

Retailer's Density and Single Stick Cigarette's Accessibility among School-Age Children in Indonesia

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Abstract

Objective: The density of single-stick cigarette sales is related to the increase in tobacco epidemic-related diseases. This study aims to provide evidence of retailers' density and radius around the school location, accessibility of single-stick cigarette selling among school-age children, and retailers' response regarding the restriction policy options in urban areas in Indonesia. **Methods:** It is a cross-sectional study. The retailers' spatial density and the radius around schools in Daerah Khusus Ibukota (DKI) Jakarta Province were investigated using Google Maps and Google Street View (GSV). The coordinates of retailers and schools were geo-coded to Kernel Density Map. The accessibility of single-stick cigarettes among children and restriction policy options for cigarette selling were derived from random sampling using surveys of 64 retailers based on Google Data results. **Result:** Virtually walking using google maps and GSV found 8,371 retailers in DKI Jakarta. There were ± 15 cigarette retailers every 1 km², and an average of \pm one cigarette retailer in every 1,000 residents. There were 456 (21.67%) retailers with a radius ≤ 100 meters around elementary schools, even an increase around junior high school locations of 167 (26.05%) retailers. The accessibility of cigarettes among children is easy because the price is relatively low, at Rp1,500/ \$0.11 per stick. In addition, 58.1% of retailers allowed customers to buy on debt. Eleven percent of cigarette retailers intended to reduce the sale of cigarettes if the prohibition of single-stick cigarette sales were applied. **Conclusion:** Cigarette retailers were very dense and single-stick cigarettes were still accessible to children in Indonesia. The implementation of the prohibition on single-stick cigarette sales should be added for future tobacco control in developing countries such as Indonesia.

Keywords: Single stick cigarettes- cigarette accessibility- child smoking- Google Street View

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Introduction

Worldwide several actions help to control children smoking behavior, such as enforcing Tobacco Advertising, Promotions, Sponsorship (TAPS) bans, increasing-price of cigarettes, monitoring tobacco use, and increasing pictorial warnings about tobacco (WHO, 2008; Levy et al., 2018). One action plan to address monitoring tobacco use is limiting cigarette retail among school-age children (Edwards et al., 2011). American Governments have established a policy of banning retail cigarette sales to children and adolescents (Stillman et al., 2014). Australia has also established a license and proximity limits policy to reduce the number of retail cigarette sellers in the density area (Burton et al., 2012; Schmitt et al., 2014). However, the restriction policy models have not been implemented in developing countries such as Indonesia.

Single-stick cigarette selling is common in Indonesia

(Hasanah, 2014), although the Tobacco Advertising, Promotions, Sponsorship (TAPS) ban and increasing cigarette prices have been regulated. The single-stick cigarette selling, giving a contrary effect, could reduce the effectiveness of tobacco control (Lal et al., 2015). In addition, as one of the recent promotion techniques, the increased use of sponsorship in single-stick cigarette ads for youth-oriented brands in the retailers' outlets also increased smoking initiation (Paek et al., 2012). Previous studies also revealed that purchasing and distributing retail cigarettes per stick contribute to increasing cigarette consumption, especially for children (Burton et al., 2012; Adisasmito et al., 2020).

The global prevalence of current smoking lives in 3 Asian countries— China, India, and Indonesia (Yang and Dong, 2019). In Southeast Asia, Indonesia has a higher smoking prevalence among children aged 13-15 than Thailand, Myanmar, and Srilanka (GYTS, 2019).

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In Indonesia, smoking among children aged 10-18 years increased from 7.2% in 2013 to 9.1% in 2018 (RISKESDAS, 2018). It implies the cause of tobacco epidemic-related diseases, including all forms of cancer (Hartono et al., 2019). In addition, Lost productivity costs related to smoking and premature mortality were a significant source of high economic burden for Indonesia (Kristina et al., 2019).

Previous studies examine the causes of the increased prevalence of smokers based on the role of cigarette point of sales in the retailers in Indonesia, such as Denpasar, Depok, Banyuwangi, Yogyakarta, and Surabaya (Astuti et al., 2019; Dewi et al., 2020, 2022; Adisasmito et al., 2020; Morrison et al., 2021). However, the studies have not followed up on the description of the accessibility of single cigarettes to school-age children and the retailer's response to restriction policies. Only a few studies have tested the theory by exposing the target segments (Durkin et al., 2022). Public support is essential for successful implementation; however, while public resistance can occur against a regulation, interventions tend to become more acceptable (Sohlberg, 2019; Nurhasana et al., 2020).

Daerah Khusus Ibukota (DKI) Jakarta Province is the capital city of Indonesia and is an urban area with the densest population, including school-age children. In 2019, the total number of people in DKI Jakarta was 10,557,810, and around 30% were children aged 0-19 (Unit Pengelola Statistik, 2020). DKI Jakarta has 3,047 elementary schools, 1,077 junior high schools, 524 senior high schools, and 997 vocational school locations (BPS DKI Jakarta, 2018). It needs some restrictions or policy interventions to prevent the city from becoming a massive market for single-stick-cigarette sales, with school-age children as the target. DKI Jakarta will be an unfriendly and unsafe area for children as it has the potential to produce child smokers. Therefore, this study has three specific objectives. It first provides evidence of the spatial density of single-stick cigarette retailers and the radius of single-stick cigarette retailers around the school location in DKI Jakarta. Second, assessing the accessibility of school children to single-stick cigarette sales. Third, determining retailers' responses regarding the policy option of cigarette sales restrictions.

The first hypothesis of this study is that there are overcrowded single-stick cigarette retailers near schools in DKI Jakarta. The Google data, including Google Maps and Google Street View (GSV), was chosen to audit the location of retailers and schools. It can be an alternative, convenient, and cost-effective solution for this study (Wilson et al., 2018). A previous study in Indonesia has also used Google data. However, it was not located in DKI Jakarta (Morrison et al., 2021). A deep and further examination regarding the possibility of children's accessibility to buy cigarettes is highly recommended to find out other tobacco control policies and practices (D'Angelo et al, 2015; Sohlberg, 2019; Nurhasana et al., 2020; Dewi et al., 2022). The retailer data from Google was followed up by a random field survey as the triangulation of confirming the accessibility of single-stick cigarettes; it was also to find out the sellers' support for the restrictions policy. The second hypothesis of this

study is the seller supports the restriction policy options for protecting the children from accessing cigarettes because school-age children still have easy access to buy single-stick cigarettes. All of the hypotheses are expected to answer the main objective of this study, which is to provide evidence of retailers' density and accessibility of single-stick cigarette sales among school-age children in urban area in Indonesia.

Materials and Methods

The Setting of the Study

This is a quantitative descriptive study in DKI Jakarta, Indonesia. The cross-sectional design was used to determine cigarette retailers' density and the sellers' survey. The density of retail outlets was investigated from February to March 2021 using data from Google, including Google Maps and GSV. The data collection of this study was assisted by five Research Assistants (RA) with public health and economics backgrounds. The research team monitored, supervised, and validated the data collected by RAs.

The inclusion criteria of this study for cigarette retailers are informal-roadside outlets selling cigarettes by a single stick in DKI Jakarta. The informal roadside outlets mean own unregistered enterprises. The informal cigarette outlet is identified by Google Maps or by GSV. The selected retailers must have permanent buildings and not include street vendors because their selling locations are not settled to measure the density of access single-stick cigarettes. The exclusion criteria are the retailer, which is located in the Thousand Islands Region (Kabupaten Kepulauan Seribu). Although this area is part of DKI Jakarta Province, it is categorized as a rural area. Convenience stores with a policy prohibiting selling cigarettes in a stick, such as Indomaret, Alphamart, Alfamidi, Family Mart, etc., are also excluded from this study.

Google Data Tracking

There are systematic steps to obtain the geolocation of cigarette retailers in DKI Jakarta. First, search for the retailer using specific keywords on google maps. The keywords used are grosir rokok eceran di Jakarta/ Retail Cigarette Wholesale in Jakarta", "rokok eceran di Jakarta/ Retail Cigarettes in Jakarta", "warung rokok di Jakarta/ Cigarette Shop in Jakarta", and "kios rokok di Jakarta/ cigarette kiosks in Jakarta". The retailer was identified by zooming on the location. The identification used to ensure the location image is the cigarette retailer according to the inclusion criteria followed by ensuring the characteristics i.e., cigarette banners, cigarette displays, or cigarette products in the image location. The limitation of this search method is that it only grabbed the Google-data registered retailers.

The second step was virtually walking up and down all the streets in DKI Jakarta using GSV to overcome the search limitation for cigarette retailers on Google Maps. We start virtual walking from the retailer that has been found using Google Maps to find the others. Virtual roads explored are given a unique mark on Google Maps to prevent double tracing for streets and outlets. The location

coordinates of the retailer's outlet were recorded using Microsoft Excel. The research team did the validation of the correctness of the total of cigarette retailers in each administrative city by conducting random re-virtually walking to minimize bias.

The third step is tracking and recording the school locations in DKI Jakarta Province using Google Maps. The schools are categorized into elementary, junior high, senior high school, and vocational school to determine which level is closest to the retailer outlet.

The exclusion criteria are the school addresses unrecorded in Google and/ or stated permanently closed based on Google information. Several schools with the same building are considered in the exact coordinate location. Based on these criteria, this study included 2,104 elementary schools, 641 junior high schools, 520 senior high schools, and 989 vocational schools in DKI Jakarta Province.

The fourth step was preparing the figure of the map of DKI Jakarta in the shp file extension. The coordinates of retailers and schools were transformed into point locations on a map using the QGIS application. Map location of cigarette outlets and schools are analyzed by kernel density into four categories. They are elementary school density, junior high school density, high school density, and tobacco retailer density. Kernel density analysis was used to describe cigarette retailers' density patterns compared to school locations.

The Density Measurement

The density of cigarette retailers was measured by comparing to city area in km² and the total population of cities in DKI Jakarta. The calculation was done by dividing the number of retailers' outlets by the area in km² and the outlet by 1,000 population based on the administrative city in DKI Jakarta.

The distance between the school's location and the retailer was calculated using the Measure Line menu in the QGIS application. The closest radius outlet to the school location was recorded in the Microsoft Excel. The radius between school locations and cigarette retailers was measured based on school levels and ownership, including public or private schools. The location is considered 'near' if the radius is located ≤ 100 meters from the school. The category is derived from the experience of urban areas in China that prohibit selling retail cigarettes within 100 m of the school location (Wang et al., 2017). The output of this step is the closest distance between schools and retailers' outlets in DKI Jakarta Province.

Cigarette Retailer Survey

The retailer survey was conducted after getting the results of the outlet density around schools' locations. The survey explores the possibility of cigarette accessibility to school-age children. This survey became a pilot study on the policy option of a single-stick cigarette restriction in Indonesia from the retailers' point of view. The accessibility was observed in the marketing techniques, the price of single-stick cigarettes, and the most in-demand brands product of cigarettes. At this stage, it also explored the perception of the retailers toward the

three policy options related to a cigarette restriction of a single stick. Three potential policies are a registration of the cigarette retailers (licensing), zoning for licensed cigarette retailers (zoning), and supervising and imposition of fines for selling cigarettes to children aged < 18 years and pregnant women.

The population of the survey is cigarette retailers in DKI Jakarta Province. The unit of analysis is the cigarette retailers, and the unit of observation was individuals or cigarette sellers. The sample was obtained from outlets found during a search activity using Google data by randomly choosing which represents the proportion of each administrative city in DKI Jakarta Province. This sampling method used a sample proportion formula. The estimated proportion of outlets that sell single-stick cigarettes was 80% in DKI Jakarta Province. This proportion is decided on the previous study, which revealed that stalls selling cigarettes were 62%, and the data from the National Agency of Drug and Food Control Agency (Badan POM) estimated that 70-80% of stalls sell cigarettes in the sticks (Luxiarti and Syaputra, 2020; GoodStats, 2022). The survey was conducted in June 2021. We decided to reduce the sample size by increasing the precision level to 10% to minimize direct contact with respondents due to June 2021 being the increasing Covid-19 cases in DKI Jakarta. So, the minimum number of samples studied is 61.47, or 62 cigarette retailers.

Three RAs helped the survey with bachelor's degrees in public health and economics. They have received training about the questionnaires in this study, how to explain the descriptions of school-age children to the respondents, and health protocols for conducting the survey. Before the interview, the retailer or the owner signed an Informed Consent as a respondent.

The survey's outcome variable is cigarette retailers' marketing characteristics in promoting, packaging, and pricing the single stick of cigarettes. The detailed description of the socio-economic cigarette retailers is explained by the characteristics of age, gender, last education level, number of household members, income per month, duration of selling cigarettes, and assets owned. The perception of the retailers toward the three policy options to restrict cigarette sales is described in retailers' opinions on whether to continue, reduce or stop selling cigarettes.

The potential restrictions include a ban on the sale of cigarettes per stick, a ban on selling cigarettes in residential areas or around schools, sanctions for selling cigarettes to children and pregnant women, and licensing the cigarette retailers. Data analysis was done by determining the tabulation of the seller characteristics, marketing characteristics, and potential restriction policies. A graph was to emphasize the findings of the accessibility of single-stick cigarettes. All survey data were analyzed with the STATA version 14. This study has been approved by the ethics committee Sekolah Tinggi Ilmu Kesehatan Indonesia Maju (Universitas Indonesia Maju) No. 357/Sket/K/RE/STIKIM/III/2021.

Results

The Density of Cigarette Retailers

The investigation using Google Maps and GSV identified 8,371 total number of cigarette retailers in DKI Jakarta Province (Table 1). Most cigarette retailers were in East Jakarta (3,085 retailers) and West Jakarta (2,139 retailers). Compared to the area per km², on average, there found ± 15 cigarette retailers in every 1 km² in DKI Jakarta (Table 1). Central Jakarta had the highest density at ± 30 retailers every 1 km².

Compared to the total population, it is found that there was an average ± 1 retailer of 1,000 residents in DKI Jakarta (Table 1). Central Jakarta is still the city with the highest density of retailers, even if being compared to the population. The density of retailers assures the access of residents, including children, to purchase cigarettes in sticks.

There were ± 8 retailers in every area around the school locations in DKI Jakarta (Figure 1). There were 456 (21.67%) retailers with a radius ≤ 100 meters around elementary schools. It was found that 423 retailers with an average distance of ± 57.99 meters and 33 retailers around private elementary schools with an average distance of ± 57.52 meters around public elementary schools. There were 167 (26.05%) retailers with a radius of ≤ 100 meters around junior high school locations.

Cigarette retailers are closer to the private junior

high schools than the public junior high schools, but not significantly, statistically. Private junior schools have 124 cigarette retailers with an average distance of ± 56.01 meters (Table 2). Cigarette retailers around senior high schools or vocational schools with a radius of ≤ 100 meters were identified as 236 retailers (15.63%). There were 220 cigarette retailers with an average distance of ± 59.39 meters around the private senior high school or vocational school.

The Socio-Economic Characteristics of Cigarette Retailers

The survey found that the characteristics of cigarette retailers in DKI Jakarta Province were mostly male (n=36/58.06%), with the average age of seller was 39.5 years; the average number of household numbers was 4 persons, most of the sellers were graduated from senior high school (n=23/37%), having the main job as the entrepreneur (n=53/85.48%), and having the highest monthly income at Rp3,000,000-4,999,999 / \$210.24-\$350.39 (n=26/41.94%) (see Table 3). All of the retailers selling cigarettes in single-stick. Overall, most of the cigarette retailers had low and middle Socio-Economic Status. However, all cigarette retailers already had electrical assets. In addition, most of the cigarette retailers already had assets like motorbikes (88.71%), refrigerators (88.71%), and television (64.51%). The cigarette retailers have been selling single-stick cigarettes for an average of

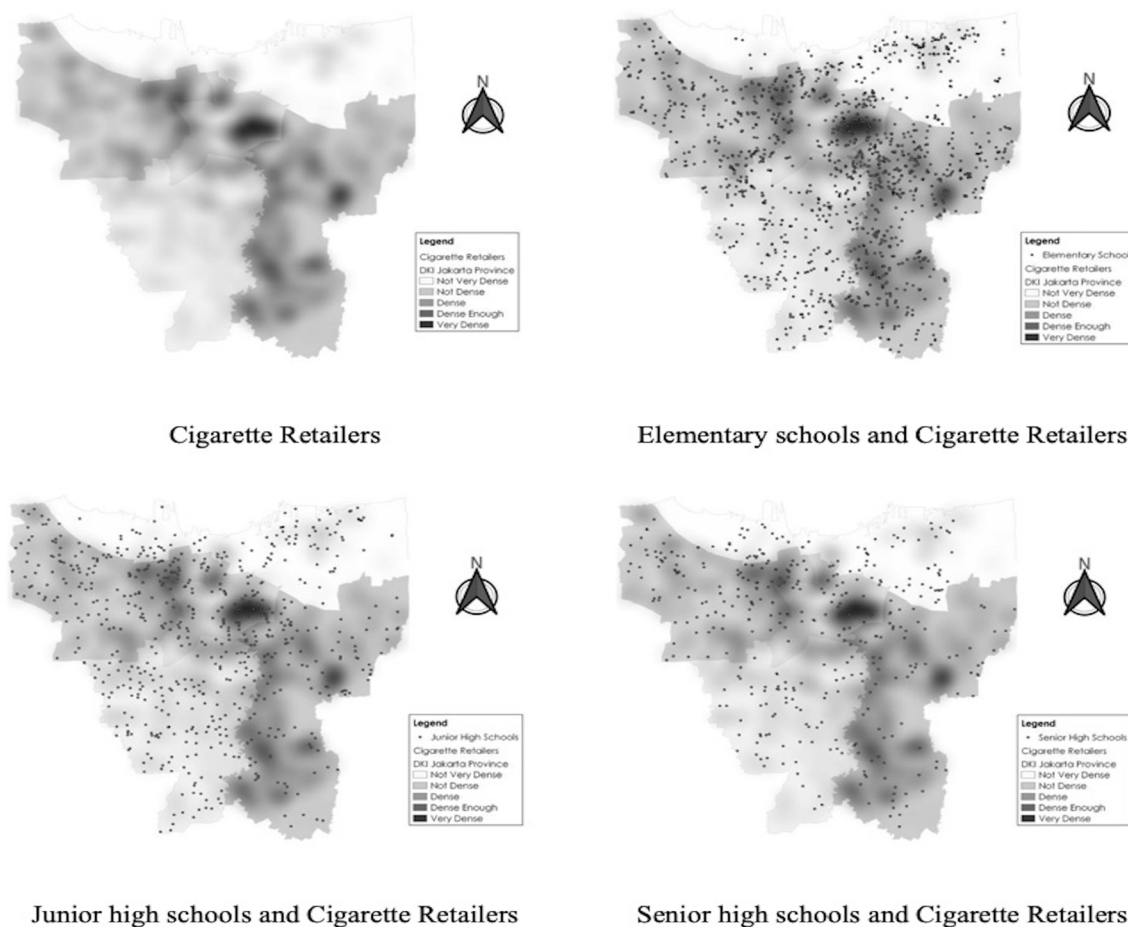


Figure 1. Cigarette Retailers and School Locations in DKI Jakarta, Indonesia, 2021

Table 1. The Density of Cigarette Retailers to Area and Population in the Capital City of Indonesia, DKI Jakarta, 2021

City	Area in km ² in 2018	Population Size (Thousand) in 2018	Retailers	Retailers/ km ²	Retailers/ 1,000
South Jakarta	141.27	2.246	1.293	9,152	575
East Jakarta	188.03	2.916	3.085	16,406	1057
Central Jakarta	48.13	925	1.457	30,272	1575
West Jakarta	129.54	2.559	2.139	16,512	835
North Jakarta	146.66	1.747	397	2,706	227
			Mean	15.01	853

Note: Data on the area in km² and total population per administrative city are obtained from the DKI Jakarta Central Statistics Agency (BPS)

Table 2. Radius between Cigarette Retailer and School Locations in DKI Jakarta

Cigarette Retailer Radius ≤ 100 meters	Public	Private	p-value	Total	Proportion
Elementary School (2,104 schools)	423 (±57.99 m)	33 (±57.52 m)	475	456 (±57.75 m)	21.67%
Junior High School (641 schools)	43 (±64.56 m)	124 (±56.002 m)	438	167 (±64.56 m)	26.05%
Senior High School (520)/Vocational High School (989) (1.509 schools)	16 (±68.5 m)	220 (±59.39 m)	389	236 (±63.94 m)	15.63%

11.87 years, with the longest duration at 57 years.

Accessibility of Single-Stick Cigarette Sales

Most of the retailer's locations are close (≤ 100 meters) to the school area (61.2%) (See Table 4). Selling of cigarettes per pack per week is relatively cheap at Rp20,564.52/ \$1,32 (Rp18,000/\$1.16 - Rp26,000/\$167). Meanwhile, selling cigarettes per stick per week is too affordable at Rp1,581.58/ \$0.11 (Rp1,250/\$0.08 - Rp1,667/\$0.12). In terms of products, cigarettes have the highest sales compared to other commodities such

Table 3. Characteristics of Cigarette Retailers in DKI Jakarta, Indonesia, 2021

Characteristics	n	Percent/ Min-Max
Gender		
Male	36	58.06
Last Education Level		
Without School	2	3.23
Graduated from elementary schools	17	27.42
Graduated from junior high school	18	29.03
Graduated from senior high school	23	37.10
Graduated from college	2	3.23
Income per-month		
> Rp1,000,000 / \$70.08	4	6.45
Rp1,000,000-Rp2,999,999 / \$70.09-\$210.23	8	12.90
Rp3,000,000-Rp4,999,999 / \$210.24-\$350.39	26	41.94
≥ Rp5,000,000- / \$351	24	38.71
Age (years)	39.5	20-64
Number of Family Members of sellers (person)	3.38	0-7
Duration of Selling Cigarettes (Years)	11.87	1-57
Best Selling Product of Each Retailer		
Cigarette	39	62.9
Groceries	8	12.9
Fast Moving Consumer Goods	1	1.61
Ice Cream	13	20.97
Others	1	1.61

as groceries and snacks. In a week, the sale of cigarettes reached 312 sticks, with maximum sales at 1,750 cigarettes. At the same time, the best-selling cigarette brand is a top-tier or famous, including Gudang Garam Filter (67.7%).

On the promotion side, most retailers (80.7%) have promotional media cigarettes, which also display the price of cigarettes per stick through the banner (Table 4). Eleven point three percent of retailers promoted single-stick cigarette products by offering free other products. In addition, 58.1% of retailers allowed consumers to buy retail cigarettes in debt. In other words, single-stick cigarettes are still relatively easily accessible to be purchased by the community and school-age children.

Potential Restriction Policy Options

Most sellers supported the restriction of selling cigarette policy to stop selling cigarettes with the ban on selling cigarettes in a residential area or around the school area (37.1%). The second option was that cigarette sellers must have a license (17.7%) (Table 5). Eleven percent of cigarette retailers intended to reduce the sale of cigarettes if the prohibition of single-stick cigarette sales were applied. The proposed policy option that can be implemented is tightening cigarette sales and banning single-stick cigarette sales because the retailers support it.

Discussion

This descriptive cross-sectional study identified the density of single cigarette retailers and their radius around schools in an area in the DKI Jakarta Province. Virtual audit using Google Data identified 8,371 single stick cigarette retailers, ± 15 cigarette retailers every 1 km², and an average ± 1 cigarette retailer every 1,000 residents. These findings are consistent with previous studies on cigarette retailers in Indonesia (Astuti et al., 2019; Dewi et al., 2020, 2022; Adisasmito et al., 2020; Morrison et al., 2021).

Table 4. Accessibility Characteristics of Cigarette in Retailers, 2021

Accessibility of Cigarette	n/ mean	Percent/ Min-Max
Retailers location \leq 100 meters from the school	38	61.2
Selling of cigarettes Per Week		
In Pack	Rp20,564.52/ \$1,32	(Rp18,000/\$1.16 - Rp26,000/ \$167)
In a single stick	Rp1,581.58/ \$0.11	(Rp1,250/\$0.08 - Rp1,667/\$0.12)
The Best Brand of Cigarette Per Week		
Gudang Garam Filter	42	67.7
Sampoerna A Mild	16	25.8
Djarum Super	4	6.5
Promotional Aspect While Selling Cigarette		
Having promoted cigarettes through the banner and sticker in last 4 weeks	50	80.7
Having sold cigarette by giving free other product in last 4 weeks	7	11.3
Having allowed consumers to buy cigarettes in debt in the last 4 weeks	36	58.1

A former study in Bali found that cigarette retailer density was 32.2/km² and 4.6/1000 population (Astuti et al., 2019). This result is higher than the finding from this study which found 15.01/km² and 1/1000 population. It happens because this study only tracked the location of the small informal outlets selling single-stick cigarettes and was done using google data. It follows up on society's phenomenon that without a license, one can make a house garage become an informal cigarette retailer and sell single-stick cigarettes freely in Indonesia. This study excluded formal stalls prohibiting customers from buying a single cigarette.

The evidence of the density of single-stick cigarette retailers from this study still guarantees the convenience of residents, including children, to purchase cigarettes easily. The easy access to single-stick cigarettes implied the initiation of smokers from youth. A previous study also proven that youth close to cigarette retailers are relatively more likely to become active smokers and tend to be more challenging to quit smoking (D'Angelo et al.,

2014). Teachers smoking behavior during school hours is associated with adolescent smoking (Poulsen et al., 2002). This ease of access to cigarettes for children, and some give examples of smoking behavior at school, has negative consequences for children's health and productivity in the future. This impact encourages further step of tobacco prevention strategies that not only establish smoke-free schools' regulation but also add the prohibition of selling cigarettes in the sticks in Indonesia.

The average sales of cigarettes in the sticks are included in the cheap category at \pm Rp1,500 / \$0.11 per stick. The effectiveness of controlling cigarette consumption related to the minimum price increase applied to the excise tariff policy will not be optimal if the sale of cigarettes in the sticks is still allowed. Besides the prohibition of selling cigarettes per stick, the increase of the Tobacco Excise tariff, the increase in the Retail Selling Price (HJE), and the simplification of the excise strata tariff are necessary to control cigarette consumption, including for children. It is also urgent to amend Indonesia's tobacco control policy.

Table 5. Seller's Response to the Potential Policy of Restricting Cigarette Sales

Restriction	Response in Cigarette Selling at all [n (percent)]			Proposed Policy
	Keep selling cigarettes	Reduce selling cigarettes	Stop selling cigarettes	
Prohibition of retail cigarette sales per stick	53 (85.5%)	7 (11.3%)	2 (3.2%)	Restricting the single stick cigarettes sales
Prohibition of cigarette sales in a residential area	31 (50%)	8 (12.9%)	23 (37.1%)	Prohibiting cigarette sales in a residential area
Prohibition of cigarette sales around the school area	33 (53.2%)	14 (22.6%)	15 (37.1%)	Zoning cigarette sales from the school area
Giving sanctions on selling cigarettes to children <18 years / pregnant women	-	40 (64.5%)	22 (35.5%)	Implementing the sanction if proven to sell cigarettes to children and pregnant women
Data based on all cigarette sales	50 (80.6%)	8 (12.9%)	4 (6.5%)	Developing register system for cigarette seller
The licence in cigarette sales	49 (79.0%)	2 (3.2%)	11 (17.7%)	Developing a system for licensing cigarette sellers

The implication of single-stick cigarette sale restrictions reduces the accessibility of cigarettes, mainly for school-age children. This also supports and complements the other tobacco control policies that have been implemented in Indonesia, such as a no-smoking area, increased cigarette excise tax, TAPS ban, and pictorial health warning in the Indonesia Government Regulation No. 109 of 2012. Indonesia Minister of Education Regulation Number 64 of 2015 also stated that schools as non-tobacco areas. However, this regulation does not protect children outside of school.

On the other hand, restricting the single stick cigarette sales only reduces 11.3% the cigarette selling based on the retailer's opinions. This policy allows retailers to sell cigarettes, but not in the sticks. Banning the sale of single-stick cigarettes does not adversely prejudice any parties because retailers can still sell cigarettes, and people can buy cigarettes per pack. However, a study in New Zealand states that the policy of banning the sale of cigarettes in the sticks can reduce 50% of stalls selling retail cigarettes within 9–14 years of implementation (Robertson and Marsh, 2019). The entrepreneurial spirit possessed by the seller will always increase the innovation to sell the other products besides selling cigarettes in the sticks.

All tobacco control regulations, including cigarette sales restrictions, will be ineffective without proper supervision and policy response (Ngok and Li, 2010). A former study reports that law enforcement, high surveillance, and severe penalties for violations are important aspects of reducing smoking among youth (Dewi et al., 2020). For example, America determines the sale of single-stick cigarettes as illegal and it is followed up with enforcement efforts, considerable community involvement, and public health efforts (Stillman et al., 2014). This action will be more robust by convincing the nation that cigarettes are not a cultural heritage, so their circulation must be tightened for public health. Besides the Government roles, schools, should also supervise the students to prevent access to cigarettes. Schools need to contract with retail cigarette stalls around the school not to sell cigarettes to students, supervise students not to smoke, and conduct health promotion about the dangers of smoking to students.

This study encourages restriction policies on selling single-stick cigarettes in Indonesia. This study supported using technology from google data, including google maps and GSV, to find evidence of tobacco control in Indonesia. In addition, the retailer's response to policy options regarding the single-stick cigarette restriction becomes a pilot project to further advocate for Indonesia's government.

The limitation of this study is that it only described the location of single-stick cigarette retailers and school areas recorded in the google database. The comparison of the total retailer with the total land size could have a potential bias since the study may not cover empty land, industrial area, or office area. In addition, this study reduces the sample size for the survey due to the social distancing policy during the Covid-19 pandemic.

This study concludes that cigarette sticks are still

accessible to school-age children in DKI Jakarta, Indonesia. This identification includes 8,371 cigarette retailers, ± 15 retailers every 1 km², and it has an average of ± 1 retailer every 1,000 populations in DKI Jakarta. Based on the radius of the school location, there is still easy access for school-age children to buy cigarettes in sticks because there are still cigarette stalls with a radius of ≤ 100 meters around the school area.

This study also concluded that cigarette sticks are affordable for school-age children in DKI Jakarta, Indonesia. It can be seen from the average weekly sales of cigarettes of > 300 per week at relatively low prices. In addition, $> 80\%$ of retailers still use promotional media, such as banners and cigarette display which are easily visible to children. In addition, the best-selling cigarette brands are top tier (quite well-known) which should not be affordable if sales are made per pack.

This study provides suggestions for ministries and institutions in Indonesia to conduct synergies in restrictions on the accessibility of cigarettes to school-age children. The Ministry of Health must support the revision of Government Regulation No. 109 of 2012 regarding prohibiting selling cigarettes on the sticks. The Ministry of Trade must develop the regulation of the prohibition on single-stick cigarette sales. In addition, the Ministry of Education and Culture needs to encourage schools to supervise students to avoid smoking and intensify promoting the dangers of smoking to the students.

Author Contribution Statement

Conceptualizations, methodology, and data analysis, RKH; investigation and data collection, RFM; data analysis and writing, RN; supervising, review and editing the draft, TD and AS.

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Ethical Declaration

This study has been approved by ethic committee of Sekolah Tinggi Ilmu Kesehatan Indonesia Maju (Universitas Indonesia Maju) to fulfil the lecturer's research obligations on the tri dharma of higher education.

Data Availability

Data belongs to CSSS-UI. Any institutions or researchers interested in utilizing the data set can make a request and submit their proposal by email to csgs.pkjs@ui.ac.id.

Conflict of Interest

The authors declared that there is no conflict interest.

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