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Type of Occupation and Smoking Behavior: A Multinomial Analysis of Global Adults Tobacco Survey (GATS) Indonesia

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Abstract
Smoking remains a major public health problem in Indonesia, with occupation playing a key role in shaping smoking behavior. This study investigated how occupational type affects smoking behavior among Indonesian adults. This study was using data from the 2021 Global Adult Tobacco Survey (GATS), which included 9,155 respondents. The dependent variable was smoking behavior (daily smoker, non-daily smoker, or never smoker), and the main independent variable was occupational type. Control variables included age, gender, education level, and place of residence. Data analysis involved descriptive statistics, chi-square test, ANOVA, and multinomial logistic regression. The results showed that 25.47% of adults were daily smokers, 5.95% were non-daily smokers, and 68.57% were never smokers. Most participants were unemployed (47.67%), indoors workers (15.03%), outdoors (32.90%), or in both settings (4.40%). Bivariate analysis revealed significant associations between smoking behavior and type of occupation, gender, education, place of residence, and age. Daily smoking was more common among men, individuals with lower education, rural residents, and outdoor workers. Multivariate analysis indicated that outdoor workers were significantly more likely to smoke daily than indoor workers (OR = 1.36–1.96). Compared with unemployed individuals, those occupation indoors, outdoors, and in both environments were 1.82, 2.87, and 2.94 times more likely to smoke daily, respectively. These findings suggest that employment, especially outdoor employment, is strongly associated with daily smoking. Targeted smoking prevention programs should prioritize outdoor workers, men, rural residents, and those with lower education levels.

Keywords: Chronic Diseases, GATS, Smoking, Type of Occupation.

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1. INTRODUCTION

Smoking is a habit that can significantly affect health, with broad impacts on individuals and society. Global smoking trends show a decline in the number of smokers from 1.32 billion in 2018 to 1.30 billion in 2020, and are expected to continue to decline to 1.27 billion in 2025. This decline reflects global efforts in tobacco control, including policies banning tobacco advertising, promotion and sponsorship, as well as increasing cigarette taxes (World Health Organization, 2021). In Indonesia, given the high prevalence of smokers among adults (Effendi et al., 2024; Putri et al., 2025).

Based on data from the Global Adult Tobacco Survey (GATS) Indonesia 2021, the prevalence of tobacco use among Indonesian adults is 34.5%, which is equivalent to around 70.2 million people. In detail, 65.5% of adult men and 3.3% of adult women use tobacco. In addition, data shows that 74.2% of adults are exposed to cigarette smoke in dining areas, and 44.8% in the workplace. This exposure poses serious health risks, given the close relationship between smoking and various chronic diseases (World Health Organization, 2023). It is important to note that although the prevalence of smoking decreased from 36.1% in 2011 to 34.5% in 2021, the total number of adult smokers increased by 8.8 million people, from 60.3 million to 69.1 million (World Health Organization, 2022).

Smoking is known to have a very negative impact on health, including various chronic diseases such as lung cancer, heart disease, stroke, and other respiratory diseases (Gupta et al., 2024). Smoking can also reduce the quality of life and increase the economic burden related to medical costs and lost productivity (Coyle et al., 2024; Pichon-Riviere et al., 2024). The type of occupation or type of job is often associated with smoking habits (Xia et al., 2020). Several studies have shown that job factors, such as stress levels, social environment, and work patterns, can affect individual smoking habits (Thomeer et al., 2019). Workers in certain sectors, such as construction or manufacturing, often have a higher prevalence of smoking compared to workers in other sectors such as education or government (Tomioka et al., 2020). This because of factors such as greater job pressure, social habits in the workplace, or the lack of workplace health programs that focus on controlling smoking habits (Fithria et al., 2021). Although several studies relate between work and smoking habits, research on the effect of work type on smoking frequency in Indonesia is still limited. Using data from the Global Adult Tobacco Survey (GATS) Indonesia 2021, this study aims to analyze the effect of type of occupation on smoking behavior among adults in Indonesia.

2. RESEARCH METHOD

This study utilized the secondary data from The Global Adult Tobacco Survey (GATS) in 2021. The Global Adult Tobacco Survey (GATS) was a nationally-representative household survey that aims to systematically track adult (smoking and smokeless) tobacco use and measures key tobacco indicators. The latter was coordinated by the National Institute of Health Research and Development (NIHRD) of the Ministry of Health. The GATS 2021 employed a multi-stage random sampling by geographical region and type of residence (urban/rural). Additionally, the sampling design was the national level by selecting the region (Sumatera, Java and Bali, Kalimantan, Sulawesi, and other regions). The urban and rural area was selected equally. The questionnaire of GATS survey was adapted from GATS core questions and were consulted with WHO Country Office for Indonesia and WHO Regional Office for Southeast Asia. The questionnaire was on 2020 in Bogor City, West Java. The data collection was implemented by the National Institute of Health Research and Development (NIHRD) and the Indonesian Central Statistics Agency. The data collection was carried in 28 provinces, 101 districts, and 339 census blocks during 29 March and 15 April 2021 (World Health Organization, 2023).

This study focused on 9,155 adults aged 15 years and older. The dependent variable of this study is smoking behavior, consisted of the 0 = not smoking, 1 = not daily smoking, 2 = smoking daily. The main independent variable of this study is type of occupation, consisted of 0 = not Occupation, 1 = Occupation indoor, 2 = Occupation outside, 3 = both.

The control variables included in this study are age (in year), sex (male/female), education level (uneducated/primary/secondary/higher/university), and place of residence (urban/rural). The data was tested by univariate, bivariat, and multivariate analysis. The univariate was represented by frequency and percentage for categorical variables and the continuous variable described by mean and confidence interval. The bivariat analysis was using chi square test and ANNOVA test and multivariate analysis with multi nomial logistic regression have been used. The analysis was done using STATA software with confidence interval 95%. The ethical approval of GATS was obtained from the Health Research Ethics Committee of Health Research and Development Agency, Indonesia Ministry of Health with reference number LB.02.01/2/KE.451/2020.

3. RESULTS AND DISCUSSION

Table 1. The General Characteristics of the Study Sample.

Variables	Frequency	Percentage
Smoking Behavior		
Not smoking	6.278	68.57
Less than daily smoking	545	5.95
Daily smoking	2.332	25.47
Type of Occupation		
Not Occupation	4.364	47.67
Occupation indoor	1.376	15.03
Occupation outdoor	3.012	32.90
Occupation both	403	4.40
Age	Mean = 44 years old	Standard dev = 17
Sex		
Male	4.281	46.76
Female	4.874	53.24
Education level		
Uneducated	1.694	18.50
Primary school	2.476	27.05
Secondary school	1.739	19.00
Higher	2.411	26.34
University	835	9.12
Place of residence		
Urban	4.090	44.68
Rural	5.065	55.32

Table 1 above offers the univariate analysis with general characteristics of the study samples. The result described the general characteristics of the study samples. Among 1,955 adults, 25.47% of them were daily smoker, 5.95% less than daily smoker, and 68.57% were not smokers. According to main independent variable, almost of them did not work (47.67%), Occupation indoor (15.03%), Occupation outdoor (32.90%), and Occupation both indoor and outdoor (4.40%). The control variables included in this study revealed that the mean age of them were 44 years old and standard deviation was 17. According the age, the proportion of female was higher than male (53.24% and 46.76%). Education level in this study offers that those finished the primary school took the highest percentage (27.05%), following by higher school (26.34%), secondary school (19.00%), uneducated (18.50%), and university (9.12%).

The place of residence revealed that percentage those lived in rural area was higher than urban (55.32% and 44.68%).

Table 2. The Bivariate Test Results of Association Between Predictors and Smoking

Variables	**Not smoking**	**Less than daily smoking**	**Daily smoking**	**Total**	**Chi-square value**	***p-value***
	%	**%**	**%**			
Type of Occupation					1.30E+03	<0.001
Not Occupation	85.17	4.45	10.38	4.364		
Occupation indoor	68.9	5.45	25.65	1.376		
Occupation outdoor	47.28	7.7	45.02	3.012		
Occupation both	46.9	10.92	42.18	403		
Age	SS (Sum of square)	Df (degree of freedom)	MS (Mean square)		147.5167	<0.001
Between groups	118.81	81	1.47			
Within groups	6789.38	9073	0.75			
Sex					4.10E+03	<0.001
Male	35.46	11.73	52.81	4.281		
Female	97.66	0.88	1.46	4.874		
Education level					73.0935	<0.001
Uneducated	70	5.19	25	1.694		
Primary	66	5.21	28.39	2.476		
Secondary	67	7.25	26	1.739		
Higher	66.94	6.97	26.09	2.411		
University	79.64	4.07	16.29	835		
Place of residence					14.529	0.001
Urban	70.15	6.28	23.57	4.090		
Rural	67.31	5.69	27.01	5.065		

Table 2 shows that there was a significant relationship between various demographic factors and smoking status. Based on employment status, outdoor workers had a higher prevalence of smoking, with 45.02% smoking daily, compared to indoor workers and those who did not work. Gender also showed a striking difference, with the majority of men (52.81%) smoking daily, while only 1.46% of women did the same. Education level played an important role, with those with no education and primary education having a higher prevalence of smoking compared to those with higher education, especially university. In addition, place of residence also influenced smoking habits, with people living in rural areas having a higher prevalence of daily smoking (27.01%) compared to those living in urban areas (23.57%). Finally, age also influenced smoking status, with significant differences between different age groups. All of these variables had a significant relationship with smoking habits, as seen from the p-value which was less than 0.05.

Table 3. The Multinomial Logistic Regression Results

Variables	Not smoking and Less than daily smoking			*p-value*	Not smoking and daily smoking			*p-value*
	AOR	(CI 95% Lower - Upper)			AOR	(CI 95% Lower - Upper)		
Type of Occupation								
Not Occupation	ref							
Occupation indoo	0.91	0.67	1.24	0.554	1.82	1.49	2.22	0.000
Occupation outdoor	1.36	1.08	1.71	0.009	2.87	2.45	3.37	0.000
Occupation both	1.96	1.32	2.92	0.001	2.94	2.21	3.92	0.000
Age	0.99	0.98	0.99	0.000	0.99	0.99	1.00	0.004
Sex								
Male	ref							
Female	0.03	0.02	0.04	0.000	0.01	0.01	0.02	0.000
Education level								
Uneducated	ref							
Primary	0.68	0.50	0.94	0.020	0.86	0.69	1.06	0.156
Secondary	0.68	0.48	0.97	0.031	0.69	0.54	0.88	0.002
Higher	0.58	0.41	0.81	0.001	0.58	0.47	0.74	0.000
University	0.30	0.19	0.48	0.000	0.31	0.23	0.41	0.000
Place of residence								
Urban	ref							
Rural	0.91	0.74	1.11	0.358	1.02	0.89	1.17	0.731

Table 3 shows that the result of multivariate analysis using multinomial logistic regression. The first comparison is between not smoking and less than daily smoking. It revealed that factors significantly associated that those smoking less than daily compared to not smoking were smoking status, age, sex, and education level. In details, compared to those who were not Occupation, those who were Occupation outdoor and both were 1.36 and 1.96 times more likely to smoke (less than daily). The control variable which is age found that being older will decrease 1% the probability to be smoker (less than daily). In terms of the sex, compared to male, being female decreased 97% probability of being smoker (less than daily). The education level found that compared to uneducated, adults graduated from primary, secondary, higher, and university decrease 32%, 32%, 42%, and 70% probability to be less than daily smokers, respectively.

The second comparison is between not smoking and daily smoking adults. It revealed that compared to not Occupation adults, adults who work indoor, outdoor, and both were 1.82, 2.87, and 2.94 times more likely to be daily smokers. The increasing the age is significantly associated with decreasing 1% probability to be daily smokers. In terms of the sex, compared to male, being female decreased 99% probability of being smoker (less than daily). The education level found that compared to uneducated, adults graduated from secondary, higher, and university decrease 31%, 32%, and 69% probability to be less than daily smokers, respectively.

This study's initial comparison between individuals who do not smoke and those who smoke less than daily revealed that factors significantly associated with smoking less than daily, as compared to non-smokers, included smoking behavior, age, sex, and education level. On the other hand, Comparisons between non-smokers and daily smokers highlighted a significant association between occupation and the likelihood of smoking daily. Another research indicates that sociodemographic status is a significant determinant of smoking behavior. Those in lower-income occupations are often more likely to smoke, potentially due

to increased stress levels and limited access to health education and cessation resources (Amalia et al., 2019). Notably, workers in high-stress environments, like the construction industry, exhibit higher smoking rates. This phenomenon occurs as individuals resort to smoking as a coping mechanism for job-related stress and exposure to hazardous Occupation conditions. Specifically, the construction industry in Indonesia mirrors findings in other global contexts, where workers use smoking as a tool to alleviate their stress while confronted with difficult Occupation conditions (Syamlal et al., 2018).

The control variable of age indicates that older individuals have a 1% lower probability of being a smoker (less than daily and daily smokers). This result different from finding in US were the proportion of individuals who transitioned to daily smoking in early adulthood also rose among daily cigarette smokers (Barrington-Trimis et al., 2020). This difference is natural due to the differences culture between the two countries. In terms of sex, females have a 97% lower probability of being a smoker (less than daily) compared to males. This result is reasonable for the Indonesian context. Smoking behavior in women is rare categorical. In developed countries, smoking in women is balanced with men (Mollaioli et al., 2020). This is due to lifestyle, stress levels and liberal life adopted by urban communities such as European Countries and America (Gallus et al., 2021).

Regarding education level, compared to those with no education, adults who graduated from primary, secondary, higher, and university education have a 32%, 32%, 42%, and 70% lower probability, respectively, of being less than daily smokers. Furthermore, educational factors intertwined with occupational status significantly affect smoking behaviors in Indonesia. Lower educational attainment is often correlated with higher smoking prevalence, creating a cycle where individuals in less skilled jobs lack the knowledge and resources to quit smoking (Assari et al., 2025). This lack of education frequently aligns with exposure to cigarette advertising, which predominantly targets youth and Occupation-age individuals, suggesting that occupational type influences not only smoking prevalence but also smoking initiation among younger workers (Efendi et al., 2021; Megatsari et al., 2023). From the youth perspective, cultural and peer group are pivotal in shaping attitudes toward smoking (Littlecott et al., 2023). Many adolescents in Indonesia cite their familial role models as significant influencers on their smoking behavior, complicating the relationship between occupational type and smoking frequency by introducing an intergenerational dimension to smoking behavior (Ilmaskal et al., 2022).

4. CONCLUSION

The type of occupation significantly affects smoking behavior in Indonesia, influenced by a myriad of factors including sociodemographic status. The interactions between these elements necessitate comprehensive public health strategies that target specific occupational groups, prioritizing the creation of supportive environments for smoking cessation and preventive education initiatives tailored to the unique needs of different demographics in Indonesia.

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