

ALTERNATIVE TOBACCO AND NICOTINE PRODUCTS
USE AND ITS ASSOCIATED FACTORS AMONG LATE
ADOLESCENTS IN GOVERNMENT COLLEGES IN
KOTA BHARU



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ABBREVIATIONS

ATNP	Alternative tobacco and nicotine products
MOH	Ministry of Health
GYTS	Global Youth Tobacco Survey
GATS	Global Adult Tobacco Survey
CDC	Center for Disease Control and Prevention
U.S	United States
E-cigarette	Electronic cigarette
TECMA	Tobacco and E-cigarette Among Malaysia Adolescents
RM	Ringgit Malaysia
CI	Confidence interval
SD	Standard deviation

ABSTRACT

English

Alternative tobacco and nicotine products use and its associated factors among late adolescents in government colleges in Kota Bharu.

Introduction The rising prevalence of tobacco products use among adolescents nowadays is a matter of concern as tobacco is a well-known cause of various diseases with high morbidity and mortality. This situation is expected to be worsened by the preexisting alternative tobacco products that have been used since the last century and the emergence of newer alternative tobacco and nicotine products (ATNP) in the markets. This study examined the use of e-cigarettes and shisha, as well as the other types of older smoked tobacco such as bidi, kretek, cigars or cigarillo, and smokeless tobacco products among late adolescents.

Objective To determine prevalence of alternative tobacco and nicotine products use among late adolescents in government colleges in Kota Bharu and its associated factors.

Methodology This is a cross-sectional study involving 388 students from government colleges in Kota Bharu aged 18 to 19 years old. They were requested to answer a set of questionnaire on sociodemographic, types of tobacco and nicotine products use, environmental influence, reasons for using the products, their perceptions towards the products, refusal skills, and self-efficacy.

Results The prevalence of alternative tobacco and nicotine products (ATNP) use among the adolescents was 14.4%. Peer use, male sex, cigarette smoking status, and self-efficacy were significantly associated with ATNP use by both simple and multiple logistic regressions. While the other factors such as parental and sibling use, perception that ATNP were less harmful and less addictive, reasons for use such as curiosity, less expensive, to aid smoking cessation, variety of flavours and taste as well as refusal skills were not significant.

Conclusion The prevalence of ATNP use among adolescents in Kota Bharu was much higher than what was reported among Malaysian adolescents. Measures should be taken to reduce the influence of peers in tobacco products use and interventions should be focussing more on male adolescents. Prevention of cigarette smoking and strengthening of self-efficacy among adolescents will indirectly reduce ATNP in the future. This issue should be tackled seriously by the government, local authorities who responsible for tobacco control and regulation, health organisations, and schools in combating tobacco and nicotine use among adolescents.

ABSTRAK

Malay

Penggunaan produk tembakau dan niotin alternatif dan faktor-faktor yang berkaitan di kalangan remaja di kolej-kolej awam di Kota Bharu.

Pendahuluan Peningkatan prevalens penggunaan produk tembakau di kalangan remaja hari ini adalah perkara yang membimbangkan memandangkan tembakau adalah penyebab utama pelbagai penyakit dengan morbiditi dan mortaliti yang tinggi. Keadaan ini akan menjadi bertambah buruk disebabkan oleh adanya produk tembakau alternatif yang telah wujud sejak berabad lalu dan juga kemunculan produk-produk tembakau dan niotin alternatif yang baru di pasaran. Kajian ini menyiasat tentang penggunaan rokok elektronik, shisha, dan jenis tembakau berasap yang lain seperti bidi, kretek, dan cerut serta produk tembakau tidak berasap di kalangan remaja.

Objektif Untuk menentukan prevalens penggunaan produk tembakau dan niotin alternatif di kalangan remaja di kolej-kolej awam di Kota Bharu dan faktor-faktor yang berkaitan.

Kaedah Kajian ini merupakan kajian hirisan lintang yang melibatkan 388 pelajar dari kolej-kolej awam di Kota Bharu berusia antara 18 hingga 19 tahun. Pelajar telah diminta untuk menjawab satu set soal selidik mengenai sosio-demografi, jenis produk tembakau dan niotin yang digunakan, pengaruh persekitaran, sebab penggunaan serta persepsi mereka

Keputusan Prevalens penggunaan produk tembakau dan nikotin alternatif di kalangan remaja adalah 14.4%. Penggunaan produk tersebut adalah berkaitan dengan penggunaan oleh rakan sebaya, faktor jantina, status merokok serta efikasi diri yang telah dibuktikan melalui analisa regresi logistik ringkas dan berganda. Faktor-faktor lain seperti penggunaan oleh ibubapa dan adik-beradik, persepsi bahawa ia kurang berbahaya dan kurang ketagihan, sebab-sebab penggunaan seperti rasa ingin tahu, lebih murah, untuk membantu berhenti merokok, pelbagai perisa dan rasa serta kemahiran penolakan tidak berkaitan dengan penggunaan peroduk tembakau dan nikotin alternatif di kalangan remaja.

Kesimpulan Penggunaan produk tembakau dan nikotin alternatif di kalangan remaja di Kota Bharu adalah jauh lebih tinggi daripada yang dilaporkan di kalangan remaja di Malaysia. Langkah-langkah perlu diambil untuk mengurangkan pengaruh rakan sebaya dalam penggunaan produk tembakau dan intervensi harus lebih tertumpu lebih kepada remaja lelaki. Pencegahan rokok dan pengukuhan efikasi sendiri di kalangan remaja secara tidak langsung akan mengurangkan penggunaan produk tembakau dan nikotin alternatif pada masa akan datang. Isu ini perlu ditangani dengan serius oleh pihak kerajaan, pihak berkuasa tempatan yang bertanggungjawab terhadap peraturan dan kawalan hasil tembakau, organisasi kesihatan, dan pihak sekolah dalam memerangi penggunaan tembakau dan nikotin di kalangan rema

CHAPTER 1

INTRODUCTION

1.1 Introduction

Tobacco use is a global health issue due to its implications and serious long-term consequences. It is recognised as the main cause of premature and preventable death in our country (Institute for Public Health, 2016). It is estimated that 10,000 deaths in Malaysia are attributed to smoking yearly (Ministry of Health Malaysia, 2003). Statistics from the Ministry of Health Malaysia (MOH) in 2006 revealed that diseases related to smoking remained the top causes of death in MOH hospitals, accounting for more than 15% of hospitalisations and 35% of in-hospital deaths (Institute of Public Health, 2011).

The rising prevalence of tobacco products use among adolescents nowadays is a matter of concern as both male and female adolescents engaged with smoking (Daing and Osman, 2013). The prevalence of tobacco smoking among female adolescents in Malaysia seems to increase throughout these recent years from 4.2% in 2003 to 5.3% in 2009 (Center for Disease Control and Prevention, 2003; Institute for Public Health, 2016). The other worrying issue now is the trend of starting tobacco products at earlier age. A comparison of the National Health Morbidity Survey (NHMS II) (1996) and NHMS III (2006) surveys shows a lowering in the mean age of smoking initiation for both men and women over a 10-year period. The overall mean age of initiation dropped from 19.9 to 18.6 years (Institute of Public Health, 2011). Then in 2011, overall mean age of smoking initiation was much more lower (17.2 years). In the latest national survey among adolescents, 78.7% (95% CI: 75.0, 82.0) tried their first cigarette before

the age of 14 and a third [33.1% (95% CI: 30.2, 36.1)] of them had their first cigarette at the age of 12 to 13 (Institute for Public Health, 2016). This trend of starting and experimenting cigarettes at early age was also seen with the other tobacco products (Institute for Public Health, 2016). Therefore, it is important to prevent and reduce any form of tobacco use among youths as to decrease the rate of nicotine dependence and subsequent morbidity and mortality in future adults.

Nowadays, tobacco products have undergone transformation in the way people use them. Traditionally, they have been used as conventional cigarettes or older form of smoked tobacco and smokeless tobacco which are now become less popular. Smoked tobacco includes manufactured cigarettes, hand-rolled cigarettes, kretek, tobacco-filled pipes, cigars or cigarillos, shisha or hookah and bidis (Institute of Public Health, 2011). The smokeless tobacco involves direct using of tobacco either by nasal sniffing, keeping it in the mouth or chewing (Institute of Public Health, 2015). Since past decade, tobacco use has gone through an evolutionary change from conventional manufactured cigarettes to alternative tobacco and nicotine products which increasingly being promoted as potentially less harmful cigarette alternatives and being used as a substitute for cigarette smoking. Two notable transitions seen in the tobacco market are the re-emergence of shisha or hookah and electronic nicotine delivery device or e-cigarette. These forms of tobacco consumption can deliver higher doses of tar, nicotine, and carbon monoxide than the standard manufactured cigarette and are also associated with adverse health effects including several types of cancers, chronic obstructive pulmonary disease, coronary heart disease, gum recession, and nicotine addiction (Alderete et al., 2010).

A newer form of smoked tobacco but in a different form, known as water pipe (also called as shisha or hookah) was the first new tobacco trend of the 21st century originated from

Eastern Mediterranean region. It is now gaining popularity in many western countries including Australia, United Kingdom, Canada, and the United States of America (USA), and also in Southeast Asia (Wong et al., 2016a). Beginning in the 1990s, water pipe re-emerged as a popular way to use tobacco (O'Connor, 2012). It is used by indirectly heating the aromatic tobacco by burning the embers or charcoal. The smoke that is produced will then filtered through a bowl of water (sometimes mixed with other liquids such as wine) and further drawn through a rubber hose to a mouthpiece. There are various shisha flavours in the market, including apple, banana, berry, cherry, chocolate, coconut, coffee, cola, grape, kiwi, lemon, and many more (American Lung Association, 2007). The special features of aromatic tobacco, easy availability with a lot of attractive designs have contributed to its popularity (Institute for Public Health, 2016).

Like the manufactured cigarette, shisha also contains carbon monoxide which is hazardous to health and addictive chemical which is nicotine (American Lung Association, 2007). The level of nicotine and cotinine which are the chemical marker of nicotine exposure in shisha smokers were found to be high even after one session of hookah use (Shafagoj et al., 2002). One hookah session is equivalent to the exposure of up to 50 cigarettes (Gilreath et al., 2016). Even that, shisha smoking is gaining popularity among adolescents and can be regarded as a predominantly social phenomenon that allows people to spend pleasurable time with friends and family at the cafes or bars (Al-Naggar and SA Saghir, 2011). It is also growing threat to public health because of a common misconception that smoking shisha is relatively less hazardous than smoking tobacco cigarettes. Secondly, most of the outlets offering shisha remain largely unregulated (Wong et al., 2016a). Although limited research has been done on the health risks of shisha use, evidence from previous studies indicates that it poses similar health risks as cigarette smoking (O'Connor, 2012).

The second transition was the emergence of vaporised nicotine products which is called electronic cigarette (e-cigarette) (Czoli et al., 2015). The act of using e-cigarette known as vaping (Palazzolo, 2013). The e-cigarette is a relatively new phenomenon that is quickly gaining the interest of many long-time tobacco smokers. It was introduced to the global market since 2003 (Hummel et al., 2015). These devices, often constructed to resemble cigarettes, work by vapourising a solution containing nicotine dissolved with flavourings in a carrier medium (usually propylene glycol) (O'Connor, 2012). It is now become a preferred alternative for nicotine delivery among many smokers because of the realistic look, different feel of smoke, and various tastes compared to manufactured cigarettes. Furthermore, many cigarette smokers have changed their smoking habit to vaping as e-cigarette was marketed as cheaper and safer cigarettes, and a possible smoking cessation tool (Palazzolo, 2013). Additionally, the nicotine delivery of the e-cigarettes was tested to be significantly lower than that of cigarettes, raising questions of whether they can be cigarettes' substitute over the long term (O'Connor, 2012). However, these products have not been thoroughly evaluated in scientific studies. Thus, there is considerable controversy about the disease risk and toxicity of e-cigarettes and empirical evidence on short- and long-term health effects are still ongoing (Sutfin et al., 2013).

1.2 Rationale of study

The use of tobacco and nicotine products has proven to significantly increase mortality and morbidity of its users as well as people around them. The government has enforced tobacco control programmes while health care providers have carried out quit smoking clinic and awareness programmes to address and prevent these growing issues. These interventions have led to the declined in its prevalence. Unfortunately, tobacco industries have come out with the innovative ways of using tobacco products. They claimed that the newest generations will help in reducing health-related risks and replacing it at an affordable price.

At present, there is still limited data on the harmful effects of these new products. However, most of the respiratory experts believe that these products might be as harmful as conventional cigarettes. Of concern, our young generations have expressed their interest as evidenced by its prevalence and young age at initiation. With the increasing popularity of these alternative tobacco and nicotine products, local research should be carried out to determine the significance this issue in affecting our young generations. We argue that this research will also contribute to the body of knowledge on the factors (including socio-cultural) encouraging them to choose these products. The findings will facilitate us to strengthen our local tobacco and nicotine control and subsequently to save the society from its destructive effects.

CHAPTER 2

LITERATURE REVIEW

2.1 Prevalence of Alternative Tobacco and Nicotine Products Use in Malaysia

Tobacco smoking prevalence among youths indicates increasing rates of future tobacco-related diseases and death (ITC Project, 2012). To date, the prevalence of all form of tobacco products use among adolescents is in rising trend. Malaysia Global Youth Tobacco Survey (GYTS) 2003 reported that 8.1% of adolescents 13 to 15 years of age used tobacco products other than cigarettes (8.8% were male and 7.5% were female) (Center for Disease Control and Prevention, 2003). The Malaysia GYTS (2009) reported the increasing prevalence of non-cigarette tobacco use to 9.5% (Ministry of Health Malaysia, 2016). As of 2011, Global Adult Tobacco Survey (GATS) Malaysia which is a nationally representative household survey published their research on non-institutionalised men and women aged 15 years and older. The survey focussed on prevalence and burden of tobacco use in Malaysia. The authors revealed 16.6% of them smoked any form of tobacco with only 2.0% use alternative products of smoked tobacco including pipes, cigars, shisha, bidis, and any other reported tobacco smoking products. Based on the same survey, 96.8% of the smokers used smoked tobacco, 1.4% used smokeless tobacco and 1.8% used both smoked and smokeless (Institute of Public Health, 2011).

The use of alternative tobacco products among adolescents is worrisome over few years as the drastic increment in its prevalence as mentioned earlier. In Malaysia, overall prevalence of Shisha smoking among adults and adolescents more than 15 years old in 2011 was only 0.7%, while 0.8% of them used e-cigarette (Institute of Public Health, 2011). Meanwhile in 2015, a local study done among 503 shisha smokers in cafe and restaurants in Malaysia where by 13%

of the subjects were adolescents. They reported overall higher prevalence of shisha smoking (18.1%) as opposed to previous data (Wong et al., 2016a).

This phenomenon was also proven by the tremendous increment of prevalence of alternative tobacco and nicotine products (ATNP) based on report in a national survey conducted by Ministry of Health, Tobacco and E-cigarette Survey Among Malaysia Adolescents (TECMA) 2016. This survey focussed on the use of various tobacco products, particularly e-cigarette and shisha among school-going adolescents aged 10-19 years old at public and private schools. They reported the prevalence of current e-cigarette users has increased to 9.1% while the prevalence of ever e-cigarette users was 19.1%. This prevalence was much higher than Malaysian adult population (0.8%, 95% CI: 0.4-1.6%) (Institute of Public Health, 2011). In Kelantan specifically, 89% (95% CI: 83.8 to 93.8) of all adolescents in the state participated in TECMA survey ever heard of e-cigarette while 7.8% (95% CI: 4.1-12.4) of them are current e-cigarette users (Institute for Public Health, 2016).

Surprisingly, despite the reducing popularity of the older tobacco products, the TECMA survey reported high prevalence of current smokeless tobacco (11.0%), followed by traditional hand-rolled cigarettes (3.6%), tobacco snuff (3.5%), 'roll-your-own' with cigarette paper (2.2%), cigars (1.2%), pipe smoker (0.8%) and tobacco chewing (0.6%). Meanwhile, prevalence of shisha smokers as reported in TECMA survey was less than half of e-cigarette prevalence at 3.5%, whilst the overall prevalence of ever shisha smokers was 10.6%. Current shisha smokers were significantly higher among secondary school adolescents as compared to primary school adolescents with the prevalence of 1.8% (95%CI: 1.3, 2.6) and 4.5% (95%CI: 3.5, 5.6) respectively (Institute for Public Health, 2016). The substantial number of advertisements especially in the websites and successful marketing strategy in portraying the products as safer

and more fashionable alternative to conventional cigarettes plays an important role in encouraging youngsters to choose ATNP rather than quit smoking.

As for international data, the ATNP use among adolescents all around the world is also increasing in trend. Global Youth Tobacco Survey (GTYS) 1999-2008 reported similar percentage of boys who smoke cigarettes and those who used other forms of tobacco products such as pipes, water pipes, cigars, smokeless tobacco, and bidis (12% respectively). Similarly, the trend was seen among girls where 8.0% of them used alternative tobacco products while 7.0% smoke cigarettes (Centers for Disease Control and Prevention, 2009). National Youth Tobacco Survey (NYTS) conducted in 284 schools in United States from 2011 to 2012 reported that reduction in the use of manufactured cigarettes among both middle and high school students (4.3% to 3.5% and 15.8% to 14% respectively) but the use of non-cigarette tobacco products particularly e-cigarettes and shisha was substantially increased with overall prevalence of the products was 13.5% in 2011 and 35.5% in 2012. Meanwhile, reduction of prevalence was seen in all other forms of tobacco products such as cigars, smokeless tobacco, pipes, snus, kreteks, bidis and dissolvable tobacco. Although the prevalence of use was reduced, cigars, smokeless tobacco and pipes were three most commonly used in both middle and high school students (2.8%, 1.7% and 1.8% versus 12.6%, 6.4% and 4.5% respectively) (Center for Disease Control and Prevention, 2013).

A study done by Enofe et al 2014 found that 18.0% of all college students in USA included in her study reported current use of alternative tobacco products within the last 30 days. The most common alternative tobacco product used was little cigars (10.0%), followed by cigarillos (5.0%), hookah (4.3%), cigars (3.7%), chew (2.9%), and snus (0.9%) (Enofe et al., 2014). In 2015, a study done among Canadian secondary school students found that 21.2% of

them reported using any tobacco and nicotine products in the past 30 days. E-cigarette was reported to be the second higher prevalence of its use after cigarillo (7.2% versus 7.0% respectively), followed by cigar (5.0%), hookah or shisha (4.3%) and smokeless tobacco (4.3%) (Czoli et al., 2015). These data support the ongoing shift of tobacco consumption from conventional cigarettes to the other forms of tobacco products which occurred much earlier in the other countries worldwide. However, based on the above literature, the types of alternative tobacco products that they used were different from Malaysian adolescents who preferred shisha and electronic cigarettes more than the other tobacco products.

2.2 Associated Factors of Alternative Tobacco and Nicotine Products Use

Adolescents experience and attract to ATNP in various ways. Sociodemography, environmental factors specifically influence from peer and family, perceptions towards ATNP, concurrent cigarette smoking, refusal skills, self-efficacy and special characteristics of the ATNP which differ from the conventional cigarettes are some of the important factors in encouraging them to choose ATNP.

2.2.1 Sociodemographic factors

The use of ATNP is influenced by socioeconomic status of the adolescents in terms of family monthly income, sex and also cigarette smoking status.

2.2.1 (a) Monthly family income

With regards to monthly family income, for instance, higher family income will be able to provide extra pocket money to the students causing the ATNP are very much affordable. S.Mohan et al (2005) mentioned in his study that private school students who came from a family with higher socioeconomic status received more pocket money and this was significantly associated with the use of tobacco products other than cigarette (Mohan et al., 2005). This fact was proven by a study done among Malaysian university students in Selangor on shisha smoking which found that family monthly income was significantly associated with shisha smoking. Students with high family income (more than RM4000 per month) had higher practice of shisha as compared to those with lower monthly family income (less than RM4000 per month) (Ahmed Al-Naggar and SA Saghir, 2011). Although based on Malaysia Economy Planning Unit, average Kelantan household income is rm3700 per month while RM890 per month and below is categorised as poverty level (Jabatan Perangkaan Malaysia, 2012). However, to date, there was lack of study done in Malaysia looking into this socio economy factor in ATNP use. Even that, the relationship between economic status of the family was shown to be associated with the practice of ATNP.

2.2.1 (b) Sex

Apart from that, sex was found significantly associated with the practice of ATNP among adolescents. According to a local study done in 2011, male sex was significantly associated with shisha smoking among Malaysian university students. The finding was male students had a higher practice of shisha smoking compared to female students. Female had on average 87% lower odds of being shisha smoker than male students (Al-Naggar and SA Saghir,

2011). The author also found similar result among medical students in one local university whereby male sex was significantly associated with shisha smoking ($p=0.029$) (Al-Naggar, 2012). Besides, male adolescents were found to be highly involved with other forms of tobacco consumption as compared to female adolescents which include smokeless tobacco (0.9% versus 0.6%), hand-rolled cigarette (7.4% versus 0.4%) and kretek (8.4% versus 0.1%) (Institute of Public Health, 2011).

Similarly, our national survey in 2015 reported more male adolescents were current e-cigarette users compared to female adolescents, 16% and 2.9% respectively. Additionally, the prevalence of shisha smoking among male adolescents [5.5% (95%CI: 4.4, 6.8)] was significantly higher than female adolescents [1.4% (95%CI: 0.9, 2.1)]. Same goes to the other tobacco products such as smokeless tobacco, pipes, tobacco chewing, cigar and snuff which male predominantly involved in the consumption of the products. (Institute for Public Health, 2016). Enofe et al (2014) reported 46.7% of male adolescents used alternative tobacco products and it showed a significant association. It was mentioned that female students had 59% lower odds of being alternative tobacco products users (OR= 0.41, 95% CI 0.33 to 0.51) (Enofe et al., 2014). In another study, male youth was found to have more than twice the odds of being poly-tobacco users relative to non-users compared to females (Gilreath et al., 2016). The consumption of alternative tobacco product was higher among male adolescents (27.1%), and male was 3 times more likely than female to smoke pipe (Alderete et al., 2010).

2.2.1 (c) Cigarette smoking status

Current or previous cigarette smoking is an important determinant of ATNP use which leads to future poly-tobacco practice. TECMA (2016) reported 5.2% of Malaysian adolescents were current dual users while 3.9% of them were current single users (Institute for Public Health, 2016). According to a reviewed article, there was a positive association between cigarette smoking and water pipe smoking among youth in Beirut (Martinasek et al., 2011). In a recent study about e-cigarettes among New Zealand adults in 2015, current smokers had a 34-fold increased odds of ever use of e-cigarette while ex-smokers had a 3-fold increased odds of ever-use than never smokers (Alderete et al., 2010). This fact was in line with a study among Canadian Youth in 2015 which found that current cigarette smoking was the powerful predictor of current use of e-cigarette (Czoli et al., 2015).

In USA, current cigarette smokers were 8.5 times more likely to become an e-cigarette use as compared to other non-cigarette alternatives (Loukas et al., 2015). In the other recent study done in Canada, among over 44,000 secondary school students, 34.8% of current smokers had used e-cigarettes in the past 30 days. Of the 63.8% of current smokers who had ever tried to quit, 32.8% had used e-cigarettes (Czoli et al., 2015). Enofe et al did a study among nearly 24000 college students in US and reported that the odds of using alternative tobacco products was significantly higher among non-daily smokers and daily smokers in comparison to non-smokers (OR=6.43, CI: 4.92-8.40; OR=2.79, CI: 1.92-4.05 respectively) (Enofe et al., 2014). These literatures showed how common poly-tobacco is especially the combination of conventional cigarettes and e-cigarettes.

2.2.2 Environmental influence

The dominant role of peers and family members in influencing smoking and also alternative tobacco use and experimentation among adolescents has been investigated extensively and proven in multiple studies (Al-Naggar, 2012; Chang et al., 2006; Martinasek et al., 2011; Vartiainen et al., 2007). According to Malaysian adolescents' survey held in 2016, 43% of current e-cigarette or vape users obtained the product from friends while 19.6% of female users and 10.3% male users obtained it from family members (Institute for Public Health, 2016). Similar findings reported in a pilot study done to explore the reasons of Shisha smoking among teenagers in Ipoh, Perak. The authors found out that most of the respondents were influenced by peers in their first attempt in Shisha smoking (Khor et al., 2012). Another local study done also found that having parents, siblings and friends who smoke shisha were significantly associated with shisha smoking status among youths (Al-Naggar, 2012).

Not only shisha and e-cigarette, influence from family and peers was also related to experimentation of smokeless tobacco by adolescents (Cohen, R.Y. et al, 1987). Alderete et al had done a study about alternative tobacco products use among Latin American youth in 2009 which revealed that those who have five or more friends who smoked were 1.8 times increase likelihood of using tobacco and 2.1 times more likely to smoke cigars. In a recent study by Kong et al (2015) stated that those who have parents or family using e-cigarettes were 1.7 times more likely to have the same practice but the experimentation of e-cigarettes was not significantly associated with peer use regardless of their cigarette smoking status [ever cigarette smoker (OR= 0.86, 95% CI 0.61, 1.22); current cigarette smoker (OR=0.78, 95% CI 0.55, 1.12)]. Anand,V. et al (2015) reported that 31% among ever e-cigarette users had friends with similar practice followed by fathers (6.8%), mothers (6.8%), and siblings (4%). Besides, the high school students

who practice e-cigarette have more fathers than mothers as ever smoking conventional tobacco cigarettes (45.7% vs. 30%) or using smokeless tobacco (10.4% vs. 3.3%). Similarly in a U.S survey, 31% of adolescents reported having friend using e-cigarettes which contributed to their practice as well (Kong et al., 2015).

2.2.3 Perceptions towards alternative tobacco and nicotine products

Furthermore, ATNP were preferred by the adolescents because they believed the products were less harmful than conventional cigarette (O'Connor et al., 2007). It was particularly true with shisha and e-cigarette as proven in a lot of studies and surveys. A study showed that 48.5% of one local university students mentioned that shisha was less harmful while more than half them (66%) mentioned that shisha was less addictive than cigarettes (Ahmed Al-Naggar and SA Saghir, 2011). In another local study among 503 of shisha smokers, more than half (53.3%) of the subjects believed that shisha was healthier and less harmful than conventional cigarettes as the shisha smoke was not as pollutive or intrusive as cigarette smoke (Wong et al., 2016a). Meanwhile, TECMA (2016) reported that among ever e-cigarette users, 63.6% stated that e-cigarette was safer than tobacco cigarettes. Among the current e-cigarette users in the similar survey, 35.6% felt that it was less harmful compared to cigarette smoking while another one-third felt that it was equally harmful and more harmful compared to cigarette smoking (Institute for Public Health, 2016).

Other studies have found that youths perceived shisha smoking was not as harmful or as addictive as cigarettes and other forms of tobacco smoking (Al-Naggar, 2012; Khor et al., 2012; Wong et al., 2016a). While in Iran, the vast majority (89.9%) of the participants also felt that shisha use was less harmful from cigarette smoking (Karimy et al., 2013). In a reviewed article

by Martinasek et al (2011), Roskin and colleagues (2009) reported that British university students perceived shisha was less harmful because of the smoothness of the inhaled fruit-flavoured tobacco smoke which was thought to enter the lungs in different pathway as compared to cigarette smoke (Martinasek et al., 2011).

Not only shisha, e-cigarette users seemed to be aware of the dangerous effects of cigarette smoking to their health and thought that e-cigarette was an alternative to decrease these health risks (Hummel et al., 2015). In a UK survey done in 2012, majority of the participants (85%) perceived e-cigarettes to be less dangerous than conventional cigarettes and 93% of them believed that e-cigarettes were addictive but lesser than conventional cigarettes. Interestingly, about half of them (52%) perceived themselves as being addicted to e-cigarettes (Maciej. L Goniewicz et al., 2013). However, in a U.S study, the perception that e-cigarettes were less harmful was not significantly associated with its practice. They reported that current cigarette smokers were less likely to discontinue e-cigarette use because of the health risks (OR=0.44, 95% CI 0.26, 0.75) (Kong et al., 2015).

A latest study done among 22,000 middle and high schools students in USA reported that perceiving e-cigarettes as less harmful than conventional cigarettes increased odds of lifetime use of e-cigarettes by 2.4 times (OR = 2.40, 95% CI 1.98–2.90) and past 30-day use of e-cigarette by 2.2 times (OR = 2.18, 95% CI 1.63–2.92). Perceiving e-cigarettes as less addictive than conventional cigarettes also increased students' odds of lifetime use (OR=2.11, 95% CI=1.82–2.45) and past 30-day use of e-cigarettes (OR=1.93, 95% CI=1.57–2.38) (Page et al., 2016).

Most of the shisha smokers believed that it does not contain nicotine and carbon monoxide, does not lead to lung cancer, dental problems, as well as cardiovascular diseases (Al-Naggar, 2012). These misperceptions and poor knowledge about the impact of ATNP on health have led to the initiation, experimentation and ongoing use of the products (Al-Naggar, 2012; Cohen, R.Y. et al, 1987; Martinasek et al., 2011).

2.2.4 Reasons of alternative tobacco and nicotine products use

2.2.4 (a) Use of ATNP to aid smoking cessation

As ATNP were extensively promoted as potential tools for smoking cessation, a lot of literatures mentioned that most of the adolescent and adult smokers tend to divert their practice from using conventional cigarettes to alternative tobacco and nicotine products (ATNP) in order to reduce the number of cigarettes, overcome their nicotine addiction or quit smoking without realising the effectiveness. This fact was proved in multiple studies done among smokers where by most of them used e-cigarette to quit smoking and to reduce cigarette consumption as they perceived that electronic cigarette was less toxic than regular cigarettes (Etter, 2010; Li et al., 2015; Wong et al., 2016b). Among Malaysian adult smoker, majority (87.9%) reported using e-cigarettes as a way to quit smoking tobacco (Wong et al., 2016b). Another local study mentioned that 37.6% of shisha smokers between 15 to 64 years old used it as an aid to quit cigarette smoking (Wong et al., 2016a).

Using ATNP as an attempt to quit smoking was further supported by a study among adolescent and adult smokers done by Popova and Ling (2013), Goniewicz et al (2013), and Hummel. K et al (2015). In a study done in USA, 7.8% of adult smokers reported trying to

switch cigarettes to chewing tobacco, snuff or snus as an effort to quit smoking while additional 5.8% considered it but never tried (Popova and Ling, 2013). It has been mentioned that adult smokers who thought of their health were 1.6 more likely to use e-cigarettes aiming at reducing their cigarette consumption (Hummel et al., 2015). Similar findings was noted in a UK survey on e-cigarette use, 47% out of 177 respondents tried e-cigarettes for the first time with intention to quit smoking. Over half of these users reported complete abstinence from their usual cigarettes and the rest reported reduced levels of smoking (Goniewicz et al., 2013).

Meanwhile, a cross sectional survey done in 2013 reported that 38% of adolescents more than 16-year-old had tried alternative tobacco products to quit smoking most frequently e-cigarettes while 21% have tried by switching to smokeless tobacco. Although alternative nicotine products particularly e-cigarettes and vape being used as a replacement for cigarettes, studies have shown that the change of practice was not associated with successful quit attempts (Popova and Ling, 2013).

However, another study in 2014 also reported that the use of e-cigarettes was associated with lower odds of abstinence from cigarette smoking. Ever e-cigarette use was associated with 76% lower odds of abstinence from conventional cigarettes at 30-day and 6-month and 75% at 1-year while current e-cigarette users had 89% lower odds of 30-day and 6-month abstinence and 88% at 1-year (Dutra and Glantz, 2014). In addition to that, strong evidence in a meta analysis by Kalkhoran and Glantz (2016) showed that smokers who use e-cigarettes are 28% (OR 0.72, 95% CI 0.75 to 0.91) less likely to quit smoking compared to those who did not use them (Ministry of Health Malaysia, 2016). However, results from two studies done in United Kingdom found that participants using e-cigarettes were 2.3 times more likely to have abstained from smoking for at least 6 months (RR=2.29, 95% CI 1.05 to 4.96) (Ministry of Health

Malaysia, 2016). Despite potential to decrease the cigarette consumption, empirical evidence showing that e-cigarettes help smokers completely quit smoking is lacking. Instead of helping in smoking cessation, e-cigarette use resulted in prolonged nicotine addiction. (Wong et al., 2016b).

2.2.4 (b) Curiosity

On the other hand, experimenting due to curiosity was the other common reason for using ATNP among adolescents as reported in previous literature. In TECMA (2016), 64.3% of adolescents used e-cigarettes as experimentation (Institute for Public Health, 2016). In a survey involving 5400 U.S adolescents in middle, high schools and colleges found that curiosity was one of the top three reasons for e-cigarette experimentation among lifetime e-cigarette users (54%), regardless of cigarette smoking status and school level. The study further mentioned that current cigarette smokers and ever cigarette smokers were 1.1 and 1.3 times more likely to use e-cigarette because of curiosity (Kong et al., 2015). Besides, Li et al (2015) also reported 57.1% of all e-cigarette ever-users indicated that they first tried electronic cigarette out of curiosity (Li et al., 2015). In addition, a review article by Singh SK. et found that curiosity was the main reason of initiating shisha among youths as mentioned in the studies done by Erbaydar et al (2010), Ghafouri et al (2011), Karimy et al (2013), Haroon et al (2014), Hammal et al (2008), and Baheiraei (2015) (Singh et al., 2017). However, one study in 2013 found that curiosity was not the main reason of using e-cigarettes among both adult and adolescent subjects. Only 4 % (95% CI 1.0 to 7.0) tried e-cigarette because of curiosity (Goniewicz et al., 2013).

2.2.4 (c) Less expensive

Cost appears to be another important reason that alternative tobacco and nicotine products are gaining popularity compared to conventional tobacco. E-cigarette was said to be relatively cheaper compared to tobacco cigarettes (Wong et al., 2016b). In Malaysia, a main survey related to e-cigarettes among adolescents reported that 37.3% of them claimed that e-cigarette was more economical than the conventional cigarette and 36.2% said it was affordable. Cost estimation showed the majority of current e-cigarette/vape users spent less than RM50 per month (23.9%) where as 14.5% spent between RM50 to RM100 per month for e-cigarettes (Institute for Public Health, 2016). In local study investigated reasons of using e-cigarettes among adult populations reported that in terms of monthly expenses on e-cigarettes, most of the respondents spent more than RM100 (n = 226, 52.7 %), but 53.2% also reported saving up to RM200 per month since using e-cigarettes (53.2 %) (Wong et al., 2016b).

A multi countries internet survey done in 2010 reported 32% of respondents used e-cigarette because it was less expensive than regular cigarettes (Etter, 2010). In another study, 10% of students used e-cigarette because of its lower cost, however ever cigarette smokers and current cigarette smokers were less likely to continue using e-cigarette because of the cost [OR=1.45, 95% CI 0.82 to 2.56; OR= 1.27, 95% CI 0.71 to 2.28] Despite that, the association between cost and discontinuation of e-cigarettes was not significant (Kong et al., 2015). Similarly, the cheaper price of shisha was one of the main contributory factors to its use as the users usually shared the shisha together and this would indirectly reduce their expenses in buying cigarettes (Al-Naggar and SA Saghir, 2011; Nakkash et al., 2011). A few local surveys also reported that shisha smoking was preferred due to its cheaper price (Khor et al., 2012; Wong et al., 2016a). Wong LP et al found in his study that 30.3% of the shisha smokers in Malaysia

thought that shisha is relatively cheaper than cigarette (Wong et al., 2016a).

In a reviewed article by Martinasek et al (2011), Chayaa M. et al mentioned in his study that Lebanese colleges students, as well as their British counterparts, independently reported that shisha smoking was an inexpensive way to hang out with their friends (Martinasek et al., 2011). In Malaysia, many websites advertising shisha as a cheaper option as it can be shared by many users at a rate as low as RM5 to as high as Rm50 to RM50 depends on the type of shisha, flavour and venue.

In addition to that, rising cigarettes price and taxes causing shifting trend of tobacco use. Excise tax duty was increased by 25% in 2007. As of 2010, tax constitutes about 54% of the retail price of popular brand cigarettes (ITC Project, 2012). This had obviously contributes to the increasing price of manufactures cigarettes nowadays. by doing this, the government predicted by an increase in Malaysian ringgit (RM) 1.60 to 2.00 per pack would reduce cigarette consumption by 3.37% (Khor et al., 2012). It was just a prediction even so in fact it did not happen. Because of increasing cigarettes price nowadays, most of the tobacco users claimed ATNP were much cheaper. However, there was lack of cost analysis study done in our country comparing the price of manufactured cigarette and these alternative products. An article stated the price for one disposable e-cigarette which delivers a higher amount of nicotine is equals to 2 to 3 packs of cigarettes, while 10 millilitres of e-liquid equal to consumption of 5 packs of cigarettes (Vinik, 2014). This indicates the consumption of e-cigarette able to provide nicotine at the same amount that the cigarette does but at a cheaper price.

2.2.4 (d) Pleasurable flavours and taste

Various studies have reported the reasons of using ATNP. Besides all the reasons mentioned earlier, one of the most common reason was seeking the pleasurable flavours and taste. TECMA (2016) reported that among ever e-cigarette/vape users, 77.3% of the adolescents liked the taste and smell of e cigarettes or vape. Among females who were ever e-cigarette/vape users, the reasons to start using e-cigarettes/vape were preferring the taste and smell [70.7% (95% CI: 61.5, 78.5)] followed by popularity (65.7%) (95% CI: 56.6, 73.7)] (Institute of Public Health, 2016). In addition, another main reason for using or experimenting the ATNP was appealing flavours and variety of taste (Khor et al., 2012). In a survey involving adolescents from 4 countries, 4% of them stated that one of the reasons of choosing e-cigarette was its variety of taste and smell improves the sense of taste and does not cause unpleasant odours or bad breath (Etter, 2010). Another survey also reported that 43.8% of overall students tried e-cigarette because of its appealing flavours and they were 1.2 times more likely to use e-cigarettes (Kong et al., 2015).

2.2.5 Refusal skills

Smoking refusal skill is the term to describe someone's ability to refuse a smoking invitation by another person. It has been shown that lower refusal skill was associated with the practice of alternative tobacco products (Karimy et al., 2013). Those who never smoke significantly have better refusal skills and resisted any offers of cigarettes by just saying "No, thank you" (Charlton, A. et al., 1999). In 2007, an interventional study was conducted among secondary school students in Taiwan to explore the impact of no smoking strategy and smoking prevention module including refusal skills. The interventional group showed better refusal skills

as compared to control group. The higher the score, the higher the possibility of smoking refusal technique to be used (Lee et al., 2007). This would indirectly prevent the adolescents from engaging in such practice.

An almost similar interventional study done in a 3-year smoking prevention program in secondary schools in Helsinki with the aim of exploring the effects of the program on adolescent smoking. The program consisted of 14 sessions of smoking information sessions and refusal skills training. The researchers concluded that programme significantly prevent the onset of weekly smoking practice among those who were never smoking at the baseline when compare to control group [OR=0.63 (0.45–0.90)] (Vartiainen et al., 2007). Another study done in Iran reported those with high smoking refusal skills had decreased odds of being water pipe smokers by 23% than those who had low refusal skills (Karimy et al., 2013).

2.2.6 Self-efficacy

The theory of self-efficacy in the maintenance of smoking cessation has been described since many years ago. In 1981, an interventional study was done to 63 heavy smokers who previously had quit smoking through 3 different treatments with the objective of demonstrating the relationship between self-efficacy with post-treatment abstinence at a 5-month follow-up. Two-thirds of all subjects successfully maintained as non-smoker at 5-month with significantly higher self-efficacy scores than recidivists (Diclemente, 1981). A few years later, Godding and Glasgow (1985) conducted a study to develop and evaluate the usefulness of self-efficacy and outcome expectation measures in predicting smoking status. They found strong correlations between their self-efficacy score and smoking behaviour at a 6-month follow-up after situational controlled of smoking behaviour (Godding and Glasgow, 1985). A comparative finding was

reported in a study done among 800 adolescents in U.S which concluded that self-efficacy scale used in the study was an appropriate instrument for the prediction of smoking behaviour (Lawrence and Rubinson, 1986).

On top of that, many latest studies have shown that higher levels of self-efficacy relate to lower rates of smoking initiation (Hiemstra et al., 2011). Chang et al conducted a study to examine whether changes in self-efficacy predicted smoking initiation among 1,654 adolescents in Netherlands. His findings showed that lower self-efficacy predict smoking initiation (Chang et al., 2006). Similarly, Mahmood Karimy et al found that self-efficacy was a major predictive of shisha smoking (OR=0.82; 95%CI 0.61-0.93) (Karimy et al., 2013). Although all the literature described the effects of self efficacy to cigarette smoking behaviour, however it can be also related to the ATNP use as both products shared common characteristics and poly-tobacco consumption is frequently occurred.

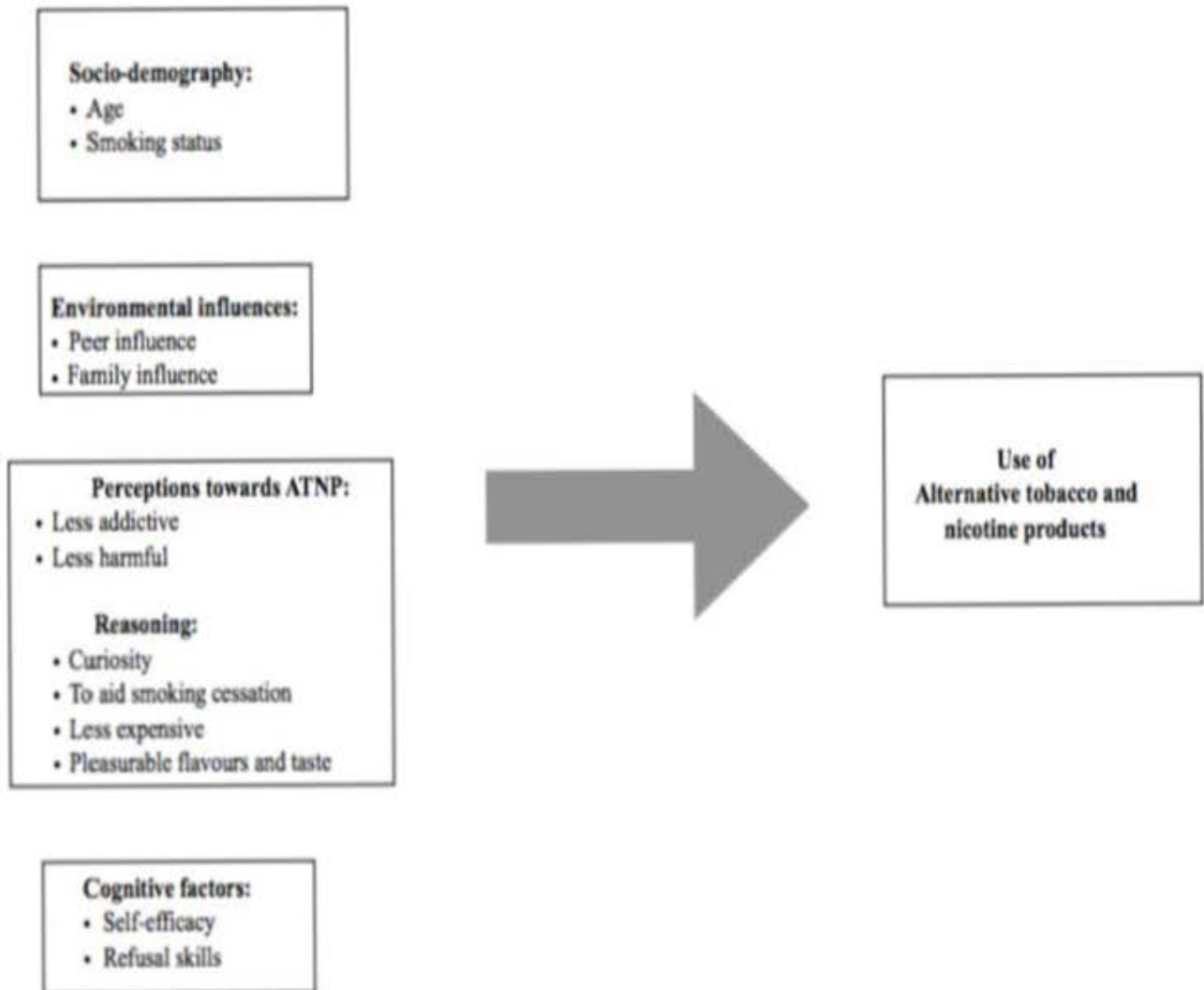


Figure 1: Conceptual framework of associated factors of alternative tobacco and nicotine products use among adolescents