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THE INFLUENCE OF AWARENESS AND UNDERSTANDING OF PHILIPPINE VAPING LAW IN ADOLESCENT E-CIGARETTE USE

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Abstract

Vaping prevalence in adolescents has been a public health concern worldwide. Despite implementation of vaping laws aimed at curbing this increasing menace, vaping still continues to rise. The aim of this study is to identify gaps in vaping regulations by identifying the factors, attitudes and beliefs, awareness of health risks, awareness of Philippine vaping law and compare the regulation provisions of ASEAN countries. This research employs analytical cross-sectional study with benchmarking component utilizing survey questionnaires answered by participants through Google forms. Results revealed that factors on personal, social, psychological and environmental play a role in the increasing vaping use in adolescents. Participants answered positively on the attitude and belief, knowledge on the impacts of vaping and possible interventions. Most of the participants lack awareness of the provisions of the Vape law. The Philippines, despite a comprehensive vaping law, still has the highest prevalence rate among the ASEAN countries. In conclusion, several factors influenced the increasing prevalence of vape in the Philippines and this can be addressed by strictly enforcing or amending some of the provisions of the law. For the recommendation, multi-sectoral involvement and strategies are needed to decrease the prevalence of vaping in the Philippines.

Key words: Adolescent Vaping, Philippine Vape Law, E-Cigarette Regulation, Health Policy Awareness, Youth Risk Behavior

1-INTRODUCTION

A variety of devices, including e-pens, e-hookahs, and vape pens, are referred to as electronic nicotine delivery systems (ENDS) or electronic cigarettes (e-cigarettes). These devices operate by heating a liquid to generate an aerosol that users inhale, frequently containing nicotine and other substances. The American Lung Association (n.d.) and the U.S. Environmental Protection Agency (EPA) have also reported that the aerosols may contain risky chemicals, such as nicotine, formaldehyde, and heavy metals, which are toxic to both the users and other individuals around them (U.S. Food and Drug Administration, 2024). Although marketed as a safer alternative to traditional cigarettes, e-cigarettes have driven an emerging public health epidemic, particularly among adolescents. The number of e-cigarette users is growing on a global scale. In 2021, the Global State of Tobacco Harm Reduction (GSTHR) estimated that 82 million individuals worldwide used vape products and 2.7 million individuals in the Philippines alone, equivalent to about 3% of the world's population. According to 2022 statistics, over 2.5 million middle and high school students in the United States have been e-cigarette users, with over 27% of them using e-cigarettes daily (CDC, 2016; GSTHR, 2021). The trend of vaping among Southeast Asian young people has also increased tremendously over the last several years, as indicated by Malaysia's increase from 1.2% to 9.8% and Thailand's from 3.3% to 8.1% (Patanavanich et al., 2022). According to the 2019 Global Youth Tobacco Survey (GYTS), 14.1% of Filipino students aged 13 to 15 were currently using e-cigarettes, higher than the use of any other tobacco product. Worryingly, most students reported that the products were easily accessible, contrary to the age restriction. Adolescents between 10 and 19 are at a crucial phase of life when they form healthy behaviors and habits (WHO, 2019b). Nicotine exposure during this time influences brain development, particularly in learning, impulse control, and attention areas. Nicotine has been shown to disrupt the synapse formation process, thereby heightening the risk of addiction, cognitive dysfunction, and mood disorders (Lumen Learning, n.d.). Additionally, lung and heart disease, cancer, and even early evidence of cardiovascular dysfunction have been associated with the inhalation of vaporized chemicals like diacetyl, aldehydes, and volatile organic compounds (VOCs) (News-Medical, 2023).

The potential danger has also been underscored by the e-cigarette or vaping-associated lung injury (EVALI) outbreak, in which the first case in the Philippines was reported in 2019 in a 16-year-old female teenager (Cabalza, 2024; Rebuli et al., 2023b). The popularity of e-cigarettes among youths has been attributed to various factors, such as the attractiveness of flavored types, stress coping, aggressive marketing, and peer influence. Despite the presence of existing laws, laxity in its implimentation complicates these behavior patterns. Republic Act No. 11900, more

commonly called the Vaporized Nicotine and Non-Nicotine Products Regulation Act, was passed in 2022 to solve these issues. However, public health advocates have been troubled by the law provisions allowing minimal restrictions on banning on flavor, online advertising, reducing the minimum purchase age, and transferring regulatory authority to the Department of Trade and Industry (Global Tobacco Control, 2023). These critics believe that the amendments may enhance the attractiveness and accessibility of e-cigarettes among children. Despite vaping laws, youth awareness and knowledge about such laws are yet to be studied extensively. It is vital to measure the extent to which young people know about such legal measures and to what extent their awareness conditions their behavior—or the lack thereof. This research examines the role of individual, social, psychological, and environmental determinants in adolescent e-cigarette consumption, particularly referencing their knowledge and awareness of the Philippine Vape law. The study seeks to identify regulatory gaps and guide evidence-based intervention to reduce the prevalence of vaping among Filipino adolescents

MATERIALS AND METHODS
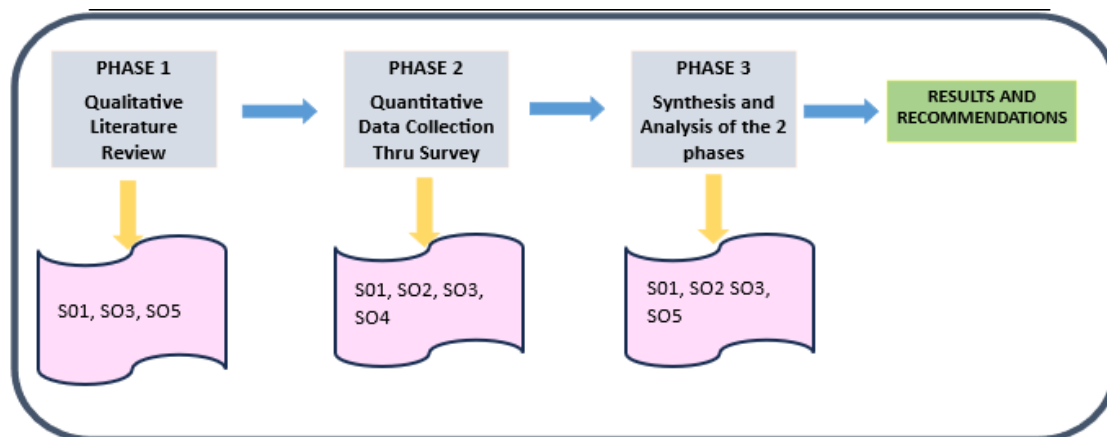
Research Design

Figure 1. Analytical cross-sectional study with benchmarking component.

This study employed analytical cross-sectional study with benchmarking component as shown in Figure 1. The author analyzed the factors, knowledge on health impacts and influence of adolescent awareness and understanding on Philippine vaping law which causes increasing prevalence of adolescent vaping. The survey was administered using Google Forms in the computer laboratory of the school. Results were analyzed using Jamovi version 2.4.8 and Microsoft Excel.

Locale of the Study

The study was conducted at Solano High School, a public secondary school at Solano, Nueva Vizcaya, Philippines. Preparatory discussions were initiated with stakeholders in the school prior to study commencement.

Sampling Technique

The study utilized random sampling to select participants from Grade 7 to 10 students of Solano High School, aged 13 to 17 years old. The minimum required sample size was determined using the Raosoft calculator, based on a 95% confidence interval and a 5% margin of error, resulting in a target sample of 348. Ultimately, 352 students completed the survey and were included in the analysis.

Research Instrument

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A 47-item self-administered survey questionnaire served as the main research instrument. The questionnaire consisted of seven sections addressing participant demographics, vaping behavior, psychological, social, and environmental influences, awareness and understanding of the Philippine Vaping Law, beliefs and attitudes, and possible interventions. The tool was adapted from the Global Youth Tobacco Survey (GYTS) with additional items developed by the researcher. The survey was administered online via Google Forms and underwent pilot testing to ensure clarity, relevance, and appropriateness of the items.

Data Gathering Procedure

Prior to data collection, the researcher conducted an orientation with key school stakeholders including the principal, advisers, coordinators, and participating students. Ethical clearance was obtained from the Institutional Research and Ethics Board (IREB) of Isabela State University (Appendix 4). Following approval, the survey link was disseminated through email by the computer laboratory coordinator. The online data collection took place over a one-month period, from April 7 to May 10, 2024.

Data Analysis

Data were coded and entered in an excel file to facilitate retrieval and processing. Statistical analysis with the help of Jamovi version 2.4.8 was utilized. The weighted mean, standard deviation and frequencies were used to describe the different factors and other variables. The chi-square test was used to determine the significance of difference between the scores obtained by the participants across different variables. ANOVA Welch's was used to measure the degree of association between knowledge and awareness towards e-cigarettes regulations, attitudes and beliefs, knowledge and health impacts and the possible interventions. The p-value for all inferential treatments was set at 0.05.

RESULTS AND DISCUSSION

Participant Profile and Vaping Prevalence

Table 1. Participant profile and vaping prevalence *(n=352).*

Demographic	Category	Vapers	Non-Vapers
Gender	Male	57	117
	Female	20	158
Age Group	12–14	19	155
	15–17	58	120
Grade Level	Grade 7–8	25	137
	Grade 9–10	52	138
Allowance (Weekly)	<₱10.00-₱500.00	66	206
	>₱500.00-₱1,000.00	11	69
Household Income	<₱10,957 (Poor)-₱43,828 (LMC)	74	159
	₱43,829 (MC)->₱219,140 (Rich)	3	16

LMC – Lower Middle Class; MC – Middle Class

A total of 366 students entered into the survey link but only 352 answered and completed the survey and were included in the study. Gender distribution among the participants was nearly equal with 49.43% male and 50.57% female, mostly 15 years of age at 28.13% and in Grade 10 level (30.97%.) Mean age was at 14.4 years old with standard deviation of 1.31. Participants average spendable weekly money was at P10.00-P100.00 with 42.68% coming from poor households with income less than P10 957 at 34.38%. (Table 1, Figure 2).
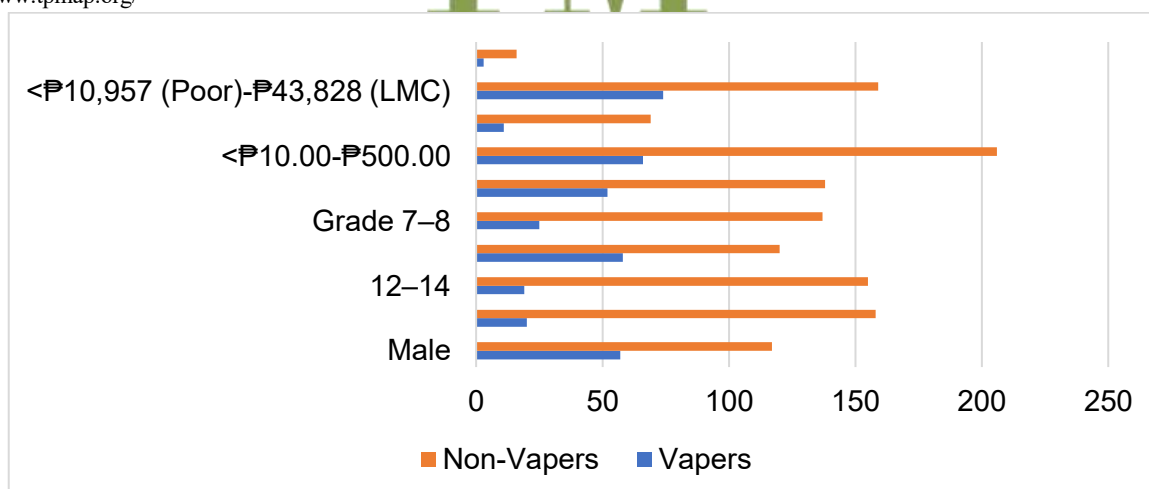
Figure 2. Participant profile and vaping prevalence

Awareness of the Philippine Vaping Law

Table 2a. Frequency, weighted mean and SD of all participants on awareness on the provisions Philippine vaping law *(n=352).*

Provision of Vaping Law	Weighted Mean	SD	Interpretation
Existing law?	3.42	1.08	Aware
Sale of e-cigarette	2.92	1.03	Neutral
Location based sale restrictions	3.00	1.06	Neutral
Point of sale product display	2.84	1.04	Neutral
Sales of e-cigarette via the internet	3.11	1.06	Neutral
Flavors	2.97	1.06	Neutral
Use in indoors, public places, workplace, and public transport	3.01	1.04	Neutral
Advertising and promotions	2.98	1.05	Neutral
Sponsorship	2.90	1.03	Unaware
Specified ingredients and activities	2.63	0.701	Unaware
Age restriction	3.40	1.31	Aware

Table 2a shows the awareness of the participants regarding the provisions of the Philippine vaping law wherein they showed varying levels of awareness across different provisions. The highest weighted mean awareness scores were for the existence of the law (3.42) and age restrictions (3.40), both interpreted as "aware". These provisions also have the highest percentages of respondents who are "Totally Aware and aware.". Other provisions: Sale of e-cigarette, location-based sale restriction, point of sale product display, sale of e-cigarette via internet, flavors, use in indoor and public places, advertising and promotions, sponsorship and specified ingredients and additives have a weighted mean between 2.63-3.11 and were interpreted as "Neutral". The standard deviation was relatively consistent, indicating similar levels of variability in responses across these provisions.

Table 2b. Frequency, mean and SD on awareness of vapers on the provisions Philippine vaping law *(n=77).*

Provision of Vaping Law	Weighted Mean	SD	Interpretation
Existing law?	3.42	1.08	Aware
Sale of e-cigarette	2.92	1.03	Neutral
Location based sale restrictions	3.00	1.06	Neutral
Point of sale product display	2.84	1.04	Neutral
Sales of e-cigarette via the internet	3.11	1.06	Neutral

Flavors	2.97	1.06	Neutral
Use in indoors, public places, workplace, and public transport	3.01	1.04	Neutral
Advertising and promotions	2.98	1.05	Neutral
Sponsorship	2.90	1.03	Neutral
Specified ingredients and activities	2.63	0.701	Neutral
Age restriction	3.40	1.31	Aware

Table 2b shows the awareness of vapers regarding the provisions of the Philippine vaping law. Results revealed similar with the overall participants wherein the provisions on awareness of the law and age restriction where also interpreted as "Agree" while all other provisions are interpreted as "Neutral".

Adolescent Vaping Experimentation and Dual Use

Table 3. Vaping behavior, prevalence, and statistical associations of adolescent vape experimentation

Variable / Category	Non-Vapers (n = 275)	Vapers (n = 77)	χ^2	Odds Ratio	95% CI	p-value
A. Descriptive Statistics						
Tried or experimented with e-cigarette/vape	106	73	–	–	–	–
Did not try	169	4	–	–	–	–
Currently using traditional cigarettes	68	25	–	–	–	–
Not currently using	207	52	–	–	–	–
B. Prevalence Rates						
% Tried/Experimented with e-cigarettes	30.11%	20.74%	–	–	–	–
% Dual Users (Vape + Cigarettes)	19.32%	7.10%	–	–	–	–
C. Inferential Statistics						
First source of vape info: Personal vs. Media/Social Media	–	–	12.50	0.377	0.217–0.654	<0.001
Tried or experimented with vaping	–	–	76.20	29.10	10.3–81.9	0.007
Currently using traditional cigarettes	–	–	1.85	1.46	0.844–2.54	0.173

Table 3 shows that 50% of the total participants had experimented using e-cigs. Most of the vapers experimented using e-cigs before engaging in vaping (94.81%); fewer non-vapers experimented using e-cigs (38.55%). Among vapers, 32.47% concurrently used traditional cigarettes as compared with 24.7% of the non-vapers. On the prevalence rates, it shows that the prevalence rate for those who experimented with vaping among non-vapers is 30.11% compared to 20.74% among vapers. Results of all the total respondents, 50.85% had experimented with use of e-cig. This table also shows that 19.32% of non-vapers are current traditional cigarette users while 7.10% of all the vapers use both e-cigs and cigarettes. The high percentage of experimentation suggest that e-cigs are relatively popular or accessible (André et al., 2023). This indicated a significant exposure to vaping products among the participants. With the notable high proportion of non-vapers who have tried vaping, this could imply that despite being non vapers, curiosity or even peer influence led them to experiment. The existence of dual users (26.24% of all respondents) may signify that the use of e-cigs does not help in stopping use of cigarettes by an individual (Groom et al., 2021). On the part of inferential statistics, is a statistically significant association that experimenting with vaping will lead to becoming a vaper (p value of 0.007). The odds ratio was 29.2 indicating that participants who have tried vaping are much more likely to continue using e-cigs. However, for dual users, there is no statistically significant association for those who use cigarettes will also become vapers. The odds ratio of 1.46 suggested a slight increase in likelihood, but the

confidence interval (0.844-2.54) indicates that the result is not statistically robust because the p-value of 0.173 being greater than 0.005 shows the lack of significance.

Attitudes and Beliefs

Table 4a. Frequency, weighted mean and SD of all participants on attitudes and beliefs in using e-cigarette/vape *(n=352).*

Provision of Vaping Law	Weighted Mean	SD	Interpretation
If one of your best friends offered you any form of tobacco product, would you use it?	1.63	0.757	Definitely not
At any time during the next 12 months, do you think you will use any form of tobacco other than vape?	1.72	0.727	Definitely Not
Once someone has started smoking tobacco, do you think it would be difficult for them to quit?	2.82	0.729	Probably yes
If one of your best friends offered you any form of tobacco product, would you use it?	2.09	0.757	Definitely Not
At any time during the next 12 months, do you think you will use any form of tobacco other than vape?	2.05	0.727	Probably Not
Once someone has started smoking tobacco, do you think it would be difficult for them to quit?	2.64	0.729	Probably Yes

Table 4a summarizes the frequency and weighted mean for the attitudes and beliefs on e-cigs use. For the question on accepting an e-cigs offer from a friend and future use, weighted mean value was interpreted as "Definitely Not". With regard to quitting from smoking, weighted mean was interpreted as "Probably Yes." Similar results with overall participants except on question on future use wherein result revealed "Probably Not."

Table 4b. Frequency tabulation on attitudes and beliefs in using e- cigarette *(n=352).*

Provision of Vaping Law	Weighted Mean	SD	Interpretation
If one of your best friends offered you any form of tobacco product, would you use it?	1.63	0.757	Definitely not
At any time during the next 12 months, do you think you will use any form of tobacco other than vape?	1.72	0.727	Definitely Not
Once someone has started smoking tobacco, do you think it would be difficult for them to quit?	2.82	0.729	Probably yes
If one of your best friends offered you any form of tobacco product, would you use it?	2.09	0.757	Definitely Not
At any time during the next 12 months, do you think you will use any form of tobacco other than vape?	2.05	0.727	Probably Not
Once someone has started smoking tobacco, do you think it would be difficult for them to quit?	2.64	0.729	Probably Yes

Table 4b shows the percentages of the attitudes and beliefs in using e-cigarettes. Most of the respondents answered "Definitely not" and "Probably Not" with regard to questions on acceptance of offer and future use. This indicates not accepting the offer to any tobacco product which may indicate reluctance or low intent to initiate e-cigs use. Cumulative responses with regard to difficulty of quitting revealed around 76% indicating the respondents believed it would be difficult to quit once started. This means that quitting will be quite challenging once started on tobacco product use (Why Quitting Smoking Is Hard | Quit Smoking | Tips From Former Smokers | CDC, n.d.).

Association Between Awareness and Vaping Behavior

Table 5. ANOVA results on awareness and vaping behavior.

Law Provisions	F	df1	Df2	p
1. Existing vaping law	0.0166	1	137	0.898
2. Sale of e-cigarette	0.4549	1	120	0.501
3. Location based sale restrictions	0.8222	1	119	0.366
4. Point of sale product display	0.716	1	122	0.790
5. Sales of e-cigarette via internet	0.0326	1	115	0.857
6. Flavors	3.7274	1	131	0.056
7. Use in indoor public places, workplace	5.0932	1	126	0.026
8. Advertising and promotions	2.1098	1	123	0.149
9. Sponsorship	0.9105	1	123	0.342
10.Specified ingredients	29.5065	1	114	<0.001

<0.05 With Significant Difference

Table 5 shows the ANOVA analysis on awareness of the vape law. There was significant differences in awareness with regard to the following law provisions: Use in indoor and public places ($p = 0.026$); Specified Ingredients ($p < 0.001$); and Age Restriction ($p < 0.001$). These provisions showed significant differences in awareness, suggesting that certain groups are either much more or much less aware of these regulations. In contrast, for the other provisions, the p-values indicated no significant difference in awareness levels, meaning that awareness is uniformly low across different groups for these provisions.

Non-awareness by adolescents of vaping laws including penalties contributed to increased vaping prevalence due to the following factors: First, reduction of the deterrent effect, making adolescents more likely to experiment with the use of ECs. Second, perception of social acceptance, as adolescents influenced by unaware peers or family members see vaping as a normal behavior. Third, non-participation by adolescents in educational programs about the vaping and the health risks associated with vaping. Fourth, disregard of information, education and communication materials (IEC). Fifth, easier access to vaping products because uninformed adolescents are less likely to report these violations like point of sale and age restrictions provisions. Consequently, the combination of reduced deterrence, perceived social acceptance, insufficient education due to non- participation in educational programs, disregarding IEC materials and easier access due to non-awareness of laws collectively increase vaping among adolescents. A study done by Yan et al. (2023) states that youth vape experimentation and dependence appear to be driven by weak regulations, youth-enticing flavors, inaccurate nicotine labelling, misleading media information, poor age verification compliance, and seductive advertising. The study was very comprehensive that it covers a lot of law provisions similar to our vaping law as it is adopted from the World Health Organization (WHO) Framework Convention on Tobacco Control. Another study that involved a review of the effectiveness of regulations was the systemic review done by Reiter et. al. (2024). It synthesized the evidence on the effectiveness of regulatory strategies intended to reduce or prevent the use of E-cigarettes among youth. Findings of the studies revealed that flavor bans, sales licenses, warning labels, and taxation were all associated with a positive impact on youth vaping thus possibly can decrease the prevalence in this age group. Evidence on the effectiveness of laws restricting the legal age of E-cigarettes purchase was inconclusive, both in Reiter et al. (2024) and in that by Taylor et al. (2021). In any country having this provision on age, implementation is challenging because it requires compliance by the retailers and effective enforcement by the local governments. A study done by Nali et al. (2023) showed that 72% of online vendors were noncompliant with measures such as identification checks for E-cigarette purchasing. Moreover, the youth could also access e-cigs through older individuals

such as family members and older friends which could bypass any age restrictions. Macinko et al. in (2014) concluded that irregularities in implementation of age restriction may give a wrong signal of the effectivity of this law provision. Several studies including the study done by Cho et al. (2018) indicate that a better result will be achieved through several regulations on e-cigs compared to just one regulation. Increasing awareness of vaping law and vaping health impacts by all stakeholders (communicating with students, parents, teachers and staff and other community members) is a strategy that can be used to decrease prevalence of vaping in adolescents (Khambayat et al. 2023).

Determinants of Adolescent E-Cigarette Use

Table 6. Determinants of e-cigarette use in terms of cross tabulation of demographic factors, psychological factors, social factors, environmental factors, and experimented and duals users

Factor	Odds Ratio (OR)	95% CI	p-value	Significance
Personal				
Age ≥15 vs. <15	3.94	2.23–6.97	<0.001	Significant
Male vs. Female	3.85	2.19–6.67	<0.001	Significant
Grade 9–10 vs. 7–8	2.06	1.21–3.52	0.007	Significant
Allowance >₱300	2.01	1.00–4.02	0.046	Significant
Higher Household Income	0.522	0.281–0.970	0.038	Significant
Psychological				
Curiosity	1.19	16.2–868	<0.001	Significant
Stress/Depression	5.23	2.92–9.34	<0.001	Significant
Social				
Peer Influence	24.0	3.27–176	<0.001	Significant
Family Influence	1.84	1.08–3.13	0.024	Significant
Environmental				
Information Source (Personal vs. Media)	12.5	0.377	0.217-0.654	<0.001
Media Exposure (Seen online/TV/movies)	0.626	1.41	0.599-3.32	0.429
Affordability (Cost less than cigarettes)	6.55	2.01	1.17-3.47	0.011
Accessibility (Easier to get than cigarettes)	2.24	1.50	0.881-2.54	0.134
Cessation Intent (Trying to quit smoking)	5.80	2.11	1.14-3.92	0.016
Flavor Availability	4.73	4.42	1.03-19.0	0.030
Harm Perception (Perceived less harmful)	14.8	2.81	1.64-4.81	<0.001
Discreet Use (Unnoticed at home/school)	19.2	0.274	0.150-0.501	<0.001
Nicotine Buzz (To get high/buzz)	2.65	1.59	0.908-278	0.103
Experimented and Dual Users				
Experimenters (Tried but not regular)	12.5	0.377	0.217-0.654	<0.001
Dual Users (Vape + traditional tobacco)	76.2	29.1	10.3-81.9	0.007
Traditional Users (Cigarette only)	1.85	1.46	0.844-2.54	0.173

<0.05 With Significant Difference

The study identified several variety of critical determinants of adolescent vaping in personal, psychological, social, and environmental factors. The statistically significant result (p < 0.001) indicates that adolescents aged 15 and older were 3.94 times more likely to vape than those under the age of 15 in the factor of of personal use. This is consistent with the conclusions of Robert Lourdes et al. (2019) and Perikleous et al. (2018), who previously

suggested that the independence of older adolescents leads to their increased exposure to vapor devices and their social interactions with peers. Study conducted in Indonesia (Fauzi & Areesantichai, 2020) and the UK (Irvine et al., 2022) has corroborated this pattern, specially on which it is attributed to heightened susceptibility to marketing campaigns and lower damage perception. Additionally, males who vaped were 3.85 times more likely than females to do so (p < 0.001). Students in Grades 9–10 were 2.06 times more likely to vape than their lower-grade counterparts (p = 0.007), a result that is consistent with similar studies conducted in the United States and Korea (Bang & Baker, 2013; Struik et al., 2023). Additionally, grade level was identified as a determinant. The financial results indicate that individuals who received allowances exceeding ₱300 per day had a 2.01-fold increase in the likelihood of vaping (p = 0.046). This discovery is consistent with the results of research conducted by Short and Cole (2021), most specially in which this illustrate the motivational impact of low cost. It is intriguing that individuals from more affluent families specially of were substantially less likely to vape (OR = 0.522, p = 0.038). This finding is in stark contrast to certain literature cross sectioned, but it is in accordance with Simon et al. (2017), who postulate that individuals of lower socioeconomic status will vape more due to stress and peer pressure.

As psychological predictors of high correlation with e-cigarette use, curiosity and tension have both been identified. Young individuals who reported being inquisitive were 1.19 times more likely to vape (p < 0.001). Curiosity is a well-established driver of experimentation, typically elicited by media exposure and uncertainty (Margolis et al., 2018; Struik et al., 2020). Furthermore, the probability of users vaping to alleviate tension or melancholy was 5.23 times greater (p < 0.001). The study that was conducted is consistent with the results of Jha and Kraguljac (2021) and Finkelstein et al. (2006), specially in which demonstrated that a significant number of adolescents mistakenly believe that vaping is a stress-relieving activity. Additionally, the Truth Initiative (2022) has provided evidence that nicotine can exacerbate anxiety. Peer influence has been the most reliable predictor of vaping behavior, with social circumstances playing a significant role. Teens who were associated with peers who vaped were 24.0 times more likely to vape themselves (p < 0.001). Similar associations were reported in Asia, including Malaysia and Thailand, with peer bonding and shared activity serving as the primary factors (Yusof et al., 2019; Patanavanich et al., 2022) (Groom, 2021). Additionally, adolescents who had family members who vaped were 1.84 times more likely to develop a vaping habit (p = 0.024). Family influence was equally robust. The main factors identified by Jones and Salzman (2020) and Bigwanto et al. (2019) are parental modeling and communication. Despite the fact that school education on the hazards of vaping was most frequently reported by both vapers and non-vapers, its function was determined to be more preventative than determinative. However, the literature suggests that it is, most specially on those schools that remain critical locations for education and intervention (Jeon et al., 2016; Pettigrew et al., 2022; MacCauley et al., 2023). Vaping behavior was significantly influenced by media sources of information in relation to environmental factors predicted in the table. The observation that participants who initially learned about vaping from media were more likely to vape than those who found out about it through personal sources (OR = 0.377, p < 0.001) (Mantey et al., 2026; Lee et al., 2021; Do et al., 2021) is indicative of the influence of social media and marketing.

Both the Scottish Government (2024) and Sapru et al. (2020) have recognized the significance of affordability. Individuals who perceived e-cigarettes as less expensive than traditional tobacco were 2.01 times more likely to vape (p = 0.011). Although convenience of access (OR = 1.51) was positively correlated with use, the outcome was not statistically significant (p = 0.134). Youth who perceived that vaping assisted them in quitting smoking were 2.11 times more likely to use e-cigarettes (p = 0.016), as was the case with the findings of Zang et al. (2021) regarding the controversial use of e-cigarettes as a cessation aid. The

flavor factor substantially contributed to use (OR = 1.42, p = 0.030), which is consistent with reports that youth are drawn to the newness and variety of vape flavorings (Trucco et al., 2020). Additionally, when e-cigarettes were perceived as less detrimental than cigarettes, the likelihood of using them was 2.81 times higher (p < 0.001). The appeal for concealed use was also a factor, with individuals who were concerned about concealability being 19.2 times more likely to vape (p < 0.001), which is consistent with the findings of Zhao et al. (2023). Nevertheless, the utilization of a vape to induce a nicotine "buzz" did not yield statistically significant results (p = 0.103). Lastly, the ability to predict subsequent behavior from single use was demonstrated by the fact that young individuals who had ever vaped were 12.5 times more likely to be habitual vapers (p < 0.001) (Perikleous et al., 2018). The odds of sustained use were significantly higher among dual users, who use both traditional cigarettes and e-cigarettes (OR = 29.1, p = 0.007). This has resulted in a greater public health concern due to the additive nature of health impact (Jeon et al., 2016; Fletcher, 2024). Traditional tobacco users were not significantly more inclined to vape (p = 0.173). The results of this study further suggest that adolescent vaping is likely the result of environmental stimuli, peer influence, and novelty, rather than a direct result of smoking cessation or replacement.

Age of Onset and Use Patterns Among Vapers.

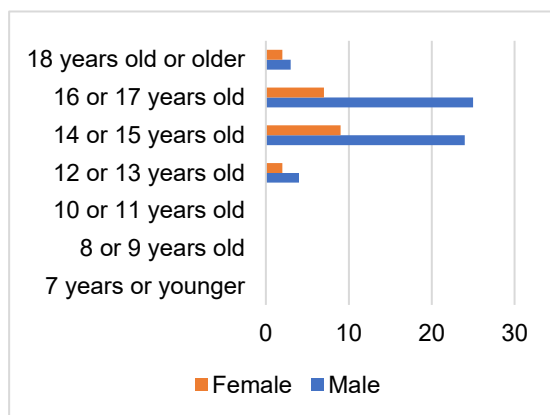## Age of Onset and Use Patterns Among Vapers

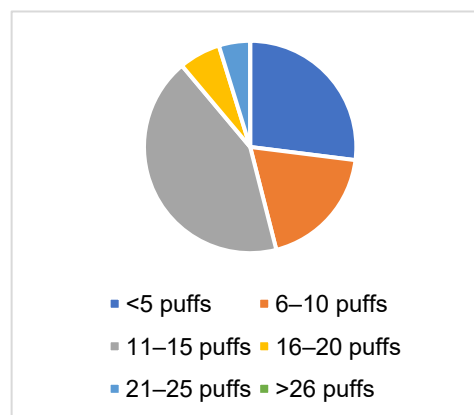Figure 3a. Started using vape

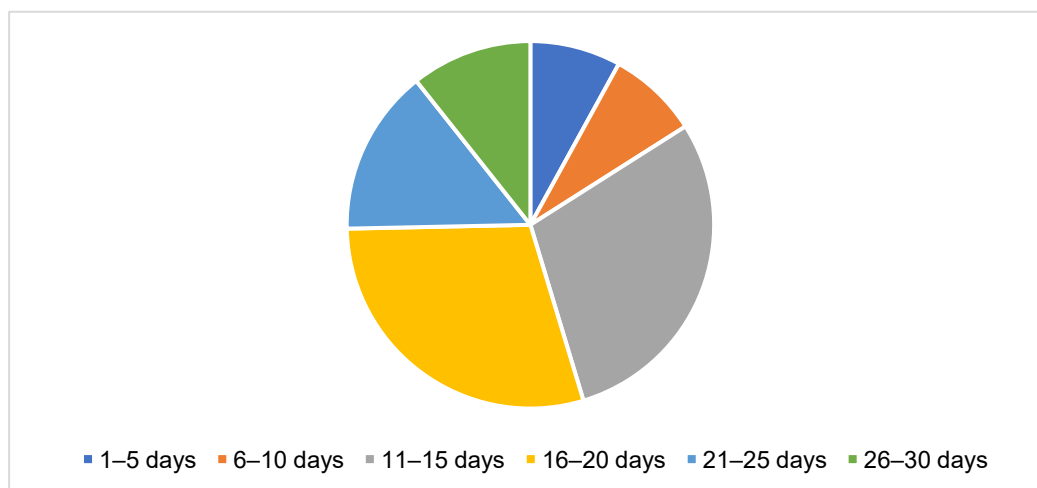

Figure 4b. Number of puffs per day

Figure 5c. Number of days of vape usage

Figure 3a shows that most of the vapers started using e-cigarette at 12 or 13 years of age (44.16%) and closely followed by ages 14 or 15 at 41.56%. The study done by Chen et al. (2020) revealed that e-cigs smoking is initiated at the young age of 7 years but the likelihood of initiating e-cigarette smoking continues to increase up to age 18 years. Mc Cauley et al. (2023) study results revealed a mean age of initiation is 14.3 with SD of 3.0. Knowledge of age initiation is crucial as it helps policymakers identify the vulnerable age groups to focus and to anticipate the health impacts to those who have significant numbers of years using vape. Age related interventions can be instituted before they are likely to be exposed or to be tempted to use vape and possibly involve those who are commonly with adolescent like teachers and their parents.

Understanding the frequency and puffs of e-cigarette use is very crucial since it provides a direct measure of nicotine exposure; thus, it can be used as a parameter to determine possible nicotine dependence. Moreover, it is also a parameter to determine the impact of e-cigarette use on adolescent health. The more puffs per day and more frequent use may help us determine the extent of health impact to the users. This study shows that the average usage of e-cigarettes of vapers are 11-15 puffs per day during 11-20 days lower than the frequency in the study by Wang et al. (2020) where 38.9% of high school students and 20.0% of middle school students reported using e-cigarettes within 20 out of 30 days; 22.5% of high school users and 9.4% of middle school users reported daily use. (Figure 3b & 3c).

CONCLUSION

Personal, social, psychological, and environmental factors all contribute to the increase in adolescent vaping in Solano, Nueva Vizcaya despite the existence of a Vape law. Despite positive responses of adolescents to the questions on their attitudes and beliefs on vaping and their knowledge on its health impacts and safety, there exists a gap between their awareness and behavior. In the Philippines, despite its Vape law, the prevalence of vaping among adolescents remains the highest in South East Asia. This discrepancy indicates that, while legislation is crucial, its implementation and enforcement may require reevaluation and strengthening. Therefore, a thorough review of the current Vape law in our country is warranted to ensure proper enforcement and to address the persistent high rates of vaping among adolescents.

RECOMMENDATIONS

There is a need to adopt an integrated, multi-sectoral response to stop the alarming increase in Filipino teen vaping despite the enactment of Republic Act 11900 (Vape Law). The government sector must take the lead by changing key provisions of the Vape Law. Such provisions involve increasing the legal age for purchase to 25 years, banning flavor additives and point-of-sale product displays, mandating clear ingredient labeling, restricting the locations of stores near schools and parks to at least one kilometer, and reinstating regulatory control under the Food and Drug Administration (FDA). Enforcement should also be increased, with a special focus on sponsorships, advertising, and sales over the Internet. Incentivizing low-prevalence regions, increasing health literacy financing, and establishing a national monitoring system to monitor the developments and outcomes of vaping are also necessary measures. The educational system must pursue continuous research in guiding public policy, teaching effective health communication, and incorporating vaping education into curricula. The health

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sector should engage professional organizations such as the Philippine Medical Association and Philippine Pediatric Society in policy-making, education of providers with regionally appropriate communication, and implementation of facility-based awareness and cessation programs. In addition to focused public health interventions, coverage can be expanded by making local workers share anti-vape messages and facilitate cessation at the community level. The media sector must be activated to carry out responsible reporting and implement ubiquitous awareness campaigns to counter misinformation. Finally, surveillance must be carried out to promote health literacy among young people, and cessation programs must be cooperatively engaged with medical societies. These are efforts that can be coordinated in developing a national plan that addresses the multi-faceted underlying causes of teen vaping and the strength of the current vaping law.

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