



# Tobacco Consumption Among Young Population in Rural Indonesia: Prevalence and Associated Factors

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## Abstract

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**BACKGROUND:** Tobacco consumption among youths is increasing in Indonesia and other middle-income countries. In rural areas, its prevalence is even higher compared to urban settings. Understanding the extent and associated factors of tobacco consumption within this population are essential to inform the formulation of appropriate prevention and control strategies.

**AIM:** This study aims at analyzing the prevalence and associated factors of tobacco consumption among the young population living in rural Indonesia.

**METHODS:** Data were obtained from Indonesia Family Life Survey wave 5 (IFLS-5). Two thousand seven hundred and eighty-six (2786) responses from respondents aged 15–24 years and living in rural areas were analyzed. Binary logistic regression was used to examine the association between tobacco consumption with the predictors.

**RESULTS:** The prevalence of tobacco consumption among youths in rural Indonesia was 26.5%. Binary logistic regression discovered that factors significantly associated with tobacco consumption among young population were aged 20–24 years (AOR = 4.760, 95% CI: 3.557–6.368), less educated (AOR = 5.988, 95% CI: 3.193–11.229), being married (AOR = 2.484, 95% CI: 1.631–3.782), and having smoking parent (AOR = 1.346, 95% CI: 1.016–1.783). Young males had a much higher tobacco use prevalence (57.1%), whereas females had significant negative association with tobacco consumption (AOR = 0.001, 95% CI: 0.000–0.002).

**CONCLUSION:** Many youths in rural Indonesia were identified to have tobacco-use behavior. Appropriate prevention and control strategies are needed to address the population groups identified in this study. Policymakers should anticipate challenges that may occur resulting from geographical and cultural differences.

## Introduction

Tobacco use is a major issue in most middle-income nations, including Indonesia. Smoked and smokeless tobacco consumption has been globally known to negatively impact health, some of which are causing chronic obstructive pulmonary disease, cancer, heart disease, and stroke [1]. Smokers have a higher risk of premature death than non-smokers [2]. In 2015, the number of smokers in Indonesia was estimated to reach almost 100 million, and thus the prevalence of smoking was the highest among South-east Asian nations [3]. Nearly, 2 million cases of illness related to tobacco use and 230,862 tobacco-related mortality were reported [4]. Among the young population aged 15–24 years, the prevalence of tobacco use in Indonesia is also high [5], [6]. Data from the Global Youth Tobacco Survey in 2014 showed that 36.2% of boys and 4.3% of girls in Indonesia were smokers [7]. The Ministry of Health of the Republic of Indonesia reported that the prevalence of smoking among youths increased by 1.9% between 2013 and 2018 [8].

The increasing tobacco consumption trend among youths also occurs in other developing countries such as India and Nigeria [9], [10]. This phenomenon demonstrates that tobacco consumption among the young population deserves more attention, since a young age, smoking initiation has been identified as one of the main drivers of being a regular smoker in adulthood [11]. Further, the urgency to reduce the prevalence of youth tobacco consumption in Indonesia has been emphasized since this country is currently experiencing a demographic bonus phenomenon where the number of young citizens is greater than the elderly population [12].

The previous studies in Indonesia found that the prevalence of youth tobacco consumption is higher in rural areas [6], [13]. People living in rural areas of Indonesia experience significant disparities in health services and socio-economic opportunities compared to those living in urban settings [14], [15], [16]. These disparities have put people living in rural areas as a disadvantaged population. Therefore, understanding the factors associated with tobacco-use behavior are critical for identifying high-risk populations, informing

government policy, and designing effective smoking cessation programs. Prior studies have shown that age, sex, level of education attained, marital status, religion, ethnicity, access to the internet, and parental smoking behavior influence tobacco use in youths [13], [17], [18], [19], [20], [21]. In light of the above, this study investigates the prevalence and associated factors of tobacco consumption among the young population in rural areas of Indonesia.

## Methods

### Data

This study utilized the data of Indonesia Family Life Survey wave 5 (IFLS-5) [22]. The survey incorporates answers from over 30,000 respondents living in 13 of Indonesia's 27 provinces, representing 83% of the Indonesian population. The survey was fielded between 2014 and 2015 with a multistage stratified sampling design [22]. Although the IFLS was a longitudinal survey, only the most recent wave was utilized to cross-sectionally investigate the association between tobacco consumption and pertinent risk variables. In this study, the sample was restricted to a young population aged 15–24 living in rural areas of Indonesia. The IFLS data are available on the RAND Corporation website ([www.rand.org](http://www.rand.org)).

### Variables

The dependent variable of this study was tobacco consumption by youth living in rural areas. This variable was assessed by asking, "Have you ever had the habit of chewing tobacco, smoking pipe tobacco, self-rolled tobacco, or smoking cigarettes/cigars?" The answer to this question was dichotomous "yes" or "no." The responses were coded "1" for "yes" and "0" for "no."

The explanatory variables were chosen based on the current literature, which identifies age, sex, level of education attained [6], [13] marital status [17], religion [18], ethnicity [20], access to the internet [21], and parental smoking behavior [23] as an important risk factor. To meet the requirements for binary logistics regression, all the independent variables were transformed into categorical ones.

### Analysis

Before the analysis, variance inflation factors were used to evaluate potential multicollinearity between variables, and none of them surpassed the threshold value. The association between tobacco consumption

and each selected indicator was assessed using bivariate measures of association. Logistic regression was then used to assess the relationship between tobacco use and selected dependent variables. In all cases, associations were considered to be significant at 5%. Variables that showed significant correlation in the bivariate analysis were taken into binary logistics regression. Both crude odds ratio (COR) and adjusted odds ratio (AOR) were reported along with their 95% confidence intervals (CIs). All statistical tests were conducted using IBM SPSS 25 ([www.ibm.com/analytics/spss-statistics-software](http://www.ibm.com/analytics/spss-statistics-software)).

### Ethics approval

The ethical clearance was granted by International Review Boards (IRBs) in the United States and Universitas Gadjah Mada in Indonesia [22].

## Results

The selection criteria yielded 2786 observations ( $n = 2786$ ). The proportion of the age of respondents was relatively balanced. The number of female respondents was slightly higher (54.0%) than male respondents (46.0%). Participants from senior high school education were the highest in quantity (47.8%). The most of the respondents were not yet married (62.0%), Islam (87.7%), Javanese (38.1%), had internet access (65.5%), and had smoking parents (67.5%).

The bivariate analysis showed a significant association between tobacco consumption and age, sex, education attained, marital status ( $p < 0.001$ ), religion, internet access, and the presence of smoking parents ( $p < 0.05$ ). Ethnicity was the only explanatory variable that showed an insignificant association with tobacco consumption. Respondents' characteristics and the result of the bivariate analysis are served in Table 1.

In the adjusted model, binary logistic regression results showed a significant positive association between tobacco consumption with the older age group (20–24), lower level of education, being married, and having a smoking parent. Whereas significant but negative correlation was found between young females and tobacco use behavior.

On the other hand, religion and internet access were found not significant. Table 2 presents crude and adjusted odds ratios derived from logistic regression between tobacco consumption among youth in rural areas of Indonesia with all explanatory variables.

**Table 1: Characteristics and prevalence of tobacco consumption among youth in rural areas (n = 2786)**

Variable	n (%)	Tobacco consumption status		$\chi^2$
		No, n (%)	Yes, n (%)	
Age				
15–19	1427 (51.2)	1149 (80.5)	278 (19.5)	73.095 <sup>a</sup>
20–24	1359 (48.8)	900 (66.2)	459 (33.8)	
Sex				
Male	1281 (46.0)	550 (42.9)	731 (57.1)	1142.100 <sup>a</sup>
Female	1505 (54.0)	1499 (99.6)	6 (0.4)	
Education				
University	227 (8.1)	183 (80.6)	44 (19.4)	19.507 <sup>a</sup>
Senior high school	1333 (47.8)	995 (74.6)	338 (25.4)	
Junior high school	834 (29.9)	614 (73.6)	220 (26.4)	
Elementary	392 (14.1)	257 (65.6)	135 (34.4)	
Marital status				
Not yet married	1727 (62.0)	1216 (70.4)	511 (29.6)	25.835 <sup>a</sup>
Married	1027 (36.9)	812 (79.1)	215 (20.9)	
Divorced	32 (1.1)	21 (65.6)	11 (34.4)	
Religion				
Other	103 (3.7)	61 (59.2)	42 (40.8)	13.209 <sup>a</sup>
Catholic	22 (0.8)	14 (63.6)	8 (36.4)	
Protestant	100 (3.6)	73 (73.0)	27 (27.0)	
Hindu	119 (4.3)	92 (77.3)	27 (22.7)	
Islam	2442 (87.7)	1809 (74.1)	633 (25.9)	
Ethnicity				
Other	845 (30.3)	610 (72.2)	235 (27.8)	5.437
Batak	119 (4.3)	94 (79.0)	25 (21.0)	
Chinese	105 (3.8)	75 (71.4)	30 (28.6)	
Sasak	129 (4.6)	93 (72.1)	36 (27.9)	
Balinese	138 (5.0)	104 (75.4)	34 (24.6)	
Madurese	95 (3.4)	75 (78.9)	20 (21.1)	
Sundanese	280 (10.1)	201 (71.8)	79 (28.2)	
Javanese	1061 (38.1)	786 (74.1)	275 (25.9)	
Toraja	14 (0.5)	11 (78.6)	3 (21.4)	
Access to internet				
No	961 (34.5)	732 (76.2)	229 (23.8)	5.193 <sup>c</sup>
Yes	1825 (65.5)	1317 (72.2)	508 (27.8)	
Having smoking parent				
No	906 (32.5)	693 (76.5)	213 (23.5)	5.980 <sup>c</sup>
Yes	1880 (67.5)	1356 (72.1)	524 (27.9)	

<sup>a</sup>p < 0.001, <sup>b</sup>p < 0.01, <sup>c</sup>p < 0.05.

## Discussion

This study found that the prevalence of tobacco consumption among the young population living in rural areas of Indonesia was 26.5%. The older age group (20–24 years) was shown to have a

**Table 2: Logistic regression between explanatory variables and tobacco consumption among youth in rural areas in Indonesia (n = 2786)**

Variable	COR	95% CI		AOR	95% CI	
		Lower	Upper		Lower	Upper
Age						
15–19 (reference)	1	1	1	1	1	1
20–24	2.108 <sup>a</sup>	1.774	2.505	4.760 <sup>a</sup>	3.557	6.368
Sex						
Male (reference)	1	1	1	1	1	1
Female	0.003 <sup>a</sup>	0.001	0.007	0.001 <sup>a</sup>	0.000	0.002
Education						
University (reference)	1	1	1	1	1	1
Senior high school	1.413	0.994	2.008	2.303 <sup>b</sup>	1.393	3.808
Junior high school	1.490 <sup>c</sup>	1.036	2.143	2.788 <sup>a</sup>	1.633	4.759
Elementary	2.185 <sup>a</sup>	1.480	3.225	5.988 <sup>a</sup>	3.193	11.229
Marital status						
Not yet married (reference)	1	1	1	1	1	1
Married	0.630 <sup>a</sup>	0.525	0.756	2.484 <sup>a</sup>	1.631	3.782
Divorced	1.246	0.597	2.604	2.549	0.421	15.975
Religion						
Other (reference)	1	1	1	1	1	1
Catholic	0.830	0.320	2.153	1.456	0.410	5.166
Protestant	0.537	0.297	0.970	0.889	0.378	2.092
Hindu	0.426 <sup>b</sup>	0.238	0.763	0.669	0.295	1.518
Islam	0.508	0.340	0.761	0.854	0.454	1.609
Access to internet						
No (reference)	1	1	1	1	1	1
Yes	1.233 <sup>c</sup>	1.030	1.477	0.976	0.720	1.323
Having smoking parent						
No (reference)	1	1	1	1	1	1
Yes	1.257 <sup>c</sup>	1.046	1.511	1.346 <sup>c</sup>	1.016	1.783

<sup>a</sup>p < 0.001, <sup>b</sup>p < 0.01, <sup>c</sup>p < 0.05. COR: Crude odds ratio, AOR: Adjusted odds ratio, CI: Confidence interval.

statistically significant positive association with tobacco consumption compared to the 15–19 age group. This finding is consistent with the previous studies on the young population in Indonesia and Nepal, which showed that the 20–24 age group had a higher smoking proportion [6], [24], [25]. This study's finding also confirms the 2014 Indonesia Global Youth Tobacco Survey results that found higher tobacco use prevalence among respondents aged 20–24 years compared to the 15–19 age group [7].

Young males were found to have a much higher prevalence of tobacco consumption (57.1%) than young females (0.4%). This finding confirms the results of the previous studies conducted in China, Nepal, and Ethiopia that discovered a significant correlation between tobacco use and male identity [3], [24], [26]. In the context of Indonesia, an earlier study denoted that for most young males in Indonesia, smoking is a symbol of masculinity and a medium to socialize with peers [27]. Offering a cigarette to a male friend is often the easiest way to start a conversation [25]. Sharing cigarettes are also seen as a symbol of solidarity among young males in Indonesia. Further, for a young male, peer influence is fundamental, and thus when he has smoking friends, it will be difficult for him to stop smoking [6].

On the other hand, this study's results demonstrated a significant negative association between tobacco consumption and young females living in rural areas in Indonesia. The fully adjusted model showed AOR = 0.001 with 95% CI: 0.000–0.002. This result means that a young female had a 99.9% probability of not having tobacco use behavior. The current phenomenon might be caused by the Indonesian rural population's characteristics that still practice strict cultural practices [16]. In Indonesian culture, smoking for young and adult women is considered inappropriate. Violation of this cultural norm is an embarrassment for her and her family. Hence, parents will be very strict with their daughters about not smoking to avoid the stigma, even if the father himself is a smoker. A similar result was found in Malaysia, where smoking prevalence among female adolescents was much lower than among male adolescents [28]. This result is anticipated because Indonesia and Malaysia are cognate countries with many cultural similarities.

Moreover, this study found a significant positive association (p < 0.001) between tobacco consumption with education level, where youths who have a low education level have a higher probability of having tobacco use behavior compared to youths from higher education group. Youths with elementary education had 5.988 of odds having tobacco use behavior (95% CI: 3.193–11.229) compared to youths who attend university as the reference category. This finding is in conjunction with the research results in Iran and India that found an elevated tobacco consumption prevalence among illiterate respondents and with low educational attainment [29], [30]. In individuals



with lower educational attainment, the capacity to comprehend the effects of tobacco use on health may be hindered. Education has been shown to significantly influence youths' knowledge and understanding of the dangers of tobacco consumption [31]. Formal education in schools is an effective medium for raising awareness of the disadvantages of tobacco consumption among students [32]. Individuals who have good educational attainment were found to have a higher level of health literacy. Although using education as the proxy for health literacy level may cause over or under-estimation, education is still regarded as the strongest predictor of health literacy [33]. On the other hand, disseminating information regarding the dangers of tobacco use through non-formal media is still needed to educate the young population who cannot attend school. Non-formal education has been reported to help reduce the prevalence of tobacco consumption in young people with low educational attainment [34].

This research found a significant positive association between tobacco consumption with married respondents. This result aligns with the results of studies in China and India which stated that the probability of having tobacco use behavior was higher in respondents who were married or living with a partner [35]. Similarly, a study in Malaysia found that tobacco consumption was more prevalent among the married population than among the unmarried and divorced groups [36]. On the other hand, an opposite result was found in South Korea, where unmarried or divorced men and women have a higher smoking prevalence than married ones [37]. While in Iraq, marital status was not correlated with smoking behavior in both men and women [38].

This study discovered that tobacco consumption was not associated with any religion in the fully adjusted model. This finding is in line with the previous studies' results which found no significant association between religion and tobacco consumption in England and Bangladesh [3], [18]. Although binary logistic regression showed statistically insignificant results, the COR and AOR indicated a negative association between tobacco consumption and religion in Indonesia. It means that religions were protective against tobacco use behavior. The literature showed that religion was negatively correlated with harmful practices to one's health, including smoking [39], [40]. In 2017, a study in Germany reported that individuals who did not affiliate themselves with any religion were 13–19% more likely to have tobacco use behavior than those who identified themselves as religious believers [39]. The Muslim perspectives on cigarettes heavily influenced Indonesia as the country with the world's largest Muslim community. The two largest Indonesian Muslim organizations, *Muhammadiyah* and *Nahdlatul Ulama*, had different fatwa. *Muhammadiyah* had called for abstention and issued a *haram* fatwa against cigarettes. *Nahdlatul Ulama* argued that smoking cigarettes are *makruh* (not desired but not prohibited). The absence of consensus

between these two Muslim bodies might have caused the attitude of young Muslims toward cigarette smoking to remain ambivalent [41]. Although all major religions, Islam, Catholic, Protestant, Hindu, and Buddha, are all opposed to smoking [18], the attitude toward tobacco use is much likely influenced by individuals' degree of religiosity, education attainment, and other socio-cultural factors.

The crude model revealed a significant positive association between internet access and tobacco consumption. However, in the fully adjusted model, the significance was attenuated. In the fully adjusted model, the odds ratio revealed an inverse, insignificant correlation, and meaning respondents with internet access had a lower probability of tobacco consumption. This phenomenon might be caused by the incessant anti-smoking campaigns on social media such as YouTube, Facebook, and Twitter which most of their users are teenagers and young adults. Earlier research indicated that web-based media could be an effective means of promoting smoking cessation [21].

Further, this study identified a significant correlation between tobacco consumption among youth in rural areas and the presence of a smoking parent. Youths whose parents are smokers are more likely to have tobacco-use behavior than youths whose parents are non-smokers. This result aligns with the previous research conducted in Indonesia and Korea that revealed a significant correlation between parental smoking status and adolescent smoking behavior [42], [43]. The present phenomenon is caused by the tendency for children to imitate their parents' behavior [44]. Therefore, children who grow up seeing their parents smoking could assume that smoking is normal and not harmful to health [45]. In Indonesia, this circumstance seems to happen mostly to young males since parents are more permissive to tobacco use by male children than females.

This study has strengths and limitations. At first, this study added to the literature regarding factors associated with tobacco-use behavior among the young population in rural areas of Indonesia using nationally representative data, which were gathered using an internationally recognized instrument. Further, this study examined the correlation between religion and ethnicities with tobacco consumption. Factors were not analyzed in the previous research on tobacco use in rural areas of Indonesia [25]. This information is essential for policymakers to formulate context-specific tobacco prevention and control strategies. Several limitations were also identified; first, this study was cross-sectional and thus unable to present a causal relationship between outcome and predictor variables. Second, several important factors such as peer influence, economic status, and attitude toward tobacco consumption were absent.

## Conclusion

The prevalence of tobacco consumption among the young population living in rural areas of Indonesia is higher in males (57.1%) than females (0.4%). This study has identified that low educational attainment, being in the age of 20–24, being married, and having smoking parents are the main drivers of tobacco use behavior. Whereas being female is a protective factor against tobacco consumption. Therefore, the tobacco control program in rural areas of Indonesia is suggested to focus on the young male population with these characteristics. Furthermore, given the high proportion of respondents who have access to the internet (65.5%), this study recommends intensifying the web-based anti-tobacco campaigns. A web-based anti-tobacco campaign could reach a wider audience, including people who live in remote and difficult-to-reach areas.

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