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Sociodemographic predictors for smoking persistence among young males in Indonesia

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ABSTRACT

The prevalence and burden of non-communicable diseases (NCDs) in Indonesia are increasing. One major risk factor for NCDs is smoking. Thus, this study assessed sociodemographic predictors of smoking persistence among young males in Indonesia, who are at high risk for smoking and NCDs. We analysed the Indonesian Demographic and Health Survey (IDHS) conducted in 2017, a nationally representative survey in 34 provinces of Indonesia. We included data from 9957 young males aged 15-24 who had tried smoking and were interviewed by the IDHS enumerators for their smoking patterns and sociodemographic characteristics. Logistic regression analyses were used to assess the predictors of smoking persistency. Our analyses uncovered that those who started smoking at high-school age, lived in rural areas, had an occupation, and had lower education levels, had higher odds of smoking persistence than other young males. The use of internet, also increased the odds of smoking persistence, while those reading newspapers had lower odds of smoking persistence. Regarding household characteristics, young males who came from poor households, whose household heads were smokers or not married, also had higher odds of smoking. In conclusion, this study also showed the significance of several individual variables and household sociodemographic factors related to smoking persistence. Based on our findings, we recommend the need for intervention that aims not only at large-scale policy to ban smoking and educational campaigns through the internet but also specific educational intervention targeting families, particularly poor families with active smokers. The educational campaign is also needed to target the younger population, who are at higher risk for smoking persistence if they start smoking earlier.

Key words:
smoking addiction; smoking persistence; non-communicable diseases

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INTRODUCTION

The increasing trends of non-communicable diseases (NCDs) globally, including in Indonesia, require targeted and specific primary prevention[1]. In Indonesia, several major NCDs have shown increasing trends in the past several years. One of the main NCDs, hypertension, is relatively prevalent in Indonesia. Approximately 33.4% of Indonesian adults had high blood pressure, with a 31% prevalence among males and 35.4% prevalence among females[2]. These figures are estimated to increase along with the changing lifestyle, diet, rising prevalence of obesity, and increasing life expectancy in Indonesia[3]. With the heavy burden of NCDs in Indonesia and the economic cost of these diseases, primary and secondary prevention becomes crucial.

Meanwhile, global discussion on NCDs in adolescents is still getting less attention, even though almost 35% of the global burden of disease comes from adolescents, and most of them are due to NCDs, injuries, and other preventable causes[4]. Hence, attention to NCDs in adolescents as a global public health concern should be increased because the risk factors for NCDs in adults usually begin in adolescence, and these risk factors can actually be prevented during adolescence[5]. Several major risk factors for NCDs include smoking, alcohol consumption, diet and obesity, and a sedentary lifestyle[6,7]. One of the main strategies for NCDs prevention is adopting a healthy lifestyle, including smoking cessation[8]. In this case, as a major cause of NCDs globally, tobacco use kills more than 7 million people worldwide every year [4]. The smoking prevalence is still high even though efforts to control tobacco use as a major global health threat have been carried out for decades[9].

In Indonesia, tobacco use is also one of the main risk factors for NCDs and obesity[10]. In Indonesia, the prevalence of smoking, one of the main risk factors for NCDs, is relatively high, particularly among males. Almost 57% of males in Indonesia were regular smokers, with more than 75% of young males having tried smoking, and more than half of those continued to become regular smokers[11]. In addition, adolescent smoking and tobacco use are also high in Indonesia. Tobacco use in adolescents is closely related to tobacco use in parents and tobacco exposure as passive smokers[12]. Among school students aged 13-15 years in Indonesia, as many as 32.1% of them have used tobacco products, and the percentage of males (54.1%) is higher than females (9.1%)[13]. Besides, the smoking prevalence among young males (15-19 years old) living in rural areas of Indonesia is also quite high at 41.8%[14]. Therefore, quitting smoking from a young age is vital because it can reduce the risk of developing NCDs in adulthood[15]. Moreover, interventions to improve health and reduce the disease burden targeted at young people can improve the population's health status in the future[16].

In this regard, an effective strategy to improve healthy behavior, including reducing smoking prevalence, is to target high-risk populations[17,18]. With the high prevalence of smoking, including among young males, strategies to address the epidemic of smoking among these high-risk groups become essential. Therefore, this study aims to provide an understanding of the predictors for smoking persistence, particularly among high-risk young males in Indonesia. The finding of this study can be the basis for tailoring interventions to address the high smoking prevalence among young males, not only in Indonesia but also in other countries with similar characteristics. Eventually, an effective reduction in smoking prevalence, particularly starting from a younger age, will reduce the risk of developing NCDs.

METHOD

Data from the latest Indonesian Demographic and Health Surveys (IDHS) conducted in 2017 were analysed. IDHS is a cross-sectional survey conducted in all provinces in Indonesia every three-five years since 1987. The IDHS 2017 was conducted in all 34 provinces in Indonesia. In this study, we used the young males' data, including questions on smoking habits and sociodemographic characteristics[19]. Of 10,036 young males who tried smoking, 79 were excluded due to missing values in educational level and current smoking variables. Thus, our analyses were conducted on 9,957 young males aged 15-24 years old (at the time of the surveys) who had tried smoking. Our dependent variable, smoking persistence, was obtained from two conditions: 1) young males who had tried smoking and 2) young males who were currently regularly smoking. Meanwhile, the non-smoking persistence

category included young males who had tried smoking but had stopped smoking or not currently smoking regularly.

In addition, we included several sociodemographic characteristics, including current age, level of education, area of residence, occupation, and age at first smoking. We also included exposure to the internet and mass media in our analyses. In this case, internet exposure is defined as the frequency of exposure to the internet and categorized into never, seldom, and regularly. Meanwhile, mass media exposure is described as radio, television, or newspaper exposure. Each was categorized into three categories: not at all, less than once a week, and at least once a week. Aside from the individual-level variables, we also included the household characteristics: smoking status, marital status, level of education of the household head, and household wealth status. All the variables were obtained by the IDHS through questionnaire-based interviews and were self-reported by respondents to the IDHS enumerator. We conducted descriptive statistical analyses on IDHS data using the Chi-square test and further analyses employing logistic regression. All analyses were conducted in the STATA survey (svy) procedure to consider the sampling weight and sampling methods in IDHS 2017 [20]. All analyses were conducted in STATA version 16 https://www. stata.com/.

RESULTS

A total of 9,957 males aged 15-24 years old were included in this study. These young males were mostly (47.0%) less than 18 years old at the time of the interview. Most of them had at least senior high education (58.2%) and lived in urban areas (53.3%). Of all the young males that had tried smoking we included in this study, 48.7% (n=4,583) of them continued to be regular smokers at the time of the interview. In the descriptive analysis, a higher prevalence of smoking persistence occurred in young males aged 19-21 years (34.6%) and had at least senior high education (52.6%), lived in urban areas (51.5%), started smoking at the age of 13-18 years (77.0%), and not being exposed to the radio (53.2%) or newspapers (56.6%). Regarding the household characteristics, the analyses showed that being poor and having household heads who were smokers was associated with smoking persistence (Table 1).

Table 1: Sociodemographic characteristics

Sociodemographic Characteristics	No Smoking Persistence (%, SE) n=5,374	Smoking Persistence (%, SE)n=4,583	Total (%, SE) n = 9,957	P-value
Total	51.3 (0.6)	48.7 (0.6)	100 (0.6)	
Age*				<0.001
≤18 years old	59.5 (0.8)	33.8 (0.9)	47.0 (0.6)	
19-21 years old	23.5 (0.7)	34.6 (0.9)	28.9 (0.6)	
>21 years old	17.0 (0.6)	31.7 (0.8)	24.1 (0.5)	
Educational level*				<0.001
Elementary or less	6.5 (0.4)	15.2 (0.6)	10.7 (0.4)	
Junior high	15.2 (0.6)	22.8 (0.8)	18.9 (0.5)	
Senior high	63.5 (0.8)	52.6 (0.9)	58.2 (0.6)	
Academy/university	14.8 (0.6)	9.5 (0.5)	12.2 (0.4)	
Occupation*				<0.001
Others	46.4 (0.9)	21.3 (0.8)	34.2 (0.6)	
Formal employee	5.4 (0.4)	6.0 (0.4)	5.7 (0.3)	
Non-formal employee	36.0 (0.8)	56.9 (0.9)	46.1 (0.6)	
Farmer	12.3 (0.5)	15.9 (0.6)	14.1 (0.4)	
Age of first smoking*				<0.001
< 13 years old	22.8 (0.7)	19.1 (0.7)	21.0 (0.5)	
13-18 years old	73.2 (0.8)	77.0 (0.8)	75.1 (0.5)	
>18 years old	4.0 (0.3)	3.9 (0.3)	3.9 (0.2)	

Sociodemographic Characteristics	No Smoking Persistence (%, SE) n=5,374	Smoking Persistence (%, SE)n=4,583	Total (%, SE) n = 9,957	P-value
Internet use				0.061
Never	9.7 (0.5)	10.6 (0.5)	10.1 (0.4)	
Seldom	64.2 (0.8)	61.5 (0.9)	62.9 (0.6)	
Regularly	26.1 (0.7)	27.9 (0.8)	27.0 (0.5)	
Listening to the radio*				<0.001
Not at all	50.3 (0.8)	53.2 (0.9)	51.7 (0..6)	
Less than once a week	35.1 (0.8)	30.5 (0.8)	32.9 (0.6)	
At least once a week	14.6 (0.6)	16.3 (0.7)	15.4 (0.5)	
Watching television				0.061
Not at all	2.6 (0.3)	2.2 (0.3)	2.4 (0.2)	
Less than once a week	19.6 (0.7)	21.8 (0.8)	20.6 (0.5)	
At least once a week	77.8 (0.7)	76.0 (0.8)	76.9 (0.5)	
Reading newspaper*				<0.001
Not at all	44.5 (0.9)	56.6 (0.9)	50.4 (0.6)	
Less than once a week	40.1 (0.8)	30.9 (0.8)	35.6 (0.6)	
At least once a week	15.4 (0.6)	12.6 (0.6)	14.0 (0.4)	
Household education*				<0.001
Elementary or less	43.5 (0.9)	54.0 (0.9)	48.6 (0.6)	
Junior high	16.1 (0.6)	17.6 (0.7)	16.9 (0.5)	
Senior high	29.3 (0.8)	22.1 (0.8)	25.8 (0.5)	
Academy/university	11.1 (0.5)	6.3 (0.4)	8.8 (0.3)	
Household marital status				0.111
No	18.0 (0.6)	19.5 (0.7)	18.7 (0.5)	
Yes	82.0 (0.6)	80.5 (0.7)	81.3 (0.5)	
Household head smoking*				<0.001
No	49.0 (0.9)	21.7 (0.8)	35.7 (0.6)	
Yes	51.0 (0.9)	78.3 (0.8)	64.3 (0.6)	
Wealth*				<0.001
Non-Poor	62.0 (0.8)	54.4 (0.9)	58.3 (0.6)	
Poor	38.0 (0.8)	45.6 (0.9)	41.7 (0.6)	
Area of residence*				0.008
Rural	45.1 (0.9)	48.5 (0.9)	46.7 (0.6)	
Urban	54.9 (0.9)	51.5 (0.9)	53.3 (0.6)	

*Note: *) Chi-square test was conducted to assess differences in proportion by sociodemographic factors, and all tests were significant at $p < 0.01$.*

In the logistic regression, older age at interview (aOR 3.4 95%CI 2.9-4.0 compared to those ≤ 18 years old), being a primary school student or less, having an occupation, and tried smoking at high school were factors that related to smoking persistence among young males in Indonesia (Table 2). In addition, other factors also related to smoking persistence among young males in Indonesia, which included using the internet both regularly and rarely and not being exposed to the newspaper at all. The habit of household heads who smoked (aOR 3.1 95%CI 2.8-3.5), rural living areas, and low-income family welfare conditions were also significant factors in smoking persistence among young males (Table 2).

Table 2: Predictors of smoking persistence

Sociodemographic Characteristics	Odds Ratio (95%CI)	Adjusted Odds Ratio (95%CI)
Age		
≤18 years old	Reference	Reference
19-21 years old	2.6 (2.3-2.9)*	2.5 (2.1-2.8)*
>21 years old	3.3 (2.9-3.7)*	3.4 (2.9-4.0)*
Educational level		
Elementary or less	Reference	Reference
Junior high	0.6 (0.5-0.8)*	0.7 (0.6-0.9)*
Senior high	0.4 (0.3-0.4)*	0.5 (0.4-0.6)*

Sociodemographic Characteristics	Odds Ratio (95%CI)	Adjusted Odds Ratio (95%CI)
Academy/university	0.3 (0.2-0.3)*	0.3 (0.2-0.4)*
Occupation		
Others	Reference	Reference
Formal employee	2.4 (1.9-3.0)*	1.7 (1.3-2.2)*
Non-formal employee	3.4 (3.1-3.9)*	2.0 (1.7-2.3)*
Farmer	2.8 (2.4-3.3)*	1.7 (1.4-2.0)*
Age of first smoking		
< 13 years old	Reference	Reference
13-18 years old	1.3 (1.1-1.4)*	1.1 (1.0-1.3)
>18 years old	1.2 (0.9-1.5)	0.6 (0.4-0.8)*
Internet use		
Never	Reference	Reference
Seldom	0.9 (0.7-1.0)	1.4 (1.1-1.7)*
Regularly	1.0 (0.8-1.2)	1.3 (1.0-1.6)*
Listening to radio		
Not at all	Reference	Reference
Less than once a week	0.8 (0.7-0.9)*	0.9 (0.8-1.0)
At least once a week	1.0 (0.9-1.2)	1.1 (0.9-1.2)
Watching television		
Not at all	Reference	Reference
Less than once a week	1.3 (0.9-1.8)	1.0 (0.7-1.4)
At least once a week	1.1 (0.8-1.6)	1.0 (0.7-1.5)
Reading newspaper		
Not at all	Reference	Reference
Less than once a week	0.6 (0.5-0.7)*	0.7 (0.6-0.8)*
At least once a week	0.6 (0.6-0.7)*	0.7 (0.6-0.8)*
Household education		
Elementary or less	Reference	Reference
Junior high	0.9 (0.8-1.0)	1.0 (0.9-1.2)
Senior high	0.6 (0.5-0.7)*	0.8 (0.7-1.0)*
Academy/University	0.5 (0.4-0.6)*	0.9 (0.7-1.1)
Household marital status		
No	Reference	Reference
Yes	0.9 (0.8-1.0)	0.8 (0.7-1.0)*
Household head smoking		
No	Reference	Reference
Yes	3.5 (3.1-3.9)*	3.1 (2.8-3.5)*
Family wealth		
Non-Poor	Reference	Reference
Poor	1.4 (1.2-1.5)*	1.1 (0.9-1.2)
Area of residence		
Urban	Reference	Reference
Rural	1.1 (1.0-1.3)*	1.0 (0.9-1.1)

*Note: *) showed that the predictor was significant at $p < 0.05$.*

DISCUSSION

This study showed a relatively high smoking persistence among young males who had tried smoking. Furthermore, we revealed several sociodemographic characteristics, which were important predictors for smoking persistence: age, age of first smoking, having an occupation, and lower level of education. We also identified several household characteristics associated with smoking persistence: being poor, having household heads who were smokers, and living with household heads who were not married. This study also highlights the importance of exposure to the internet, which increases the odds of smoking persistence.

Previous studies have underlined the importance of age of first smoking as a predictor of smoking persistence. The high persistence of smoking in young adults begins as teenagers when

they first try and has become a problem for millions of young adults today [21]. This study found that young males who first tried smoking as adolescents were influenced by their closest friends who smoked and shared their habits. Related to that, convincing by coercion to smoke is also often done to test their loyalty [22]. In addition, those who first tried smoking as adolescents were considered a cultural transition, extending into adulthood with a higher risk of persistent smoking in adulthood compared to non-smokers without a history of tried smoking, known as the "sleeper effect" phenomenon [23].

Moreover, with the increasing prevalence of NCDs, detecting risk factors and early screening becomes an important step in the global strategy to address NCDs[24,25]. Specifically, smoking prevention is essential in reducing the burden of NCDs. As one of the main risk factors for NCDs, smoking is a major burden for NCDs and accounts for approximately 14.1% (95% CI 13.3–15.0) mortality and 9.2% (95% (95% CI 8.0–10.3) Disability-Adjusted Life Years (DALYs) in males in Iran[26]. Based on research in Indonesia, the risk of death is 48% higher in current smokers than in non-current smokers aged 40 years or more[27].

The increasing risk of smoking persistence with increasing age also shows the need to provide continuous health education about the danger of smoking. Aside from conventional educational outlets, the use of informational technology, website, and social media might be an effective strategy in the current setting, particularly among youth [28]. In addition, prevention through education in junior and senior high schools and targeting youth under 18 years is not enough to prevent the harm of smoking. Thus, current prevention efforts also need to focus on the young adult populations [29]. Moreover, additional information on the mechanism of how age at first tried smoking, level of education, family , and media affect smoking behavior is important to provide recommendations for specific educational materials. The anti-smoking campaign is important, particularly in countries with high smoking prevalence as Indonesia.

Several previous smoking interventions include a policy to ban smoking in public spaces, mass media campaigns, and smoking cessation clinics [30,31], and banning the open display of cigarettes have also been proven effective in reducing smoking prevalence [32]. Our findings disclose that those who tried smoking during high school were more likely to be regular smokers, also providing a window of opportunity for smoking prevention. In this case, a multilevel and comprehensive approach to preventing smoking among students is important, particularly during high school. This program should involve not only the school and the students but also the family/parent. Family support has an essential role in the transition from adolescence into early adulthood in reducing risky behaviors and as a protective factor in adverse environments [33]. School-based tobacco control intervention programs also have a long-term role in reducing smoking behavior in adolescents and preventing adolescents from starting smoking. Thus, school-based tobacco control intervention programs also need to involve teachers and staff and follow consistent enforcement of policies to avoid adolescent failure to internalize personal anti-smoking beliefs [34].

In our study, education also showed a dose-response association with smoking persistence. A higher risk for smoking persistence was observed in young males with less educational background, with the highest risk among elementary school graduates. In this regard, lower levels of education had a lower chance of providing information and knowledge about smoking and its effects on health than colleagues with higher education. In the community view, academic qualifications are also the reason for the difference in smoking prevalence in young males as observed between the university and senior high school graduates [35]. It might be due to the lack of knowledge and awareness of the danger and effects of smoking and less favorable social network or peers [31,36].

Previous studies have notified that a reduction in smoking prevalence will reduce NCDs. In particular, implementing the WHO tobacco control policy by reducing the prevalence of tobacco use by 30% by 2025 compared to the annual trend of smoking prevalence from 1990 to 2015 can prevent 23,600 deaths and reduce the mortality rate by 7.8%. In addition, tobacco control can also help reduce 16,000 cancer deaths, 6000 CRD deaths, and 2,000 CVD deaths each year[37]. For this reason, intervention strategies tailored to address the highly susceptible population should also be undertaken, particularly young males with lower education for whom the school-based intervention might not reach. For these populations, increasing the smoking tax, a stricter policy on smoke-free areas, or a social

media intervention might be more useful [38,39]. Our findings also highlighted the importance of a targeted intervention strategy to address the high prevalence of smoking among young males. These strategies include the large-scale strategy of the smoking ban and educational campaigns. Further, specific and targeted intervention for the high-risk population found in this study is also needed for poor communities with lower education levels. With the increasing use of the internet and the importance of internet exposure in smoking persistence, there is also a need to develop an anti-smoking campaign targeting young males.

Limitation and strength

This study has several limitations. First, the self-reported nature of smoking persistence might risk reporting bias. Second, we could not address several factors, i.e., peer factors in this study, which might influence smoking persistence. Despite these limitations, this study provides evidence on several key risk factors in smoking persistence among young males. This study also highlights the importance of intervening on multilevel factors associated with smoking persistence, including family. Currently, most smoking prevention program focuses on the community and individual level. Thus, a comprehensive program involving family, school, and community is needed to prevent smoking persistence, particularly among young males.

CONCLUSION

Our study provides evidence of the relatively high smoking persistence among young Indonesian males. This study also showed several sociodemographic factors related to smoking, including older age, those who started smoking at high school, having an occupation, and young males with less educational background. We also highlighted the importance of family factors in smoking persistence, i.e., being poor and having a household head who smokes or is not married also increased smoking persistence. Therefore, an effective and comprehensive intervention to prevent smoking initiation, particularly among high school students, while simultaneously implementing a community-based anti-smoking policy might be a useful method for reducing smoking prevalence in Indonesia. As our findings also revealed the importance of access to media, specifically the internet, on smoking persistence, an educational campaign targeting high-school students and their families through online media is an important step in reducing smoking persistence in Indonesia.

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DISCLAIMER

The content is solely the authors' responsibility and does not necessarily represent the official views of Universitas Sebelas Maret.

CONFLICT OF INTEREST STATEMENT

None declared.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The Indonesian Demographic and Health Survey (DHS) took informed consent from respondents before administering the questionnaire. We obtained permission to use the data for the present study from the DHS program. Ethical approval was also obtained from Universitas Sebelas Maret Ethics Review Board.

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