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## Determinants of Smoking Behaviour Among Indonesian Elementary School Students: A Cross-Sectional Study

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### Abstract

Indonesia faces a critical public health challenge with one of the highest smoking rates globally, including among elementary school children. Understanding the determinants of this early smoking behavior is essential for developing effective prevention strategies. This study, Determinants of Smoking Behaviour Among Indonesian Elementary School Students: A Cross-Sectional Study, aimed to identify the factors associated with smoking behavior among elementary school students in Bojonegoro Regency, Indonesia. A cross-sectional study was conducted using secondary data from a Ministry of Health survey. The sample consisted of 1,071 students from grades 4–6 across 20 elementary schools, selected via total population sampling. Data were analyzed using Chi-square tests to examine associations between smoking status and variables such as gender, grade level, knowledge, and environmental exposure. The prevalence of ever having smoked was 8.7%, exclusively among boys. Significant risk factors ( $p < 0.01$ ) included being male, higher grade level, having smoking family members, having peers who smoke, and witnessing people smoke at school—notably, teachers and community members. Surprisingly, children who knew the dangers of smoking had a higher smoking prevalence. Smoking behavior in elementary students is strongly influenced by environmental exposure and gender. Prevention requires a multi-faceted approach, including strict smoke-free policies in schools, targeted anti-smoking education for boys, and community-wide interventions to reduce children's exposure to smoking role models.

**Keywords:** smoking, child, behavior, risk factor

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### INTRODUCTION

*Tobacco* is one of the leading risk factors for the global disease burden and mortality. This burden is associated with both direct tobacco consumption and secondhand exposure, particularly among children (Carreras et al., 2021). In 2019, secondhand smoke was estimated to be responsible for approximately 50,000 deaths and 4.5 million disabilities among children under the age of 14. Indonesia ranks among the countries with the highest number of active smokers globally, with over 70.2 million tobacco users in 2021, following China and India (Series, 2021). There was an increase of 8.8 million adult smokers in 2021 compared to a decade earlier, after accounting for population growth (Tam et al., 2021; Zi, Xu, Li, Yu, & Wang, 2025). Tobacco use is significantly more prevalent among men, with 65.5% of men smoking in 2021, compared to only 3.3% of women (Jankowski et al., 2022; Organization, 2024).

According to Government Regulation No. 19 of 2003, cigarettes are processed tobacco products that are wrapped and contain nicotine and tar, with or without additional substances (Koshchuk, Korotun, Novytska, & Khliebnikova, 2020). Cigarettes are typically cylindrical in shape, made from

paper measuring 70–120 mm in length (depending on the region) with a diameter of approximately 10 mm, and filled with tobacco leaves and other mixtures (Cannizzaro, 2023).

Exposure to cigarette smoke is harmful to children and adolescents. They inhale dust at twice the rate of adults, thereby absorbing more smoke particles. This is due to their higher respiratory rates and narrower airways, which result in greater exposure (Makadia, Roper, Andrews, & Tingen, 2017). Furthermore, exposure to cigarette smoke increases the incidence of respiratory tract infections, coughing, phlegm production, wheezing, and asthma; it has also been associated with significant reductions in lung function. Such exposure exacerbates pre-existing chronic respiratory conditions. In the long term, it may negatively impact children's nutritional status (Bush, 2021).

Nicotine can reduce oxygen delivery by 30–40% and inhibit the absorption of calcium, minerals, and vitamin C—all vital for growth. Smoking at a young age may contribute to the adoption of other harmful lifestyle behaviors, including alcohol and drug use later in life (Daw, Margolis, & Wright, 2017). Cigarette use is also linked to early onset of stroke and various dental and oral health problems (Shahi et al., 2022). Despite the dual burden of malnutrition and high smoking prevalence in Indonesia, there is a lack of research exploring children's understanding of smoking behaviors (Bella et al., 2023; Muchlis et al., 2023).

A study conducted by the Global Youth Tobacco Survey (GYTS) from 2006 to 2012 found that 81.4% of Indonesian adolescents were exposed to secondhand smoke (Bigwanto, Mongkolcharti, Peltzer, & Laosee, 2017). Among adolescents aged 13–15 years, 24.5% of boys and 2.3% of girls were smokers, with 3.2% already showing signs of addiction (Ameen, 2020; Roble, Osman, Lathwal, & Aden, 2021). Previous research has also shown that, in the past decade, cigarette consumption among adolescents in Bojonegoro increased by up to 55.1%, with smokers accounting for 60% of the total population (Budiyati, Yusuf, Habsari, & Padmaningrum, 2025; Mayasari, Rahayu, & Yudhana, 2023).

One characteristic of school-aged children is a high level of curiosity. This curiosity is often directed toward objects and their surrounding environment (Carruthers, 2024). The development of curiosity and its influence on memory during childhood highlight the need for educational approaches tailored to various stages of child development (Fandakova & Gruber, 2021; Gruber & Fandakova, 2021). For effective and targeted prevention, it is essential to first understand the risk factors that lead children to engage in specific behaviors, including smoking. It is expected that this exploratory study will produce specific and applicable insights tailored to the real socio-cultural conditions of the target area.

Bojonegoro is one of the tobacco-producing regions in Indonesia and has historically served as a supplier to cigarette manufacturers from Kudus, Malang, and Surabaya. In addition to locally cultivated tobacco, Bojonegoro also produces Virginia tobacco, which is in high demand among manufacturers. The region hosts more than one cigarette factory, including PT. Gudang Garam, Tbk., and PT. Putera Jaya Sakti Perkasa. These factories are strategically located near residential areas and even schools. Such proximity raises concerns about the behavior of elementary school children, who tend to imitate adults and possess a natural curiosity, coupled with easy access to cigarettes.

Based on global and national data, tobacco use remains a leading risk factor for mortality and disease burden, with significant implications for child health through both direct use and secondhand exposure. The 2019 **Global Burden of Disease**<sup>^</sup> highlights tobacco's profound impact on global health, while, in Indonesia, the situation is particularly alarming, with over 70.2 million active tobacco users reported in 2021, positioning the country among those with the highest smoking rates worldwide. This public health issue extends to younger populations, with the **Global Youth Tobacco Survey** (GYTS) indicating that a substantial proportion of Indonesian adolescents are exposed to secondhand smoke, and a notable percentage, especially boys, initiate smoking at a very young age. Such early initiation is

critical, as studies, including one by Yayasan Kakak in Solo, found that a majority of child smokers began before the age of 12, underscoring the vulnerability of the elementary school age group.

Despite the high prevalence and known health consequences, a significant research gap exists in understanding the specific *determinants of smoking behavior among Indonesian elementary school students: A Cross-Sectional Study*, particularly in local contexts with unique socio-cultural and economic factors. Previous studies, such as those by Ariani et al. (2019) in Karawang and Rezeki & Utari (2021) in Banda Aceh, have identified risk factors like family and peer influence but often focus on broader adolescent populations or lack comprehensive analysis of the school environment's role. Furthermore, while knowledge of smoking's dangers is often assumed, research by Gilang Sasmita and Muhammad Abduh (2023) suggests that elementary students' understanding may be superficial or inaccurate, indicating a gap between awareness, perception, and actual behavior that warrants deeper investigation within specific regional settings, such as tobacco-producing areas.

The urgency of this research is underscored by the escalating number of young smokers and the severe, long-term health implications of early tobacco use, including respiratory illnesses, nutritional deficiencies, and the adoption of other risky behaviors. In regions like Bojonegoro, a major tobacco producer where cigarette factories are situated near schools, children's inherent curiosity and easy access to tobacco products create an environment ripe for early experimentation. The proximity of industry to daily life, combined with high exposure to smoking role models at home and in school—as indicated by studies on teacher smoking and parental influence (Wang et al., 2018)—demands immediate, evidence-based interventions to prevent a further increase in childhood smoking rates and its associated lifelong health and social burdens.

The novelty of this study lies in its focused exploration of a comprehensive set of determinants—including demographic factors, knowledge, and environmental exposures at school and home—specifically within a cohort of elementary school students in a distinctive Indonesian tobacco-producing region. By utilizing recent secondary data from the Ministry of Health and employing a cross-sectional design to analyze factors such as gender, grade level, observation of smokers at school, family smoking, and peer influence, this research provides a localized and multi-faceted perspective that has not been extensively covered in previous literature, which often concentrates on older adolescents or more generalized populations.

Therefore, the purpose of this research is to identify and analyze the key determinants associated with smoking behavior among elementary school students in Bojonegoro Regency. The primary benefit of this study is to generate actionable evidence that can inform the development of targeted, school-based anti-smoking campaigns and policies. By pinpointing specific risk factors within this vulnerable demographic, the findings aim to empower healthcare professionals, educators, and policymakers to design effective prevention strategies, ultimately contributing to the creation of a healthier, smoke-free environment for Indonesian children and supporting national efforts to reduce the future burden of tobacco-related diseases.

## **METHOD**

This study employed a cross-sectional design using secondary data, which had received prior approval from the Bojonegoro District Health Office under letter number 440/2337/412.202/2024. The data consisted of questionnaire results. The study is presented using a descriptive and quantitative approach. The target population comprised elementary school students in grades 4 through 6. The sampling method used was an all-sampling technique, in which the researcher included and analyzed all available data. Inclusion and exclusion criteria were applied to ensure that the selected sample from the secondary data met the study objectives and provided sufficient information. The inclusion criterion

was that the data pertained to children enrolled in grades 4 to 6 of elementary schools in Bojonegoro District.

The data were collected using a standardized smoking screening questionnaire developed by the Ministry of Health of the Republic of Indonesia. This instrument has been validated in various Indonesian populations and covers key domains including: (1) demographic characteristics (grade level, gender); (2) smoking status (ever/never smoked); (3) knowledge about smoking hazards; (4) environmental exposure to smoking (at school, within family, among peers); and (5) identification of smoking role models in the school environment.

Data analysis was performed using IBM SPSS Statistics software version 25.0. Categorical comparative analysis with the Chi-square test was conducted to examine associations between risk factors—such as demographic variables (grade level, gender) and exposure to smoking (knowledge of the negative effects of smoking, witnessing someone smoke at school, having a family member who smokes, having close friends who smoke)—and the outcome variable of smoking status (never smoked vs. ever smoked). Statistical significance was set at  $p < 0.05$ . For variables showing significant associations, proportions and percentages were calculated to quantify the strength of each risk factor.

Ethical considerations were maintained throughout the study. Although this research utilized secondary data, all personal identifiers were removed to ensure participant confidentiality. The data were accessed and analyzed solely for research purposes with proper authorization from the Bojonegoro District Health Office. The study adhered to the principles of the Declaration of Helsinki regarding research involving human subjects.

## RESULTS AND DISCUSSION

This study was successfully conducted in 20 elementary schools located in the Gunungsari area of Bojonegoro. The research utilized secondary data derived from a standardized smoking screening questionnaire developed by the Ministry of Health of the Republic of Indonesia. After applying the inclusion and exclusion criteria, a total of 1,071 respondents were included in the analysis.

The schools involved in this study were: MI Al Falah Kadungrejo, MI Faradisa Jannah, MI Mansyaul Huda, MI Miftahul Ulum, MI Muhammadiyah 19, MI Tanwiriyah, MI Tanwirul Hija, MI Tanwirul Qulub, SD-NU Al Falah, SD Negeri Gajah I, SD Negeri Gajah II, SD Negeri Gunungsari I, SD Negeri Kadungrejo, SD Negeri Kalisari, SD Negeri Lebaksari, SD Negeri Sumuragung, SD Negeri Tanggungan, SD Negeri Tlogoagung I, and SD Negeri Tulungagung I. The characteristics of the respondents are presented in Table 1.

Data analysis was performed using categorical comparative analysis with the Chi-square test to examine the associations between risk factors—such as demographic variables (grade level, gender) and exposure to smoking (knowledge of the negative effects of smoking, witnessing someone smoke at school, having a family member who smokes, having close friends who smoke) and the outcome variable of smoking status (never smoked vs. ever smoked).

**Table 1. Respondent Characteristics**

Demographic characteristic	Total (n)	Percentage (%)
Total responden	1071	100,0
<b>Grade</b>		
4th	371	34,6
5th	373	34,8
6th	327	30,5
<b>Gender</b>		
Male	546	51,0

Female	525	49,0
<b>Never/ever smoked</b>		
Ever smoked	93	8,7
Never smoked	978	91,3
<b>Knowing the bad effect of smoking</b>		
Yes	806	75,3
No	265	24,7
<b>Have seen people smoke at school</b>		
Yes	403	37,6
No	668	62,4
<b>People who smoke at school</b>		
Teacher	169	43,6
School residents	36	9,3
Security	7	1,8
Firends	2	0,5
Other	174	44,8
<b>Having family member who smoke</b>		
Yes	704	65,7
No	367	34,3
<b>Having close friend who smoke</b>		
Yes	117	10,9
No	954	89,1

## DISCUSSION

### Grade Level

This study revealed a significant increase in the proportion of students who reported smoking as grade level advanced among 4th to 6th-grade elementary school students. The percentage of smokers was 4.9% (18 out of 371) in grade 4, 8.3% (31 out of 373) in grade 5, and 13.1% (43 out of 327) in grade 6, with statistical analysis indicating a significant difference ( $p < 0.01$ ). A survey conducted by Yayasan Kakak in Solo in 2020 involving 100 children showed that 58.8% of children began smoking before the age of 12, highlighting that prevention efforts are crucial during or before grade 6. Another study by the Social Security Study Center of the University of Indonesia also reported that most street children began smoking as early as grades 3 or 4.

According to the 2014 Global Youth Tobacco Survey, Indonesia had the highest prevalence of adolescent smokers in the world. Specifically, 8.9% began smoking under the age of 7, 10.9% at ages 8–9, increasing to 25.6% at ages 10–11, and 43.2% at ages 12–13, with 11.4% starting at ages 14–15. Considering relative age effects, it has been observed that, on one hand, relatively older students within a grade level tend to have lower motivation than their younger peers. On the other hand, relatively younger students often exhibit lower levels of social-emotional adjustment and self-esteem. Moreover, maladaptive behaviors—considered risk factors for repeated delinquency—occur more frequently among relatively younger students, leading to higher rates of deviant behavior recurrence within this group. In terms of interpersonal relationships, it is noteworthy that while relatively younger students tend to have fewer friends and less face-to-face interaction, they engage in electronic communication more frequently than their relatively older peers<sup>12</sup>.

### Gender

All of the children who reported smoking in this study were boys; no girls reported smoking (92 out of 546 vs. 0 out of 525;  $p < 0.01$ ). This finding aligns with data from various regions in Indonesia, which consistently show that the number of male child smokers is significantly higher than

that of females<sup>13</sup>. Similarly, other studies have found that the prevalence of adolescent smoking is higher among male students, particularly those of Malay ethnicity<sup>14</sup>. This gender disparity persists into adulthood, with male smoking prevalence reaching 47.5% compared to only 1.1% among females, according to the 2013 Indonesian Basic Health Research (Riskesdas).

There is a prevailing perception that smoking enhances a male's image, portraying him as cool or tough. Additionally, cigarette advertisements often promote positive imagery that appeals specifically to boys and young men<sup>15</sup>. A study in Surabaya revealed that smoking behavior is socially constructed as an element of masculinity among adolescent males, despite existing regulations aimed at restricting tobacco product access to minors. The study emphasized the urgent need to reconsider the distribution of tobacco products to ensure they are not accessible to youth<sup>16</sup>.

Curiosity is defined as a desire within an individual to learn about a particular object or event, obtained through observation, listening, or measurement. Research has shown gender-based differences in the distribution of curiosity levels among students. A higher percentage of male students were categorized as having very high and high curiosity compared to female students. However, a higher percentage of female students were categorized as having very high and high levels of comprehension difficulties. This may suggest that curiosity does not always translate directly into understanding, and that gender differences can influence cognitive styles and thought processes in children<sup>17</sup>.

### **Knowledge about the Dangers of Smoking**

In this study, children who stated that they were aware of the harmful effects of smoking had a significantly higher proportion of smokers compared to those who reported not knowing about these harmful effects (85 out of 806 [10.5%] vs. 7 out of 265 [2.6%];  $p < 0.01$ ). The most plausible explanation for this counterintuitive finding is that the majority of respondents may not possess adequate or accurate knowledge about smoking. A previous study assessing the knowledge of 112 elementary school students in a region of Yogyakarta found that only 13.4% of children achieved a good knowledge score (score  $>75$ )<sup>18</sup>.

A study involving 52 students from SD Negeri Grogol 05 in West Jakarta revealed that most students held negative perceptions of smoking behavior, indicating that they viewed smoking as harmful. However, the majority lacked specific knowledge about smoking, including information on harmful substances in cigarettes and the associated health risks<sup>19</sup>. Conversely, research by Ariani et al. (2019) involving 356 students from grades IV and V across 33 elementary schools in Karawang showed a more positive perception of smoking behavior. This may reflect a lack of understanding among elementary students regarding the direct and indirect dangers of smoking<sup>20</sup>.

Young children are typically highly motivated to explore and understand their world. It has been suggested that children's understanding emerges when they actively seek connections between their experiences and conceptual frameworks that help them make sense of their environment<sup>21</sup>. A study by Nurmansyah et al. (2019) found that the majority of students both smokers and non-smokers were aware that smoking could cause health problems. This finding underscores the importance of shifting the youth's perspectives on smoking, rather than solely focusing on delivering information about its health risks once awareness is already present<sup>22</sup>. A similar dynamic is observed in studies examining the relationship between knowledge, attitudes, and behavior in health protocol compliance. One such study found a weak but positive correlation between knowledge and attitudes with adherence to health protocols, suggesting that greater knowledge and positive attitudes may lead to improved behavior, albeit modestly<sup>23</sup>.

### **Ever seen people smoking at school**

The prevalence of smoking among students who had witnessed someone smoking at school was significantly higher than among those who had not (62 out of 403 [15.4%] vs. 30 out of 668 [4.5%],  $p < 0.01$ ). Demographic data revealed that the individuals most frequently observed smoking in the school environment were categorized as “others,” including street vendors and nearby residents ( $n = 174$  [44.8%]), followed closely by teachers ( $n = 169$  [43.6%]). School staff ( $n = 36$  [9.3%]), security personnel ( $n = 7$  [1.8%]), and peers ( $n = 2$  [0.5%]) accounted for smaller proportions.

Teachers represent a major contributing factor to students’ exposure to smoking behavior within school premises. Given their role as role models and their prolonged interaction time with students, teachers should refrain from exhibiting behaviors that set a negative example<sup>24</sup>.

Much of children's knowledge is derived not from direct experience but through information received from others. The use of visual materials is particularly effective in the learning process. Visual imagery can stimulate thought, capture students' attention, and facilitate conceptual understanding<sup>25</sup>. Visual perception involves the processing of sensory and cognitive information through vision, relying on both visual stimuli and cognitive factors such as visual attention and memory. It entails the differentiation of concepts through visual analysis, including form constancy, background discrimination, and the application of existing knowledge<sup>26</sup>.

The presence of smokers on school grounds increases the likelihood of secondhand smoke exposure among students. It is not uncommon for teachers to smoke openly in the school environment, consequently exposing nearby students to passive smoking. From a public health perspective, secondhand smoke is often considered more harmful than direct smoking. Therefore, it is advisable for schools to enforce strict no-smoking policies for their teaching staff<sup>22</sup>.

### **Family Members Smoking**

This study demonstrated a significant association between having family members who smoke and the prevalence of smoking among children. The proportion of smokers was significantly higher among children with at least one smoking family member compared to those without (84 out of 704 [11.9%] vs. 8 out of 367 [2.2%],  $p < 0.01$ ). A meta-analysis by Wang et al. (2018) revealed that smoking by family members and peers is a strong predictor of tobacco use among adolescents and children<sup>27</sup>.

This finding aligns with a study by Rezeki and Utari (2021), which investigated 120 sixth-grade students across four elementary schools in Banda Aceh. They found that students from families with smoking members were significantly more likely to smoke themselves—61.8% reported smoking—placing them at 5.3 times greater risk compared to those without such family exposure. Common reasons for initiating smoking included being frequently asked by parents to purchase cigarettes and often witnessing family members smoke, which led to curiosity and, eventually, addiction<sup>28</sup>.

Additional factors influencing adolescent smoking include parental smoking, peer pressure, and the desire to gain social acceptance. Initiation may also be shaped by parenting style, the smoking behavior of siblings, and the belief that smoking alleviates stress and boredom<sup>8</sup>. Logistic regression analysis in another study found that parental permission to smoke at home was the strongest predictor of child smoking, followed by low levels of parental supervision. Parents and siblings who smoke, lenient household smoking rules, and weak parental oversight are significant predictors of smoking behavior in children aged 8–12. In the Indonesian cultural context, children tend to hold their parents and siblings in high regard due to cultural, religious, and customary norms, making family members important role models. Consequently, children are likely to imitate behaviors exhibited by their family<sup>29</sup>.

Child development is influenced by individual characteristics, family environment, and broader social contexts. Physical health, cognition, language skills, and socio-emotional development all contribute to school readiness. Parental behavior and values are frequently passed down to children through daily routines at home<sup>21</sup>. In South Korea, the proportion of adolescents exposed to secondhand smoke at home decreased from 40.3% in 2006 to 23.0% in 2018, driven by increasing parental awareness and behavioral change—parents have become more conscious about not smoking in the presence of children<sup>30</sup>. Setting clear expectations for smoke-free environments appears to be more effective in preventing smoking initiation among youth than merely advising them against tobacco use<sup>31</sup>.

### Peers Who Smoke

In this study, children who reported having peers who smoked showed a significantly higher smoking prevalence compared to those who did not have smoking peers (63 out of 117 [53.8%] vs. 29 out of 954 [3.0%],  $p < 0.01$ ). This finding is consistent with the study by Smit et al. (2023), which demonstrated that adolescent smokers typically have more friends who also smoke, whereas non-smokers tend to associate more with non-smoking peers. This phenomenon can be explained through the concept of peer influence, a social process whereby an individual’s behaviors or attitudes are shaped by the behaviors and expectations of their peers within a social network<sup>32</sup>.

A study by Ajsal et al. (2023) involving 32 students from grades 4 to 6 at SD 210 Kajaolaliddong, Barebbo Subdistrict, Bone Regency, found a statistically significant relationship between having smoking peers and students' smoking behavior ( $p = 0.002$ ). This relationship is likely due to the frequent social interactions that students have with their peers both in school and in their neighborhoods, making them highly susceptible to negative influences such as smoking and peer group formation. Students often feel social pressure to imitate their friends’ behaviors to avoid being labeled as unpopular<sup>33</sup>.

Smoking behavior generally begins and develops during adolescence. Current research highlights that attitudes associated with smoking behavior differ significantly between smokers and non-smokers. Beliefs such as smoking increases confidence, enhances social appeal, helps with stress relief, and symbolizes maturity and masculinity are statistically associated with adolescent smoking behavior<sup>22</sup>.

Peer influence is a powerful determinant of behavior in elementary school children and can shape the peer environment. This environment is characterized by attitudes of cooperation, empathy, mutual understanding, and helpfulness, which can significantly affect student learning outcomes<sup>34</sup>. A separate study emphasized the importance of cultivating wisdom in forming friendships. It advocates avoiding harmful and destructive relationships while promoting supportive peer relationships that foster personal growth, positive behavioral change, and collective well-being, including spiritual development<sup>35</sup>.

**Table 2. Results of categorical comparative analysis of factors associated with never/never smoking**

Dependent Variable	Ever Smoked		<i>p-Value*</i>
	Yes n (x%)	No n (x%)	
<b>Grade</b>			
4th grade elementary school (n=371)	18 (4,9%)	353 (95,1%)	<0,01
5th grade elementary school (n=373)	31 (8,3%)	342 (91,7%)	
6th grade elementary school (n=327)	43 (13,1%)	284 (86,9%)	

<b>Gender</b>			
Male (n=546)	92 (16,8%)	454 (83,2%)	<0,01
Female (n=525)	0 (0%)	525 (100%)	
<b>Knowing the bad effects of smoking</b>			
Yes (n=806)	85 (10,5%)	721 (89,5%)	<0,01
No (n=265)	7 (2,6%)	258 (97,4%)	
<b>Have seen people smoke at school</b>			
Yes (n=403)	62 (15,4%)	341 (84,6%)	<0,01
No (n=668)	30 (4,5%)	638 (95,5%)	
<b>Having a family member who smokes</b>			
Yes (n=704)	84 (11,9%)	620 (88,1%)	<0,01
No (n=367)	8 (2,2%)	359 (97,8%)	
<b>Having close friends who smoke</b>			
Yes (n=117)	63 (53,8%)	54 (46,2%)	<0,01
No (n=954)	29 (3,0%)	925 (97,0%)	

\*Pearson Chi-square

## CONCLUSION

The study identified key risk factors for smoking among elementary school children, including gender, exposure to smokers within the school environment, smoking family members, and peer influence. Families and schools, as primary protectors against smoking initiation and its harmful effects, must maintain active roles in prevention efforts given children's long-term vulnerability. Based on these findings, the researchers suggest targeted interventions focusing on the school environment. They propose a printed media campaign directed at teachers, school staff, and students to discourage smoking role models and empower students to reject smoking. Future research should explore the effectiveness of such school-based interventions and evaluate how combining family involvement with school efforts can further reduce smoking initiation in this age group.

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