



Public Perception of Electric Cigarettes Based Health Knowledge Level in Palembang

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ABSTRACT

The Nicotine Replacement Therapy (NRT) method is a medium for giving nicotine needed by smokers without burning tobacco. An electric cigarette is one from many NRTs that uses electricity from battery power to deliver nicotine in the form of vapor. But it is not recommended by the WHO or the Food and Drug Administration (FDA) because it has many negative effects. According to Green, there are 3 behavioral factors which are predisposition, support and drive. According to Notoatmodjo, lack of knowledge can form a false perception of electric cigarettes. According to Hude, perception is the giving of meaning to the stimulus received by sensory systems. The purpose of this research is to know the relation of demographic characteristic and to identify health knowledge to know public perception about the existence of electric cigarette in Palembang City. This research is a quantitative analytical research with cross sectional study design conducted in Palembang city using questionnaire in February 2018. The sample of this research is male active smoker with age > 15 years in Palembang city taken by purposive sampling technique. The data obtained were analyzed by univariate analysis, chi square test, and multivariate logistic regression analysis using IBM SPSS statistic version 22. The study obtained 162 respondents who met the inclusion criteria. The result of statistical test in this research is 51.2% positive perception toward electric cigarette based on health knowledge level in Palembang city ($p = 0,000$). There is no significant relationship between demographic characteristics and public perception of electric cigarette ($p > 0,005$). Predisposing factors concerning knowledge of electric cigarette usage can cause addiction problem is the most dominant factor in shaping people's perception on electric cigarette ($p = 0,008$).

1. Introduction

Smoking is a world health problem that has not been resolved to date. Based on data from the WHO in 2008, Indonesia was ranked three of the five highest level of cigarette consumption in the world after China and India, reaching 5% of the entire population in the world.¹ Meanwhile, according to WHO, the number of male smokers in Indonesia in 2015 reached 75,9%, with the number of women smokers is 3.3%.² The number of smokers aged ≥ 10 years in South Sumatra Province was 24.7% above

the average number of smokers aged ≥ 10 years in Indonesia, which amounted to 24.3%.³

According to WHO, by the end of this century cigarettes will kill more than a billion people if there is no attempt to cope. Therefore, WHO formed WHO Framework Convention on Tobacco Control (WHO-FCTC) provides solutions to problems that have a global tobacco epidemic. Until now, WHO continues to encourage people to quit smoking to reduce the dangers of tobacco with various methods, one of



which is using Nicotine Replacement Therapy, or NRT (Nicotine Replacement Therapy).^{4,5} Based on these factors, it can be seen that stopping smoking is not easy. Nicotine is the major alkaloid of tobacco smoke and the main modulator of psychopharmacological effects associated with addiction. NRT is a method of using a medium to provide the necessary nicotine without burning tobacco disadvantage. Electric cigarette or e-cigarette is one of the NRT that uses electricity from the batteries to deliver nicotine in vapor form and by WHO referred to as Electronic Nicotine Delivery Systems (ENDS). Electric cigarettes are designed to deliver nicotine without burning tobacco while still providing smoking sensation to its users.^{6,7} However it is not recommended by the WHO or the Food and Drug Administration (FDA) because it has many negative effects.⁸ Westenberger et al's research on e-cigarette states that e-cigarette contains toxic tobacco specific nitrosamines (TSNA) and diethylene glycol (DEG), known as carcinogens. Lawrence Green (1980) develops theories about behavioral factors, particularly those related to health behavior. Green has developed a model of behavior that is determined and influenced by three factors: first, predisposing factors are factors that predict the occurrence of a person's behavior manifested in knowledge, attitudes, beliefs, values, and so forth. Second, supporting factors are factors that facilitate the occurrence of a person's behavior, among others; facilities or facilities available. Third, the driving factor is the factor that reinforces and encourages the behavior of a person.⁹

According to Notoatmodjo (2011), knowledge is one aspect that influences one's behavior to smoke. Knowledge or cognitive is a very important domain for the formation of one's actions.¹⁰ The lack of knowledge of one person will cause the individual to feel not susceptible to health problems that occur in him. In addition, the lack of knowledge gained can also form a false perception of electric cigarettes.

Hude (2006) says perception is a follow-up of a feeling, because perception is essentially a gift of meaning to the stimulus captured by the sensing system. Perceptions also rely heavily on several factors: personal factors and situational factors or functional factors as well as structural factors.^{11,12} Indra's study (2015) regarding to psychological picture of tobacco smokers who switched to electric cigarette conclude that respondents consider e-cigarettes safer than tobacco cigarettes. This study also said that respondents felt more comfortable feeling of using electric cigarette because social friends increased and followed the today's lifestyle.¹³

Looking at the explanation above, it is very important to know the behavior patterns that are seen based on the level of knowledge of each society. So if there is a wrong perception on the community can be done appropriate mediation steps. Therefore the researchers are interested to know more in how the image of the public perception of electric cigarette based on the level of health knowledge in the city of Palembang.

2. Methods

This research is a quantitative analytic research with cross sectional design conducted in Palembang city through the distribution of questionnaire in November 2017. The population in this study is male active smokers with age > 15 years found in Palembang city taken by purposive sampling with the number of samples at least 158 people. Health knowledge as independent variable while predisposing factor, supporting factor, and also driving factor as dependent variable. The inclusion criteria of this study were the people of Palembang city of male sex, age > 15 years and active smokers. Exclusion criteria for this study were all samples who were not willing to answer the questionnaire. Before the data were collected, validity test and reliability test were conducted on this research questionnaire.



After data is collected, the data is presented in the form of narration and table. The data obtained were analyzed by univariate analysis, chi square test, and multivariate logistic regression using IBM SPSS statistic version 22.

3. Results

The results of data collection obtained 162 respondents from all communities of Palembang city according to inclusion criteria. The questionnaire created has 5 interval points (Linkert Scale) with the following description: 1; very unaffected, 2: no effect, 3: less influential, 4: influential, 5: very influential.

Table 1. Respondent's demography characteristic

Demography Characteristic	N	%
Age		
15-25 Years	49	30.2
26-45 Years	92	56.8
46-65 Years	18	11.1
>65 Years	3	1.9
Profession		
Student	50	30.9
Entrepreneur	25	15.4
Government Employee	5	3.1
Private Employee	29	17.9
Honorary Worker	6	3.7
Lainnya	47	29
Social and Economy		
>Rp 3.500.000	29	17.9
Rp 2.500.000-3.500.000	28	17.3
Rp 1.500.000-2.500.000	36	22.2
<Rp 1.500.000	69	42.6
Educational Status		
Elementary School	3	1.9
Junior High School	13	8
High School	107	66
Diploma/Bachelor	39	24.1
Total	162	100.0

In table 1 it can be seen that the distribution of demographic characteristics of respondents by age, most often found in the age group 26-45 years with the number 92 respondents (56.8%), based on the profession, at most in students with the number of 50 respondents (30.9 %), social and economic aspect of most of the income is Rp. 1,500,000 as many as 69 respondents (42,6%) and highest education status is 107 respondents (66%). Bivariate analysis aims to determine the relationship between independent variables predisposisi factor (Nicotine content contained in electric cigarettes can cause health problems, especially in the circulatory system **(P1)**,

content of propylene glycol and glycerin in liquids in electric cigarettes **(P2)**, content of formaldehyde content at electrical smoke of 0.1-25 ppm can cause ISPA **(P3)**, the content of formaldehyde content in electrical cigarette smoke of 0.01-2 ppm can cause eye irritation **(P4)** content of formaldehyde content in electric cigarette smoke of 2 ppm for 28 day can cause inflammation of the nose **(P5)** Public perception based on content of formaldehyde content on electric cigarette smoke of 10 ppm can cause slow pulse and weakened breathing **(P6)** Levels of formaldehyde content in electric cigarette smoke of 65 ppm for 15 days are carcinogenic, resulting in DNA damage to



the bone marrow **(P7)** Carbonyl content contained in electric cigarettes is potentially a cancer-triggering substance **(P8)** The diethylene glycol (DEG) content contained in electric cigarettes can cause popcorn lung, respiratory illness and other chronic cardiovascular diseases **(P9)** The use of electric cigarettes can cause addiction problems **(P10)**, support factors (Reasons for using electric cigarettes because people around them use cigarettes electric **(P11)**), The reason for using electric cigarette will make more friends **(P12)**, The reason for using electric cigarette will make more confidence because it does not cause bad breath and unpleasant odor **(P13)**, Interest in using electric cigarettes for wanting

to try new things **(P14)**, driving factors (Suggestions for government to make policy in determining the permissible nicotine levels in electric cigarettes **(P15)**, Suggestions for government to make laws to legalize electric cigarettes with content **(P17)**, Suggestions for the government to make a policy of prohibiting the use of electric cigarettes in public and home **(P17)**, Suggestions for government to make policy not to bear all the diseases caused by electric cigarette in BPJS **(P18)**

Public perception that has significant relation to electric cigarette based on health knowledge level can be seen in table 2.

Table 2. Public perception on electric cigarettes based on health knowledge level in Palembang city

Factors	<i>P value</i>
P ₁	0.000
P ₂	0.000
P ₃	0.000
P ₄	0.052
P ₅	0,000
P ₆	0,001
P ₇	0,000
P ₈	0,000
P ₉	0,000
P ₁₀	0,000
P ₁₁	0,005
P ₁₂	0.211
P ₁₃	0.227
P ₁₄	0.296
P ₁₅	0.000
P ₁₆	0.001
P ₁₇	0.000
P ₁₈	0.000

Table 2. $p < 0.05$ ($p < \alpha$) shows that there is a significant relationship between people's perception of electric cigarette based on predisposing factors: the nicotine content contained in electric cigarettes can cause health problems especially in the circulatory

system **(P1)**, the content of propylene glycol and glycerin in liquids in electrical cigarettes **(P2)**, the content of formaldehyde content in electrical cigarette smoke of 0.1-25 ppm can cause ISPA **(P3)**, the content of formaldehyde content in cigarette smoke of



2 ppm for 28 day can cause inflammation of the nose (P5), public perception based on the content of formaldehyde content in electric cigarette smoke of 10 ppm can cause slow pulse and weakened breathing (P6), content of formaldehyde content in electric cigarette smoke of 65 ppm for 15 days is carcinogenic so there is DNA damage to the bone marrow (P7), carbonyl content contained in electric cigarette b erpotensi become cancer-trigger substance (P8), diethylene glycol (DEG) content contained in electric cigarette can cause popcorn lung, respiratory disease and other chronic cardiovascular disease (P9) and the use of electric cigarette can cause addiction problem (P10). Significant relationships are also based on supporting factors: the reasons for using electric

cigarettes because the people around them use electric cigarettes (P11) and driving factors: suggestions for governments to make policy on determining the allowable nicotine levels in electric cigarettes (P15), suggestions for governments to enact legislation to legalize electrical cigarettes with the minimum amount of nicotine (P16), suggestions for governments to enact a policy of prohibiting the use of electric cigarettes in public and private spaces (P17) and suggestions for governments to make policies not to cover all diseases caused by electric cigarette in BPJS (P18).

Another bivariate analysis aims to determine the relation of public perception to electric cigarette based on demographic characteristics.

Table 3. Public perception on electric cigarette based on demographic characteristic in Palembang city

Demography Characteristic	<i>P value</i>
Age	0.237
Profession	0.569
Social and Economy Status	0.225
Education Status	0.490

In table 3, it can be seen that all aspects of demographic characteristics such as age, profession, socioeconomic status and recent educational status have no significant relationship in shaping perception of electric cigarette with $p > 0,005$.

Multivariate analysis with logistic regression test

on factors influencing public perception toward electric cigarette is variable which in bivariate analysis has p value (p value) $< 0,05$ and p value (p value) $< 0,25$. There is one variable that can not be analyzed multivariate that is P14 with $p > 0,25$.

Table 4. Multivariate analysis logistic regression results between predisposing factors, supporting factors, and driving factors to health promotion patterns.

Factors	<i>P value</i>
P ₂	0.994
P ₃	0.994
P ₁₀	0.008
P ₁₁	0.994
P ₁₅	0.996
P ₁₆	0.062



After multivariate analysis of logistic regression, 6 predominant variables are predisposing factor: propylene glycol content and glycerin in liquids in electric cigarette (**P2**), content of formaldehyde content in electric cigarette smoke 0.1-25 ppm can cause ISPA (**P3**) the use of electric cigarettes can lead to addiction problems (**P10**), the supporting factor: the reason for using electric cigarettes because the people around them use electric cigarettes (**P11**), the driving factor: suggestions for governments to make policy on determining the permissible nicotine levels in cigarettes electric (**P15**) and advice to the government to make laws to legalize electric cigarettes with a minimum of nicotine (**P16**). But that shows significant significance only one variable that is **P10** (predisposing factor) with $p = 0,008$.

4. Discussion

This study states that there is a relationship between positive perception of society with good knowledge of the effect of nicotine content of 68.8% ($p = 0,000$) while with poor knowledge resulted in negative perception of 88% ($p = 0,000$). This is similar to Kimberly's research that more positive than negative perceptions of nicotine content in electric cigarettes can cause health problems.¹⁴

Positive perceptions of electric cigarettes based on the knowledge of propylene glycol and glycerin content in liquids in electrical cigarettes are good at 66.7% ($p = 0,000$) whereas with poor knowledge produce negative perceptions of 92.9% ($p = 0,000$). This result is in accordance with the theories of Krench and Crutchfield that one of the perception-forming factors is a personal factor such as one's knowledge.¹⁵ In Indra's study, one respondent revealed a positive perception that some liquids in an electric cigarette contain harmful substances.¹³

Positive perception of electric cigarette based on good knowledge on content of formaldehyde content in electric cigarette smoke of 0,1-25 ppm can cause

ISPA is 81,2% ($p = 0,000$) whereas with less good knowledge resulted negative perception 92,4 % ($p = 0,000$). This result is in accordance with the theories of Krench and Crutchfield that one of the perception-forming factors is a personal factor such as one's experience and knowledge.¹⁵ The results of this study are supported by Kerfoot research in Bhatnagar workers exposed to formaldehyde-containing gases to become irritating to the upper respiratory tract.¹⁶

While the positive perception of electric cigarette based on good knowledge will content content of formaldehyde on electric cigarette smoke of 0,01-2 ppm can cause eye irritation equal to 56% ($p = 0,052$). This shows that there is no meaningful relationship. The results of this study differ from the Kerfoot research in Bhatnagar that workers exposed to gases containing lower formaldehyde levels feel their eyes sore and red.¹⁶

A good knowledge of the content of formaldehyde content in cigarette smoke of 2 ppm for 28 days may cause inflammation of the nose to make positive perceptions of electric cigarettes by 61.9% ($p = 0,000$) whereas with poor knowledge produce a negative perception of 100% ($p = 0,000$). This result is in accordance with the theories according to Krench and Crutchfield that one of the perception-forming factors is a personal factor such as one's knowledge.¹⁵ This result of this study supported by Borchers in Bhatnagar states that exposure to formaldehyde continuously for 30 days can lead to accumulation of monocytes, macrophages and lymphocytes in the nasal interstitial tissue, mucus cell metaplasia and widening of the airway.¹⁶

A good knowledge of the content of formaldehyde content in electric cigarette smoke of 10 ppm can cause a slow pulse and weak breathing make positive perceptions of electric cigarette of 60.2% ($p = 0.001$) whereas with less good knowledge produce negative perception of 66, 7% ($p = 0,000$). This result is in accordance with the theories of Krench and



Crutchfield that one of the perception-forming factors is a personal factor such as one's knowledge.¹⁵ This result is supported by the Peasant research in Bhatnagar that in experimental studies with animals, inhalation of formaldehyde can decrease the pulse rate and respiratory rate. This effect occurs as a result of effects imparted through the afferent nerve from the nasal mucosa.¹⁶

A good knowledge of the content of formaldehyde content in electric cigarette smoke of 65 ppm for 15 days is carcinogenic so that DNA damage to the bone marrow makes positive perceptions of 65.8% ($p = 0,000$) whereas with poor knowledge it produces a negative perception of 86,7% ($p = 0,000$). This result is in accordance with the theories according to Krench and Crutchfield that one of the perception-forming factors is a personal factor such as one's knowledge.¹⁵ This result is supported by Yu's research in Bhatnagar that if the dose of excessive use of electric cigarettes, the levels of formaldehyde in the blood are also high and will be the trigger cancer. These levels induce toxicity in the bone marrow due to oxidative stress on the heart.¹⁶

Positive perception of electric cigarette based on good knowledge of carbonyl content contained in electric cigarettes has the potential to trigger good cancer of 66.7% ($p = 0,000$) whereas with poor knowledge generate negative perceptions of 85.4% ($p = 0,000$). These results are supported by Maruf's research stating that as many as 146 (73%) of respondents agree that electric cigarettes can cause various diseases such as cancer.¹⁷

Positive perception of electric cigarette based on good knowledge of Diethylene Glycol (DEG) content contained in electric cigarette can cause Popcorn Lung, respiratory illness and other chronic cardiovascular disease of 68,4% ($p = 0,000$) while with less good knowledge yield negative perception of 93.3% ($p = 0,000$). These results are supported by Rowell Research that the use of electric cigarettes for

5 minutes leads to a significant increase in respiratory resistance, which indicates a change in the small airways, thus, it is possible that the use of electric cigarettes can cause different lung diseases in COPD.¹⁸

Positive perception of electric cigarette based on knowledge of electric cigarette usage can cause addiction problem is 73% ($p = 0,000$) whereas with unfavorable knowledge produce negative perception equal to 83,9% ($p = 0,000$). According to Hude perception is also a gift of meaning to the stimulus captured by sensing. This result is supported by research Maciej states that 60% believe that electric cigarettes are addictive but not excessive as conventional cigarettes.¹⁹

The reason for using electric cigarette because the people around using electric cigarette cause positive perception of 61,1% ($p = 0,005$) whereas with unfavorable knowledge resulted negative perception 44% ($p = 0,005$). This happens because different psychological images also affect the differences in individual perceptions in perceiving an object. This result is supported by research by Kong stating that 31.6% are interested in using electric cigarette because of the influence of peers and the environment.²⁰

The reason for using electric cigarette will make more friends have bigger negative perception that is 52,4% ($p = 0,211$) whereas with less good knowledge yield positive perception is bigger that is 57,9% ($p = 0,211$). This happens because different psychological images also affect the differences in individual perceptions in perceiving an object. The results of this study differ in research Barbeau states that one of the reasons for using electric cigarette is a social factor to be able to have more friends.²¹

The reason for using electric cigarette will make more confidence because it does not cause bad breath and unpleasant smell cause bigger negative perception that is 51,2% ($p = 0,227$) whereas with less



good knowledge yield positive perception is bigger that is 60,6% (p = 0.227). This result is different from the research conducted by Indra that the respondents gave positive perceptions as much as 1 person about the vapor released by this electric cigarette does not interfere with breathing and has a perfumed smell than tobacco cigarettes. Other respondents also said that the use of electric cigarettes does not bother people around with the smell

Negative perceptions of electric cigarette based on interest in using electric cigarette for want to try new thing is 52% (p = 0,296) whereas with less good knowledge yield positive perception is bigger that is 56,5% (p = 0,296).

This result is consistent with Hude's theory of perception that giving is a gift to a stimulus captured by sensing. In this case it may be an interest to try something new that is not a reason to wear electric cigarettes. According to Krench and Crutchfield that one of the perception-forming factors is a functional factor such as a person's need for cigarettes and personal factors such as experience.¹⁵ In addition, different psychological images also affect the differences in individual perceptions in perceiving an object.

The results of this study is different from research conducted by Peters stated that there is a significance between interested in using electric cigarette because of curiosity and want to try new things that is as much as 32% of respondents.²² In Kong research also stated that the most important reason to try electric cigarette because of the wish know of 54.4% .²⁰

Positive perceptions of electric cigarettes based on suggestions for government to make policy in determining the permissible nicotine levels in electric cigarettes are 58% (p = 0,000) whereas with poor knowledge produce a negative perception of 100% (p = 0,000). This result is supported by Wackowski's research that the majority of respondents (62.5%) did

not know that e-cigarette was not regulated by the FDA (Food and Drug Administration) but agreed that e-cigarette should be regulated by FDA.²³

Positive perception of electric cigarette based on suggestion for government to make law to legalize electric cigarette with minimum nicotine content is 57,1% (p = 0,001) whereas with less good knowledge resulted negative perception 75,9% (p = 0,001). This result is supported by Wackowski's study of 87.7% of respondents agree if electrically recommended cigarettes have the same legal sales as other tobacco cigarettes.²³

Positive perceptions of electric cigarette based on suggestion for government to make policy of prohibition of electric cigarette usage in public and house are 69,8% (p = 0,000) whereas with unfair knowledge produce negative perception equal to 69,7% (p = 0,000) . This result is supported by Wackowski's research that agrees if there is a policy to limit the use of electric indoor cigarette by 41.2% .²³

Positive perception of electric cigarette based on suggestion for government to make policy not to bear all diseases caused by electric cigarette in BPJS is 67% (p = 0,000) whereas with bad knowledge generate negative perception equal to 76,3% (p = 0,000) . This result is supported by Wackowski's study of 87.7% of respondents agree if electrically recommended cigarettes have the same legal sales as other tobacco cigarettes.²³

Based on the demographic characteristics all variables of age, profession, socioeconomic status and recent educational status have no significant effect in shaping perceptions of electric cigarettes. based on age category most is age 26-45 year 55,4% (p = 0,237) but there is no significant relation. This result is different from Alawiyah research that the highest proportion of respondents positive perception on electric cigarette based on age is adult equal to 52,9%. Besides, the highest proportion of



respondents positive perception toward electric cigarette based on last education is SMA by 50% .¹²

In multivariate analysis logistic regression shows that the only dominant and significant variable is predisposing factor, that is the use of electric cigarette can cause addiction problem with $p = 0,008$. This result is in accordance with research conducted by Maciej states that 60% believe that electric cigarettes are addictive but not excessive as conventional cigarettes. Respondents believe that electric cigarettes make it addictive and contain harmful toxin compounds such as conventional cigarettes.¹⁹

5. Conclusion

There is an influence of health knowledge in shaping a public perception of electric cigarette but there is no significant relationship between demographic characteristics and public perception of electric cigarette. The most dominant behavioral factor in shaping people's perception of electric cigarette is predisposing factor.

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