International Journal of Public Health Science (IJPHS)
Vol. 14, No. 2, June 2025, pp. 561~568
ISSN: 2252-8806, DOI: 10.11591/ijphs.v14i2.25304

Determinants of cigarette consumption among Indonesian adolescents: a cross-sectional study

Musparlin Halid[1], Lili Amaliah[2], Sri Nurcahyati[3], Krisnita Dwi Jayanti[4], Supriatin[5,6], Suyitno[7], Maretalinia[8]

[1]Department of Medical Record and Health Information, Politeknik Medica Farma Husada Mataram, Mataram, Indonesia
[2]Department of Public Health, Faculty of Health, Institut Teknologi dan Kesehatan Mahardika, Cirebon, Indonesia
[3]Department of Medical Records and Health Information, Faculty of Health, Institut Teknologi dan Kesehatan Mahardika, Cirebon, Indonesia
[4]Department of Medical Records and Health Information, Faculty of Technology and Health Management, Institut Ilmu Kesehatan Bhakti Wiyata, Kediri, Indonesia
[5]Department of Nursing Science, Cirebon College of Health Sciences, Cirebon, Indonesia
[6]Faculty of Nursing, Lincoln University College, Petaling Jaya, Malaysia
[7]Department of Occupational Safety and Health, Politeknik Medica Farma Husada Mataram, Mataram, Indonesia
[8]Institute for Population and Social Research, Mahidol University, Nakhon Pathom, Thailand

Article Info

Article history:

Received Jun 7, 2024
Revised Oct 15, 2024
Accepted Dec 6, 2024

Keywords:

Adolescents
Cigarette
Determinants
Indonesia
Lombok
Parental
Peers

ABSTRACT

Adolescent smokers in Indonesia remain a problem that impacts educational output. This study aimed to examine the determinants of cigarette consumption among school-age adolescents. The study employed a cross-sectional design in Lombok Island, West Nusa Tenggara Province, Indonesia. The study collected data from January 2022 to July 2023. The total sample in this study consisted of 819 adolescents from junior high and senior high schools (SHS). Among all respondents, 438 adolescents (53.5%) reported smoking >10 stems/day. The binary logistic regression results revealed that significant variables associated with cigarette consumption included males aged 14 to 16, who drank alcohol more than three times a week, consumed more than three liters of alcohol a week, had low parental education levels, had peer influence, were exposed to social media, had parents who smoked, and had experienced parental divorce. The collaboration between stakeholders at the school level and parents, such as counseling and supervision intensive, can prevent adolescent smoking behavior.

Corresponding Author:

Musparlin Halid
Department of Medical Record and Health Information, Politeknik Medica Farma Husada Mataram
Mataram, West Nusa Tenggara, Indonesia
Email: musparlinhalid@gmail.com

1. INTRODUCTION

Adolescence is a critical period of development characterized by rapid physical, emotional, and social changes. During this time, young individuals are particularly vulnerable to external influences, including the impact of westernized lifestyles and social developments within their communities [1]. The process of westernization refers to the adoption of western cultural values, practices, and lifestyles by non-western societies. This phenomenon has become increasingly prevalent in many parts of the world, driven by globalization, technological advancements, and media exposure. As a result, traditional cultural norms and values often coexist with Western ideals, creating a complex landscape for adolescents to navigate [2].

Adolescent tobacco use remains a significant public health concern in many parts of the world. Tobacco use among adolescents includes not only cigarette smoking but also the use of other tobacco products

like smokeless tobacco, cigars, and electronic cigarettes (vaping) [3]. Adolescence is a critical period for development, and tobacco use can have severe health consequences. Nicotine, the primary addictive component, can lead to dependence, making it difficult for adolescents to quit. Tobacco use is linked to respiratory issues, heart disease, and cancer. It also negatively impacts brain development, memory, attention, and academic performance. Adolescents who use tobacco are more likely to experiment with other substances [4].

Several aspects need to be considered regarding cigarette consumption among adolescents in Indonesia, such as the easy availability of cigarette products in many places in Indonesia, including grocery stores, and stalls. Making adolescents more likely to buy and try cigarettes [5]. In addition, the tobacco industry has long conducted aggressive promotional campaigns, including media advertising, event sponsorship, and point-of-sale promotions. This may influence adolescents' perceptions of cigarettes and increase their interest in trying them. Some adolescents may not be fully aware of the long-term health risks associated with smoking, such as the risk of heart disease, cancer and respiratory disorders [6]. In some social groups, smoking may be perceived as a sign of masculinity, freedom, or a cool lifestyle. These social pressures may influence adolescents to try smoking [7].

Adolescent smoking in West Nusa Tenggara (WNT) Province is a serious problem that requires attention from authorities and the community. Cigarette consumption at a young age can lead to a range of health and social problems with long-term impacts. Cigarette consumption rates among adolescents across Indonesia, including in WNT, have been a concern over the past few years. Research has shown that factors such as aggressive cigarette promotion, easy access to cigarettes. Lack of knowledge about the health risks associated with smoking, as well as social pressure from the surrounding environment can contribute to the increasing rate of smoking among adolescents [8]. To address this issue, the government, along with health institutions and communities, needs to make a concerted effort to educate adolescents about the risks of smoking and encourage them to avoid the behavior. Anti-smoking campaigns, strict regulations on the sale of cigarettes to adolescents, and improved access to smoking-related health services can be measures taken to reduce cigarette consumption among adolescents in WNT and throughout Indonesia. The purpose of this study was to examine the determinants of cigarette consumption among adolescents in Lombok Island, WNT, Indonesia.

2. METHOD

This study used a cross-sectional design to examine determinants of cigarette consumption among adolescents. Researchers collected data from a representative sample of adolescents from various socioeconomic backgrounds. The study was conducted in Lombok, WNT from January 2022 to July 2023. This research has approved the ethical review of the Ethics Commission of the Politeknik Medica Farma Husada Mataram with a Certificate of Ethical Approval, Number: 126-KEPK/2022.

2.1. Variables

This study included several variables related to cigarette consumption and its determinants. The dependent variable was cigarette consumption as a dummy (1=categories $\geq$10 cigarettes/day, 0<10 cigarettes/day). Independent variables included age with categories 14-16 and 17-19, gender with categories male and female, frequency of alcohol consumption with categories $\geq$3 times/week and <3 times/week, volume of alcohol/liquor consumption with categories $\geq$3 liters/week and <3 liters/week, parents' education level with the category of low if parents' education is senior high school (SHS) graduate or lower and high if parents' education is university/college graduate, peer influence with the category of yes and no, social media exposure with the category of exposed and not exposed, parents' smoking status with the category of yes and no, and marital status of parents with divorced and non-divorced categories.

2.2. Data collection

Data collection for this study involved a combination of self-reported and consent questionnaires. The instrument used was adopted and developed from the National Youth Tobacco Survey (NYTS) Questionnaire 2022 [9], to assess the level of cigarette consumption in adolescents defined as adolescents who have ever smoked/used tobacco more than or equal to 10 cigarettes per day and less than 10 cigarettes per day. Before administering the questionnaire, we distributed informed consent forms to ensure the respondent's readiness. The questionnaires were administered in schools, to ensure a comfortable and controlled environment for the data collection process. Socio-demographic profiles such as age, gender, parents' education level, parent's marital status, and parent's smoking status were identified using checklists, and no formal instruments were used. To identify such sociodemographic profiles, students were asked to indicate their parent's education level and marital and smoking status. Before administering the questionnaires, we distributed informed consent forms to ensure the respondent's readiness to be questioned. The adolescents targeted in this study were adolescents in junior high schools (JHS) totaling 23 schools and SHS totaling 17 schools in grades 7 to 12 spread across Lombok Island. Sampling used a simple random

sampling technique with a population of 1,021 so that the total sample was found to be 819 adolescents. Confidentiality and anonymity of participants were maintained throughout the study.

2.3. Data analysis

The researchers used various statistical techniques to analyze the data and identify the determinants of cigarette consumption among adolescents. Descriptive statistics were used to summarize the characteristics of the sample. Inferential statistics, in this case, the Chi-square test, and binary logistic regression analysis, and results were presented in terms of the adjusted odds ratio (OR) with a significant level of $p<0.05$ and a confidence interval (CI) of 95%, were used to test the relationship between variables. Data processing using Statistical Package for Social Studies (SPSS) version 26.

3. RESULTS AND DISCUSSION

Adolescents who smoke are at risk of serious health issues and long-term consequences. Despite awareness of the dangers, many continue to experiment with cigarettes, leading to potentially life-altering outcomes. The prevalence of adolescents who consume more than 10 cigarettes per day is 53.5%, while those who consume less are 46.5%, as seen in Table 1. This high prevalence is similar to the 2019 Global Youth Tobacco Survey (GYTS) data, which reported 19.2% of adolescents aged 13-15 being actively smoking. Indonesia Health Survey 2023 reported the highest proportion of actively smoking among 15-19-year-olds.

In this study, sociodemographic conditions were taken into account to determine the factors that determine behavior in adolescents. Table 2 shows that participants based on gender were 56.3% male and 43.7% female. Furthermore, the age range of 14-16 years old was 54.1%, and 17-19 years old was 45.9%. The pattern of alcohol consumption among adolescents was more than 3 times/week by 52% and less than 3 times/week by 48%. Meanwhile, the volume of alcohol consumption in adolescents was more than 3 liters/week by 54.3% and less than 3 liters/week by 45.7% as shown in Table 2.

Table 1. Frequency distribution of adolescents who consume cigarettes (n=819)

Variables	Frequency	%
Cigarette consumption		
≥10 stems/day	438	53.5
<10 stems/day	381	46.5

Table 2. Frequency distribution of sociodemographic conditions of respondents (n=819)

Variables	Frequency	%
Gender		
Male	461	56.3
Female	358	43.7
Age		
14-16	443	54.1
17-19	376	45.9
Alcohol drinking patterns		
>3 times/week	426	52.0
<3 times/week	393	48.0
Alcohol consumption volume		
>3 liters/week	445	54.3
<3 liters/week	374	45.7
Parent education level		
Low (≤Senior high school)	445	54.3
High (≥University)	374	45.7
Peer influence		
Yes	450	54.9
No	369	45.1
Social media exposure		
Exposed	452	55.2
Not exposed	367	44.8
Parental smoking status		
Yes	393	48.0
No	426	52.0
Marital status of parents		
Divorced	416	50.8
Not divorced	403	49.2

In addition, based on the level of parental education, adolescents with a low level of parental education amounted to 54.3%, and adolescents who had parents with a high level of education amounted to 45.7%. Adolescents who were influenced by their friends amounted to 54.9%, and those who were not

influenced amounted to 45.1%. Adolescents who were exposed to social media or cigarette advertisements were 55.2%, and those who were not exposed were 44.8%. Adolescents who had parents with active smoking status were 48%, and those who did not smoke were 52%. Adolescents who had divorced parents were 50.8%, and adolescents who had non-divorced parents were 49.2% as shown in Table 2.

Based on the results of the analysis in Table 3, shows that gender has a significant relationship with the level of cigarette consumption in adolescents. Male adolescents have a higher tendency to consume cigarettes ≥10 cigarettes/day (67.9%). The age factor has a significant influence on cigarette consumption patterns in adolescents, and the age range of 14-16 years has a higher tendency to consume cigarettes ≥10 cigarettes/day by 66.6%. Cigarette consumption among adolescents is a pressing issue that has far-reaching implications for public health, social behavior, and individual well-being. The prevalence of smoking among young people is a matter of concern due to its detrimental effects on physical health, mental well-being, and social development.

Table 3. The correlation of each independent variable on cigarette consumption (n=819)

Variables	Cigarette consumption				$\chi 2$	p-value
	≥10 stems/day		<10 stems/day			
	n	%	n	%		
Gender						
Male	313	67.9	148	32.1	88.097	<0.001*
Female	125	34.9	233	65.1		
Age						
14 - 16	295	66.6	148	33.4	66.677	<0.001*
17 - 19	143	38	233	62		
Alcohol drinking patterns						
>3 times/week	288	67.6	138	32.4	71.202	<0.001*
<3 times/week	150	38.2	243	61.8		
Alcohol consumption volume						
>3 liters/week	297	66.7	148	33.3	68.888	<0.001*
<3 liters/week	141	37.7	233	62.3		
Parent education level						
Low (≤ Senior high school)	296	66.5	149	33.5	66.573	<0.001*
High (≥ University)	142	38	232	62		
Peer influence						
Yes	315	70	135	30	109.564	<0.001*
No	123	33.3	246	66.7		
Social media exposure						
Exposed	307	67.9	145	32.1	84.545	<0.001*
Not exposed	131	35.7	236	64.3		
Parental smoking status						
Yes	280	71.2	113	28.8	95.865	<0.001*
No	158	37.1	268	62.9		
Marital status of parents						
Divorced	285	68.5	131	31.5	76.762	<0.001*
Not divorced	153	38	250	62		

χ^2=Chi-square; *=Significant

The study found that gender, age, and alcohol consumption significantly impact adolescents' cigarette consumption. Males had a 3,950 times greater tendency to consume more than 10 cigarettes/day than females, while adolescents aged 14-16 years had a 2,762 times greater tendency to consume more than 10 cigarettes/day compared to adolescents aged 17-19 years. Adolescents who consumed alcohol more than 3 times/week had a 2.956 times greater tendency to consume more than 10 cigarettes/day. Adolescents with influenced by friends, and exposed to social media or cigarette advertisements had a 4,876 times greater tendency to consume more than 10 cigarettes per day. Adolescents with active smoking status had a 3,747 times greater tendency to consume more than 10 cigarettes/day. Marital status also contributed significantly to cigarette consumption patterns in adolescents as presented in Table 4.

Similar studies that have been conducted consistently show that there are marked gender differences in smoking initiation rates among adolescents [10]. According to some studies, it is revealed that boys are more likely to experiment with smoking and start smoking regularly at an earlier age compared to girls [11]. This may be due to a variety of factors, including social norms, peer influence, and media portrayals of smoking as a masculine behavior [12]. On the other hand, while boys may have higher rates of smoking initiation, the prevalence of smoking among girls continues to increase [13], a study conducted by the National Institute on Drug Abuse found that girls are catching up with boys in terms of smoking rates [14]. This may be driven by changing societal norms, increased marketing efforts targeting girls, and the perception that smoking is a way to control weight [15].

Table 4. Binary logistic regression of determinants of cigarette consumption (n=819)

Variables	Adj odd ratio	95% confidence interval	p-value
Sex (ref: female)			
Male	3.95	(2.580–6.048)	<0.001
Age (ref: 17-19 years old)			
14-16 years old	2.76	(1.823–4.184)	<0.001
Alcohol drinking patterns (ref: <3 times/week)			
>3 times/week	2.96	(1.933–4.521)	<0.001
Alcohol consumption volume (ref: <3 liters/week)			
>3 liters/week	2.64	(1.729–4.017)	<0.001
Parental educational level (ref: high)			
Low	5.88	(3.780–9.149)	<0.001
Peer influence (ref: no)			
Yes	4.01	(2.620–6.139)	<0.001
Social media exposure (ref: not exposed)			
Exposed	4.88	(3.175–7.488)	<0.001
Parental smoking status (ref: no)			
Yes	3.75	(2.461–5.706)	<0.001
Marital status of parents (ref: not divorced)			
Divorced	5.63	(3.651–8.671)	<0.001

One of the key aspects of age, and smoking rates in adolescents is peer influence [1]. Adolescence is a time when individuals seek acceptance, and validation, which often leads to the adoption of behaviors exhibited by their peers. Research consistently shows that younger adolescents, usually in the early stages of puberty, are more susceptible to peer pressure, and more likely to experiment with smoking [16]. This age group is particularly vulnerable as they are still developing their sense of identity and are more easily influenced by their social environment [17]. Another important factor to consider is the impact of age on cognitive development [18]. Adolescence is a period characterized by significant brain development, including the prefrontal cortex which is responsible for decision-making and impulse control [16]. Many adolescents experiment with smoking as a way to cope with stress, anxiety, or peer-related problems. Smoking is often perceived as a way to alleviate these emotional difficulties, and gain a sense of control [5].

Younger adolescents have limited cognitive abilities compared to older adolescents, so they are more impulsive and less likely to consider the long-term consequences of smoking [1]. In contrast to the factors discussed above, certain protective factors may influence the relationship between age, and smoking rates in adolescents. Older adolescents who have developed strong personal values, self-esteem, and resilience may be more resistant to peer pressure, and less likely to smoke [6]. Additionally, the availability of supportive relationships, such as positive family dynamics and involvement in extracurricular activities, may act as protective factors that reduce the likelihood of smoking initiation at younger ages [19].

In addition, adolescents who consumed alcohol more than 3 liters/week were 2.636 times more likely to consume more than 10 cigarettes/day than adolescents who consumed alcohol less than 3 liters/week as shown in Table 4. Studies show that adolescents who consume heavy alcohol are more likely to smoke than those who don't, due to factors like social influence, peer pressure, and risk-taking behavior. Adolescents are particularly vulnerable to these influences, making them more prone to smoking [20]. Alcohol consumption is often associated with social gatherings, and parties, where peer pressure to smoke may be high. In these situations, the presence of alcohol may lower inhibitions, and increase the likelihood of trying cigarettes [21]. Another factor contributing to the link between alcohol, and smoking in adolescents is the shared tendency towards risk-taking behavior [1]. Adolescence is a period characterized by impulsivity, and a desire for novelty, and thrill. Alcohol consumption, and smoking are seen as rebellious and risky behaviors that provide a sense of excitement, and independence [6]. The influence of alcohol, and cigarette advertising cannot be ignored when discussing the relationship between alcohol consumption, and smoking in adolescents [19]. Targeted marketing strategies by the alcohol, and tobacco industries often portray these substances as glamorous, cool, and socially desirable. Exposure to such advertisements can shape adolescents' perceptions, and increase their curiosity to try alcohol, and cigarettes [22].

Studies reveal that parental education significantly influences adolescents' behavior and choices, including tobacco consumption. Parents who receive high levels of education are more likely to adopt a healthy lifestyle and serve as positive role models [23]. In addition, parental education is also related to socioeconomic status, which can indirectly influence adolescent smoking behavior [24]. Parental education influences adolescent behavior through increased knowledge, positive role models, and better communication. The development and comprehensive strategies to prevent adolescent smoking, and promote healthier lifestyles is important [25]. Adolescents are strongly influenced by their social circle, and peer pressure can play an important role in initiating, and maintaining smoking behavior. Schools and communities can play an important role in countering this influence by promoting smoke-free environments and implementing anti-smoking campaigns that emphasize the negative consequences of smoking [26].

Parents smoking behavior becomes a strong role model for adolescents. If parents smoke, their children tend to perceive smoking as a socially acceptable behavior [27]. In addition, lack of parental supervision, and communication about the dangers of smoking may contribute to increased smoking initiation among adolescents [28]. Studies show a strong link between peer association and adolescent smoking initiation. Peer pressure is a significant factor in this behavior, as adolescents often seek acceptance and conform to social norms. Smoking becomes a symbol of rebellion, independence, and maturity, leading to social approval. The psychological concept of social identity also reinforces this influence, as adolescents develop a sense of identity by associating with certain groups or subcultures. If smoking is prevalent, adolescents may adopt it to establish their identity [29].

Adolescents from divorced families were more likely to smoke than those from intact families [30]. Divorce significantly impacts adolescents' lives, causing changes in family dynamics, living arrangements, and emotional well-being. These disruptions can have short-term and long-term consequences, including anger, sadness, and confusion [8]. Adolescents from divorced families often experience emotional distress due to feelings of loss or betrayal. They may also have higher stress levels and lower self-esteem compared to those from intact families. Psychological factors influence cigarette consumption among adolescents, who often use it to cope with stress and gain control [26].

Social media platforms, such as Facebook, Instagram, and Twitter, significantly impact adolescents' lives. Social media provides a wealth of information, including smoking-related content. This exposure can shape adolescents' attitudes, beliefs, and behaviors toward smoking [31]. The adolescents who were highly exposed to smoking-related content on social media were more likely to start smoking or progress from experimenting to smoking regularly. Exposure to pro-smoking content on social media platforms increases the likelihood of smoking initiation among adolescents, especially those who have never smoked before [32]. Social media provides access to smoking-related information, including tips on how to smoke, the latest smoking trends, and even ways to buy cigarettes. This information can normalize smoking behavior, and make it seem more acceptable [31].

4. CONCLUSION

This study emphasized the crucial impact of males aged 14 to 16 who drank alcohol more than three times a week, consumed more than three liters of alcohol a week, had low parental education levels, had peer influence, were exposed to social media, had parents who smoked and had experienced parental divorce have significant related with smoking behavior among adolescents. For a deeper understanding of the reason behind this, a qualitative study could be more effective to explore how those levels impact their smoking behavior. The study focused on junior and SHS students, not primary school students. It emphasizes the importance of comprehensive public health campaigns educating adolescents about smoking dangers and benefits, using social media, school programs, and community outreach.

ACKNOWLEDGEMENT

We would like to thank all the staff of the Politeknik Medica Farma Husada Mataram, Indonesia, and fellow lecturers who have provided constructive advice and input so that this research was completed on time. Although this research did not receive any financial support.

REFERENCES

[1] G. Vionalita, D. A. Kusumaningtiar, and D. Angkasa, "Relationship between health belief model constructs and smoking behavior among school-age adolescents in indonesia: a cross-sectional study," *Public Health of Indonesia*, vol. 9, no. 4, pp. 140–146, Dec. 2023, doi: 10.36685/phi.v9i4.717.

[2] P. Pelters and M. R. Galanti, "'It's nice to just be': a qualitative study on the meaning-imbued reality of waterpipe smoking among young adults in Sweden," *Nordic Studies on Alcohol and Drugs*, vol. 40, no. 5, pp. 482–501, Oct. 2023, doi: 10.1177/14550725231195183.

[3] L. Lund, L. S. Bast, M. Rubæk, and S. Andersen, "Exploring factors associated with smokeless tobacco use among young people: a systematic scoping review," *Drug and Alcohol Dependence*, vol. 240, p. 109627, Nov. 2022, doi: 10.1016/j.drugalcdep.2022.109627.

[4] T. L. M. Ruberu *et al.*, "Joint risk prediction for hazardous use of alcohol, cannabis, and tobacco among adolescents: a preliminary study using statistical and machine learning," *Preventive Medicine Reports*, vol. 25, p. 101674, Feb. 2022, doi: 10.1016/j.pmedr.2021.101674.

[5] S. S. Lucia, N. Yetiani, L. Suwarni, H. Rusmitasari, M. Maretalinia, and S. Suyitno, "The determinants of adolescent smokers in Indonesia," *International Journal of Public Health Science*, vol. 11, no. 3, pp. 808–814, Sep. 2022, doi: 10.11591/ijphs.v11i3.21510.

[6] Sutantri *et al.*, "A qualitative evaluation of smoke-free policy implementation among the hospitality industry in Yogyakarta, Indonesia," *Public Health of Indonesia*, vol. 10, no. 2, pp. 194–202, Jun. 2024, doi: 10.36685/phi.v10i2.799.

[7] J. Vassey, A. Galimov, C. J. Kennedy, E. A. Vogel, and J. B. Unger, "Frequency of social media use and exposure to tobacco or nicotine-related content in association with e-cigarette use among youth: a cross-sectional and longitudinal survey analysis," *Preventive Medicine Reports*, vol. 30, p. 102055, Dec. 2022, doi: 10.1016/j.pmedr.2022.102055.

[8] J. Kishun, A. Kumar, U. Singh, and S. Kumar, "Comparison of common predictors of current cigarette smoking among adolescents: across South East Asian Countries," *Clinical Epidemiology and Global Health*, vol. 17, p. 101112, Sep. 2022, doi: 10.1016/j.cegh.2022.101112.

[9] Centers for Disease Control and Prevention (CDC), "National youth tobacco survey (nyts) 2022 questionnaire." Centers for Disease Control and Prevention (CDC), USA, p. 47, 2022. [Online]. Available: https://www.cdc.gov/tobacco/data_statistics/surveys/nyts/pdfs/2022-nyts-questionnaire-508.pdf.
[10] D. S. Irvine, E. Y. Lee, I. Janssen, and S. T. Leatherdale, "Gendered associations between e-cigarette use, cigarette smoking, physical activity, and sedentary behaviour in a sample of canadian adolescents," *Dialogues in Health*, vol. 1, p. 100029, Dec. 2022, doi: 10.1016/j.dialog.2022.100029.
[11] K. Shartle, "Do high school friends still matter for health behavior in adulthood? variations in smoking trajectories by adolescent peer smoking networks, race/ethnicity, and gender," *SSM - Population Health*, vol. 16, p. 100925, Dec. 2021, doi: 10.1016/j.ssmph.2021.100925.
[12] Y. Zhao *et al.*, "Prevalence, frequency, intensity, and location of cigarette use among adolescents in china from 2013–14 to 2019: findings from two repeated cross-sectional studies," *The Lancet Regional Health - Western Pacific*, vol. 27, p. 100549, Oct. 2022, doi: 10.1016/j.lanwpc.2022.100549.
[13] J. Woo, E. Lawrence, and S. Mollborn, "Racial/ethnic and gender differences in smoking in early middle adulthood," *SSM - Population Health*, vol. 18, p. 101119, Jun. 2022, doi: 10.1016/j.ssmph.2022.101119.
[14] L. T. Montgomery *et al.*, "Reductions in tobacco use in naltrexone, relative to buprenorphine-maintained individuals with opioid use disorder: secondary analysis from the national drug abuse treatment clinical trials network," *Journal of Substance Abuse Treatment*, vol. 130, p. 108489, Nov. 2021, doi: 10.1016/j.jsat.2021.108489.
[15] M. Fang, "Association between adolescent body mass index and adulthood smoking," *Nicotine and Tobacco Research*, vol. 21, no. 12, pp. 1629–1635, 2019, doi: 10.1093/ntr/nty183.
[16] N. E. Wade *et al.*, "Clouding up cognition? secondhand cannabis and tobacco exposure related to cognitive functioning in youth," *Biological Psychiatry Global Open Science*, vol. 3, no. 2, pp. 233–242, Apr. 2023, doi: 10.1016/j.bpsgos.2022.01.010.
[17] A. Majmundar *et al.*, "Tobacco and cannabis use advertisements targeting adolescents and young adults on snapchat in 2019," *Preventive Medicine Reports*, vol. 26, p. 101758, Apr. 2022, doi: 10.1016/j.pmedr.2022.101758.
[18] K. Colyer-Patel, L. Kuhns, A. Weidema, H. Lesscher, and J. Cousijn, "Age-dependent effects of tobacco smoke and nicotine on cognition and the brain: a systematic review of the human and animal literature comparing adolescents and adults," *Neuroscience and Biobehavioral Reviews*, vol. 146, p. 105038, Mar. 2023, doi: 10.1016/j.neubiorev.2023.105038.
[19] F. Hafidah, Apriningsih, C. Simanjorang, and L. Hanifah, "Determinants of electronic smoking behavior among adolescents in Indonesia (analysis of global youth tobacco survey 2019)," *Public Health of Indonesia*, vol. 10, no. 2, pp. 133–142, Jun. 2024, doi: 10.36685/phi.v10i2.787.
[20] S. B. Cunha, R. C. de Araújo, J. V. B. de Oliveira, R. Mola, and A. C. R. Pitangui, "Factors associated with current tobacco use among adolescents and young students," *Jornal de Pediatria*, vol. 96, no. 4, pp. 447–455, Jul. 2020, doi: 10.1016/j.jped.2019.01.002.
[21] H. Liu *et al.*, "Associations between tobacco and alcohol use and aggressive behavior among adolescents in 55 low- and middle-income countries," *Journal of Affective Disorders*, vol. 329, pp. 519–524, May 2023, doi: 10.1016/j.jad.2023.02.131.
[22] H. E. Barker *et al.*, "Exposure to and appeal of tobacco ADS and displays in China: a qualitative exploration of Chinese youth perceptions," *Nicotine and Tobacco Research*, vol. 26, no. 4, pp. 427–434, Mar. 2024, doi: 10.1093/ntr/ntad192.
[23] D. Nagrath, M. R. Mathur, R. Gupta, and S. P. Zodpey, "Socio-demographic and socioeconomic differences in tobacco use prevalence among Indian youth," *Preventive Medicine Reports*, vol. 14, p. 100832, Jun. 2019, doi: 10.1016/j.pmedr.2019.100832.
[24] A. Zhou *et al.*, "Academic performance and peer or parental tobacco use among non-smoking adolescents: influence of smoking interactions on intention to smoke," *International Journal of Environmental Research and Public Health*, vol. 20, no. 2, p. 1048, Jan. 2023, doi: 10.3390/ijerph20021048.
[25] S. Aswathy *et al.*, "Tobacco use and exposure to second-hand smoke among high school students in Ernakulum District, Kerala: a cross-sectional study," *Public Health in Practice*, vol. 2, p. 100213, Nov. 2021, doi: 10.1016/j.puhip.2021.100213.
[26] J. K. Felner and J. P. Calzo, "Housing status as a social determinant of disparities in adolescent smoking, vaping, and dual use of cigarettes and e-cigarettes," *Addictive Behaviors*, vol. 141, p. 107631, Jun. 2023, doi: 10.1016/j.addbeh.2023.107631.
[27] H. Lestari, Irma, and Yasnani, "Adolescent smoking behavior and its related factors in coastal area of Kendari, Indonesia," *Public Health of Indonesia*, vol. 9, no. 4, pp. 156–163, Dec. 2023, doi: 10.36685/phi.v9i4.709.
[28] N. Mat Hassan, A. Abdul Aziz, R. Husain, N. Daud, and S. N. Juhari, "Association of prosocial behavior with ever smoking and alcohol drinking among school-going adolescents," *Heliyon*, vol. 6, no. 7, p. e04530, Jul. 2020, doi: 10.1016/j.heliyon.2020.e04530.
[29] G. E. Khalil and A. V. Prokhorov, "Friendship influence moderating the effect of a web-based smoking prevention program on intention to smoke and knowledge among adolescents," *Addictive Behaviors Reports*, vol. 13, 2021, doi: 10.1016/j.abrep.2020.100335.
[30] Y.-T. Lee *et al.*, "Prevalence and psychosocial risk factors associated with current cigarette smoking and hazardous alcohol drinking among adolescents in Taiwan," *Journal of the Formosan Medical Association*, vol. 120, no. 1, pp. 265–274, Jan. 2021, doi: 10.1016/j.jfma.2020.05.003.
[31] R. B. Mann and F. Blumberg, "Adolescents and social media: the effects of frequency of use, self-presentation, social comparison, and self esteem on possible self imagery," *Acta Psychologica*, vol. 228, p. 103629, Aug. 2022, doi: 10.1016/j.actpsy.2022.103629.
[32] H. M. Mamudu *et al.*, "Social media and use of electronic nicotine delivery systems among school-going adolescents in a rural distressed appalachian community," *Preventive Medicine Reports*, vol. 29, p. 101953, Oct. 2022, doi: 10.1016/j.pmedr.2022.101953.

BIOGRAPHIES OF AUTHORS

Musparlin Halid is a lecturer at Politeknik Medica Farma Husada Mataram, Mataram City, Lombok Island, West Nusa Tenggara, Indonesia. His research focuses on public health. He is interested in exploring the determinants of public health in the future. He can be contacted at email: musparlinhalid@gmail.com.

Lili Amaliah is a Permanent lecturer of the Public Health study program at Mahardika Institute of Technology and Health Cirebon which was formerly known as STIKes Mahardika Cirebon and now as a Doctoral Student in Public Health, Universitas Negeri Semarang. Several books and articles have been written both independently and together with other lecturers, with the hope that the works that have been made can contribute to the development of science, especially related to public health and environmental health. She can be contacted at email: liliamaliah200382@gmail.com.

Sri Nurcahyati has an educational background in the public health sector with an interest in epidemiology. She is also a Doctoral Student in Public Health, at Universitas Negeri Semarang Currently. As a lecturer at the Mahardika Institute of Technology and Health Cirebon, her interest research topic is about the epidemiological recording system. She can be contacted at email: srinur@mahardika.ac.id.

Krisnita Dwi Jayanti is interested in epidemiology since 2006. Until now, she has expertise in Epidemiology and acts as a lecturer in the Medical Records and Health Information Study Program. As a lecturer, the author carries out the tri dharma of higher education by playing an active role as a teacher, and researcher and conducting community service in the field of epidemiology. She can be contacted at email: krisnita.jayanti@iik.ac.id.

Supriatin is a Ph.D. student in Nursing, at Lincoln University College, Malaysia. She also lecturer in the Nursing Study Program, Cirebon College of Health Sciences, Cirebon, West Java, Indonesia. She is a lecturer and is active in research and community service activities. She is active in making scientific publications about reproductive health, maternal health child, and pediatric nursing, and has an active role as a resource person for seminar activities. She can be contacted at email: supriatin98@yahoo.co.id or supriatincirebonok@gmail.com.

Suyitno is a Doctoral Student in Public Health, at Universitas Negeri Semarang. He is also a lecturer in the Occupational Health and Safety Program, Politeknik Medica Farma Husada Mataram, Indonesia. The courses taught are socio-anthropology of health, safety culture, and occupational health, and courses related to hygiene and health social science. He can be contacted at email: nameseno@gmail.com.

Maretalinia is a Ph.D. candidate in the Demography Program at the Institute for Population and Social Research, Mahidol University, Thailand. She also experienced working as a lecturer in the Public Health Program. She completed her Bachelor of Public Health from Sriwijaya University and her Master of Art from Mahidol University. She can be contacted at email: mareta.linia.21@gmail.com.