



CROSS-SECTIONAL STUDY ON FACTORS RELATED TO SMOKING BEHAVIOR IN BELAPUNRANGA AND BELABORI VILLAGES

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ABSTRACT

Smoking behavior remains a significant public health issue in Indonesia and contributes to the rising burden of non-communicable diseases. Various sociodemographic factors are known to influence smoking habits, including educational attainment, age, occupational type, and physical activity level. This study aims to examine the association between educational level, age, heavy physical activity, and occupational category with smoking behavior among the productive-age population in Belapunranga and Belabori Villages, Gowa Regency. A cross-sectional design was applied with 1,833 respondents selected through purposive sampling. Data were collected using a structured questionnaire and analyzed using the Chi-Square test. The findings show that the prevalence of smoking was 31.4%. Significant associations were found between educational level ($p = 0.037$), occupational category ($p = 0.000$), and heavy physical activity ($p = 0.000$) with smoking behavior. Individuals with lower educational backgrounds, those employed in the private sector, and those engaging in heavy physical activity were more likely to smoke. Meanwhile, age showed no statistically significant association ($p = 0.065$), although adults had the highest number of smokers descriptively. These results indicate that smoking behavior is more strongly influenced by social factors, workplace environment, and education level than by age alone. The findings are expected to serve as a basis for developing more effective and contextually relevant tobacco-control interventions.

Keywords: Smoking behavior; Educational attainment, Heavy physical activity

1. INTRODUCTION

Smoking behavior remains one of the most significant public health problems in Indonesia. Tobacco use is a major risk factor for various non-communicable diseases, including coronary heart disease, stroke, cancer, chronic obstructive pulmonary disease (COPD), and diabetes mellitus. Globally, tobacco consumption causes more than five million deaths each year and is projected to increase to ten million annual deaths if current trends do not decline substantially. Although WHO reports a global decrease in tobacco users from 1.38 billion in 2000

to 1.2 billion in 2024, tobacco is still consumed by one in five adults worldwide, accompanied by a growing use of electronic cigarettes with more than 100 million users globally. These data indicate that tobacco consumption remains a serious threat to public health.

In Indonesia, the health burden of smoking is reflected in its high prevalence. The Global Adult Tobacco Survey (GATS) 2021 reported 69.1 million tobacco users, with a disproportionately higher prevalence among men (65.5%) compared to women (3.3%). According to data from Statistics Indonesia (BPS) in 2024, 28.99% of individuals in the productive age group (15–64 years) were active smokers. Even more concerning is the increasing number of smokers among children and adolescents. The Global Youth Tobacco Survey (GYTS) 2019 documented a rise in smoking prevalence among individuals aged 13–15 years, from 18.3% to 19.2% (Reitsma et al., 2021). Furthermore, the Indonesia Health Survey (SKI) 2023 found that the highest proportion of smokers was among the 15–19 age group (56.5%), followed by the 10–14 age group (18.4%). These findings indicate that smoking behavior is increasingly emerging at younger ages, heightening the risk of long-term health consequences.

At the regional level, South Sulawesi Province continues to show a relatively high smoking prevalence. According to the Basic Health Research Survey (Riskesdas), the prevalence of smoking among individuals aged ≥ 10 years reached 20.9%, slightly lower than the national average of 23.7%. The current smoking prevalence in the province is 25.5%, and Gowa Regency ranks as the third-highest, with a prevalence of 23.6%. Smoking behavior is predominantly found among the productive age group of 25–64 years, although an increasing trend has also been observed among younger populations. In addition, nearly half of males aged ≥ 10 years are classified as daily smokers, with higher prevalence found among individuals with lower educational attainment and those residing in rural areas.

More specifically, data from Statistics Indonesia (BPS) in 2023 indicate that Gowa Regency has the highest proportion of smokers in the 15–24 age group, reaching 31.62%. This is followed by the 35–44 age group at 25.65% and the 55–64 age group at 18.98%. The high proportion of smokers within the productive-age population suggests that smoking has become an integral part of daily life in the region. This condition increases the risk of hypertension and other chronic diseases at a younger age.

Numerous factors are known to influence smoking behavior. Age is one of the key determinants, as adolescents and young adults tend to have a higher likelihood of smoking due to peer influence, social pressure, and identity-forming processes (Umur et al., n.d.). Educational attainment is also significantly associated with smoking behavior; individuals with lower education levels often have limited health literacy, making them more vulnerable to becoming smokers (Batam & Esmiralda, 2019). In addition, occupation and levels of physical activity play an important role (Easter Yanti et al., 2021). Jobs with high physical demands, such as laborers or farmers, tend to exhibit higher smoking prevalence, as cigarettes are often used for relaxation or embedded as part of workplace culture.

Given the high prevalence of smoking among the productive-age population and the various associated risk factors, research is needed to understand the relationship between these factors and smoking behavior at the local level. Such understanding is crucial, as smoking among individuals in their productive years can increase the burden of chronic diseases such as hypertension, ultimately affecting the quality of life and overall productivity of the community. Based on this overview, this study was conducted to examine the relationship between educational level, age, physical activity, and occupation with smoking behavior among the productive-age population in Belapunranga and Belabori Villages, Gowa Regency. These two

villages were selected because, to date, no empirical studies have specifically examined the determinants of smoking behavior among the productive-age population at the village level in this area. This research gap is particularly important given the increasing trend of smoking prevalence among individuals of productive age, both nationally and regionally. Understanding smoking behavior in these rural communities is therefore essential, as smoking has become increasingly embedded in daily life and may pose long-term health and productivity risks. The findings of this study are expected to provide locally relevant evidence that can support the development of more effective, targeted, and contextually appropriate tobacco control interventions in Gowa Regency.

2. METHODS

This study was conducted in Belapunranga and Belabori Villages, Gowa Regency, during the designated research period. A quantitative approach with a cross-sectional design was employed. The instrument used in this study was a structured questionnaire containing data on respondent characteristics and research variables. The population in this study consisted of all residents living in Belapunranga and Belabori Villages, with a total of 1,833 individuals. The study population consisted of all productive-age residents (15–64 years) living in Belapunranga and Belabori Villages. A total sampling technique was applied, in which all individuals who met the inclusion criteria were included as research respondents. Based on the available data, a total of 1,833 respondents met the criteria and were included in the analysis.

Data analysis consisted of univariate analysis to describe the distribution of each variable, followed by bivariate analysis using the Chi-Square (χ^2) test to assess the relationship between the independent variables and smoking behavior. The results were evaluated based on the significance value, with a p-value < 0.05 indicating a statistically significant association, while a p-value > 0.05 indicated no significant relationship.

3. RESULTS AND DISCUSSION

Univariate Results

Table 1. Distribution of Respondents Based on Latest Education Level, Age, Type of Occupation, Heavy Physical Activity, and Smoking Behavior

Variable	Categories	n	%
Age	Adolescents	174	9.5
	Adults	1568	85.5
	Elderly	91	5.0
Education Level	No Scholing	365	19.9
	Low	1342	73.2
	High	126	6.9
Occupation	Not Working	858	46.8
	Government employees/ contract workes	19	1.0
	Private sector workes	956	52.2
Physical Activity	Yes	744	40.6
	No	1089	59.4

Smoking Behavior	Smoker	576	31.4
	Non-Smoker	1257	68.6
Total		1833	100

(Source: Secondary Data, 2025)

Based on Table 1 the characteristics of the respondents demonstrate several notable patterns. Of the 1,833 respondents, the majority were within the adult age group, accounting for 1,568 individuals (85.5%). Meanwhile, adolescents comprised 174 respondents (9.5%), and older adults represented 91 respondents (5.0%). This distribution indicates that the sample was predominantly composed of individuals in the productive age range.

Regarding educational attainment, most respondents had a low level of education, with 1,342 individuals (73.2%) categorized in this group. A total of 365 respondents (19.9%) reported having no formal education, while only 126 respondents (6.9%) had attained a higher level of education. These findings suggest limited educational attainment within the study population, which may influence their knowledge and health-related behaviors. In terms of employment status, 858 respondents (46.8%) reported not working, while 956 respondents (52.2%) were employed in the private sector. Only 19 respondents (1.0%) worked in the government or as contract staff. This pattern indicates that the unemployed population and private-sector workers constituted the largest employment groups in this study. For the variable of heavy physical activity, 744 respondents (40.6%) reported engaging in heavy physical activity, whereas 1,089 respondents (59.4%) did not. This shows that the majority of respondents were not involved in high-intensity physical activities.

Finally, with respect to smoking behavior, 576 respondents (31.4%) were identified as smokers, while 1,257 respondents (68.6%) were non-smokers. Although most respondents did not engage in smoking behavior, the proportion of smokers remains considerable within the study population.

Bivariate Results

Table 2. Relationship Between Age and Smoking Behavior

Age	Smoking Behavior				Total	P Value
	Smoker		Non-smoker			
	n	%	n	%		
Adolescents	42	2.3	132	7.2	174	0.065
Adults	501	27.3	1067	58.2	1568	
Elderly	33	1.8	58	3.8	91	
Total	576	31.4	1257	68.6	1833	

(Source: Secondary Data, 2025)

Table 2 shows the relationship between age and smoking behavior among 1,833 respondents. Of the total respondents, 576 individuals were smokers and 1,257 were non-smokers. In the adolescent group, 42 individuals (2.3%) were smokers, while 132 were non-smokers. In the adult group, the number of smokers was substantially higher, with 501 individuals (27.3%) reporting smoking behavior and 1,067 reporting non-smoking status. Among older adults, 33 individuals (1.8%) were smokers, while 58 were non-smokers.

Statistical analysis yielded a p-value of 0.065, indicating that the association between age category and smoking behavior was not statistically significant.

Table 3. Relationship Between education Level and Smoking Behavior

Education Level	Smoking behavior				Total	P Value
	Smoker		Non - Smoker			
	n	%	n	%		
No Scholing	122	6.7	243	13.3	365	0.037
Low	427	23.3	915	49.9	1342	
High	27	1.5	99	5.4	126	
Total	576	31.4	1257	68.6	1833	

(Source: Secondary Data, 2025)

Table 3 shows the relationship between education level and smoking behavior among 1,833 respondents. Of the total respondents, 576 individuals were identified as smokers and 1,257 as non-smokers. The distribution by educational level indicates that individuals with no schooling had a smoking prevalence of 6.7%, those with low education had a prevalence of 23.3%, and those with higher education had a prevalence of only 1.5%. The statistical test yielded a p-value of 0.037, indicating a significant association between educational level and smoking behavior.

Table 4. Relationship between type of occupation and smoking behavior

Occupation	Smoking Behavior				Total	P Value
	Smoker		Non smoker			
	n	%	n	%		
Not Working	91	5.0	767	41.8	858	0.000
Government Employees /Contract Workers	3	0.2	16	0.9	19	
Private Sector Workers	482	26.3	474	25.9	956	
Total	576	31.4	1257	68.6	1833	

(Source: Secondary Data, 2025)

Table 4 shows the relationship between type of occupation and smoking behavior among 1,833 respondents. Of the total respondents, 576 individuals were identified as smokers, while 1,257 were non-smokers. In the unemployed group, 91 individuals (5.0%) were smokers and 767 were non-smokers. In the group of government or honorary workers, only 3 individuals (0.2%) were smokers, while 16 individuals were non-smokers.

Meanwhile, the private-sector worker group had the highest number of smokers, with 482 individuals (26.3%) reporting smoking behavior and 474 individuals reporting non-smoking status. The statistical test yielded a p-value of 0.000, indicating a significant association between type of occupation and smoking behavior.

Table 5. Relationship Between Heavy Physical Activity and Smoking Behavior

Physical Activity	Smoking Behavior				Total	P Value
	Smoker		Non Smoker			
	n	%	n	%		
Yes	378	20.6	366	20.0	744	0.000
No	198	10.8	891	48.6	1089	
Total	576	31.4	1257	68.6	1833	

(Source: Secondary Data, 2025)

Table 5 shows the relationship between heavy physical activity and smoking behavior among 1,833 respondents. Of the total respondents, 576 individuals were smokers and 1,296 were non-smokers. In the group engaged in heavy physical activity, 378 individuals (20.6%) were smokers and 366 were non-smokers. Meanwhile, in the group not engaged in heavy physical activity, the number of smokers was lower, with 198 individuals (10.8%) reporting smoking behavior and 891 reporting non-smoking status.

The statistical test yielded a p-value of 0.000, indicating a highly significant association between heavy physical activity and smoking behavior.

Relationship Between Educational Level and Smoking Behavior

An analysis of 1,833 respondents showed a significant association between educational level and smoking behavior ($p = 0.037$). A total of 576 respondents (31.4%) were smokers, while 1,257 (68.6%) were non-smokers. The prevalence of smoking was 6.7% among those with no schooling, increased to 23.3% among those with low education, and declined sharply to 1.5% among individuals with higher education.

These findings are consistent with Rusdani & Nopri Esmiralda (2019), who also reported a significant association ($p = 0.018$), indicating that lower educational attainment is associated with a higher likelihood of smoking due to limited health literacy, stronger smoking norms within the social environment, and restricted access to health information.

From a health behavior perspective, individuals with higher education generally possess better cognitive capacity and information literacy to understand long-term health risks, enabling more rational decision-making. These findings are consistent with Nkomo and Adanlawo (2024), who reported that lower educational attainment is significantly associated with a higher likelihood of smoking, as individuals with limited education tend to have lower health literacy, greater susceptibility to social and economic pressures, stronger pro-smoking norms within the family and social environment, and reduced access to accurate health information.

Relationship Between Age and Smoking Behavior

The results of this study show that adults had the highest smoking prevalence at 34.3%, followed by older adults at 30.4%, while adolescents had the lowest prevalence at 28.2%. However, statistical analysis indicated that these differences were not significant ($p = 0.065$), suggesting that age was not meaningfully associated with smoking behavior in this study population.

These findings differ from those reported by Elvi Juliansyah & Achmad Rizal (2017), who found that individuals under 18 years of age had a substantially higher likelihood of smoking ($OR = 6.176$). Adolescence is characterized as a developmental phase marked by identity exploration, strong peer influence, curiosity, and increased exposure to advertising and social pressures.

Differences across studies suggest that age-related smoking patterns are influenced by contextual factors. Family supervision and school social control have been shown to limit smoking behavior among adolescents (Hidayati & Arianto, 2024), whereas among adults, smoking is more closely associated with occupational stress and work-related psychosocial demands, including job strain and effort–reward imbalance, indicating its role as a coping mechanism (Kouvonen et al., 2005; Slopen et al., 2013).

Relationship Between Heavy Physical Activity and Smoking Behavior

Heavy physical activity was found to be significantly associated with smoking behavior, with a smoking prevalence of 20.6% among individuals engaged in heavy physical activity, nearly twice that of respondents without heavy physical activity (10.8%), with $p = 0.000$. Zhang et al.

(2023) similarly reported that occupational physical activity increased the risk of smoking by 28.9% ($p < 0.01$), indicating that physically demanding work environments may constitute a risk factor for smoking.

Kim and Lee (2021) demonstrate that elevated occupational stress is strongly associated with smoking as a coping behavior. This mechanism is consistent with Atmaka et al. (2025), who showed that work demands and working styles influence stress levels and coping mechanisms. Taken together, these findings suggest that physically demanding occupations may increase smoking tendencies indirectly through heightened stress and maladaptive coping responses.. Evidence from the literatur, including Zhang et al. (2023), suggest that compulsory or physically demanding activities—such as heavy manual work—are positively associated with elevated stress levels and smoking behavior. In contrast, recreational physical activity is negatively associated with smoking tendencies, likely due to its stress-reducing effects and contribution to psychological well-being.

Relationship Between Type of Occupation and Smoking Behavior

This study identified a significant association between type of occupation and smoking behavior ($p = 0.000$). The “government/honorary” category included civil servants, honorary staff, government office employees, as well as members of the military (TNI) and police (Polri). Meanwhile, the “non-government workers” category encompassed various non-government occupations, including private office workers, farmers, fishermen, laborers, construction workers, traders, factory workers, and other informal-sector occupations.

Results showed that non-government workers had the highest smoking prevalence, at 53.4% (441 of 825), followed by the unemployed at 10.6% (91 of 858), while the lowest prevalence occurred among government/honorary workers at 29.3% (44 of 150). This pattern indicates that occupations in the non-government sector—particularly manual and field-based jobs—carry a higher risk of smoking.

This finding aligns with Dhiny Easter Yanti et al. (2021), who reported a positive but weak association ($D = 0.071$). The positive pattern suggests that occupations increasingly oriented toward fieldwork—such as agriculture, plantations, factories, and other manual labor—tend to show higher smoking tendencies due to low supervision and permissive smoking norms.

Zhang et al. (2023) further emphasized that occupations characterized by high physical demands or stressful work environments exhibit greater smoking prevalence than office-based or formal-sector jobs with stricter smoking regulations. Manual and informal-sector workers are often exposed to strong smoking cultures, making them more vulnerable to smoking behavior.

4. CONCLUSION

This study demonstrates that smoking behavior among the productive-age population in Belapunranga and Belabori remains relatively high. Of the four factors examined, three showed significant associations with smoking behavior: educational level, type of employment, and engagement in heavy physical activity. Individuals with lower educational attainment, those working in the private sector, and those involved in physically demanding activities were more likely to smoke. In contrast, age did not show a significant relationship with smoking behavior, although descriptively adults constituted the largest group of smokers.

These findings indicate that smoking behavior is more strongly shaped by social conditions, workplace environments, and job characteristics rather than age alone. Therefore,

tobacco control efforts should focus on improving health education, strengthening workplace regulations on smoking, and developing targeted interventions for high-risk groups. Integrating moral and spiritual values including Islamic teachings on maintaining health and avoiding harm may further support the effectiveness of smoking prevention and control strategies within the community.

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