Tobacco Retailers Near Schools and the Violations of Tobacco Retailing Laws in Thailand

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ABSTRACT

Context: A growing body of evidence indicates that the location of tobacco retailers may influence tobacco access among youths.
Objective: The aim of this research was to examine the relationship between the proximity of tobacco retailers to schools and the violations of tobacco retailing laws.
Design: A cross-sectional survey research.
Main Outcome Measures: We applied geographical information system to measure the proximity between tobacco retailers and schools and linked them with self-report surveys concerning the violations of tobacco retailing laws. We then tested the relationship between the proximity of tobacco retailers within 500 m of schools and the violations of tobacco retailing laws by the χ^2 test.
Participants: All tobacco retailers (121 shops) and schools (14 schools) (covering 5 levels: 2 primary schools, 6 primary-middle schools, 3 secondary schools, 2 vocational schools, and 1 university) in a town municipality in Thailand.
Results: Most tobacco retailers were most densely located around primary schools and located less than 500 m away from schools (47.1%), and most of them had violated the tobacco retailing laws. In addition, it was found that the tobacco retailers that were located less than 500 m away from schools allowed customers to do a self-service ($P = .04$). Nonetheless, the tobacco shops that were far away from schools, more than 500 m, were likely to sell the cigarettes in sticks ($P = .04$).
Conclusion: Our results suggest that Thai young people may be at a particularly high risk of tobacco-related problems due to high exposure to tobacco retailers and sales near their educational institutions. We support the possibility of zoning restrictions that can be used to prohibit the operation of tobacco retailers close to schools.

KEY WORDS: near schools, Thailand, the violations of laws, tobacco access, tobacco retailers, youth

Smoking causes 6 million deaths worldwide.[1] There are 10.9 million smokers, and 50 000 people die from diseases attributed to smoking annually in Thailand.[2] Smoking is the second highest

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cause of disability-adjusted life years of Thai people, followed by drinking alcohol. In addition, in 2009, diseases attributed to smoking caused 74 884 million baht economic loss or 0.78% of GDP, of which 11 473 million baht were spent on direct medical expenses and 61 219 million baht on premature death.[3] Most smokers begin smoking during adolescence, and the majority of them had developed nicotine addiction afterward.[4,5] Thus, adolescent smoking prevention at the initial stage is an important strategy in health care.

According to Global Youth Tobacco Survey in Thailand,[6] 11.3% of Thai adolescents are smokers, of whom 67.4% of minors or those younger than 18 years bought their own cigarettes from tobacco retailers such as grocery stores and convenience stores. In addition, 44.0% of them reported having bought cigarettes without hindrance or age checking, 54.7% bought cigarettes sold individually (not in a pack), and 30.9% had exposure to point-of-sale tobacco displays.[6] This fact from the demand side is not surprising, as it is consistent with the fact from the supply side, where it was found that more than half (58.7%)

of tobacco retailers violated the laws of restriction of selling cigarettes to minors. Moreover, there were 4 influencing factors affecting the violations law, which comprised open display of cigarettes at the point-of-sale ($OR_{adjusted} = 2.066$, $P = .005$), cigarettes sold individually (not in a pack) ($OR_{adjusted} = 13.33$, $P \leq .001$), selling cigarettes by self-service ($OR_{adjusted} = 2.415$, $P \leq .001$), and not checking the age of buyers before selling ($OR_{adjusted} = 2.415$, $P \leq .001$). All 4 factors predicted cigarette selling behavior to minors at 56.6%.[7]

A large number of previous studies found that geographical factors of tobacco retailers have been one major influence that affects the access and availability of tobacco to youth.[8-11] According to the results of a narrative review of Gwon et al,[9] there were 7 articles that found tobacco retailer density was a statistically significant predictor of the smoking possibility and smoking experience of students,[12-17] and only 1 article that examined the association between the proximity of the tobacco retailers to schools and students having exceeded 30 days of smoking failed to show a statistically significant association.[18] Therefore, zoning regulations of tobacco retailers may be needed to prevent adolescents from gaining easy access to tobacco products and to be more effective in reducing the prevalence of youth tobacco use.[19-22] However, to date, there has not been any research that studied the association between the density and proximity of tobacco retailers to schools and the violations of tobacco control laws of tobacco retailers. This may be another way of monitoring access to youth smoking initiation at the upstream or from the supply side, which may be a quicker and easier method than demand side surveillance.

In light of the available evidence, this is the first attempt in Thailand that applies geographical information system (GIS) to analyze the density of tobacco retailers nearby schools. This study aimed to examine the relationship between the proximity of tobacco retailers to schools and the violations of tobacco retailing laws in Thailand that primarily address 4 issues: prohibition on selling tobacco products to minors or persons younger than 18 years; banning retail displays of tobacco products; prohibition on selling cigarettes individually or in packs of fewer than 20 cigarettes that do not contain health warning texts or images; and prohibition on selling cigarettes with self-service. This finding would be very useful to develop an effective measure of restriction of tobacco access to the youth, whereby zoning to control the number and location of tobacco retailers near schools appears to be more effective in reducing the prevalence of youth tobacco use in Thailand.

Methods

This cross-sectional survey has been certified by the Ethics Committee in Human Research, Nareasuan University (project no. 620/59). The research did not have any funding support from organizations or businesses related to tobacco. This research was conducted in the area of Muang Uttaradit Municipality, Uttaradit Province, Thailand, which is an important urban and economic area of Uttaradit. Data collection was divided into 2 parts.

Measurement-independent variable

In the first part, we applied GIS to measure the proximity between tobacco retailers and schools. All tobacco retailers (121 shops) and schools (14 schools) addresses (covering 5 levels: 2 primary schools, 6 primary-middle schools, 3 secondary schools, 2 vocational schools, and 1 university) were geocoded using Global Positioning System (GPS). Geocoding refers to the QGIS program (free software) for creating a point along a roadway segment that defines the location of a given address. We calculated tobacco retailer density within 500 m of schools and then used the network analyst function to measure the distance from each tobacco retailer to the nearest schools, which is capable of finding and measuring the distance of the shortest roadway path.

In terms of investigating the density of tobacco retailers, a 500-m buffer zone was created around each educational institution using the QGIS program. This buffer zone was chosen because the Thai government has recently considered banning sales of alcohol and alcohol outlets within 300 to 500 m of an educational institute.[23]

Measurement-dependent variables

The second part was the survey for collecting data on the violations of tobacco retailing laws that were obtained from the first part. The data were collected using a self-administered questionnaire that was separated into 2 domains: (1) 5 general questions: gender (male/female), age (years), education (below bachelor's degree, bachelor's degree, or higher), type of shop (grocery shop, convenience store, or franchise), and approximate distance from the shop to the nearest educational institution (in meters); and (2) the experiences in the violation of tobacco retailing laws within the past 30 days were addressed by 4 questions: (1) Did you display the cigarettes or advertise cigarette products at the point of sale? (Yes/No); (2) Did you sell cigarettes individually or in a package of fewer than 20 cigarettes? (Yes/No); (3) Did you sell

cigarettes for self-service customers? (Yes/No); and (4) Did you sell cigarettes to teenagers or persons younger than 18 years? (Yes/No). This set of the questionnaire had the content validity index (I-CVI) at 0.80 to 1.00 and the coefficient of reliability (KR-20) was 0.72, which qualified the acceptable criteria (>0.7).

Data collection

Data from both parts were gathered by 20 third-year students in the Public Health Program, Uttaradit Rajabhat University, since they knew the environment and the roadway paths in the research area very well. Moreover, they had completed a 2-day workshop on the use of GPS led by an instructor from the Regional Center of Geo-Informatic and Space Technology, Lower Northern Region, Naresuan University, as well as instruction on the use of questionnaires on the violation of tobacco product control laws by the researcher. They started collecting data immediately after the training.

For the data collection process, the data collectors introduced themselves to the tobacco retailers individually and informed the retailers that they were students studying at an institution in the area and then showed their student ID cards to confirm that they were not officers and to affirm that the survey was only for academic purposes and not for law enforcement purposes. In addition, they assured the retailers that all respondents would be anonymous and there would be no photograph taking. Furthermore, the results would be presented in aggregate and could not be traced to individual information. After the tobacco retailers understood the purpose of the data collection process and gave their permission, the data collectors explained more about how to answer the questions. Then the questionnaire was distributed. If anyone in the sample group was illiterate, the data collectors read the question, let them answer, and made an appointment to collect the questionnaire on the same day. The data collectors compiled data from the sample group, and 100% of data were collected from both parts.

Statistical Methods

We analyzed the density and proximity of the tobacco retailers within school neighborhoods using the QGIS program, divided into 2 groups (>500 m and ≤500 m), and examined the relationship between the proximity of tobacco retailers to schools and the violations of tobacco products control laws using SPSS version 17.0, including the number, percentage, mean, standard deviation, and χ^2.

Results

The characteristics and geographic information

Most of the tobacco retailers (75.2%) were female and their average age was 44 ± 14 years. In total, 74.4% had completed undergraduate degrees and 85.1% of the shops were grocery stores. The majority of tobacco retailers were located in the commercial zone and near schools. There were 57 tobacco retailers (47.1%) within 500 m of schools, and the ratio of number of schools to tobacco retailers within a 500-m radius was 1:8. The tobacco retailers were most densely located around primary schools, followed by secondary schools, and vocational schools and opportunity expansion schools at the ratios of 1:13, 1:10, and 1:7, respectively. The average distance from the tobacco retailers to the nearest school was 859.0 ± 91.2 m (min = 54.7 m; max = 3346.3 m).

The relationship between the proximity and violations of tobacco retailing laws

Most of the tobacco retailers admitted that they had violated the tobacco retailing laws in the past 30 days: 67.8% of them did not check the buyer's age before selling tobacco products, 70.2% sold cigarettes individually, 67.8% displayed tobacco products at the point of sale, 21.5% sold tobacco products by self-service, and 53.7% sold cigarettes to minors at least 1 time in the past month.

An examination of the relationship between the proximity of tobacco retailers to nearest schools and the violations of the tobacco retailing laws found that within 500 m of schools, 29.8% of the tobacco retailers sold tobacco products by self-service whereas those located more than 500 m away from the school comprised 14.1% ($P = .04$). On the contrary, 78.1% of the tobacco retailers located more than 500 m away from the schools sold cigarettes individually whereas 61.4% of those located less than 500 m away from school sold cigarettes individually ($P = .04$) (Table).

Discussion

Findings illustrated that most of the tobacco retailers were dispersed along the main streets and were dense in the commercial zone and school neighborhoods. The tobacco retailers were most densely located around primary schools and secondary schools and were located 500 m or less away from the nearest school, accounting for 47.1%. This was in accordance with a survey of liquor store dispersion in Muang, Chiang Mai Province, which showed that liquor store distributions were clustered and likely

TABLE

The Relationship Between the Proximity of Tobacco Retailers to the Nearest Schools and the Violation of the Tobacco Product Control Law

Variables	Proximity to the Nearest Schools		χ^2	P
	>500 m (n = 64), %	≤500 m (n = 57), %		
Selling cigarette in stick			4.033	.04[a]
Yes	78.1	61.4		
No	21.9	38.6		
Tobacco display at POS			1.727	.24
Yes	62.5	73.7		
No	37.5	26.3		
Checking the buyer age			0.060	.84
Yes	31.3	33.3		
No	68.8	66.7		
Selling tobacco by self-service			4.440	.04[a]
Yes	14.1	29.8		
No	85.9	70.2		
Selling tobacco to minor			1.748	.20
Yes	78.1	68.4		
No	21.9	31.6		

Abbreviation: POS, point of sale.
[a]$P \leq .05$.

to gradually move close to educational institutions.[24] It confirms the findings from recent studies showing the placement as a marketing strategy because the more tobacco outlets surrounding schools, the greater the likelihood that underage smokers purchased their own cigarettes[10-11,25]

Using geographic information system to collect data, evaluate, and analyze geographic coordinate information of cigarette shops to obtain more valid and reliable empirical information is a new idea to Thailand. Although this research did not provide a direct causal relationship between distance from the cigarette shops to educational institutions and behavior of selling cigarettes to the youth, it is in line with the previous results stating that most of the youths chose to buy cigarettes from the regular shops that easily sold cigarettes to them rather than from a distance.[18] In addition, these results showed inconsistencies in the influence of geographic factors on selling tobacco behavior near schools. We found that the shops located 500 m or less away from educational institutions sold cigarettes to customers by allowing them to access the point of sale more than those located more than 500 m away, whereas the shops located more than 500 m away from the school sold

cigarettes individually more than those located less than 500 m away from schools. This may be because the violations of laws on selling tobacco in Thailand still occur frequently and in almost every area.[7]

However, this study reflected the problems of the law violations regarding the sale of tobacco, especially within a 500-m radius around the educational institutions, which found that 66.7% did not check the buyer's age before selling tobacco products, 78.1% sold cigarettes individually, 73.7% displayed tobacco products at the point of sale, and 68.4% sold cigarettes to minors at least 1 time in the past month. This was in line with research results of Chan and Leatherdale[16] and Lipton et al,[26] stating that geographic factors of cigarette shops around educational institutions were related to the possibility of cigarette access by the youth. It is also in accordance with the research result of Chan and Leatherdale,[16] who discovered that the geographic factors of cigarette shops around educational institutions were related to the increase of decision making of the youth who had not yet smoked since the students had a chance to perceive more advertisements and sales promotion and it made cigarette buying an easy matter. Furthermore, it simplified the availability of cigarettes among youths because it saved money and time to travel.[27,28] This was because the density and proximity of the tobacco retailers nearby schools may contribute to students being able to be exposed to tobacco advertisements or tobacco sales promotion, so selling and buying cigarettes to the youth would become normal. Furthermore, the near distance between tobacco retailers and schools helps students save costs and time to travel.[22,29]

Up to the present time, Thailand has not given any importance to zoning to control the number and location of cigarette retail shops from the center area for youth such as schools or stadiums. Apparently, the government sector should determine a quota and special zone of cigarette retail shops by eliminating the certifying of cigarette retailor licenses to new entrepreneurs or replacing the licenses for the existing ones who closed down businesses, since selling cigarettes causes health problems to people in communities, particularly youth.[29] There are some case studies conducted in many cities in California. For example, in Santa Clara County, cigarette retailor licenses were not issued to pharmacies and retail shops situated within a 1000-ft radius around educational institutions, and specified that the distance between each shop must not be less than 500 ft away from each other. Likewise, in Huntington Park, the ratio of the number of cigarette retail shops to population was determined at 1:>1000. Therefore, it is evidently a challenge for the government and public

sector concerned with tobacco consumption control in Thailand to accelerate research on the possibility and appropriateness of solving the problem in the society and the physical environment to move policy to practical reality.

Limitations

This research had 2 restrictions. First, this was a cross-sectional survey in which the dependent and independent variables were collected at the same period of time. Thus, the researchers could not determine the cause and effect as to whether educational institutions were the primary factors causing the density of cigarette shops, or vice versa. It is possible not only that educational institutions were established or moved to the community after the cigarette retailers but also that some third factor (eg, population density) might have caused both. Second, the method of collecting the dependent variables, which were the behaviors of the breaches of restrictions of cigarette access to youth by entrepreneurs, who answered questions in private, might include some bias in the answers of some respondents. This possibly minimized the breach information of the retail shop entrepreneur. The researchers considered the possibility of bias by confirming that all information and information presentation were aggregated and confidential, as well as using students from the area to collect data to make the respondents feel comfortable.

Conclusions

In Thailand, this is the first attempt to apply GIS to evaluate the impacts of geographic location of tobacco retailers on tobacco access among youths in order to have valid and reliable empirical findings. These results revealed that most of the tobacco retailers were located near schools and most of them had violated the tobacco retailing laws. Although there was a slight association between the proximity of tobacco retailers to schools and the violation of tobacco retailing laws, it may serve as a key to the puzzle that could help health policy makers consider zoning or license restrictions of tobacco retailers around schools to control tobacco access and ultimately prevent smoking among youths.

Implications for Policy & Practice

- As Thailand is a developing country, there are some knowledge gaps about the influence of geographic factors of cigarette retail shops around educational institutions on cigarette access of youth.

- This is the first research in Thailand that applies GIS to collect data and evaluate the geographic factors of cigarette shops in a municipality of Thailand in order to have valid and reliable empirical findings.

- Findings revealed that most of the cigarette shops were located near educational institutions.

- Although there was a slight relationship between the distance from the shop to educational institutions and the breaches of restrictions of cigarette access to youth, it indicated the importance of zoning to control the number, location, and proximity restrictions of cigarette retail shops in Thailand.

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