

LIM YU HUI

DETERMINANTS OF PA AND MENTAL HEALTH

2023

**AWARENESS ON THE ADVERSE EFFECTS
OF VAPING TO HEALTH AMONG UNIVERSITY
STUDENTS IN UTAR**

LIM YU HUI

**BACHELOR OF PHYSIOTHERAPY
(HONOURS) UNIVERSITI TUNKU**

ABDUL RAHMAN

JANUARY 2023

(This page is intentionally left blank.)

**AWARENESS ON THE ADVERSE EFFECTS OF VAPING TO
HEALTH AMONG UNIVERSITY STUDENTS IN UTAR**

By

LIM YU HUI

A Research project submitted to the Department of Physiotherapy,
M. Kandiah Faculty of Medicine and Health Sciences,
Universiti Tunku Abdul Rahman,
in partial fulfillment of the requirements for the degree of Bachelor of
Physiotherapy (HONOURS)

JANUARY 2023

AWARENESS ON THE ADVERSE EFFECTS OF VAPING TO HEALTH AMONG UNIVERSITY STUDENTS IN UTAR

Meneka Naidu a/p Mohnaraju¹

Lim Yu Hui²

Author affiliation

1. Lecturer, M. Kandiah Faculty of Medicine and Health Sciences, Department of Physiotherapy, Universiti Tunku Abdul Rahman, Malaysia.
2. Year 3 Bachelor of Physiotherapy (HONOURS) student, M. Kandiah Faculty of Medicine and Health Sciences, Department of Physiotherapy, Universiti Tunku Abdul Rahman, Malaysia

ABSTRACT

Background and Objective: Nowadays, vaping had become popular, especially among the young generation. Vaping was an action of breathing in and out nicotine or other drugs in a state of vapour rather than smoking by using electronic cigarettes or other devices. Like tobacco cigarettes, e-cigarettes would bring adverse effects on human health. Most commonly, people who vaped would suffer from coughing, irritation in the mouth and throat, cough, nausea and vomiting. Besides, vaping would also harm the body system such as respiratory system, cardiovascular system, oral cavity, gastrointestinal system, neurological system and haematopoietic system. Till 2020, 33.7% of Malaysian claimed to have vaped. The result showed that the Malaysian's vaping rate was relatively high, and this issue should be investigated seriously. Hence, the aim of this study was to determine the awareness of university students towards the adverse effects of vaping on health and to determine the prevalence of vaping among university students in UTAR.

Methods: A descriptive cross-sectional study is carried out among university students in UTAR. A self-administered questionnaire will be distributed to the students online to determine the prevalence of vaping among university students and the awareness towards the adverse effects of vaping on health. 416 participants who aged between 18 to 25, foundation and undergraduate students from UTAR Sungai Long and Kampar, will be recruited to fill up the questionnaire. All the data collected from the Microsoft Form will be computerised and analysed by using IBM Statistical Package for Social Science (SPSS) Statistics 26 software. The study outcomes will be produced by using Microsoft Excel. Descriptive statistics will analyse demographic data.

Results: The total number of respondents was 433 students, but only 422 of those responses were processed. There are 206 male participants (48.8%) and 216 female participants (51.2%), with a mean age of 19.89 (SD = 1.45). 3.3% of UTAR students reported that they currently vaped, which was significantly higher among males than females (78.6% vs 21.4%). All the participants had an

overall average score of 25.76 (SD = 10.28) out of a total score of 47 on vaping awareness. 24.6% of the respondents considered as having awareness while 75.4% of the respondents considered as no awareness, with the scores falling below the cut-off point.

Conclusion: In short, every authority can plan for future programmes or education to help decrease the prevalence of vaping and increase university students' awareness towards the effects of vaping on human health. More attention must be given to the usage of e-cigarettes among adolescents before this trend rises. Future study can be conducted on a larger population which include all university students in Malaysia.

Keywords: Awareness, Adverse Effects, Vaping, Health, University Students

ACKNOWLEDGEMENTS

First and foremost, I would like to express my deepest gratitude to my supervisor, Ms Meneka, for her guidance and assistance throughout the final year project journey.

Besides, with the completion of this research project, I would like to express my appreciation to all the participants for spending their time answering my research survey.

Lastly, I would like to thank all my friends for their supporting and encouragement. The research journey would not be that boring and tiredness without them.

APPROVAL SHEET

This Research project entitled “**AWARENESS ON THE ADVERSE EFFECTS OF VAPING TO HEALTH AMONG UNIVERSITY STUDENTS IN UTAR**” was prepared by LIM YU HUI and submitted as partial fulfilment of the requirements for the degree of Bachelor of Physiotherapy (HONOURS) at Universiti Tunku Abdul Rahman.

Approved by:

(Ms Meneka Naidu a/p Mohnaraju)
Supervisor

Date:.....

Department of Physiotherapy
M. Kandiah Faculty of Medicine and Health Sciences
Universiti Tunku Abdul Rahman

Approved by:

(Mr. Muhammad Noh Zulfikri bin Mohd Jamali)
Head of Department

Date:.....

Department of Physiotherapy
M. Kandiah Faculty of Medicine and Health Sciences
Universiti Tunku Abdul Rahman

**M. KANDIAH FACULTY OF MEDICINE AND HEALTH
SCIENCES
UNIVERSITI TUNKU ABDUL RAHMAN**

Date: 23/12/2022

PERMISSION SHEET

It is hereby certified that **LIM YU HUI** (ID No: **19UMB03816**) has completed this Research project entitled “**AWARENESS ON THE ADVERSE EFFECTS OF VAPING TO HEALTH AMONG UNIVERSITY STUDENTS IN UTAR**” under the supervision of Ms Meneka Naidu a/p Mohanaraju (Supervisor) from the Department of Physiotherapy, M. Kandiah Faculty of Medicine and Health sciences.

Yours truly,

(LIM YU HUI)

DECLARATION

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

Name: LIM YU HUI

Date: 23/12/2022

TABLE OF CONTENT

ABSTRACT	II
ACKNOWLEDGEMENTS	IV
APPROVAL SHEET	V
PERMISSION SHEET	VI
DECLARATION	VII
TABLE OF CONTENT	VIII
LIST OF TABLES	XII
LIST OF FIGURES	XIII
LIST OF ABBREVIATIONS	XV
CHAPTER I	16
INTRODUCTION	16
1.1 Chapter overview	16
1.2 Background of study	16
1.2.1 Electronic cigarettes	20
1.2.2 Refill e-liquid	21
1.3 Research Question	21
1.4 Aim of Study	21
1.5 Objective of Study	22
1.6 Rationale of Study	22
1.7 Scope of Study	24
1.8 Operational Definition	24
CHAPTER II	26
LITERATURE REVIEW	26
2.1 Chapter Overview	26
2.2 Awareness on Vaping	26
2.3 Effect of Vaping on Health	27
2.3.1 Respiratory System	27
2.3.2 Cardiovascular System	28
2.3.3 Oral Cavity	29
2.3.4 Gastrointestinal System	30
2.3.5 Neurological System	31
2.3.6 Haematopoietic System	31
2.4 Prevalence of Vaping	32

2.4.1 Among adolescents	32
2.4.2 Among adults	33
2.4.3 Among University Students	34
CHAPTER III	36
METHODS	36
3.1 Chapter Overview	36
3.2 Research Design	36
3.3 Ethical Approval	36
3.4 Sampling Method	37
3.5 Sampling Size	37
3.6 Research Instrument	38
3.7 Procedure	41
3.8 Data Analysis	41
3.9 STROBE Statement	41
CHAPTER IV	42
RESULTS	42
4.1 Chapter Overview	42
4.2 Sociodemographic Characteristics	42
4.3 Experience of Vaping	44
4.3.1 History of Vaping among Participants	44
4.3.2 Current Vaping among Participants	45
4.4 Proportion of Vapers by Demographic Data (n=14)	46
4.5 Vaping Background	48
4.5.1 Age of Vaping	49
4.5.2 Nicotine Contains in Refill E-liquid	50
4.5.3 Flavours of e-liquid	51
4.5.4 Place of vaping	52
4.5.5 Reasons of vaping	53
4.6 Scoring for Penn State Electronic Cigarette Dependence Index (PSECDI)	54
4.7 Addiction Characteristics	56
4.7.1 How many times per day do you usually use your electronic cigarette? (assume that one “time” consists of around 15 puffs or lasts around 10 minutes)	57
4.7.2 On days that you can use your electronic cigarette freely, how soon after you wake up do you first use your electronic cigarette?	58

4.7.3 Do you sometimes awaken at night to use your electronic cigarette?	60
4.7.4 Do you use an electronic cigarette now because it is really hard to quit?	61
4.7.5 Do you ever have strong cravings to use an electronic cigarette?	62
4.7.6 Over the past week, how strong have the urges to use an electronic cigarette been?	63
4.7.7 Is it hard to keep from using an electronic cigarette in places where you are not supposed to?	64
4.7.8 Did you feel more irritable because you couldn't use an electronic cigarette?	65
4.7.9 Did you feel nervous, restless, or anxious because you couldn't use an electronic cigarette?	66
4.8 General Questions about Vaping	67
4.8.1 Awareness on Negative Health Effects of Vaping	67
4.8.2 Awareness on the Substances Contained in E-Cigarettes	69
4.9 Specific Questions on the Adverse Effects of Vaping to Health	71
4.9.1 Awareness on the Adverse Effects of Vaping on Respiratory System	71
4.9.2 Awareness on the Adverse Effects of Vaping on Gastrointestinal System	74
4.9.3 Awareness on the Adverse Effects of Vaping on Cardiovascular System	75
4.9.4 Awareness on the Adverse Effects of Vaping on Neurological System	77
4.9.5 Awareness on the Adverse Effects of Vaping on Urogenital System	79
4.9.6 Awareness on the Adverse Effects of Vaping on Hematopoietic System	80
4.9.7 Awareness on the Adverse Effects of Vaping on Oral Cavity	81
4.9.8 Awareness on the Adverse Effects of Vaping on Physical Changes	82
4.10 Inferential analysis	84
CHAPTER V	88
DISCUSSION	88
5.1 Chapter Overview	88
5.2 Awareness of University Students towards the Adverse Effects of Vaping on Health	88
5.3 Prevalence of Vaping among University Students	94

5.4 Limitation of Study	95
5.5 Recommendations for Future Study	97
CHAPTER VI	98
CONCLUSION	98
LIST OF REFERENCES	99
APPENDIX A – ETHICAL APPROVAL FORM	108
APPENDIX B – INFORMED CONSENT FORM	109
APPENDIX C – PERSONAL DATA PROTECTION NOTICE	110
APPENDIX D – KREJCIE AND MORGAN TABLE	112
APPENDIX E – QUESTIONNAIRE FORM (DEMOGRAPHICS)	113
APPENDIX F – HISTORY OF VAPING	115
APPENDIX G – PENN STATE ELECTRONIC CIGARETTE DEPENDENCE INDEX (PSECDI)	117
APPENDIX H – GENERAL QUESTIONS ON VAPING	120
APPENDIX I – SPECIFIC HEALTH RELATED QUESTIONS ON VAPING	121
APPENDIX J – TURNITIN REPORT	124

LIST OF TABLES

Table 4.1: Sociodemographic data of participants	43
Table 4.2: Experience of vaping among participants.	44
Table 4.3: Proportion of vapers by demographic data	46
Table 4.4: Habits of vaping of participants.	48
Table 4.5: Scoring for Penn State Electronic Cigarette Dependence Index (PSECDI)	55
Table 4.6: Addiction Characteristics among Participants who had vaped	57
Table 4.7: Awareness on negative health effects of vaping among participants	67
Table 4.8: Awareness on the substances contained in e-cigarettes among participants	69
Table 4.9: Awareness on the adverse effects of vaping on respiratory system among participants	71
Table 4.10: Awareness on the adverse effects of vaping on gastrointestinal system among participants	74
Table 4.11: Awareness on the adverse effects of vaping on cardiovascular system among participants	75
Table 4.12: Awareness on the adverse effects of vaping on neurological system among participants	77
Table 4.13: Awareness on the adverse effects of vaping on urogenital system among participants	79
Table 4.14: Awareness on the adverse effects of vaping on hematopoietic system among participants	80
Table 4.15: Awareness on the adverse effects of vaping on oral cavity among participants	81
Table 4.16: Awareness on the adverse effects of vaping on physical changes among participants	82
Table 4.17: Awareness scores of vaping among participants	85
Table 4.18: Total awareness scores among participants	85

LIST OF FIGURES

Figure 4.1: History of vaping among participants	44
Figure 4.2: Current vaping among participants	45
Figure 4.3: Starting age of vaping among participants	49
Figure 4.4: Nicotine contains in refill e-liquid	50
Figure 4.5: Flavors of refill e-liquid used among participants	51
Figure 4.6: Places of vaping among participants	52
Figure 4.7: Reasons of vaping among participants	53
Figure 4.8: Frequency of using electronic cigarettes per day	57
Figure 4.9: Duration between waking up time and the first use of electronic cigarette among participants	58
Figure 4.10: Habit on awaken at night to use an electronic cigarette	60
Figure 4.11: Frequency of vapers awake at night to use electronic cigarettes	60
Figure 4.12: Habit of using an electronic cigarette due to addiction	61
Figure 4.13: Presence of strong cravings towards using electronic cigarettes	62
Figure 4.14: Urges of using electronic cigarettes among participants	63
Figure 4.15: Difficulty to resist using an electronic cigarette in places that are not supposed to.	64
Figure 4.16: Feeling of irritated due to unable to use electronic cigarettes among participants.	65
Figure 4.17: Feeling of nervous, restless or anxious due to unable to use electronic cigarettes among participants.	66
Figure 4.18: Awareness on negative health effects of vaping among participants	67
Figure 4.19: Awareness on the substances contained in e-cigarettes among participants	69
Figure 4.20: Awareness on the adverse effects of vaping on respiratory system among participants	72
Figure 4.21: Awareness on the adverse effects of vaping on gastrointestinal system among participants	74
Figure 4.22: Awareness on the adverse effects of vaping on cardiovascular system among participants	76
Figure 4.23: Awareness on the adverse effects of vaping on neurological system among participants	77
Figure 4.24: Awareness on the adverse effects of vaping on urogenital system among participants	79

Figure 4.25: Awareness on the adverse effects of vaping on hematopoietic system among participants	80
Figure 4.26: Awareness on the adverse effects of vaping on oral cavity among participants	81
Figure 4.27: Awareness on the adverse effects of vaping on physical changes among participants	83

LIST OF ABBREVIATIONS

UTAR	Universiti Tunku Abdul Rahman
ENDS	electronic nicotine delivery system
EVALI	product use-associated lung injury

CHAPTER I

INTRODUCTION

1.1 Chapter overview

This chapter will summarise the background of the study, providing context for the overall research project before proceeding to the research objectives, scope of study, and the operational definition of terms for the research study.

1.2 Background of study

Nowadays, vaping has become popular, especially among the young generation. Vaping is breathing in and out the nicotine or other drugs in a state of vapour rather than smoking by using electronic cigarettes or other devices (*Vaping*, n.d.).

Electronic cigarette, which is also known as an electronic nicotine delivery system (ENDS), is one of the devices used when vaping. It is a battery-operated device that heats and vaporises the liquid solution and then delivers it to the human body by inhaling it. Usually, the liquid solution contains nicotine, propylene glycol, benzoic acid, vegetable glycerine and different flavouring chemicals (Grana et al., 2014). Other than that, toxicants such as volatile organic compounds, heavy metals, and formaldehyde will be produced due to the thermal

breakdown of the liquid ingredients (Breland et al., 2016). Unlike tobacco cigarettes, electronic cigarettes do not produce tar and carbon monoxide (Bush et al., 2018).

Similar to tobacco cigarettes, e-cigarettes will also bring adverse effects on human health. E-liquids are mainly made up of propylene glycol and glycerine. Prolonged exposure to these ingredients will affect the central nervous system as well as cause eye and respiratory tract irritation. Most commonly, people who vape will suffer from coughing, irritation in the mouth and throat, cough, nausea, and vomiting (Grana et al., 2014). E-cigarette vapour will also affect the circulatory system. For example, increased blood pressure, decreased resting heart rate, irregular heartbeat, and heart palpitations. Moreover, vaping will weaken the immune system and hence increase the rate of getting the flu (Hua et al., 2013). Some of the constitutional symptoms caused by vaping are fever, headache, chills, change in appetite, weight loss and fatigue (Case et al., 2022). The most severe effect is the explosion of the e-cigarette's battery due to the increase temperature of the internal battery. The battery explosion will cause burn injury to the person (Quiroga et al., 2019).

In Malaysia, there was research showing that the prevalence of vaping among Malaysians has been increasing since 2011. In 2011, 0.8% of Malaysian over 15 years old reported vaping in the past 30 days. In 2016, the reported cases arose to 3.2% of the Malaysian aged 18 and above. By 2019, the reported cases were still increasing by 7.5% of teenagers between 15 to 19 and 14.7% of young

adults between 20 to 24 were using e-cigarettes. However, in the same year, it was reported that there was only less than 5% of Malaysian who aged 30 and above vaped. Till 2020, 33.7% of Malaysian claimed to have ever vaped (Driezen et al., 2022). The results show that the Malaysian vape rate is quite high, and this issue should be investigated seriously.

Most people use e-cigarettes as an alternative to help them quit tobacco smoking. This is because most of the advertising from social media mentioned that e-cigarettes are health benefits, environmentally friendly and cleaner than tobacco cigarettes as it does not produce second-hand smoke. Besides, research has shown that e-cigarettes are cost savings as they are cheaper than tobacco cigarettes (Grana & Ling, 2014). Research has shown that 24.7% of smokers are completely using e-cigarettes to stop tobacco smoking (Caraballo et al., 2017). However, according to the Centers for Disease Control and Prevention (CDC), it mentioned that e-cigarettes have not yet been approved by FDA as a smoking-cessation aid (Centers for Disease Control and Prevention, 2018). Also, until today, there is no article that completely proves that using e-cigarettes is an effective way to quit tobacco cigarettes (Grana et al., 2014).

Since the smoking rate in Malaysia was increasing, in 2018, Malaysia Government amended the Control of Tobacco Product Regulations (CTPR). The latest CTPR 2018 mentioned that smoking is prohibited in all eating places. Any location, inside or outside a building, where food is cooked, served, or sold is an eating place. It includes any room or area on a ship or train, any area on a vehicle

and any surrounding area within a radius of 3 meters from the vehicle where food is prepared, served or sold. This amendment was executed on 1st January 2019 (*Control of Tobacco Product (Amendment) Regulations 2018*, 2018).

Vaping brings negative effects on humans as well as the environment. Therefore cessation of vaping is necessary for e-cigarette users. A survey done in Malaysia in 2016 shows that most e-cigarettes and vapes users are people aged 18 to 24 with tertiary education (Ab Rahman et al., 2017). Hence, the awareness of an individual towards the side effects of vaping is important, especially for university students. As a student aware of the impact of vaping, he is sure that he will promote the related knowledge to his family and friends and hence encourage them to keep away from vaping. By doing so, the prevalence of vaping among Malaysian will decrease.

Previously, a study was done in Malaysia to determine the prevalence of vaping among health science programme students in IMU in 2017 (Goh et al., 2017). It was the most recent article in Malaysia, with university students selected as the study population. Since this year is 2022, the prevalence of vaping among university students might be changed. It might increase or decrease. Besides, the regulations of smoking were amended in 2018, which mentioned that smoking is prohibited in eating places. Hence, it is necessary to conduct a study to assess the prevalence of vaping among university students to rule out whether the government regulations amended in 2018 are effective. Besides, some studies have been done in Malaysia to determine university students'

awareness of vaping. However, no study was done to determine the students' awareness towards the effect of vaping on health. Since the study was limited in Malaysia, it failed to show that people were actually aware of the adverse effects of vaping. Therefore, it is necessary to conduct this study on university students in Malaysia to determine whether people's knowledge of the adverse effects of vaping still seems to be very low or unknown.

As there is no research in this area, a study was conducted to assess the prevalence of vaping among university students in UTAR and their awareness of its adverse effects on health. This study is aimed to assess the prevalence of vaping among university students in UTAR and to determine the awareness of the students on the adverse effects of vaping on health.

1.2.1 Electronic cigarettes

Electronic cigarettes are made up of a battery, liquid container, and atomizer. There are numerous names for e-cigarettes which include "e-cigs", "e-hookahs", "mods", "vape pens", "vapes", as well as "tank systems". Other than names, they are also designed in different appearances. Some of them look like regular cigarettes, USB drives, and pipes and some like pens (Centers for Disease Control and Prevention, 2018). Besides, electronic cigarettes are constructed in different voltage and resistance, which then determine the device's power output. The batteries have voltages ranging from 3V to 6V (Breland et al., 2016).

1.2.2 Refill e-liquid

E-liquids in e-cigarettes have different flavours. For example, tobacco, mint, vanilla, chocolate, fruit flavours, candy flavours and many more (Kim et al., 2018). From the research done by Schneller et al. (2018), among youth who reported using e-cigarettes, majority of them prefer using fruit flavoured followed by candy flavoured. Meanwhile, menthol or mint flavour are the most popular among adults, followed by fruit flavoured (Schneller et al., 2018).

1.3 Research Question

1. What is the prevalence of vaping among university students in UTAR?
2. How aware are the students towards the adverse effect of vaping on health?

1.4 Aim of Study

The research title is “Awareness on the adverse effect of vaping on health among university students in UTAR”. Hence, the aims of this study are to determine the prevalence of vaping among university students in UTAR in the year 2022 and to determine the awareness of university students towards the adverse effects of vaping on health.

1.5 Objective of Study

Main objective

To determine the awareness of university students towards the adverse effects of vaping on health.

Secondary objective

To determine the prevalence of vaping among university students in UTAR in the year 2022.

1.6 Rationale of Study

Till 2020, there were 33.7% of Malaysian claimed to have ever vaped (Driezen et al., 2022). This shows that vaping has become a current trend in Malaysia. People nowadays, especially the young generations, vaping is not a habit; they are more like a lifestyle, they vape just due to their curiosity, and they feel that vaping is cool. Their engagement in vaping might be why they do not even know its side effects.

The title of this study is “Awareness on the adverse effects of vaping on health among university students in UTAR”. As there was a survey done in Malaysia in 2016 showed that majority of e-cigarette and vape users are people who aged 18 to 24 with tertiary-level education (Ab Rahman et al., 2017). Hence, the population of my study is university students. A study was done in Malaysia

to determine the prevalence of vaping among health science programme students in IMU in 2017 (Goh et al., 2017). It was the most recent article in Malaysia with university students selected as the study population. Since this year is 2022, the prevalence of vaping among university students might be changed. It might increase or decrease. Besides, the regulations of smoking were amended in 2018 which mentioned that smoking is prohibited in eating places. Hence, it is necessary to conduct a study to assess the prevalence of vaping among university students to rule out whether the government regulations amended in 2018 are effective. Besides, some studies have been done in Malaysia to determine university students' awareness of vaping. However, no study was done to determine the students' awareness towards the effect of vaping on health. Since the study was limited in Malaysia, it failed to show that people were actually aware of the adverse effects of vaping. Therefore, it is necessary to conduct this study on university students in Malaysia to determine whether people's knowledge of the adverse effects of vaping still seems to be very low or unknown.

The results of this study will enable physiotherapists to further look into the program's planning and education to raise students' awareness of the effects of vaping on health. The physiotherapist can educate students and share some negative effects and impacts of vaping on health. Moreover, by doing the questionnaires, it was able to create awareness and draw students' attention towards the effects of vaping. As students, it is crucial to have high understanding on the effect of vaping so that they can be aware of it and quit smoking. Hence, it is definitely that the prevalence of vaping might be decreased. Besides, the study results enable healthcare professionals, including

physiotherapists, to formulate a specific programme such as talks or seminars that can help improve their awareness.

1.7 Scope of Study

The aim of this study is to determine the prevalence of vaping among university students in UTAR. Besides, this study also uses to determine the awareness of university students in UTAR towards the adverse effects of vaping on human health. Hence, the study will involve both males and females who aged between 18 to 25, foundation and undergraduates in all faculty and programme in UTAR Sungai Long and Kampar.

1.8 Operational Definition

Vaping: Vaping is an action of breathing in and out nicotine or other drugs in a state of vapour rather than smoking by using electronic cigarettes or any other devices (*Vaping*, n.d.).

Prevalence: Prevalence is the total number of people in a population who suffer from a disease or health condition divided by the total population at a particular time. It is normally expressed in percentage (*Prevalence and Incidence Defined*, 2012).

Awareness: Awareness is a condition or a capacity to observe, feel or be aware of objects and sensory patterns. In education, awareness is the knowledge and understanding of a person regarding scientific, social, and political issues (Gafoor, 2012).

Adverse effect: Adverse effect is a harmful or negative result caused by medication or exposure to chemical substances, which may lead to illness or death (*Definition of Adverse Effect*, n.d.).

CHAPTER II

LITERATURE REVIEW

2.1 Chapter Overview

This chapter highlights the different themes explored through past journals and articles, providing the framework for the research project.

2.2 Awareness on Vaping

A study was done on 304 students from public university in north Malaysia to determine their awareness of vaping. The results showed that most of the respondents had high awareness towards vaping. They believe that vaping will bring a bad impact on health and able to cause serious health problems (Razak, 2021). Similarly, a study by Goh et al. (2017) in International Medical University (IMU) in Malaysia showed that health science students had high awareness of vaping. However, a study conducted in Jazan University, Saudi Arabia among 775 students showed that most of the students failed to identify the health risks of vaping. It was suggested that students' awareness towards the pros and cons of vaping needs to be enhanced (Aqeeli et al., 2020). Surveys were done in 4 countries: Indonesia, Malaysia, Qatar and Greece, to determine their awareness and current use of vapes. Results show that there was only 10.9% of people in Indonesia aware of vaping, 21.0% in Malaysia, 49.0% in Qatar and

88.5% in Greece. In these 4 countries, it was found that awareness was higher in males compared to females (Palipudi et al., 2015). Similar to the study by Zavala-Arciniega et al. (2018), most of female adolescents and adults had less awareness than males as they were less likely to be familiar with vaping. The study also clarified that people who live in rural areas and those with lower education and wealth had low awareness towards vaping.

2.3 Effect of Vaping on Health

Many studies clarified that tobacco cigarettes will negatively affect human health. Hence, although more research needs to be done to investigate the effects of vaping on health, it is still believed that vaping will also harm human health. The section below will discuss the impact of vaping on the human respiratory system, cardiovascular system, oral cavity, gastrointestinal system, neurological system and haematopoietic system.

2.3.1 Respiratory System

According to the research, people who vaped had a high risk of getting lung-related diseases. E-cigarettes containing nicotine stimulate cytokine expression, airway hyperreactivity and damage to lung tissues. After a long time, these factors may lead to the formation of COPD. Besides, the study also found that vaping will cause cytotoxic effects on human lung cells by triggering the inflammation response in the lung. Researchers found that exposure to e-

cigarette vapour on human airway epithelial cells will induce the release of proinflammatory mediators, which are IL-6 and IL-8 (Lerner et al., 2015). Also, through vaping, the risk of airway bacterial infection will be increased due to inhalation of the contaminants. E-cigarette vapour will decrease the ability of macrophages and neutrophils to phagocytose against bacteria and decrease the expression of phagocytosis receptors. Hence, the antimicrobial activity in human epithelial cells will be declined. As a result, the rate of phagocytosis to the bacteria such as *Staphylococcus aureus*, *Escherichia coli*, and *Mycobacterium tuberculosis* will be reduced (Bravo-Gutiérrez et al., 2021). According to the research done by Hua et al. (2013) through online forum, e-cigarette users had reported that they faced some symptoms such as dry cough, mouth and throat irritation, dizziness and asthma attack. It also suggested that e-cigarette users may have increased pulmonary resistance as some reported having the symptoms of tightening lungs and difficulty breathing.

2.3.2 Cardiovascular System

There was a study conducted to determine the effect of vaping on artery stiffness by using carotid-femoral pulse wave velocity. The result showed that it increases significantly after 5 mins of exposure to e-cigarettes. Besides, research also demonstrated that vaping cause increasing in heart rate and blood pressure (Vlachopoulos et al., 2016). This might occur because of the nicotine or other substances contained in e-cigarettes. Nicotine releases neurotransmitters such as epinephrine, norepinephrine and dopamine by binding with nicotinic cholinergic

receptors located in the neuromuscular junction (Skotsimara et al., 2019). As a result, neurotransmitters will help to increase in heart rate. Another study done in mouse shown that vaping will increase heart tissue angiogenesis and capillary density which might increase the risk of tumour growth and atherogenesis. CD31 and CD34, commonly used as endothelial and angiogenesis markers in cardiac tissue, were measured after the mouse was exposed to e-cigarette vapour (Shi et al., 2019). Apart from that, e-cigarette vapour will cause accumulation and adhesion of platelets on the endothelial wall, resulting in thrombosis and atherosclerosis (Qasim et al., 2017). A study done on mice showed that the heart mass of the mice was increased after 8 months of exposure to e-cigarettes vapour, which might be due to the increase in left ventricle mass (Olfert et al., 2018).

2.3.3 Oral Cavity

In a study, the researcher found that people who vape had a higher risk of getting gum disease and periodontal disease, such as bone loss around the teeth. This is because e-cigarette vapour had the tendency to damage the DNA in the gingival epithelium, promoting cell apoptosis and necrosis. This then reduced the proliferation rate of gingival fibroblasts and human periodontal ligament cells (Atuegwu et al., 2019). As a result of gum disease, they reported that they had cracked or decayed teeth, and some needed to remove them. There was also a study which done on 20 smokers with mild periodontal disease. They were instructed to switch from tobacco smoking to e-cigarettes for 2 weeks. The results showed that gingival inflammation rates were increasing among them

(Wadia et al., 2016). Besides, vaping will bring some negative effects on the mouth. For example, dryness of mouth, burning and irritation sensation in the mouth, pain or discomfort, oral mucosa lesions, bad breath and bad taste in the mouth, tongue soreness and black tongue were the common complaints among e-cigarette users. All these symptoms were found to be less reported in e-cigarette users when compared with tobacco cigarette users. However, it was greater symptoms associated with e-cigarette users when compared with non-users. Throat irritation, sore throat, difficult swallowing, hoarseness tonsillitis and uvulitis were also some common symptoms of e-cigarette users (Yang et al., 2020).

2.3.4 Gastrointestinal System

According to the research done by Case et al. (2022), both nicotine and marijuana vapers have gastrointestinal problems. “Nic sickness”, a condition characterised by symptoms such as nausea, vomiting, diarrhea and abdominal pain, arises from excessive exposure to nicotine (Case et al., 2022). Besides, according to the research which is done in both murine and human models, it was found that chronic exposure to e-cigarette aerosols will affect the gut epithelial barrier. It will increase the risk of bacterial infections, triggering gut inflammation (Sharma et al., 2021).

2.3.5 Neurological System

A study by Kaisar et al. (2017) showed that e-cigarettes that contain nicotine would cause oxidative stress and worsen the cerebral ischaemic. Chronic vaping can lead to loss of blood-brain barrier (BBB) integrity and vascular inflammation. As a result, it acts as a risk factor for the onset of stroke, worsening the post-ischemic brain injury (Kaisar et al., 2017). Besides, the study showed that chronic exposure to nicotine would have long-term effects on memory and attention, leading to a person's lack of concentration and sleeping difficulties of a person. Moreover, the person who vapes will experienced dizziness, anxiety, irritability and headache (Seiler-Ramadas et al., 2020).

2.3.6 Haematopoietic System

In the study done by Layden et al. (2019), among 98 patients who vaped, it was found that 83% of them had leukocytosis, in which their white blood cell count was more than 11000 per cubic millimetre. Neutrophil predominance was also seen in 91% of the patients whose neutrophil percentage was greater than 80%. Besides, the same study also found that vaping cause elevating in the erythrocyte sedimentation rate (Layden et al., 2019).

2.4 Prevalence of Vaping

2.4.1 Among adolescents

According to World Health Organization (WHO), people who aged between 11 to 19 are categorized as adolescents (World Health Organization, 2022). There was research conducted in Poland from September 2010 to June 2011 in high school students to determine the prevalence of vaping among teenagers. The results show that 23.5% of students between 15 to 19 years old had ever vaped, and 8.2% of students reported that they had vaped within 30 days (Goniewicz & Zielinska-Danch, 2012). Another study was conducted in the United States in 2019 among 8837 middle school students and 10097 high school students. The findings showed that 10.5% of middle school students and 27.5% of high school students had vaped (Cullen et al., 2019). There was a study done in the United States from 16 January 2020 to 16 March 2020 among middle school students and high school students showed that 4.7% (n=550,000) of middle school students and 19.6% (n=3.02 million) of high school students currently vape (Wang, 2020). The prevalence of vaping among middle and high school students were dropped from 2019 to 2020. However, it still needs to take into account as vaping will bring various harms to health. In Connecticut and New York, a study was conducted in two suburban high schools from February 2010 to June 2011. From the results, we can see that the prevalence of vaping in the past 30 days increased significantly from 0.9% in February to 2.3% in June (Camenga et al., 2014).

2.4.2 Among adults

Adults are people who are 18 and above. Research has shown that the prevalence of vaping among young adults aged between 18 to 24 in United States has gradually decreased since 2014. However, starting in 2017, the prevalence started increasing gradually. The reported data on vaping was 5.1% in 2014, 5.2% in 2015 and 4.7% in 2016. In 2017, the prevalence increased to 5.2%; in 2018, the prevalence rose rapidly to 7.6%. However, from 2014 to 2018, the results showed that the prevalence of vaping among adults aged between 25 to 44 had few changes. Meanwhile, there was a linear decline in the prevalence among those aged 45 and above (Dai & Leventhal, 2019). An International Tobacco Control (ITC) survey was done in different countries from 2009 to 2013, showing that the current rate of vaping in 2009 in China was 0.05%. In 2010, the usage rate in the Republic of Korea was 7%, 6% in the United States, 4% in the United Kingdom and 1% in Canada. In 2011, there was 14% of the vaping rate in Malaysia. Until 2013, there was 7% of vaping rate in Australia and 3% in the Netherlands (Gravely et al., 2014). A study was done in Malaysia among people who attend government hospitals and health clinics. Findings show that 122 out of 923 of them, 13.2%, reported that they ever vaped. Most of them were males between 18 to 34, who also smoked cigarettes (Perialathan et al., 2018).

2.4.3 Among University Students

A study was done in North Carolina, United States, in 2009. 4444 students from 8 colleges were selected to complete a web-based survey, and 4.9% of them reported ever vaping, with most being males (Sutfin et al., 2013). Research conducted in Poland from September 2010 to June 2011 on university students showed that 19% of students between 20 to 24 years old had ever vaped, and 5.9% of students reported that they had vaped in the past 30 days (Goniewicz & Zielinska-Danch, 2012). Another study was done in the United Arab Emirates from March 2021 to November 2021. The study was conducted through an online survey. Questionnaires were shared online with 240 university students who came from 3 different universities. Among them, 37% of students had ever vaped. 17.5% of students reported increased nicotine usage during pandemic while 52% of the students remained unchanged (Abbasi et al., 2022). In Malaysia, there were some studies conducted among university students. One of the studies conducted in Malaysia from August 2016 to December 2016 found that among 1302 students from 6 different universities, 74.9% of them vaped. Among them, 40.3% of the students were dual smokers, meaning they used both e-cigarettes and tobacco cigarettes. Most of them were males, and they clarified that they used e-cigarettes as a smoking cessation tool (Wan Puteh et al., 2018). In the same year, a study was conducted from June 2016 to December 2016 among 484 university students in USIM. USIM is the only university in Malaysia that emphasises formal Islamic education; all the students at USIM are Malay. The results showed that only 6.6% (n=32) of students were smoked and that only 28.1% (n=9) of them had ever vaped. The prevalence was quite low as compared

with the study done by Wan Puteh et al. (2018). This might be because smoking is a sensitive issue, and among students who have religious backgrounds, they might not vape (Jaafar et al., 2021). Hence, in my research, the religions of the participants are not specified. Another study in 2017 in Malaysia among 404 undergraduate health science programme students in IMU showed that 13.8% of students had ever vaped. Among them, students who vaped every day occupied 2.4%, 4.7% of them vaped on some days, and 6.7% did not vape in the past 30 days (Goh et al., 2017).

CHAPTER III

METHODS

3.1 Chapter Overview

This chapter outlines the research methodology used, displaying the research design, sampling design, research instrument and research procedure in detail.

3.2 Research Design

The research design for this study was a descriptive cross-sectional study. This is a quantitative and non-experimental study design. It is a descriptive study because there is no comparison group involved in this study. Besides, it is a cross-sectional study as the data is just looked at one point in time (Jameson, n.d.). Survey was done by distributing the online questionnaire (Microsoft Form) through WhatsApp, Instagram and Microsoft Teams to UTAR students in Sungai Long and Kampar. Besides, the questionnaire was also delivered via face-to-face approach in UTAR Sungai Long KA and KB block.

3.3 Ethical Approval

This study was started after obtaining ethical approval from the Scientific and Ethical Review Committees (SERC) of UTAR (Appendix A).

3.4 Sampling Method

The convenience sampling method was used in this study. The population was gotten from UTAR due to time deficiency during undergraduate study. It was not enough time to conduct this study in every single university in Malaysia.

3.5 Sampling Size

This study's population was university students aged between 18 to 25, male and female from UTAR Sungai Long and Kampar. Krejcie and Morgan (1970) formula was used to calculate the sample size.

According to Krejcie and Morgan (1970), sample size can be calculated by using a formula.

$$s = \frac{X^2NP(1-P)}{[d^2(N-1) + X^2P(1-P)]}$$

s = requires sample size

X^2 = the table value of chi-square for 1 degree of freedom at desired confidence level (3.841).

N = population size.

P = the population proportion (assumed to be 0.50 since this would provide the maximum sample size).

d = the degree of accuracy expressed as a proportion (0.05).

Sample size was based on total number of UTAR students which was 22000. The sample size for this study was 378 people. 10% of the sample size was added in case some of the data is incomplete or the participants do not meet the inclusion criteria. Therefore, the sample size is around 416. Besides calculation, sample size can also simply be determined by the Krejcie and Morgan table (Appendix D).

3.6 Research Instrument

A self-constructed questionnaire was used in this survey to collect the data. A content validation was done, and the questionnaire was reviewed by 9 experts. The validity of this questionnaire was calculated using Fleiss's Kappa statistical method with a value of 0.91.

The survey form was divided into 7 main sections. The first section was Informed Consent (Appendix B), which contains a brief introductory description of the title and purpose of this research.

The second section was Personal Data Protection Notice (Appendix C) and consent form. Participants needed to indicate their intention to participate in this study by filling in the acknowledgement of notice and digital signature.

The third section was demographic data (Appendix E). Name, age, gender, ethnicity, UTAR email, campus, faculty and programme of study of participants were collected.

The fourth section assessed the history of vaping of participants to determine the prevalence of vaping among participants (Appendix F). The questionnaire from Global Adult Tobacco Survey (*Global Adult Tobacco Survey (GATS) Core Questionnaire with Optional Questions*, 2020) and the article Perceived health effects of vaping among Hungarian adult e-cigarette-only and dual users (Abafalvi et al., 2019) were used as references. The questionnaire was slightly modified from the article in (Global Adult Tobacco Survey (GATS) Core Questionnaire with Optional Questions, 2020). Some questions in (Abafalvi et al., 2019) were added to the questionnaire to ensure that the data collected can meet the objectives of this study. Participants were asked if they had ever, even once, or currently vaped, age at vaping initiation, the amount of nicotine contained in the refill e-liquid, flavours of e-liquid, places they usually vaped and the reasons they vaped.

The fifth section assessed the dependency on vaping among participants (Appendix G). Penn State Electronic Cigarette Dependence Index (PSECDI) was used (Foulds et al., 2014). There are 10 questions in this section. Each question has its own scoring. For the participants who total score between 0 to 3 indicate that they are not dependent on vaping, for those who total score between 4 to 8 indicate that they have low dependence on vaping, 9 to 12 marks indicate

that they have medium dependence on vaping and those who had the total score 13 and above indicate that they have high dependence on vaping.

The next section assessed participants' awareness of vaping's adverse effects on health (Appendix H). General questions about vaping were asked. The article “Awareness regarding the Adverse Effects of Tobacco among Adults in India: findings from secondary data analysis of GATS” was used as a reference for constructing the questionnaire (Kankaria et al., 2021). Participants were asked by the questions, “What are the negative health effects of using e-cigarettes” and “Which of the following substances are found in e-cigarettes”. Participants need to choose “Yes”, “No” or “I don’t know” for each option.

The last section asked about specific health-related questions about vaping (Appendix I). The article “Health Effects of Electronic Cigarettes on Organ Systems and its Implications for Public Health” was used for constructing the questionnaire (Seiler-Ramadas et al., 2020). Participants were asked the question “Based on what you think, does vaping cause adverse effects on health”. There are 12 questions asked about the respiratory system, 3 questions asked about the gastrointestinal system, 4 questions asked about the cardiovascular system, 7 questions asked about the neurological system, 1 question about the urogenital system, 2 questions about the hematopoietic system, 3 questions about oral cavity and lastly 4 questions about the adverse effects of vaping on physical changes. Participants were required to answer “Yes”, “No”, and “I don’t know” for each question.

3.7 Procedure

After receiving ethical approval from UTAR Scientific and Ethical Review Committee, the online questionnaire was delivered using Microsoft Form through WhatsApp, Instagram and Microsoft Teams to UTAR students in Sungai Long and Kampar. Besides, the questionnaire was also delivered via face-to-face approach in UTAR Sungai Long KA block and KB block. The researcher delivered the questionnaire by asking the participants to scan the QR code. Inclusion criteria were listed in the first page of the form. Students eligible were welcomed to sign the consent form and digital signature before proceeding to the questionnaire. After attempting all the questions, the results and responses of participants will be exported to the computer for further analysis. The data collected was highly confidential.

3.8 Data Analysis

All the data collected from the Microsoft Form will be computerized and analysed by using IBM Statistical Package for Social Science (SPSS) Statistics 26 software. The study outcomes will be produced by using Microsoft Excel. Demographic data will be analysed by descriptive statistics.

3.9 STROBE Statement

This study will fulfil the requirement listed in the STROBE checklist to conduct this cross-sectional study smoothly.

CHAPTER IV

RESULTS

4.1 Chapter Overview

This chapter outlines the findings after data collection. The results are presented in the sequence of relevant tables and graphs, followed by a brief description.

A total number of 433 responses were collected. Among them, 11 participants disagree with giving consent to process their data. Hence, these data were removed. In the end, 422 responses proceeded to the data analysis process.

4.2 Sociodemographic Characteristics

Characteristics	Frequency (%)	Mean (Std Dev)
Gender		
Male	206 (48.8)	
Female	216 (51.2)	
Age		19.89 (1.45)
18	97 (23.0)	
19	81 (19.2)	
20	87 (20.6)	
21	106 (25.1)	
22	32 (7.6)	
23	17 (4.0)	
24	2 (0.5)	
Ethnicity		
Chinese	411 (97.4)	
Malay	1 (0.2)	
Indian	6 (1.4)	
Others	4 (0.9)	
Program of Study		

Health science	75 (17.8)
Non-health science	347 (82.2)

Table 4.1: Sociodemographic data of participants

Table 4.1 displays the sociodemographic data of the participants. The total number of 422 participants includes 206 male participants (48.8%) and 216 female participants (51.2%).

The average age of participants is 19.89 (SD = 1.45). 97 participants aged 18 (23.0%), 81 participants who aged 19 (19.2%) and 87 participants who aged 20 (20.6%). The participants who aged 21 were the most, with 106 people (25.1%). There are 32 participants aged 22 (7.6%) and 17 participants aged 23 (4.0%). There are only 2 participants who are aged 24, which only constitutes 0.5%.

The majority of the participants are Chinese, consisting of 411 people (97.4%). There are 6 Indian participants (1.4%), 1 Malay participant (0.2%) and 4 participants (0.9%) that are under the category of another ethnicity, which are Sino, Bidayuh, Egyptian and Filipino.

There are 75 participants who are health science students (17.8%) and 347 participants who are non-health science students (82.2%). Non-health science students include the participants who study in foundation and bachelor of degree other than Bachelor of Physiotherapy, Bachelor of Chinese Medicine, Bachelor of Nursing and Bachelor of Medicine and Bachelor of Surgery.

4.3 Experience of Vaping

Characteristics	Frequency (%)
Have you ever, even once, vaped?	
Yes	47 (11.1)
No	375 (88.9)
Do you currently vape?	
Yes	14 (3.3)
No	408 (96.7)

Table 4.2: Experience of vaping among participants.

4.3.1 History of Vaping among Participants

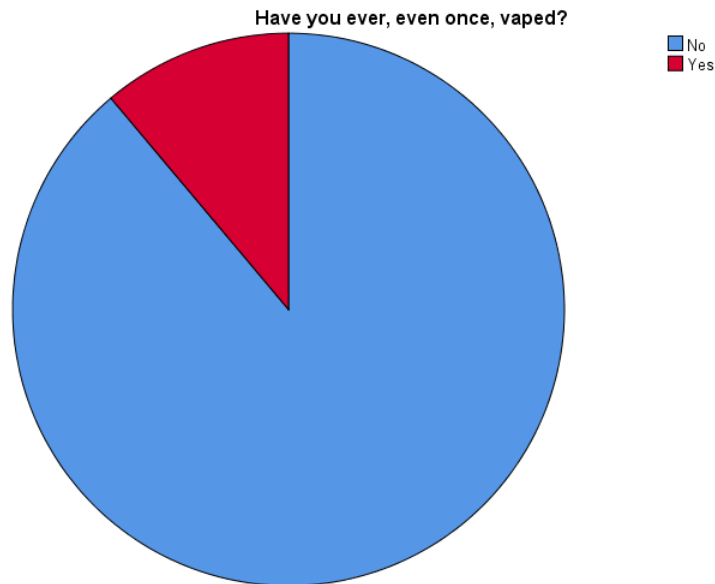


Figure 4.1: History of vaping among participants

In this study, there are 47 participants (11.1%) reported that they had ever, even once, vaped. 375 participants (88.9%) reported that they never, even once, vaped.

4.3.2 Current Vaping among Participants

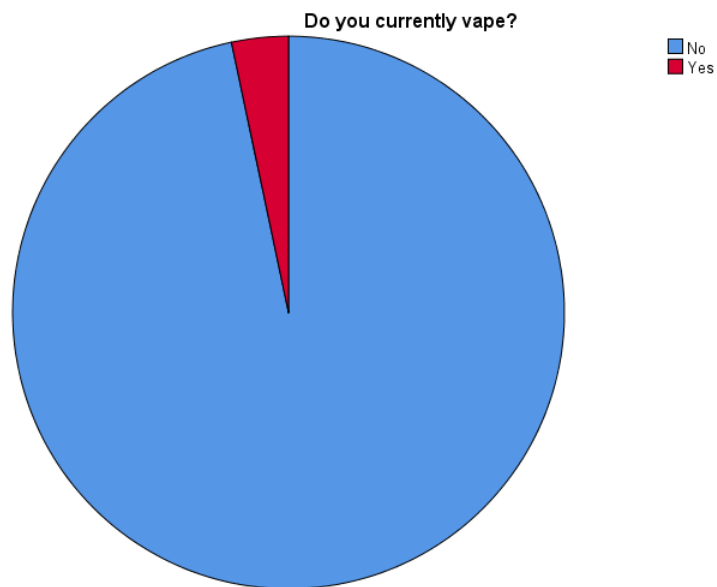


Figure 4.2: Current vaping among participants

Figure 4.2 displays the data on current vaping among participants. 408 participants (96.7%) do not vape currently. However, there are 14 participants (3.3%) reported that they had vape currently.

4.4 Proportion of Vapers by Demographic Data (n=14)

Characteristics	Frequency (%)	Mean (Std Dev)
Gender		
Male	11 (78.6)	
Female	3 (21.4)	
Age		
		20.14 (1.406)
18	3 (21.4)	
19	1 (7.1)	
20	3 (21.4)	
21	5 (35.7)	
22	2 (14.3)	
Ethnicity		
Chinese	11 (78.6)	
Others	3 (21.3)	
Program of Study		
Non-health science	14 (100.0)	

Table 4.3: Proportion of vapers by demographic data

The table above shows the proportion of vapers by demographic data. There is total of 14 participants who reported that they had vaped. Among them, 11 are males (78.6%), and 3 are females (21.4%).

The average age among 14 vapers is 20.14 (SD = 1.406). 3 vapers who currently 18 years old (21.4%) and 20 years old (21.4%), respectively, 1 vaper who is currently 19 years old (7.1%), 5 vapers who are currently 21 years old (35.7%) and 2 vapers who now 22 years old (14.3%).

78.6% or 11 of the participants are from Chinese, and 21.3% or 3 of them, are from others, including 1 Sino, 1 Egyptian and 1 Filipino.

From table 4.3, it can be seen that all 14 vapors (100%) are from non-health science programme studies. There is no one from the health science programme study.

4.5 Vaping Background

Characteristics	Frequency (%)
At what age do you start vaping?	
< 10 y/o	0 (0)
10 – 15 y/o	3 (21.4)
16 – 20 y/o	8 (57.1)
21 – 25 y/o	3 (21.4)
26 – 30 y/o	0 (0)
I don't know	0 (0)
How many mg/ml of nicotine contains in the refill e-liquid you are currently using?	
1 – 18 mg/ml (nicotine free)	9 (64.3)
>18 mg/ml	2 (14.3)
I don't know	3 (21.4)
Which flavours of e-liquid do you currently use? (Can choose more than one options)	
Tobacco flavoured	0 (0)
Menthol or mint flavoured	4 (25.0)
Fruit flavoured	11 (68.8)
No flavoured	0
Others	1 (6.3)
Where do you usually vape? (Can choose more than one options)	
At home	11 (31.4)
At school	4 (11.4)
On the street/ public place	12 (34.3)
In restaurants or social sites	6 (17.1)
Others	2 (5.7)
What are the reasons that you vape? (Can choose more than one options)	
To quit tobacco smoking	2 (5.6)
To release stress	11 (30.6)
It is less harmful than tobacco cigarettes	4 (11.1)
It is cheaper than tobacco cigarettes	4 (11.1)
It comes in flavours I like	5 (13.9)
Influence from family	0 (0)
Influence from friends	8 (22.2)
Others	2 (5.6)

Table 4.4: Habits of vaping of participants.

4.5.1 Age of Vaping

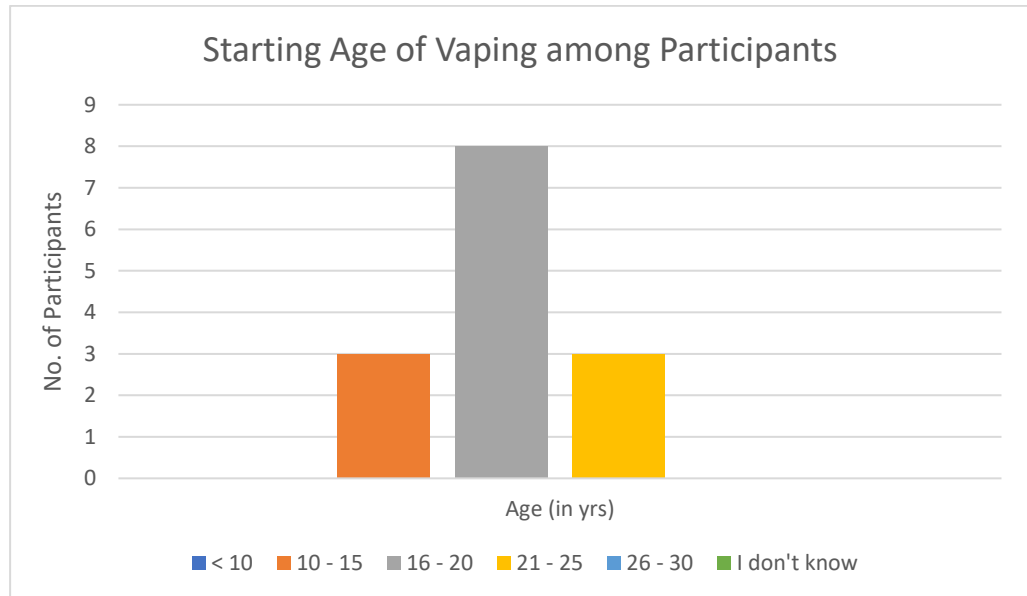


Figure 4.3: Starting age of vaping among participants

Figure 4.3 illustrates the starting age of vaping among participants who had vaped. 3 participants (21.4%) started vaping when they were 10 to 15 years old. Besides, 8 participants (57.1%) started vaping between 16 and 20 years old. Lastly, 3 participants (21.4%) reported that they started vaping between 21 and 25 years old. No participants reported that they started vaping when they were younger than 10 years old and between 26 to 30 years old.

4.5.2 Nicotine Contains in Refill E-liquid

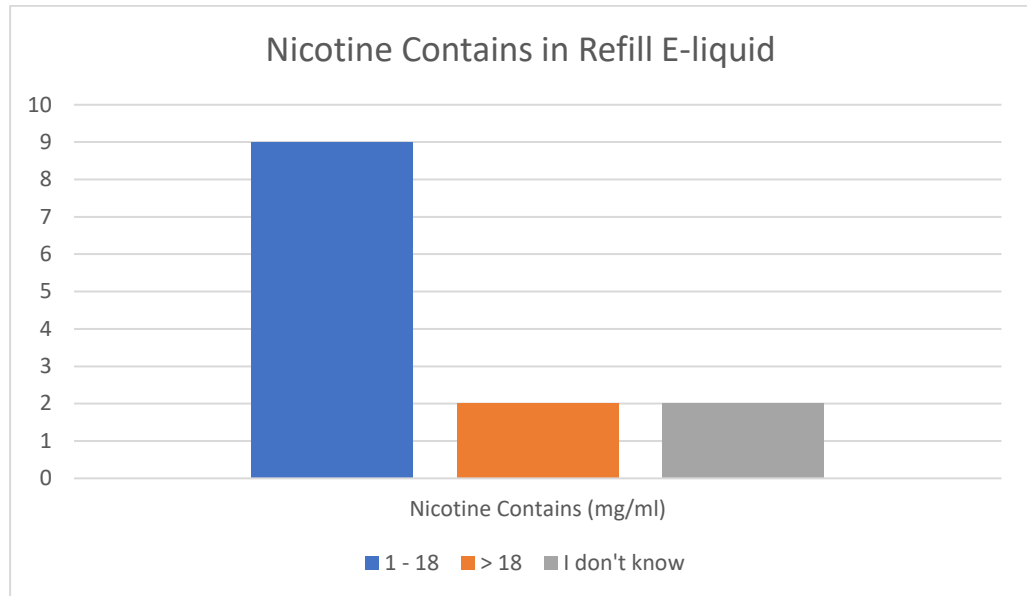


Figure 4.4: Nicotine contains in refill e-liquid

Figure 4.4 shows the nicotine contained in refill e-liquid that is currently used by participants who had vaped. There are 9 vapers (64.3%) who used refill e-liquid, which contains 1 – 18 mg/ml of nicotine, which is considered nicotine-free e-liquid. Besides, there are 2 vapers (14.3%) who used the refill e-liquid which contains more than 18 mg/ml of nicotine, and lastly, there are 3 vapers (21.4%) not sure about the nicotine contained in the refill e-liquid they used.

4.5.3 Flavours of e-liquid

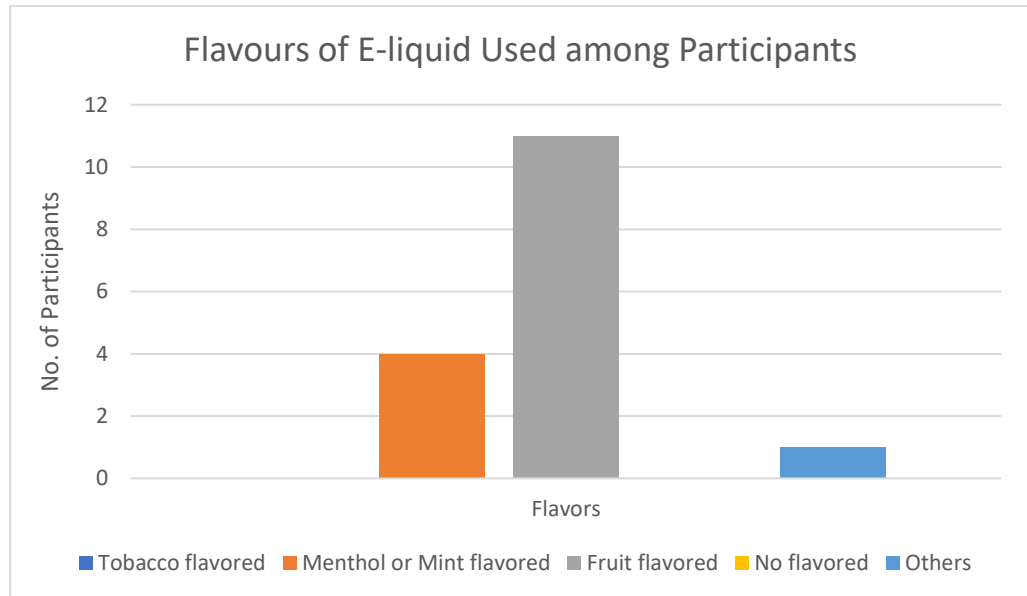


Figure 4.5: Flavours of refill e-liquid used among participants

The figure above shows the flavours of refill e-liquid used by the vapers. In this question, participants can choose more than one flavour of refill e-liquid that they used. There is no one using tobacco-flavoured and no-flavoured refill e-liquid. For menthol or mint flavoured, there are 4 vapers (25.0%) currently use it. The most popular flavour of refill e-liquid is fruit flavoured, used by 11 participants (68.8%). There is 1 participant (6.3%) reported that he currently used refill e-liquid other than the options given, which is Chinese tea flavoured.

4.5.4 Place of vaping

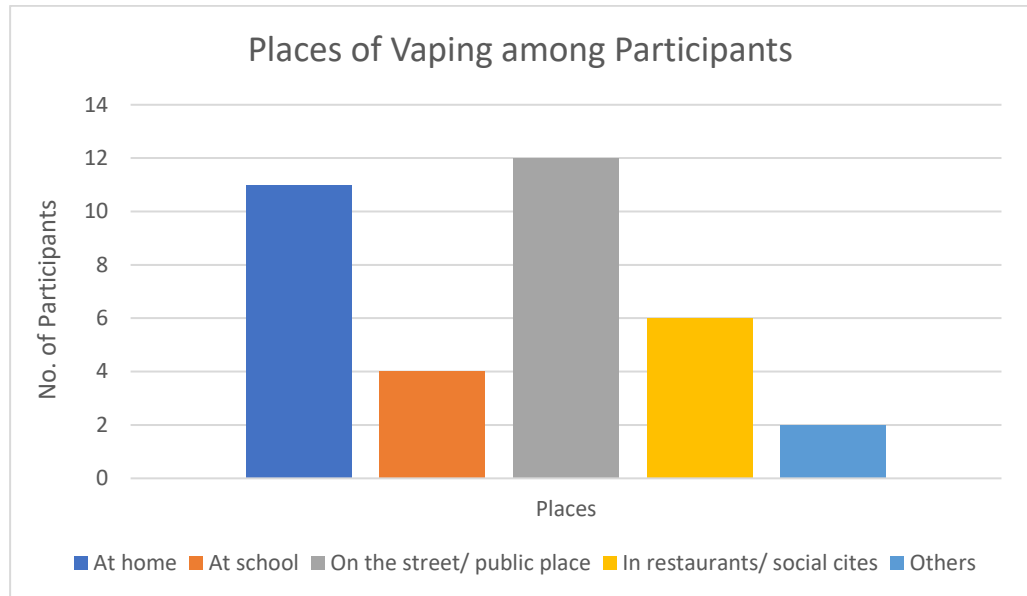


Figure 4.6: Places of vaping among participants

The figure above illustrates the places of vaping among participants. In this question, participants were allowed to choose more than one answer. From the figure above, it can be seen that most of the vapers, which include 12 of them (34.3%), are usually vaped on the street or public place. 11 of them (31.4%) vaped at home, 6 of them (17.1%) vaped in restaurants or social sites, and 4 of them (11.4%) vaped at school. 2 of them (5.7%) selected the option “others” and they mentioned that they usually vaped everywhere.

4.5.5 Reasons of vaping

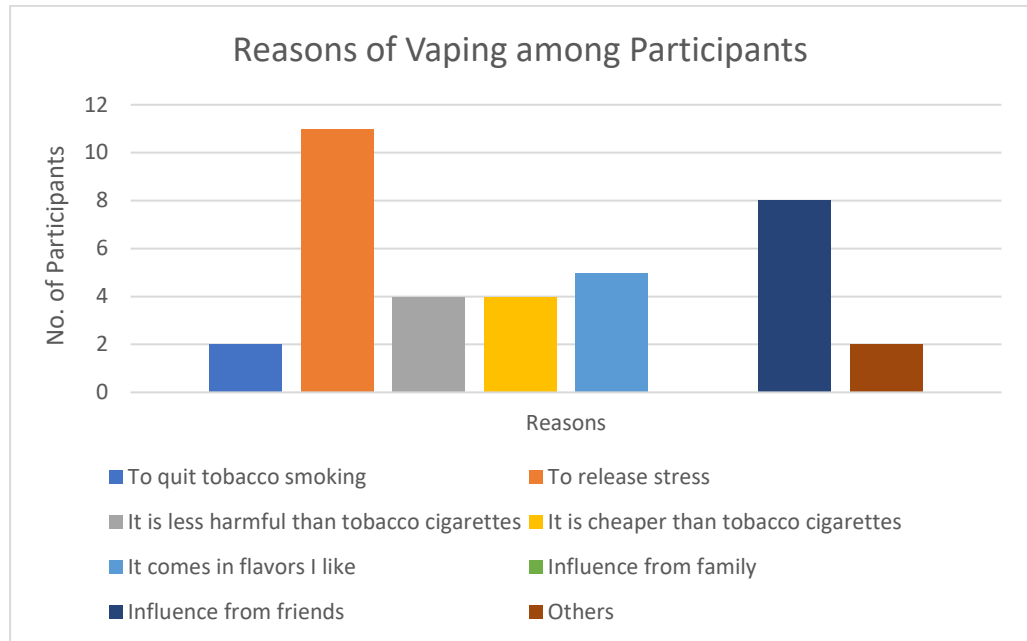


Figure 4.7: Reasons of vaping among participants

Figure 4.7 displays the reason for vaping among participants. In this question, participants were allowed to choose more than one answer. From the responses, it can be seen that most of the participants, occupied 11 responses (30.6%) vaped to release stress. Besides, 8 of them (22.2%) vaped because of the influence from friends, 5 of them (13.9%) vaped because e-cigarettes come in many flavours they like, 4 of them vaped (11.1%) because they thought that e-cigarettes are less harmful than tobacco cigarettes. Also, 4 of them (11.1%) thought that e-cigarettes are cheaper than tobacco cigarettes. 2 of the participants (5.6%) stated that vaping can help them to quit tobacco smoking. Lastly, another 2 of the participants (5.6%) mentioned that they vaped because it was refreshing as well as energetic.

**4.6 Scoring for Penn State Electronic Cigarette Dependence Index
(PSECDI)**

Characteristics	Points
How many times per day do you usually use your electronic cigarette? (assume that one “time” consists of around 15 puffs or lasts around 10 minutes)	
0 – 4 times/ day	0
5 – 9 times/ day	1
10 – 14 times/ day	2
15 – 19 times/ day	3
20 – 29 times/ day	4
> 30 times/ day	5
On days that you can use your electronic cigarette freely, how soon after you wake up do you first use your electronic cigarette?	
0 – 5 mins	5
6 – 15 mins	4
16 – 30 mins	3
31 – 60 mins	2
61 – 120 mins	1
> 121 mins	0
Do you sometimes awaken at night to use your electronic cigarette?	
Yes	1
No	0
If yes, how many nights per week do you typically awaken to use your electronic cigarette?	
0 – 1 nights	0
2 – 3 nights	1
> 4 nights	2
Do you use an electronic cigarette now because it is really hard to quit?	
Yes	1
No	0
Do you ever have strong cravings to use an electronic cigarette?	
Yes	1
No	0
Over the past week, how strong have the urges to use an electronic cigarette been?	
None/ Slight	0
Moderate/ Strong	1
Very strong/ Extremely strong	2
Is it hard to keep from using an electronic cigarette in places where you are not supposed to?	
Yes	1

No	0
Did you feel more irritable because you couldn't use an electronic cigarette?	
Yes	1
No	0
Did you feel nervous, restless, or anxious because you couldn't use an electronic cigarette?	
Yes	1
No	0

Table 4.5: Scoring for Penn State Electronic Cigarette Dependence Index (PSECDI)

Table 4.5 demonstrates how each Penn State Electronic Cigarette Dependence Index (PSECDI) was scored. There is a total number of 10 questions. The score from each question was summed to provide an overall total score for nicotine dependence. The total score for PSECDI will then be categorized into 4 categories. Total scores between 0 to 3 will be classified as “not dependent”, total scores between 4 to 8 will be categorized as “low dependence”, total scores between 9 to 12 will be categorized as “medium dependence”, and total scores 13 and above will be categorized as “high dependence”. 4 participants (28.6%) were categorized as not dependent, 7 participants (50.0%) were categorized as low dependent, 2 participants (14.3%) were categorized as medium dependent, and 1 participant (7.1%) was categorized as highly dependent. The average PSECDI score among 14 participants who vaped was 5.71 (SD=3.518), indicating a low level of dependence.

4.7 Addiction Characteristics

Characteristics	Frequency (%)
How many times per day do you usually use your electronic cigarette? (assume that one “time” consists of around 15 puffs or lasts around 10 minutes)	
0 – 4 times/ day	3 (21.4)
5 – 9 times/ day	3 (21.4)
10 – 14 times/ day	1 (7.1)
15 – 19 times/ day	1 (7.1)
20 – 29 times/ day	2 (14.3)
> 30 times/ day	4 (28.6)
On days that you can use your electronic cigarette freely, how soon after you wake up do you first use your electronic cigarette?	
0 – 5 mins	4 (28.6)
6 – 15 mins	1 (7.1)
16 – 30 mins	2 (14.3)
31 – 60 mins	2 (14.3)
61 – 120 mins	0
> 121 mins	5 (35.7)
Do you sometimes awaken at night to use your electronic cigarette?	
Yes	5 (35.7)
No	9 (64.3)
If yes, how many nights per week do you typically awaken to use your electronic cigarette?	
0 – 1 nights	4 (80.0)
2 – 3 nights	0
> 4 nights	1 (20.0)
Do you use an electronic cigarette now because it is really hard to quit?	
Yes	6 (42.9)
No	8 (57.1)
Do you ever have strong cravings to use an electronic cigarette?	
Yes	8 (57.1)
No	6 (42.9)
Over the past week, how strong have the urges to use an electronic cigarette been?	
None/ Slight	6 (42.9)
Moderate/ Strong	8 (57.1)
Very strong/ Extremely strong	0
Is it hard to keep from using an electronic cigarette in places where you are not supposed to?	
Yes	4 (28.6)
No	10 (71.4)

Did you feel more irritable because you couldn't use an electronic cigarette?

Yes	7 (50.0)
No	7 (50.0)

Did you feel nervous, restless, or anxious because you couldn't use an electronic cigarette?

Yes	5 (35.7)
No	9 (64.3)

Table 4.6: Addiction Characteristics among Participants who had vaped

4.7.1 How many times per day do you usually use your electronic cigarette? (assume that one “time” consists of around 15 puffs or lasts around 10 minutes)

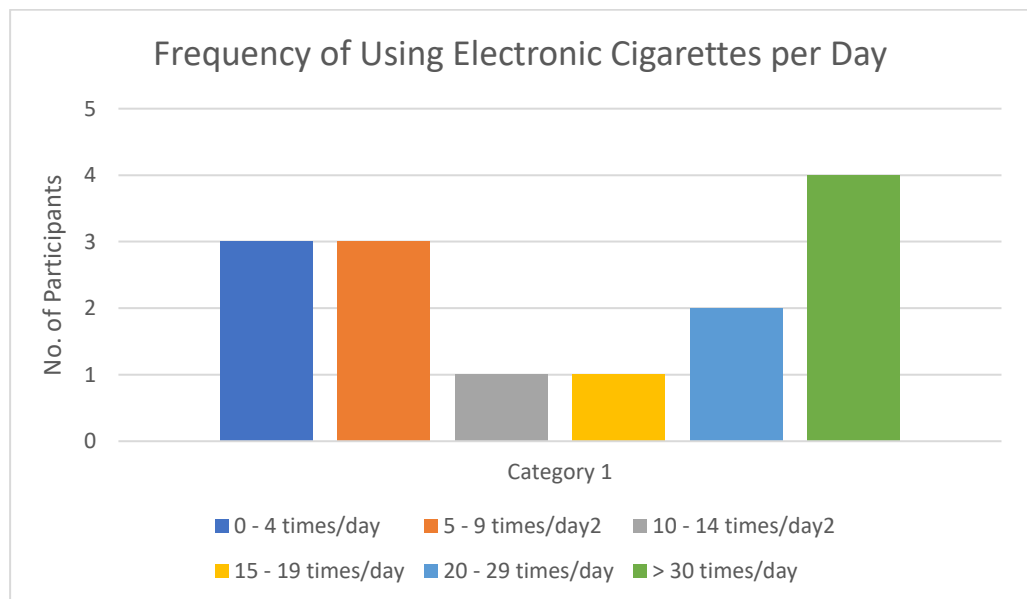


Figure 4.8: Frequency of using electronic cigarettes per day

The figure above displays the frequency of using electronic cigarettes per day by vapers. There are 3 participants (21.4%) reported that they only used electronic cigarettes 0 to 4 times per day. Also, there are 3 participants (21.4%) reported that they used electronic cigarettes 5 to 9 times per day. Besides, there are 1 participant (7.1%) used electronic cigarettes 10 to 14 times per day, and

another 1 participant (7.1%) reported that they used electronic cigarettes 15 to 19 times per day. 2 participants or 14.3% of them, reported that they need to use electronic cigarettes 20 to 29 times per day. Majority of the participants, consisting of 4 participants (28.6%), reported that they need to vape more than 30 times per day.

4.7.2 On days that you can use your electronic cigarette freely, how soon after you wake up do you first use your electronic cigarette?

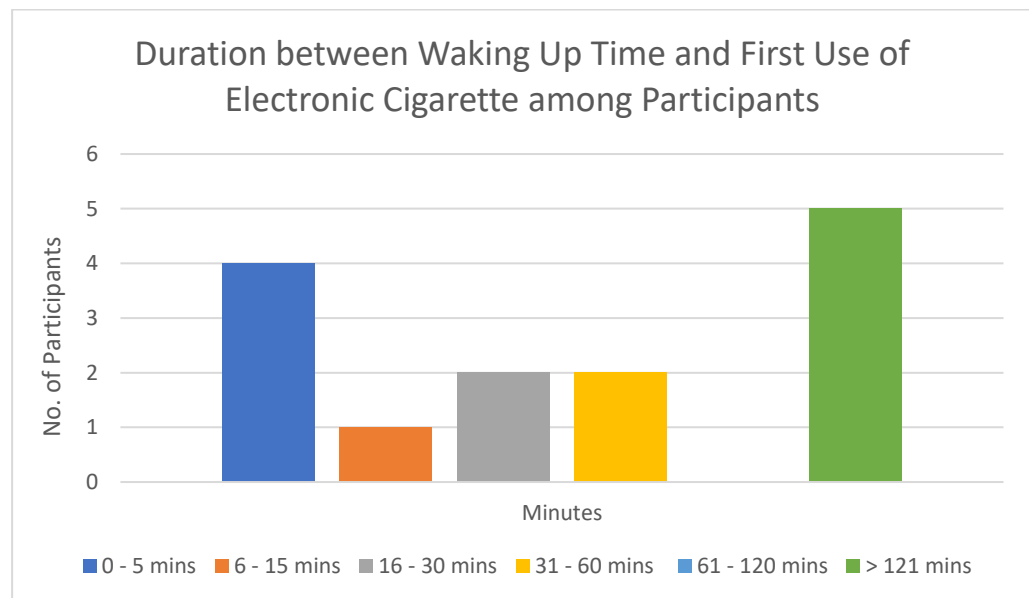


Figure 4.9: Duration between waking up time and the first use of electronic cigarette among participants

The figure above shows the duration between waking up time and participants' first use of an electronic cigarette. There were 4 participants (28.6%) who reported that they vaped immediately in 5 minutes after waking up. Besides, there was 1 participant (7.1%) started vaping in 6 to 15 minutes after waking up. 2 participants (14.3%) started vaping in 16 to 30 minutes after waking up and 2 participants (14.3%) started vaping in 31 to 60 minutes after waking up. No one

reported that they vaped in 61 to 120 minutes after waking up. Majority of the participants, which occupied 5 of the participants (35.7%) reported that they vaped in 121 minutes or more after waking up.

4.7.3 Do you sometimes awaken at night to use your electronic cigarette?

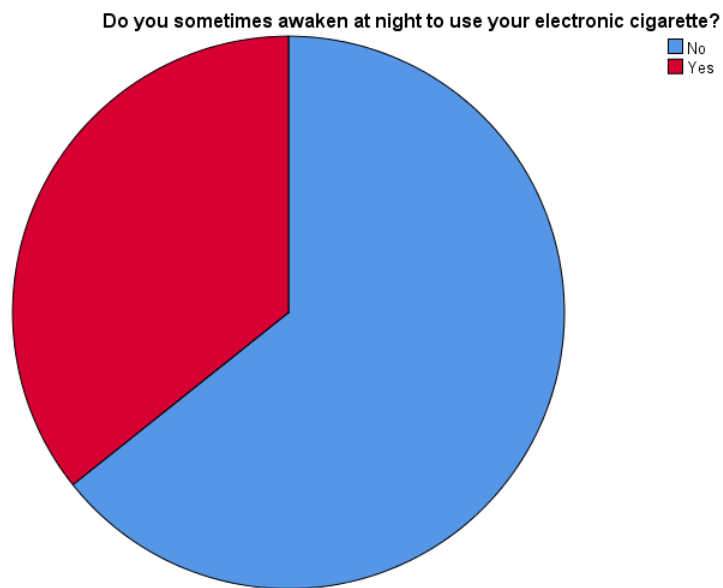


Figure 4.10: Habit on awaken at night to use an electronic cigarette

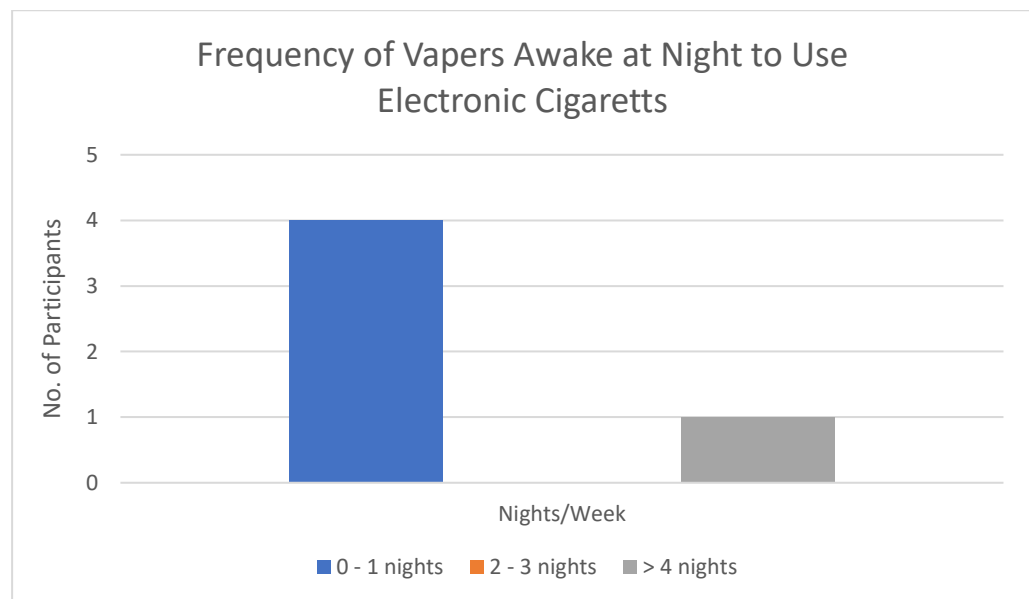


Figure 4.11: Frequency of vapers awake at night to use electronic cigarettes

In Figure 4.11, there are 5 participants (35.7%) reported that they sometimes awaken at night to use electronic cigarettes. Among them, 4 participants (80.0%) reported needing to be awake 0 to 1 night per week to use

electronic cigarettes. No participants reported that they need to be awake 2 to 3 nights per week to use electronic cigarettes. Only 1 participant (20.0%) claimed that he needs to be awake more than 4 nights per week to use electronic cigarettes. On the other hand, 9 participants (64.3%) mentioned that they do not awake at night to use electronic cigarettes.

4.7.4 Do you use an electronic cigarette now because it is really hard to quit?

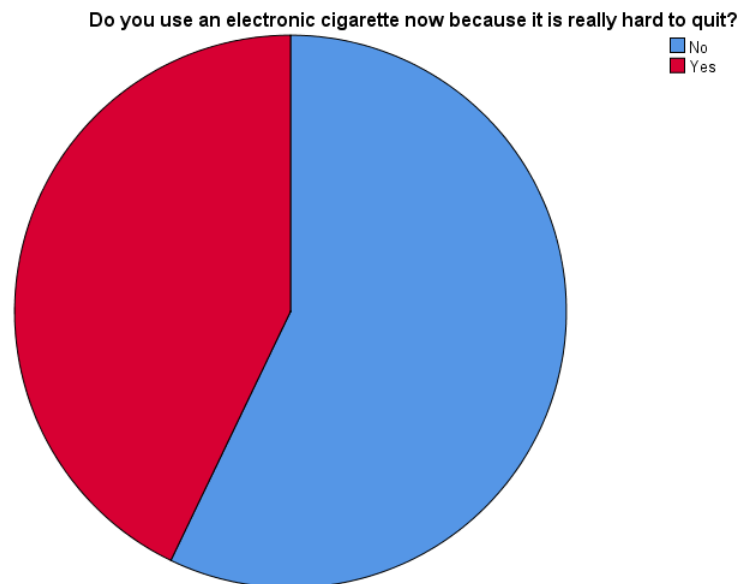


Figure 4.12: Habit of using an electronic cigarette due to addiction

From the figure above, it can be seen that 6 vapers (42.9%) reported that they vaped nowadays because it is really hard to quit. However, 8 vapers (57.1%) vaped not for that reason.

4.7.5 Do you ever have strong cravings to use an electronic cigarette?

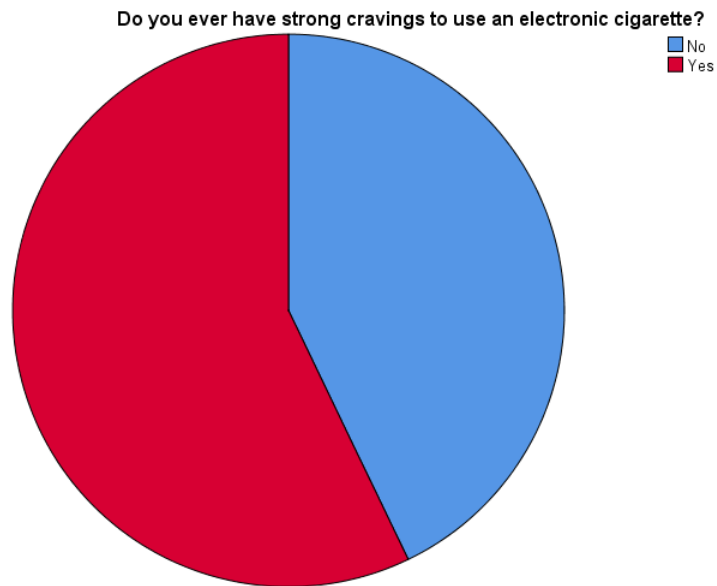


Figure 4.13: Presence of strong cravings towards using an electronic cigarette

From the figure above, it can be seen that 8 vapers (57.1%) vaped because they had strong cravings to use it meanwhile, 6 vapers (42.9%) vaped not because of that reason.

4.7.6 Over the past week, how strong have the urges to use an electronic cigarette been?

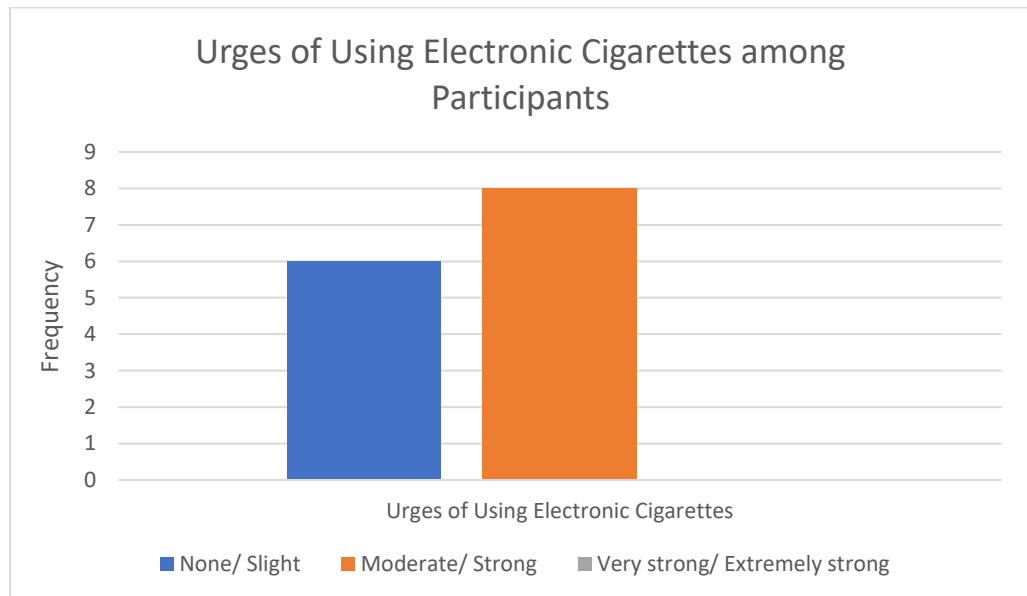


Figure 4.14: Urges of using electronic cigarettes among participants

From the figure above, 6 participants (42.9%) reported having no or slight urges to use electronic cigarettes. Besides, 8 participants (57.1%) reported that they had moderate or strong urges to use electronic cigarettes. No one reported that they had very strong or extremely strong urges to use electronic cigarettes.

4.7.7 Is it hard to keep from using an electronic cigarette in places where you are not supposed to?

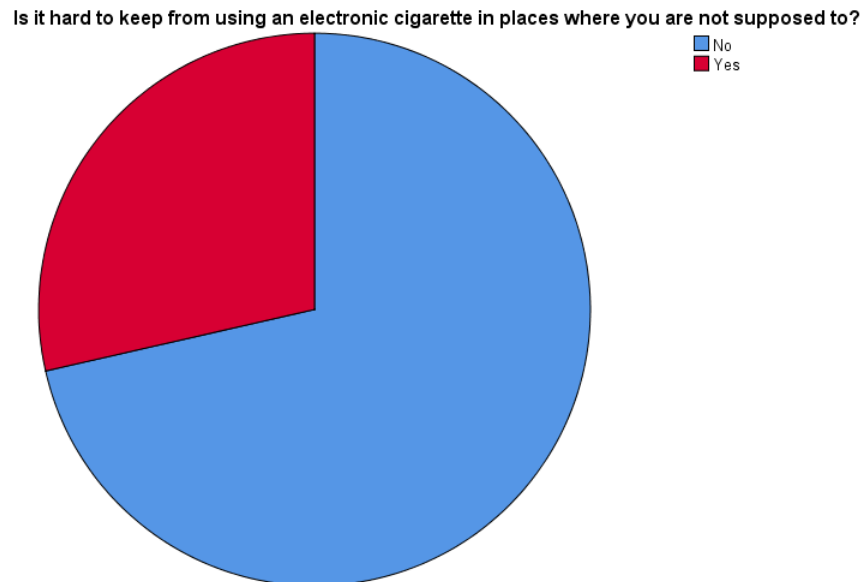


Figure 4.15: Difficulty in resisting using an electronic cigarette in places that are not supposed to.

From the figure above, 4 participants (28.6%) reported that it is really hard to keep from using an electronic cigarette in places where they are not supposed to. However, 10 participants (71.4%) refused this statement.

4.7.8 Did you feel more irritable because you couldn't use an electronic cigarette?

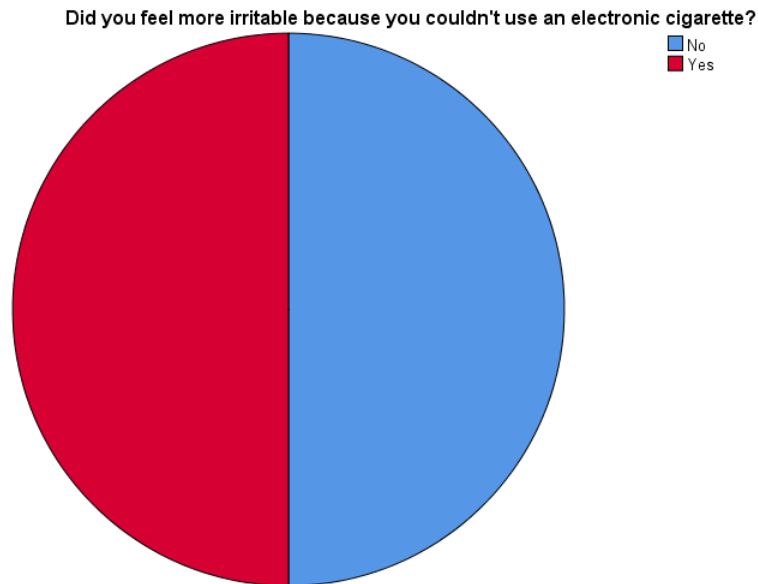


Figure 4.16: Feeling of irritation due to unable to use electronic cigarettes among participants.

From the figure above, 7 participants (50.0%) reported feeling more irritable because they couldn't use an electronic cigarette. Meanwhile, 7 participants (50.0%) did not feel irritable because they couldn't use an electronic cigarette.

4.7.9 Did you feel nervous, restless, or anxious because you couldn't use an electronic cigarette?

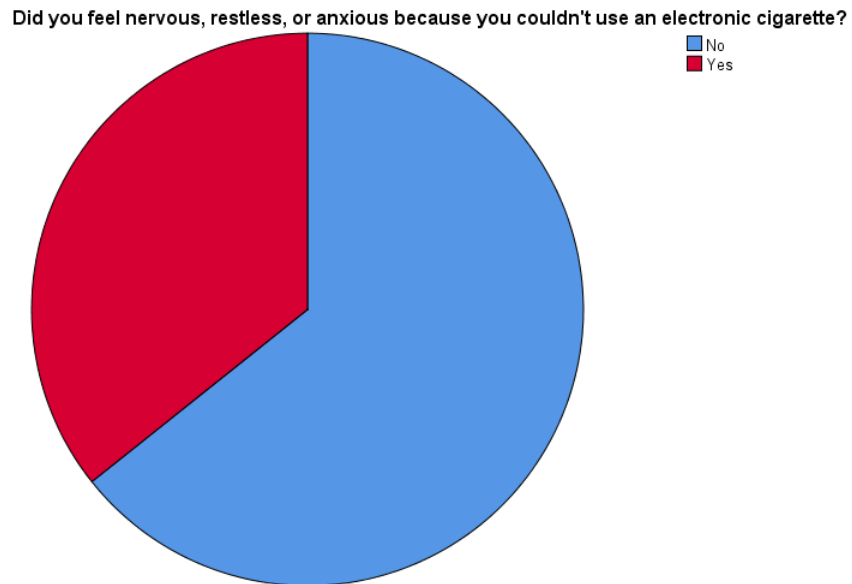


Figure 4.17: Feeling of nervousness, restlessness or anxiety due to being unable to use electronic cigarettes among participants.

From the figure above, 5 vapers (35.7%) reported feeling nervous, restless or anxious because they couldn't use an electronic cigarette, while 9 vapers (64.3%) did not feel so.

4.8 General Questions about Vaping

4.8.1 Awareness on Negative Health Effects of Vaping

Characteristics	Yes n (%)	No n (%)	I don't know n (%)
What are the negative health effects of using e-cigarettes?			
Increased risk of heart attack	361 (85.5)	16 (3.8)	45 (10.7)
Increased risk of stroke	337 (79.9%)	28 (6.6)	57 (13.5)
Increased risk of coronary artery disease	368 (87.2)	15 (3.6)	39 (9.2)
Increased risk of seizure (a condition that causes temporary abnormalities in muscle tone or movements)	250 (59.2)	56 (13.3)	116 (27.5)
Decreased risk of lung disease	129 (30.6)	269 (63.7)	24 (5.7)
Decreased risk of depression	115 (27.3)	194 (46.0)	113 (26.8)

Table 4.7: Awareness on negative health effects of vaping among participants

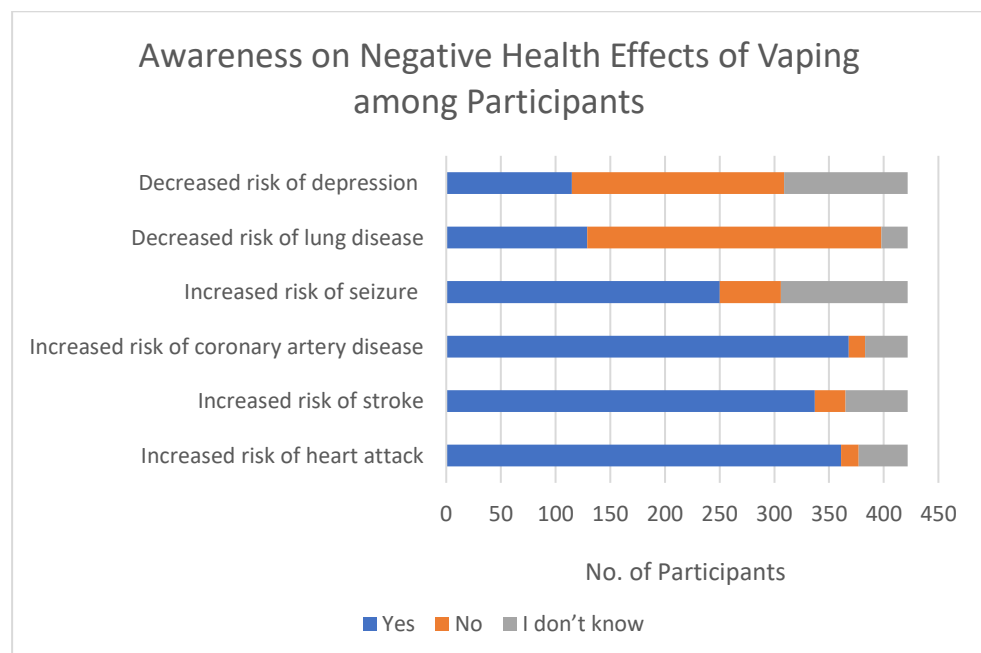


Figure 4.18: Awareness on negative health effects of vaping among participants

From figure 4.18, among 422 participants, majority of the participants (87.2%) had awareness regarding the question “increased risk of coronary artery disease”. Only 15 participants (3.6%) answered “No” to this question, and 39 participants (9.2%) answered “I don’t know” for this question. The second highest, which occupied 85.5% of the participants, had awareness on the “increased risk of a heart attack.” 16 of them (3.8%) answered “No” to this question, and 45 of them (10.7%) did not have any idea about this question. 79.9% of the participants were aware of the “increased risk of stroke”. However, 28 of them (6.6%) answered “No” to this question, and 57 of them (13.5%) answered “I don’t know” for this question. For the question “decreased risk of lung disease”, 269 participants (63.7%) answered “No” for this question, and 24 participants (5.7%) answered “I don’t know” for this question. Only 129 participants (30.6%) answered “Yes” to this question. Besides, 194 participants (46.0%) answered “No” to the question “decreased risk of depression”, and 113 participants (26.8%) answered “I don’t know” for this question. 115 of them (27.3%) answered “Yes” to this question. Lastly, for the question “increased risk of seizure”, 250 participants (59.2%) answered “Yes”, 56 participants (13.3%) answered “No” and 116 participants (27.5%) answered “I don’t know”.

4.8.2 Awareness on the Substances Contained in E-Cigarettes

Characteristics	Yes n (%)	No n (%)	I don't know n (%)
Which of the following substances are found in e-cigarettes?			
Formaldehyde	150 (35.5)	18 (4.3)	254 (60.2)
Volatile organic compounds (organic compounds that evaporate easily at room temperature)	199 (47.2)	43 (10.2)	180 (42.7)
Heavy metals (tin, lead, nickel, cadmium)	185 (43.8)	62 (14.7)	175 (41.5)
Benzoic acid	149 (35.3)	28 (6.6)	245 (58.1)
Carbon monoxide	222 (52.6)	57 (13.5)	143 (33.9)
Tar	223 (52.8)	88 (20.9)	111 (26.3)

Table 4.8: Awareness on the substances contained in e-cigarettes among participants

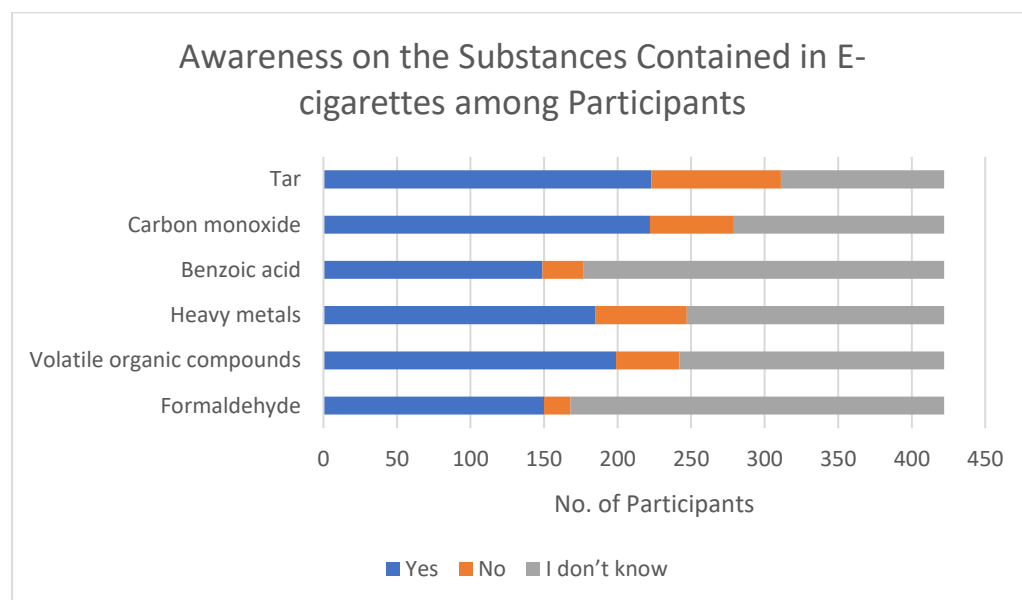


Figure 4.19: Awareness on the substances contained in e-cigarettes among participants

In figure 4.19, the awareness of the participants on the substances contained in e-cigarettes was tested. 150 participants (35.5%) believed that there is formaldehyde in e-cigarettes, 18 participants (4.3%) thought that there is an absence of formaldehyde in e-cigarettes, and 254 participants (60.2%) did not have any idea about it. For the volatile organic compounds, an organic compound which evaporates easily at room temperature, 199 participants (47.2%) believed it is present in e-cigarettes. However, 43 of them (10.2%) refused to believe the presence of volatile organic compounds, and 180 of them (42.7%) answered “I don’t know”. For heavy metals, which include tin, lead, nickel and cadmium, 185 participants (43.8%) believed that it is present in e-cigarettes, while 62 participants (14.7%) answered “No” and 175 (41.5%) answered “I don’t know”. Besides, for the benzoic acid, 149 participants (35.3%) answered “Yes”, 28 participants (6.6%) answered “No” and 245 participants answered “I don’t know”. Moreover, 222 participants (52.6%) believed that there is a present of carbon monoxide in an e-cigarette. 57 participants (13.5%) disagree, and 143 participants (33.9%) do not know about it. Lastly, for the presence of tar in e-cigarettes, most of the participants, which involve 223 of them (52.8%) answered “Yes”, 88 of them (20.9%) answered “No” and 111 of them (26.3%) answered “I don’t know”.

4.9 Specific Questions on the Adverse Effects of Vaping to Health

4.9.1 Awareness on the Adverse Effects of Vaping on Respiratory System

Characteristics	Yes n (%)	No n (%)	I don't know n (%)
Based on what you think, does vaping cause adverse effects on respiratory system?			
Breath with whistling sound (wheezing)	314 (74.4)	42 (10.0)	66 (15.6)
Cough	372 (88.2)	25 (5.9)	25 (5.9)
Difficulty in breathing (dyspnea)	337 (79.9)	41 (9.7)	44 (10.5)
Cancer (e.g. lung, nasal, paranasal cancer)	369 (87.4)	21 (5.0)	32 (7.6)
Chest pain	265 (62.8)	57 (13.5)	100 (23.7)
Cough with blood (haemoptysis)	213 (50.5)	85 (20.1)	124 (29.4)
Low oxygen saturation (oxygen in blood < 95%)	269 (63.7)	36 (8.5)	117 (27.7)
Breathing rate >20 breaths per minute (tachypnea)	273 (64.7)	35 (8.3)	114 (27.0)
Irreversible injury to the lung	354 (83.9)	15 (3.6)	53 (12.6)
Presence of excess fluid in the lungs (pleural effusion)	238 (56.4)	61 (14.5)	123 (29.1)
Presence of air in between lungs and chest (pneumothorax)	213 (50.5)	63 (14.9)	146 (34.6)
Presence of airflow blockage and breathing-related problems (pulmonary obstruction)	272 (64.5)	40 (9.5)	110 (26.1)

Table 4.9: Awareness on the adverse effects of vaping on respiratory system among participants

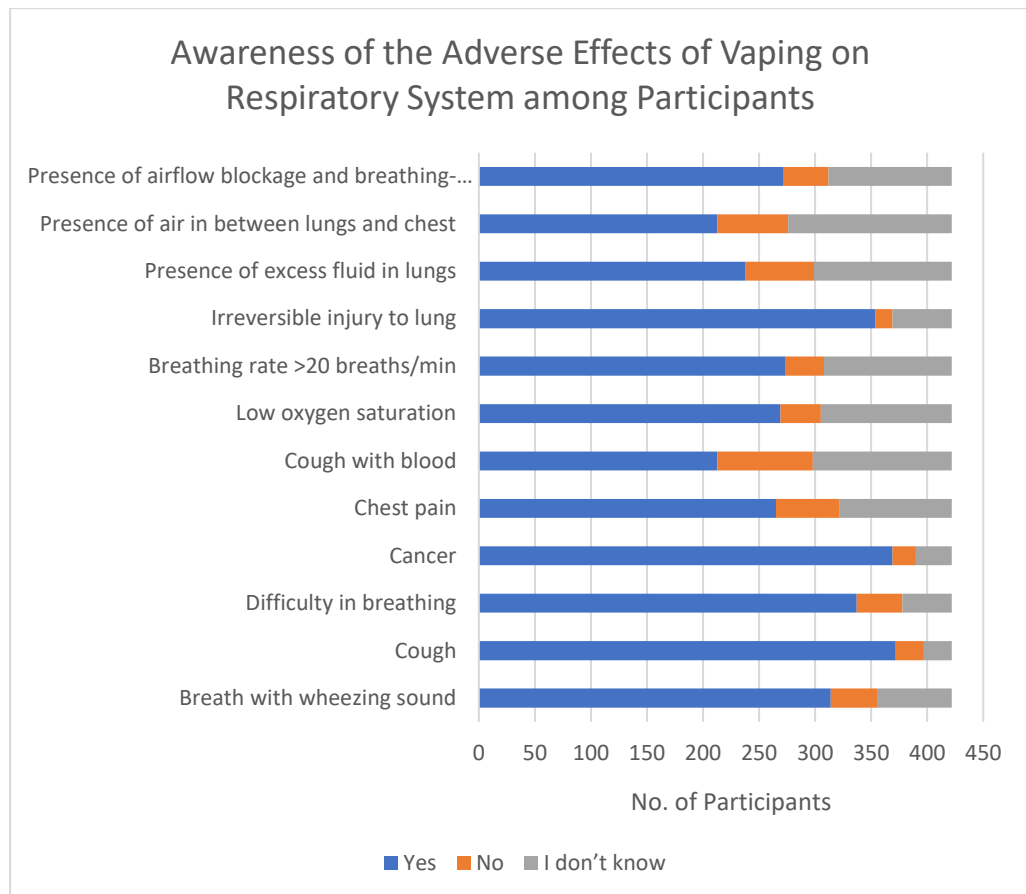


Figure 4.20: Awareness on the adverse effects of vaping on the respiratory system among participants

Figure 4.20 illustrates the awareness of the participants on the adverse effects of vaping on the respiratory system. 314 participants (74.4%) agree that vaping will cause breathing with a whistling sound, 42 participants (10.0%) disagree with that and 66 (15.6%) do not know about that. Most of the participants answered “Yes” with a total of 372 (88.2%) for cough, 25 participants (5.9%) answered “No”, and 25 of them (5.9%) answered “I don’t know”. For the statement difficulty in breathing, 337 participants (79.9%) answered “Yes”, 41 participants (9.7%) answered “No” and 44 participants (10.5%) answered “I don’t know”. Besides, there were 369 participants (87.4%) who believed that vaping would cause cancer to the lung, nasal and paranasal,

whereas 21 participants (5%) disagreed with that, and 32 participants (7.6%) did not know about that. Moreover, there were 265 participants (62.8%) indicated that vaping will cause chest pain, whereas 57 participants (13.5%) disagreed with that, and lastly, 100 participants (23.7%) did not know about that. For the statement cough with blood, there were 50.5%, 213 participants ticked for the answer “Yes”, 85 participants (20.1%) answered “No” and 124 participants (29.4%) answered “I don’t know”. Furthermore, for the statement low oxygen saturation, majority of the participants, with a total number of 269 (63.7%), agreed that it was one of the effects of vaping on health. 36 participants (8.5%) disagreed with that, and 117 participants (27.7%) did not know about it. A total of 273 or 64.7% of the participants, believed that vaping would increase the breathing rate by more than 20 breaths per minute. 35 or 8.3% disagreed with that, and 114 or 27.0% of the participants did not know about it. For the statement irreversible injury to the lung, 354 participants (83.9%) answered “Yes” to this statement, whereas 15 participants (3.6%) answered “No” and 53 of them (12.6%) answered “I don’t know”. Lastly, 238 participants (56.4%) believed that vaping would lead to the presence of excess fluid in the lungs, 61 participants (14.5%) disagreed with them and finally, 123 of the participants (29.1%) did not know about it.

4.9.2 Awareness on the Adverse Effects of Vaping on Gastrointestinal System

Characteristics	Yes n (%)	No n (%)	I don't know n (%)
Based on what you think, does vaping cause adverse effects on gastrointestinal system?			
Nausea, vomiting	204 (48.3)	98 (23.2)	120 (28.4)
Diarrhea	100 (23.7)	178 (42.2)	144 (34.1)
Abdominal pain	126 (29.9)	147 (34.8)	149 (35.3)

Table 4.10: Awareness on the adverse effects of vaping on gastrointestinal system among participants

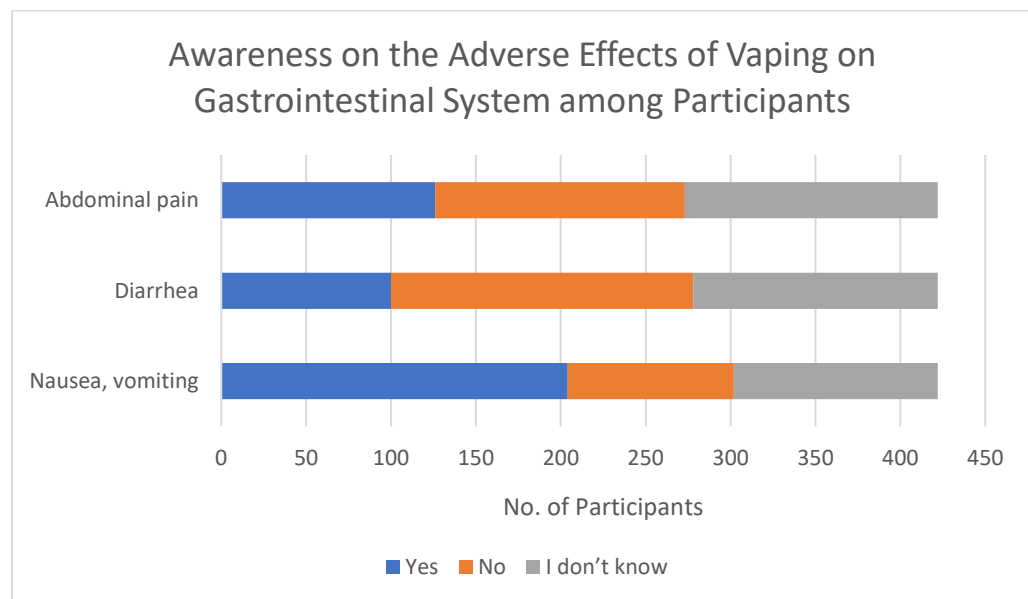


Figure 4.21: Awareness on the adverse effects of vaping on the gastrointestinal system among participants

Based on figure 4.21, the participants' awareness of the adverse effects of vaping on the gastrointestinal system was analysed. 204 participants (48.3%) agreed that vaping would cause nausea and vomiting, whereas 98 participants (23.2%) disagreed with that, and 120 participants (28.4%) did not know about it.

For the adverse effect of diarrhoea, 100 participants (23.7%) answered “Yes”, whereas 178 participants (42.2%) answered “No” and 144 participants (34.1%) answered “I don’t know”. Lastly, for the statement abdominal pain, 126 participants (29.9%) agreed with that, 147 participants (34.8%) disagreed with that, and 149 (35.3%) did not have any idea about it.

4.9.3 Awareness on the Adverse Effects of Vaping on Cardiovascular System

Characteristics	Yes n (%)	No n (%)	I don’t know n (%)
Based on what you think, does vaping cause adverse effects on cardiovascular system?			
Decreased blood pressure	124 (29.4)	184 (43.6)	114 (27.0)
Tachycardia (heart rate > 100 beats/minute)	248 (58.8)	40 (9.5)	134 (31.8)
Narrowing of the large blood vessels on the heart (acute endothelial dysfunction)	253 (60.0)	38 (9.0)	131 (31.0)

Table 4.11: Awareness on the adverse effects of vaping on cardiovascular system among participants

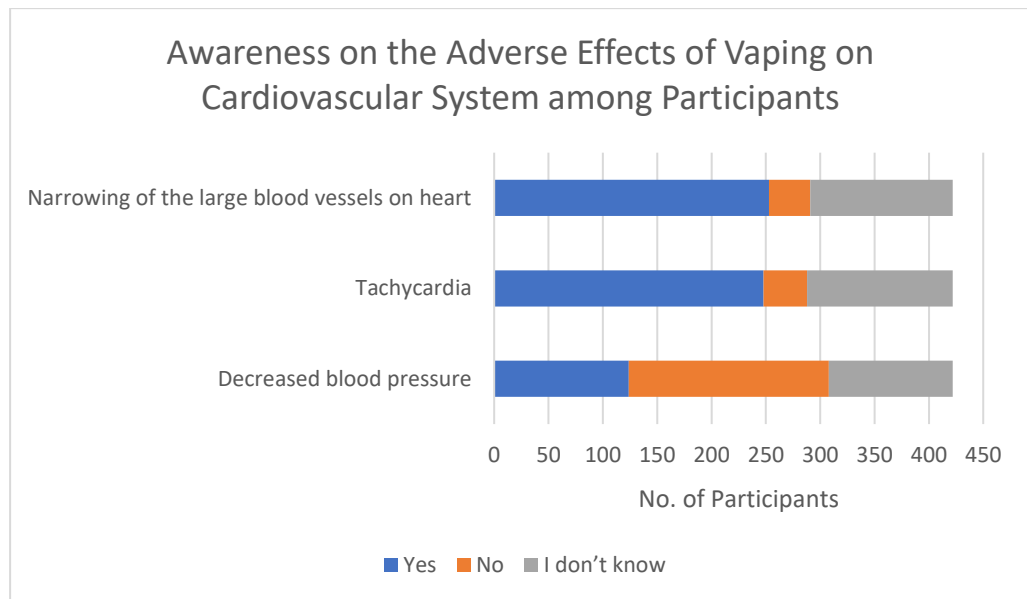


Figure 4.22: Awareness on the adverse effects of vaping on the cardiovascular system among participants

Based on the table and graph above, the awareness of the participants on the adverse effects of vaping on the cardiovascular system was studied. For the statement decreased blood pressure, 124 participants (29.4%) answered “Yes”, 184 participants (43.6%) answered “No” and 114 participants (27.0%) answered “I don’t know”. 248 participants (58.8%) claimed that vaping causes tachycardia, which causes heart rate was increased to more than 100 beats/minute. However, 40 participants (9.5%) disagreed, and 134 (31.8%) did not know about it. Lastly, majority of the participants, which occupied 253 people or 60.0% believed that vaping would cause the narrowing of the large blood vessels in the heart. However, 38 participants (9.0%) answered “No” and 131 participants (31.0%) answered “I don’t know”.

4.9.4 Awareness on the Adverse Effects of Vaping on Neurological System

Characteristics	Yes n (%)	No n (%)	I don't know n (%)
Based on what you think, does vaping cause adverse effects on neurological system?			
Dependency/ addiction	364 (86.3)	20 (4.7)	38 (9.0)
Dizziness	206 (48.8)	98 (23.2)	118 (28.0)
Anxiety	216 (51.2)	109 (25.8)	97 (23.0)
Irritability	245 (58.1)	66 (15.6)	111 (26.3)
Headache	246 (58.3)	82 (19.4)	94 (22.3)
Lack of concentration	286 (67.8)	50 (11.8)	86 (20.4)
Sleeping difficulties	208 (49.3)	88 (20.9)	126 (29.9)

Table 4.12: Awareness on the adverse effects of vaping on neurological system among participants

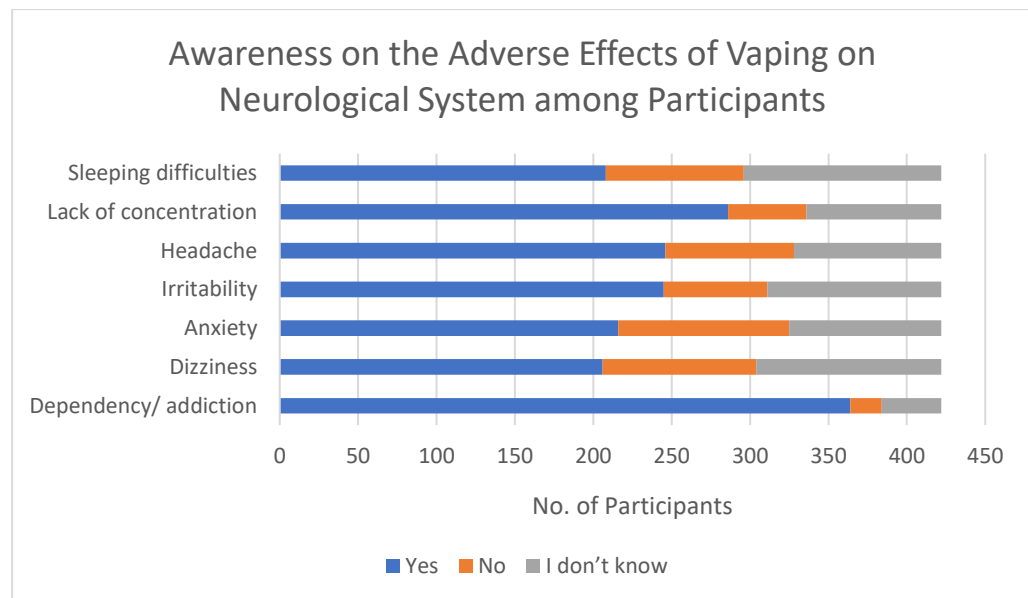


Figure 4.23: Awareness on the adverse effects of vaping on the neurological system among participants

Figure 4.23 displays the data on the awareness of the participants on the adverse effects of vaping on the neurological system. Majority of the participants, which occupied 364 or 86.3%, believed that vaping would cause dependency or addiction. However, 20 (4.7%) disagreed that vaping will cause dependency or addiction, and 38 (9.0%) did not know about it. Besides, for the statement dizziness, 206 or 48.8% of the participants answered “Yes”, 98 or 23.3% of the participants answered “No” and 118 or 28.0% of the participants answered “I don’t know”. For statement anxiety, 216 participants agreed that vaping will cause anxiety, while 109 participants (25.8%) disagreed with that. Only 97 participants (23.0%) do not know about it. Moreover, for the statement irritability, 245 or 58.1% of the participants answered “Yes”, 66 or 15.6% participants answered “No” and 111 or 26.3% of the participants answered “I don’t know”. There were 246 participants (58.3%) who claimed that vaping would cause headaches, 82 participants (19.4%) disagreed with that, and 94 participants (22.3%) did not know about it. Furthermore, for the statement lack of concentration, most participants, with a total number of 286 (67.8%) agreed that vaping was one of the effects on the neurological system. 50 participants (11.8%) disagreed with that, and 86 participants (20.4%) do not know about it. Lastly, for the statement about sleeping difficulties, 208 participants (49.3%) answered “Yes”, 88 participants (20.9%) answered “No” and 126 participants (29.9%) answered “I don’t know”.

4.9.5 Awareness on the Adverse Effects of Vaping on Urogenital System

Characteristics	Yes n (%)	No n (%)	I don't know n (%)
Based on what you think, does vaping cause adverse effects on urogenital system?			
Poor function of the kidneys (acute renal insufficiency)	218 (51.7)	67 (15.9)	137 (32.5)

Table 4.13: Awareness on the adverse effects of vaping on urogenital system among participants

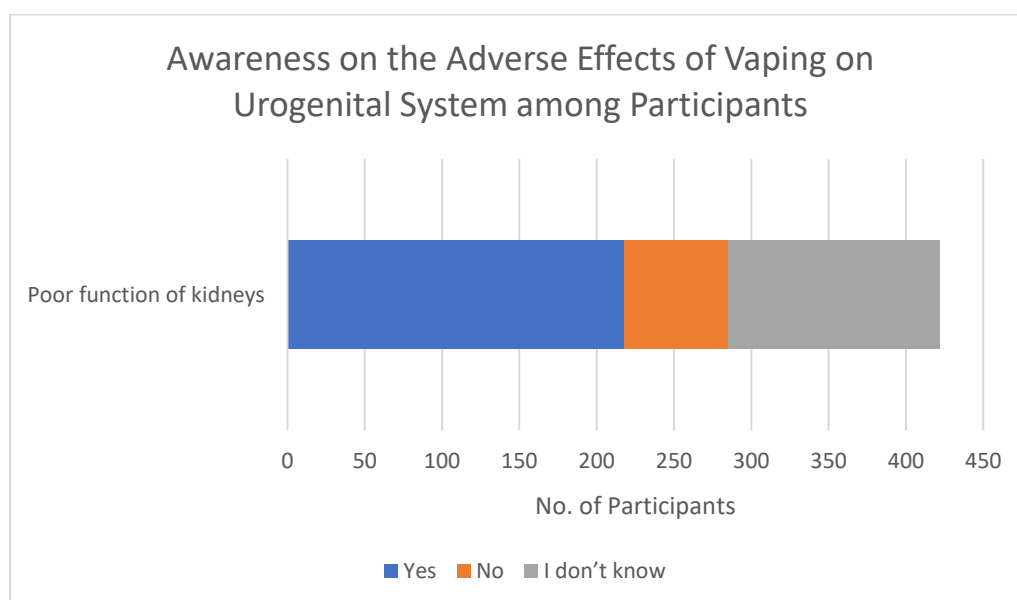


Figure 4.24: Awareness on the adverse effects of vaping on urogenital system among participants

Figure 4.24 shows the data for the awareness of participants on the adverse effects of vaping on the urogenital system. From the figure above, it can be noticed that 218 participants (51.7%) agreed that vaping would lead to acute renal insufficiency, which causes poor function of the kidneys. However, 67 participants (15.9%) disagreed with it and 137 participants (32.5%) did not know about it. All the participants had an average score of .52 (SD = .50) out of the total score of 1 in this section.

4.9.6 Awareness on the Adverse Effects of Vaping on Hematopoietic System

Characteristics	Yes n (%)	No n (%)	I don't know n (%)
Based on what you think, does vaping cause adverse effects on hematopoietic system?			
Increased white blood cells count (leukocytosis)	101 (23.9)	113 (26.8)	208 (49.3)
Increased red blood cell count	41 (9.7)	185 (43.8)	196 (46.4)

Table 4.14: Awareness on the adverse effects of vaping on hematopoietic system among participants

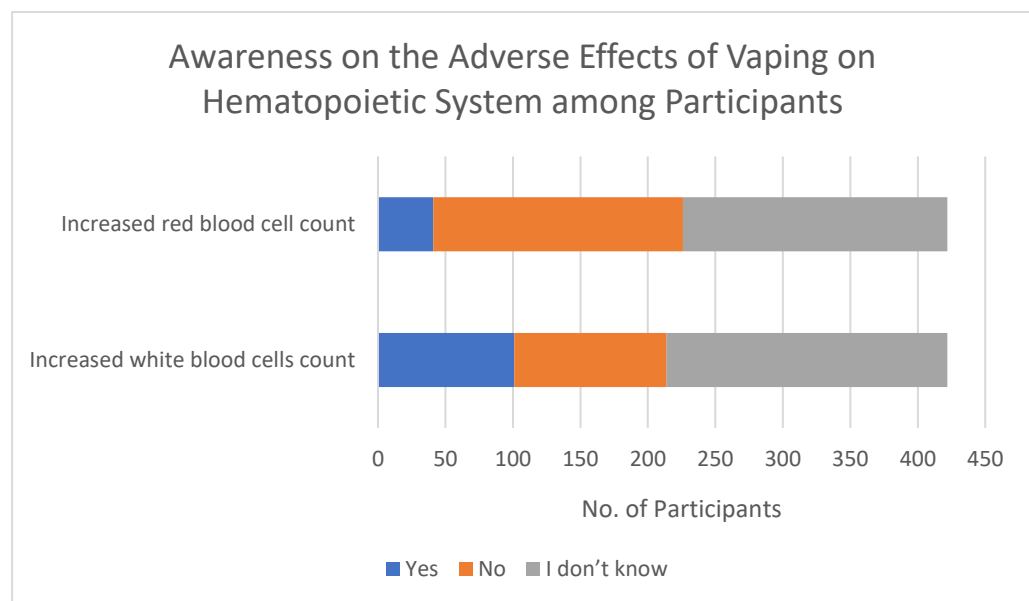


Figure 4.25: Awareness on the adverse effects of vaping on the hematopoietic system among participants

According to figure 4.25, it can be seen that the awareness of participants on the adverse effects of vaping on the hematopoietic system was displayed. From the data above, 101 or 23.9% of the participants believed that vaping would cause increase in white blood cell count. However, 113 or 26.8% of the participants refused to believe that and 208 or 49.3% of the participants did not

know about that. For the statement increased red blood cell count, 41 or 9.7% of the participants answered “Yes”, 185 or 43.8% of the participants answered “No” and lastly, 196 or 46.4% of participants answered “I don’t know”.

4.9.7 Awareness on the Adverse Effects of Vaping on Oral Cavity

Characteristics	Yes n (%)	No n (%)	I don’t know n (%)
Based on what you think, does vaping cause adverse effects on oral cavity?			
Dry or sore mouth or throat	329 (78.0)	22 (5.2)	71 (16.8)
Dental disease (e.g. cracked or decay teeth)	298 (70.6)	43 (10.2)	81 (19.2)
Gum bleeding	229 (54.3)	72 (17.1)	121 (28.7)

Table 4.15: Awareness on the adverse effects of vaping on oral cavity among participants

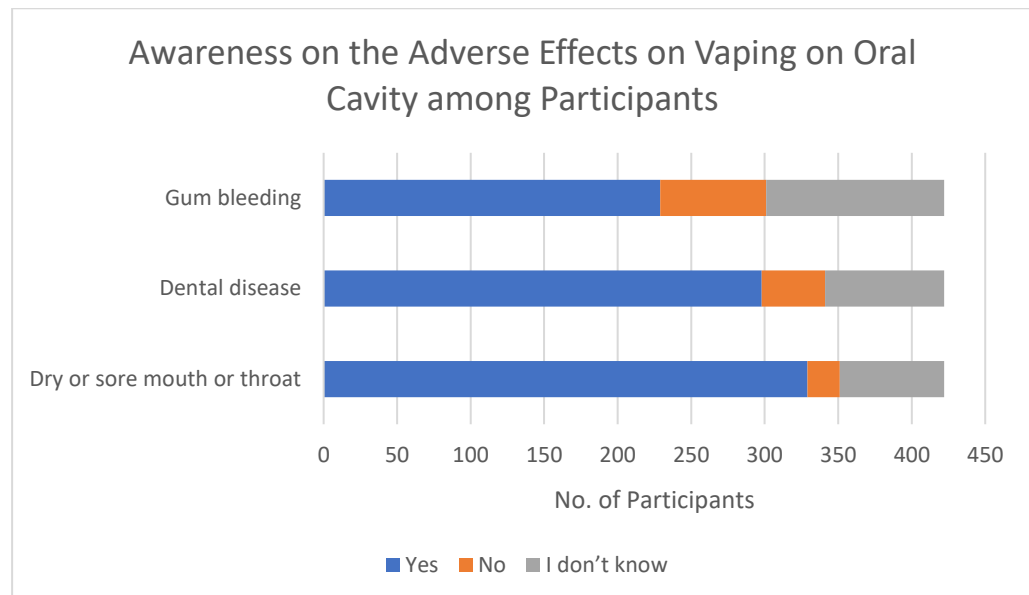


Figure 4.26: Awareness on the adverse effects of vaping on the oral cavity among participants

Figure 4.26 illustrates the awareness on the adverse effects of vaping on oral cavity among participants. From the data above, it can be seen that most of the participants, around 329 or 78.0%, clarified that vaping would cause dry or sore mouth or throat. However, 22 or 5.2% refused this statement and 71 or 16.8% did not know about it. Besides, 298 or 70.6% of the participants agreed that vaping would cause dental diseases such as cracked or decayed teeth. 43 or 10.2% of the participants disagreed with that, and 81 or 19.2% of the participants did not know about it. Lastly, for the statement gum bleeding, 229 participants (54.3%) answered “Yes”, 72 participants (17.1%) answered “No” and 121 participants (28.7%) answered “I don’t know”.

4.9.8 Awareness on the Adverse Effects of Vaping on Physical Changes

Characteristics	Yes n (%)	No n (%)	I don't know n (%)
Based on what you think, does vaping cause any physical changes?			
Fever	104 (24.6)	194 (46.0)	124 (29.4)
Chills (feelings of coldness accompanied by shivering)	123 (29.1)	155 (36.7)	144 (34.1)
Gain weight	85 (20.1)	196 (46.4)	141 (33.4)
Fatigue/ malaise	251 (59.5)	69 (16.4)	102 (24.2)

Table 4.16: Awareness on the adverse effects of vaping on physical changes among participants

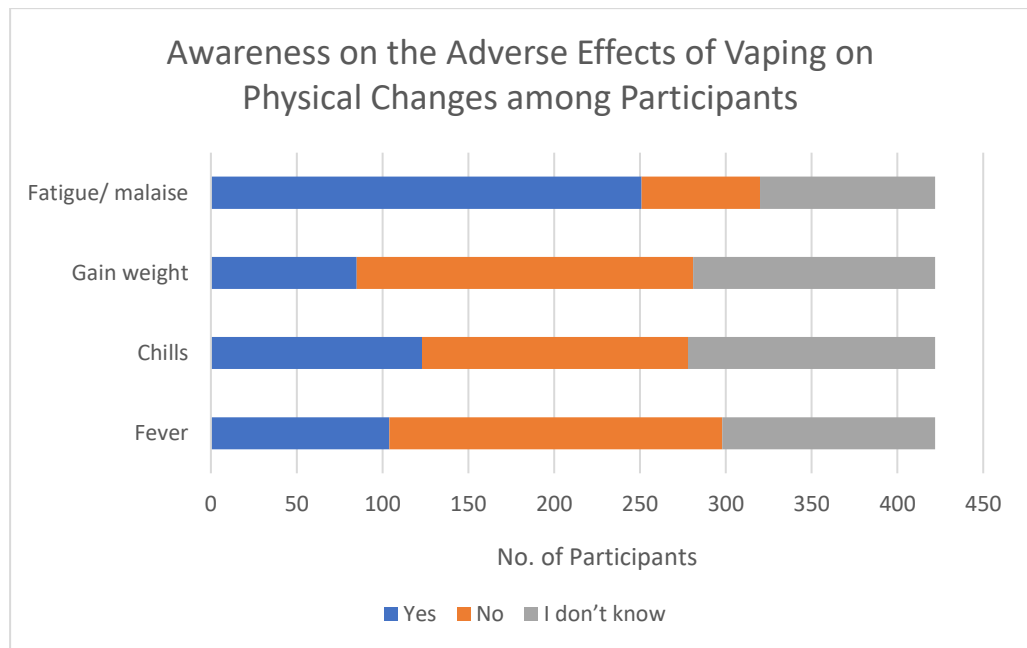


Figure 4.27: Awareness on the adverse effects of vaping on physical changes among participants

From the table and figure above, the awareness on the adverse effects of vaping on physical changes among participants were displayed. From the data above, 104 or 24.6% of the participants answered “Yes” for the statement fever, 194 or 46% of participants answered “No” and 124 or 29.4% of participants answered “I don’t know”. 123 participants (29.1%) believed that vaping would cause chills, whereas 155 participants (36.7%) disagreed with that, and 144 participants (34.1%) did not have any idea about it. For the statement gain weight, 85 or 20.1% of the participants gave the answer “Yes”, 196 or 46.4% of the participants answered “No” and 141 or 33.4% of the participants answered “I don’t know”. Lastly, majority of the participants, which occupied 251 or 59.5%, answered “Yes” to the statement fatigue or malaise. However, 69 or 16.4% of the participants answered “No”, and 102 or 24.2% of the participants answered “I don’t know”.

4.10 Inferential analysis

This subsection will focus on data analysis. Since there is no hypothesis in this research, no correlation test is used for analysis the data.

The awareness of vaping among participants was analysed in mean and standard deviation. All the items in each section were coded during data entry. Participants who answered “Yes” was coded as 1, meanwhile “No” and “I don’t know” were coded as 0. The items “decreased risk of lung diseases”, “decreased risk of depression”, “carbon monoxide”, “tar”, “decreased blood pressure”, and “gain weight” were reversed coded.

The awareness score of each participant will be sum up and the maximum scores will be 47. The total scores will then be dichotomized to binary random variables by assuming a cut-off of 75%. Those who answered the questions 75% or more correctly was categorized as having awareness, otherwise he was categorized as not having awareness (Aghar et al., 2020). The score after cut-off of 75% in this research will be 35.

Characteristics	Mean (Std Dev)
Awareness on negative health effects of vaping	4.22 (1.47)
Awareness on the substances contained in e-cigarettes	1.96 (1.64)
Awareness on adverse effects of vaping on respiratory system	8.27 (3.42)

Awareness on adverse effects of vaping on gastrointestinal system	1.02 (1.15)
Awareness on adverse effects of vaping on cardiovascular system	1.62 (1.06)
Awareness on adverse effects of vaping on neurological system	4.20 (2.32)
Awareness on adverse effects of vaping on urogenital system	.52 (.50)
Awareness on adverse effects of vaping on hematopoietic system	.34 (.62)
Awareness on adverse effects of vaping on oral cavity	2.03 (1.08)
Awareness on adverse effects of vaping on physical changes	1.60 (1.11)
Overall awareness score	25.76 (10.28)
25 th percentile (Q1)	18
Median (Q2)	27
75 th percentile (Q3)	34
Minimum score	0
Maximum score	45

Table 4.17: Awareness scores of vaping among participants

Total scores	Frequency (%)
0 - 34	318 (75.4)
35 - 47	104 (24.6)

Table 4.18: Total awareness scores among participants

Table 4.17 illustrates participants' awareness scores on vaping. All the participants had an average score of 4.22 (SD = 1.47) out of the total score of 6 in the “Awareness on negative health effects of vaping” section. Besides, all the

participants had an average score of 1.96 (SD = 1.64) out of the total score of 6 in the section “Awareness of the substances contained in e-cigarettes”. The average score is 8.27 (SD = 3.42) out of the total score of 12 in the section “Awareness on adverse effects of vaping on the respiratory system”. Moreover, all the participants had an average score of 1.02 (SD = 1.15) out of the total score of 3 in the section “Awareness on adverse effects of vaping on the gastrointestinal system”. There is a mean score of 1.62 (SD = 1.06) out of the total score of 3 among 422 participants in the “Awareness on adverse effects of vaping on the cardiovascular system” section. All the participants had an average score of 4.20 (SD = 2.32) out of the total score of 7 in the “Awareness on adverse effects of vaping on the neurological system”.

Furthermore, all the participants had an average score of .52 (SD = .50) out of the total score of 1 in the “Awareness on adverse effects of vaping on the urogenital system”. The average score is .34 (SD = .62) out of the total score of 2 in the section “Awareness on adverse effects of vaping on the hematopoietic system”. There is a mean score of 2.03 (SD = 1.08) out of the total score of 3 among 422 participants in the “Awareness on adverse effects of vaping on oral cavity” section. Lastly, all the participants had an average score of 1.60 (SD = 1.11) out of the total score of 4 in the section “Awareness on adverse effects of vaping on physical changes”.

Table 4.18 shows the total awareness scores on vaping among participants. 318 participants (75.4%) had a score lower than 35, which was considered as having no awareness on the adverse effects of vaping; meanwhile,

104 participants (24.6%) had a score more than 35, considered as having awareness.

In short, all the participants had an overall average score of 25.76 (SD=10.28, Q1=18, Q2=27, Q3=34) out of the total score of 47 on vaping awareness. The mean of 25.76 is lower than the cut-off of 35 designed for those who were considered aware. 75.4% of the respondents considered no awareness, with the scores falling below the cut-off point.

CHAPTER V

DISCUSSION

5.1 Chapter Overview

This chapter will discuss the findings from the results sections and compares the results with previous studies following the research objectives. It will be followed by the limitation of the study, recommendations for future research, and the conclusion of this research study.

5.2 Awareness of University Students towards the Adverse Effects of Vaping on Health

According to the results in table 4.7, among 422 participants, there was a total number of 172 students (40.8%) did not have awareness at the point “vaping will increase the risk of seizure”, respectively. However, this might not be true as, according to Douglass et al. (2020), the FDA had received reports indicating more than 100 seizure issues associated with e-cigarettes over the last decade. Besides, 337 participants (79.9%) had awareness at the point of “vaping will increase the risk of stroke”. This was similar to the research conducted by Kaisar et al. (2017), which stated that vaping could act as a risk factor for the onset of stroke, and it will worsen post-ischemic brain injury. However, according to Klein et al. (2021), there was limited data on this new issue.

Therefore, the risk association between the usage of e-cigarettes and stroke remained unclear. Hence, further research in this area was required.

In table 4.8, a total number of 273 out of 422 respondents did not have awareness at the point of “benzoic acid can be found in e-cigarettes”. 28 of them (6.6%) answered “no” and 245 of them (58.1%) answered “I don’t know”. However, this might be incorrect as Grana et al. (2014) mentioned that the liquid solution in e-cigarettes contains nicotine, propylene glycol, benzoic acid, vegetable glycerine and different flavouring chemicals. Besides, Lu et al. (2021), it mentioned that e-liquid contained 1.92% of benzoic acid. In the statement “tar can be found in e-cigarettes”, 223 participants (52.8%) answered “yes”. However, their answers were incorrect, according to Bush et al. (2018), it mentioned that electronic cigarettes did not produce tar as well as carbon monoxide. 199 of them (47.2%) had awareness on “volatile organic compounds can be found in e-cigarettes”. This was identical to the study conducted by Breland et al. (2016), which mentioned that volatile organic compounds, heavy metals and formaldehyde would be produced due to the thermal breakdown of the liquid ingredients.

Next, according to the results in table 4.9, majority of the respondents, which occupied 88.2%, had an awareness that vaping will cause cough. This was similar to the finding in Case et al. (2022), in which cough was a symptom of product use-associated lung injury (EVALI). Besides, in the same finding, both dual vapers and nicotine-only vapers reported a notably higher prevalence of

cough. However, in the study by Hua et al. (2013), e-cigarette users reported that vaping could positively affect the respiratory system, reducing coughing and bad breath. This can be seen that the effects of e-cigarettes on an individual might be different or opposite. There was a total of 209 respondents who were unaware of the statement “vaping will lead to haemoptysis in which a person coughs with blood”. 85 respondents (20.1%) answered “no”, and 124 respondents (29.4%) answered “I don’t know” for this statement. However, this might not be true. According to the case report by Evans et al. (2021), a man with a vaping background but without any medical comorbidities who developed EVALI was admitted to the hospital with haemoptysis and shortness of breath. A limited study clarified that there was a risk association between the usage of e-cigarettes and haemoptysis. As a result, more studies were needed to be conducted in this area.

According to table 4.10, 204 respondents (48.3%) clarified that vaping causes adverse effects such as nausea and vomiting in the gastrointestinal system. This shows that they were aware of this issue. This can be proved by the study done by Hua et al. (2013), which clarified that a person would suffer from several symptoms such as nausea, vomiting or dizziness due to nicotine overdose. On the other hand, there was a total number of 322 respondents, of which 178 them (42.2%) and 144 of them (34.1%) respectively did not have an awareness of the issue that “vaping will cause diarrhoea”. This might not be true because, according to Case et al. (2022), vaping will cause “Nic sickness”, a condition characterised by symptoms such as nausea, vomiting, diarrhoea and abdominal pain.

Based on the results in table 4.11, it can be seen that most of the respondents who occupied 60.0% of them are aware of the issue that “vaping will lead to narrowing of the large blood vessels in the heart”. This was slightly similar to the article conducted by Stratton et al. (2018), which mentioned that exposure to toxic chemicals in e-cigarette aerosols would lead to the formation of atherosclerosis and coronary heart disease. 124 respondents (29.4%) answered “yes”, and 114 respondents (27.0%) answered “I don’t know” for the statement “decreased blood pressure”. These respondents could be known as having no awareness. According to Tsai et al. (2020), vaping would actually increase blood pressure and heart rate due to acute exposure to e-cigarette aerosols.

In table 4.12, awareness of the adverse effects of vaping on the neurological system among participants was discussed. From the table, it can be seen that 364 respondents (86.3%) had awareness and clearly knew that vaping would cause addiction or dependency. U.S. Department of Health and Human Services et al. (2016) clarified that vaping could cause addiction associated with symptoms such as craving and unconscious behaviour and harm the developing adolescent brain due to nicotine exposure. On the other hand, there was total number of 216 respondents, in which 23.2% of them answered “no” and 28.0% of them answered “I don’t know” respectively, did not have an awareness of “vaping will cause dizziness”. This situation opposed the finding done by Wan

Puteh et al. (2018), which claimed that dizziness was the adverse effect most commonly reported by vapers.

Table 4.13 shows the awareness of the adverse effects of vaping on the urogenital system among participants. Among 422 participants, 218 of them (51.7%) had the awareness that “vaping will cause the poor function of the kidneys” meanwhile, 204 of them (48.4%) did not have an awareness of it. In a study carried out by Layden et al. (2019), out of 43 patients, there was only one case reported that a previously healthy male who used e-cigarettes daily suffered from acute renal insufficiency, which then resolved with intravenous hydration. As there was a limited study on this issue, the relationship between e-cigarette usage and acute renal insufficiency cannot be clearly clarified. Hence, more study in this area was necessary.

Table 4.14 shows awareness of the adverse effects of vaping on hematopoietic system among participants. The majority of the respondents who occupied 76.1% and 90.2% were not aware of “vaping will increase white blood cell count” and “vaping will increase red blood cell count” respectively. This might not be true as in the study done by Layden et al. (2019), among 98 patients who vaped, it was found that 83% of them had leukocytosis, in which their white blood cell count was more than 11000 per cubic millimetre. Besides, the same study also found that vaping causes elevating in the erythrocyte sedimentation rate (Layden et al., 2019).

In table 4.15, awareness of the adverse effects of vaping on the oral cavity was demonstrated. In the statement “vaping will cause dry or sore mouth or throat”, 78% of the respondents had an awareness of it. This was similar to the study by Chan et al. (2019) in which e-cigarette users reported that the most common adverse effects they faced were sore throat and dry mouth. However, this situation is opposed to the study done by Hua et al. (2013) in which e-cigarette users reported that e-cigarettes might bring positive effects to them, which fewer sore throats. On the other hand, there was a total number of 193 respondents, in which 17.1% of them answered “no” and 28.7% of them answered “I don’t know” respectively did not have awareness on “vaping will cause gum bleeding”. It might not be accurate as in the previous study. Respondents reported that they experienced gum bleeding after using e-cigarettes (Abafalvi et al., 2019).

Based on table 4.26, awareness of the adverse effects of vaping on physical changes among participants was investigated. From the results, it can be seen that 59.5% of the respondents were aware that vaping will cause fatigue and malaise. This is similar to the research conducted by Case et al. (2022) which stated that vaping will bring some constitutional symptoms such as fever, headache, chills, change in appetite, weight loss and fatigue (Case et al., 2022). However, 75.4% of the respondents do not have an awareness on “vaping will cause fever”. This can be opposed to the research done by Billa et al. (2020). Three of three adolescent patients admitted into hospital due to product use associated lung injury (EVALI) had the symptom of fever.

Overall, based on table 4.18, 318 participants (75.4%) had a score lower than 35, which was considered as having no awareness on the adverse effects of vaping; meanwhile, 104 participants (24.6%) had a score more than 35, considered as having awareness. The result was different from the finding from Abd Razak et al. (2021) which found that most of the respondents were aware of the impact of e-cigarettes. This might be because students did not receive any information about e-cigarettes in university. As a result, they were unaware of the dangers of e-cigarettes to their health.

5.3 Prevalence of Vaping among University Students

The study showed that the overall prevalence of current vaping among university students in UTAR in year 2022 was 3.3%. This was quite similar to the study by Tavolacci et al. (2016) in which 5.7% of the college students in France used e-cigarettes. Compared with the study by the Institute of Public Health Malaysia (2016), which had 9.1% of Malaysian adolescents vaped, the prevalence in this study was relatively low. There was also an article done in 2018 among six universities in Malaysia. However, the result was much different in that 74.8% of the respondents were e-cigarette users (Wan Puteh et al., 2018), and 40.3% used both e-cigarettes and tobacco cigarettes, while 34.5% of them used only e-cigarettes. The prevalence of vaping in UTAR was considered low. This can be explained that the regulations set by government and school authority which mentioned that “Any type of smoking or vaping was strictly prohibited inside the building or outside within the perimeters of the university.

If any students break the rule, the students will be subjected to student disciplinary action.” were effective.

The prevalence of e-cigarette use among university students was significantly higher among males compared to females (78.6% vs 21.4%). This finding was similar to the research by Wan Puteh et al. (2018), which can be explained by smoking among females being culturally objectionable in Malaysia. Besides, research done in Kuantan, Malaysia also reported that 91.7% of males were e-cigarette users. Meanwhile, only 8.3% of females were e-cigarette users (Elkalmi et al., 2016).

The most popular flavours of e-liquid were fruit flavoured (68%), followed by menthol or mint flavoured (25.0%) and other flavours (6.3%). This finding was similar to the research done by Goh et al. (2017) in which fruit flavours e-liquid was most attractive. Different from the literature by Harrell et al. (2017), sweet and candy-like flavours were most popular among youth and young adults but less preferable among adults.

5.4 Limitation of Study

It is essential to discuss the limitation that may affect this current study's results.

Since this study was convenient sampling, which only included one university, and the sample size was limited, the study's outcomes do not represent the other universities and the population. Besides, the majority of the students in UTAR were Chinese. Hence, the results obtained from this study may have some bias on the aspect of ethnicity.

Besides, the study was conducted by filling up the Microsoft Form. Not all of the respondents were approached through face-to-face mode. Some of them were approached by sending the Microsoft Form through WhatsApp or Microsoft Teams. It was a self-reporting questionnaire. Therefore, this might be under or over-reported by respondents due to recall bias or misunderstanding of the questions asked (Perialathan et al., 2018). Hence, the data collected were not 100% precise. Moreover, all the questions were closed-ended, so respondents may simply guess the answers.

5.5 Recommendations for Future Study

In a future study, large sample size is recommended to increase the accuracy of the results and data. The study can be done in every university in Malaysia no matter public or private university.

Besides, the study can also be done in a face-to-face mode in which the researcher will ask the questions and explain them directly to the respondents.

CHAPTER VI

CONCLUSION

In conclusion, the aims of this study were achieved as the university students' awareness of the adverse effects of vaping on human health and prevalence of vaping among university students in UTAR was determined. All the participants had an overall average score of 25.76 (SD=10.28) out of the total score of 47 on vaping awareness. The mean of 25.76 is lower than the cut-off of 35 designed for those who were considered aware. Only 24.6% of the respondents had awareness while 75.4% of the respondents considered no awareness, with the scores falling below the cut-off point. Besides, there was 3.3% of UTAR students reported that they currently vaped, and there was significantly higher among males compared to females (78.6% vs 21.4%).

In short, every authority can plan for future programmes or education to help decrease the prevalence of vaping and increase university students' awareness of the effects of vaping on human health. More attention must be given to the usage of e-cigarettes among adolescents before this trend rises. Future study can be conducted on a larger population which include all university students in Malaysia.

LIST OF REFERENCES

- Ab Rahman, J., Nik Mohamed, M. H., Kartiwi, M., Ab Rahman, N. S., Draman, S., Mohd Yusoff, M. F., & Arif, T. (2017, August 1). *National E-cigarette Survey (NECS) 2016 in Malaysia method and population characteristics*. Irep.iium.edu.my; Malaysia Medical Association. <http://irep.iium.edu.my/58978/>
- Abafalvi, L., Péntzes, M., Urbán, R., Foley, K. L., Kaán, R., Kispélyi, B., & Hermann, P. (2019). Perceived health effects of vaping among Hungarian adult e-cigarette-only and dual users: a cross-sectional internet survey. *BMC Public Health*, 19(1). <https://doi.org/10.1186/s12889-019-6629-0>
- Abbasi, Y., Hout, M.-C. V., Faragalla, M., & Itani, L. (2022). Knowledge and Use of Electronic Cigarettes in Young Adults in the United Arab Emirates, particularly during the COVID-19 Pandemic. *International Journal of Environmental Research and Public Health*, 19(13), 7828. <https://doi.org/10.3390/ijerph19137828>
- Abd Razak, R., Hazlyna, N., Edzwan Shahril, A., Natasha Azman, A., & Naim Zainudin, N. M. (2021). Awareness of E-Cigarettes among Student in Malaysian Public University. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, 12(3), 1602–1608. <https://doi.org/10.17762/turcomat.v12i3.975>
- Aghar, H., El-Khoury, N., Reda, M., Hamadeh, W., Krayem, H., Mansour, M., Raouf, H., & Jaffa, M. A. (2020). Knowledge and attitudes towards E-cigarette use in Lebanon and their associated factors. *BMC Public Health*, 20(1). <https://doi.org/10.1186/s12889-020-8381-x>
- Aqeeli, A. A., Makeen, A. M., Al Bahhawi, T., Ryani, M. A., Bahri, A. A., Alqassim, A. Y., & El-Setouhy, M. (2020). Awareness, knowledge and perception of electronic cigarettes among undergraduate students in Jazan Region, Saudi Arabia. *Health & Social Care in the Community*. <https://doi.org/10.1111/hsc.13184>
- Atuegwu, N. C., Perez, M. F., Oncken, C., Thacker, S., Mead, E. L., & Mortensen, E. M. (2019). Association between Regular Electronic Nicotine Product Use and Self-Reported Periodontal Disease Status: Population Assessment of Tobacco and Health Survey. *International*

Journal of Environmental Research and Public Health, 16(7).
<https://doi.org/10.3390/ijerph16071263>

- Billa, R., Tigges, C., Vijayakumar, N., Radke, J., Pedati, C., Weiner, R., & McCabe, D. (2020). E-Cigarette, or Vaping, Product Use Associated Lung Injury (EVALI) with Acute Respiratory Failure in Three Adolescent Patients: a Clinical Timeline, Treatment, and Product Analysis. *Journal of Medical Toxicology*, 16(3), 248–254.
<https://doi.org/10.1007/s13181-020-00765-9>
- Bravo-Gutiérrez, O. A., Falfán-Valencia, R., Ramírez-Venegas, A., Sansores, R. H., Ponciano-Rodríguez, G., & Pérez-Rubio, G. (2021). Lung Damage Caused by Heated Tobacco Products and Electronic Nicotine Delivery Systems: A Systematic Review. *International Journal of Environmental Research and Public Health*, 18(8), 4079.
<https://doi.org/10.3390/ijerph18084079>
- Breland, A., Soule, E., Lopez, A., Ramôa, C., El-Hellani, A., & Eissenberg, T. (2016). Electronic cigarettes: what are they and what do they do? *Annals of the New York Academy of Sciences*, 1394(1), 5–30.
<https://doi.org/10.1111/nyas.12977>
- Bush, A., Bhatt, J., & Grigg, J. (2018). E cigarettes: Tar Wars: The (Tobacco) Empire Strikes Back. *Archives of Disease in Childhood*, 104(11), 1027–1039. <https://doi.org/10.1136/archdischild-2018-315820>
- Camenga, D. R., Delmerico, J., Kong, G., Cavallo, D., Hyland, A., Cummings, K. M., & Krishnan-Sarin, S. (2014). Trends in use of electronic nicotine delivery systems by adolescents. *Addictive Behaviors*, 39(1), 338–340.
<https://doi.org/10.1016/j.addbeh.2013.09.014>
- Caraballo, R. S., Shafer, P. R., Patel, D., Davis, K. C., & McAfee, T. A. (2017). Quit Methods Used by US Adult Cigarette Smokers, 2014–2016. *Preventing Chronic Disease*, 14. <https://doi.org/10.5888/pcd14.160600>
- Case, K. R., Clendennen, S. L., Tsevat, J., & Harrell, M. B. (2022). Risk of respiratory, gastrointestinal, and constitutional health symptoms: A cross-sectional study of Texas adolescent and young adult nicotine and marijuana vapers. *Preventive Medicine*, 159, 107057.
<https://doi.org/10.1016/j.ypmed.2022.107057>
- Centers for Disease Control and Prevention. (2018, November 29). *About Electronic Cigarettes (E-Cigarettes)*. Centers for Disease Control and

Prevention. https://www.cdc.gov/tobacco/basic_information/e-cigarettes/about-e-cigarettes.html

Chan, C. M. H., Ab Rahman, J., Guat Hiong, T., Lei Hum, W., Bee Kiau, H., Robson, N. Z. M. H., Draman, S., Ling Miaw Yn, J., Kuang Hock, L., Yusoff, M. F., Kartiwi, M., Ab Rahman, N. S., & Nik Mohamed, M. H. (2019). Perception of Harms and Benefits of Electronic Cigarettes Among Adult Malaysian Men: A Comparison by Electronic Cigarette Use and Smoking Status. *Asia Pacific Journal of Public Health*, 101053951986073. <https://doi.org/10.1177/1010539519860730>

Control of Tobacco Product (Amendment) Regulations 2018. (2018).

Seatca.org. <https://seatca.org/resource-center-asean-tc-malaysia/>

Cullen, K. A., Gentzke, A. S., Sawdey, M. D., Chang, J. T., Anic, G. M., Wang, T. W., Creamer, M. R., Jamal, A., Ambrose, B. K., & King, B. A. (2019). e-Cigarette Use Among Youth in the United States, 2019. *JAMA*, 322(21), 2095–2103. <https://doi.org/10.1001/jama.2019.18387>

Dai, H., & Leventhal, A. M. (2019). Prevalence of e-Cigarette Use Among Adults in the United States, 2014-2018. *JAMA*. <https://doi.org/10.1001/jama.2019.15331>

Definition of Adverse effect. (n.d.). MedicineNet.

https://www.medicinenet.com/adverse_effect/definition.htm

Douglass, B., Solecki, S., & Fay-Hillier, T. (2020). The Harmful Consequences of Vaping. *Journal of Addictions Nursing*, 31(2), 79–84. <https://doi.org/10.1097/jan.0000000000000332>

Driezen, P., Amer Nordin, A. S., Mohd Hairi, F., Yee, A., Ahmad Tajuddin, N. A., Hasan, S. I., Danaee, M., Kamaludin, I. S., Kaai, S., Yan, M., Grey, M., Quah, A., Thompson, M., & Fong, G. (2022). E-cigarette prevalence among Malaysian adults and types and flavors of e-cigarette products used by cigarette smokers who vape: Findings from the 2020 ITC Malaysia Survey. *Tobacco Induced Diseases*, 20(March), 1–7. <https://doi.org/10.18332/tid/146363>

Elkalmi, R., Bhagavathul, A., Ya'u, A., Al-Dubai, S. R., Elsayed, T., Ahmad, A., & Mohamed, W. (2016). Familiarity, perception, and reasons for electronic-cigarette experimentation among the general public in Malaysia: Preliminary insight. *Journal of Pharmacy and Bioallied Sciences*, 8(3), 240. <https://doi.org/10.4103/0975-7406.180768>

Evans, R. E., Herbert, S., Owen, W., & Rao, D. (2021). Case of e-cigarette or vaping product use-associated lung injury (EVALI) in London, UK.

BMJ Case Reports, 14(4), e240700. <https://doi.org/10.1136/bcr-2020-240700>

- Foulds, J., Veldheer, S., Yingst, J., Hrabovsky, S., Wilson, S. J., Nichols, T. T., & Eissenberg, T. (2014). Development of a Questionnaire for Assessing Dependence on Electronic Cigarettes Among a Large Sample of Ex-Smoking E-cigarette Users. *Nicotine & Tobacco Research*, 17(2), 186–192. <https://doi.org/10.1093/ntr/ntu204>
- Gafoor, K. A. (2012, January). (PDF) *Considerations in measurement of awareness*. [Www.researchgate.net](http://www.researchgate.net). <https://doi.org/10.13140/2.1.2109.2643>
- Global Adult Tobacco Survey (GATS) Core Questionnaire with Optional Questions*. (n.d.). Retrieved August 7, 2022, from https://cdn.who.int/media/docs/default-source/ncds/ncd-surveillance/gats/06_gats_corequestionnairewithoptionalquestions.pdf?sfvrsn=3b5ca226_15
- Goh, Y. H., Dujaili, J. A., Blebil, A. Q., & Ahmed, S. I. (2017). Awareness and use of electronic cigarettes: Perceptions of health science programme students in Malaysia. *Health Education Journal*, 76(8), 1000–1008. <https://doi.org/10.1177/0017896917732363>
- Goniewicz, M. L., & Zielinska-Danch, W. (2012). Electronic Cigarette Use Among Teenagers and Young Adults in Poland. *PEDIATRICS*, 130(4), e879–e885. <https://doi.org/10.1542/peds.2011-3448>
- Grana, R. A., & Ling, P. M. (2014). “Smoking revolution”: a content analysis of electronic cigarette retail websites. *American Journal of Preventive Medicine*, 46(4), 395–403. <https://doi.org/10.1016/j.amepre.2013.12.010>
- Gravelly, S., Fong, G., Cummings, K., Yan, M., Quah, A., Borland, R., Yong, H.-H., Hitchman, S., McNeill, A., Hammond, D., Thrasher, J., Willemsen, M., Seo, H., Jiang, Y., Cavalcante, T., Perez, C., Omar, M., & Hummel, K. (2014). Awareness, Trial, and Current Use of Electronic Cigarettes in 10 Countries: Findings from the ITC Project. *International Journal of Environmental Research and Public Health*, 11(11), 11691–11704. <https://doi.org/10.3390/ijerph11111691>
- Harrell, M. B., Weaver, S. R., Loukas, A., Creamer, M., Marti, C. N., Jackson, C. D., Heath, J. W., Nayak, P., Perry, C. L., Pechacek, T. F., & Eriksen, M. P. (2017). Flavored e-cigarette use: Characterizing youth, young adult, and adult users. *Preventive Medicine Reports*, 5, 33–40. <https://doi.org/10.1016/j.pmedr.2016.11.001>

- Hua, M., Alfi, M., & Talbot, P. (2013). Health-Related Effects Reported by Electronic Cigarette Users in Online Forums. *Journal of Medical Internet Research*, 15(4), e59. <https://doi.org/10.2196/jmir.2324>
- Institute of Public Health Malaysia. Tobacco & E-Cigarette Survey Among Malaysian Adolescents (TECMA). Kuala Lumpur: Institute of Public Health Malaysia; 2016 [online]. Available at: <http://www.iku.gov.my/images/IKU/Document/REPORT/TECMA2016/TabaccoandECigarette.pdf>
- Jaafar, H., Razi, N. A. M., Mohd, T. A. M. T., Noor, N. 'Ayn U. M., Ramli, S., Rahman, Z. A., Baharin, M. F. A., Rani, M. D. M., & Salleh, N. M. (2021). Knowledge, Attitude and Practice on Electronic Cigarette and their Associated Factors among Undergraduate Students in a Public University. *IIUM Medical Journal Malaysia*, 20(2). <https://doi.org/10.31436/imjm.v20i2.506>
- Jameson, J. (n.d.). *LibGuides: Critical Appraisal Resources for Nursing Research and EBP: Analytical Cross-Sectional Studies*. Libguides.utoledo.edu. <https://libguides.utoledo.edu/nursingappraisal/crosssectional>
- Kaisar, M. A., Villalba, H., Prasad, S., Liles, T., Sifat, A. E., Sajja, R. K., Abbruscato, T. J., & Cucullo, L. (2017). Offsetting the impact of smoking and e-cigarette vaping on the cerebrovascular system and stroke injury: Is Metformin a viable countermeasure? *Redox Biology*, 13, 353–362. <https://doi.org/10.1016/j.redox.2017.06.006>
- Kankaria, A., Sahoo, S. S., & Verma, M. (2021). Awareness regarding the adverse effect of tobacco among adults in India: findings from secondary data analysis of Global Adult Tobacco Survey. *BMJ Open*, 11(6), e044209. <https://doi.org/10.1136/bmjopen-2020-044209>
- Kim, S. A., Smith, S., Beauchamp, C., Song, Y., Chiang, M., Giuseppetti, A., Frukhtbeyn, S., Shaffer, I., Wilhide, J., Routkevitch, D., Ondov, J. M., & Kim, J. J. (2018). Cariogenic potential of sweet flavors in electronic-cigarette liquids. *PLOS ONE*, 13(9), e0203717. <https://doi.org/10.1371/journal.pone.0203717>
- Klein, A. P., Yarbrough, K., & Cole, J. W. (2021). Stroke, Smoking and Vaping: The No-Good, the Bad and the Ugly. *Annals of Public Health and Research*, 8(1), 1104.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8315328/?report=classic>

- Krejcie, R. V., & Morgan, D. W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, 30(3), 607–610. <https://doi.org/10.1177/001316447003000308>
- Layden, J. E., Ghinai, I., Pray, I., Kimball, A., Layer, M., Tenforde, M., Navon, L., Hoots, B., Salvatore, P. P., Elderbrook, M., Haupt, T., Kanne, J., Patel, M. T., Saathoff-Huber, L., King, B. A., Schier, J. G., Mikosz, C. A., & Meiman, J. (2019). Pulmonary Illness Related to E-Cigarette Use in Illinois and Wisconsin — Preliminary Report. *New England Journal of Medicine*, 382(10). <https://doi.org/10.1056/nejmoa1911614>
- Lerner, C. A., Sundar, I. K., Yao, H., Gerloff, J., Ossip, D. J., McIntosh, S., Robinson, R., & Rahman, I. (2015). Vapors Produced by Electronic Cigarettes and E-Juices with Flavorings Induce Toxicity, Oxidative Stress, and Inflammatory Response in Lung Epithelial Cells and in Mouse Lung. *PLOS ONE*, 10(2), e0116732. <https://doi.org/10.1371/journal.pone.0116732>
- Lu, F., Yu, M., Chen, C., Liu, L., Zhao, P., Shen, B., & Sun, R. (2021). The Emission of VOCs and CO from Heated Tobacco Products, Electronic Cigarettes, and Conventional Cigarettes, and Their Health Risk. *Toxics*, 10(1), 8. <https://doi.org/10.3390/toxics10010008>
- Olfert, I. M., DeVallance, E., Hoskinson, H., Branyan, K. W., Clayton, S., Pitzer, C. R., Sullivan, D. P., Breit, M. J., Wu, Z., Klinkhachorn, P., Mandler, W. K., Erdreich, B. H., Ducatman, B. S., Bryner, R. W., Dasgupta, P., & Chantler, P. D. (2018). Chronic exposure to electronic cigarettes results in impaired cardiovascular function in mice. *Journal of Applied Physiology*, 124(3), 573–582. <https://doi.org/10.1152/jappphysiol.00713.2017>
- Palipudi, K. M., Mbulo, L., Morton, J., Mbulo, L., Bunnell, R., Blutcher-Nelson, G., Kosen, S., Tee, G. H., Abdalla, A. M. E., Mutawa, K. A. A., Barbouni, A., Antoniadou, E., Fouad, H., Khoury, R. N., Rarick, J., Sinha, D. N., & Asma, S. (2015). Awareness and Current Use of Electronic Cigarettes in Indonesia, Malaysia, Qatar, and Greece: Findings From 2011–2013 Global Adult Tobacco Surveys. *Nicotine & Tobacco Research*, 18(4), 501–507. <https://doi.org/10.1093/ntr/ntv081>

- Perialathan, K., Rahman, A., Lim, K., Adon, Y., Ahmad, A., Juatan, N., & Jaafar, N. (2018). Prevalence and associated factors of ever use of electronic cigarettes: Findings from a hospitals and health clinics study based in Malaysia. *Tobacco Induced Diseases*, 16(November). <https://doi.org/10.18332/tid/99258>
- Prevalence and Incidence Defined*. (2012, October 21). Obesity Prevention Source. <https://www.hsph.harvard.edu/obesity-prevention-source/prevalence-incidence/>
- Qasim, H., Karim, Z. A., Rivera, J. O., Khasawneh, F. T., & Alshbool, F. Z. (2017). Impact of Electronic Cigarettes on the Cardiovascular System. *Journal of the American Heart Association*, 6(9). <https://doi.org/10.1161/jaha.117.006353>
- Quiroga, L., Asif, M., Lagziel, T., Bhat, D., & Caffrey, J. (2019). E-Cigarette Battery Explosions: Review of the Acute Management of the Burns and the Impact on Our Population. *Cureus*. <https://doi.org/10.7759/cureus.5355>
- Razak, R. A. (2021). Awareness of E-Cigarettes among Student in Malaysian Public University. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, 12(3), 1602–1608. <https://doi.org/10.17762/turcomat.v12i3.975>
- Schneller, L. M., Bansal-Travers, M., Goniewicz, M. L., McIntosh, S., Ossip, D., & O'Connor, R. J. (2018). Use of flavored electronic cigarette refill liquids among adults and youth in the US—Results from Wave 2 of the Population Assessment of Tobacco and Health Study (2014–2015). *PLOS ONE*, 13(8), e0202744. <https://doi.org/10.1371/journal.pone.0202744>
- Seiler-Ramadas, R., Sandner, I., Haider, S., Grabovac, I., & Dorner, T. E. (2020). Health effects of electronic cigarette (e-cigarette) use on organ systems and its implications for public health. *Wiener Klinische Wochenschrift*. <https://doi.org/10.1007/s00508-020-01711-z>
- Sharma, A., Lee, J., Fonseca, A. G., Moshensky, A., Kothari, T., Sayed, I. M., Ibeawuchi, S.-R., Pranadinata, R. F., Ear, J., Sahoo, D., Crotty-Alexander, L. E., Ghosh, P., & Das, S. (2021). E-cigarettes compromise the gut barrier and trigger inflammation. *IScience*, 24(2), 102035. <https://doi.org/10.1016/j.isci.2021.102035>

- Shi, H., Fan, X., Horton, A., Haller, S. T., Kennedy, D. J., Schiefer, I. T., Dworkin, L., Cooper, C. J., & Tian, J. (2019). The Effect of Electronic-Cigarette Vaping on Cardiac Function and Angiogenesis in Mice. *Scientific Reports*, 9(1). <https://doi.org/10.1038/s41598-019-40847-5>
- Skotsimara, G., Antonopoulos, A. S., Oikonomou, E., Siasos, G., Ioakeimidis, N., Tsalamandris, S., Charalambous, G., Galiatsatos, N., Vlachopoulos, C., & Tousoulis, D. (2019). Cardiovascular effects of electronic cigarettes: A systematic review and meta-analysis. *European Journal of Preventive Cardiology*, 26(11), 1219–1228. <https://doi.org/10.1177/2047487319832975>
- Stratton, K., Kwan, L. Y., & Eaton, D. L. (Eds.). (2018). *Public Health Consequences of E-Cigarettes*. National Academies Press. <https://doi.org/10.17226/24952>
- Sutfin, E. L., McCoy, T. P., Morrell, H. E. R., Hoepfner, B. B., & Wolfson, M. (2013). Electronic cigarette use by college students. *Drug and Alcohol Dependence*, 131(3), 214–221. <https://doi.org/10.1016/j.drugalcdep.2013.05.001>
- Tavolacci, M.-P., Vasiliu, A., Romo, L., Kotbagi, G., Kern, L., & Ladner, J. (2016). Patterns of electronic cigarette use in current and ever users among college students in France: a cross-sectional study. *BMJ Open*, 6(5), e011344. <https://doi.org/10.1136/bmjopen-2016-011344>
- Tsai, M., Byun, M. K., Shin, J., & Crotty Alexander, L. E. (2020). Effects of e-cigarettes and vaping devices on cardiac and pulmonary physiology. *The Journal of Physiology*, 598(22). <https://doi.org/10.1113/jp279754>
- U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, & Office on Smoking and Health. (2016). *E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General*. https://e-cigarettes.surgeongeneral.gov/documents/2016_SGR_Full_Report_non-508.pdf
- Universiti Tunku Abdul Rahman (UTAR). (2015, July 16). Top Universities. <https://www.topuniversities.com/universities/universiti-tunku-abdul-rahman-utar>
- Vaping. (n.d.). Dictionary.cambridge.org. <https://dictionary.cambridge.org/dictionary/english/vaping>

- Vlachopoulos, C., Ioakeimidis, N., Abdelrasoul, M., Terentes-Printzios, D., Georgakopoulos, C., Pietri, P., Stefanadis, C., & Tousoulis, D. (2016). Electronic Cigarette Smoking Increases Aortic Stiffness and Blood Pressure in Young Smokers. *Journal of the American College of Cardiology*, *67*(23), 2802–2803. <https://doi.org/10.1016/j.jacc.2016.03.569>
- Wadia, R., Booth, V., Yap, H. F., & Moyes, D. L. (2016). A pilot study of the gingival response when smokers switch from smoking to vaping. *British Dental Journal*, *221*(11), 722–726. <https://doi.org/10.1038/sj.bdj.2016.914>
- Wan Puteh, S. E., Abdul Manap, R., Maharani, H., Ahmad, I. S., Idris, I. B., Md Sham, F., Yu Lin, A. B., Soo Chun, I., Pakri Mohamad, M. R., Mokhtar, A. I., Zakaria, H., Lee, J., Amer Nordin, A. S., Ariaratnam, S., & Mohd Yusoff, M. Z. (2018). The use of e-cigarettes among university students in Malaysia. *Tobacco Induced Diseases*, *16*(December). <https://doi.org/10.18332/tid/99539>
- Wang, T. W. (2020). E-cigarette Use Among Middle and High School Students — United States, 2020. *MMWR. Morbidity and Mortality Weekly Report*, *69*(37). <https://doi.org/10.15585/mmwr.mm6937e1>
- World Health Organization. (2022). *Adolescent Health*. World Health Organization. https://www.who.int/health-topics/adolescent-health#tab=tab_1
- Yang, I., Sandeep, S., & Rodriguez, J. (2020). The oral health impact of electronic cigarette use: a systematic review. *Critical Reviews in Toxicology*, 1–30. <https://doi.org/10.1080/10408444.2020.1713726>
- Zavala-Arciniega, L., Reynales-Shigematsu, L. M., Lozano, P., Rodríguez-Andrade, M. Á., Arillo-Santillán, E., & Thrasher, J. F. (2018). Patterns of awareness and use of electronic cigarettes in Mexico, a middle-income country that bans them: Results from a 2016 national survey. *Preventive Medicine*, *116*, 211–218. <https://doi.org/10.1016/j.ypmed.2018.09.018>

APPENDIX A – ETHICAL APPROVAL FORM



UNIVERSITI TUNKU ABDUL RAHMAN

Wholly Owned by UTAR Education Foundation (Company No. 578227-M)

Re: U/SERC/224/2022

4 November 2022

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

Dear Mr Muhammad Noh,

Ethical Approval For Research Project/Protocol

We refer to your application for ethical approval for your students' research project from Bachelor of Physiotherapy (Honours) programme enrolled in course UMF3026. We are pleased to inform you that the application has been approved under Expedited Review.

The details of the research projects are as follows:

No	Research Title	Student's Name	Supervisor's Name	Approval Validity
10.	Comparison of Immediate Effect of Soft Tissue Manipulation (STM) and Ice Massage in Mechanical Neck Pain	Wong Hui Lin	Ms Kamala a/p Krishnan	
11.	Association Between Forward Head Posture and Screening Programme of Scoliosis Among UTAR Undergraduate Students	Wong Shi Yi		
12.	Prevalence of Low Back Pain and Its Association with Ergonomic Usage Among UTAR Students	Ian Lee Haorong	Ms Swapneela Jacob	
13.	Awareness, Knowledge and Attitude Towards Artificial Intelligence in Learning Among Faculty of Medicine and Health Science (FMHS) Students in UTAR	Hwang Ji Yen	Co-Supervisor: Mr Tarun Amalnerkar	
14.	Awareness & Knowledge of Breathing Exercise as Covid-19 Management Among UTAR Students	Low Wai Kit	Ms Meneka Naidu a/p Mohnaraju	
15.	Awareness on the Adverse Effects of Vaping on Health Among UTAR Students	Lim Yu Hui		
16.	Awareness Towards Bell's Palsy Among University Students	Pong Jia Shan		

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

Thank you.

Yours sincerely,

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

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

APPENDIX B – INFORMED CONSENT FORM

Awareness on the Adverse Effects of Vaping on Health among University Students in UTAR

Dear participant,

You are invited to participate in a research study conducted by Lim Yu Hui, from Bachelor of Physiotherapy (HONS) Universiti Tunku Abdul Rahman (UTAR), Sungai Long Campus.

The purpose of this research is to

1. determine the prevalence of vaping among university students in UTAR in year 2022.
2. determine the awareness of university students towards the adverse effects of vaping on health.

You are welcome to help us to complete the research if you are both:

Foundation or undergraduate student of UTAR (Sungai Long or Kampar Campus)

AND

Aged between 18 to 25

This questionnaire has 5 sections and it spent approximately 10 minutes to complete this questionnaire.

Participation:

Your participation in this study is completely voluntary. Withdrawal from this study is allowed at any time.

Risks and Benefits:

There are no risks from being in this study. By the end of the study, you will be able to improve your knowledge and awareness towards the adverse effects of vaping on health.

Confidentiality:

No information that will make it possible to identify you, will be included in any reports to the University or in any publications.

Research records will be stored securely and only approved researchers will have access to the records.

If you require additional information or any doubts, please feel free to contact me:

Name: Lim Yu Hui

Email: limyuhui0115@1utar.my

Your participation is very much appreciated.

APPENDIX C – PERSONAL DATA PROTECTION NOTICE

PERSONAL DATA PROTECTION NOTICE

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

1. Personal data refers to any information which may directly or indirectly identify a person which could include sensitive personal data and expression of opinion. Among others it includes:

- a) Name
- b) Identity card
- c) Place of Birth
- d) Address
- e) Education History
- f) Employment History
- g) Medical History
- h) Blood type
- i) Race
- j) Religion
- k) Photo
- l) Personal Information and Associated Research Data

2. The purposes for which your personal data may be used are inclusive but not limited to:

- a) For assessment of any application to UTAR
- b) For processing any benefits and services
- c) For communication purposes
- d) For advertorial and news
- e) For general administration and record purposes
- f) For enhancing the value of education
- g) For educational and related purposes consequential to UTAR
- h) For replying any responds to complaints and enquiries
- i) For the purpose of our corporate governance
- j) For the purposes of conducting research/ collaboration

3. Your personal data may be transferred and/or disclosed to third party and/or UTAR collaborative partners including but not limited to the respective and appointed outsourcing agents for purpose of fulfilling our obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.

4. Any personal information retained by UTAR shall be destroyed and/or deleted in accordance with our retention policy applicable for us in the event such information is no longer required.

5. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

Consent:

6. By submitting or providing your personal data to UTAR, you had consented and agreed for your personal data to be used in accordance to the terms and conditions in the Notice and our relevant policy.

7. 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.

8. You may access and update your personal data by writing to us at limyuhui0115@1utar.my.

1. Acknowledgment of Notice *

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

2. Digital signature (e.g.: electronically s/d chanmeili) *

输入你的答案

APPENDIX D – KREJCIE AND MORGAN TABLE

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	26	140	103	340	181	1000	276	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384
Note: "N" is Population Size "S" is Sample Size.									

APPENDIX E – QUESTIONNAIRE FORM (DEMOGRAPHICS)

Demographic Data

3. Name (e.g.: Chan Mei Li) *

Enter your answer

4. Age (in yrs) *

Enter your answer

5. Gender *

- Male
- Female

6. Ethnicity *

- Chinese
- Malay
- Indian
- Other

7. UTAR Email (e.g.: limyuhui0115@utar.my) *

Enter your answer

8. Campus *

Sungai Long

Kampar

9. Faculty (e.g.: MKFMHS/ LKCFES/ FCI...) *

Enter your answer

10. Program of study (e.g.: PS/ MBBS/ CI...) *

Enter your answer

APPENDIX F – HISTORY OF VAPING

11. Have you ever, even once, vaped? *


- Yes
- No

12. Do you currently vape? *

- Yes
- No

13. At what age do you start vaping? *

- less than 10 y/o
- 10 - 15 y/o
- 16 - 20 y/o
- 21 - 25 y/o
- 26 - 30 y/o
- I don't know

14. How many mg/ml of nicotine contains in the refill e-liquid you are currently using? * 

- 1 - 18 mg/ml (nicotine free)
- > 18 mg/ml
- I don't know

15. Which flavors of e-liquid do you currently use? * 

tobacco flavored

menthol or mint flavored

fruit flavored

no flavored

Other

16. Where do you usually vape?

(You can choose more than one answer) *

at home

at school

on the street/ public place

in restaurants or social sites

Other

17. What are the reasons that you vape?

(You can choose more than one answer)

* 

to quit tobacco smoking

to release stress

it is less harmful than tobacco cigarettes

it is cheaper than tobacco cigarettes

it comes in flavors I like

influence from family


influence from friends

Other

APPENDIX G – PENN STATE ELECTRONIC CIGARETTE

DEPENDENCE INDEX (PSECDI)

Penn State Electronic Cigarette Dependence Index

18. How many times per day do you usually use your electronic cigarette? (assume that one "time" consists of around 15 puffs or lasts around 10 minutes) * 

- 0 - 4 times/day
- 5 - 9 times/day
- 10 - 14 times/day
- 15 - 19 times/day
- 20 - 29 times/day
- > 30 times/day

19. On days that you can use your electronic cigarette freely, how soon after you wake up do you first use your electronic cigarette?

*

- 0 - 5 mins
- 6 - 15 mins
- 16 - 30 mins
- 31 - 60 mins
- 61 - 120 mins
- > 121 mins

20. Do you sometimes awaken at night to use your electronic cigarette? *

Yes

No

21. If yes, how many nights per week do you typically awaken to use your electronic cigarette?

0 - 1 nights

2 - 3 nights

> 4 nights

22. Do you use an electronic cigarette now because it is really hard to quit? *

Yes

No

23. Do you ever have strong cravings to use an electronic cigarette? *

Yes

No

24. Over the past week, how strong have the urges to use an electronic cigarette been? *

- None/ Slight
- Moderate/ Strong
- Very strong/ Extremely strong

25. Is it hard to keep from using an electronic cigarette in places where you are not supposed to? *

- Yes
- No

26. Did you feel more irritable because you couldn't use an electronic cigarette? *

- Yes
- No

27. Did you feel nervous, restless, or anxious because you couldn't use an electronic cigarette? *


- Yes
- No

APPENDIX H – GENERAL QUESTIONS ON VAPING

General Questions

28. What are the negative health effects of using e-cigarettes? * 

	Yes	No	I don't know
Increased risk of heart attack 增加心脏病发作的风险	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased risk of stroke 增加 中风的风险	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased risk of coronary artery diseases 增加心血管疾 病的风险	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased risk of seizure (a condition that causes temporary abnormalities in muscle tone or movements) 增加癫痫发作的风险	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decreased risk of lung diseases 减少患肺病的风险	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decreased risk of depression 减少患抑郁症的风险	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

29. Which of the following substances are found in e-cigarettes? * 

	Yes	No	I don't know
Formaldehyde 甲醛	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Volatile organic compounds (organic compounds that evaporate easily at room temperature) 挥发性有机化 合物	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heavy metals (tin, lead, nickel, cadmium) 重金属	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Benzoic acid 苯甲酸	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Carbon monoxide 一氧化碳	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tar 焦油、沥青	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX I – SPECIFIC HEALTH RELATED QUESTIONS ON VAPING

Specific Health Related Questions

Based on what you think, does vaping cause adverse effects to the health?

30. Respiratory system *

	Yes	No	I don't know
Breath with whistling sound (wheezing) 喘息	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cough 咳嗽	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Difficulty in breathing (dyspnea) 呼吸困难	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cancer (eg: lung, nasal, paranasal cancer) 癌症	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chest pain 胸口痛	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cough with blood (hemoptysis) 咳血	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low oxygen saturation (oxygen in blood < 95%) 低血氧	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Breathing rate > 20 breaths per minute (tachypnea) 呼吸急促	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Irreversible injury to the lung 对肺造成不可逆转的伤害	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Presence of excess fluid in the lungs (pleural effusion) 胸腔积液	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Presence of air in between lungs and chest (pneumothorax) 气胸	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Presence of airflow blockage and breathing-related problems (pulmonary obstruction) 肺阻塞	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

31. Gastrointestinal system * 

	Yes	No	I don't know
Nausea, vomiting 恶心、呕吐	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diarrhea 腹泻	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Abdominal pain 腹痛	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

32. Cardiovascular system *

	Yes	No	I don't know
Decreased blood pressure 降低血压	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tachycardia (heart rate > 100 beats/minute) 心动过速	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Narrowing of the large blood vessels on the heart (acute endothelial dysfunction) 心血管狭窄	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

33. Neurological system *

	Yes	No	I don't know
Dependency/ addiction 上瘾	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dizziness 晕眩	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anxiety 焦虑	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Irritability 易怒	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Headache 头疼	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of concentration 缺乏注意力	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sleeping difficulties 睡眠困难	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

34. Urogenital system *

	Yes	No	I don't know
Poor function of the kidneys (acute renal insufficiency) 急性肾功能衰竭	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

35. Hematopoietic system *

	Yes	No	I don't know
Increased white blood cells count (leukocytosis) 增加白细胞数量	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased red blood cell count 增加红细胞数量	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

36. Oral cavity *

	Yes	No	I don't know
Dry or sore mouth or throat 口干	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dental diseases (eg: cracked or decay teeth) 牙齿疾病	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gum bleeding 牙龈出血	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

37. Physical changes *

	Yes	No	I don't know
Fever 发烧	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chills (feelings of coldness accompanied by shivering) 发冷	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gain weight 体重增加	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fatigue/ Malaise 疲劳、身体不适	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX J – TURNITIN REPORT

ORIGINALITY REPORT

12%	8%	9%	5%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Amir Khorrami, Heitham Gheriani. "Vaping-Induced Acute Epiglottitis: A Case Report", Research Square Platform LLC, 2022 Publication	1%
2	docplayer.net Internet Source	1%
3	Submitted to Universiti Tunku Abdul Rahman Student Paper	1%
4	www.ncbi.nlm.nih.gov Internet Source	1%
5	www.csiro.au Internet Source	1%
6	www.isrctn.com Internet Source	1%
7	suaire.suanet.ac.tz Internet Source	<1%
8	worldwidescience.org Internet Source	<1%
	repositorio.ufjf.br	

9	Internet Source	<1 %
10	Elona Hasmujaj, Visar Dizdari. "Anxiety during COVID-19 Pandemic among Students of University of Shkoder, Albania", <i>European Journal of Humanities and Social Sciences</i> , 2021 <small>Publication</small>	<1 %
11	Suha AlMuhaissen, Haneen Mohammad, Afnan Dabobash, Marya Q. Nada, Zahra M. Suleiman. "Prevalence, Knowledge, and Attitudes among Health Professions Students toward the Use of Electronic Cigarettes", <i>Healthcare</i> , 2022 <small>Publication</small>	<1 %
12	Md Mizanur Rahman, Mohd Taha Arif, Abdul Rahim Abdullah. "Support and Practice of Smoke-Free Eating Places in Sarawak, Malaysia: A Structural Path Analysis", <i>Journal of Health Reports and Technology</i> , 2022 <small>Publication</small>	<1 %
13	Marine Michon, Clément Mercier, Claudie Petit, Lara Leclerc, Laurent Bertoletti, Jérémie Pourchez, Valérie Forest. "In Vitro Biological Effects of E-Cigarette on the Cardiovascular System—Pro-Inflammatory Response Enhanced by the Presence of the Cinnamon Flavor", <i>Toxics</i> , 2022	<1 %

14	academic.oup.com Internet Source	<1 %
15	spel3.upm.edu.my Internet Source	<1 %
16	Carla J. Berg. "Preferred flavors and reasons for e-cigarette use and discontinued use among never, current, and former smokers", International Journal of Public Health, 2015 Publication	<1 %
17	Shengtai Bian, Anqi Hu, Gui Lu, Zemei Cao, Jinming Wang, Jundong Wang. "Study of Chitosan Ingestion Remitting the Bone Damage on Fluorosis Mice with Micro-CT", Biological Trace Element Research, 2021 Publication	<1 %
18	C. Buscail, B. Gagnière. "Vaccination coverage of adolescents: Results of a Defense and Citizenship Day-based survey", Médecine et Maladies Infectieuses, 2016 Publication	<1 %
19	adsa.cdeworld.com Internet Source	<1 %
20	Submitted to Charles Darwin University Student Paper	<1 %
21	Submitted to Aspen University Student Paper	

		<1 %
22	Jack Bozier, Emily K. Chivers, David G. Chapman, Alexander N. Larcombe et al. "The Evolving Landscape of Electronic Cigarettes", Chest, 2020 Publication	<1 %
23	Jona M. Johnson, Jessica L. Muilenburg, Stephen L. Rathbun, Xiaozhong Yu, Luke P. Naeher, Jia-Sheng Wang. "Elevated Nicotine Dependence Scores among Electronic Cigarette Users at an Electronic Cigarette Convention", Journal of Community Health, 2017 Publication	<1 %
24	Submitted to University of Arizona Student Paper	<1 %
25	Submitted to University of Kentucky Student Paper	<1 %
26	www.myflfamilies.com Internet Source	<1 %
27	www.rightdiagnosis.com Internet Source	<1 %
28	www.scielo.org.za Internet Source	<1 %
	www.nationalauditprojects.org.uk	

29	Internet Source	<1 %
30	www.iiste.org Internet Source	<1 %
31	Betul Aycan Alim, Mehmet Burak Guneser, Asiye Nur Dincer. "Cardiologists' and cardiovascular surgeons' attitudes toward managing endodontic infections and oral health in patients with cardiovascular diseases", Postgraduate Medicine, 2020 Publication	<1 %
32	Submitted to Nilai University College Student Paper	<1 %
33	Shabeer Ali Thorakkattil, Sainul Abideen Parakkal, Fatimah Abushoumi, Habib S. Nemr, Hoor Alhazza, Rita Jabbour, Fuad Al-Ghamdi. "Online patient portal-based management of medication renewal and refill pickup in ambulatory care settings: A retrospective utilization study at tertiary care hospital in Saudi Arabia", Saudi Pharmaceutical Journal, 2022 Publication	<1 %
34	Shanzina Iasmin Sompaa, Anna Zettergren, Sandra Ekström, Swapna Upadhyay et al. "Predictors of electronic cigarette use and its association with respiratory health and	<1 %

obesity in young adulthood in Sweden;
findings from the population-based birth
cohort BAMSE", Environmental Research,
2022

Publication

35	Submitted to Kenyatta University Student Paper	<1 %
36	www.healio.com Internet Source	<1 %
37	link.springer.com Internet Source	<1 %
38	Jung Ah Lee, Sun Hee Kim, Hong-Jun Cho. "Electronic cigarette use among Korean adults", International Journal of Public Health, 2015 Publication	<1 %
39	coek.info Internet Source	<1 %
40	researchonline.gcu.ac.uk Internet Source	<1 %
41	www.science.gov Internet Source	<1 %
42	Submitted to Universiti Teknologi MARA Student Paper	<1 %
43	etd.uum.edu.my Internet Source	<1 %

44	foundation.chestnet.org Internet Source	<1 %
45	journaljpri.com Internet Source	<1 %
46	lethallure.org Internet Source	<1 %
47	livrepository.liverpool.ac.uk Internet Source	<1 %
48	repository.smuc.edu.et Internet Source	<1 %
49	www.coursehero.com Internet Source	<1 %
50	www.icmab.org.bd Internet Source	<1 %
51	Submitted to CSU, Los Angeles Student Paper	<1 %
52	HEBA M. ISMAIL, BRANDON M. NATHAN, JERRY P. PALMER, LINDA DIMEGLIO, JAY M. SOSENKO. "1343-P: A Comparison of C-Peptide and Glucose Responses between Children and Adolescents Who Progress to Type 1 Diabetes (T1D)", Diabetes, 2019 Publication	<1 %
53	Juan Fang*, Jianping Ren*, Lixian Ren, Wendy Max, Tingting Yao, Falin Zhao. "Electronic	<1 %

cigarette knowledge, attitudes and use among students at a university in Hangzhou, China", Tobacco Induced Diseases, 2022

Publication

54 Olivia A. Wackowski, Mariam Rashid, Kathryn L. Greene, M. Jane Lewis, Richard J. O'Connor. "Smokers' and Young Adult Non-Smokers' Perceptions and Perceived Impact of Snus and E-Cigarette Modified Risk Messages", International Journal of Environmental Research and Public Health, 2020 <1%

Publication

55 Peltzer, Karl, Supa Pengpid, Tony K. C. Yung, Hajer Aounallah-Skhiri, and Rehana Rehman. "Comparison of health risk behavior, awareness, and health benefit beliefs of health science and non-health science students: An international study : Health risk behavior", Nursing and Health Sciences, 2015. <1%

Publication

56 Submitted to Wawasan Open University <1%

Student Paper

57 asiapharmaceutics.info <1%

Internet Source

58 clkrep.lacity.org <1%

Internet Source

59 epublications.marquette.edu

Internet Source

		<1 %
60	senate.texas.gov Internet Source	<1 %
61	ulspace.ul.ac.za Internet Source	<1 %
62	Andrea McCubbin, Amanda Wiggins, Janine Barnett, Kristin Ashford. "Perceptions, Characteristics, and Behaviors of Cigarette and Electronic Cigarette Use among Pregnant Smokers", Women's Health Issues, 2020 Publication	<1 %
63	Foulds, J., S. Veldheer, J. Yingst, S. Hrabovsky, S. J. Wilson, T. T. Nichols, and T. Eissenberg. "Development of a Questionnaire to Assess Dependence on Electronic Cigarettes in a Large Sample of Ex-smoking E-cig Users", Nicotine & Tobacco Research, 2014. Publication	<1 %
64	Alison Breland, Eric Soule, Alexa Lopez, Carolina Ramôa, Ahmad El-Hellani, Thomas Eissenberg. "Electronic cigarettes: what are they and what do they do?", Annals of the New York Academy of Sciences, 2017 Publication	<1 %
65	Bibiana K. Batinge, Hatice Jenkins. "Gender and Poverty Reduction in Ghana: The Role of	<1 %

Microfinance Institutions", International
Journal of Economics and Finance, 2021

Publication

-
- 66** Palipudi, K. M., L. Mbulo, J. Morton, L. Mbulo, R. Bunnell, G. Blutchner-Nelson, S. Kosen, G. H. Tee, A. M. E. Abdalla, K. A. A. Mutawa, A. Barbouni, E. Antoniadou, H. Fouad, R. N. Khoury, J. Rarick, D. N. Sinha, and S. Asma. "Awareness and Current Use of Electronic Cigarettes in Indonesia, Malaysia, Qatar, and Greece: Findings From 2011-2013 Global Adult Tobacco Surveys", *Nicotine & Tobacco Research*, 2015. <1%
- Publication

-
- 67** healthlibrary.vanderbilthealth.com <1%
- Internet Source

Exclude quotes On
Exclude bibliography On

Exclude matches Off