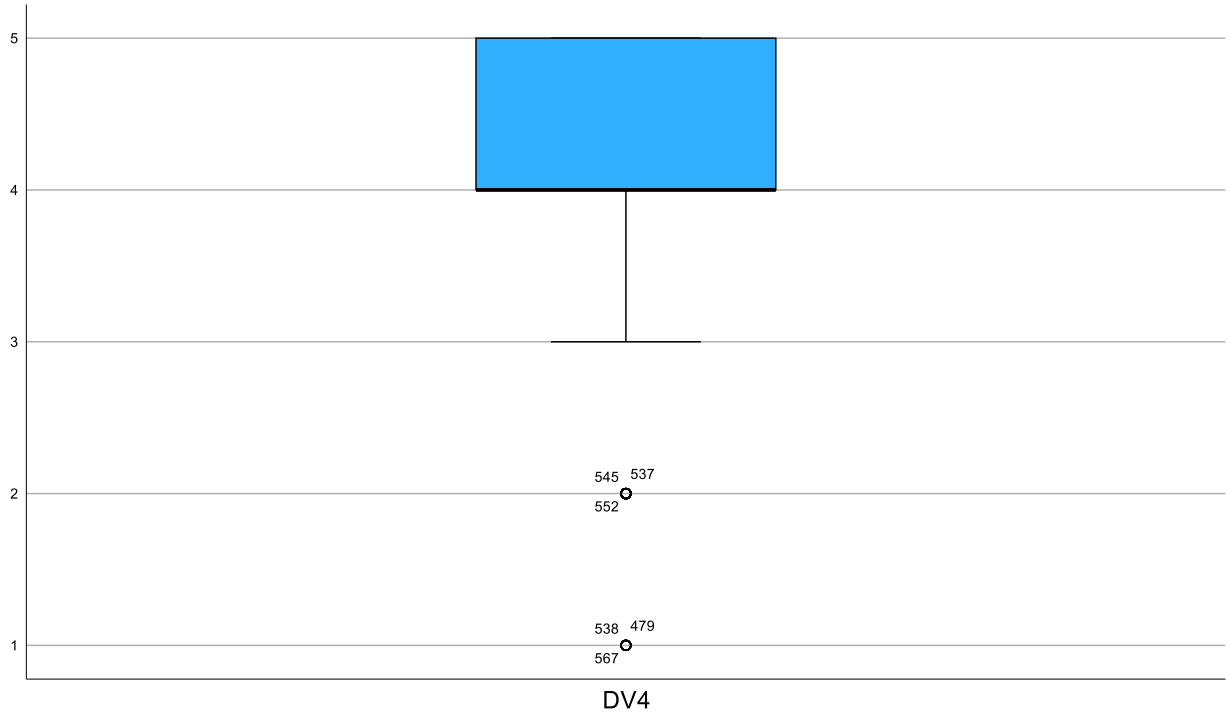


Figure 4.12

Box-plot for 5th item (DV5) of Dependent Variable

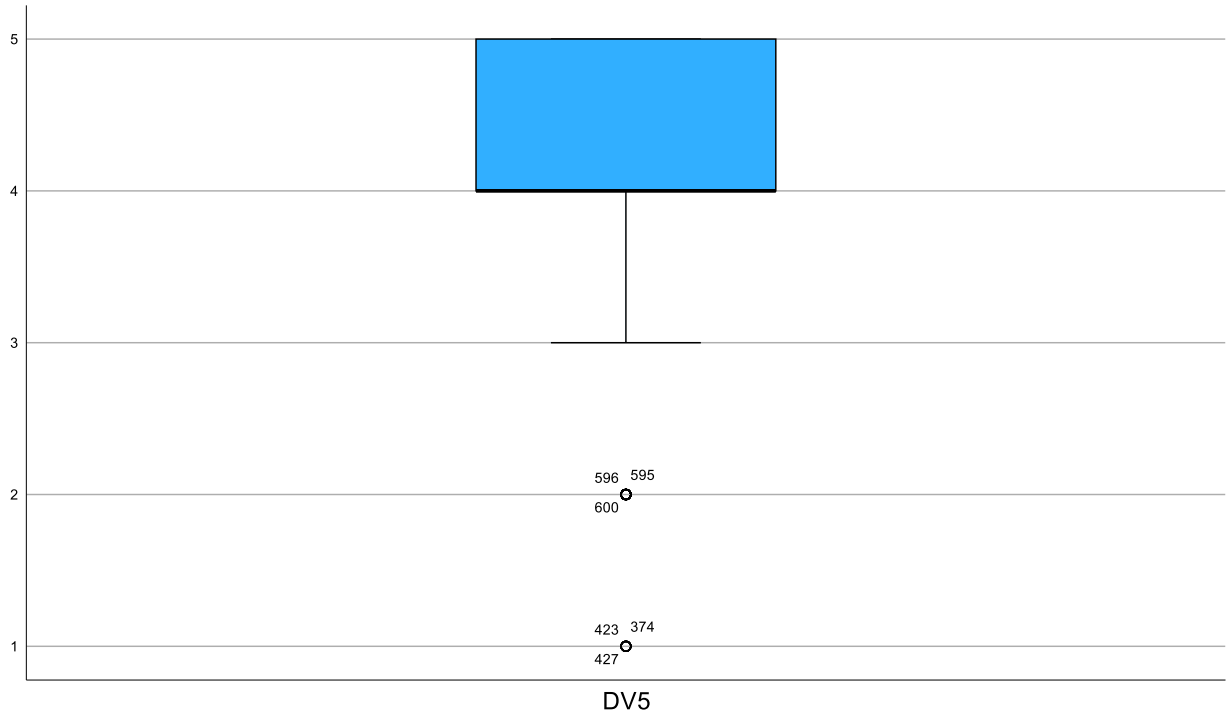


Figure 4.13

Box-plot for 6th item (DV6) of Dependent Variable

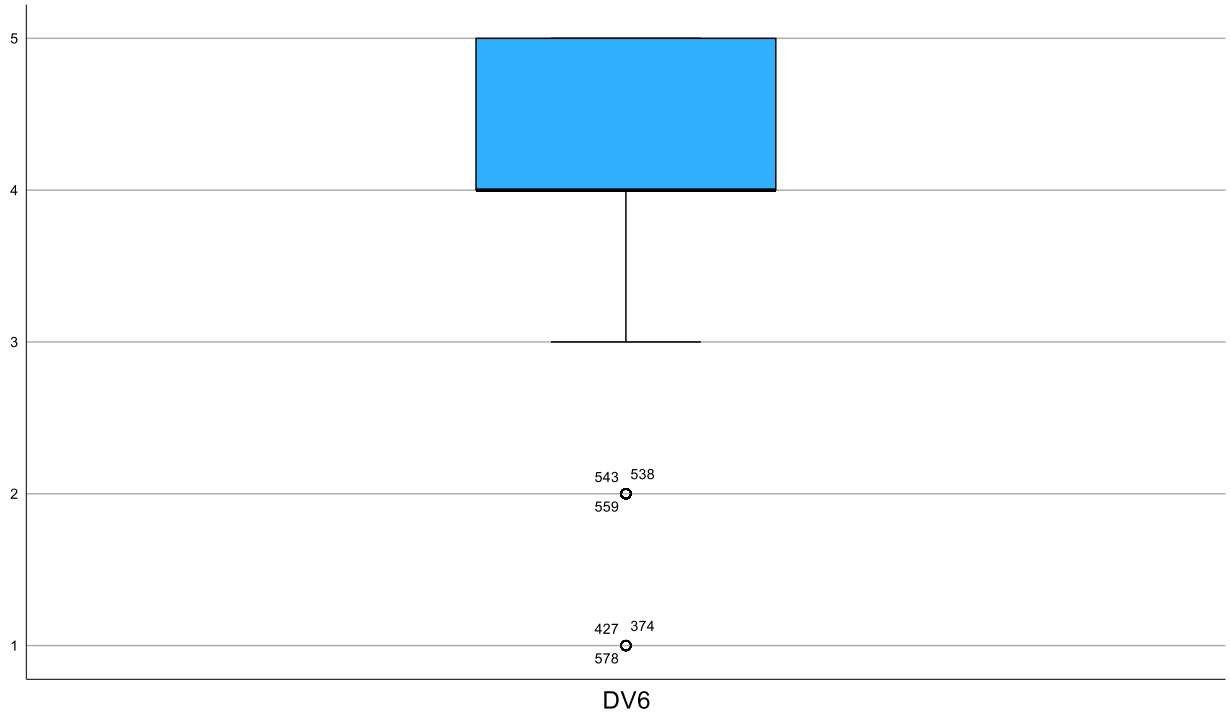


Figure 4.14

Box-plot for 7th item (DV7R) of Dependent Variable

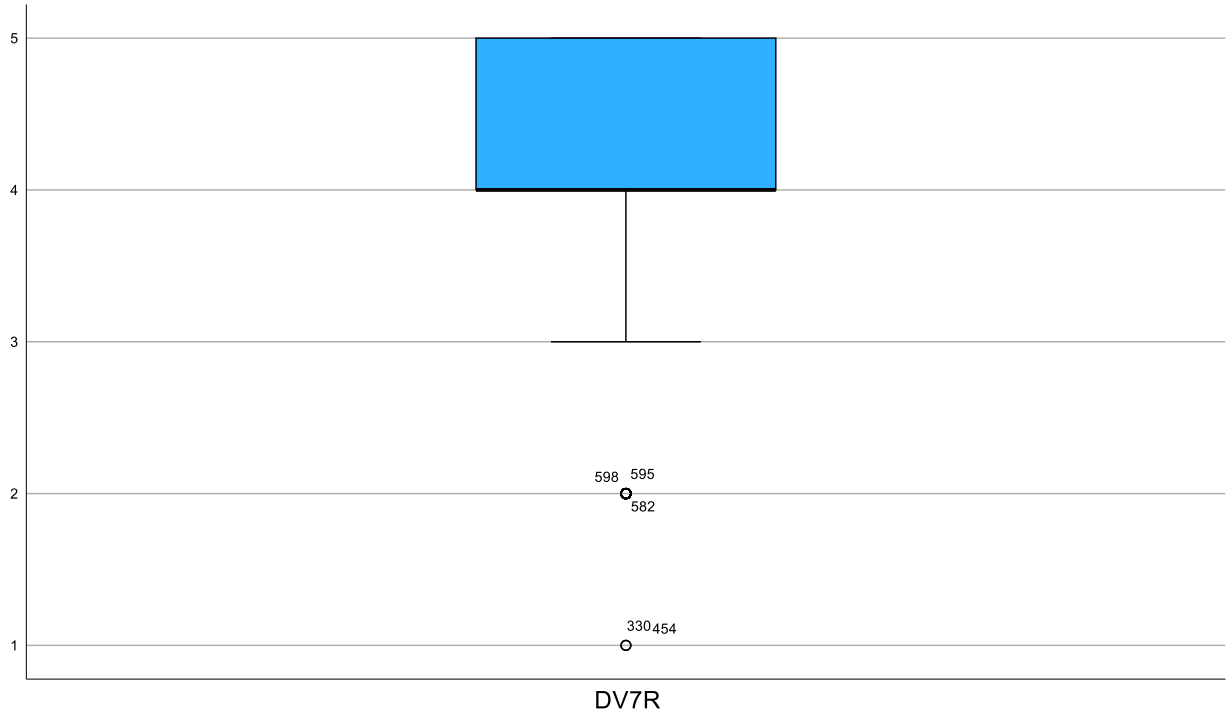
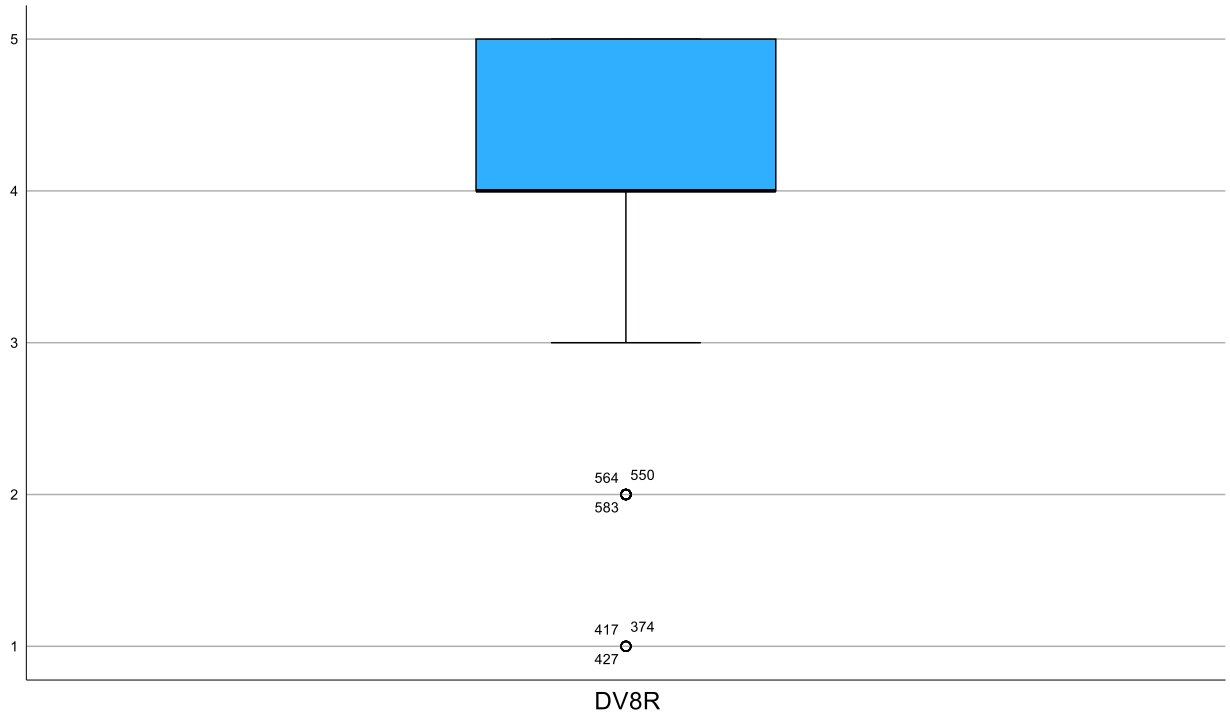


Figure 4.15

Box-plot for 8th item (DV8R) of Dependent Variable



An outlier is an observation that seems to significantly differ from the rest of the data (Grubbs, 1969, as cited in Boukerche et al., 2020). In the box-plot method, data points that fall between 1.5 and 3 times the interquartile range (IQR) above the quartiles are categorised as mild outliers and are usually denoted with a circle (Garth, 2008). Based on Figure 4.8 to Figure 4.15 above, two circles in each figure represent mild outliers because they fall between 1.5 and 3 times the IQR outside the whiskers.

However, these outliers are retained to preserve representativeness. It is because outliers may reflect actual population response and characteristics, which is a legitimate extreme finding that should not always be considered as mistakes (Osborne & Overbay, 2004; Wilcox, 2022). Some outliers below the lower whisker are probably due to the significant low level of COPD risk awareness among respondents.

4.4 Inferential Analysis

4.4.1 Multiple Regression Analysis

Table 4.15

Multiple Regression Analysis

	Unstandardized Coefficient Beta	**Coefficient Std. Error**	**Standardized Coefficient Beta**	**T-statistics**	**p-value**
(Constant)	7.200	1.642		4.384	<0.001
Severity	0.683	0.061	0.425	11.257	<0.001
Benefits	(0.067)	0.030	(0.073)	(2.226)	0.026
Barriers	0.175	0.039	0.164	4.442	<0.001
Self_efficacy	0.169	0.035	0.177	4.844	<0.001
R-squared					0.370
Adjusted R-square					0.366
F-test					88.282
p-value					<0.001

This study examines how four independent variables, perceived severity of COPD (Severity), perceived benefits of health screening (Benefits), perceived barriers (Barriers) and perceived self-efficacy (Self_efficacy), relate to the dependent variable, COPD risk awareness. Since the p-value for all four independent variables, as seen in the above table, is less than 0.05; thus, these independent variables are statistically significant.

At a 95% confidence level, the first independent variable, perceived severity of COPD, is significant. This is because its p-value is less than 0.05, at less than 0.001. Similar positive correlation results are observed in Jannah et al. (2025) and Su et al. (2024). These studies support a significant connection between perceived severity of COPD and COPD risk awareness. Moreover, the table shows the unstandardized regression coefficient of perceived severity of COPD stands at a positive 0.683, suggesting that a one-unit rise in perceived severity of COPD results in an increase of 0.683 units in COPD risk awareness among adults exposed to active and second-hand smoke, assuming all other factors are held constant.

Next, at the 95% confidence level, the study's second independent variable, perceived benefits of health screening, is statistically significant, as indicated by its p-value of 0.026, which is smaller than the significance level of 0.05. The result of the outcome is similar to the studies by Xu et al. (2024a) and Sikjær et al. (2018), which showed that a person's perception of the health screening's benefits affects their COPD risk awareness. Additionally, a negative value of 0.067 is shown by the unstandardised regression coefficient. This indicates that an inverse relationship exists between this independent variable and the dependent variable. When all other factors are held constant, adults exposed to active and second-hand smoke every 1 unit increase in perceived benefits of health screening, COPD risk awareness decreases by 0.067 units.

Perceived barriers, the third independent variable, is also significant at a 95% confidence level. This is because its p-value of less than 0.001 is smaller than the significance criterion of 0.05. The result is in line with studies conducted by Shatto et al. (2024) and Alsajri et al. (2025). The results support the study's hypothesis that perceived barriers and COPD risk awareness are significantly correlated. At 0.175, the unstandardised regression coefficient is positive. Therefore, when all other factors are held constant, adults exposed to active and second-hand smoke typically had a 0.175 unit increase in COPD risk awareness for every unit increase in perceived barriers.

Perceived self-efficacy, the fourth independent variable, has a 95% confidence level of significance. This is due to the fact that its p-value of less than 0.001 falls below the significance level of 0.05. The result is in line with studies conducted by Aliakbari et al. (2022) and Al Bshabshe et al. (2023). This demonstrates that COPD risk awareness is significantly influenced by perceived self-efficacy. Additionally, at 0.169, the unstandardised regression coefficient displays a favourable outcome. This shows that adults exposed to active and second-hand smoke will have 0.169 units more COPD risk awareness for every unit increase in perceived self-efficacy.

Based on the table above, the first independent variable, perceived severity of COPD, is the predictor variable that contributes most to the variation of the dependent variable, COPD risk awareness. This is because, compared to other predictor variables, perceived benefits of health screening, perceived barriers, and perceived self-efficacy, the standardised coefficient Beta for this predictor variable is the largest, 0.425. This shows that, once the variation explained by all other predictor factors in the model has been controlled for, perceived severity of COPD presents the most distinctive explanation for the variation of dependent variable, COPD risk awareness. Perceived severity of COPD has a positive correlation with the dependent variable, COPD risk awareness, as indicated by the positive value of 0.425.

However, when compared to other predictor variables, such as perceived severity of COPD, perceived barriers, and perceived self-efficacy, the standardised coefficient Beta for the second independent variable, perceived benefits of health screening, is the one that has the least impact on the dependent variable's variation, with negative Beta value of 0.073. This indicates that the perceived benefits of health screening accounts for the least proportion of variance in the dependent variable, COPD risk awareness, after all other predictor variables in the model have been taken into account. The

negative value of 0.073 also indicates that perceived benefits of health screening has a negative relationship with the dependent variable, COPD risk awareness.

Additionally, the coefficient of determination, or R-squared (R^2), is defined as the percentage of the dependent variable's volatility that can be anticipated from the independent variables (Chicco et al., 2021). The R-squared value, which is 0.370, shows that variances in perceived severity of COPD, perceived benefits of health screening, perceived barriers and perceived self-efficacy account for 37% of the variation in COPD risk awareness among adults exposed to active and second-hand smoke. Other factors contribute to 63% of COPD risk awareness among adults exposed to active and second-hand smoke. Based on Cohen's guideline of R-squared (R^2) in his book titled "Statistical Power Analysis" which is typically used by researchers (Brydges, 2019), large correlational effect size occurs when the value of R-squared is equal to or more than 0.25 (Cohen, 1988). As this study shows 0.370 R-squared-value, it is considered large effect.

Subsequently, the adjusted R-squared is 0.366. After adjusting for levels of independence, perceived severity of COPD, perceived benefits of health screening, perceived barriers and perceived self-efficacy explain 36.6% of the variation in COPD risk awareness among adults exposed to active and second-hand smoke.

Lastly, as the regression model's p-value from the F-test is less than 0.001, which is below a specified significance level of 0.05, it displays a statistically significant result with a 95% confidence level. Consequently, the F-statistic value is significant. The regression model clearly demonstrates the connection between four independent variables, which are perceived severity of COPD, perceived benefits of health screening, perceived barriers and perceived self-efficacy, and the dependent variable, which is COPD risk awareness.

4.5 Conclusion

SPSS 30.0 is used to analyse data. The scales in the questionnaire, which have been proven to be accurate, are useful for analysing and summarising the information obtained from each respondent. Furthermore, there is an absence of non-normality or multicollinearity problems. The multiple regression analysis's findings demonstrated a significant connection between COPD risk awareness and all four independent variables, which are perceived severity of COPD, perceived benefits of health screening, perceived barriers, and perceived self-efficacy.

CHAPTER 5: DISCUSSION AND CONCLUSION

5.0 Introduction

In Chapter 5, the research findings from the previous chapters are comprehensively presented, which begins with a summary of the key findings. Then, it is followed by a summary of the main insights for every variable the study examined. Managerial and theoretical implications are discussed before outlining the findings' limitations. This chapter provides recommendations towards future research regarding the research limitations.

5.1 Discussion of Findings

Table 5.1

Summary of the Statistical Findings

Independent variables	**T-statistics**	**P-value**	**Results**
Perceived Severity of COPD	11.257	<0.001	Significant
Perceived Benefits of Health Screening	(2.226)	0.026	Significant
Perceived Barriers	4.442	<0.001	Significant
Perceived Self-efficacy	4.844	<0.001	Significant

5.1.1 Perceived Severity of COPD and COPD Risk Awareness

Based on Table 5.1, the perceived severity of COPD demonstrated a strong significance to COPD risk awareness among adults exposed to active and second-hand smoke. It shows similar results to the study of Jannah et al. (2025). Perceived severity of COPD reflects people's knowledge and perception of COPD, which are interrelated with COPD risk awareness. Su et al. (2024) mentioned that knowledge is significantly impacting practices that may cause COPD, requiring an understanding of the disease for further intervention.

5.1.2 Perceived Benefits of Health Screening and COPD Risk Awareness

The result of significance for the perceived benefits of health screening and COPD risk awareness showed a significant relationship among adults exposed to active and second-hand smoke. This is in sync with the study from Xu et al. (2024a) and Sikjær et al. (2018). The intention of health screening is directly related to COPD risk awareness. The intention of health screening may be facilitated by personality style and self-estimation of symptoms of chronic diseases. The decision of the health screening related to COPD may bring out a gap in information for the COPD risk (Sikjær et al., 2018).

5.1.3 Perceived barriers and COPD risk awareness

In addition, the study showed significant connections between perceived barriers and COPD risk awareness. Similar results were found in the findings of Alsajri et al. (2025) and Shatto et al. (2024). This is because barriers across multiple sectors, including economic, geographical, and physical resources availability, cause individuals to experience inequality and can directly influence their awareness of COPD. Addressing barriers to health awareness should be the primary focus before emphasizing health behavioural change (Hendel et al., 2024).

5.1.4 Perceived self-efficacy and COPD risk awareness

Perceived self-efficacy is also having a significant relationship with COPD risk awareness, according to the table above, showing that this result is supported by the study from Al Bshabshe et al. (2023) and Aliakbari et al. (2022). The likelihood that a person will be conscious of the risks connected with COPD increases with their perceived level of self-efficacy in identifying, responding to, and managing the condition.

5.2 Implications of the Study

The first independent variable, the perceived severity of COPD, significantly influences COPD risk awareness, according to multiple regression analysis. To increase awareness of COPD risk, media communicators play a vital role in raising public

understanding of the chronic and symptomatic aspects of COPD to highlight the severity by transmitting messages about the real-life consequences of the disease. For example, social media platforms can be used to host interactive content-sharing sessions, such as short videos, to promote self-reflection on COPD. This can help internet users understand and connect with health information about COPD, reaching wider populations, particularly those who tend to underestimate the disease's severity. Additionally, public health authorities could implement targeted programs with tailored interventions for populations at risk of COPD. For instance, campaigns that promote preventive behaviours, like smoking cessation, can be effective. These activities can boost community engagement and highlight the importance of preventing COPD. These measures could be implemented to raise people's awareness about COPD and help individuals understand the severity of the disease, especially when exposed to active or second-hand smoke.

The multiple regression analysis demonstrates that awareness of COPD is significantly impacted by the second independent variable, perceived benefits of health screening. Undeniably, early diagnosis and intervention are important to optimize health outcomes related to COPD while minimizing chronic disease burden in the long term (Choi et al., 2022). Relevant stakeholders should implement additional alternative actions. Instead of focusing only on pointing out the advantages of screening to change the public's perception, healthcare providers play a crucial role in integrating risk education into screening procedures. For example, it can be performed by providing personalized risk assessment for patients regarding their symptomatic and demographic data, such as smoking history, occupational exposure, and respiratory-related symptoms. Moreover, the government could focus on risk prevention for COPD, especially for high-risk populations. This can be achieved by providing supportive measures in public health action, such as providing resource support for screening programs that promote affordable and widely accessible screening services to maintain the consistency of health screening across the nation. In short, extra practical actions could be taken by healthcare providers and the government to better build awareness of COPD and

enhance their perception of health screening, which could affect the detection of COPD at the same time.

The third IV, perceived barriers, is significant for awareness of COPD risk according to multiple regression analysis. It indicates that perceived obstacles strongly influence targeted populations' awareness of COPD risk. Employers could play an important role in reducing barriers related to occupational factors. They can improve workplace ventilation and provide protective equipment for workers exposed to smoke to enhance safety measures and ensure workers' occupational health. Furthermore, healthcare providers could create a platform that allows the public easy access to health information and assistance. For instance, by addressing patients' concerns about barriers to diagnosis and treatment, such as long distances to hospitals, healthcare facilities can introduce initiatives like e-platforms that enable patients to schedule appointments online and seek medical advice conveniently. This could also increase the public's willingness to learn about health issues like COPD risk. Therefore, stakeholders should prioritize patients' needs and work to reduce perceived barriers related to financial, accessibility, and informational challenges through the actions suggested.

Based on the multiple regression analysis for the last IV of our study, we found that perceived self-efficacy is significantly associated with COPD risk awareness. It could be defined that individuals who are more likely to be aware of and confident in their self-ability in taking actions that ensure their health status, will be more likely to be aware of the risk that might expose them to COPD. One of the stakeholders is educational institutions, which is important to increase an individual's sense of self-regard regarding their ability to handle their physical health. For instance, health literacy can be promoted by education in schools and universities by organizing health programs that talk about respiratory health. Other than that, research institutions could help to identify effective approaches that help people to obtain their self-efficacy to manage health. This action could be accomplished by conducting research about self-

efficacy in respiratory health management that involved suggested behavioural interventions, which proposed the objective of improving COPD risk awareness. The findings from the researchers' study could also become a reference and guidance for policymakers to develop possible effective strategies in the future. To summarize, empowering individuals with sufficient confidence in their ability to control their health condition is important to be supported by several initiatives from relevant stakeholders.

5.3 Limitations of study

This section outlines certain limitations in this study. First, when self-reported measures are used for data collection, such as Likert scales, in behavioural healthcare research, response bias is typically possible (Rosenman et al., 2011; Grimmond et al., 2025). The respondents may provide biased assessments of their own behaviour due to some reasons. For example, some may tend to have social desirability bias and guess the possible best answer when involved in a survey, even if it is an anonymous survey (Rosenman et al., 2011). Thus, it may lead to unreliable data collection and distort the research's analysis of the relationships between variables.

Next, a five-point Likert scale questionnaire that examines the relationship between the dependent variable, COPD risk awareness, and the four independent variables, perceived severity of COPD, perceived benefits of health screening, perceived barriers, and perceived self-efficacy, was used in this study to collect participant data utilizing a quantitative method. This is because the questionnaire might sufficiently gather data on perceptions and behaviours in health research within limited timeframes (Lu et al., 2021; Koo & Yang, 2025). Although employing a questionnaire is advantageous when the population is large and dispersed, it might be challenging to monitor respondents' confusion and misinterpretation of the questions (Rathi & Ronald, 2022).

Moreover, despite efforts to provide explanations, language barriers remain a challenge that affects respondents' understanding of the questionnaire. To help with understanding when responding to the questionnaire, uncommon vocabulary and medical terms are described in simple sentences. However, it is still possible for questions to be misinterpreted if the explanation further confuses the respondents, not to mention that some of them may have varying levels of literacy. Thus, the result may be affected when some struggle to guess what to expect rather than responding based on their knowledge (Wenz et al., 2019).

5.4 Recommendations for Future Research

This section provides some suggestions to help future studies explore the factors affecting Chronic Obstructive Pulmonary Disease (COPD) risk awareness among adults exposed to active and second-hand smoke. Therefore, more thorough research on COPD risk awareness among adults exposed to active and second-hand smoke could be conducted in the future.

First, to increase the validation of self-reporting data, the information of participants enrolled should be collected to prevent the involvement of general populations with characteristics that are irrelevant to the study during the analysis (Althubaiti, 2016). The possible existence of social desirability bias can be identified using measurements, for example, the Marlowe-Crowne Social Desirability Scale and Martin-Larsen Approval Motivation score as suggested by Althubaiti (2016). Besides that, inconsistent and low-quality data can be filtered using self-reported effort questions, such as “I read all items carefully”, and instructed items, such as “Please mark ‘disagree’

for this" (Akbulut, 2025). Statistical methods can also be used to identify outliers and remove them if necessary to improve the validity of data (Akbulut, 2025).

Second, instead of depending solely on quantitative research methods, future researchers could consider using a qualitative method to collect information from respondents. To acquire comprehensive details about COPD risk awareness from participants and try to prevent confusion and misunderstandings as much as possible, a face-to-face interview with respondents could be conducted in person or virtually. Additionally, they could also think about mixing quantitative and qualitative research techniques to effectively get the data required for the research.

Lastly, in addition to simplifying the explanation of questions, future research may employ multilingual questionnaires that are professionally translated. Hence, more valid results can be obtained from target populations with different cultural backgrounds and avoid biased results for a certain subgroup. To ensure the accuracy of translation, the forward and back translation and pre-test should be conducted before distributing the questionnaire (Cruchinho et al., 2024).

5.5 Conclusion

This study aims to identify the factors affecting Chronic Obstructive Pulmonary Disease (COPD) risk awareness among adults exposed to active and second-hand smoke. SPSS 30.0 was run to analyse the data gathered through the questionnaire method. The research found that all four independent variables, perceived severity of COPD, perceived benefits of health screening, perceived barriers, and perceived self-efficacy are significantly related to COPD risk awareness. The study presents the

findings and implications, research limitations, and recommendations for future researchers, offering valuable insights for further studies in this area.

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Appendices

APPENDIX 1.1: ETHICAL APPROVAL FOR RESEARCH PROJECT

UNIVERSITI TUNKU ABDUL RAHMAN DU012(A)
Wholly owned by UTAR Education Foundation Co. No. 578227-M

Re: U/SERC/78-609/2025

1 October 2025

Dr Siti Fazilah Binti Abdul Shukor
Head, Department of Business and Public Administration
Faculty of Business and Finance
Universiti Tunku Abdul Rahman
Jalan Universiti, Bandar Baru Barat
31900 Kampar, Perak.

Dear Dr Siti Fazilah,

Ethical Approval For Research Project/Protocol

We refer to your application for ethical approval for your students' research project from Bachelor of Business Administration (Honours) Healthcare Management programme enrolled in course UBHZ3016. We are pleased to inform you that the application has been approved under Expedited Review.

The details of the research projects are as follows:

No.	Research Title	Student's Name	Supervisor's Name	Approval Validity
1.	The Impact of Academic Stress, Grit, Positive Mental Health on Academic Performance Among Undergraduate Students at UTAR, Kampar	1. Marina a/p Kirubakaran 2. Soo Hui Jing	Dr Ng Lee Peng	1 October 2025 – 30 September 2026
2.	The Influences of Lifestyles Quality on Central Obesity Among Young Adults	1. Song Zhi Yao 2. Too Yan Thong	Ms Jamie Anne a/p James Michael	
3.	Factors Affecting Chronic Obstructive Pulmonary Disease (COPD) Risk Awareness mong Adults Exposed to Active and Second-Hand Smoke	1. Tee Joo Eer 2. Wong Siuw Ying	Dr Hemaniswarri Dewi a/p Dewadas	
4.	Factors Influencing the Perception of Mental Health Resources Among University Students in UTAR	1. Khor Qianyi 2. Yeong Zi Qing	Dr Marvi	
5.	Factors Affecting the Increase of Hygiene-Related Diseases Among University Students	1. Leong Wai Yan 2. Yap Zhi Xuan	Dr Charles Ramendran a/l S PR Subramaniam	
6.	Factors Affecting the Intention to Use Mobile Health Among Malaysia Adults	1. Cheah Ru Xin 2. Rowena Lim Yi Jing	Ms Rajaletchumy a/p Mani	
7.	Impact of Lifestyle and Psychological Factors on Poor Sleep Quality Among University Students in Malaysia	1. Ashley Foo Siew Chin 2. Yang, Chun	Dr Ravindran a/l Nadarajan	
8.	Factors on Consumption of Sugary Beverages Among UTAR Students (Kampar Campus)	1. Wong Kit Sum 2. Ng Yue Yan	Mr Kuek Thiam Yong	
9.	The Impact of Food Delivery Apps on Dietary Habits Among Undergraduate Students at UTAR Kampar	1. Yong Ling Wei 2. Ting Man Yi	Dr Ramesh Kumar a/l Moona Haji Mohamed @ Rajoo	
10.	Exploring the Impact of Healthcare Product Type on UTAR Students' Trust in Social Media Advertising	1. Phoebe Mercy Dyi 2. Wong Shuet Ean 3. Chua Jia Xin	Ms Rajaletchumy a/p Mani	

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

The conduct of this research is subject to the following:

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

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

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

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

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 Dr Zuraidah Abd Manaf
Chairman
UTAR Scientific and Ethical Review Committee

c.c Dean, Teh Hong Piow Faculty of Business and Finance
Director, Institute of Postgraduate Studies and Research

Kampar Campus : Jalan Universiti, Bandar Barat, 31900 Kampar, Perak Darul Ridzuan, Malaysia
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APPENDIX 1.2: SURVEY QUESTIONNAIRE

UNIVERSITI TUNKU ABDUL RAHMAN
Faculty of Business and Finance

TOPIC: Factors Affecting Chronic Obstructive Pulmonary Disease (COPD) Risk Awareness among Adults Exposed to Active and Second-Hand Smoke

Dear respondents,

We are students of BACHELOR OF BUSINESS ADMINISTRATION (HONOURS) HEALTHCARE MANAGEMENT from Universiti Tunku Abdul Rahman (UTAR). The purpose of this study is to obtain the acknowledgement of adults exposed to active and second-hand regarding Chronic Obstructive Pulmonary Disease (COPD) and their awareness on COPD risk. This study can help adults exposed to active and second-hand smoke to know more about their risk in COPD.

There are **SIX (6)** sections in this questionnaire. Section A is on demographics. Section B, C, D, E and F cover all of the variables in this study. Please read the instructions carefully before answering the questions. Please answer ALL questions in ALL sections. Completion of this questionnaire will take you approximately 10 to 15 minutes.

Your participation in this study is entirely voluntary. There will be no disadvantage if you decide not to complete the attached anonymous questionnaire. You can withdraw at any time without any penalty. You can refuse to answer any question at any time if you feel uncomfortable.

The information collected from you will be kept strictly private and confidential. All responses and findings will be used solely for academic purpose.

Your assistance in completing this questionnaire is very much appreciated. Thank you for your participation. If you have any question regarding to this questionnaire, you may contact us at teejooeer@1utar.my or wsysy04@1utar.my.

If you decide to complete this attached anonymous questionnaire, this will be taken as

you voluntarily agree and formal consent to participate in this study. Thank you very much for your cooperation and willingness to participate in this study.

Yours sincerely,

Tee Joo Eer
Wong Siuw Ying

PERSONAL DATA PROTECTION NOTICE

Please be informed that in accordance with Personal Data Protection Act 2010 ("PDPA") which came into force on 15 November 2013, 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: Name, identity card, place of birth, address, education history, employment history, medical history, blood type, race, religion, photo, 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 us at teejooeer@1utar.my or wsysy04@1utar.my.

Acknowledgment 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.

……
Name:
Date:

Section A: Demographic Profile

Please place a tick "√" for each of the following:

1. Gender:
   - ☐ Male
   - ☐ Female

2. Age range (year):
   - ☐ 18 to 30 years old
   - ☐ 31 to 40 years old
   - ☐ 41 to 50 years old
   - ☐ 51 to 60 years old
   - ☐ 61 years old and above

3. Education level:

- ☐ Primary school
- ☐ Secondary school
- ☐ Diploma
- ☐ Bachelors
- ☐ Masters
- ☐ PhD

4. Categories of exposure to smoke:

- ☐ Current smoker
- ☐ Ex-smoker
- ☐ Second-hand smoker (A non-smoker who involuntarily inhales tobacco smoke.)

5. Occupation:

- ☐ Manager
- ☐ Professional
- ☐ Technician and associate professional
- ☐ Clerical support worker
- ☐ Service and sales worker
- ☐ Skilled agricultural, forestry, livestock and fishery worker
- ☐ Craft and related trades worker
- ☐ Plant and machine operator and assembler
- ☐ Elementary occupation (Perform simple, routine and non-systematic tasks.)
- ☐ Unemployed
- ☐ Retiree

6. Residential area:
(Please follow this format: "[City], [State]", and the example is shown below.)

Kampar, Perak

Please specify: _____

7. Household income range (The total income earned by all members of a single household.):

- ☐ RM2,000 and below
- ☐ RM2,001 to RM4,000
- ☐ RM4,001 to RM6,000
- ☐ RM6,001 to RM8,000
- ☐ RM8,001 to RM10,000
- ☐ RM10,001 and above

Section B: COPD Risk Awareness

Please choose the most appropriate option that best indicates your agreement level about the following statements.

Level of agreement
1 - Strongly disagree;
2 - Disagree;
3 - Neutral;
4 - Agree
5 - Strongly agree

No.	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I am aware that people with COPD may experience shortness of breath.	1	2	3	4	5
2	I recognize that coughing can be a symptom of COPD.	1	2	3	4	5
3	I am aware that persistent sputum could be a sign of COPD risk. (Sputum is a mixture of saliva and mucus that is coughed up from the respiratory tract.)	1	2	3	4	5
4	I realize that wheezing may indicate a risk of COPD. (Wheezing is a high-pitched, whistling sound that can occur during breathing when the airways in the lungs become narrowed or blocked.)	1	2	3	4	5
5	I recognize that having chest pain or tightness may be related to COPD.	1	2	3	4	5
6	I understand that unusual fatigue may signal a risk for COPD.	1	2	3	4	5
7	I am not aware that unexplained weight loss can be linked to COPD.	1	2	3	4	5
8	I am not familiar with the symptoms of COPD.	1	2	3	4	5

Section C: Perceived severity of COPD

Please choose the most appropriate option that best indicates your agreement level about the following statements.

Level of agreement
1 - Strongly disagree;
2 - Disagree;
3 - Neutral;
4 - Agree
5 - Strongly agree

No.	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I know that COPD is a serious disease, even though it can be prevented.	1	2	3	4	5
2	I know that persistent coughs related to COPD can severely affect a person's daily life.	1	2	3	4	5
3	I know that the symptoms of COPD can become severe without stopping smoking.	1	2	3	4	5
4	I know that regular exposure to smoke puts people at serious risk of COPD.	1	2	3	4	5
5	People with COPD are at serious risk of complications if they do not receive pneumonia vaccination.	1	2	3	4	5
6	People with COPD face serious health consequences because they are more likely to develop frequent chest infections.	1	2	3	4	5

Section D: Perceived benefits of health screening

Please choose the most appropriate option that best indicates your agreement level about the following statements.

Level of agreement
1 - Strongly disagree;
2 - Disagree;
3 - Neutral;
4 - Agree
5 - Strongly agree

No.	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I believe health screening could help me determine my current lung health status.	1	2	3	4	5
2	Participating in health screening can help detect early warning signs of the disease.	1	2	3	4	5
3	I think that early detection and treatment of COPD are beneficial.	1	2	3	4	5
4	I believe attending health screening, even without symptoms, could help me protect my health in the long term.	1	2	3	4	5
5	I am afraid that health screening may reveal that I already have a lung problem.	1	2	3	4	5
6	I think health screening is a waste of time.	1	2	3	4	5
7	I think health screening procedures are too complicated for me.	1	2	3	4	5
8	I will avoid health screening because it causes me fear, anxiety, and discomfort.	1	2	3	4	5

Section E: Perceived barriers

Please choose the most appropriate option that best indicates your agreement level about the following statements.

Level of agreement
1 - Strongly disagree;
2 - Disagree;
3 - Neutral;
4 - Agree
5 - Strongly agree

No.	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	The general medical services I need are provided at the health centre.	1	2	3	4	5
2	The distance from the health centres to my house is appropriate.	1	2	3	4	5
3	The time required to reach the health centre is appropriate.	1	2	3	4	5
4	Getting to and from the health centre is easy for me.	1	2	3	4	5
5	The expected time to receive the services I need is appropriate.	1	2	3	4	5
6	The working hours of the public health centre are suitable for receiving services from these centres.	1	2	3	4	5
7	I have trouble paying for health screening.	1	2	3	4	5
8	Due to cost restraints, I have delayed or did not receive health screening although I needed it.	1	2	3	4	5

Section F: Perceived self-efficacy

Please choose the most appropriate option that best indicates your agreement level about the following statements.

Level of agreement
1 - Strongly disagree;
2 - Disagree;
3 - Neutral;
4 - Agree
5 - Strongly agree

No.	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I believe I can identify smokers who represent COPD risk to me.	1	2	3	4	5
2	I am confident that I can avoid harmful behaviours that lead to COPD.	1	2	3	4	5
3	I am confident that I can identify the symptoms of COPD.	1	2	3	4	5
4	I am confident that I can receive the health screening when I have COPD symptoms.	1	2	3	4	5
5	I am confident that I can get COPD-related information through the Internet or medical books.	1	2	3	4	5
6	I am confident that I will consult with medical staff when I have questions about COPD symptoms.	1	2	3	4	5
7	It is difficult for me to keep updated with COPD information and protect myself from COPD.	1	2	3	4	5

Thank you for your participation.

APPENDIX 1.3: RELIABILITY TEST ANALYSIS RESULTS FOR PILOT TEST

COPD risk awareness

Case Processing Summary

		N	%
Cases	Valid	50	100.0
	Excluded[a]	0	.0
	Total	50	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.849	.861	8

Perceived severity of COPD

Case Processing Summary

		N	%
Cases	Valid	50	100.0
	Excluded[a]	0	.0
	Total	50	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.922	.924	6

Perceived benefits of health screening

Case Processing Summary

		N	%
Cases	Valid	50	100.0
	Excluded[a]	0	.0
	Total	50	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.697	.704	8

Perceived barriers

Case Processing Summary

		N	%
Cases	Valid	50	100.0
	Excluded[a]	0	.0
	Total	50	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.693	.751	8

Perceived self-efficacy

Case Processing Summary

		N	%
Cases	Valid	50	100.0
	Excluded[a]	0	.0
	Total	50	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.709	.726	7

APPENDIX 1.4: RELIABILITY TEST ANALYSIS RESULTS FOR FULL TEST

COPD risk awareness

Case Processing Summary

		N	%
Cases	Valid	606	100.0
	Excluded[a]	0	.0
	Total	606	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.807	.809	8

Perceived severity of COPD

Case Processing Summary

		N	%
Cases	Valid	606	100.0
	Excluded[a]	0	.0
	Total	606	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.714	.714	6

Perceived benefits of health screening

Case Processing Summary

		N	%
Cases	Valid	606	100.0
	Excluded[a]	0	.0
	Total	606	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.658	.629	8

Perceived barriers

Case Processing Summary

		N	%
Cases	Valid	606	100.0
	Excluded[a]	0	.0
	Total	606	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.752	.753	8

Perceived self-efficacy

Case Processing Summary

		N	%
Cases	Valid	606	100.0
	Excluded[a]	0	.0
	Total	606	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.726	.746	7

APPENDIX 1.5: MULTIPLE LINEAR REGRESSION ANALYSIS RESULTS

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.608[a]	.370	.366	3.61588

a. Predictors: (Constant), Self_efficacy, Benefits, Barriers, Severity

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4617.029	4	1154.257	88.282	<.001[b]
	Residual	7857.836	601	13.075		
	Total	12474.865	605			

a. Dependent Variable: DV

b. Predictors: (Constant), Self_efficacy, Benefits, Barriers, Severity

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	7.200	1.642		4.384	<.001
	Severity	.683	.061	.425	11.257	<.001
	Benefits	-.067	.030	-.073	-2.226	.026
	Barriers	.175	.039	.164	4.442	<.001
	Self_efficacy	.169	.035	.177	4.844	<.001