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Lack of Smoking Knowledge and Behavior among Adolescents during COVID-19 Pandemic in Rural Areas

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Abstract

ABSTRACT
Background: Indonesia has a high smoking rate and is a leading tobacco producer, with adolescent smoking prevalence increasing from 18.3% to 19.2% in 2019. This study explored smoking knowledge and behavior among 60 male adolescents in rural areas during the COVID-19 pandemic.
Methods: This study was conducted in rural areas in Indonesia. We employed a cross-sectional research design and included 60 adolescents, especially males, using data from a questionnaire about smoking knowledge and behavior. The dependent variables included knowledge and behavior of smoking in adolescents that occurred during COVID-19. The independent variables included adolescent-related factors about smoking during COVID-19.
Results: Individuals from rural areas in Indonesia started smoking at a very young age and had years of smoking experience using conventional cigarette since then. Receiving counseling about the dangers of smoking was statistically significantly related to good knowledge. Moreover, learning about the susceptibility of smoking to contract ($p = 0.007$), spread ($p = 0.029$), worsen symptoms ($p < 0.001$), and create a higher risk of COVID-19 infection ($p = 0.001$) can promote good knowledge. More than 50% of adolescents had the intention to decrease smoking around individuals and in the house during COVID-19.
Conclusion: Interventions targeting individuals at an early school age are needed. To develop knowledge and behavior about smoking among adolescents in Indonesia, schools should cooperate with other agencies.

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INTRODUCTION

According to the Global Burden of Disease, smoking is a risk factor for early morbidity and mortality worldwide. Currently, Indonesia is one of the countries with the highest smoking prevalence and is also one of the biggest tobacco producers worldwide (Holipah, 2020). In 2022, the smoking prevalence in Indonesia was approximately 38% (Firmansyah et al, 2020). Smoking prevalence among adolescents in Indonesia increases annually. In Indonesia, the Global Youth Tobacco Survey stated that the percentage of smokers in 2019 was higher than that in 2014, which increased from 18.3% to 19.2% (Ministry of Health, 2019). Based on this scenario, smoking is believed to seriously affect the future of adolescents. Moreover, a lack of knowledge about smoking is observed (Jradi, 2014). Adolescents with poor knowledge about smoking but have positive attitudes about it are predicted to increase smoking prevalence in the next 5 years (Heydari, 2022). This knowledge deficiency contributes to a low smoking behavior. Furthermore, not only knowledge but multilevel influential factors determine smoking behaviors in adolescents.

According to the socioecological developmental model and social cognitive theory, smoking behavior is a result of interactions among multilevel factors (e.g., personal, community, and environmental factors. These factors are consistent with the study by Green, who reported that three factors support an individual's behavior, including predisposing, enabling, and reinforcing factors. Furthermore, a systematic review noted that beliefs of adolescents about the likelihood of addiction, health risks, and consequences of smoking are associated with smoking behavior.

Several adolescents have started smoking owing to curiosity. In the future, smoking can be a significant risk factor for the development of several chronic illnesses. Smoking remains uncommon among females in rural areas. Culture and data in Indonesia have shown that most smokers are males. However, smoking is risk factor for various diseases, including lung diseases such as bronchial asthma, chronic obstructive pulmonary disease (COPD), emphysema, interstitial lung diseases, lung fibrosis, and lung cancer. Then, iron homeostasis, cardiovascular problems, disturbances in the secretion and metabolism of hormones, reproductive system disorders, Alzheimer's disease, periodontal problems, nervous system disorders, and dry eyes (Varghese, 2023).

From 2020 to 2024, individuals were affected by the COVID-19 pandemic. Currently, smoking habits are noted in communities worldwide. For example, the United States, Italy, England, and China have reported an increase in the number of smokers (Kowitt et al, 2020; Caponetto, 2020). Moreover, this increase has been observed in Indonesia, with the increase noted from the age of first smoking among individuals aged >10 years. According to the Indonesian basic health research in 2018, first smoking was noted in 87.5% of individuals aged 10–14 years, and the number increased to 90.3% in 2023 (Ministry of Healt, 2023). Moreover, smoking among adolescents can be a risk factor for chronic obstructive pulmonary disease (Global Initiative for Chronic Obstructive Lung Disease, 2018). Additionally, smoking can weaken the immune system and increase the risk of COVID-19 infection (Haddad, 2021). Smoking behavior activates peripheral nicotinic acetylcholine receptors and increases vulnerability to severe acute respiratory syndrome coronavirus 2 infection in several organ systems, indicating that smoking can further aggravate COVID-19 (Oakes). As smoking is highly dangerous for adolescents, then studies about factors influencing smoking knowledge and behavior must be conducted.

Most studies have focused on the relationship between characteristics or determinants of smoking, including knowledge and behavior. This study aimed to explore the characteristics of smoking knowledge and behavior of adolescents, particularly males, during the COVID-19 pandemic in rural areas in Indonesia. Hopefully, this study can serve as a reference for promoting smoking cessation in adolescents in rural areas in Indonesia.

METHOD

This study using quantitative study especially cross-sectional design. Then from 60 adolescent who were distributed in Yogyakarta, Indonesia, we identified characteristics, including age, initiation age of smoking, cigarette use duration, cigarette type, primary reason of smoking, and family members or friends in the house or school who smoke. Furthermore, we identified factors about smoking knowledge, such as received information about the dangers of smoking, received counseling about the dangers of smoking, smokers being more susceptible to contracting COVID-19, smoking can increase the risk of spreading COVID-19, smokers having more severe symptoms if they contract COVID-19, smokers' lung function being more difficult to fight COVID-19, smokers have higher death rates from COVID- 19 than non-smokers, and cigarettes that are alternately smoked have a higher risk of COVID- 19 transmission. Using the questionnaire, the following characteristics were identified: intention or desire to quit smoking, reduce cigarette consumption during the COVID-19 pandemic, not smoke around other individuals during the COVID-19 pandemic, not smoke in the house, and more smoking knowledge and behavior. Subsequently, this was a quantitative correlational study with a cross-sectional research design. The relationship between adolescent factors and knowledge and behavior was investigated. Knowledge and behavior were classified as less, enough, and good.As dependent variables, smoking knowledge was identified using the questionnaire adapted from the study by Gulo, which

comprised 19 questions about the dangers of smoking, cigarettes' toxic substances, effects of smoking on health, diseases caused by smoking, and regulations regarding smoking prohibition. This questionnaire was proven valid and reliable (0.788). It used right and wrong answers. Meanwhile, smoking behavior was identified using the questionnaire adapted from the study by Azkiyati, which comprised 21 questions regarding smoking behavior to measure the level of smoking behavior of adolescents, and the answers included always, often, sometimes, and never. Moreover, this questionnaire was proven valid and reliable (0.711).

This study, we have ethics statement i.e. The Medical Ethics Committee of the Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada, Indonesia reviewed and approved this study (KE/FK/1356/EC/2022).

RESULTS AND DISCUSSION

Table 1. Characteristics of Respondent

Factors	**n (%)**
Age of adolescent	
<18 years	44 (73)
≥18 years	16 (27)
Initiation Age of Smoking	
<14 years	19 (32)
≥14 years	41 (68)
Duration of using cigarette (year)	
0-5	55 (92)
6-10	4 (7)
>10	1 (2)
Type of cigarette	
Conventional cigarette	36 (60)
E-cigarette	3 (5)
Both	21 (35)
First reason that caused to smoke	
Myself	40 (67)
Friends	17 (28)
Parents	3 (5)
Any family's member is smoking	
Yes	44 (73)
No	16 (27)
Any friend in house is smoking	
Yes	59 (98)
No	1 (2)
Any friend in school is smoking	
Yes	43 (72)
No	17 (28)
Ever received information of smoking from school	
Yes	49 (82)
No	11 (18)
Ever received counseling about the dangers	
Yes	43 (72)
No	17 (28)
Have the desire to quit smoking	
Yes	44 (73)

Factors	n (%)
No	16 (27)
Smokers are more susceptible to contracting COVID-19	
Yes	23 (38)
No	37 (62)
Smoking can increase the risk of spreading COVID-19	
Yes	22 (37)
No	38 (63)
Smokers have more severe symptoms if they contract COVID-19	
Yes	33 (55)
No	27 (45)
Smokers' lung function is more difficult to fight COVID-19 and other diseases	
Yes	41 (68)
No	19 (32)
Deaths from COVID-19 are higher for smokers than non	
Yes	33 (55)
No	27 (45)
Cigarettes that are smoked alternately have a higher risk of transmission of COVID-19	
Yes	47 (78)
No	13 (22)
I will reduce the amount of cigarette consumption during the COVID-19	
Yes	37 (62)
No	23 (38)
I will not smoke around people during the COVID-19	
Yes	35 (58)
No	25 (42)
During the COVID-19, I will not smoke in the house	
Yes	33 (55)
No	27 (45)
I have reduced the amount of cigarette consumption during the COVID-19 pandemic	
Yes	32 (53)
No	28 (47)
I don't smoke around people during the COVID-19	
Yes	29 (48)
No	31 (52)
During the COVID-19,I didn't smoke inside the house	
Yes	28 (47)
No	32 (53)

Source : primary data

As shown in Table (1), data of 60 adolescents are analyzed, including age, age at first smoking, duration of smoking habit, class, type of cigarette consumed, primary reason for smoking, whether or not family members and friends smoke, exposure to information on the dangers of smoking at school, receive education about the dangers of smoking, and the desire to stop smoking.

The respondent characteristics are presented in Table (1). All 60 respondents were adolescents, with 44 adolescents (73%) aged <18 (14–17 years), and 22 adolescents (36.7%) each belonged in classes XI and XII. Most adolescents first smoked at ≥14 years. Moreover, 41 (68%) and 55 (92%) adolescents had 0–5 years of cigarette use duration, of which conventional cigarettes were the most frequently consumed (60%). Self-desire was the primary reason for smoking in 40 adolescents (67%), whereas 44 adolescents (73%) admitted the presence of family members who smoke, 59 adolescents (98%) had friends at home who smoke, and 43 adolescents (72%) had friends at school who smoke. Furthermore, 49 (82%), 43 (72%), and 44 (73%) adolescents received dangers of smoking information from school, received counseling about dangers of smoking, and wanted to quit smoking, respectively. Adolescent basic knowledge regarding the impact of smoking on the pandemic. Moreover, 37 (62%) and 38 (63%) adolescents responded that smokers were not more susceptible to contracting COVID-19 and smoking did not increase the risk of spreading COVID-19, respectively. However, 33 adolescents (55%) recognized that smokers have more severe symptoms when infected with COVID-19, and 41 adolescents (68%) recognized that smokers' lung function makes it more difficult to fight COVID-19 and other diseases. Thirty-three adolescents (55%) recognized that smokers have higher death rates from COVID-19 than non-smokers. Additionally, 47 adolescents (78%) identified that cigarettes that are alternately smoked have a higher risk of transmitting COVID-19. Basic adolescent behaviors related to smoking habits are also presented in Table 1. Further, 37 (62%) and 35 (58%) adolescents wanted to reduce cigarette consumption and would not smoke near other individuals during the COVID-19 pandemic, respectively. Subsequently, 33 (55%) and 32 (53%) adolescents responded to not smoke at home and have reduced cigarette consumption, respectively. However, 31 (52%) and 32 (53%) adolescents still smoked near other individuals and still smoked at home.

Smoking knowledge and behavior were further identified in detail. Regarding cigarettes' contents, 57 adolescents (95%) identified that cigarettes contain dangerous substances, and 48 adolescents (80%) recognized that cigarettes contain carbon monoxide, which can bind to red blood cells and cause blood vessel narrowing. Furthermore, 25 adolescents (42%) did not recognize that ingredients contained in cigarettes including tar and nicotine are not harmful to health. However, 42 adolescents (70%) recognized that nicotine does not cause addiction in smokers, and 53 adolescents (88%) identified that cigarettes contain ingredients that are dangerous to health.

Regarding the question about cigarettes are not dangerous for health, 44 adolescents (73%) identified that it is wrong. Fifty adolescents (83%) recognized that cigarettes are dangerous for smokers. Subsequently, 58 (97%) and 55 (92%) adolescents identified that smoking causes lung cancer and heart diseases, respectively. Forty-eight adolescents (80%) recognized that cigarettes can cause blood circulation problems. Subsequently, 41 adolescents (68%) identified no significant relationship between smoking and the smoker's health, and 55 adolescents (92%) did not recognize that there are various diseases caused by smoking. Moreover, 54 adolescents (90%) identified that smoking affects dental and oral health, and 50 adolescents (83%) recognized that smoking can cause impotence, decreased individual immunity, and cancer. However, 50 adolescents (83%) did not recognize that smoking has less positive impact to COVID-19 pandemics.

Regarding the question about active and passive smoker, 54 adolescents (90%) identified that cigarette smoke causes air pollution for the people around. Moreover, 56 adolescents (93%) recognized that when someone near the adolescent is not a smoker but inhales the cigarette smoke that the adolescent exhales, then he/she is a passive smoker. Moreover, regarding the question about smoking regulations, 50 adolescents (83%) recognized the existence of legal regulations that prohibit smoking in public places, health facilities, workplaces, teaching and learning facilities, and transportation. Meanwhile, regarding the evaluation of smoking behavior types, 30 adolescents (50%) never smoked mainly when they feel restless/irritated. Additionally, 21 adolescents (35%) always smoke when anxious and calm, whereas 26 adolescents (43%) sometimes increased the number of cigarettes day by day. Regarding the smoker type, 17 adolescents (28%) were often or always smoked a maximum of four cigarettes a day. Furthermore, 25 adolescents (42%) often smoked a fixed number of cigarettes every day. Twenty-five adolescents (42%) never smoked more than seven cigarettes a day.

The time to smoke was also identified. Thirty-six adolescents (43%) always smoked when the mouth tasted sour. Moreover, 23 adolescents (38%) always smoked whenever. However, 22 adolescents (37%) never smoked especially after eating, and 21 adolescents (35%) never smoked in cold weather. However, 22 adolescents (37%) always smoked whatever the weather. Furthermore, 28 adolescents (47%) smoked mainly when with friends, whereas 23 adolescents (38%) never invited friends to smoke. Subsequently, 23 adolescents (38%) smoked when alone and with friends, whereas 20 adolescents (33%) sometimes smoked especially when friends asked. Subsequently, 24 adolescents (40%) sometimes smoked cigarettes that contain more nicotine and tar, and 22 adolescents (37%) always smoked cigarettes that have a distinctive aroma. Twenty-three adolescents (38%) smoked cigarettes that have low nicotine and tar contents. Twenty-one adolescents (35%) often smoked mainly in quiet places. Eighteen adolescents (30%) sometimes smoke anywhere, whereas 28 adolescents (47%) never felt dizzy when they did not smoke in one day. The relationship between adolescent-related factors and smoking knowledge are identified below.

This study described male adolescents aged 14–19 years and their relationship to smoking knowledge and behavior. The results showed that the initiation age of smoking at ≥14 years are more than <14 years old. This result is different from those of a previous study that approximately 80% of adolescents started smoking at <13 years. Subsequently, we have recognized that individuals have started smoking at a very young age and have years of smoking experience since then. Age plays a significant role in determining smoking habits. The risks of tobacco-related diseases are higher among those who start early and continue using it (Chezhian et al, 2015).

Based on our results, adolescents most frequently consumed conventional cigarettes, which is consistent with a previous study that reported conventional cigarette use days were higher (16.3%) than e-cigarette use days (13.3%, p = 0.017) (Bigwanto, 2024). Furthermore, in Indonesia, clove-flavored (*kretek*) or traditional cigarettes are the most frequently consumed cigarette type (Ministry of Health, 2018). For this habit, the primary reason for smoking is self-desire. However, undeniably, close friends (either in the school or house), siblings, and family influence smoking initiation and habit.

Table 2. Relationship of adolescent characteristics to smoking knowledge

Factors	Knowledge level			p-value
	less n(%)	enough n(%)	good n (%)	
N	16	22	22	
Age of adolescent				
<18 years	9 (56)	19 (86)	16 (73)	0.12
≥18 years	7 (44)	3 (14)	6 (27)	
Initiation Age of Smoking				
<14 years	6 (38)	8 (36)	5 (23)	0.53
≥14 years	10 (63)	14 (64)	17 (77)	
Duration of using cigarette (year)				
0-5	13 (81)	21 (95)	21 (95)	0.39
6-10	2 (13)	1 (5)	1 (5)	
>10	1 (6)	0 (0)	0 (0)	
Type of cigarette				
Conventional cigarette	12 (75)	15 (68)	9 (41)	0.20
E-cigarette	0 (0)	1 (5)	2 (9)	
Both	4 (25)	6 (27)	11 (50)	
First reason that caused to smoke				
Myself	10 (63)	14 (64)	16 (73)	0.42
Friends	4 (25)	8 (36)	5 (23)	
Parents	2 (13)	0 (0)	1 (5)	
Any family's member is smoking				
Yes	10 (63)	18 (82)	16 (73)	0.41
No	6 (38)	4 (18)	6 (27)	
Any friend in house is smoking				
Yes	15 (94)	22 (100)	22 (100)	0.25
No	1 (6)	0 (0)	0 (0)	

Factors	Knowledge level			p-value
	less n(%)	enough n(%)	good n (%)	
N	16	22	22	
Any friend in school is smoking				
Yes	12 (75)	16 (73)	15 (68)	0.89
No	4 (25)	6 (27)	7 (32)	
ever received information about of smoking from school				
Yes	11 (69)	20 (91)	18 (82)	0.22
No	5 (31)	2 (9)	4 (18)	
ever received counseling about the dangers				
Yes	6 (38)	18 (82)	19 (86)	0.002
No	10 (63)	4 (18)	3 (14)	
have desire to quit smoking				
Yes	12 (75)	16 (73)	16 (73)	0.98
No	4 (25)	6 (27)	6 (27)	
Smokers are more susceptible to contracting COVID-19 pandemic				
Yes	1 (6)	10 (45)	12 (55)	0.007
No	15 (94)	12 (55)	10 (45)	
Smoking can increase the risk of spreading COVID-19 pandemic				
Yes	2 (13)	8 (36)	12 (55)	0.029
No	14 (88)	14 (64)	10 (45)	
Smokers have more severe symptoms if they contract COVID-19				
Yes	2 (13)	13 (59)	18 (82)	<0.001
No	14 (88)	9 (41)	4 (18)	
Smokers' lung function is more difficult to fight COVID-19 and other diseases				
Yes	9 (56)	13 (59)	19 (86)	0.072
No	7 (44)	9 (41)	3 (14)	
Deaths from COVID-19 pandemic are higher for smokers than non-smokers				
Yes	8 (50)	14 (64)	11 (50)	0.59
No	8 (50)	8 (36)	11 (50)	
Smoked cigarette alternately have a higher risk of transmission of COVID-19				
Yes	8 (50)	17 (77)	22 (100)	0.001
No	8 (50)	5 (23)	0 (0)	
I will reduce the amount of cigarette consumption during the COVID-19				
Yes	7 (44)	13 (59)	17 (77)	0.11
No	9 (56)	9 (41)	5 (23)	
I will not smoke around other people during the COVID-19 pandemic				
Yes	9 (56)	12 (55)	14 (64)	0.81
No	7 (44)	10 (45)	8 (36)	
During the COVID-19 pandemic I will not smoke in the house				
Yes	7 (44)	11 (50)	15 (68)	0.27
No	9 (56)	11 (50)	7 (32)	
I have reduced the amount of cigarette consumption during the COVID-19				
Yes	6 (38)	12 (55)	14 (64)	0.28
No	10 (63)	10 (45)	8 (36)	
I don't smoke around other people during the COVID-19 pandemic				
Yes	5 (31)	10 (45)	14 (64)	0.13
No	11 (69)	12 (55)	8 (36)	
During the COVID-19 pandemic I didn't smoke inside the house				
Yes	5 (31)	10 (45)	13 (59)	0.23
No	11 (69)	12 (55)	9 (41)	

Source : primary data

Based on the p-value, the characteristics that were statistically significantly related to the smoking knowledge included received counseling about the dangers of smoking (p = 0.002) and some basic knowledge about smoking and COVID-19 (Table 2). Basic knowledge included smokers more susceptible to contracting COVID-19 (0.007), smoking increases the risk of spreading COVID-19 (0.029), smokers have more severe symptoms if they contract COVID-19 (<0.001), and cigarettes that are smoked have a higher risk of COVID-19 transmission (0.001). Other factors were not statistically significantly related to the smoking knowledge.

Most of the adolescents responded that they received information about the dangers of smoking from schools and received counseling about dangers of smoking; however, these do not guarantee that all adolescents gained good smoking knowledge and behavior. Regarding the basic knowledge collected from characteristics of adolescents, 62%, 63%, and 83% of adolescents did not recognize that smokers are more susceptible to COVID-19, were unaware that smoking increases the spread of COVID-19, and did not recognize that smoking has less positive impact, respectively. Although cigarette smoke contains thousands of chemicals, several of which pose a serious health risk (Larsson et al, 2012). More than 50% of adolescents have basic knowledge of smoking and its relationship to COVID-19; however, all adolescents have not thoroughly recognized it yet. Furthermore, this study explained that receiving counseling about the dangers of smoking was significantly related to good smoking knowledge. This finding is consistent with that of a previous study with high-quality evidence stating that counseling can be more effective than other interventions (Lancaster, 2017). Moreover, learning about basic knowledge on smoking including the susceptibility of smoking to contract ($p = 0.007$), spread ($p = 0.029$), worsen symptoms ($p < 0.001$), and create a higher risk of COVID-19 infection ($p = 0.001$) can promote good knowledge among adolescents. Our results are consistent with those of a previous study that reported activeness of counseling ($p = 0.001$) is significantly associated with smoking knowledge and behavior. Additionally, our results agree with those of previous studies that active smoking is significantly associated with a greater risk of COVID-19 progressing toward a severe disease (Lippi et al 2023; Lo, E., 2020). Current smoking status still remained a risk factor for severe COVID-19 in the multivariate analysis (He, et al, 2022). Even though these knowledge have received to all adolescents yet. This can be seen from the fact that not all teenagers have perfect knowledge regarding smoking.

Table 3. Relationship of characteristics to smoking behavior

Factors	Behavior level			p-value
	less n(%)	enough n(%)	good n (%)	
N	18	27	15	
Age of adolescent				
<18	14 (78)	22 (81)	8 (53)	0.12
≥18	4 (22)	5 (19)	7 (47)	
Initiation Age of Smoking				
<14	5 (28)	10 (37)	4 (27)	0.72
≥14	13 (72)	17 (63)	11 (73)	
Duration of using cigarette (year)				
0-5	17 (94)	25 (93)	13 (87)	0.54
6-10	1 (6)	2 (7)	1 (7)	
>10	0 (0)	0 (0)	1 (7)	
Type of cigarette				
Conventional cigarette	10 (56)	17 (63)	9 (60)	0.81
E-cigarette	1 (6)	2 (7)	0 (0)	
Both	7 (39)	8 (30)	6 (40)	
First reason that caused to smoke				
Myself	11 (61)	19 (70)	10 (67)	0.39
Friends	6 (33)	8 (30)	3 (20)	
Parents	1 (6)	0 (0)	2 (13)	
Any family's member is smoking				
Yes	13 (72)	18 (67)	13 (87)	0.37
No	5 (28)	9 (33)	2 (13)	
Any friend in house is smoking				
Yes	18 (100)	27 (100)	14 (93)	0.22
No	0 (0)	0 (0)	1 (7)	
Any friend in school is smoking				
Yes	14 (78)	19 (70)	10 (67)	0.76
No	4 (22)	8 (30)	5 (33)	
Ever received information about smoking from school				
Yes	16 (89)	21 (78)	12 (80)	0.63
No	2 (11)	6 (22)	3 (20)	
Ever received counseling about the dangers				

Factors	Behavior level			p-value
	less n(%)	enough n(%)	good n (%)	
N	18	27	15	
Yes	13 (72)	20 (74)	10 (67)	0.88
No	5 (28)	7 (26)	5 (33)	
have the desire to quit smoking				
Yes	15 (83)	22 (81)	7 (47)	0.026
No	3 (17)	5 (19)	8 (53)	
Smokers are more susceptible to contracting COVID-19 pandemic				
Yes	8 (44)	10 (37)	5 (33)	0.79
No	10 (56)	17 (63)	10 (67)	
Smoking can increase the risk of spreading COVID-19 pandemic				
Yes	8 (44)	9 (33)	5 (33)	0.72
No	10 (56)	18 (67)	10 (67)	
Smokers have more severe symptoms if they contract COVID-19				
Yes	13 (72)	14 (52)	6 (40)	0.16
No	5 (28)	13 (48)	9 (60)	
Smokers' lung function is more difficult to fight COVID-19 and other diseases				
Yes	15 (83)	16 (59)	10 (67)	0.23
No	3 (17)	11 (41)	5 (33)	
Deaths from COVID-19 pandemic are higher for smokers than non-smokers				
Yes	7 (39)	18 (67)	8 (53)	0.18
No	11 (61)	9 (33)	7 (47)	
smoked cigarette alternately have a higher risk of transmission of COVID-19				
Yes	15 (83)	21 (78)	11 (73)	0.78
No	3 (17)	6 (22)	4 (27)	
I will reduce the amount of cigarette consumption during the pandemic				
Yes	14 (78)	18 (67)	5 (33)	0.025
No	4 (22)	9 (33)	10 (67)	
I will not smoke around other people during the COVID-19 pandemic				
Yes	10 (56)	17 (63)	8 (53)	0.80
No	8 (44)	10 (37)	7 (47)	
During the COVID-19 pandemic I will not smoke in the house				
Yes	12 (67)	15 (56)	6 (40)	0.31
No	6 (33)	12 (44)	9 (60)	
I have reduced the amount of cigarette consumption during the pandemic				
Yes	10 (56)	16 (59)	6 (40)	0.48
No	8 (44)	11 (41)	9 (60)	
I don't smoke around other people during the COVID-19 pandemic				
Yes	9 (50)	12 (44)	8 (53)	0.85
No	9 (50)	15 (56)	7 (47)	
During the COVID-19 pandemic I didn't smoke inside the house				
Yes	9 (50)	14 (52)	5 (33)	0.49
No	9 (50)	13 (48)	10 (67)	

Source : primary data

Based on the p-value also, the characteristics that were statistically significantly related to the smoking behavior of adolescents included having the desire to quit smoking (p = 0.026) and willingness to reduce cigarette consumption during the COVID-19 pandemic (p = 0.025) (Table 3). Other factors were not statistically significantly related to the smoking behavior of adolescents.

Regarding the basic behavior of smoking, 43% of adolescents still sometimes smoked an increasing number of cigarettes day by day. Further, 38% of adolescents always smoked whenever they wanted, and 38% adolescent smoked alone or with friends, indicating that they do not identify smoking areas and do not recognize smoking regulations in the environment yet. However, the desire not to smoke actually has less and enough behavior, respectively. If adolescents will reduce cigarette consumption during the pandemic, the knowledge only less or enough behavior of smoking, respectively. However, this study concluded that adolescents also have the intention to decrease and quit smoking, which was evidenced by 53%, 62%, 58%, and 55% of adolescents reduced cigarette consumption, had the intention to reduce cigarette consumption, will not smoke around other individuals, and did not smoke in the house during COVID-19, respectively. Although

this behavior is good, a previous study reported that approximately two-thirds of the participants (100 participants) attempted to quit smoking in the past, and more than 50% of the participants showed the intention to quit smoking in the near future (Chezhian et al, 2015).

Table 4. Logistic Regression of Relation between Student's Characteristics & Smoking Knowledge

Variables	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 4 OR (95% CI)	Model 5 OR (95% CI)
Ever received information about the dangers of smoking from school					
Yes	1.01				
	[0.65,1.57]				
No	1				
Perception of smokers are more susceptible to contracting COVID-19					
Yes	1.18	1.19	1.33		
	[0.80,1.75]	[0.81,1.74]	[0.89,1.98]		
No	1	1	1		
Perception of smokers have more severe symptoms if they contract COVID-19 pandemic					
Yes	1.85**	1.85**	2.08***	1.97***	
	[1.27,2.71]	[1.27,2.70]	[1.41,3.07]	[1.39,2.79]	
No	1	1	1	1	
Perception of cigarettes that are smoked alternately have a higher risk of transmission of COVID-19 pandemic					
Yes	1.81**	1.81**		1.89**	2.49***
	[1.17,2.81]	[1.18,2.80]		[1.24,2.89]	[1.60,3.88]
No	1	1		1	1
Pseudo R^2					
AIC	121.6	119.6	125.2	118.4	130.5
Observations	60	60	60	60	60

Exponentiated coefficients; 95% confidence intervals in brackets

Data source: primary data; adjusted and unweighted data; *(p<0.05), **(p<0.01), ***(p<0.001); akaike's information criterion (AIC);

Furthermore, as shown in Table (4), basic knowledge such as perception of smokers have more severe symptoms if they contract COVID-19 and perception of cigarettes that are smoked alternately have a higher risk of transmission of COVID-19 have the highest relation to smoking knowledge.

Table 5. Logistic Regression of Relation Between Characteristics of Students & Smoking Behavior

Variables	**Model 1 OR (95% CI)**	**Model 2 OR (95% CI)**	**Model 3 OR (95% CI)**	**Model 4 OR (95% CI)**	**Model 5 OR (95% CI)**
Any friend in house is smoking					
Yes	2.30				
	[0.61,8.69]				
No	1				
Perception of smokers are more susceptible to contracting Covid-19					
Yes	1.17	1.85**			
	[0.79,1.72]	[1.24,2.74]			
No	1	1			
Perception of smokers have more severe symptoms if contract Covid-19					
Yes	1.75**		2.35***		

Variables	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 4 OR (95% CI)	Model 5 OR (95% CI)
	[1.18,2.60]		[1.66,3.34]		
No	1		1		
Perception of cigarettes that are smoked alternately have a higher risk of transmission of Covid-19					
Yes	1.86**			2.49***	
	[1.19,2.90]			[1.60,3.88]	
No	1			1	
Will reduce the amount of cigarette consumption during the pandemic					
Yes	1.07				1.56*
	[0.74,1.55]				[1.03,2.35]
No	1				1
Pseudo R^2					
AIC	121.4	136.7	125.3	130.5	141.2
Observations	60	60	60	60	60

Exponentiated coefficients; 95% confidence intervals in brackets

Data source: primary data; adjusted and unweighted data; *(p<0.05), **(p<0.01), ***(p<0.001); akaike's information criterion (AIC);

Then in table (5) proves that any friend in the house is smokes can affect 2.3 times adolescents to have smoking behavior. On the other hand, perception that smokers are more susceptible to contracting COVID-19, smokers have more severe symptoms if they contract COVID-19, and cigarettes that are smoked alternately have a higher risk of transmission of COVID-19 also related to smoking behavior. Finally, the desire of adolescents to reduce the amount of cigarette consumption during the COVID-19 pandemic related to smoking behavior.

Based on table (4) and (5), this study identified that individuals from rural areas in Indonesia started smoking at a very young age and had years of smoking experience using conventional cigarette since then. Receiving counseling about the dangers of smoking was statistically significantly related to good knowledge (86%). Learning about basic knowledge on smoking including the susceptibility of smoking to contract ($p = 0.007$), spread ($p = 0.029$), worsen symptoms ($p < 0.001$), and create a higher risk of COVID-19 infection ($p = 0.001$) can promote good knowledge among adolescents. Furthermore, adolescents had the intention to decrease and quit smoking, more than 50% of adolescents reduced cigarette consumption, had the intention to reduce cigarette consumption, will not smoke around other individuals, and did not smoke in the house during COVID-19. This study had some limitations. First, the characteristics of adolescents could have been explored further. Second, the economic status, role of parents and friends in smoking decision, and comprehensiveness of the determinants of knowledge and behavior among adolescents should be identified. Therefore, interventions targeting individuals at an early school age are needed. The school, which acts to promote smoking knowledge and behavior, should cooperate with primary healthcare, parents, and friends in school to decrease smoking and increase counseling services among adolescents who smoke.

Implications:

Improved health service quality directly correlates with increased patient satisfaction, aligning with the fundamental goal of healthcare to meet patient needs, thereby positively impacting patient recovery. Community health centers are crucial in serving the public and must consistently deliver excellent care despite challenges in human resources and evolving medical technology. Patient satisfaction is a key factor influencing the number of visits to healthcare facilities, underscoring the importance of continuous efforts to enhance service quality as a primary

driver of patient contentment. Achieving the highest level of public health necessitates high performance from healthcare workers.

Research Contribution:

This study demonstrates a significant relationship between the quality of health services and outpatient satisfaction, specifically finding that better service quality leads to higher patient satisfaction. The research supports previous findings that reliability is related to patient satisfaction. It highlights that while most respondents considered service quality "sufficient" (84.1%), deficiencies were noted in responsiveness, which contributed to dissatisfaction among some patients. The study also provides current data on patient satisfaction levels in an Indonesian health center, showing that a majority of respondents were satisfied (56.8%).

Limitations:

The study utilized an analytical observational method with a cross-sectional design, which provides a snapshot in time and does not establish causality. The sample size was relatively small, with a total of 44 participants. The study was conducted at a single health center (LP Health Center), which may limit the generalizability of the findings to other healthcare settings. The sampling technique used was consecutive sampling. The primary instrument used in this study was a questionnaire, which can be subject to response bias.

Suggestions:

Healthcare providers, particularly at community health centers, should prioritize improving the responsiveness dimension of service quality, as this was identified as a lacking area. This includes prompt attention to patient complaints, quick response times, and efficient service delivery to reduce waiting times. Officers should ensure thoroughness in providing services and proactively offer information about a patient's illness, rather than only when requested. Efforts should be made to ensure the completeness and availability of necessary equipment and medicines. Healthcare professionals should maintain politeness, friendliness, and good communication with patients and their families, avoiding non-work-related conversations during duty. Addressing factors causing dissatisfaction, such as inadequate attention to patient complaints, lack of cooperation with patients and families, and officers being less attentive to patient needs and expectations, is also crucial. Future research could explore these relationships with a larger sample size and across multiple health centers to enhance generalizability. Longitudinal studies could be conducted to understand the impact of service quality improvements on patient satisfaction over time. Qualitative research methods could be employed to gain deeper insights into patient experiences and expectations regarding service quality.

CONCLUSION

Early counseling and COVID-19–related education significantly improve smoking knowledge among rural Indonesian adolescents, over half of whom intend to reduce smoking around others during the pandemic. Early, school-based interventions in partnership with relevant agencies are therefore essential to foster lasting positive changes in smoking behavior and awareness. Therefore, interventions targeting individuals at an early school age are needed. The school, which acts to promote smoking knowledge and behavior, should cooperate with primary healthcare, parents, and friends in school to decrease smoking and increase counseling services among adolescents who smoke.

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