

## Exposure to Outdoor Tobacco Advertisements Near Home is Associated with Smoking among Youth in Indonesia

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### Abstract

**Background:** The prevalence of cigarette smoking among adults is persistently high, and among youth is increasing in Indonesia. **Objective:** This study aims to examine the association between youth smoking behavior and outdoor tobacco adverts near home in Indonesia. **Methods:** We conducted a cross-sectional survey of 3,557 students in North Sumatera during September-November 2020. The main independent variables include seeing tobacco advertisements near home, near school, on social media. The outcome variables included ever smoked and smoked in the last ten days. **Results:** We found significant associations between exposure to outdoor tobacco adverts near home and youth smoking. High school students who reported seeing tobacco adverts near home were 1.42 times more likely to smoke and 2.29 times more likely to smoke in the last ten days. Moreover, students at private schools (a proxy for higher income) exposed to tobacco adverts near home were 1.56 times more likely to smoke and 2.93 times more likely to smoke in the last ten days. **Conclusion:** Exposure to outdoor tobacco advertisements near home is associated with smoking among youth in Indonesia. Comprehensive tobacco control efforts are needed, including through a ban of outdoor tobacco adverts.

**Keywords:** Tobacco control- tobacco advertisements- smoking- youth- Indonesia

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### Introduction

Smoking is among the top contributors to deaths and disability globally, as shown by the latest Global Burden of Study 2019 (Vos et al., 2020). In Indonesia, the prevalence of cigarette smoking among adult males (15+ years) was persistently high at 67% in 2018 while that among young males (13-14 years) was increasing to 35.5% in 2019, among the highest in the world (World Health Organization [WHO] 2018; Ministry of Health [MOH] 2020; Hapsari et al., 2020; Yuliaty et al., 2021). With a population of over 270 million, the World Health Organization estimated 61.4 million current smokers in Indonesia in 2018 (WHO, 2018; Dhani et al., 2021).

Because the government still has not ratified the Framework Convention on Tobacco Control, comprehensive efforts are lacking in Indonesia (Kusuma et al., 2019; Adisasmito et al., 2020a; Ahsan et al., 2020). Currently, there is no policy at the national level to ban outdoor tobacco advertisements (Sebayang et al., 2022; Adisasmito et al., 2020b). While other countries in Southeast Asia, such as Thailand and Malaysia, have banned outdoor tobacco advertisements, Indonesia has not. Similarly, while Brunei and Singapore have banned the display of tobacco products at point-of-sale, Indonesia

has not (SEATCA, 2021; Priyono et al., 2020).

Previous studies have shown the effect of outdoor tobacco advertisement on increased smoking, especially among youth. A Cochrane systematic review assessed 19 studies in the United States, United Kingdom, Germany, and Spain. It concluded that exposure to tobacco advertising and promotion is associated with adolescents' likelihood to start to smoke (Lovato et al., 2011). In India, researchers utilized both outdoor tobacco advertisement and smoking behavior data and found tobacco advertisement density near schools was associated with the use and current use of tobacco (Mistry et al., 2015).

In Indonesia, researchers conducted a survey in 2018 and found a total of 3453 outdoor tobacco advertisements throughout Semarang city, of which 74% were within 300 meters from schools (Nurjanah et al., 2020). Another study in 2019 used both outdoor tobacco advertisement and smoking behavior data and found that students at schools with medium and high density of outdoor tobacco advertising were up to 2.16 times more likely to smoke, than those with low density (Handayani et al., 2021). However, such evidence is lacking for tobacco advertisements near home. In high-income countries such as the United Kingdom, the government has banned

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outdoor tobacco advertisements for nearly 20 years (Action on Smoking and Health [ASH], 2019). Thus, our study aims to examine the association between youth smoking behavior and outdoor tobacco advertising near home in Indonesia, a lower-middle-income country.

**Materials and Methods**

We conducted a quantitative cross-sectional survey of 3,557 students in 146 high schools in the North Sumatra province, Indonesia. A team of 20 trained data collectors visited the schools during September-November 2020 and interviewed the students who came to schools while ensuring compliance with the COVID-10 protocol. The main independent variables include seeing tobacco advertisements near home, near school, on social media. For each binary variable, one (1) is saying yes to the question: “Do you know, or have you seen any tobacco adverts near home?” – similar questions for near schools and on social media; 0 is otherwise. Also, additional independent variables include having family members smoking and friends/teachers smoking. There are two primary outcome variables: ever smoked and smoked in the last ten days. For each binary variable, one (1) is saying yes to the question “Do you know smoke cigarettes” and “Did you smoke in the last ten days?” We also collected socioeconomic indicators for control variables, including gender, age, education, parental employment, and school type (e.g., public/private).

We conducted descriptive and multivariate logit regression analyses. We provided the descriptive statistics of sample characteristics, independent variables, and outcome variables. Also, we used multivariate logit regressions, including subgroup analyses by gender and school type (public and private as an income proxy), controlling for socioeconomic variables. We conducted all analyses in STATA MP 15.1.

Ethical approval was from Universitas Islam Negeri Sumatera Utara (No. 081/EC/KEPK.UISU/IX/2020).

**Results**

The descriptive statistics, including sample characteristics, main independent variables, and outcome variables are provided in Table 1 (panels a-c). In terms of sample characteristics (panel a), we collected data from a total sample of 3557 high school students aged 10-23 years old, including 34.8% males and 65.3% females. Among them, 41.5% and 58.5% went to junior and senior high schools, respectively. By school type, 48.2% went to public schools while 51.8% to private ones. Regarding the main independent variables (panel b), 96.4% of the students reported seeing tobacco adverts near their schools, while 69.9% and 56.9% reported seeing tobacco adverts near homes and on social media, respectively. Moreover, 84.1% of the students reported having family members smoking while 78.6% reported knowing friends, teachers, and religious leaders who smoke cigarettes. In terms of the outcome variables (panel c), 11.6% of the students reported ever smoking cigarettes and 5.2% of them reported smoking cigarettes in the last ten days.

The associations between tobacco adverts of youth smoking behavior, including ever smoke cigarettes and smoke cigarettes in the last ten days, are provided in Table 2. In terms of ever smoked cigarettes (panel a), seeing tobacco adverts near home is associated with an increase in the probability of smoking by 1.42 times (OR=1.42, p-value<0.05) – see column 1. While significant by gender and school type, the effects are higher among male

Table 1. Descriptive Statistics

	All students (N=3557)	
	n	%
<b>(a) Sample characteristics</b>		
Gender		
Male	1,236	34.8
Female	2,321	65.3
Age group tertiles		
10-15 years	1,483	41.7
16-17 years	1,353	38
18-23 years	721	20.3
Education		
Senior high school	2,080	58.5
Junior high school	1,477	41.5
Parent employed		
Yes	2,710	76.2
No	847	23.8
School type		
Public schools	1,715	48.2
Private schools	1,842	51.8
<b>(b) Main independent variables</b>		
Seen tobacco adverts near home		
Yes	2,487	69.9
No	1,070	30.1
Seen tobacco adverts near schools		
Yes	3,430	96.4
No	127	3.6
Seen tobacco adverts on social media		
Yes	2,023	56.9
No	1,534	43.1
Family members smoking		
Yes	2,991	84.1
No	566	15.9
Friends/teachers/religious leaders smoking		
Yes	2,796	78.6
No	761	21.4
<b>(c) Outcome variables</b>		
Ever smoked cigarettes		
Yes	411	11.6
No	3,146	88.5
Smoked cigarettes last 10 days		
Yes	186	5.2
No	3,371	94.8

N, Observations

Table 2. Associations between Tobacco Adverts and Smoking Behavior among Youth

	Odds ratios (95%CI)				
	Total [1]	Males [2]	Females [3]	Public schools [4]	Private schools [5]
<b>(a) Ever smoked</b>					
Seen tobacco adverts near home	1.42* (1.11 - 1.81)	1.54* (1.03 - 2.29)	1.38* (1.01 - 1.90)	1.31 (0.91 - 1.88)	1.56* (1.12 - 2.17)
Seen tobacco adverts near schools	1.29 (0.72 - 2.31)	2.47 (0.72 - 8.43)	0.93 (0.47 - 1.82)	n/a	1.26 (0.70 - 2.28)
Seen tobacco adverts on social media	1.05 (0.85 - 1.31)	1.27 (0.90 - 1.79)	0.92 (0.70 - 1.22)	1.34 (0.97 - 1.85)	0.85 (0.64 - 1.14)
Family members smoking	1.69* (1.20 - 2.37)	2.13* (1.17 - 3.86)	1.5 (0.99 - 2.28)	1.82* (1.11 - 2.99)	1.59 (1.00 - 2.54)
Friends/teachers smoking	0.76* (0.60 - 0.97)	1.92* (1.22 - 3.04)	0.46* (0.34 - 0.62)	0.72 (0.51 - 1.01)	0.79 (0.56 - 1.10)
N	3,557	1,236	2,321	1,713	1,842
<b>(b) Smoked in last 10 days</b>					
Seen tobacco adverts near home	2.29* (1.53 - 3.44)	2.17* (1.20 - 3.92)	2.61* (1.48 - 4.59)	1.79* (1.01 - 3.19)	2.93* (1.66 - 5.18)
Seen tobacco adverts near schools	1.6 (0.63 - 4.05)	3.52 (0.46 - 26.93)	1.03 (0.35 - 2.98)	n/a	1.63 (0.64 - 4.19)
Seen tobacco adverts in social media	0.86 (0.64 - 1.17)	0.94 (0.59 - 1.49)	0.79 (0.52 - 1.20)	1.04 (0.66 - 1.64)	0.71 (0.47 - 1.08)
Family members smoking	4.61* (2.15 - 9.90)	4.66* (1.44 - 15.03)	4.73* (1.72 - 12.99)	3.97* (1.44 - 10.95)	5.51* (1.72 - 17.62)
Friends/teachers smoking	0.96 (0.67 - 1.39)	2.07* (1.07 - 4.01)	0.61* (0.39 - 0.96)	0.93 (0.55 - 1.58)	0.96 (0.58 - 1.59)
N	3,557	1,236	2,321	1,713	1,842

Adverts, advertisements; N, observation; CI, confidence interval; n/a, not available; Logit regressions were conducted in STATA 15.1. Control variables include gender, age, education, parent employment, and school type. Level of significance \* p<0.05

students by 1.54 times (OR=1.54 for males v OR=1.38 for females, p-values<0.05) and among private school students by 1.56 times (OR=1.56 for private v 1.31 for public, p-value<0.05 for private) – see columns 2-5.

In terms of smoking in the last ten days (panel b), seeing tobacco adverts near home is associated with an increase in the probability of smoking by 2.29 times (OR=2.29, p-value<0.05) – see column 1. While significant by gender and school type, the effects are higher among female students by 2.61 times (OR=2.61 for females v OR=2.17 for males, p-values<0.05) and among private school students by 2.93 times (OR=2.93 for private v 1.79 for public, p-values<0.05) – see columns 2-5. However, results are not statistically significant for seeing tobacco adverts near schools and on social media.

Moreover, having family or friends who smoke is associated with youth smoking. Having family members who smoke is associated with an increase in the probability of ever smoking by 1.69 times (OR=1.69, p-value<0.05) and of smoking in the last ten days by 4.61 times (OR=4.61, p-value<0.05) – see panels a-b column 1. The effects are similarly significant among by gender and school type. Having friends, teachers, and religious leaders is associated with increased ever smoking (OR=1.92, p-value<0.05) and smoking in the past ten days (OR=2.07, p-value<0.05) only among male students – see panels a-b column 2.

## Discussion

Our study shows significant associations between exposure to outdoor tobacco adverts near home and youth smoking. High school students who reported seeing tobacco adverts near home were 1.42 times more likely to ever smoke and 2.29 times more likely to smoke in the last ten days. Moreover, students at private schools (a proxy for higher income) exposed to tobacco adverts near home were 1.56 times more likely to smoke and 2.93 times more likely to smoke in the last ten days. These results controlled for exposure to tobacco adverts at school, on social media, and socioeconomic variables.

These findings align with the previous studies showing the effect of tobacco advertisement on increased smoking among youth (Lovato et al., 2011). They also align with earlier studies on outdoor tobacco advertisements near schools on youth smoking in Mumbai (India) and Semarang (Indonesia) (Mistry et al., 2015; Handayani et al., 2021; Nurjanah et al., 2020). Our results provide new evidence that exposure to tobacco adverts near home is associated with increased youth smoking, in addition to the exposure near schools (Mistry et al., 2015; Handayani et al., 2021). Our results support more comprehensive national tobacco control efforts by banning outdoor tobacco adverts, especially in settings such as Indonesia where the prevalence of youth smoking is increasing (Wahidin et al., 2020; Wulan et al., 2022; Yunarman et al., 2020; Megatsari et al., 2021). The Indonesian government should learn from the implementation of such bans in neighboring countries such as Malaysia and Thailand (SEATCA, 2021).

Our study also found that students having family

members who smoke were 1.69 times more likely to ever smoke and 4.61 times more likely to smoke in the last ten days – the associations are similar by gender and school type (public/private). Also, male students with friends, teachers, and religious leaders who smoke were 1.92 times more likely to ever smoke and 2.07 times more likely to smoke in the last ten days. These findings align with previous studies establishing the impact of family and friend smoking behavior on cigarette smoking among young people (Huang et al., 2014; Joung et al., 2016; Wellman et al., 2016). The results also show how young Indonesians are surrounded by outdoor tobacco adverts near home, near schools, on social media, and by family and friends who smoke Wulan et al., 2022; Nasution et al., 2022; Dewi et al., 2022; Yunarman et al., 2021). This would lead to more adult smokers as studies have shown that youth smoking predicts adult smoking (Paavola et al. 1996).

Our study has at least two limitations. First, the exposure to outdoor tobacco adverts relied on the study participant's report. Further study should use both the outdoor tobacco adverts near home and smoking behavior among youth. Also, further study should consider the intensity of exposure (e.g. high, medium, low density of adverts near home). Second, our data collection was conducted when there were some COVID-19 pandemic restrictions in place the North Sumatra province, limiting our sample's representativeness. Despite these limitations, our findings have important policy implications for Indonesia and beyond.

## Author Contribution Statement

N, PAS, AA and DK conceptualized the study. N, AAT, PAS, RRAH conducted data collection. DK and PAS conducted data analysis. DK drafted the manuscript and N, AAT, PAS, RRAH, and AA provided inputs to the manuscript. All authors approved the final version of the manuscript.

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Data is availability upon reasonable request.

### Conflicts of interest

None.

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