ORIGINAL RESEARCH ARTICLE

What is the most influential factor associated with youth smoking in Bantul Indonesia?

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Abstract

Smoking is one of the risk factors for non-communicable diseases. Smoking worsens a person's health and can even cause death. This smoking behaviour is primarily initiated in adolescence. The aim of this study was to identify the determinants of youths' smoking behaviour. The design of this study is cross-sectional, with a sample size of 368 youths (aged 15 to 24 years) in Bantul Regency, Special Region of Yogyakarta, Indonesia. The sampling technique used is multistage random sampling. The statistical test used is logistic regression. This study showed that 67.9% of the sample were smokers. The results of the logistic regression test show that gender, occupational, attitudes and the role of peers have a significant effect on the smoking behaviour of youths. From our findings, gender is the most influential variable, in terms of having the highest odds ratio, on youth smoking behaviour. *(Afr J Reprod Health 2024; 28 [10s]: 141-151).*

Keywords: Youth, behaviour, determinants, smoking, Indonesia

Résumé

Le tabagisme est l'un des facteurs de risque de maladies non transmissibles. Le tabagisme détériore la santé d'une personne et peut même entraîner la mort. Ce comportement tabagique s'initie principalement à l'adolescence. Le but de cette étude était d'identifier les déterminants du comportement tabagique des jeunes. La conception de cette étude est transversale, avec un échantillon de 368 jeunes (âgés de 15 à 24 ans) dans la régence de Bantul, région spéciale de Yogyakarta, en Indonésie. La technique d'échantillonnage utilisée est l'échantillonnage aléatoire à plusieurs degrés. Le test statistique utilisé est la régression logistique. Cette étude a montré que 67,9 % de l'échantillon étaient des fumeurs. Les résultats du test de régression logistique montrent que le sexe, la profession, les attitudes et le rôle des pairs ont un effet significatif sur le comportement tabagique des jeunes. D'après nos résultats, le sexe est la variable la plus influente, en termes de rapport de cotes le plus élevé, sur le comportement tabagique des jeunes. *(Afr J Reprod Health 2024; 28 [10s]: 141-151).*

Mots-clés: Jeunesse, comportement, déterminants, tabagisme, Indonésie

Introduction

Smoking behaviour is a public health issue that continues to be explored. Smoking is one of the risk factors for non-communicable diseases, such as lung cancer[1–4]. Smoking affects the maximum oxygen capacity in the lungs[5], while each individual needs adequate oxygen capacity for each activity. Some studies state that smoking e-cigarettes are less toxic than smoking tobacco, but that does not mean e-cigarettes are not free from harmful effects[6]. Nevertheless, acute smoking of e-cigarettes increases blood pressure, causes endothelial dysfunction, and increases oxidative stress of blood vessels and the brain[7]. Smoking is also a risk factor for cardiovascular disease[8,9], such as coronary heart disease[8,10], hypertension[11–13], and stroke[14]. In studies conducted on women, tobacco consumption is significantly related to the occurrence of anemia[15].

Smoking culture in Indonesia influences a person's masculinity and becomes an economic and health problem. Masculinity is the attributes assumed to characterize men, such as being handsome and muscular[16]. Smoking culture has become a culture among adult men, including women. However, over time, this culture penetrated among teenagers, even minors[17]. Tobacco use and second-hand smoke exposure are common among

adolescents in low- and middle-income countries[18]. Adolescent smoking experiments or trials attributed to peers[19–21] and the motivations of individual and social relationships[19,21], whereas the number of classmates who smoked and their attitudes toward tobacco control policies were predictors of adolescents smoking[19]. Other findings say that parental influence is more dominant than peer influence regarding smoking initiation[22]—parents as role models[18,21,23,24]. Government policies protecting youth, such as smoke-free public areas, are not always enforced[25]. Teenagers are still exposed to advertisements for tobacco products online, even fun and incredible promotions. Tobacco product advertising regulations do not adequately protect adolescent health[26]. Some studies show no relationship between knowledge and teenage smoking behaviour, even though we know that knowledge is the basis of a person's behaviour [27,28]. Health professionals should actively participate in creating smoke-free communities, consistently working to prevent smoking initiation among early adolescents[29]. Indonesia experienced an increase in the prevalence of youth smokers between 2018 and 2023, 17.65% in 2018[30] and 23.58% in 2023[31]. The special region of Yogyakarta has experienced an adverse trend in youth tobacco use, with proportions increasing from 15.17% in 2017[32], to 16.86% in 2019[33], and reaching 20.06% in 2021[34]. This situation makes adolescents the center of non-communicable disease control efforts[35]. The aim of this study was to identify the determinants of youths' smoking behaviour in Bantul Regency, Special Region of Yogyakarta, Indonesia.

Methods

Study's population and the study's analytical sample

This study is quantitative research with a cross-sectional approach. The study population was 130,675 people for young people (15-24 years)[36]. The study's analytical sample was calculated as 368 young people aged 15 to 24 years, using a multistage random sampling technique and the Lemeshow
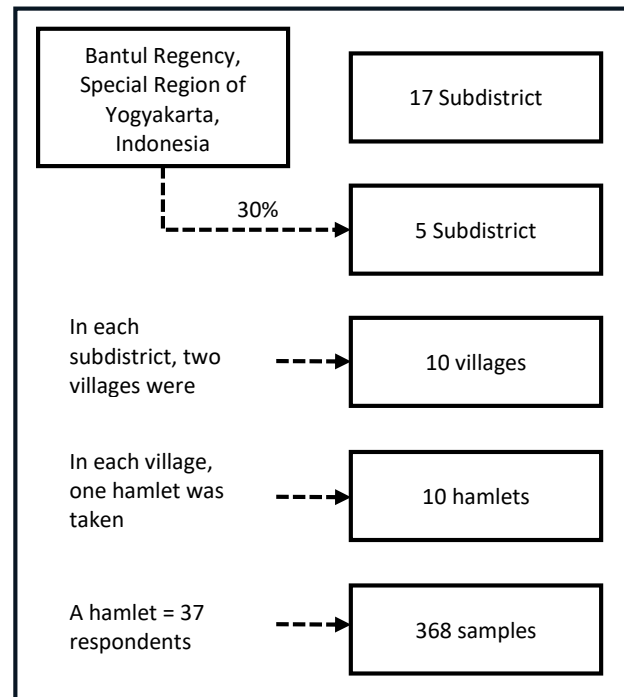

Figure 1: Sampling technique with multistage random sampling

simple random sampling formula as a guide. This is described in Figure 1.

Bantul Regency has 17 sub-districts. Based on the researcher's ability, 30% (5 sub-districts were selected). Each sub-district had an average of four villages, and two villages per sub-district were chosen randomly. Each village, on average, has 12 hamlets, and then one Dusun per village was randomly selected. Finally, 37 youths were randomly chosen from an average of 140 people per dusun. Some questionnaires were incomplete during the data collection process, so we ensured that at least the minimum sample size was met, i.e. 368.

Measures

Outcome/dependent variable

The dependent variable of this study is the smoking behaviour of youths, which is defined as smoking every day or occasionally in the last month, with at least one cigarette a day. A questionnaire was used to measure this variable. We used closed-ended

questions with two response options (smoker and non-smoker). We followed up by asking if the respondent smoked in the last 24 hours to clarify the answers given. Smoking behaviour was categorised as smoking.

Explanatory/independent variable

This study used four independent variables: knowledge, attitude, family role, and peer role. We measured the four independent variables using a questionnaire. We define knowledge as the sum of all the information that young people have about the contents of cigarettes and the dangers of smoking. The knowledge variable was assessed through a true/false questionnaire. An attitude is a tendency to either prefer or disapprove of smoking among young people. We used a Likert scale with four response options – strongly agree, agree, disagree or strongly disagree – to assess the attitudes of youth towards smoking behaviour. The role of the family is to control youth smoking behaviour, and this is achieved through various efforts made by parents and other family members. Peers play a significant role in influencing youth to smoke. The influence of family and peers was measured with a Likert scale that had five response options: always, often, sometimes, rarely, and never. We categorised each independent variable into two categories: not good and not a good fit for the knowledge level, positive and negative for attitude, not playing a role and playing a role for family role, and not playing a role and playing a role for peer role.

Confounders

This study considered four variables as confounders: age, gender, highest education completed, and youth occupation. The variables were measured using open-ended entries in the questionnaire and categorised as follows: age (15-19 years and 20-24 years), gender (male and female), highest education completed (primary school and secondary school and above), and occupation (student and worker).

Statistical analyses methods

We used descriptive statistics, bivariate, and multivariate analysis to analyse the data. Descriptive statistics are presented as frequency counts and percentages for all variables. We used chi-square tests in our bivariate analysis to assess the relationships between confounding variables (age, gender, highest education completed, and occupation) and independent variables (knowledge, attitudes, family roles, and peer roles) and smoking behaviour as the dependent variable.

The chi-squared test results show that we must follow up on all variables related to the dependent variable with multivariate analysis. We used a logistic regression test for the multivariate analysis. We used a stepwise logistic regression test to find the best model and identify the variables that most influence smoking behaviour. The statistical significance level for the bivariate and multivariate logistic regression tests was set at $p< 0.05$. The author asserts that confounding variables exist in this study, including age, gender, highest education completed, and occupation. The authors will use three stages to obtain a suitable logistic regression model. Any insignificant independent variables are removed from the model until the best one is found. The third model is the best model. The author uses IBM SPSS Statistics 27 as the software tool for data analysis. The data collection process begins with explaining the study's purpose, benefits, procedures, potential risks, and obtaining written consent to the adolescent participants. For those under 18, parental consent is required. Participants are informed of their right to withdraw at any time without consequences. Their identities will be anonymized, and all data will be kept confidential. This thorough process ensures the collection of valid and reliable data to meet the research objectives.

Results

Data collection in this study has been carried out on youths aged 15-24 years, a total of 368 people. The results of the analysis are presented as follows:

Descriptive statistics results

The results of the descriptive statistics are summarized in Table 1. Table 1 presents the frequency and percentage of each variable.

Table 1: Results of descriptive statistics on youths in Kabupaten Bantul, Special Region of Yogyakarta, Indonesia

No	Variable	Frequency	Percentage (%)
1	Age		
	20-24 years	185	50.3
	15-19 years	183	49.7
2	Gender		
	Boy	210	57.1
	Girl	158	42.9
3	Highest education completed level		
	Secondary level school and above	239	64.9
	Primary school	129	35.1
4	Occupational category		
	Worker	153	41.6
	Student	215	58.4
5	Knowledge Level		
	Not good	103	28.0
	Good	265	72.0
6	Attitude		
	Positive	183	49.7
	Negative	185	50.3
7	Family roles		
	Don't play a role	174	47.3
	Play a role	194	52.7
8	Peer Roles		
	Play a role	171	46.5
	Don't play a role	197	53.5
9	Smoking behaviour		
	Smoking	118	32.1
	No Smoking	250	67.9
Total		368	100.0

Based on Table 1, 50.3% of our respondents were aged 20-24 years and above, i.e. 57.1%. Most respondents completed their education at the secondary school level and above, i.e. 64.9%. A total of 58.4% of the respondents were students, and the rest were workers. Most respondents had good knowledge about the content of cigarettes and the dangers of smoking, at 72%. The percentage of respondents who had a positive and negative attitude towards smoking was almost the same, at 49.7% and 50.3%. This was also the case with the family role variable, which was 47.3% and 52.7%. A total of 53.5% of respondents stated that peers did not play a role in smoking behaviour, while 46.5% stated that they did not play a role. A total of 67.9% of respondents in this study were non-smokers, while the remaining 32.1% were smokers.

Bivariate analysis

Bivariate analysis in this study used the Chi-Square Test to determine the relationship between confounder (age, gender, highest education completed level, occupational) and independent variables (knowledge, attitude, family role, and peer role variables) with youths smoking behaviour. The results of the analysis are presented in Table 2.

The cross-tabulation results in Table 2 reveal that smoking is most prevalent among respondents aged 20-24 years, predominantly boy, with secondary education and above, worker, knowledgeable, and having a positive attitude towards smoking. Additionally, these individuals often come from families with a limited role in their lives and have peers who influence their smoking behaviour. Notably, respondents with good knowledge about smoking showed higher smoking rates compared to their less knowledgeable counterparts. However, the only variable not significantly related to smoking behaviour is the highest level of education completed, indicated by a p-value of 0.209. This variable acts as a confounding factor. In contrast, other variables such as age, gender, occupation, knowledge, attitude, family roles, and peer influences demonstrate significant correlations with smoking behaviour.

Multivariate logistic analysis

Table 3 shows unadjusted OR compared to adjusted OR generated from logistic regression tests. Based on Table 3, we can compare the resulting OR between unadjusted and adjusted OR. The best model resulting from the multivariate test is model 4. In model 4, it is known that four variables are psychologically related to smoking behaviour, namely gender (p-value <0.001, OR 44.913, CI95% 5.786-348.660), occupational (p-value <0.01, OR 3,023, CI95% 1.174-6.198), attitude (p-value

Table 2: Relationship between determinants of smoking behaviour and youths' smoking behaviour based on Chi-Square analysis

No	Variable	Variable Categories	Smoking behaviour		p-value
			Smoking	No smoking	
1	Age	20-24 years	80 (67.8%)	105 (42.0%)	<0.001
		15-19 years	38 (32.2%)	145 (58.0%)	
2	Gender	Boy	117 (99.2%)	93 (37.2%)	<0.001
		Girl	1 (0.8%)	157 (62.8%)	
3	Highest education completed level	Secondary school and above	82 (69.5%)	157 (62.8%)	0.209
		Primary school	36 (30.5%)	93 (37.2%)	
4	Occupational	Worker	70 (59.3%)	83 (33.2%)	<0.001
		Student	48 (40.7%)	167 (66.8%)	
5	Knowledge	Not good	58 (49.2%)	45 (18.0%)	<0.001
		Good	60 (50.8%)	205 (82.0%0	
6	Attitude	Positive	112 (94.9%)	71 (28.4%)	<0.001
		Negative	6 (5.1%)	179 (71.6%)	
7	Family roles	Don't play a role	96 (81.4%)	78 (31.2%)	<0.001
		Play a role	22 (18.6%)	172 (68.8%)	
8	Peers' roles	Play a role	108 (91.5%)	63 (25.2%)	<0.001
		Don't play a role	10 (8.5%)	187 (74.8%)	
Total			118 (100%)	250 (100%)	

<0.001, OR 14.172, CI95% 5.222-38.457), and peers' roles (p-value <0.001, OR 6.625, CI95% 2.809-15.621). All ORs have positive values, meaning all variables positively relate to youth smoking behaviour. Compared to unadjusted OR, the OR result of multivariate has changed; namely, there is a decrease in value because the test was carried out to calculate the role of all variables in influencing smoking behaviour. The variable that most affects smoking behaviour is gender, followed by attitude variables, peer roles, and the last is occupational. The pseudo-R-Square generated in model 4 is 0.713, which shows that the variables in model 4 (gender, occupational, attitude, peers' roles) can explain youth smoking behaviour by 71.3%.

Discussion

This study aimed to identify the determinants of youths' smoking behaviour in Bantul Regency, Indonesia. Smoking has become a culture for adult men, including women. Nowadays, it has spread to teenagers, even including teenage girls. The age of daily smoking is reported to be primarily in the age range of youths[17]. Efforts to protect adolescents from

the influence of tobacco must continue, one of which is by knowing the determinants of youths' smoking behaviour along with the determinants that play the most role. This study used logistic regression tests to assess the influence of determinants of youths' smoking behaviour. Through this test, which determinants are most influential on youth smoking behaviour? The following determinants had statistically significant associations with the smoking behaviour of youths in Bantul Regency, Indonesia: gender, occupation, attitude, and peer role.

The findings in this study indicate that gender has a significant and positive relationship with youths' smoking behaviour. These results are consistent with the findings of other related studies[37–40]. Gender was the most influential variable on smoking behaviour in the present study. The proportion of male smokers in this study was higher than that of females. Boys in Indonesia are experiencing a rapidly increasing prevalence of smoking within their social circles[41]. The higher risk of adolescent boys compared to girls is due to the stigmatization of female smokers in Indonesia[37]. Other studies suggest that gender does not have a

Table 3: Relationship between determinants of smoking behaviour and youths' smoking behaviour based on Multivariate Logistic Regression analysis

Variable	Unadjusted OR	Adjusted OR Model 1	Model 2	Model 3	Model 4	Model 5
Smoking behaviour						
Family Roles						
Play a role	[1,1]	[1,1]				
Don't play a role	9.622	1.057				
	(5.636-16.429)	(0.447-2.496)				
Highest education level						
Primary school	[1,1]	[1,1]	[1,1]			
Secondary school and above	1.349	0.569	0.568			
	(0.845-2.155)	(0.237-1.369)	(0.236-1.366)			
Age						
15-19 years	[1,1]	[1,1]	[1,1]	[1,1]		
20-24 years	2.907	1.853 (0.749-	1.867	1.513		
	(1.834-4.608)	4.584)	(0.761-4.581)	(0.660-3.469)		
Knowledge						
Good	[1,1]	[1,1]	[1,1]	[1,1]	[1,1]	
Not good	4.404	1.963	1.980	2.015	1.987	
	(2.714-7.146)	(0.913-4.217)	(0.933-4.203)	(0.953-4.258)	(0943-4.184)	
Gender						
Girl	[1,1]	[1,1]	[1,1]	[1,1]	[1,1]	[1,1]
Boy	197.516***	41.946***	42.271***	45.038	48.934***	44.913***
	(27.136-1437.672)	(5.356-328.494)	(5.414-330.055)	(5.724-354.364)	(6.125-390.941)	(5.786-348.660)
Occupational						
Student	[1,1]	[1,1]	[1,1]	[1,1]	[1,1]	[1,1]
Worker	2.934*	2.613*	2.627*	2.484	3.088**	3.023**
	(1.867-4.610)	(1.100-6.205)	(1.111-6.212)	(4.065-5.791)	(1.498-6.365)	(1.474-6.198)
Attitude						

Negative	[1,1]	[1,1]	[1,1]	[1,1]	[1,1]	[1,1]
Positive	47.061***	11.819***	12.010***	11.509	11.975***	14.172***
	(19.794-111.892)	(4.154-33.628)	(4.348-33.173)	(4.188-31.625)	(4.373-32.794)	(5.222-38.457)
Peers' roles						
Don't play a role	[1,1]	[1,1]	[1,1]	[1,1]	[1,1]	[1,1]
Play a role	32.057***	6.228***	6.330***	6.030	6.184***	6.625***
	(15.793-65.072)	(2.500-15.519)	(2.630-15.237)	(2.520-14.427)	(2.589-14.772)	(2.809-15.621)
Pseudo R-Squared		0.724	0.724	0.721	0.719	0.713

Exponentiated coefficients (OR); 95% confidence intervals inside the curve
*p<0.05, **p<0.01, ***p<0.001

direct effect on teenage smoking vulnerability but through the mediator variable, which is the number of friends who smoke[39]. In addition, boys from lower educational backgrounds, where paternal behaviour and parental control are less strict, may lead to higher smoking rates[42].

The following finding of this research is the respondents' occupation. The researcher differentiated the respondents' occupations into students and workers. The results of the analysis show that occupation is significantly and positively related to the smoking behaviour of youths. A student has money from their parents, while a worker already has their income. A worker can spend money on cigarettes, even reducing the amount spent on food. This condition occurs in low, middle, and high-income families.[43]. As this study shows, a worker is 44.9 times more likely to smoke than a student. Another study in Indonesia stated that male adolescents who were heavy smokers identified in the survey were employed[44].

This study's findings also showed a significant relationship between youth attitudes and smoking behaviour in Bantul Regency. Attitudes are feelings or opinions about something, especially if seen in the person's behaviour[45], like smoking. Like the results of this study, other studies also state that attitude is related to a person's smoking status. A study found that most people who had never smoked or were former smokers had a positive attitude towards anti-smoking statements[46].

The study also found a significant relationship between peer roles youth smoking behaviour in the Bantul district. A peer is someone of the same age or social position as others in a group[47]. Teenagers are at risk of starting or trying to smoke around age 18-19[48]. Older teens have a higher chance of smoking than younger ones. Peer influence and peer selection influence adolescent smoking behaviour. The role of good friends and friends is enormous in teenage smoking behaviour[49]. Peers' association[50], peers' pressure[51], and peer conformity[52] influence a youth's smoking behaviour. Friends who smoke influence youth smoking behaviour[21,24,53–55]. Teens who have nonsmoker peers tend to be more prone to resisting smoking

behaviour[56]. A study states that friends' smoking behaviour is the most potent factor in adolescent smoking behaviour[46]. Smoking is becoming a social habit among teenagers[24].

This research only covered 30% of all available sub-districts in Bantul Regency. Future research should be more extensive, with a larger sample size. In addition, gender-related issues need to be addressed in Indonesia, including the monitoring of smoking prevalence and the perceived social benefits of smoking[41]. In order to develop effective interventions for male adolescents, research needs to be conducted specifically on male adolescents to assess the determinants that influence them to smoke.

Conclusion

In conclusion, this study revealed that gender, occupation, attitude, and peer role are determinants of smoking behaviour among adolescents. Gender was the most influential variable on adolescent smoking behaviour. Findings from this study revealed that certain genders are synonymous with smoking behaviour. Especially in Bantul Regency, youth who smoke are primarily male. Policymakers and youth smoking control should pay attention to this finding that male youth are at risk of becoming smokers or maintaining their smoking behaviour.

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Contribution of authors

Marsiana Wibowo: Conceptualization, design, data collection and analysis and manuscript editing
Ahmad Ahid Mudayana: collected and analysed the data
Ira Nurmala: reviewed empirical studies and manuscript reviews.

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