# KNOWLEDGE AND PRACTICE ON VAPING AMONG UNDERGRADUATE STUDENTS IN A PRIVATE UNIVERSITY IN KAJANG

By

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**ABSTRACT**

**BACKGROUND:** Vaping is generally perceived as more attractive than traditional cigarettes due to factors like accessibility, affordability, stylish designs, and ease of use. However, many studies found that misconceptions exist, such as perceiving vaping as less harmful and less addictive than smoking, even as a smoking cessation aid. These misunderstandings have contributed to a surge in usage, particularly among young people, despite associated health risks.

**OBJECTIVE:** To determine the knowledge level and practice on vaping among undergraduate students in a private university in Kajang.

**METHODOLOGY:** A quantitative, cross-sectional survey was conducted among 200 undergraduate students at a private university in Kajang. Participants were recruited using quota sampling method. A self-administered questionnaire was distributed to participants through face-to-face approach. Data analysis was performed using SPSS version 27.

**RESULTS:** Majority of the participants (70.5%) exhibited good level of knowledge on vaping, while 21.0% reported being current vapers. Chi-square analysis indicated significant association between knowledge level on vaping and both the participants' major of study and smoking status. Regarding vaping practices, statistically significant associations were found with age, gender, major of study and smoking status. There was a significant association between knowledge level and practice on vaping.

**CONCLUSION:** Majority of university students demonstrated good knowledge level on vaping (70.5%) and vaping practice was 21.0%. Significant associations were found between knowledge and practice, emphasizing the necessity for comprehensive vaping control strategies, including health education talks and awareness campaigns, to decrease its use among university students.

**KEYWORDS:** Vaping, electronic cigarette, knowledge, practice, university students

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**DECLARATION**

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

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(SIA CHEE YAN)

Date: 29 September 2023

**APPROVAL SHEET**

This research project entitled 'KNOWLEDGE AND PRACTICE ON VAPING AMONG UNDERGRADUATE STUDENTS IN A PRIVATE UNIVERSITY IN KAJANG' is prepared by SIA CHEE YAN and submitted as partial fulfilment of the requirements for the degree of Bachelor of Nursing (Hons) at Universiti Tunku Abdul Rahman.

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| | |
|---|---|
| E-cigarette | Electronic cigarette |
| EVALI | E-cigarette or Vaping Product Use-Associated Lung Injury |
| FAM | Faculty of Accountancy and Management |
| FCI | Faculty of Creative Industries |
| FDA | Food and Drug Administration |
| GATS | Global Adult Tobacco Survey |
| GYTS | Global Youth Tobacco Survey |
| LKCFES | Lee Kong Chian Faculty of Engineering and Science |
| MKFMHS | M. Kandiah Faculty of Medicine and Health Sciences |

# CHAPTER ONE

# Introduction

**CHAPTER 1: INTRODUCTION**

**1.0 CHAPTER OVERVIEW**

Contents such as background, problem statement, research objectives, research questions, hypothesis, conceptual framework, conceptual and operational definitions, and significance of study will be discussed in this chapter.

**1.1 BACKGROUND**

A "vape," or electronic cigarette, is a device that heats up a liquid or juice, which typically contains nicotine, flavourings, and other chemicals to generate an aerosol when users inhale (National Institute on Drug Abuse (NIDA), 2020; Mohammed Faez Baobaid, et al., 2021). The process of using e-cigarette is known as vaping. Vaping typically imitates conventional smoking except that there is no burning and vapor are inhaled rather than smoke (Mohammed Faez Baobaid, et al., 2021). Vape was invented in 2003 by Hon Lik, a Chinese pharmacist with the purpose to serve as an alternative to traditional tobacco smoking and since then, its use has increased substantially across the world, particularly among adolescents and young adults (Sapru, et al., 2020).

Corresponding to that, previous studies have shown vaping is generally perceived as more appealing than conventional cigarettes due to its accessibility, affordability, stylish design and convenience of use with more than 100 flavours available including fruit, coffee, vanilla, candyfloss and mint (Lee, 2020; Sapru, et al., 2020; Kurdi, et al., 2021; Driezen, et al., 2022). Vaping devices come in

various forms such as pens, hookahs, cigars, or pipes, and they can be designed in either reusable or disposable type (Oriakhi, 2020). Most vape pens consist of a refillable cartridge that stores liquid, a heating element that converts liquid into vapor for inhalation through a mouthpiece, a control button, and a rechargeable battery (NIDA, 2020; Oriakhi, 2020; Marques, Piqueras and Sanz, 2021). Currently, there are more than 460 vaping models available in the market (NIDA, 2020).
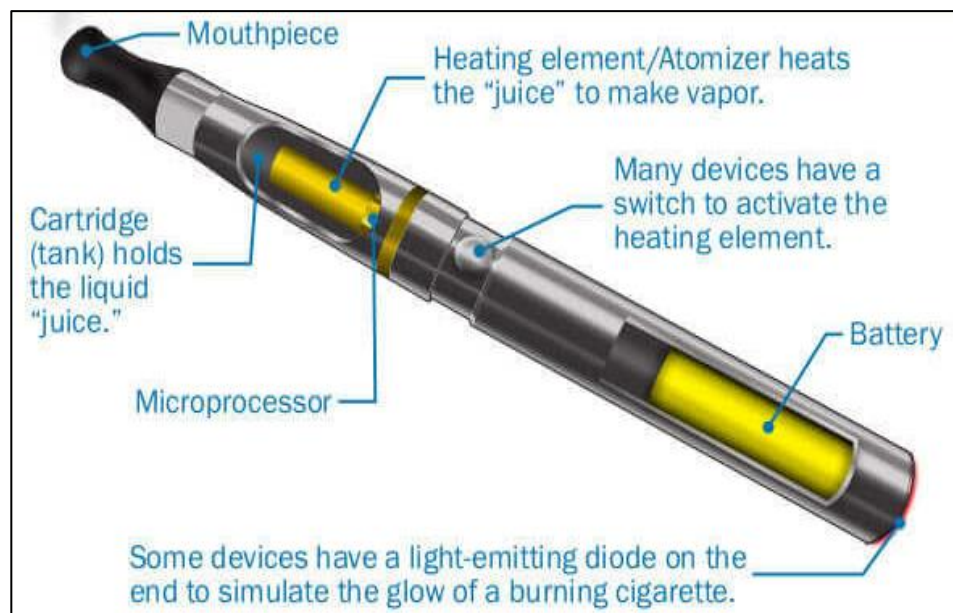


**Figure 1.1: Parts of an electronic cigarette (Wikimedia Commons, 2015).**

The prevalence of vaping among adult population in western and middle east countries are: United States (US) 6.8%, New Zealand 0.8%, United Kingdom 6.7%, Great Britain 5.5%, Qatar 0.9% and Greece 1.9% (Jamalludin Ab Rahman, et al., 2019). Whereas, in Southeast Asia countries like China, India, Philippines and Vietnam, the prevalence of vaping among adults were 1.0%, 0.02%, 0.7% and 0.2% respectively. Surprisingly, in Malaysia alone the prevalence rate is at 4.9% (Driezen, et al., 2022; Pan, et al., 2022), which is

considered high compared to other Southeast Asia countries. It was reported that this may be due to assumptions such as viewing vaping as harmless, less addictive and non-polluting to the environment as compared to tobacco smoking (Sapru, et al., 2020; Kurdi, et al., 2021; Mohammed Faez Baobaid, et al., 2021; Nuurain Amirah MR, et al., 2021). Another common misconception about vaping is that it acts as an effective tool for smoking cessation, though to date, it has yet to be authorized by the Food and Drug Administration (FDA) (Centers for Disease Control and Prevention (CDC), 2023).

## 1.2 PROBLEM STATEMENT

Based on personal observations at the researcher's university, there has been a noticeable increase in the popularity of vaping, particularly among students. This surge in vaping's appeal may be attributed to widespread assumptions that vaping is a safer and less addictive alternative to traditional cigarette smoking. This has prompted the researcher to question whether students are fully aware of the potential health risks associated with vaping. Additionally, given the limited previous research conducted on this topic within the university, this study was undertaken to determine the knowledge level and vaping practices among undergraduate students.

Previous studies had consistently indicated that vape products often contain nicotine, a highly addictive and potentially brain-damaging chemical, which can adversely affect the cognitive development of young adults, leading to a range of physical and mental health concerns such as anxiety disorders, low self-esteem, and depressive symptoms (Grant, et al., 2019; Sapru, et al., 2020; Ministry of Health, 2021; Gorfinkel, et al., 2022; Pan, et al., 2022; CDC, 2023). Students who are unaware of nicotine's addictive properties may begin vaping casually, only to become addicted without fully comprehending the consequences. This nicotine dependency can detrimentally affect their academic performance, mental health, and overall well-being (Javed, et al., 2022; Janjua, Kreski and Keyes, 2023).

Additionally, certain modified flavourings of vape obtained from unauthorised sources like street market may also inflict harm to the users' health due to toxic components like heavy metals and carcinogenic chemicals (Oriakhi, 2020). Vaping itself can lead to side effects like elevated blood pressure and heart rate, oral and/or throat irritation, cough, nausea, vomiting, headache and dizziness (Sapru, et al., 2020; Kurdi, et al., 2021). A person who vapes daily doubles the risk of myocardial infarction whereas for dual users (both conventional smoker and vaper), the odds increase five times (Sapru, et al., 2020; Ministry of Health, 2021).

The risk of cardiovascular and respiratory diseases like atherosclerosis, asthma and lung injury increases as a result of vaping (Sapru, et al., 2020). Corresponding to that, an outbreak of E-cigarette or Vaping Product Use-Associated Lung Injury (EVALI) cases was reported in the United States leading to 68 deaths and a total of 2807 hospitalisation predominantly in the young populations, from August 2019 until 18 February 2020 (CDC, 2021). Meanwhile in Malaysia, there was a total of 14 confirmed EVALI cases from the year 2019 to 2021 (Bernama, 2022).

This raises a substantial public health concern and indicates the essential need to educate the public regarding potential health risks of vaping. Hence, this quantitative research was conducted to determine the knowledge level and practice on vaping among university students which will be crucial in identifying common misconceptions associated with it.

## 1.3 RESEARCH OBJECTIVES
### 1.3.1 GENERAL OBJECTIVES

To determine the knowledge level and practice on vaping among undergraduate students in a private university in Kajang.

**1.3.2 SPECIFIC OBJECTIVES**

1. To determine the knowledge level on vaping among undergraduate students in a private university in Kajang.

2. To determine the practice on vaping among undergraduate students in a private university in Kajang.

3. To determine the association between knowledge level on vaping and the sociodemographic characteristics (age, gender, major of study, year of study, smoking status) among undergraduate students in a private university in Kajang.

4. To determine the association between practice on vaping and the sociodemographic characteristics (age, gender, major of study, year of study and smoking status) among undergraduate students in a private university in Kajang.

5. To determine the association between knowledge level and practice on vaping among undergraduate students in a private university in Kajang.

**1.4 RESEARCH QUESTIONS**

1. What is the knowledge level on vaping among undergraduate students in a private university in Kajang?

2. What is the practice on vaping among undergraduate students in a private university in Kajang?

3. What is the association between knowledge level on vaping and the sociodemographic characteristics (age, gender, major of study, year of study

and smoking status) among undergraduate students in a private university in Kajang?

4. What is the association between practice on vaping and the sociodemographic characteristics (age, gender, major of study, year of study and smoking status) among undergraduate students in a private university in Kajang?

5. Is there any association between knowledge level and practice on vaping among undergraduate students in a private university in Kajang?

## 1.5 HYPOTHESIS

### 1.5.1 NULL HYPOTHESIS

$H_0 1$: There will be no statistically significant association between knowledge level on vaping and the sociodemographic characteristics (age, gender, major of study, year of study and smoking status) among undergraduate students in a private university in Kajang.

$H_0 2$: There will be no statistically significant association between practice on vaping and the sociodemographic characteristics (age, gender, major of study, year of study and smoking status) among undergraduate students in a private university in Kajang.

$H_0 3$: There will be no statistically significant association between knowledge level and practice on vaping among undergraduate students in a private university in Kajang.

## 1.5.2 ALTERNATIVE HYPOTHESIS

$H_a 1$: There will be statistically significant association between knowledge level on vaping and the sociodemographic characteristics (age, gender, major of study, year of study and smoking status) among undergraduate students in a private university in Kajang.

$H_a 2$: There will be statistically significant association between practice on vaping and the sociodemographic characteristics (age, gender, major of study, year of study and smoking status) among undergraduate students in a private university in Kajang.

$H_a 3$: There will be statistically significant association between knowledge level and practice on vaping among undergraduate students in a private university in Kajang.

## 1.6 CONCEPTUAL FRAMEWORK
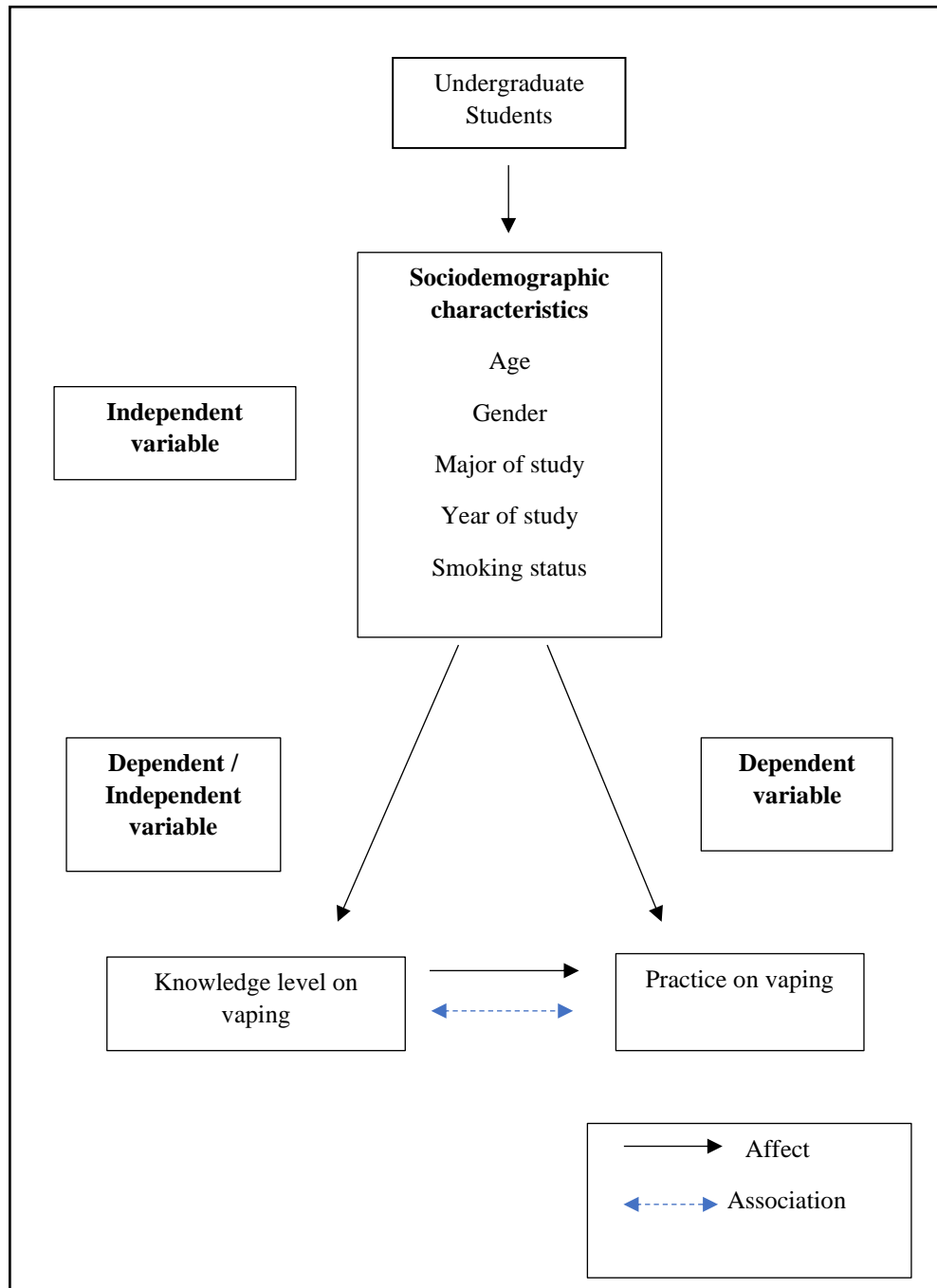


Figure 1.2: The conceptual framework of sociodemographic characteristics and knowledge level and practice on vaping among undergraduate students.

This conceptual framework demonstrated the sociodemographic characteristics with knowledge level and practice on vaping among undergraduate students. The blue arrow between knowledge level and practice on vaping represents a possible significant association, which will be determined in the study. The sociodemographic characteristics (age, gender, major of study, year of study and smoking status) were the independent variables. The influence of sociodemographic variables on knowledge level on vaping (dependent variable) and practice on vaping (dependent variable) answered research question 3 and 4. Meanwhile, the influence of knowledge level on vaping (independent) and practice on vaping (dependent) answered research question 5.

## 1.7 CONCEPTUAL AND OPERATIONAL DEFINITIONS

### 1.7.1 VAPING

Vaping is known as the act of inhaling vapor from e-liquid or juice that contains nicotine, flavourings, and other chemicals through an electronic device known as vape pen/e-cigarette (Merriam-Webster, 2022a).

### 1.7.2 KNOWLEDGE LEVEL ON VAPING

Conceptual definition: Knowledge is the understanding or awareness of an information and facts attained by education or experience (Cambridge Dictionary, 2022a).

Operational definition: In this study, the participants' knowledge level on vaping were determined. The instrument used to assess participants' knowledge level on vaping was adapted from a validated questionnaire by Ahmad Hafiz, M. Mizanur Rahman and Zulkifli Jantan (2019) and Kurdi, et al. (2021), which comprised of 8 items with '*Yes / No / Do Not Know*' options. 1 point was given for correct answer and 0 point for incorrect answer, including '*Do Not Know*' option. The scoring system ranged from 0 to 8 points. Subsequently, the obtained data were categorized into two groups: poor knowledge (0 – 4 points) and good knowledge (5 – 8 points), based on the scoring criteria established by Nkfusai, et al. (2019).

### 1.7.3 PRACTICE OF VAPING

Conceptual definition: Practice is defined as performing something frequently to accomplish better result (Collins, 2022b).

Operational definition: Participants' practice on vaping were assessed using validated questionnaire adapted from Global Youth Tobacco Survey (GYTS) (CDC, 2014) and Kurdi, et al. (2021) which consisted of 8 items**.** The first item assessed participants' vaping status. While, for item 3.2 until 3.8 were designated only for participants who admitted as current vapers. Current vapers referred to participants who vaped at least once or more during the past 30 days (CDC, 2014). Questions like age of initiation, frequency of use, type of flavour, timing and place of vaping were assessed.

### 1.7.4 SOCIODEMOGRAPHIC CHARACTERISTIC

A combination of social and demographic factors are defined as sociodemographic (Merriam-Webster, 2022b). In this study, sociodemographic variables included were age, gender, major of study, year of study and smoking status.

### 1.7.4.1 AGE

Age is defined as the period of time a person lived (Dictionary.com, 2022). Data collected were classified as ordinal data. The intervals of age were categorised as follow: 18-20 years, 21 to 24 years and 25 years and above, based on previous studies (Wamamili, et al., 2020; Al-Sawalha, et al., 2021; Rafidah Abd Razak, et al., 2021; Aizat Helmi Ali et al., 2022).

### 1.7.4.2 GENDER

The state of being male or female is known as gender (Cambridge Dictionary, 2022b). Male and female were measured using nominal data.

### 1.7.4.3 MAJOR OF STUDY

Major of study refers to the field of study where university students are specialized in (Law Insider, 2022a). Participants' major of study were categorized into health sciences and non-health sciences. Health sciences included M. Kandiah Faculty of Medicine and Health Sciences (MKFMHS) whereas non-health sciences included Lee Kong Chian Faculty of Engineering

and Science (LKCFES), Faculty of Accountancy and Management (FAM) and Faculty of Creative Industries (FCI).

### 1.7.4.4 YEAR OF STUDY

Year of study refers to the year of university students currently studying for a programme (Law Insider, 2022b). Participants' year of study were quantified using an ordinal scale as Year 1, Year 2, Year 3 and Year 4/final year.

### 1.7.4.5 SMOKING STATUS

Smoking is the inhalation of smoke from burning tobacco using various forms including cigarettes, cigars and pipes (World Health Organization (WHO), 2022). Smoking status was categorised using a nominal scale into three groups: current, former, or never users. Current users refer to participants who had been smoking for at least once or more during the past 30 days (Wamamili, et al., 2020). Former users refer to participants who had been smoking but not within the past 30 days while never users included participants who had never tried smoking before (Wamamili, et al., 2020).

### 1.7.5 UNIVERSITY STUDENTS

University students is defined as students who enrolled in a university for tertiary education (Collins, 2022a). University students aged 18 years and above, enrolled in an undergraduate program at a private university in Kajang, Malaysia, were invited to participate in this study.

### 1.8 SIGNIFICANCE OF THE STUDY

In recent years, vaping has become a popular trend among the young adults in Malaysia as many people assume that vaping is less harmful than cigarette smoking which may consequently result in cardiovascular and respiratory diseases (Oriakhi, 2020; Nuurain Amirah MR, et al., 2021). This study focused on university students, as this demographic may be more inclined to experiment with vaping due to their natural curiosity and desire to try new things (Pan, et al., 2022). The findings of this study can provide valuable baseline data on vaping knowledge and practices among this demographic, aiding in the development of comprehensive vaping control strategies, including health education and awareness campaigns. These efforts aim to equip university students with knowledge about the health risks associated with vaping, ultimately reducing its prevalence. Additionally, as future healthcare professionals, understanding young people's vaping habits is crucial for planning effective prevention programs and fostering a healthier community culture.

**1.9 SUMMARY**

The growing vaping practices, particularly among young adults, driven by unverified assumptions such as vaping being less harmful than traditional tobacco smoking and its potential as a smoking cessation tool, underscores the critical importance of focusing on vape-related education. Therefore, this study aimed to determine university students' knowledge and vaping practices, providing valuable insights for future health education initiatives aimed at preventing vaping.

# CHAPTER TWO


# Literature Review

# CHAPTER 2: LITERATURE REVIEW

## 2.0 CHAPTER OVERVIEW

The search strategy and literature review for this study will be explained in this chapter.

## 2.1 SEARCH STRATEGY

UTAR E-database, Google Scholar and PubMed was utilized to explore research articles for literature review. Boolean operators such as "AND" and "OR" was applied along with keywords "vape" OR "vaping" OR "electronic cigarettes" AND "knowledge on vaping" OR "knowledge on electronic cigarettes" AND "practice on vaping" OR "practice on electronic cigarettes" AND "university students" OR "undergraduate students" to refine searching process. A total of 3385 articles was retrieved. To further narrow down the search, exclusion criteria for articles such as before 2016 (n=1503), non-academic journals source type (n=1755), and languages other than English (n=102) were applied, removing a total of 3360 articles. The balanced 25 articles were used for literature review. The search strategy flowchart as shown in **Figure 2.1**.

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│  │  3)  Practice on vaping OR practice on electronic cigarettes AND   │
│  │  4)  University students OR undergraduate students        │  │
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**Figure 2.1: Search strategy flowchart**

**2.2 REVIEW ON LITERATURE**

In this part, research articles on the topic of knowledge level and practice on vaping as well as sociodemographic characteristics such as age, gender, major of study, year of study and smoking status, along with association between knowledge level and practice on vaping will be explained.

**2.2.1 KNOWLEDGE LEVEL ON VAPING**

Muhammad Faris Mahamad Sob, et al. (2022) conducted a cross-sectional study in 2020 to assess the knowledge, attitudes, and perceptions of e-cigarette use and its health effects among 309 undergraduate students (aged 18-25) in a Malaysian university. Purposive sampling was utilized, focusing on medical and dental undergraduates, and used a validated questionnaire distributed online via Google Forms. The overall results demonstrated majority participants (62.1%) had poor knowledge of e-cigarette and 56.0% perceived vaping to be less harmful than tobacco smoking.

Additionally, Alsanea, et al. (2022) carried out a cross-sectional study in 2020 to determine the prevalence, knowledge and attitude towards vaping among university students in Saudi Arabia. The sample size was 308 participants aged more than 18 years. The summarised findings revealed there was a reduced knowledge level about vaping among the students as 64.56% of them were unaware that vape products were not considered as a smoking cessation tool and

36.03% did not know that besides nicotine, vape products may contain harmful substances like carcinogenic and non-carcinogenic toxins.

Another cross-sectional study was conducted in Qassim University in 2018 to investigate the knowledge, perception, and prevalence of vaping among 229 medical students with a mean age of 22 years using a prevalidated questionnaire from a previous study (Abdullah Almutham, 2019). Most of the students (71.9%) were unsure whether vaping was approved by the FDA as a smoking cessation method. Meanwhile, 65.8% of students were convinced that vaping was less addictive than traditional cigarette smoking.

To conclude the three studies above, poor knowledge among university students were due to misconceptions like it is less harmful and addictive than tobacco smoking, a smoking cessation tool and does not contain potential carcinogenic/non-carcinogenic toxins. These findings are worrying as it demonstrated that many students were unaware of the potential health risks of vaping which may contribute to an increased susceptibility to nicotine addiction, cardiovascular and respiratory diseases. Therefore, this study aimed to determine the knowledge level on vaping among undergraduate students in this private university so that the findings from this research can facilitate comprehensive vaping control strategies to raise awareness predominantly among youths.

## 2.2.2 PRACTICE ON VAPING

Wamamili, et al. (2020) conducted a cross-sectional study in a New Zealand university with 1476 students aged 18 to 24. Data were collected through surveys, using convenience sampling via both online and physical modes. The overall result revealed 40.5% of the students had ever vaped, 6.1% were current vapers and 1.7% daily vapers. Out of the vapers surveyed, 11.5% had engaged in daily vaping for at least one month. Meanwhile, the majority (70.2%) used vaping devices that contained nicotine. Additionally, 80.8% stated that they did not vape in indoor areas, while 73.8% refrained from vaping in outdoor smoke-free spaces where smoking is banned.

In another cross-sectional study conducted by Sharifa Ezat Wan Puteh, et al. (2018), the researchers aimed to profile vaping habits among undergraduate students in six universities within the Klang Valley, Malaysia. Their sample consisted of 1302 participants, chosen through a random box-model sampling method. The overall findings indicated 74.9% of the respondents vaped whereby 34.5% were exclusive vapers and 40.3% were dual users. In contrast to previous study, this research revealed a lower percentage of usage of vape-nicotine devices (51.1%) among participants. However, 21.7% of participants were uncertain about whether their vaping devices contained nicotine. This lack of awareness highlights a knowledge gap among the university students regarding vaping substances, particularly nicotine.

On the contrary, another cross-sectional research to investigate the usage of e-cigarettes among university students in Jordan was conducted from 2020 to 2021 (Al-Sawalha, et al., 2021). The sample of study included 1259 participants aged 18 and above. The findings revealed that there were only approximately 11% of e-cigarette users, indicating low popularity among the university students as compared to previous studies (Sharifa Ezat Wan Puteh, et al., 2018; Wamamili, et al, 2020). This disparity could be attributed to differences in the enforcement of policies within the university.

To summarise above findings, two studies conducted by Sharifa Ezat Wan Puteh, et al. (2018) and Wamamili, et al. (2020) indicated a high prevalence of vaping among university students, with most using nicotine-containing devices, while a study in Jordan reported a lower prevalence (Al-Sawalha et al., 2021). Notably, some students were unaware of the content of their vaping devices, highlighting the need for educational interventions on vaping risks. Thereby, this study, the researcher aimed to determine vaping practices among undergraduate students in her university, which the findings can serve as guideline for interventions to combat vaping among this demographic.

**2.2.3 SOCIODEMOGRAPHIC CHARACTERISTICS**

**2.2.3.1 AGE**

**KNOWLEDGE LEVEL ON VAPING**

In two separate cross-sectional studies, one involving 1259 participants aged 18 and above in Jordan and the other involving 484 university students aged 19 to 25 in Malaysia, neither study found a significant association between age and knowledge about e-cigarettes (Al-Sawalha, et al., 2021; Nuurain Amirah MR, et al., 2021).

**PRACTICE ON VAPING**

Over the years, vaping has become a popular trend in many countries particularly among young adults. According to a cross-sectional study on e-cigarette use in 14 countries using Global Adult Tobacco Survey (GATS) from 2015 until 2018, there were approximately 18.3 million active vapers in which young adults aged 15 to 24 years had higher adjusted prevalence (Pan, et al., 2022). The high prevalence of vape among the young population was due to misconceptions like vaping is less harmful and less addictive as compared to conventional smoking.

In another cross-sectional study conducted among 199 Qatar university students, the results revealed that the median age of vaping was 21 years (Kurdi, et al., 2021). Moreover, several studies revealed that youths are easily influenced by attractive advertisement on vaping products in popular social media sites like Facebook, Instagram and YouTube claiming it as being safer, healthier and less

addictive than combustible cigarettes (Nasrallah Alfaraj, et al., 2019; Tamulevicius, et al., 2020; Vassey, et al., 2021; Lyu, et al., 2022; Wulan, et al., 2022).

Therefore, since age did not show a significant association with knowledge levels in prior studies by Kurdi, et al. (2021) and Pan, et al. (2022), this research will determine whether similar results will emerge or differ within the context of this private university. Moreover, considering the higher prevalence of vaping among young adults, it becomes imperative to investigate age-related trends among university students in this private university.

**2.2.3.2 GENDER**

**KNOWLEDGE LEVEL ON VAPING**

Rafidah Abd Razak, et al. (2021) conducted a cross-sectional study to assess students' knowledge on vaping in a public university in Malaysia in 2020. The number of participants recruited were 304 aged 18 years and above with 55.59% male and 44.41% female. The findings of this study revealed that overall female students had better knowledge of the health impact of e-cigarettes compared to male students.

In contrast, another cross-sectional study conducted in United states, England, Canada, and Australia using International Tobacco Control Survey found that males have better knowledge on vaping than females (Yong, et al., 2019). This may be due to male gender having higher exposure to smoking habits hence they acquire better knowledge on vaping (Franks, et al., 2017; Yong, et al., 2019; McLeish, Hart and Walker, 2022; Albgami, et al., 2023).

**PRACTICE ON VAPING**

Kurdi, et al. (2021) conducted a similar study in Qatar University that involved 199 participants comprised of 37.2% male and 62.8% female students. The prevalence of vaping among male (16.2%) was higher than female (12.8%) but this difference was not statistically significant.

In another cross-sectional study conducted among 401 undergraduate students (39% male and 61% female) in Saudi Arabia, the summarised results revealed that there was a strong association between gender and practice on vaping whereby male students were 3 times more likely to vape, as compared to female students (Eiad Habib, et al., 2020).

To sum up, previous studies have produced mixed results, with some indicating that males possess higher knowledge and practice levels on vaping, while others suggest females exhibit better knowledge. In light of these discrepancies, the

researcher is particularly interested in determining potential gender-based association in knowledge levels and vaping practices among undergraduate students at this private university. Thus, to ensure a representative sample, the participants were divided into quotas based on genders.

**2.2.3.3 MAJOR OF STUDY**

**KNOWLEDGE LEVEL ON VAPING**

A cross-sectional study conducted among 1259 university students in Jordan from 2020 to 2021 revealed that there was a significant association between knowledge on vaping and faculty in which medical students had better knowledge regarding the harmful and addictive effect of e-cigarettes than non-medical students (Al-Sawalha, et al., 2021).

**PRACTICE ON VAPING**

In a cross-sectional study conducted by Brożek et al. (2017) among 1906 students in Poland, the results showed that non-medical students were more inclined to vape due to their perception that it was not detrimental to health, in contrast to medical students.

Similarly, in a cross-sectional study involving 792 university students in Thailand, the majority of e-cigarette users (94.4%) were found to be participants from non-health-related faculties (Phetphum, et al., 2021).

Given the scarcity of research on the influence of students' majors on their knowledge and vaping practices among Malaysian university students, this study aims to fill this gap. It will determine knowledge and vaping practices across different majors (health sciences and non-health sciences) at this private university, providing insights within the Malaysian university context.

**2.2.3.4 YEAR OF STUDY**

**KNOWLEDGE LEVEL ON VAPING**

In a cross-sectional study conducted by Ibrahim Alfayoumi, Aqel and Axon (2022) in United States among 256 university students, there was no statistically significant differences between third- and fourth-year students for total knowledge scores on vaping.

**PRACTICE ON VAPING**

A cross-sectional study conducted by Abdullah Almutham, et al. (2019) in a Qassim University involving 256 students revealed that there was no significant relationship between e-cigarette users and year of study. In contrast, a cross-sectional study conducted among 145 university students in Malaysia from 2020 to 2021 revealed that the highest prevalence of vaping was among third year students (18.6%) (Aizat Helmi Ali, et al., 2022). However, the findings from this study does not certainly represent Malaysia's university students due to small sample size hence it has limited generalizability (Aizat Helmi Ali, et al., 2022).

Another cross-sectional survey conducted among 563 university students in China revealed third year (12.4%) and fourth year students (14.9%) vape more than the first (2.9%) and second year students (5.6%) (Fang, et al., 2022).

Given the varying findings from prior studies, it is crucial to incorporate year of study as a variable in this research. These discrepancies underscore the potential impact of academic level on both knowledge and vaping practices among university students.

**2.2.3.5 SMOKING STATUS**

**KNOWLEDGE LEVEL ON VAPING**

Nuurain Amirah MR, et al. (2021) conducted a cross-sectional study in a local university in Malaysia involving 484 students. The summarised findings revealed that smokers had higher mean score of knowledge on e-cigarette than non-smokers, however the results were not significant.

Furthermore, a cross-sectional study conducted in Jordan University involving 1259 students revealed that conventional tobacco smokers were found to be independently associated with a better knowledge on vaping than non-smokers (Al-Sawalha, et al., 2021).

On the contrary, in another cross-sectional study among 333 university students in Saudi Arabia, the results revealed that smokers were significantly less knowledgeable than non-smokers as they believed vaping was safe and were unaware of the harmful substances contained in it (Alsanea, et al., 2022).

**PRACTICE ON VAPING**

A cross-sectional study involving 1476 participants at a university in New Zealand revealed that cigarette smokers were significantly more likely to vape as compared to non-smokers (Wamamili, et al., 2020).

Another study conducted in Jordan among 1259 university students indicated a low prevalence of e-cigarette usage, with approximately 10% of smokers opting for e-cigarettes, highlighting their limited popularity within this student demographic (Al-Sawalha, et al., 2021).

Thus, this study aims to determine how smoking status may influence knowledge and vaping practices among undergraduate students, addressing conflicting findings in previous studies. Additionally, insights gained within the university's context can facilitate targeted interventions and policies.

## 2.2.4 RELATIONSHIP BETWEEN KNOWLEDGE LEVEL AND PRACTICE ON VAPING

According to a cross-sectional study conducted involving 554 undergraduate students in one of the universities in Vietnam in 2021, the findings revealed that students with inadequate knowledge about e-cigarette were more likely to vape (Le, et al., 2022).

Similarly, another cross-sectional study with 1362 university students in Thailand revealed that usage of vape was negatively associated with students' knowledge whereby poor knowledge resulted in higher practice (Chudech and Janmaimool, 2021).

Another cross-sectional study conducted by Nuurain Amirah MR, et al. (2021) in a public university in Malaysia revealed there was a significant negative association between knowledge and vaping practices, indicating that students with higher knowledge had lower practice scores.

This study seeks to determine the association between knowledge levels and vaping practices among undergraduate students. Understanding this connection is vital, as previous studies consistently indicated that limited knowledge about e-cigarettes is associated with higher rates of vaping. Thus, this investigation can provide valuable insights for tailored interventions to address vaping practices among university students.

## 2.3 SUMMARY

In summary, through literature review, it allowed the researcher to understand the current issues pertaining with vaping such as inadequate knowledge on vaping among young population which may subsequently influence their practice on it. In the next chapter, the research design and methodology will be explained.

# CHAPTER THREE


# Methodology

# CHAPTER 3: METHODOLOGY

## 3.0 CHAPTER OVERVIEW

In chapter 3, the research design, variables, setting of the study, population, sample, sampling, research instruments, validity and reliability, pilot study, data collection procedure and ethical consideration will be discussed.

## 3.1 RESEARCH DESIGN

A quantitative, cross-sectional survey was conducted in this study to determine the knowledge level and practice on vaping among undergraduate students. Cross-sectional design is a descriptive research that describes the phenomena at a particular point of time within a particular population (Zangirolami-Raimundo, Echeimberg and Leone, 2018; Ihudiebube-Splendor and Chikeme, 2020; Ma, et al., 2020).

This study design was used as it facilitated speedier results obtainment as data was collected in a point of time without the need for follow-up of the participants, hence it was extra cost effective as compared to other study designs (Zangirolami-Raimundo, Echeimberg and Leone, 2018). Additionally, the results obtained in this study using cross-sectional survey can serve as a foundation for conducting a more comprehensive and detailed research investigation in the future (Wang and Cheng, 2020).

Besides, the researcher is determining the association in sociodemographic characteristics concerning knowledge level and practice on vaping, as well as the association between knowledge and vaping practices. Thus, a survey with close ended questions was distributed to the sample of the designed population (university students) to generate responses on the study issues. The process of the study is shown in **Figure 3.1**.
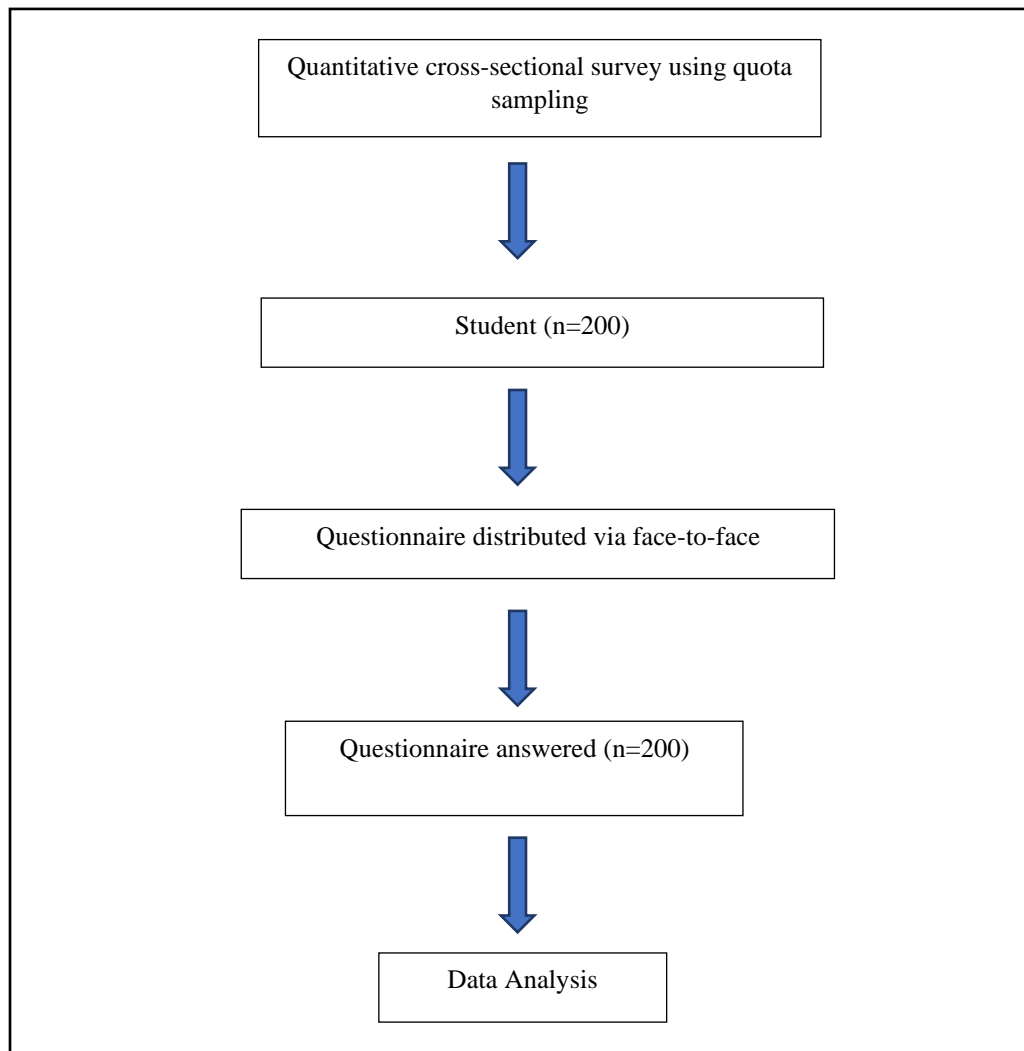


**Figure 3.1: Process of study**

## 3.2 VARIABLES

### 3.2.1 INDEPENDENT VARIABLES

Andrade (2021) explained independent variables are variables that can potentially affect the dependent variables. In this study, the independent variables for research objectives 3 and 4 were sociodemographic characteristics (age, gender, major of study, year of study and smoking status). Meanwhile, knowledge level on vaping was the independent variable for research objective 5.

### 3.2.2 DEPENDENT VARIABLES

Dependent variables are defined as variables that are influenced by other variables (Andrade, 2021). Knowledge level on vaping was the dependent variable in objective 3 while practice on vaping was the dependent variable in objective 4 and 5

## 3.3 SETTING OF THE STUDY

This study was conducted in a private university in Sg Long, Kajang, Malaysia. It is a non-profit university that was established in 2002. This university consists of four main faculties which are Lee Kong Chian Faculty of Engineering and Science (LKCFES), Faculty of Accountancy and Management (FAM), M. Kandiah Faculty of Medicine and Health Sciences (MKFMHS) and Faculty of Creative Industries (FCI), with a total of 6935 undergraduate students.

### 3.4 POPULATION

### 3.4.1 TARGET POPULATION

Target population included all the undergraduate students studying at the private university in Kajang.

### 3.4.2 ACCESSIBLE POPULATION

Accessible population included all the undergraduate students studying at the private university in Kajang aged 18 and above that were present and consented during data collection.

### 3.5 SAMPLE

Sample included all undergraduate students aged 18 years and above who were studying undergraduate programmes (LKCFES, FAM, MKFMHS, FCI) from year 1 to year 4/final year in a private university in Kajang.

### 3.6 SAMPLING

### 3.6.1 SAMPLING METHOD

Proportional quota sampling method was utilized to recruit participants in this study. It is a non-probability sampling that select representative data from a population that has been divided into subgroups (Sarstedt, et al., 2018; Iliyasu and Etikan, 2021; Inas Nurfadia Futri, Risfandy and Mansor H. Ibrahim, 2022).

This sampling method was used to ensure that the sample group represents particular characteristics of the population selected by the researcher (gender and major of study) as balanced representation can enhance the study's ability to determine association between variables effectively (Iliyasu and Etikan, 2021). Gender and major of study were selected as these variables had the most significant associations with knowledge and vaping practices (Aizat Helmi Ali, et al., 2022; Pettigrew, et al., 2023).

The total population (6935 students) was divided into subgroups based on gender. The first subgroup consisted of male students (total male students = 3512) and second subgroup consisted of female students (total female students = 3423). Then, the two subgroups (based on gender) were further divided into smaller subgroups based on major of study (50% health sciences and 50% non-health sciences) (Pettigrew, et al., 2023). Faculty under health sciences included MKFMHS, while non-health sciences included LKCFES, FAM and FCI respectively as shown in **Figure 3.2** below. The total number of populations for each subgroup was obtained from the university's Department of Admission. Subsequently, the researcher determined the necessary quota sample size for each subgroup. This calculation was detailed in 'Section 3.6.2 Sample Size'. Additionally, quota sampling uses a convenience sampling method within each subgroup (Inas Nurfadia Futri, Risfandy and Mansor H. Ibrahim, 2022). Hence, in this study, the participants were selected via convenience sampling according to gender and major of study until each quota was filled.
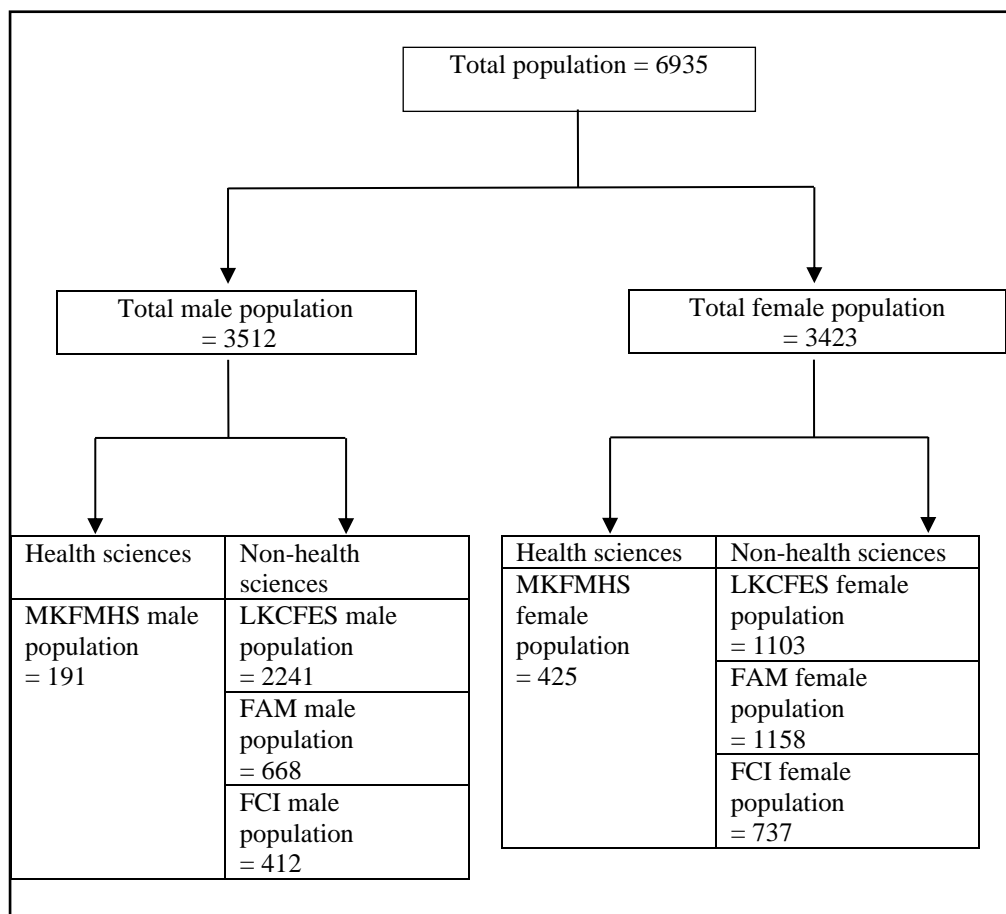
**Figure 3.2 Stratification into subgroups based on gender and major of study (health sciences and non-health sciences)**

### 3.6.2 SAMPLE SIZE

In this study, sample size was calculated by using formula from Kish (1965)
as shown below:

$$N = \frac{(Z_{1-a})^2 \, P \, (1 - P)}{D^2}$$

$N$ = Estimated sample size

$(Z_{1-a})$ = confidence interval of 1.96

P = Prevalence from previous study (Aizat Helmi Ali, et al.,
2022)

D = allowable error 5% = 0.05

After applying Kish L, 1965 formula,

$$N = \frac{(1.96)^2 \; 0.124(1 - 0.124)}{0.05^2}$$

$$N = 167 + 0.2 \, (167) = 200$$

The prevalence of e-cigarette use among university students in Malaysia was
12.4% according to Aizat Helmi Ali, et al. (2022). Estimated sample was 167
and a 20% attrition rate was added in the sample size. Hence, after adding,
the final sample size required was 200.

Quota sample (Male)

Calculation for total male sample: (Total male population / total population) x
sample size

**Table 3.1. Quota sampling based on male gender**

| Calculation | Number of students |
|---|---|
| (3512/6935) x 200 | 101 |

Calculation of total male sample into 50% health sciences and 50% non-health
sciences: Total male sample / 2

**Table 3.2. Quota sampling based on major of study (health sciences and non-health
sciences)**

| Calculation | Number of students |
|---|---|
| Health sciences (MKFMHS) = 101/2 | 51 |
| Non-health sciences (LKCFES, FAM, FCI) = 101/2 | 50 |
| Total | 101 |

Calculation for number of male students needed for non-health sciences:
(Population of faculties / total non-health sciences population) x 50

**Table 3.3. Quota sampling based on faculty distribution (non-health science)**

| Calculation | Number of students |
|---|---|
| LKCFES = (2241/3321) x 50 | 34 |
| FAM = (668/3321) x 50 | 10 |
| FCI = (412/3321) x 50 | 6 |
| Total | 50 |

**Quota sample (Female)**

Calculation for total female sample: (Total female population / total population) x sample size

**Table 3.4. Quota sampling based on female gender**

| Calculation | Number of students |
|---|---|
| (3423/6935) x 200 | 99 |

Calculation of total female sample into 50% health sciences and 50% non-health sciences: Total female sample / 2

**Table 3.5. Quota sampling based on major of study (health sciences and non-health sciences)**

| Calculation | Number of students |
|---|---|
| Health sciences (MKFMHS) = 99/2 | 50 |
| Non-health sciences (LKCFES, FAM, FCI) = 99/2 | 49 |
| Total | 99 |

Calculation for number of female students needed for non-health sciences: (Population of faculties / Total non-health sciences population) x 49

**Table 3.6. Quota sampling based on faculty distribution (non-health sciences)**

| Calculation | Number of students |
|---|---|
| LKCFES = (1103/2998) x 49 | 18 |
| FAM = (1158/2998) x 49 | 19 |
| FCI = (737/2998) x 49 | 12 |
| Total | 49 |

```
┌─────────────────────────────────────────────────────────────────────┐
│                          ┌──────────────────────┐                    │
│                          │  Sample size = 200   │                    │
│                          └──────────────────────┘                    │
│                                                                       │
│       ┌──────────────────────┐          ┌──────────────────────┐     │
│       │ Male sample = 101    │          │ Female sample = 99   │     │
│       └──────────────────────┘          └──────────────────────┘     │
│                                                                       │
│  ┌───────────────┬───────────────┐   ┌───────────────┬─────────────┐ │
│  │ Health        │ Non-health    │   │ Health        │ Non-health  │ │
│  │ sciences      │ sciences (50%)│   │ sciences      │ sciences    │ │
│  │ (50%)         │               │   │ (50%)         │ (50%)       │ │
│  ├───────────────┼───────────────┤   ├───────────────┼─────────────┤ │
│  │ FMHS male     │ LKCFES male   │   │ FMHS female   │ LKCFES      │ │
│  │ population     │ population    │   │ population    │ female      │ │
│  │ = 51          │ = 34          │   │ = 50          │ population   │ │
│  │               ├───────────────┤   │               │ = 18        │ │
│  │               │ FAM male      │   │               ├─────────────┤ │
│  │               │ population    │   │               │ FAM female  │ │
│  │               │ = 10          │   │               │ population   │ │
│  │               ├───────────────┤   │               │ = 19        │ │
│  │               │ FCI male      │   │               ├─────────────┤ │
│  │               │ population    │   │               │ FCI female  │ │
│  │               │ = 6           │   │               │ population   │ │
│  │               │               │   │               │ = 12        │ │
│  └───────────────┴───────────────┘   └───────────────┴─────────────┘ │
└─────────────────────────────────────────────────────────────────────┘
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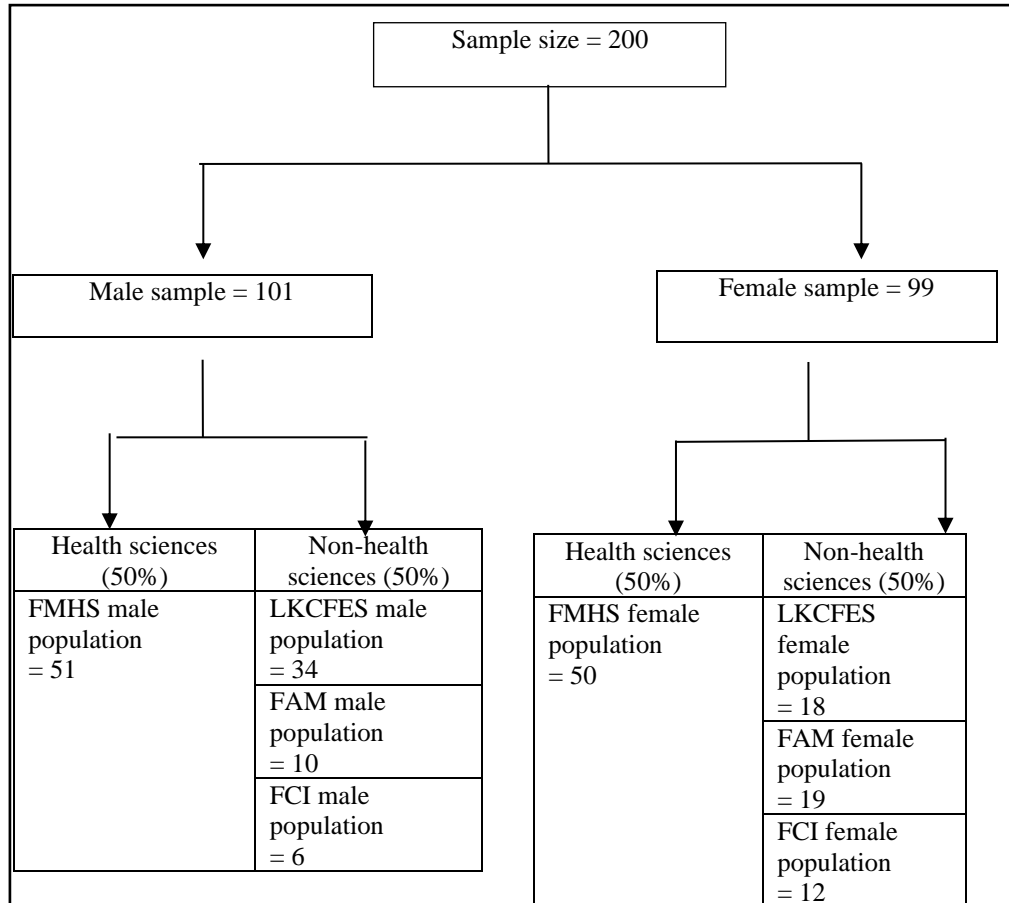
**Figure 3.3 Quota Sample**

## 3.6.3 SAMPLING CRITERIA

Inclusive and exclusive sampling criteria as listed below were used to recruit participants in this study.

## 3.6.3.1 INCLUSION CRITERIA

- Aged 18 years and above.

- Currently pursuing undergraduate programme in a private university in Kajang.

### 3.6.3.2 EXCLUSION CRITERIA

- Foundation students and postgraduate students, Master and Doctor of Philosophy

- Refused to participate in this research.

### 3.7 RESEARCH INSTRUMENT

The instrument used in this research was a questionnaire that consisted of 21 questions which was divided into 3 sections as explained below (Attached in *Appendix B*). Permission letter to request for the use of both questionnaires was attached in *Appendix B.*

### 3.7.1 SECTION A: SOCIODEMOGRAPHIC

This section consisted of 5 close-ended questions. The questionnaire began with obtaining participants' sociodemographic data which were age, gender, faculty, year of study and smoking status. The data were used for analysis to answer research questions 3 and 4.

### 3.7.2 SECTION B: KNOWLEDGE ON VAPING

Section B consisted of 8 close-ended specific questions to determine participants' knowledge level on vaping (Ahmad Hafiz, M. Mizanur Rahman and Zulkifli Jantan, 2019; Kurdi, et al., 2021). Participants were required to answer '*Yes / No / Do Not Know'.* 1 point was given for correct answer and 0

point for incorrect answer, including '*Do Not Know*' option (Kurdi, et al., 2021). The correct answer for Question 2.1, 2.5 and 2.6 was "*Yes*" while Question 2.2, 2.3, 2.4, 2.7, 2.8 was "*No*". Data obtained was further classified into 2 categories: poor knowledge (0 – 4 points) and good knowledge (5 – 8 points) (Nkfusai, et al., 2019).

### 3.7.3 SECTION C: PRACTICE ON VAPING

Section C consisted of 8 closed-ended questions to determine participants' practice on vaping (CDC, 2014; Kurdi, et al., 2021). The first question, 3.1 assessed participants' vaping status. While question 3.2 until 3.8 were designated only for participants who admitted as current vaper. Questions like age of initiation, frequency of use, type of flavour, timing and place of vaping were assessed.

### 3.8 VALIDITY AND RELIABILITY

### 3.8.1 VALIDITY

Validity refers to the extent to which a study instrument is carefully measured to ensure the accuracy of data (Scott, et al., 2019; Surucu and Maslakci, 2020). Correspondingly, content validity is often determined by experts in that particular field of study (Raeisi, Nadi and Sharifi Ghoortani, 2022). Hence, the questionnaire in this study was sent to one internal department Nursing lecturer (Dr Thavamalar a/p Paramasivam) and one external department lecturer specializing in Population Medicine (Prof. Dr Retneswari a/p S. Masilamani) for

content validation *(Appendix B)* after ethical approval was acquired. The questionnaire was found to be suitable for usage without any modification.

### 3.8.2 RELIABILITY

Reliability refers to the stability and consistency of the measured values attained on repeated trials under the same circumstances by using the same research instrument (Scott, et al., 2019; Surucu and Maslakci, 2020). The original questionnaires (CDC, 2014; Kurdi et al., 2021) did not include a reliability test for internal consistency, as Cronbach's Alpha is unsuitable for dichotomous variables, potentially yielding inaccurate reliability values and predictions (Doval, Viladrich, and Angulo-Brunet, 2023).

In contrast, the test-retest method, which employs the intraclass correlation coefficient (ICC) and is suitable for dichotomous variables, was utilized in the current study. This approach was supported by cross-sectional studies by Fang et al. (2022) and Sreeramareddy, Shroff, and Gunjal (2023), aimed to identify any potential questionnaire inaccuracies (Hassan, 2023).

During the pilot study, the questionnaire was administered twice to 20 students, with a two-week interval between administrations, in accordance with the recommended timeline from Alkaed et al. (2018) and Muriithi and Gore (2023). The ICC obtained was 0.761, indicating good reliability. ICC ranges are as

follows: <0.5 for poor, 0.5-0.75 for moderate, 0.75-0.9 for good, and >0.9 for excellent (Koo and Li, 2016; Mohajan, 2017; Bobak, Barr and O'Malley, 2018).

## 3.9 PILOT STUDY

A pilot study was conducted from 3$^{rd}$ August 2023 to 17$^{th}$ August 2023 after obtaining ethical approval. 20 participants (10 males and 10 females) were selected, which constituted 10% of the total sample size (n=200). The same participants completed the questionnaire twice, with a two-week interval between administrations, as mentioned earlier. Its purpose was to test research instruments before the main data collection, aiding in identifying areas for improvement (Lowe, 2019; Muresherwa and Jita, 2022). To prevent duplication of data, participants were reminded to notify the researcher if they received the same questionnaire in the main data collection phase. The pilot study was uneventful, thus no modifications to the instrument were made for the main study.

Quota sampling calculation for pilot study is shown below:

(Undergraduate students required per faculty for actual data collection / total

study sample size) x Total pilot study sample size

**Male:**

**Table 3.7. Pilot study quota sampling based on male gender and health sciences**

| Calculation | Number of students |
|---|---|
| MKFHMS = (51/200) x 20 | 5 |

**Table 3.8. Pilot study quota sampling based on male gender and non-health sciences**

| Calculation | Number of students |
|---|---|
| LKCFES = (34/200) x 20 | 3 |
| FAM = (10/200) x 20 | 1 |
| FCI = (6/200) x 20 | 1 |
| Total | 5 |

The total number of male samples required for pilot study:

Total male health sciences (5) + total male non-health sciences (5) = 10

**Female:**

Table 3.9. Pilot study quota sampling based on female gender and health sciences

| Calculation | Number of students |
|---|---|
| MKFHMS = (50/200) x 20 | 5 |

Table 3.10. Pilot study quota sampling based on female gender and non-health sciences

| Calculation | Number of students |
|---|---|
| LKCFES = 18/200) x 20 | 2 |
| FAM = (19/200) x 20 | 2 |
| FCI = (12/200) x 20 | 1 |
| Total | 5 |

Total number of female samples required for pilot study:

Total female health sciences (5) + total female non-health sciences (5) = 10

## 3.10 DATA COLLECTION PROCEDURE

The data collection process took place from 18[th] August 2023 to 25[th] August 2023, following approval from the private university's ethical board. A self-administered questionnaire along with a consent form was distributed to the participants via face-to-face approach at the private university in Kajang. This is due to conducting surveys face-to-face allow greater sample coverage. Additionally, the presence of researcher can lead to higher response rates as they can address any questions or concerns participants may have, thereby increasing participants' willingness to participate and provide accurate responses (Braekman, et al., 2022).

To select participants, the researcher first determined the required number of students from each gender and faculty based on the previously established quota, and then approached them randomly. Upon approaching participants, the researcher provided an explanation of the study's purpose to ensure participants' comprehension of their role in the research. At the same time, the researcher verbally confirmed with participants that they had not previously participated in any part of the research, including pilot study to prevent duplication of involvement. Most importantly, the researcher emphasized that their privacy and confidentiality will be maintained to promote honest-self disclosure when answering questions. Participants were given ample time (5-10 minutes) to complete the survey, and any questions or uncertainties were promptly clarified by the researcher. All questionnaires were counter-checked to ensure their completeness, and the collected data were subsequently entered into SPSS version 27 for analysis.

## 3.11 ETHICAL CONSIDERATION

Ethical approval was obtained from the private university's ethical board on 3rd August 2023, as shown in **Appendix D,** before commencement of data collection. Meanwhile, in November 2022, permission letters requesting the use of questionnaires from the authors involved in the current study were sent via email. These letters were attached in **Appendix B** for reference.

Consent was obtained from participants prior to data collection to safeguard their privacy and confidentiality (**Appendix A**). Participants were also informed of their rights to withdraw the study anytime. All data collected was kept anonymous and used solely for this study purpose. Hardcopies of data were stored in a sealed envelope and kept in a locked cabinet, while softcopies of data were encrypted with password and stored in the researcher's personal laptop. Last but not least, all data will be disposed after 7 years.

**3.12 SUMMARY**

This study was conducted to determine the knowledge level and practice on vaping among undergraduate students in a private university in Kajang. The research design employed was a cross-sectional study utilizing quota sampling, with a survey serving as the primary research tool. A total sample size of 200 was calculated and surveys were administered via face-to-face approach. All data collected were analysed using SSPS version 27. The findings and result will be further discussed in the next chapter.

# CHAPTER FOUR


# Data Analysis and Results

# CHAPTER 4: DATA ANALYSIS & RESULTS

## 4.0 CHAPTER OVERVIEW

In this chapter, descriptive and inferential analysis, statistical data processing and analysis, and the results of the study will be discussed in accordance with the research objectives respectively.

## 4.1 DESCRIPTIVE AND INFERENTIAL ANALYSIS

### 4.1.1 DESCRIPTIVE ANALYSIS

Descriptive analysis was used to analyse sociodemographic characteristics (age, gender, major of study, year of study, smoking status), research objective one (knowledge level on vaping) and two (practice on vaping). Since the variables were categorical, the results were presented in the form of frequency and percentage (Kaur, Stoltzfus and Yellapu, 2018).

### 4.1.2 INFERENTIAL ANALYSIS

All variables collected in this study were categorical. Chi-square test was the most appropriate test to determine association between two categorical variables (Schober and Vetter, 2019). Thus, for research objective three and four, Chi-square test was used to determine the association between knowledge level on vaping and practice on vaping in relation to the sociodemographic characteristics. Similarly, research objective five utilized Chi-square test to determine the association between knowledge level and practice on vaping. The

results were presented in cross tabulation with frequency, percentage, Chi-square value and p-value.

**4.2. STATISTICAL DATA PROCESSING AND ANALYSIS**

A total of 200 participants were recruited using quota sampling method and the response rate for this study was 100%. All questionnaires were meticulously coded before entering into SPSS version 27 for analysis to prevent duplication of data. Data cleaning was performed, and no missing data was found. Descriptive statistics and Chi-Square test were used respectively to produce results as according to research objectives. Confidence interval chosen was 95% and if the p-value showed less than tabulated value, 0.05, this indicate the results were statistically significant.

**4.3 RESULTS**

**4.3.1 SOCIODEMOGRAPHIC CHARACTERISTICS**

The sociodemographic characteristics of the participants in this study include age, gender, major of study, year of study and smoking status. The results were presented in frequency and percentage as displayed below.

**Table 4.1. Frequency and percentage of participants' sociodemographic characteristics (n=200)**

| Sociodemographic characteristics | Frequency (n) | Percentage (%) |
|---|---|---|
| **Age** | | |
| 18-20 | 57 | 28.5 |
| 21-24 | 125 | 62.5 |
| 25 and above | 18 | 9.0 |
| | | |
| **Gender** | | |
| Male | 101 | 50.5 |
| Female | 99 | 49.5 |
| | | |
| **Major of study** | | |
| Health sciences | 101 | 50.5 |
| Non-health sciences | 99 | 49.5 |
| | | |
| **Year of study** | | |
| Year 1 | 51 | 25.5 |
| Year 2 | 56 | 28.0 |
| Year 3 | 33 | 16.5 |
| Year 4/Final Year | 60 | 30.0 |
| | | |
| **Conventional smoker** | | |
| Current | 25 | 12.5 |
| Former smoker | 19 | 9.5 |
| Never | 156 | 78.0 |

**Table 4.1** demonstrated the frequency and percentage of participants' sociodemographic characteristics where the major findings will be explained here. Majority of the participants, 125 (62.5%), were aged 21-24 years old. In terms of gender distribution, the sample was nearly equally split, with 101 (50.5%) male and 99 (49.5%) female participants, acquired from quota sampling. Similarly, based on the quota formed, health sciences comprised of 101 (50.5%) participants from MKFMHS, and non-health sciences comprised of

99 (49.5%) participants from LKCFES, FAM and FCI. 60 (30%) of the participants, were from Year 4/final year. In relation to smoking status, only one-eighth of the participants, 25 (12.5%) were identified as current smokers, while 19 (9.5%) participants were former smokers, and the rest of the participants were never users. The remaining findings were displayed in **Table 4.1**.

### 4.3.2 KNOWLEDGE LEVEL ON VAPING

Research question one, "What is the knowledge level on vaping among undergraduate students in a private university in Kajang?" is answered via descriptive analysis in this section.

### 4.3.2.1 FREQUENCY AND PERCENTAGE OF PARTICIPANTS' RESPONSES WITH THE CORRECT AND INCORRECT ANSWERS IN ASSESSING KNOWLEDGE LEVEL ON VAPING

Eight close-ended specific questions were designed to determine participants' knowledge on vaping. The participants' responses, "Yes", "No" and "Do not know" were presented in frequency and percentage in **Table 4.2.** Data collected was further categorised into correct and incorrect group and presented in the same table. Those who answered "Yes" for Question 2.1, 2.5 and 2.6 were in the correct group whereas, those who answered "No" or "Do not know" were in the incorrect group. For Question 2.2, 2.3, 2.4, 2.7 and 2.8, participants who answered "No" were in the correct group while for those that answered "Yes" or "Do not know" were classified as incorrect group.

**Table 4.2. Frequency and percentage of participants responses with the correct and incorrect answers in assessing knowledge on vaping (n=200)**

| Item of questions | Frequency (Percentage) n (%) | | | | |
|---|---|---|---|---|---|
| | Yes | No | Do not know | Correct | Incorrect |
| 2.1 (T) Vape products may contain nicotine. | 172 (86.0) | 14 (7.0) | 14 (7.0) | 172 (86.0) | 28 (14.0) |
| 2.2 (F) Vaping is less addictive than cigarettes. | 40 (20.0) | 142 (71.0) | 18 (9.0) | 142 (71.0) | 58 (29.0) |
| 2.3 (F) Vaping is less damaging to health than traditional smoking cigarettes. | 50 (25.0) | 137 (68.5) | 13 (6.5) | 137 (68.5) | 63 (31.5) |
| 2.4 (F) Vape products do not contain carcinogenic ingredients. | 16 (8.0) | 127 (63.5) | 57 (28.5) | 127 (63.5) | 73 (36.5) |
| 2.5 (T) Vaping can increase risk of lung cancer. | 168 (84.0) | 8 (4.0) | 24 (12.0) | 168 (84.0) | 32 (16.0) |
| 2.6 (T) Vaping can increase risk of cardiovascular problems. | 169 (84.5) | 6 (3.0) | 25 (12.5) | 169 (84.5) | 31 (15.5) |
| 2.7 (F) Vaping is a good alternative for smoking cessation. | 57 (28.5) | 118 (59.0) | 25 (12.5) | 118 (59.0) | 82 (41.0) |
| 2.8 (F) Vaping prevents from smoking traditional cigarettes. | 70 (35.0) | 99 (49.5) | 31 (15.5) | 99 (49.5) | 101 (50.5) |

T = True, F = False

Based on **Table 4.2**, for the first question (2.1), more than three quarters of the participants, 172 (86.0%), agreed that vape products may contain nicotine. For second question (2.2), nearly three quarters of the participants, 142 (71.0%), were aware that 'vaping is less addictive than cigarettes' was false. Next, around two-third of participants, 137 (68.5%) believed that 'vaping is less damaging to health than traditional smoking cigarettes', was false in the third question (2.3). In question four (2.4), more than half of the participants, 127 (63.5%), thought that 'vape products do not contain carcinogenic ingredients', as false. For the fifth (2.5) and sixth question (2.6), more than three quarters of the participants, 168 (84.0%) and 169 (84.5%) believed that vaping can increase risk of lung cancer and cardiovascular problems, respectively. In question seven (2.7), more than half of the participants, 118 (59.0%), thought that vaping is a good alternative for smoking cessation, as false. For the last knowledge question (2.8), only about half of the participants, 99 (49.5%), believed that vaping prevents from smoking traditional cigarettes, as false.

Only 3 out of 8 items of questions were answered correctly by over 80% of the participants. The first question (2.1) attained the highest correct response rate where majority of the participants, 172 (86.0%) believed vape products may contain nicotine. Followed by the sixth (2.6) and fifth question (2.5), with 169 (84.5%) and 168 (84.0%) of participants, respectively, showing good knowledge about the health risks of vaping, including increased risk of cardiovascular (CVS) problems and lung cancer.

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On the contrary, the last question (2.8) received the highest rate of incorrect responses with 101 (50.5%) participants were unaware that vaping doesn't prevent from smoking traditional cigarettes. Question seven (2.7) had the second highest rate of incorrect answers, with 82 (41.0%) participants believing that vaping is a good smoking cessation alternative.

## 4.3.2.2 FREQUENCY AND PERCENTAGE OF PARTICIPANT'S KNOWLEDGE LEVEL ON VAPING

Based on **Table 4.2**, 1 point was given for correct answer and 0 point was given for incorrect answer. Participants' knowledge level was further classified into two categories: poor knowledge (0 – 4 points) and good knowledge (5 – 8 points).

**Table 4.3. Frequency and percentages of participants' knowledge level on vaping (n=200)**

| Variables | Frequency (n) | Percentage (%) |
|---|---|---|
| Knowledge level on vaping | | |
| Poor knowledge (0-4) | 59 | 29.5 |
| Good knowledge (5-8) | 141 | 70.5 |

**Table 4.3** displayed the frequency and percentages of participants' knowledge level on vaping. The results showed most of the participants, 141 (70.5%) had good knowledge level on vaping whereas 59 (29.5%) of participants were in the poor knowledge group. This finding has answered research question 1.

### 4.3.3 PRACTICE ON VAPING

Research question two, "What is the practice on vaping among undergraduate students in a private university in Kajang?" is answered via descriptive analysis in this section.

### 4.3.3.1 FREQUENCY AND PERCENTAGE OF PARTICIPANTS' RESPONSES IN ASSESSING PRACTICE ON VAPING

This section consists of eight close-ended questions to determine participants' practice on vaping. The first question (3.1) assessed the participant's vaping status, while question 3.2 to 3.8 were designated only for current vapers. The results were presented in frequency and percentage as shown in **Table 4.4** and **Table 4.5.**

**Table 4.4. Frequency and percentage of participant's vaping status (n=200)**

| Vaping status | Frequency (n) | Percentage (%) |
|---|---|---|
| **3.1 Are you a vaper?** | | |
| Current | 42 | 21.0 |
| Former vaper | 21 | 10.5 |
| Never | 137 | 68.5 |

**Table 4.4** provided an overview of the frequency and percentage of participants' vaping status. The results revealed that 42 (21.0%) participants identified as current vapers, 21 (10.5%) participants as former vapers, and the majority, comprising 137 (68.5%) participants reported as never vape users.

**Table 4.5. Frequency and percentage of current vaper's vaping practices (n=42)**

| Practice | Frequency (n) | Percentage (%) |
|---|---|---|
| **3.2 How old were you when you first tried vaping?** | | |
| Less than 18 years | 11 | 26.2 |
| 18 to 20 years | 23 | 54.8 |
| 21 to 24 years | 8 | 19.0 |
| 25 years and above | 0 | 0.0 |
| | | |
| **3.3 Does the vaping device that you use most often contain nicotine?** | | |
| Yes | 27 | 64.3 |
| No | 2 | 4.8 |
| Do not know | 13 | 31.0 |
| | | |
| **3.4 For how long have you been using vaping device?** | | |
| Less than 1 month | 6 | 14.3 |
| 1 to 3 months | 8 | 19.0 |
| 4 to 11 months | 5 | 11.9 |
| 1 to 2 years | 13 | 31.0 |
| More than 2 years | 10 | 23.8 |
| | | |
| **3.5 During the past 30 days, how many day (s) did you vape?** | | |
| Daily | 20 | 47.6 |
| Twice a week | 6 | 14.3 |
| Once per week | 9 | 21.4 |
| Biweekly | 2 | 4.8 |
| Once a month | 5 | 11.9 |
| | | |
| **3.6 What flavour [do/did] you use most when vaping/using a vaping device?** | | |
| Tobacco | 5 | 11.9 |
| Menthol or Mint | 11 | 26.2 |
| Fruit | 24 | 57.1 |
| No flavour | 2 | 4.8 |
| Others | 0 | 0.0 |
| | | |
| **3.7 Timing of using vape** | | |
| During university hours | 8 | 19.0 |
| During social situations | 20 | 47.6 |
| During stressful situations | 14 | 33.3 |
| Others | 0 | 0.0 |
| | | |
| **3.8 Place of vaping on campus** | | |
| Indoor | 1 | 2.4 |
| Outdoor | 18 | 43.9 |
| Both indoors and outdoors | 1 | 2.4 |
| Do not use in campus | 21 | 51.2 |

**Table 4.5** illustrated the frequency and percentage of current vaper's vaping practices, with the key findings outlined below. Question 3.2 revealed that majority of current vapers, 23 (54.8%) were aged 18 to 20 years when they first tried vaping. Question 3.3 indicated nearly two-thirds of the vapers, 27 (64.3%)

were aware that the vaping device that they use most often contain nicotine. Conversely, approximately one-third of the vapers, 13 (31.0%) were not aware of the nicotine content while the remaining vapers, 2 (4.8%) used nicotine-free vape device.

Regarding Question 3.4, around one third of the vapers, 13 (31.0%) have been using vaping device for 1 to 2 years, while 10 (23.8%) of participants reported having engaged in vaping for more than 2 years. Moving on to Question 3.5, about half of the vapers, 20 (47.6%) reported vaping daily in the past 30 days.

In Questions 3.6 and 3.7, it was found that fruit flavours were the most preferred choice among the vapers, with 24 (57.1%) participants selecting them, and nearly half, 20 (47.6%) participants vaped during social situations. Lastly, in response to Question 3.8, half of the vapers, 21 (51.2%) did not vape on campus, while more than one third of the participants, 18 (43.9%) reported outdoor as place of vaping. The remaining results were displayed in Table 4.5.

## 4.3.4 ASSOCIATION BETWEEN KNOWLEDGE LEVEL ON VAPING AND THE SOCIODEMOGRAPHIC CHARACTERISTICS

In this section, research question 3, 'What is the association between knowledge level on vaping and the sociodemographic characteristics (age, gender, major of study, year of study and smoking status) among undergraduate students in a private university in Kajang?' is answered. Data were analysed using Chi-square test and presented in cross tabulation with frequency, percentage, Chi-square value and p-value.

**Table 4.6. Frequency, percentage, Chi-square value and p-value for the association between knowledge level on vaping and sociodemographic characteristics (n=200)**

| Sociodemographic characteristics | Knowledge level on vaping n (%) | | Chi-square value ($\chi2$) | p-value |
|---|---|---|---|---|
| | Poor (0-4) | Good (5-8) | | |
| **Age** | | | | |
| 18-20 | 19 (33.3) | 38 (66.7) | 3.250 | 0.198 |
| 21-24 | 32 (25.6) | 93 (74.4) | | |
| 25 and above | 8 (44.4) | 10 (55.6) | | |
| | | | | |
| **Gender** | | | | |
| Male | 31 (30.7) | 70 (69.3) | 0.140 | 0.758 |
| Female | 28 (28.3) | 71 (71.7) | | |
| | | | | |
| **Major of study** | | | | |
| Health sciences | 15 (14.9) | 86 (85.1) | 21.052 | **<0.001*** |
| Non-health sciences | 44 (44.4) | 55 (55.6) | | |
| | | | | |
| **Year of study** | | | | |
| Year 1 | 14 (27.5) | 37 (72.5) | 2.209 | 0.537 |
| Year 2 | 14 (25.0) | 42 (75.0) | | |
| Year 3 | 13 (39.4) | 20 (60.6) | | |
| Year 4/Final Year | 18 (30.0) | 42 (70.0) | | |
| | | | | |
| **Conventional smoker** | | | | |
| Current | 17 (68.0) | 8 (32.0) | 32.137 | **<0.001*** |
| Former smoker | 11 (57.9) | 8 (42.1) | | |
| Never | 31 (19.9) | 125 (80.1) | | |

**\*Significance level at p < 0.05**

**Table 4.6** shows the frequency, percentage, chi square value and p-value for the association between knowledge level on vaping and sociodemographic characteristics. Among participants aged 18-20, 38 (66.7%) had good knowledge, while for those aged 21-24, the majority, 93 (74.4%), demonstrated good knowledge. For participants aged 25 and above, 10 (55.6%) had good knowledge. This result showed participants in the 21-24 age group displayed the highest knowledge level at 74.4%. However, since the p-value, 0.198, was greater than the tabulated value, 0.05, there was no statistically significant association between knowledge level on vaping and age groups, [$\chi2$ (2, n=200) = 3.250, p = 0.198].

In determining the association between the knowledge level on vaping and gender, the majority of male and female participants, constituting 70 (69.3%) and 71 (71.7%) respectively, exhibited good knowledge. This result indicated both male and female participants had similar knowledge levels on vaping and thus, there was no significant association between knowledge level and gender as p-value, 0.758 was more than tabulated value, [$\chi2$ (1, n=200) = 0.140, p = 0.758].

Majority of the participants from health sciences, 86 (85.1%) demonstrated good knowledge level regarding vaping. In contrast, only about half of the participants from non-health sciences, 55 (55.6%) possessed good knowledge. This finding highlighted a significant disparity in knowledge levels based on the participants'

major of study, with those in health sciences exhibiting significantly higher knowledge. Hence, there was a significant association between knowledge level and major of study as p-value, <0.001 was less than tabulated value, [$\chi^2$ (1, n=200) = 21.052, p < 0.001].

Across all years of study, the majority of the participants exhibited good knowledge levels on vaping, with the findings as follows: year 1, 37 (72.5%); year 2, 42 (75.0%); year 3, 20 (60.6%); and year 4/final year, 42 (70.0%). This uniformity in knowledge levels indicated that there was no statistically significant association between knowledge levels and the year of study, as p-value, 0.537, was more than tabulated value [$\chi^2$ (3, n=200) = 2.209, p = 0.537].

Among participants who were current and former smokers, only 8 (32.0%) and 8 (42.1%), demonstrated good knowledge level on vaping. In contrast, the majority of participants who had never smoked, 125 (80.1%) displayed good knowledge levels about vaping. These findings underscored a significant disparity, indicating that individuals who had never smoked possessed significantly better knowledge about vaping compared to current and former smokers. Therefore, since p-value, <0.001 was less than tabulated value, there was a statistically significant association between knowledge level and smoking status, [$\chi^2$ (2, n=200) = 32.137, p < 0.001].

Overall, among the five sociodemographic characteristics that were studied, only two, namely major of study and smoking status, exhibited a statistically significant association in knowledge level on vaping. As a result, the first null hypothesis ($H_01$), which posited 'no statistically significant association between knowledge level on vaping and sociodemographic characteristics (age, gender, major of study, year of study and smoking status) among undergraduate students in a private university in Kajang' was failed to be rejected.

## 4.3.5 ASSOCIATION BETWEEN PRACTICE ON VAPING AND THE SOCIODEMOGRAPHIC CHARACTERISTICS

This section answered the fourth research question, 'What is the association between practice on vaping and the sociodemographic characteristics (age, gender, major of study, year of study and smoking status) among undergraduate students in a private university in Kajang?'. Data were analysed using Chi-square test and presented in cross tabulation with frequency, percentage, Chi-square value and p-value.

**Table 4.7. Frequency, percentage, chi square value and p-value for the association between practice on vaping and sociodemographic characteristics (n=200)**

| Sociodemographic characteristics | Practice on vaping n (%) | | | Chi Square value ($\chi^2$)/FET | p-value |
|---|---|---|---|---|---|
| | Current | Former vaper | Never | | |
| **Age** | | | | | |
| 18-20 | 14 (24.6) | 1(1.8) | 42 (73.7) | 26.103 | **<0.001*** |
| 21-24 | 17 (13.6) | 18 (14.4) | 90 (72.0) | | |
| 25 and above | 11(61.1) | 2 (11.1) | 5 (27.8) | | |
| **Gender** | | | | | |
| Male | 29 (28.7) | 12 (11.9) | 60 (59.4) | 8.614 | **0.013*** |
| Female | 13 (13.1) | 9 (9.1) | 77 (77.8) | | |
| **Major of study** | | | | | |
| Health science | 6 (5.9) | 6 (5.9) | 89 (88.1) | 37.540 | **<0.001*** |
| Non-health sciences | 36 (36.4) | 15 (15.2) | 48 (48.5) | | |
| **Year of study** | | | | | |
| Year 1 | 8 (15.7) | 4 (7.8) | 39 (76.5) | 11.955 | 0.061 |
| Year 2 | 12 (21.4) | 3 (5.4) | 41 (73.2) | | |
| Year 3 | 11 (33.3) | 7 (21.2) | 15 (45.5) | | |
| Year 4/Final Year | 11 (18.3) | 7 (11.7) | 42 (70.0) | | |
| **Conventional smoker** | | | | | |
| Current | 15 (60.0) | 4 (16.0) | 6 (24.0) | 84.379 | **<0.001*** |
| Former smoker | 13 (68.4) | 6 (31.6) | 0 (0.0) | | |
| Never | 14 (9.0) | 11 (7.1) | 131 (84.0) | | |

**\*Significance level at p < 0.05**

Referring to **Table 4.7**, among participants aged 18-20, there were 14 (24.6%) current vapers, 1 (1.8%) former vaper, and 42 (73.7%) who had never vaped. Among participants aged 21-24, there were 17 (13.6%) current vapers, 18 (14.4%) former vapers, and the majority, 90 (72.0%), had never vaped. Conversely, the age group of 25 and above had the highest percentage of current vapers, with 11 (61.1%) individuals reporting vaping, while 2 (11.1%) were former vapers and the remaining had never vaped. To determine the association between practice on vaping and age group, Fisher's Exact test (FET) was performed as 22.2% of the cells had expected count less than 5. This result illustrated there was a statistically significant association between practice on

vaping and age group as the p-value, <0.001 was less than tabulated value, 0.05 [$\chi 2$/FET = 26.103, p < 0.001].

In terms of gender, among males, 29 (28.7%) were current vapers, 12 (11.9%) were former vapers, and more than half, 60 (59.4%) had never vaped. Among females, 13 (13.1%) were current vapers, 9 (9.1%) were former vapers, and the majority, 77 (77.8%) had never vaped. These findings clearly illustrated that male participants engage in vaping to a greater extent than females. The statistical analysis further confirmed the significance of this association, with a p-value of 0.013, which was less the tabulated value, [$\chi 2$ (2, n=200) = 8.614, p = 0.013].

Among participants from the health sciences, there were only 6 (5.9%) current vapers, along with another 6 (5.9%) who were former vapers, while the majority, 89 (88.1%), had never used vapes. Conversely, among participants from non-health sciences, 36 (36.4%) were current vapers, 15 (15.2%) were former vapers, and about half, 48 (48.5%), had never used vapes. These results showed participants from non-health sciences vape more than those from health sciences. Thus, there was a statistically significant association between practice on vaping and major of study, as the p-value, <0.001 was less than tabulated value, [$\chi 2$ (2, n=200) = 37.540, p < 0.001].

Participants in Year 3 had the highest percentage of current vapers, with 11 (33.3%), followed by Year 2 with 12 (21.4%), Year 4/final year with 11 (18.3%), and Year 1 with 8 (15.7%). However, since the p-value, 0.061 was greater than the tabulated value, there was no statistically significant association between practice on vaping and year of study, [$\chi2$ (6, n=200) =11.955, p = 0.061].

Among conventional smokers, the majority, comprising 15 (60.0%) participants admitted as current vapers, 4 (16.0%) as former vapers, and the remaining did not use vapes at all. Among former smokers, 13 (68.4%) participants were current vapers, and 6 (31.6%) were former vapers. As for never smokers, 14 (9.0%) were current vapers, and 11 (7.1%) were former vapers. Meanwhile, the study's largest group, consisting of 131 (84.0%) participants, had never smoked nor vaped. These results indicated that the majority of current and former smokers also engaged in vaping. Hence, to determine the association between practice on vaping and smoking status, Fisher's Exact test (FET) was used as 33.3% of the cells had expected count less than 5. The result demonstrated a statistically significant association between practice on vaping and smoking status as the p-value, <0.001 was less than tabulated value, [$\chi2$/FET = 84.379, p < 0.001].

In conclusion, four out of five sociodemographic characteristics (age, gender, major of study, smoking status) had statistically significant association in practice on vaping. Therefore, the second null hypothesis ($H_0 2$), 'no statistically significant association between practice on vaping and sociodemographic characteristics (age, gender, major of study, year of study and smoking status)' was rejected.

## 4.3.6 THE ASSOCIATION BETWEEN KNOWLEDGE LEVEL ON VAPING AND PRACTICE ON VAPING

The fifth research question, 'Is there any association between knowledge level and practice on vaping among undergraduate students in a private university in Kajang' was answered in this section. The results were presented in frequency, percentages, Chi-square value and p-value.

**Table 4.8. Frequency, percentages, chi square value and p value for association between knowledge level and practice on vaping (n=200)**

| Variables | Practice on Vaping n (%) | | | Chi-Square test ($\chi 2$) | p-value |
|---|---|---|---|---|---|
| | Current vaper | Former vaper | Never vaper | | |
| Knowledge level on vaping | | | | | |
| Poor (0-4) | 27 (45.8) | 4 (6.8) | 28 (47.5) | 30.949 | **<0.001\*** |
| Good (5-8) | 15 (10.6) | 17 (12.1) | 109 (77.3) | | |

**\*Significance level at p < 0.05**

Table 4.8 displayed the frequency, percentages, Chi-square value and p-value for association between knowledge and practice on vaping. The result indicated more than one quarter of participants had poor knowledge level on vaping, with 27 (45.8%) being current vapers, 4 (6.8%) former vapers, and the remaining being never vapers. In contrast, among participants with good knowledge, there

were 15 (10.6%) current vapers, 17 (12.1%) former vapers, and a majority of 109 (77.3%) who had never vaped. The result clearly indicated that the majority of participants with a good knowledge level on vaping were never vapers. This signifies that there was a statistically significant association between knowledge level and practice on vaping as the p value, <0.001 was lower than tabulated value, 0.05 [$\chi$2 (2, n=200) = 30.949, p < 0.001]. Thus, the third null hypothesis (H$_0$3), 'no statistically significant association between knowledge level and practice on vaping among undergraduate students in a private university in Kajang' was rejected.

## 4.4 SUMMARY

In accordance with the research questions, the study results have been discussed and presented in tables and figures. Overall, the results showed most of the participants in this university, 70.5% demonstrated good knowledge level on vaping, and the percentage of current vapers was 21.0%. Among the five sociodemographic characteristics analysed, only the major of study and smoking status displayed a statistically significant association in knowledge level on vaping. Furthermore, regarding vaping practices, four out of the five sociodemographic characteristics (age, gender, major of study, smoking status) exhibited statistically significant association. Lastly, findings demonstrated a statistically significant association between knowledge level and practice on vaping, as participants with good knowledge level were majority from never vape users.

# CHAPTER FIVE


# Discussion

**CHAPTER 5: DISCUSSION**

**5.0 CHAPTER OVERVIEW**

The main findings from preceding chapter will be discussed according to research objectives and it will be supported and compared with findings from previous studies. The discussion will begin with knowledge level on vaping, followed by practice on vaping, association between knowledge level on vaping and sociodemographic characteristics, association between practice on vaping and sociodemographic characteristics and lastly, the association between knowledge level and practice on vaping.

**5.1 DISCUSSION OF MAJOR FINDINGS (ACCORDING TO RESEARCH OBJECTIVES)**

**5.1.1 KNOWLEDGE LEVEL ON VAPING**

In this study, findings showed that the majority of the participants, 70.5%, demonstrated good knowledge level on vaping. The main knowledge they know about vaping was that it may contain nicotine, and the health risks associated such as lung cancer and cardiovascular problems. The results were in line with those of a cross-sectional survey done among 431 Malaysian youths, in which 287 (66.6%) participants reported having good knowledge of vaping as they were aware of nicotine's hazardous effects and that it has terrible impacts on one's health (Mohammed Faez Baobaid, et al., 2021). Similarly, in another study conducted among 183 undergraduate students in United States, the majority of participants correctly recognized that e-cigarettes raise the risk of lung and cardiovascular disease (McLeish, Hart and Walker, 2022).

One contributing factor to the increased knowledge level among participants in the current study may be the significant role played by the internet and social media in disseminating information nowadays. In recent times, vaping in Malaysia has garnered substantial media coverage and sparked internet debates, primarily due to its surging prevalence, especially among the youths (Jamalludin Ab Rahman, et al., 2019; Wee, et al., 2022). As of June 2023, the Ministry of Health Malaysia had received reports of 17 probable EVALI cases, as indicated by Sekaran (2023). This development likely heightened public awareness and concern about the topic, further enhancing the knowledge level among the study's participants.

However, current studies revealed a significant knowledge gap where half of the participants, 50.5% thought vaping prevents from smoking traditional cigarettes. Similar findings were discovered in research conducted in Qatar where 45.7% agreed vape products prevent one from smoking conventional cigarettes (Kurdi, et al., 2021). Kurdi, et al. (2021) further reported this may indicate that these percentage of students may resume using vape products or may even counsel friends who are still smokers to do so. In fact, many vaping products still include nicotine, which is a highly addictive substance (CDC, 2023). If a person begins using nicotine-containing e-liquids, they may continue to experience nicotine cravings, leading them to eventually end up using both vaping and traditional cigarettes to satisfy those desires (Jamalludin Ab Rahman, et al., 2019). Therefore, the possible reason participants in the current study answered this

question incorrectly may be due to exposure to false information from many sources, such as misleading advertisements, social media, or personal experiences, which caused them to assume that vaping prevents from smoking cigarettes (Wang, et al., 2020; Liu, et al., 2022).

In the present study, 41.0% of participants lacked knowledge in believing that vaping is a suitable alternative for smoking cessation. This finding aligns with Todkar, et al. (2022)'s research among 150 young adults in India, where 46.2% believed vaping assisted in quitting smoking. Similarly, a study by Mohammed Nasser Alhajj et al. (2022) involving 5697 undergraduate students across 20 dental universities in 11 nations revealed that 31.6% of participants thought e-cigarettes could aid in smoking cessation. Suprisingly, this may be due to vape marketers frequently promote that they are a safe and healthier alternative to traditional cigarettes and as a tool for helping smokers quit, however this claim is typically unsupported by scientific data (Sharifa Ezat Wan Puteh, et al., 2018; Wang, et al., 2020). The vape liquid contains harmful substances like nicotine, heavy metals like lead and nickel, volatile organic compounds, and carcinogenic substances that can increase the risk of cardiovascular and respiratory issues when inhaled (Traboulsi, et al., 2020; CDC, 2023). As a result, vaping is not a good alternative method to quitting smoking as to date, it has yet to be authorized by FDA (CDC, 2023). Therefore, participants in the present study might be influenced by these commercials' portrayal of vaping as a strategy to break free from smoking. These findings underscore the crucial need for the development

of educational programs such as health talks, webinars, and campaigns within the present university with the aim to rectify misconceptions about vaping and enhance students' awareness on the subject.

Conversely, a study conducted by Muhammad Faris Mahamad Sob, et al. (2022) among 309 undergraduate students in a local university in Malaysia revealed slightly more than half (62.1%) had poor level of knowledge in regard to e-cigarette and perceived vaping to be less harmful than tobacco smoking. Majority of them (85.1%) also claimed to have received extensive exposure to media marketing for e-cigarettes, which may have affected their perceptions towards vaping, leading to a poorer knowledge. However, participants in the current study had higher knowledge, may be as a result of the Ministry of Health Malaysia's recent increased use of social media to raise public awareness of the harmful effects of vaping (Sekaran, 2023). Additionally, the differences in the knowledge questionnaires used and the cutoff values applied in the previous and current studies could potentially be contributing factors to the varying results observed (Muhammad Faris Mahamad Sob, et al., 2022).

## 5.1.2 PRACTICE ON VAPING

Current study highlighted the percentage of current, former, and never vapers were 21.0%, 10.5% and 68.5%, respectively. Similar findings were found in a study conducted in University of Jordan where the prevalence of current e-cigarette smokers was 20% (AlMuhaissen, et al., 2022). In contrast, a separate study conducted by Sharifa Ezat Wan Puteh, et al. (2018) among 1302 university students in Malaysia unveiled a significantly higher vaping prevalence (74.9%). Congruently, Albgami, et al. (2023) reported a substantial vaping prevalence of 40.1% among 319 university students in Taif.

The disparities in vaping prevalence are potentially influenced by the degree of enforcement of policies within each university (AlMuhaissen, et al., 2022). In the present university, vaping on campus is strictly prohibited as outlined in the Student Code of Conduct (Universiti Tunku Abdul Rahman, 2022). Those found vaping could face disciplinary measures for violating these rules. As a result, the percentage of current vapers at the present university was notably lower in comparison to earlier studies (Sharifa Ezat Wan Puteh, et al., 2018; Albgami, et al., 2023). Besides, the difference in the vaping prevalence could potentially be attributed to the extent of the research setting. Likewise, one of the previous studies encompassed six universities situated in the Klang Valley, whereas the current study focused solely on a single university (Sharifa Ezat Wan Puteh, et al., 2018).

Among the current vapers (n=42) at the present university, the majority (54.8%) started vaping between ages 18 and 20, consistent with findings in a study of Malaysian youths (80.6% initiated after age 18) and a Qatar University study (mean age of initiation 20.37 ± 8.2) (Kurdi, et al., 2021; Mohammed Faez Baobaid, et al., 2021). This may be justified by the transitioning to college during these phases can prompt vaping initiation due to peer pressure, curiosity, increased stress levels, and the desire to fit in with a new social circle (Tamulevicius, et al., 2020; Groom, et al., 2021).

Among current vapers, 64.3% confirmed using nicotine-contained devices, aligning with a previous study conducted by Wamamili, et al. (2020) where 70.2% of vapers also used such devices. The most prevalent reason why youths use nicotine-containing vape devices is attributed to nicotine's capacity to deliver mild-stress relieving effects, hence participants may be using it to unwind stress (Donaldson, et al., 2022). Another possible factor may be participants who are addicted to nicotine from tobacco smoking may use nicotine e-liquids as a method of smoking cessation to satisfy their cravings (Tamulevicius, et al., 2020). Nonetheless, the present findings revealed that 31.0% of vapers were uncertain about the presence of nicotine in their vaping device. This underscores the importance of improving awareness about risk associated with vaping, including its nicotine content.

Among current vapers, 31.0% have been using vaping devices for 1 to 2 years, while 23.8% have exceeded 2 years of use. These findings aligned with a previous study where 24% of current vapers had been vaping for 1 to 3 years (Action on Smoking and Health (ASH), 2022). This suggests that a significant portion of current vapers have adopted vaping as a lasting habit, rather than a short-term experiment, indicating the need for educational campaigns to raise awareness among users about the risks of prolonged vaping.

In the context of vaping frequency, 47.6% of the current vapers reported daily vaping in the past 30 days. This result was inconsistent with previous research conducted among 240 university students in the United Arab Emirates, where daily vaping was lower at 23.9% (Abbasi, et al., 2022). The difference in frequency of daily usage may be due variations in cultural and social norms between the study populations.

As for flavour preferences, the majority of current vapers (57.1%) showed a preference for fruit flavours, making it the most popular choice among them, aligning with research conducted in Texas and US (Harrell, et al., 2017; Landry, et al., 2019). Further investigation is needed to determine how fruit flavours may impact participants' decisions to start vaping.

Almost half of current vapers, 47.6%, indicated that they vape during social situations. Additionally, 51.2% of vapers refrained from vaping on campus while 43.9% chose to vape outdoors, which concurs with findings from a previous research conducted by Kurdi, et al. (2021) among 199 university students in Qatar. This signifies that the existence of university policies and guidelines aids in preventing students from vaping on campus, as demonstrated by the results of the presence study.

### 5.1.3 ASSOCIATION BETWEEN KNOWLEDGE LEVEL ON VAPING AND THE SOCIODEMOGRAPHIC CHARACTERISTICS

Current study demonstrated no statistically significant association between knowledge level on vaping and the sociodemographic characteristics (age, gender, year of study), except for major of study and smoking status.

A study of 484 Malaysian undergraduates and another study of 853 US health professional undergraduates both found no significant association between age and knowledge about electronic cigarettes (Franks, et al., 2017; Nuurain Amirah MR, et al., 2021). The current study, in line with these findings, also showed no statistically significant association in vaping knowledge across age groups, despite the fact that those aged 21-24 having the highest knowledge level at 74.4%. This might be attributed to skewed age distribution whereby majority of

participants (n=125) fell within the 21-24 age range, while the other age groups were less represented.

Current study revealed the majority of both male and female participants, comprising 70 (69.3%) and 71 (71.7%) respectively, demonstrated good knowledge levels, suggesting a similarity in vaping knowledge between the two groups. This result was supported by a study conducted in the Philippines, which demonstrated that knowledge level among university students of both sexes were similar (Palmes, Trajera and Sajnani, 2021). However, an Egyptian study revealed a significant gender gap in e-cigarette knowledge, with male university students having higher understanding (Kabbash et al., 2022). This contrasting result might be linked to societal stigmas surrounding women's smoking in Eastern and Muslim cultures, limiting open discussions and information-seeking (Eiad Habib et al., 2020; Kabbash et al., 2022). It's worth noting that while the current study was conducted in a Muslim country, the majority ethnic group within the private university is Chinese, which may help explain why females exhibited similar knowledge levels to males.

Current study revealed participants from health sciences (85.1%) had higher knowledge level on vaping than non-health sciences (55.6%) and this association was statistically significant (p < 0.001). The health sciences faculty included MKFMHS, while non-health sciences included LKCFES, FAM and FCI.

Similarly, a study of 1259 university students in Jordan revealed that medical students possessed significantly better knowledge about e-cigarettes than their non-medical counterparts (Al-Sawalha, et al., 2021). Another study among US university students found that students in non-health majors perceived e-cigarettes as less harmful than their peers majoring in health-related fields (Centner, 2021). These findings suggested that health sciences students are exposed to health-related subjects, which equipped them with deeper understanding of the potential risks and complications associated with vaping (Al-Sawalha, et al., 2021; Centner, 2021). The in-depth focus of health-oriented curricula gives students in this field an advantage in understanding vaping-related health issues, emphasizing the importance of education and curriculum design. As for students from non-health sciences, further educational programs like health talks can be beneficial to improve their overall knowledge on vape-related health issues.

Knowledge level on vaping was consistently uniform across all years of study, with no significant association observed in the present study. This finding was similar to previous study conducted in the US among 256 university students which found no significant knowledge score difference between third- and fourth-year students (Ibrahim Alfayoumi, Aqel and Axon, 2022). Another US study by McLeish, Hart, and Walker (2022) with 1642 students similarly showed no year-based association in vaping knowledge. This may be due to knowledge on vaping can be highly influenced by other factors such as formal schooling,

exposure to media, peer interactions and individual research efforts (Chudech and Janmaimool, 2021). Thus, the interaction of these factors might result in an absence of a significant association between knowledge and year of study.

Present findings revealed participants who had never smoked, 80.1% possessed significantly better knowledge about vaping compared to current (32.0%) and former smokers (42.1%). Consistent results emerged from both a study of 333 Saudi Arabian university students and global research encompassing 5697 undergraduates across 11 countries. In these studies, smokers demonstrated lower knowledge regarding vaping, perceiving it as safe and lacking awareness of its harmful substances, while never smokers exhibited higher knowledge levels (Mohammed Nasser Alhajj, et al., 2022; Alsanea, et al., 2022). The potential contributing factor could be that smokers might hold misconceptions about vaping due to misleading advertisements that often portray vaping as safer and less addictive, thus potentially influencing their understanding of vaping (Vasconcelos and Gilbert, 2019). Hence, these results emphasize the importance of accurate information dissemination for smokers who might consider vaping as a harm reduction strategy to ensure they have the correct understanding of the risks associated with vape.

## 5.1.4 ASSOCIATION BETWEEN PRACTICE ON VAPING AND THE SOCIODEMOGRAPHIC CHARACTERISTICS

Current study demonstrated a statistically significant association between practice on vaping and the sociodemographic characteristics (age, gender, major of study, smoking status) except for year of study.

In the present study, results revealed a statistically significant association between practice on vaping and age ($p < 0.001$) whereby the percentage of current vaping was highest among participants aged 25 and above (61.1%). This finding was similar to studies conducted in both Malaysia and Australia/New Zealand in which exclusive vaping was more prevalent among students aged 25 and older as opposed to those under 25 (Wamamili, et al., 2021; Driezen, et al., 2022). These findings may be influenced by external factors, such as household income and predominantly, the motivations for vaping. It was reported that older students (aged 25 and above) were more inclined to use e-cigarettes as a quitting aid, potentially explaining the higher prevalence of vaping in this demographic (Driezen, et al., 2022).

Present study revealed male participants engage in vaping to a greater extent than females (28.7% vs. 13.1%) and this association was statistically significant. This observation was consistent with previous studies that revealed a significant association between gender and vaping, with female university students exhibiting a lower tendency to vape in contrast to males (Lee and Oh, 2019;

Chudech and Janmaimool, 2021; Wamamili, et al., 2021; Aizat Helmi Ali, et al., 2022; Alduraywish, et al., 2023). The gender-based variation observed may be attributed to several factors. Males are more likely to associate with friends who vape or use traditional cigarettes and hold stronger beliefs in the potential of vaping to assist in smoking cessation (Wamamili, et al., 2021; Aizat Helmi Ali, et al., 2022). Conversely, women generally prioritize their health and are more motivated to lead healthier lives, which might discourage them from vaping (Bärebring, et al., 2020).

The present study revealed participants from non-health sciences exhibited higher vaping practice than those in health sciences (36.4% vs. 5.9%), this association was statistically significant. Similarly, studies conducted among university students in northern Thailand and the United States demonstrated that students pursuing non-health-related majors were significantly more inclined to use e-cigarettes compared to their peers in health-related courses (Centner, 2021; Phetphum, et al., 2021). These consistent findings may be attributed to the fact that students pursuing non-health-related majors might have less exposure to information and awareness regarding the potential risks and negative health impacts associated with the use of e-cigarettes (Phetphum, et al., 2021). In contrast, students in health-related fields often receive education and training that increases their awareness of these health risks, which could lead to a lower inclination to vape as they may prioritize their health and well-being (Centner, 2021; Song, et al., 2023).

The highest percentage of current vaping was observed among participants in Year 3 (33.3%). This finding was in aligned with the outcomes of previous cross-sectional studies carried out by Acosta (2022) and Aizat Helmi Ali, et al. (2022), where vaping prevalence among Year 3 university students surpassed that of other academic levels, with reporting rates of 55.0% and 18.6%, respectively. However, despite these trends, the present study's analysis found no statistically significant association between vaping practices and the participants' year of study, which was similarly reported in a study conducted by Abdullah Almutham, et al. (2019).

The results of the present study demonstrated a significantly higher percentage of vaping among current and former smokers, with engagement rates of 60.0% and 68.4%, respectively, in contrast to individuals who have never smoked (9.0%). This finding was in aligned with previous studies conducted among university students, which consistently showed that conventional smoking status was significantly associated with e-cigarette usage (Wang, et al., 2020; AlMuhaissen, et al., 2022; Le, et al., 2022). This may be due to e-cigarette industry often markets its products as tools for quitting smoking or as a less harmful option (Wang, et al., 2020). As a result, people who are accustomed to smoking regular cigarettes might turn to e-cigarettes as a means to reduce their consumption of traditional tobacco products as they believe that vaping carries fewer health risks (Wang, et al., 2020; Le, et al., 2022). Thus, this may possibly explain the high percentage of vapers among current and former smokers in the present study, which underscore the need for comprehensive health education

about the potential risks of e-cigarettes to help smokers make informed choices about their tobacco consumption.

## 5.1.5 THE ASSOCIATION BETWEEN KNOWLEDGE LEVEL AND PRACTICE ON VAPING

Current study revealed that there was a statistically significant association between knowledge level and practice on vaping (p < 0.001) whereby participants with good knowledge level on vaping were majority never vapers (77.3%). This finding was consistently found in previous studies conducted in Malaysia, Jordan, Thailand and Vietnam as university students with higher knowledge score had lower practice on vaping (Al-Sawalha, et al., 2021; Chudech and Janmaimool, 2021; Nuurain Amirah MR, et al., 2021;Le, et al., 2022).

Students with insufficient knowledge about vaping may underestimate its potential risks and long-term health consequences, perceiving it as less harmful to their health (Al-Sawalha, et al., 2021; Le, et al., 2022). Additionally, the rise in vape advertising that often portrays vaping as trendy, safe and less addictive contributes to misconceptions about the risks associated with its use, ultimately encouraging students to initiate its use (Chudech and Janmaimool, 2021).

Conversely, students with good knowledge on vaping are more resistant to its allure, as they are equipped with the information needed for informed decision-making and are less susceptible to the vaping industry's deceptive messaging (Le, et al., 2022). Therefore, this highlights the importance of comprehensive education about the risks associated with vaping to counter the influence of misleading advertising and misconceptions, ultimately helping students make informed choices about their health and substance use.

## 5.2 SUMMARY

The main findings from the preceding Chapter 4 which consist of knowledge level on vaping, practice on vaping, association between knowledge level on vaping and sociodemographic characteristics, association between practice on vaping and sociodemographic characteristics and last but not least, the association between knowledge level and practice on vaping were discussed accordingly and supported with previous studies.

# CHAPTER SIX


# Conclusion

**CHAPTER 6: CONCLUSION**

**6.0 CHAPTER OVERVIEW**

This chapter will focus on discussing the strengths and limitations of study to acknowledge the study's findings and identify opportunities for improvement, followed by the implications and recommendations to enhance future research and practice. The chapter will then conclude with a concise summary.

**6.1 STRENGTHS & LIMITATION**

**6.1.1 STRENGTHS**

The increasing prevalence of E-cigarette use in recent years, as highlighted by the CDC (2023), emphasizes the urgent need to address this public health concern. One of this study's strengths is its potential to raise awareness among students at this private university, promoting collaborative efforts to combat vaping among them. Thereby, this research significantly contributes to addressing the critical issue of E-cigarette use.

Another strength of this study is that a satisfactory response rate (100%) was successfully attained in alignment with the calculated sample size (n=200). Achieving high response rates is a crucial characteristic of a robust research study because it contributes to the production of valid, consistent and generalizable findings in surveys and ensures that the study sample represents the target population (Booker, Austin and Balasubramanian, 2021).

The utilization of a face-to-face approach for questionnaire distribution to participants yielded several strengths, such as heightened level of control over the data collection process, resulting in higher data quality and reliability (Braekman, et al., 2022). Additionally, it allowed the immediate resolution of any confusion or doubts experienced by participants, thus enhancing the accuracy of the responses provided.

Another strength of this study lies in its utilization of proportional quota sampling as the chosen sampling method. The sample obtained exhibited a greater generalizability as compared to a sample acquired through convenience sampling because it ensured an equal representation of each subgroup of the population based on selected characteristics, namely gender and faculty (Iliyasu and Etikan, 2021). Thereby, this enhances the ability to draw meaningful conclusions about the entire population of the study setting.

In addition, this study offers an additional benefit in terms of efficiency and simplicity during data collection as convenience sampling was utilized to recruit participants for each quota, which was less complex compared to other sampling techniques (Sarstedt, et al., 2018; Mansor H. Ibrahim, 2022).

Prior to commencing actual data collection, the current study underwent a pilot testing phase, involving 20 participants, to validate the consistency and feasibility of the research instrument. Simultaneously, a test-retest reliability assessment was conducted, yielding an Intraclass Correlation Coefficient (ICC) value of 0.761, which indicates good reliability (Koo and Li, 2016; Mohajan, 2017; Bobak, Barr and O'Malley, 2018). Additionally, to prevent data duplication, participants from the pilot study were excluded from the actual data collection, and prior to data analysis in SPSS version 27, all questionnaires were meticulously coded.

## 6.1.2 LIMITATION

One limitation of this study is the possibility of recall and social desirability bias due to the use of a self-administered questionnaire. Recall bias may arise when participants fail to recall or report their past behaviours or experiences, such as their initiation age and frequency of vape usage (Jager et al., 2020). Meanwhile social desirability bias, where participants tend to provide responses aligning with societal norms rather than truthful information, was a concern in this study, given the stigma associated with vaping and smoking due to health risks and social disapproval (Latkin, et al., 2017). Thus, some participants may have hesitated to admit their involvement in these behaviours due to fear of judgment, potentially resulting in underreported vaping and smoking status. To address this, the researcher had provided all participants with assurance that their

confidentiality and anonymity would be strictly maintained, aiming to promote honest self-disclosure.

As random sampling was not implemented, a certain level of selection bias was likely to exist, as convenience sampling often results in researchers selecting participants who are easily accessible (Iliyasu and Etikan, 2021).Nevertheless, the researcher had a specific rationale for not opting for stratified random sampling, primarily due to unable to access the necessary sampling frame within the university, which is a prerequisite for conducting random sampling.

Besides, the study was carried out exclusively within a single university with a small sample size, which means that the results may not be applicable or generalized to students from other universities in Malaysia.

Limited variables were included in the current study. To overcome this, factors like household income, peer influences and accessibility to vaping products should be  incorporated into the study as it could potentially have an impact on the vape practices  (Groom, et al., 2021; AlMuhaissen, et al., 2022; Mohammed Nasser Alhajj, et al., 2022).

**6.2 IMPLICATION & RECOMMENDATION**

**6.2.1 IMPLICATION**

Present research conducted has provided valuable baseline data into the current knowledge levels and vaping practices among undergraduate students in this private university. The findings of this study could serve as a basis for developing initiatives aimed at discouraging vaping habits among young adults, particularly university students.

The results suggested that there was a significant knowledge gap regarding the effectiveness of vaping as a smoking cessation tool and that it prevents from smoking traditional cigarettes. Concurrently, students' knowledge levels were found to have significant association with vaping practices. These findings emphasize the importance of implementing education programs, like health talks, webinars, and campaigns to educate university students about the limitations and risks of using vaping as a smoking cessation method (Aizat Helmi Ali, et al., 2022).

Findings show that most participants were aware of vaping's health risks. Therefore, it is essential for the relevant authorities to continue promoting public health awareness for young adults to promote informed choices, correct misconceptions, and prevent vaping initiation, ultimately safeguarding their

health and reducing vaping-related issues in the population (MacMonegle, et al., 2022).

The percentage of current vapers, 21.0% among students in present study emphasizes the crucial need for the Malaysian government to impose stricter regulations on the accessibility and promotion of vaping products. Presently, there are no laws governing its sale and advertising of vape products (Boo, 2023; Lo, 2023). Unrestricted sale and unregulated advertising messages from vape manufacturers, such as portraying vaping as safer and less addictive can contribute to misconceptions about these products, ultimately encourage vape initiation (Chudech and Janmaimool, 2021).

Present study revealed 51.2% of vape users do not vape on campus, while 43.9% choose to vape outdoors. This could be due to strict university regulations prohibiting vaping on campus (Universiti Tunku Abdul Rahman, 2022). Thus, the implementation of tobacco-free campus policies, which include e-cigarettes, can serve as a model for other universities to deal with vaping issues on their campuses (Cofer, et al., 2021).

### 6.2.2 RECOMMENDATION

### 6.2.2.1 RESEARCH

Recommendation for future research is to include attitude aspect in the study, other than knowledge and practice. This inclusion will provide deeper insights into the underlying motivations and perceptions that influence students' vaping practices, such as whether it's for stress relief, social acceptance or other reasons (AlMuhaissen, et al., 2022; Mohammed Nasser Alhajj, et al., 2022). By doing so, this can establish a more comprehensive understanding of students' vaping habits, connecting the dots between their knowledge, practice, and the reasons behind their choices.

In addition, future research can conduct longitudinal study to track of participants' health outcomes, including respiratory function, cardiovascular health, and cancer incidence in connection with their vaping practices over time, thereby providing critical insights into the long-term health effects.

Future studies can consider exploring the impact of nicotine addiction from vaping on university students' academic performance and mental health. This exploration can shed light on the academic challenges faced by students who engage in vaping, ultimately aiding in the development of targeted support interventions to enhance their mental well-being (Janjua, Kreski and Keyes, 2023).

A broader range of sociodemographic variables such as household income, peer influences, and accessibility to vaping products can be incorporated into future research. Previous studies have found household income to significantly impact vaping practices, while peer influences and access to vaping products, including availability and pricing, also play pivotal roles (Groom, et al., 2021; AlMuhaissen, et al., 2022; Mohammed Nasser Alhajj, et al., 2022). Thus, integrating these variables into future studies will yield a more holistic comprehension of their influence on students' knowledge and practice on vaping.

The scope of research shall be expanded in future studies by involving multiple universities across different regions of Malaysia and increasing the sample size. This strategy aims to enhance the generalizability of research findings, ensuring that they accurately reflect the diverse population of university students in Malaysia and thereby increasing their applicability and relevance in a broader context (Aizat Helmi Ali, et al., 2022).

Stratified random sampling can be implemented in future studies to minimize selection bias by ensuring each individual in the large population has an equal chance to be selected, thereby yielding a more robust representation of the population (Iliyasu and Etikan, 2021).

**6.2.2.2 PRACTICE**

Recommendation for future practice is to develop alternative approaches aimed at enhancing students' awareness on vaping with the intention of reducing its overall use of it. One such approach could involve the university organizing health education talks, webinars, or awareness campaigns focused on vaping-related topics such as risks of prolonged vaping, including nicotine addiction. These educational initiatives shall target students from non-health sciences, who are current smokers and vapers as they exhibited significantly lower knowledge level as compared to their counterparts.

Inviting experts such as healthcare professionals, researchers, and addiction specialists to lead these sessions provides credibility to the information presented. It ensures that students receive evidence-based guidance and a deeper understanding of vaping's risks and consequences (Aizat Helmi Ali, et al., 2022; Fang et al., 2022). Importantly, it shall clarify the misconceptions that vaping is not a suitable smoking cessation tool and does not deter individuals from smoking cigarettes, especially given that approximately half of the study participants lacked knowledge in this domain.

Additionally, the university may consider providing support services for students who wish to quit vaping or smoking, including those dealing with nicotine addiction. These services could encompass counselling and access to smoking cessation resources offered by local health care providers like trained nurses. By

doing so, the university can create a more supportive environment for students striving to overcome vaping or smoking habits, fostering a healthier campus community (Cofer, et al., 2021).

## 6.3 CONCLUSION

In conclusion, the objective of this study was successfully achieved, which was to determine the knowledge level and practice on vaping among undergraduate students in a private university in Kajang. The findings revealed that 70.5% of participants had good knowledge level on vaping. They were primarily aware that vaping contains nicotine and is linked to health risks like cardiovascular problems and lung cancer. However, around half of the participants lacked knowledge about vaping's effectiveness in preventing people from smoking traditional cigarettes and serving as a smoking cessation alternative.

Regarding vaping practices, the study found that 21.0% of participants were current vapers. It also revealed statistically significant associations between vaping knowledge and major of study as well as smoking status. Health sciences students and never smokers demonstrated higher vaping knowledge levels. Additionally, vaping practices were significantly associated with age, gender, major of study, and smoking status. Participants aged 25 and above, males, non-health sciences students, and both current and former smokers had higher percentage of current vaping. There was also a significant association between vaping knowledge and practice, with the majority of those with good vaping knowledge were never vapers (77.3%).

These findings underscore the importance of the university conducting educational talks and awareness programs to address vaping misconceptions. These efforts should be tailored to students from non-health sciences, current smokers, and vapers, with the goal of improving their knowledge and reducing vaping among university students.

This study had several limitations such as recall/social desirability biases, selection bias, a small single-university sample, and limited variables. For future research, it is recommended to include attitude aspect, conduct longitudinal studies on vapers' health outcomes, explore nicotine addiction's effects on students' academic and mental health, and incorporate a broader range of sociodemographic variables.

(Word Count: 10897)

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**APPENDICES**

**APPENDIX A: CONSENT DECLARATION FORM**

<u>**PARTICIPANT CONSENT FORM**</u>

Research title: Knowledge and Practice on Vaping Among Undergraduate Students in a Private University in Kajang.

- I confirm that I have read and understand the information and cover letter of recruitment explaining the above research.

- I confirm that the purpose of the research, risk and benefits have been explained to me.

- I understand my participation is strictly voluntary and I am free to withdraw at any time without consequence.

- I understand my identity will be maintained anonymous and my responses will be kept private and confidential.

- I understand I am entitled to ask questions and to receive information and feedback for educational purpose after the study.

- I agree the data collected from me will be used in future research.

- I permit members of the research team to access my responses.

- I hereby give my consent to participate in the above research.

Signature of the Participant,                          Signature of Researcher,

.......................................                          .......................................

Name:                                                    Name:

NRIC No:                                                 NRIC No:

Date:                                                    Date:

# APPENDIX B: RESEARCH INSTRUMENT

This questionnaire consists of three sections. Section A: Sociodemographic Data, Section B: Knowledge on Vaping and Section C: Practice on Vaping.

**SECTION A: SOCIODEMOGRAPHIC DATA**

**You are required to answer ALL the questions**

1.1 Age (Years old)

☐ 18-20

☐ 21-24

☐ 25 and above

1.2 Gender

☐ Male

☐ Female

1.3 Faculty

☐ Lee Kong Chian Faculty of Engineering and Science (LKCFES)

☐ Faculty of Accountancy and Management (FAM)

☐ M. Kandiah Faculty of Medicine and Health Sciences (MKFMHS)

☐ Faculty of Creative Industries (FCI)

1.4 Year of study

☐ Year 1

☐ Year 2

☐ Year 3

☐ Year 4/Final Year

1.5 Are you a conventional smoker?

☐ Current

☐ Former smoker

☐ Never

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## SECTION B: KNOWLEDGE ON VAPING

**Please put (/) in the box that best describes your response toward vaping.**

| No | Items of questions | Yes | No | Do not know |
|----|-------------------|-----|-----|-------------|
| 2.1 | Vape products may contain nicotine. | | | |
| 2.2 | Vaping is less addictive than cigarettes. | | | |
| 2.3 | Vaping is less damaging to health than traditional smoking cigarettes. | | | |
| 2.4 | Vape products do not contain carcinogenic ingredients. | | | |
| 2.5 | Vaping can increase risk of lung cancer. | | | |
| 2.6 | Vaping can increase risk of cardiovascular problems. | | | |
| 2.7 | Vaping is a good alternative for smoking cessation. | | | |
| 2.8 | Vaping prevents from smoking traditional cigarettes. | | | |

**SECTION C: PRACTICE ON VAPING**

3.1 Are you a vaper?

☐    Current

☐    Former vaper

☐    Never

*Questions below designated for current vaper. Please skip the questions if you are not a current vaper.*

3.2 How old were you when you first tried vaping?

☐    Less than 18 years

☐    18 to 20 years

☐    21 to 24 years

☐    25 years and above

3.3 Does the vaping device that you use most often contain nicotine?

☐    Yes

☐    No

☐    Do not know

3.4 For how long have you been using vaping device?

☐    less than 1 month

☐    1 to 3 months

☐    4 to 11 months

☐    1 to 2 years

☐    more than 2 years

3.5 During the past 30 days, how many day (s) did you vape?

☐ Daily

☐ Twice a week

☐ Once per week

☐ Biweekly

☐ Once a month

3.6 What flavour [do/did] you use most when vaping/using a vaping device?

☐ Tobacco

☐ Menthol or mint

☐ Fruit

☐ No flavour

☐ Others _____ (state the flavour)

3.7 Timing of using vape

☐ During university hours

☐ During social situations

☐ During stressful situations

☐ Others _____ (state the timing)

3.8 Place of vaping on campus

☐ Indoor

☐ Outdoor

☐ Both indoors and outdoors

☐ Do not use in campus

# Permission to use research questionnaire

### Request Permission to use of Research Questionnaire Tool ⊅

**SIA CHEE YAN** <siacheeyan@1utar.my>
to hanan.arahim@qu.edu.qa, Sheela, bcc: SHI, bcc: SIN, bcc: NEYLLYNIAH ▾

Fri, Nov 25, 4:13 PM ☆ ↩ ⋮

Dear Madam,

I am Sia Chee Yan, a year 4 student studying Bachelor of Nursing (Honours) in Universiti Tunku Abdul Rahman, Malaysia. Currently I am doing my final year research titled 'Knowledge and Practice on Vaping among Undergraduate Students in a Private University'.

I came across your research paper, *"Prevalence, Risk Factors, Harm Perception, and Attitudes Toward E-cigarette Use Among University Students in Qatar: A Cross-Sectional Study"*, and I am interested to adapt and modify the questionnaire, Knowledge, Attitude and Practice on e-cigarette use to suit my study setting. Thus, I am writing this email to request your permission to use the questionnaire in my study.

Thank you in advance for your kind understanding and cooperation.

Yours sincerely,
Sia Chee Yan
Nursing Student

### Request Permission to use of Research Questionnaire Tool ⊅

**SIA CHEE YAN** <siacheeyan@1utar.my>
to rmmizanur ▾

9:56 PM (0 minutes ago) ☆ ↩ ⋮

Dear Sir,

I am Sia Chee Yan, a year 4 student studying Bachelor of Nursing (Honours) in Universiti Tunku Abdul Rahman, Malaysia. Currently I am doing my final year research titled 'Knowledge and Practice on Vaping among Undergraduate Students in a Private University'.

I came across your research paper, *"Factors associated with knowledge, attitude and practice of e-cigarette among adult population in Kuching district, Sarawak, Malaysia"*, and I am interested in adapting and modifying the questionnaire, *knowledge assessment of e-cigarettes* uses to suit my study setting. Thus, I am writing this email to request your permission to use the questionnaire in my study.

Thank you in advance for your kind understanding and cooperation.

Yours sincerely,
Sia Chee Yan

### CDC-INFO: Re: Request Permission to use GATS, GYTS AND NYTS Questionnaire Tool [External] ⊅ Inbox ×

**DoNotRespond@cdc.gov**
to me ▾

Tue, Nov 15, 10:43 AM ☆ ↩ ⋮

Thank you for your submission to CDC-INFO. **If you are a healthcare provider with an urgent question, please call 800-CDC-INFO (800-232-4636) or TTY 888-232-6348 for timely assistance.**

If you need help finding a COVID-19 vaccine provider near you, please visit the Vaccines.gov website. You can also text your zip code to 438829 (English), 822862 (Spanish) or call 1-800-232-0233 (TTY: 888-720-7489) for assistance.

- How to find a COVID-19 vaccine near you
- Frequently asked questions and answers (FAQs) about COVID-19 vaccination
- COVID-19 vaccine information for you and your family
- General FAQs about COVID-19
- FAQs for business and workplace setting
- Information for healthcare professionals
- Travel guidance
- Helpful tips on how to prevent getting sick and more.

# Content validity

**S**  **siacheeyan** <siacheeyan@1utar.my>  Tue, Jun 20, 9:13 AM  ⭐  ↩  ⋮

to retneswari, hamidah ▾

Dear Prof. Dr Retneswari,

Good day. I am Sia Chee Yan, a Year 4 UTAR Nursing student. Currently, I am conducting a final year project on "***Knowledge and Practice on Vaping Among Undergraduate Students in a Private University in Kajang***".

Hereby, I would like to request your acceptance to be a tool valuator and provide expert opinions for the accuracy, appropriateness, relevancy, and suggestions of the tool or modifications if needed.

The formal request letter with the summary of my research proposal and questionnaire is attached below. Please kindly review and thank you for your valuable time.

Thank you.

Regards,
Sia Chee Yan

---

**R**  **Retneswari a/p S. Masilamani** <retneswari@utar.edu.my>  Sun, Jun 25, 10:44 AM  ☆  ↩

to me, hamidah ▾

Dear Sia Chee Yan,

Thanks for the opportunity to check the validity of the questionnaire. The questionnaire is fine. Pls check out my comments and tracking suggestions I have given.
I have taken the liberty to also comment on the summary of your proposal as I felt better that you are clear on those comments I have made. Otherwise you will be stuck during the analysis. Eg the objective 3 and 4. Probably it is not worded properly or you are doing an association statistical test.
All the best.
Warm regards,
Retneswari. M

_____

Prof Dr. Retneswari Masilamani. MMC Reg: 24520

MBBS (Madras), M.Med- Occ Med (NUS), PhD (UM), FAOEMM, FPHMM, FFOM-RCP (Ire), FAMM, FRCP (Ire), CMIA (NIOSH).

Clinical Professor of Occupational and Community Medicine.

Department of Population Medicine.

MK Faculty of Medicine and Health Sciences

Universiti Tunku Abdul Rahman (UTAR)

Bandar Sg Long, Cheras, 43000 Kajang.

SIA CHEE YAN <siacheeyan@1utar.my>　　　　　　　　　　　　🔗 Jun 12, 2023, 4:02 PM　⭐　↩　⋮
to Thavamalar, hamidah ▾

Dear Dr Thavamalar,

Good day. I am Sia Chee Yan, a Year 4 UTAR Nursing student. Currently, I am conducting a final year project on "***Knowledge and Practice on Vaping Among Undergraduate Students in a Private University in Kajang***".

Hereby, I would like to request your acceptance to be a tool valuator and provide expert opinions for the accuracy, appropriateness, relevancy, and suggestions of the tool or modifications if needed.

The formal request letter with the summary of my research proposal and questionnaire is attached below. Please kindly review and thank you for your valuable time.

Thank you.

Regards,
Sia Chee Yan
Bachelor of Nursing (Hons)
M. Kandiah Faculty of Medicine and Health Sciences
Universiti Tunku Abdul Rahman
Sungai Long Campus

---

**T**　**Thavamalar a/p Paramasivam** <thavamalarp@utar.edu.my>　　　　　　Mon, Jun 19, 4:31 PM
　　to me, hamidah ▾

Dear Chee yan,
It looks ok.
No other suggestion.

Regards,
Dr. Thavamalar Paramasivam,
Assistant Professor,
Department of Nursing,
M. Kandiah Faculty of Medicine and Health Sciences.

# APPENDIX C: COVER LETTER OF RECRUITMENT

**Knowledge and Practice on Vaping Among Undergraduate Students in a Private University in Kajang.**

Dear Participants,

I am Sia Chee Yan, a final year student currently pursuing Bachelor of Nursing (Honours) from Universiti Tunku Abdul Rahman (UTAR), Sungai Long Campus. I would like to invite you to participate in my research study titled "Knowledge and Practice on Vaping Among Undergraduate Students in a Private University in Kajang". The study will take about 5-10 minutes.

The purpose of the study is to determine the knowledge and practice on vaping among university undergraduate students. This study can help to facilitate comprehensive vaping control strategies such as health education talks and awareness campaigns among youths to ensure each individuals have a good knowledge on the health risks associated with vape to reduce or prevent the overall use of it.

Any undergraduate students who are 18 years old and above who are willing to participate in the study voluntarily are eligible for this study. You may choose to withdraw at any time. Questionnaires are completely anonymous, and data collected will be kept private and confidentially. We urge you to complete the questionnaire alone.

If you need further explanation regarding the research, you may contact the researcher,
Ms Sia Chee Yan at siacheeyan@1utar.my
Or research supervisor,
Prof. Dr. Hamidah Hassan at hamidah@utar.edu.my

Thank you very much for participating in this survey. Your participation is greatly appreciated.

Yours sincerely,

*Sia Chee Yan*

.........................

SIA CHEE YAN

# APPENDIX D: ETHICAL CLEARANCE APPROVAL LETTER

**UNIVERSITI TUNKU ABDUL RAHMAN**
Wholly Owned by UTAR Education Foundation (Company No. 578227-M)

Re: U/SERC/200/2023

3 August 2023

Ms Liew Siew Fun
Head, Department of Nursing
M. Kandiah Faculty of Medicine and Health Sciences
Universiti Tunku Abdul Rahman
Jalan Sungai Long
Bandar Sungai Long
43000 Kajang, Selangor

Dear Ms Liew,

**Ethical Approval For Research Project/Protocol**

We refer to your application for ethical approval for your students' research project from Bachelor of Nursing (Honours) programme enrolled in course UMNE4024. We are pleased to inform you that the application has been approved under <u>Expedited Review</u>.

The details of the research projects are as follows:

| No | Research Title | Student's Name | Supervisor's Name | Approval Validity |
|----|----------------|----------------|-------------------|-------------------|
| 1. | Prevalence of Polypharmacy and Quality of Life Among Institutionalized Older People Within Klang Valley | Yee Jia Jia | Ms Liew Siew Fun | |
| 2. | Perceptions of High School Students on Nursing as a Career of Choice: A Cross-sectional Study in Chinese High Schools in Klang Valley | Chuar Shi Wei | Prof Dr Hamidah Binti Hassan | |
| 3. | Knowledge and Practice on Vaping Among Undergraduate Students in a Private University in Kajang | Sia Chee Yan | | |
| 4. | Symptoms of Dysmenorrhea and Their Impact on Quality of Life Among Female Undergraduate Students at a Private University in Kajang | Chia Shu Jing | Dr Thavamalar a/p Paramasivam<br><br>Ms G K Sathiyavani a/p Karuppiah | 3 August 2023 – 2 August 2024 |
| 5. | Knowledge and Attitude Towards Polycystic Ovary Syndrome Among Female Undergraduate Students in a Private University in Kajang | Teh Sin Yie | Dr Thavamalar a/p Paramasivam | |
| 6. | Post COVID-19 Pandemic Level of Depression and Quality of Life Among Undergraduate Students in Private University in Kajang | Neyllyniah binti Anil | Ms Thulasy a/p Perumal | |

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

# APPENDIX E: PERSONAL DATA PROTECTION STATEMENT

## PERSONAL DATA PROTECTION STATEMENT

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.

**Notice:**
1. The purposes for which your personal data may be used are inclusive but not limited to:-
   - For assessment of any application to UTAR
   - For processing any benefits and services
   - For communication purposes
   - For advertorial and news
   - For general administration and record purposes
   - For enhancing the value of education
   - For educational and related purposes consequential to UTAR
   - For the purpose of our corporate governance
   - For consideration as a guarantor for UTAR staff/ student applying for his/her scholarship/ study loan

2. 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.

3. 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.

4. 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 this form you hereby authorise and consent to us processing (including disclosing) your personal data and any updates of your information, for the purposes and/or for any other purposes related to the purpose.

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 _____.

**Acknowledgment of Notice**

[      ] I have been notified by you and that I hereby understood, consented and agreed per UTAR above notice.

[      ] I disagree, my personal data will not be processed.

.................................
Name:
Date:

## APPENDIX F: GANTT CHART

| Task | 2022 | | | | 2023 | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Oct | Nov | | Dec | Jan-June | July | Aug | Sept |
| Proposal writing | ███ | ███ | ███ | | | | | |
| Proposal presentation | | | | ███ | | | | |
| Ethical Procedures | | | | | | ███ | | |
| Pilot Study | | | | | | | ███ | |
| Data Collection and Preparation | | | | | | | ███ | |
| Data Analysis | | | | | | | | ███ |
| Results Interpretation | | | | | | | | ███ |
| Report Writing | | | | | | | | ███ |
| Presentationand Thesis Submission | | | | | | | | ███ |

Trimester break

Not taking research subject

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# APPENDIX G: TURNITIN ORIGINALITY REPORT

## Knowledge and Practice on Vaping Among Undergraduate Students in a Private University in Kajang

6    Mouhamad Bigwanto. "The 2021 Tobacco Industry Interference Index in Indonesia: How the Industry Influences Tobacco Control Policies and Takes Advantage of the COVID-19 Situation", Tobacco Prevention & Cessation, 2023
Publication    <1%

7    ndarc.med.unsw.edu.au
Internet Source    <1%

8    Liping Pan, Jeremy Morton, Lazarous Mbulo, Anna Dean, Indu B. Ahluwalia. "Electronic cigarette use among adults in 14 countries: A cross-sectional study", eClinicalMedicine, 2022
Publication    <1%

9    Submitted to University of Canterbury
Student Paper    <1%

10   www.apm.org.br
Internet Source    <1%

11   Md. Nazmul Huda, Dr. Asm Amanullah. "HIV/AIDS-Related Knowledge among Secondary School Students in Bangladesh: A Cross-Sectional Study", Advances in Infectious Diseases, 2013
Publication    <1%

12   www.journaltocs.ac.uk
Internet Source    <1%

128

**13** www.hopkinsmedicine.org
Internet Source
<1%

**14** Submitted to University of Sunderland
Student Paper
<1%

**15** Submitted to TAR University College
Student Paper
<1%

**16** Submitted to The University of Manchester
Student Paper
<1%

**17** digitalcommons.georgiasouthern.edu
Internet Source
<1%

**18** journalarticle.ukm.my
Internet Source
<1%

**19** www.jmir.org
Internet Source
<1%

**20** J. J Tickle. "Favourite movie stars, their tobacco use in contemporary movies, and its association with adolescent smoking", Tobacco Control, 2001
Publication
<1%

**21** Sylvia Rotich, Jane Kamau, Maureen Anyango Oketch, Okubatsion Tekeste Okube. "Prevalence and Predictors of Obesity among Undergraduate Students at a Private University, Nairobi, Kenya", Open Journal of Endocrine and Metabolic Diseases, 2023
Publication
<1%

22  Ziba Nariman-saleh-fam, Zahra Saadatian, Lida Nariman-Saleh-Fam, Elaheh Ouladsahebmadarek et al. "An Association and Meta-Analysis of Esophageal Squamous Cell Carcinoma Risk Associated with PLCE1 rs2274223, C20orf54 rs13042395 and RUNX1 rs2014300 Polymorphisms", Pathology & Oncology Research, 2019
Publication
<1 %

23  www.uticaod.com
Internet Source
<1 %

24  Ismael Maatouk, Moubadda Assi, Rusi Jaspal. "Predicting sexual risk and sexual health screening in a sample of university students in Lebanon: a cross-sectional study", Journal of American College Health, 2021
Publication
<1 %

25  Nour A. Al-Sawalha, Basima A. Almomani, Enas Mokhemer, Samah F. Al-Shatnawi, Roba Bdeir. "E-cigarettes use among university students in Jordan: Perception and related knowledge", PLOS ONE, 2021
Publication
<1 %

26  Rhonda D Griffiths. "Comparison of educational interventions for mental health consumers receiving psychotropic medication", JBI Reports, 2/2004
Publication
<1 %

27  archive.org
Internet Source
<1 %

28  Irfan Ullah Khan, Mati Ullah, Khurshed Iqbal, Mahraban Alam, Iftikhar Ahmad. "PERCEPTIONS OF EFL LEARNERS REGARDING EFFECTIVENESS OF TWITTER IN ENGLISH LANGUAGE LEARNING PROFICIENCY AT UNIVERSITY LEVEL", Humanities & Social Sciences Reviews, 2021
Publication
<1 %