

## Conference Paper

# Tobacco Use and Adolescents in Indonesia: Narrative Review of Determinants

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## Abstract

In 2013, Indonesia had over 60 million smokers that made this country in the third highest number of tobacco users in the world. The Global Youth Tobacco Survey 2014 revealed that there were 20.3% of adolescents aged 13-15 smoked tobacco products. Teen smokers are risky to become addicted to nicotine and suffer from tobacco-related diseases such as respiratory and cardiovascular system damage. Ultimately, these health consequences reduce the youths' productivities. A better and comprehensive understanding of factors related to tobacco use in children is critical to promote more comprehensive approaches in reducing the high prevalence of smoking, addressing health inequalities, accelerating health, social, and economic impacts.

This paper aimed to review the determinants of tobacco use among adolescents in Indonesia which were prominent for forwarding tobacco control interventions.

Systematic search literature undertakes through journal databases including PubMed, Medline (Ovid), Scopus, ProQuest, Web of Science, PsycINFO, Google Scholar, websites of the MoH, WHO, and CDC. Content and thematic analysis employed among final selected papers.

Tobacco use among adolescents in Indonesia was associated with socio-demographic determinant including age, sex, family structure, pocket money, parents' education, parental employment, grade, school area; personal determinants including curiosity, self-efficacy, attitude, positive perception of tobacco consumption effect on the mind, belief that smoking was functional; behavioural determinants including class absent, academic score, physical activities; environmental determinants including having friends, peers, parents, sibling who smoked, family function, accessibility, availability and affordability of tobacco products, social factors, cigarette advertising. There were disparities across socio-demographic factors between smokers and non-smokers — moreover, personal and behavioral determinants of smoking among adolescents mainly influenced by the environment.

Behavioral changes were necessary to improve health outcome. However, socio-environmental approach such as building healthy public policy was also needed. Tobacco control legislation could encourage social, environmental, and system changes. Moreover, they had a broader action to reduce health disparities and more sustained impact on social determinants of health than intervention which focus on individuals.

**Keywords:** Tobacco use; determinant; adolescent; Indonesia

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## 1. Introduction

Globally, more than 1.1 billion people used tobacco product in 2015, with males (36%) than females (7%) using products of tobacco (World Health Organisation (WHO) 2015). Nearly 600 million of smokers live within Southeast Asia countries. Al-Sadat et al. (2010) revealed that some countries in this region such as Malaysia, Thailand, and Vietnam had decreased their number of tobacco user progressively. On the contrary, Indonesia had a rising trend for smokers in the general population which increased from 27.2% in 1995 to 36.3% in 2013. In 2013, Indonesia had over 60 million smokers that placed this country in the third highest number of tobacco users in the world (Ministry of Health of Indonesia (MoH) 2013a).

United State Department of Health and Human Services (USDHHS) (2012) asserted that using tobacco products either smoking or smokeless tobacco was a global epidemic among adolescents. Over 50% of tobacco users were young people worldwide. Eriksen et al. (2015) found youths consumed cigarettes and other products of tobacco around the world, mainly in Southeast Asia, the Eastern Mediterranean, and sub-Saharan Africa. In Indonesia, the WHO (2015) reported from the Global Youth Tobacco Survey (GYTS) 2014 that there were 20.3% of adolescents aged 13-15 smoked tobacco products. Moreover, 43.2% of Indonesian youths started to consume cigarettes when they were 12 to 13 years old (WHO 2015).

The USDHHS (2014) confirmed that teen smokers were risky to become addicted to nicotine and suffer from tobacco-related diseases such as respiratory and cardiovascular system damage. Moreover, nicotine addiction had a permanent effect on youth brain development since a teen's brain was not fully developed (Steinberg 2007). The Center for Disease Control and Prevention (CDC) (1994) asserted that smoking in the long-term degraded the function of the lung, lowered the rate of lung growth, increased the chance of developing lung cancer. Ultimately, these health consequences reduced the youths' productivities.

The factors related to tobacco use in youths may be different across countries. The CDC (1994) indicated four determinants, including socio-demographic, environment, behavior, and personal factors influenced smoking initiation. Primary research undertaken in Banten, Indonesia, found social influence and self-efficacy were related to tobacco use among students (Bigwanto et al. 2015). Another study in Semarang, Indonesia, revealed that the smoking behavior of best friends had a prominent effect on the smoking behavior of male students (Smet et al. 1999).

Although several primary types of research on smoking in youth conducted in Indonesia, there no only research that reviewed compressively by using the evidence from these critical researches. A better and comprehensive understanding of these risk factors was crucial to promoting more comprehensive approaches to reducing the high prevalence of smoking, addressing health inequalities, and accelerating health, social, and economic impacts. Therefore, this project aimed to review the determinants of tobacco use among adolescents in Indonesia which was prominent for forwarding tobacco control interventions. Accurately, the project would evaluate the studies that

examined the association of socio-demographic, personal, behavioral, environmental determinants with tobacco use among adolescents.

## 2. Methods

Systematic search literature undertakes in publications across the following databases: PubMed and Medline (Ovid) provided life science and biomedical studies; Scopus, ProQuest, and Web of Science provided multidisciplinary studies; and PsycINFO provided behavioral and social sciences studies. Afterward, all relevant publications were examined to obtain additional relevant publications. Additionally, hand searches were also conducted to identify the grey literature including searching for papers and reports from Google Scholar, websites of the MoH in Indonesia, the WHO, and the CDC.

English-language literature published between 1999 and 2017 included in this review. This timeframe was selected because 1999 was when the Indonesian government implemented the first regulation ‘Government Regulation No. 81 of 1999’ to control the impacts of tobacco on health. Subject headings and keywords obtained by consultation with the librarian. The subject heading had four concepts, and the keywords of each concept for this review included tobacco use, smoke, tobacco, cigarette, nicotine, social determinant, social demographic, socioeconomic, culture, social class, lifestyle, environmental, personal, educational status, self-esteem, knowledge, behaviour, adolescent, youth, young adult, teenager, Indonesia, ASEAN, Southeast Asia. Also, Boolean Operator ‘AND’ and ‘OR’ was applied in combination with subject heading terms and keywords. Detail searching strategies annexed in Appendix 1.

### Appendix 1

TABLE 1: Searching strategies on tobacco smoking and adolescents in Indonesia across data bases, 2017.

Main Concepts	Concept 1	Concept 2	Concept 3	Concept 4
	<b>Tobacco Use</b>	<b>Determinants</b>	<b>Adolescents</b>	<b>Indonesia</b>
<b>Search Terms</b>	Smoke Tobacco Cigarette Nicotine	Social determinant Social demographic Socioeconomic Culture Social class Lifestyle Environmental Personal Educational status Self-esteem Knowledge Behavior	Adolescent Youth Young adult Teenager	Indonesia ASEAN Southeast Asia
<b>Search Strategy</b>	Concept 1 AND Concept 2 AND Concept 3 AND Concept 4			
	(Smok* OR tobacco* OR cigarette* OR nicotine) AND (social determinant* OR "social demographics*" OR socioeconomic* OR culture* OR "social class" OR "lifestyle" OR environmental* OR personal OR "educational status" OR self-esteem OR knowledge OR behaviour) AND (adolescents* OR youth* OR young adult* OR teenage*) AND (Indonesia* OR ASEAN* OR Southeast Asia*)			

Following systematic search literature, as described above, a systematic narrative review was employed to final numbers of studies because it saves more time than a systematic review (Enferm 2007).

## 2.1. Inclusion criteria

### 2.1.1. Types of participant

The review considered publications which reported adolescents between the ages of 10 and 19 years of the participants or population group regardless of sex, race, ethnicity and geographical boundaries and associated confounders who use tobacco products.

### 2.1.2. Types of exposure

The review considered publications that examined determinants of tobacco use among adolescents including age, sex, family structure, pocket money, parents' education, parental employment, grade, school area, curiosity, self-efficacy, attitude, positive perception of tobacco use effect on mind, believe that using tobacco products is functional, class absent, academic score, and physical activities, having friends, peers, parents, sibling who smoked, family function, accessibility, availability and affordability of tobacco products, social factors included social norm, social pressure, rules and discussion about the smoking hazard, and cigarette advertising.

### 2.1.3. Types of outcome

The review considered publications that included tobacco use as the outcome including smoked products of tobacco such as cigarettes, hand-rolled and clove cigarettes, and smokeless form of tobacco products.

### 2.1.4. Types of studies

The review considered quantitative studies including cross-sectional survey, case-control studies, and cohort and experimental studies that undertake between 1999 and 2017 in Indonesia.

## 2.2. Analysis

In data analysis, content and thematic analysis employed including these following steps: 1) the eligible articles were reviewed in full to familiarize with the content of each including paper; 2) key variables or determinants explore; 3) themes were generated based on the key variables; 4) particular variables were coded or grouped into relevant topics; 5) items were reviewed and checked if they are relevant or not or beyond; 6) irrelevant themes replace, and emerging issues added, and 7) reports were produced for each item.

### 3. Results and Discussion

During the systematic search, 382 potential studies recorded: 375 from the literature search, four from Google Scholar and websites of WHO and MoH, and three from bibliography review. A total of 148 articles remove because of the duplication. The title and abstract of 235 records were reviewed and filtered, and 200 papers exclude because they were irrelevant (129), and the outcome (21) and population (50) did not fulfill the inclusion criteria. Then, 35 papers selected for full-text reviewed, and 25 articles excluded because of the outcome (6), exposure (7), population (6), design study (6) did not fulfill the inclusion criteria. Finally, a total of 10 studies included in this review. A total of 10 studies that assessed the association between tobacco use among adolescents and at least one of the exposures were included (Appendix 2).

### Appendix 2

TABLE 2: Characteristics of included papers (n = 10).

Author	Year	Population	Setting	Study design	Summary results
Smet, et al.	1999	Students aged 11, 13, 15, and 17 years old	Semarang	Survey-cross sectional	Age, best friends' smoking behavior and attitudes towards smoking, older brothers' smoking behavior were significant determinants of smoking.
Bigwanto, et al.	2015	High school students (15 – 19 years old)	Banten	Survey-cross sectional	Age, sex, grade, mother's job, and school area had a significant association with cigarette smoking. The ownership of promotional items, attitude, social factors (norm, model, pressure, discussion about smoking hazard), self-efficacy, availability, and accessibility of cigarettes had an association with cigarette smoking.
Sukamdi & Wattie	2008	Youths living in both non-migrant and transnational households	East Java and West Java	Case-control	Age, sex, family functioning and tobacco use by friends significantly associated with smoking status.
Martini & Sulistyowati	2004	High school students aged 13 - 21 years old	Madiun City, Malang City, Jember and Bangkalan Regency	Survey-cross sectional	Age, family structure, pocket money, believe cigarettes easy to get, beliefs that are smoking increased concentration and self-confidence, helped to get better grades, made life more comfortable, perceived as attractive, and having peers that smoke or approve of smoking, family members smoke associated with smoking prevalence.

Author	Year	Population	Setting	Study design	Summary results
Prabandari & Dewi	2016	High school students aged 13 - 18 years	Yogyakarta Municipality	Survey-cross sectional	Age, sex, pocket money, and mother's education, the perception of tobacco ads, attitude toward TAPS (tobacco advertising promotion and sponsorship), having friends and family who smoked, the susceptibility to burn associated with current smoking among adolescents.
WHO	2014	Students aged 13–15 years	Indonesia	Survey-cross sectional	Sex, accessibility, and availability of cigarette had an association with cigarette smoking.
Herawati et al.	2017	grade 7 students, aged 11–14 years old	Jayapura	Case-control	Sex, there was no significant the statistical relationship between knowledge and smoking behavior among respondents, there is no significant relationship between teenagers' behavior with the action of the parents and other family members, 87 % of teenagers became smokers because there were individuals who smoke at home.
French et al.	2014	Muslim Indonesian adolescents	Bandung	Cohort prospective	Sex, friends' use, whereas network affiliates' use had an association with cigarette smoking.
Tirtohusodo et al.	2016	senior high schools' male students aged 15-19 years	Bandung	Case-control	Low and moderate physical activity, positive perception of using tobacco products and exposure to close smoking friends escalate the risk of using tobacco products in male adolescents.
Kusumawardani & Suwardi	2011	Adolescents, aged 12 - 15 years old	Depok	Survey-cross sectional	Academic score and class absents had a significant relationship with smoking behavior among male adolescents.

These studies conducted across Indonesia and the majority of them undertakes in Java Island, the most populous island in this nation. These studies included quantitative studies using cross-sectional survey (6), case-control (3), prospective cohort (1). All studies were reviewed to assess the factors affecting tobacco use among Indonesian adolescents.

### 3.1. Factors associated with tobacco use in adolescents in Indonesia

Based on the results of the thematic analysis, the following themes emerged: socio-demographic, personal, behavioral and environmental factors.

### 3.2. Socio-demographic determinants

Eight out of the ten studies eligible for review reported socio-demographic factors and tobacco use in Indonesia. The following socio-demographic factors were analyzed to assess their association with smoking among adolescents: age, sex, family structure, pocket money, parents' education, parental employment, grade, school area. Five studies appraised the relationship between generation and tobacco consumption. Smet et al. (1999) revealed that tobacco use increased significantly between the ages of 11 and 17. Bigwanto et al. (2015) who assessed generation revealed that students between 18 and 19 years old were 2.1 times more likely to smoke than the younger students. Six studies that evaluated the association between sex and smoking status revealed that being male was more likely to use tobacco than the female. This finding is corresponding with the GYTS (2000 – 2007) that reported boys in the Americas, European and South-East Asia regions were more likely to be smokers than the girls. To address gender inequalities, a gender equality framework is significant to support existing tobacco control intervention which involves an analysis including biological, social, economic and cultural factors influence health risk and lead to different needs for male teens and female teens in specific settings (WHO 2011). For instance, Sussman et al. (1998) who analyzed the reason for quitting and smoking temptation among youths by gender in California and Illinois, United States found that female teen smokers were more addicted to nicotine and less likely to have quit in the past due to a higher functional significance of smoking. Therefore, a pharmacological approach that learns about metabolism, diet, and exercise may be specifically relevant for female teen smokers than male teen smokers.

Regarding family structure, Martini and Sulistyowati (2004) reported students who lived with other family members were more likely to smoke (25%) than students who live with parents and siblings (19%). Prabandara and Dewi (2016) found that pocket money had an association with smoking status. Martini and Sulistyowati (2004) supported this finding, stating that there was a significant relationship between the amount of pocket money and being a current smoker. This result was similar to studies conducted in India and Nepal. Students getting higher pocket money were more likely to smoke since having enough cash in hand predispose youths to access cigarettes easily (Kumar et al. 2014; Pradhan et al. 2013). Therefore, it was significant to involve parents and family to address the association between pocket money and smoking among adolescents. Beside advising parents to restrict their children's pocket money, they could be encouraged to monitor and instructings to their children about using the money. Scragg et al. (2003) suggested that parents could be invited to put conditions on the utilization of the funds with a clear statement that buying tobacco products was not allowed, create and reinforce consequences of purchasing tobacco products, and encouraged their children to save money against purchase tobacco products.

Barber et al. (2008) claimed that price and taxation interventions were the most useful tools in reducing consumption of tobacco in overall prevalence, particularly in youth and the poor smokers, who were the most sensitive groups to price increases. Furthermore, increasing cigarette taxation had the potential to decrease tobacco consumption, and generate government revenue (Kostova et al. 2011). In 2013, the government of Indonesia

through the Finance Minister Regulation No. 179/PMK.011/2012 Had increased the excise tax rate on tobacco and the retail prices of cigarettes. The machine-made *kreteks* (clove cigarettes) were appraised excise taxes in the range of 50% - 56% of retail price and averaged 53% of retail price.

On the other hand, hand-rolled *kreteks* appraised in the range of 32% - 37% of retail price and white cigarettes in the field 49% - 56% of retail price (Ministry of Finance of Indonesia 2012). However, this level considered as a low tax nation compared with other countries in ASEAN region and far below the World Bank's recommended tobacco tax of 67%-80% of the retail price (World Bank 2009). Moreover, an economic analysis indicated that government revenue gaining from tobacco was only Rp.13 trillion, while loss because of tobacco use included medical bills, disabilities, and premature mortality was Rp.42 trillion (Pawitan 2010).

Kusumawardani and Suwardi (2011) found that Indonesian adolescents smoke *kreteks* as high as filter cigarettes accounted for 48.0% each respectively. Regarding the type of cigarette, *kreteks* carried a lower excise tax than filter cigarettes (Nichter et al. 2009). Therefore, the tax on cigarettes and *kreteks* should increase since there is still much room to raise taxes. Barber et al. (2008) asserted that a 10% rise in the excise tax was estimated to reduce 4% in cigarette consumption and raise in tobacco excise revenue about 7-9%.

Prabandari and Dewi (2016) reported the association between the education of parents and smoking behavior among youths. Moreover, Bigwanto et al. (2015) revealed that mother's school had an association with smoking status. Bigwanto et al. (2015) reported that a mother's job significantly associated with cigarette smoking. These studies found that youths having mothers with a lower level of education and with no work or retirement were more likely to smoke. These facts reflected that experiencing social disadvantages particularly unemployment and lower level of education increased the risk of being a smoker. Therefore, to address inequities in tobacco use among adolescents regarding the lower level of education and unemployment of mothers, it was significant to include actions that improve access to quality of education and employment. In other words, women education and empowerment were necessary as a mean of controlling tobacco use.

In term of grades and school area, Bigwanto et al. (2015) found that students who had been studying in third grades were 1.7 times more likely to smoke than those who were in first and second grades in high school. This finding was similar to a study conducted in Nainital, India that the students belonging to more top category were more likely to use tobacco than the students at first grade of schools (Awasthi et al. 2010). Furthermore, Bigwanto et al. (2015) revealed students who went to school in rural areas were 1.9 times more likely to smoke than those who went to school in urban areas. Similarly, a study in American youths found that initiation to burn earlier in life, and daily smoking were more likely among children in rural areas than kids in urban areas (American Lung Association 2015). It reflects that there were geographic location disparities of smoking among youths. Rural areas have a depriving characteristic which may lead children to seek or remain addicted to alternative sources of reward like cigarettes (Marmot and Wilkinson 2005; Leventhal 2016). Moreover, the enforcement of tobacco control



policies might face challenges in rural areas. A function of poor health communication, low access to health care, and low quality of health care in rural areas were significant factors for a diminished tobacco control impact in rural areas (Doogan et al. 2017).

### 3.3. Personal determinants

Three of the ten studies eligible for review assessed personal factors and tobacco use in Indonesia. The following personal factors were reported to associate with tobacco use: curiosity, self-efficacy, attitude, positive perception of tobacco consumption effect on the mind, belief that smoking was functional for increasing concentration, self-confidence, good grades, makes life easier and perceived as attractive.

Bigwanto et al. (2015) reported that curiosity was the main reason (32%) for experimenting with cigarettes. They also indicated the risk of smoking increased 48 times for adolescents who were in negative self-efficacy. Regarding attitude, Bigwanto et al. (2015) revealed that adolescents with negative attitude were 7.8 times more likely to use tobacco products than adolescents with positive attitudes. Therefore, creating self-efficacy to defend initiating of smoking among young people should be applied. To improve positive self-efficacy of youths and develop their abilities to perform a health-protective behavior from the social influences such as refusal skills, it needed to embodied in programs in cooperation with local authorities and families. Personal life choices were strongly affected by social and economic circumstances in which people live, learn, work and play. Therefore, social support from families, friends, and community network was related to better health (Health Canada 2015).

Tirtosudiro et al. (2016) reported an association between positive perception of tobacco use effect on the mind and the current smoking status. The study revealed that youths with a positive impression of tobacco consumption effect on their account were 8.8 times more likely to use tobacco products than those with a negative perception. A similar finding also is shown in Kelantan state, Malaysia, attitude toward smoking associated with smoking behavior in students. Agreement that tobacco was harmful to health was higher among students who did not smoke (Naing et al. 2004).

Martini and Sulistyowati (2004) revealed beliefs that are smoking increased concentration (82%) and self-confidence (80%), helped to get better grades (77%), made life more comfortable (83%), perceived as attractive (80%), were primary reasons for the prevalence of current smokers. Positive beliefs about using tobacco also occurred in youths in Thailand. Parkinson (2009) found Thai adolescents believed that smoking made male teens and female teens look more attractive and look more mature.

Health information that corrects about misperceptions of positive effects of smoking to adolescents is significant. For instance, a school-based smoking prevention program had positive effects on students' smoking knowledge, intention to smoke and behaviors (Tahlil et al. 2013). Flay (2009) asserted that a school-based smoking prevention program should be more interactive so this measure could be more useful for adolescents. School authorities needed to involve non-smoker peers to deliver knowledge about the dangers of smoking addiction and emphasize the harmful effects of smoking because youths had high interaction with their peers during adolescence.

Advertisement interference such as images of cancer and congenital disabilities on tobacco product packaging could be effective strategies. Indonesian government through MoH enacted a regulation No. 28 of 2013 regarding health warning labels and health information on cigarette packs. Health warning graphics are necessary to be imprinted to cover 40% of the main display areas both in front and reverse of the box. Although, Indonesian government prohibited misleading terms such as light and low tar on cigarette packs, other misleading names on cigarette packs such as colors, numbers, and logos are still allowed (MoH 2013b). In Australia, this country implemented more important health warning on tobacco packages with 75% of the front face of the pack and 90% of the back face. Moreover, Australia passed plain packaging regulations which all tobacco products necessitated to sold in flat, brown bags, without companies' logo and the same font for all tobacco brand per December 1, 2012 (Australian Government Department of Health 2016). Therefore, amendments to packaging and labelling regulations in Indonesia are necessary to make the advertisement interference more effective.

### 3.4. Behavioral determinants

Two of the ten studies eligible for review assessed behavioral factors and tobacco use in Indonesia. The following behavioral factors were reported to associate with tobacco use: class absent, academic score, and physical activities. Kusumawardani and Suwardi (2011) found that smoking status was more prevalent in students who have significantly higher class absents and substantially have a lower average academic score. A study conducted in Malaysia also found that tobacco users had relatively poor academic performance compared to those who did not smoke cigarettes (Naing et al. 2004).

Regarding physical activity, Tirtosudiro et al. (2016) found that low and moderate level of physical activity increased the risk of smoking in male adolescents. The male teens who did low and moderate physical activity were 10 and 2.7 times respectively more likely to use tobacco products than those who did the high physical activity. Therefore, it was significant to encourage youths to increase physical activity. The WHO (2010) recommended to include play, games, sport, chores, recreation, physical education, or planned exercise for improving physical activity in adolescents. It was also essential to build healthy environments including bike paths, footpaths to support good health.

Additionally, providing tobacco cessation facilities were urgently needed to support smokers who want to quit smoking. Community-based programming was recommended by involving family, school and key community members. Although behavior change was a prerequisite to improving youth health status, this approach was not enough. Health advocacy was required for policy supporting lifestyle change. Building healthy public policy, one of action in socioenvironmental approach, was needed since many determinants of tobacco use in youths were beyond their control.

### 3.5. Environmental determinants

Nine of the ten studies eligible for review assessed environmental factors and tobacco use in Indonesia. The following ecological factors were reported to associate with tobacco use: having friends, peers, parents, the sibling who smoked, family function, accessibility, availability and affordability of tobacco products, social factors including social norm, social pressure, rules and discussion about the smoking hazard, and cigarette advertising,

Prabandari and Dewi (2016) found that adolescents with friends who smoked were nine times more likely to become smokers than those who had no exposure from their friends. Other five studies (Sukamdi and Wattie 2008; Smet et al. 1999; French 2014; Tirtohusodo et al. 2016; Martini and Sulistyowati 2004) also reported the association between having friends or close friends or peer who smoke and respondents' smoking behavior. Peer-based tobacco use intervention could be useful to address the relationship between peer influences and smoking among adolescents. Peers were likely to be embedded in young people communities; they might have a greater extent on the behavior change in young people than adults or professionals. In a meta-analysis of peer-led interventions to prevent substance use among youths, Georgie et al. (2016) concluded that peer-based approach might be effective about tobacco use among adolescents.

A significant association between the smoking behavior of family members such as father or sibling and smoking behavior in youth assessed by Martini and Sulistyowati (2004), Smet et al. (2009), Prabandari and Dewi (2016). Furthermore, Sukamdi and Wattie 2008 reported that family functioning had a relationship with tobacco use in youths. They indicated that there were half times more likely to use tobacco products in adolescents with a supportive and functioning well-being family than those from less favorable families.

Enforcement of smoke-free home policy and school regulations to prohibit smoking are necessary to protect every family and school members from tobacco, reduce the prevalence of smoking, and ultimately improve health outcomes. A study in the United States compared students living in restriction area with those live in unrestricted residences revealed that students residing in dormitories with a restriction on smoking are less likely to smoke (21%) than their counterparts living in open areas (30.6%) (Wechsler et al. 2001).

Smoke-free places also regulated by the Indonesian government in national level through 'Government Regulation Number 81 of 1999' regarding pacification of cigarettes for health. Smoking banned in public places and workplaces including health-care facilities, educational facilities, places of worship, children playground, and also public transportation (Government of Indonesia 1999). Moreover, the Ministry of Education and Culture (2015) had stipulated regulation No. 64 of 2015 concerning smoking free in school environments which prohibited school principals, teachers, education workers, students, and other parties from smoking, producing, advertising and promoting cigarettes in a school environment.

However, the WHO (2015) revealed that the smoke-free environment in Indonesia was not being applied effectively since students whether at home or in school were exposed to second-hand smoke. Moreover, to be implemented in each district across the nation, it required passage of laws by the local authority. Therefore, local authorities should be encouraged to apply comprehensive smoke-free policies.

An association of accessibility, availability, affordability of tobacco products and current smoking assessed in 3 studies. Bigwanto et al. (2015) reported that the accessibility and availability of tobacco products had an association with the current smoking status. They found that a high level of availability and accessibility of tobacco products increased the likelihood of using tobacco to 3.7 and 7.6 times. The WHO (2015) found that 58.2% of adolescents who currently used tobacco bought their tobacco products from stores and shops. Furthermore, Martini and Sulistyowati (2004) revealed that nearly half of youth smokers in their studies thought that cigarettes were affordable.

Similarly, Shortt et al. (2016) who conducted a study in Scotland found adolescents who reside in the areas of highest density of retailers around their environment had higher odds of ever smoked (53%) and current smoking status (47%). Therefore, the government particularly MoH together with other sectors and stakeholders were needed to take the lead to reduce access to and availability of cigarettes among adolescents. For instance, the authorities required to be advised to focus on decreasing the density of tobacco stores.

Regarding social factors, Bigwanto et al. (2015) reported that the risk of using tobacco products escalated 35.5 times for youths with harmful norms of smoking. Correspondingly, adolescents with social pressure to use tobacco products were 3.2 times more likely to use tobacco. Furthermore, they also revealed that students without rules and discussion about tobacco consumption hazard at home and school were 4.9 times more likely to smoke. Therefore, it's significant for school authorities to undertake talks and study with the help of health staff to educate students about the harmfulness of tobacco use on learning activities. Moreover, co-curriculum activities should be encouraged to protect children from social pressure and prevent them from being attracted to smoking.

In term of tobacco advertising, Martini and Sulistyowati (2004) reported a high percentage of all students saw cigarettes advertising on billboards and television. They also revealed that although fewer students saw the advertising in teen magazines, this medium appeared to be related to the higher tobacco use prevalence.

Prabandari and Dewi (2016) found that the perception of smoking advertising associated with the current smoking of youths. Adolescents with a high knowledge of tobacco advertising were 7.7 times more likely to become smokers compared to those who had a low perception. They also reported that youths with a positive attitude toward tobacco advertising were 3.3 times to become smokers. Moreover, Bigwanto et al. (2015) revealed the risk of smoking increased 3.7 times for teens who had tobacco promotional items. Tobacco marketing had a significant influence on beliefs among tobacco use. Nichter (2009) asserted that tobacco companies in Indonesia advertised their products aggressively and innovatively, and the advertisements saturated the Indonesian culture and environment that portray cigarettes as symbols of cultural change, modernity, and globalization.

As one of the most significant sources of government revenue, tobacco companies in Indonesia has political and financial power in this nation. Consequently, tobacco control policies established in Indonesia have few restrictions regarding cigarettes marketing and advertising. They indicated in the amendment in the first government regulation on tobacco control No.81 of 1999. The government changed an article banning advertising in electronic media to allow tobacco advertising broadcast between the hours of 21:30 and 05:00 local time in a new regulation No. 38 of 2000. It is prohibited to show cigarettes, tobacco product branding, or smoking in broadcasting tobacco advertising (Hurt et al. 2010). However, Indonesian students have report exposure to cigarette advertisement. The WHO (2015) found that 58.2% of respondents in GYTS watched someone smokes on television, videos or movies.

Distribution of free and discounted cigarettes, cigarettes as prizes, and the brand stretching of cigarettes also banned under the law. However, the WHO (2015) found that there were 9% of Indonesian students had an item with a tobacco products brand logo and the representative of cigarette companies offered 7.9% of students free cigarettes. These facts pointed there were violations by tobacco companies of the government regulation.

Indonesia is the only nation in Asia Pacific region that has not ratified the WHO Framework Convention on Tobacco Control (FCTC). Pawitan (2010) argued that the fear of economic loss because of the myth of the importance of tobacco in the country's economy is the reason for the government for not ratifying the FCTC. However, the tobacco industry only contributed to 1.2% of the workforce in the entire industrial sector, and the workforce is mainly women who just paid a third of the average wage. Moreover, since tobacco is seasonal agriculture when it is calculated in full-time equivalent, it provides less than 1% of full-time employment in the agriculture sector (Pawitan 2010).

Therefore, the Indonesian government is strongly recommended to ratify the FCTC. Moreover, strong national legislation that enforced in earnest is required to increase the effectiveness of their implementation. A resolute political commitment which also strengthens by social movement is necessary to underpin tobacco control positions in the context of sustainable development. Therefore, an intersectoral collaboration including health, finance, agriculture, Non-Government Organisations, other key stakeholders and community participation are significant in this momentum (Reddy et al. 2012).

### 3.6. Limitation

First, this review was only considered English-language publications and excluded studies using other languages. Second, more than half of the final selected studies that review were cross-sectional which just measured the exposure and effect at one point in time, and did not guarantee the causal relationship.

## 4. Conclusion

This narrative review demonstrated that Indonesia has a high prevalence of tobacco use among adolescents. This review revealed that some factors that included socio-demographic, personal, behavioral and environmental factors contributed to smoking among adolescents in this nation. In term of socio-demographic determinants, it showed there were disparities across socio-demographic factors between smokers and non-smokers. Moreover, personal and behavioral determinants of smoking among adolescents mainly influenced by the environment.

Behavioral changes are necessary to improve health outcome. However, socio-environmental approach such as building healthy public policy is also needed. Tobacco control legislation can encourage social, environmental, and system changes. Moreover, they have a broader action to reduce health disparities and more sustained impact on social determinants of health than intervention which focus on individuals. The Indonesian government has stipulated some regulations including price and taxation increases, cigarettes advertising, promotion and sponsorship, cigarettes packaging and labeling, and restrictions on smoking in public places. However, they are still weak in control and implementation and indicated more protect the tobacco industry than the health and safety of its population. Therefore, stricter enforcement of tobacco control laws is significant to be undertaken to protect future generations of Indonesia. Moreover, to tackle the determinants of smoking among adolescents mostly located outside the health sector, inter-sectoral action via structures that promote collaboration and community engagement are significant.

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## Competing Interests

The authors declare that they have no competing interests.

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