ORIGINAL ARTICLE

Evaluation of binge drinking behavior among working-age populations in Thailand using GIS: A national survey in 2017

Nakarin Prasit[1,2], Wongsa Laohasiriwong[2], Surachai Phimha[2], Prachak Bouphan[2], Nopparat Senahad[2*], Nuttapol Yotha[1], Ampawan Nonthamat[3], Supat Kongsrima[4], Pittaya Thummawongsa[4]

[1] Doctor of Public Health Program, Faculty of Public Health, Khon Kaen University, Thailand
[2] Lecturer, Faculty of Public Health, Khon Kaen University, Khon Kaen, Thailand
[3] Bangkok Hospital KhonKaen, Khon Kaen University, Khon Kaen, Thailand
[4] Udonthani Provincial Public Health Office, Udonthani, Thailand

Corresponding Author: Surachai Phimha **Email:** Suraphi@kku.ac.th

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ABSTRACT

This study identifies the prevalence of binge drinking behaviour and the statistical relationship between local patterns and binge drinking behaviour among the working-age population in Thailand. This study was conducted using The Smoking and Drinking Behaviour Survey 2017 data set from the National Statistical Office of Thailand. Local Indicators of Spatial Association (LISA) were used to identify the spatial autocorrelation between surrounding areas, with binge drinking behaviour among the working-age population in Thailand. Findings showed that among the 61,708 participants, 11.47% engaged in binge drinking behaviour. There was aspatial global autocorrelation between the surrounding areas and binge drinking behaviour among the working-age population, with a Moran's I value of 0.579. The LISA analysis indicated nine hotspots or high–high clusters. In Thailand, there is a cultural context that encourages risky behaviour such as drinking alcohol beyond the standards set by law. Therefore, to manage this problem efficiently and effectively, the public and private sectors and related agencies should raise awareness about the health effects of binge drinking and promote health literacy to local residents while engaging all sectors in managing alcohol behaviour in all areas. This type of approach is sustainable and can have long-term effects on society.

Key words:
binge drinking behaviour; working-age population; spatial analysis; health policy; Thailand

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INTRODUCTION

Alcohol consumption is an important factor that affects public health and economic and social aspects at the global level, including in Thailand[1]. According to the World Health Organization, Thailand is ranked 47th in the world in consuming alcohol-infused drinks, and Thailand ranks 4th in Asia behind South Korea, Laos, and Japan [2]. In addition, reports indicate that alcohol consumption is associated with the leading causes of death, such as stroke, traffic accidents, diabetes, alcohol dependence, ischaemic heart disease, liver cancer, and depression. The effects of alcohol consumption are relatively high on health and other dimensions and are the main causes of death in both the short and long term. If binge drinking for a long period (alcohol addiction) can directly affect the organs in the body, specifically the "liver," alcohol poisoning also has a severe neurological effect [3]. Drinking at an early age also increases the daily cost of living and is an important factor in 84.8% of economic problems; this factor affects other family members as well [4,5] and can lead to domestic violence, crime, increased burden to society, and loss of productivity, which can amount to 1.56 billion baht. Expenses related to binge drinking include direct costs, such as medical expenses, damage to property, and cost of law enforcement and litigation (the total was 6,512.9 million baht, representing 4.2%), and indirect costs, such as productivity loss from premature death, absenteeism, and low performance (total was 149,592.5 million baht, representing 95.8 percent%)[6-8]. Therefore, binge drinking is an important health and economic issue that needs to be addressed appropriately in a local context.

At present, Thailand has implemented measures to control alcoholic beverages. The National Alcohol Strategy is a master policy plan to address the problem of alcohol consumption in the country, according to the Alcohol Control Act B.E. 2551 of 2008. In the management of alcohol, access and distribution are restricted by establishing legal conditions and procedures to frame the behaviour of manufacturers, vendors, and consumers; in effect, this approach can be considered a new road traffic law [9]. "Heavy drinking" or "Binge drinking" is defined as having a blood alcohol level > 50 milligrams and is considered harmful to the body and the control of consciousness in life [10]. Each region has its own way of life that is influenced by the values of the majority of residents in the area. Alcohol consumption behaviour that is influenced by external forces has a considerable effect on the promotion of alcohol-drinking habits based on culture, traditions, and values, thus reducing people's and society's awareness of healthy behaviours. However, even though laws have been enforced to regulate alcohol consumption, Thailand has various policies and measures for controlling alcohol, including campaigns to decrease and quit alcohol consumption; however, there is still the upward trend in alcohol consumption among working-age groups. Therefore, the health and behavioural health knowledge of working-age groups need to be improved accordingly, so that they can be a role model for the youth and be the main force in the development of the nation's future.

Nowadays, information systems are used to collect, store, and analyse data systematically; allow information to be found promptly; and can use analysis results to make decisions in a geographic information system (GIS), which is a tool that integrates maps with database systems to obtain spatial data. This data can then be displayed and reported with a computerised system based on geographic correlation as a link to other health-related data. It can

help support decision making and problem solving in the promotion, prevention, and control of diseases. According to past studies, GISs has been widely used in health research [11,12]. In particular, the surrounding area can be described as the culture, traditions, and lifestyles, including strategy policies and enforcement of measures to control the use of alcohol in provinces or regions that promote high alcohol consumption and alcohol addiction. According to a survey of Thailand's drinking behaviour, the prevalence of alcohol use decreased every year: 2011 (31.5%), 2013 (32.2%), 2014 (32.3%), 2015 (34.0%), and 2017 (28.4%). However, the prevalence of binge-drinking behaviour increased (2007 [30.0%], 2011 [44.2%], 2014 [42.4%], and 2017 [43.9%]) possibly because of a change in drinking behaviour that promotes increased alcohol use among those who already have a drinking habit. Researchers are interested in the study of spatial factors in GISs Neighbourhoods that are associated with the binge-drinking behaviour of working-age groups. In Thailand, a few studies have proposed guidelines to relevant agencies for health policy planning so that working-age populations will have good and sustainable health. In particular, the problem is caused by alcohol-drinking behaviour that exceeds the standard set by law and poses a danger to oneself, family, society, and the community. Therefore, it is necessary to focus on corrections, including the creation of a new study. In particular, the application of the GIS system to analyse health behaviour data, particularly alcohol-drinking behaviour in Thailand, is clear and comprehensive. This problem has been ongoing in Thai society for a long time to ensure sustainable health in all age groups.

METHODS/MATERIALS

Study design and population

This cross-sectional study used data obtained from the National Statistical Office. It comprises secondary data from population sampling and questionnaires[13]. A survey of smoking and alcohol consumption among people in Thailand was conducted by the NSO. The study sample comprised 129,440 participants. In this study, the inclusion criterion included participants who answered the exam, and the exclusion criteria were as follows: 1) The household did not have a clear address in which province it was located, a house registration, and a clear occupation status in the province were lacking. 2) The sample group was not in the age range of 15–59 years. 3) The questionnaires had incomplete data on alcohol consumption. The sample group in this study was 61,708 individuals (Table 1). Stata version 10 was licenced by the Faculty of Public Health of Khon Kaen University to manage and analyse data for this research study.

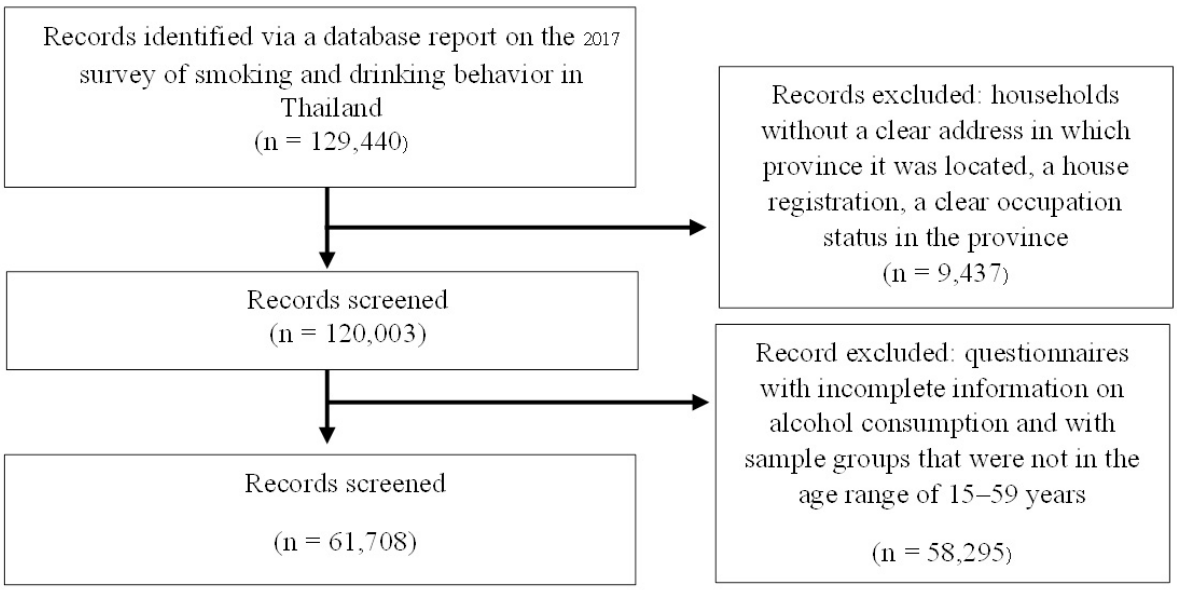

Figure 1. The inclusion and exclusion criteria of binge-drinking behaviour among working-age groups in Thailand.

Dependent factors

The dependent variable was binge-drinking behaviour. Binge-drinking behaviour was coded as "1" for binge-drinking behaviour and "0" for no binge-drinking behaviour. The sample group responding to the survey of smoking and drinking behaviour of the NSO Thailand 2017 [13] was measured as the mean and proportion of the sample who answered the smoking and drinking behaviour survey in each province. There are measures to control alcohol consumption, as measured in Thailand [9]. According to the Road Traffic Act of Thailand, B.E. 2535, alcohol intoxication is defined as a blood alcohol level > 50 mg [10]. In the current study, the NSO determined the criteria for the level of heavy drinking or binge drinking [13] (Table 1).

Table 1. Criteria for the level of heavy drinking or binge drinking

White liquor/Chang Chun/Herbal liquor	Five shots or one-fourth of a big bottle or one-half of a medium-sized bottle
Distilled liquor/mix	One-fourth of a big bottle, five shots, or eight mixing glasses
Beer	Four cans or two big bottles
Wine/Champagne	One big bottle or four glasses of wine
Cider/Wine coolers	Four one-half bottles or cans
Fermented liquor (rice liquor/Sato/local made liquor)	One big bottle or two glasses and a half

Statistical analysis

This study used the Quantum GIS programme to determine the spatial distribution patterns of independent factors and happiness among the elderly. The GeoDa programme was used to analyse spatial autocorrelation by specifying three k-nearest neighbour provinces that connect

as a criterion to identify grouping by using the weight matrix to analyse spatial correlation [14-15]. For this analysis, a weight matrix of neighbourhoods was provided via queen contiguity. The order of contiguity was defined as one, which means that a feature could be counted as a neighbour only if it had direct contact. Following the Moran's I Index results, univariate local Moran's I, which is a spatial analysis and mapping process that reveals the clustering tendency of the phenomena, was employed under the scope of the proportion of binge drinking. Global autocorrelation statistics provide a single measure of spatial autocorrelation to consider the country as a whole [15,16]. The Moran scatter plot is a plot in which the spatially lagged variable is plotted on the y-axis, and the original variable is plotted on the x-axis. Both variables were normalised, and the graph was divided into four quadrants: high–high (upper right) and low–low (lower left) indicate positive spatial autocorrelation, whereas high–low (lower right) and low–high (upper left) indicate negative spatial autocorrelation. Moran's I is equal to the slope of the linear fit of the scatter plot [15,16]. Moran's I has an expected value of -1/(n - 1) and is interpreted in a manner similar to the product-moment correlation coefficient. Informally, a value of "+1" indicates a high degree of positive spatial autocorrelation (i.e., clustering of similar values), a value of "0" indicates random spatial ordering, and a value of "-1" indicates a high degree of negative spatial autocorrelation [15,16].

Ethical clearance

Permission for the study was obtained from the Ethics Committee of Human Research of Khon Kaen University, Khon Kaen, Thailand (HE632180).

RESULT

Spatial distribution characteristics of binge-drinking behaviour among working-age population in Thailand

The prevalence of binge-drinking behaviour in the working-age population in Thailand was 11.47%. The highest proportion was observed in the province of Lamphun (23.6 %), whereas it was the lowest in Pattani (1.12 %). The decile distribution indicated the highest deciles of 18.9%–23.6% in Lamphun, Nan, Phayao, Lampang, Khon Kaen, Chiang Rai, Mae Hong Son, and Pathum Thani. The decile distribution indicated the lowest deciles of 1.1%–6.7% in Trat, Phangnga, Satun, Sing Buri, Phatthalung, Narathiwat, Yala, and Pattani (Figure 2).

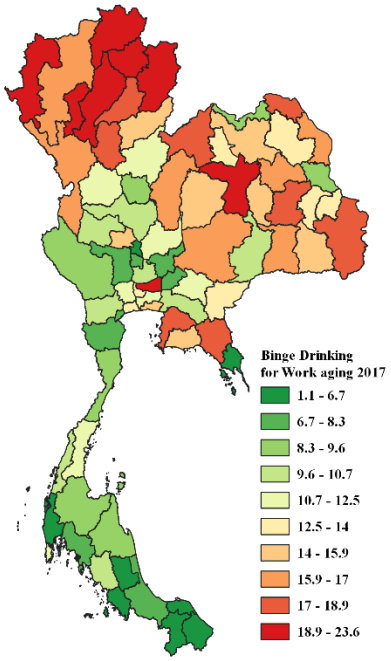

Figure 2. Decile distribution of binge-drinking behaviour in Thailand

Local Indicators of Spatial Association (LISA) between surrounding areas and the binge-drinking behaviour among working-age population in Thailand

The Moran's I indicated that surrounding areas and binge-drinking behaviour among the working-age population in Thailand have statistically significant clustering association patterns (p-value < 0.05). There was a spatial correlation between the distribution patterns of surrounding areas in the same direction as binge-drinking behaviour among the working-age population in Thailand (Moran's I = 0.579). The LISA analysis indicated nine hotspots or high–high clusters of neighbouring areas and a high level of binge-drinking behaviour among the working-age population. Furthermore, high values were also indicated for the surrounding three provinces of Lamphun, Nan, Phayao, Lampang, Chiang Rai, Phrae, Chiang Mai, Maha Sarakham, and Chaiyaphum. In addition, there were 10 provinces that have low neighbouring areas with low levels of binge-drinking behaviour among the working-age population: Lop Buri, Trang, Nakhon Si Thammarat, Surat Thani, Songkhla, Satun, Phatthalung, Narathiwat, Yala, and Pattani. These areas had a low number of neighbouring provinces (three provinces) with low levels of binge-drinking behaviour among the working-age population (cold spot or low–low clusters). Three provinces, namely, Pathum Thani, Chai Nat, and Nonthaburi, had a high number of neighbouring provinces with low levels of binge-drinking behaviour among the working-age population (low–high cluster) (Figure 3).

Figure 3. LISA and Moran's I scatter plot matrix of surrounding areas and the binge-drinking behaviour among working-age population in Thailand

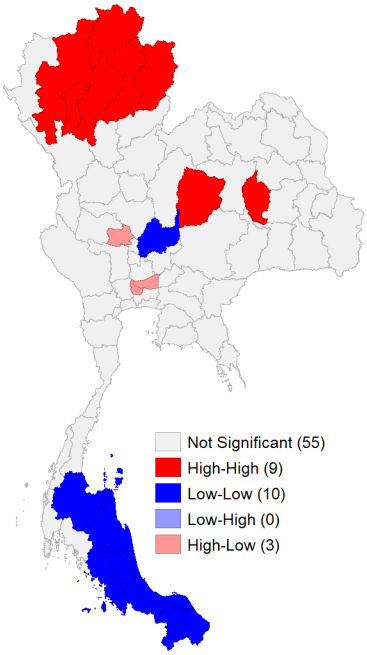

Figure 3(a) Cluster maps of Moran's I scatter plot matrix (LISA between the surrounding area and the binge-drinking behaviour among the working-age population in Thailand)

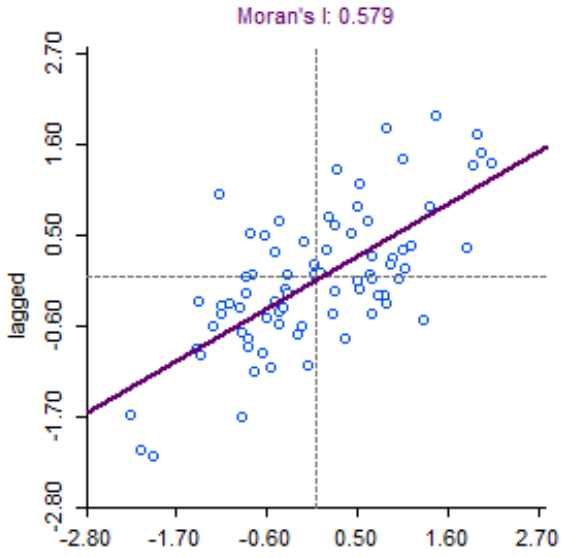

Figure 3 (b) Moran's I scatter plot matrix (LISA between the surrounding area and the binge-drinking behaviour among the working-age population in Thailand)

DISCUSSION

Thailand has enforced laws to regulate alcohol consumption and increase efficiency in managing and controlling alcohol consumption. There is a great need to apply GIS in the planning and promotion of measures in Thailand to improve the effectiveness of policies[17-19]. The use of GIS is appropriate for different areas in Thailand, where there are differences in culture, traditions, and daily living. According to the results of the current study, cultural causal factors and tradition have the same positive direct and indirect influence on the drinking of alcoholic beverages because society's values towards alcohol-drinking habits are influenced by social acceptance, which indicates that drinking shows respect, honour, and kindness in Thai society. Almost every social gathering, banquet, celebration, or tradition must always include alcoholic beverages as a component or motivation. Alcohol is also an ingredient in various rituals because liquor is considered a tool for building good relationships between individuals, groups, and communities, thus encouraging those who grew up in such societies to heavily consume alcohol. In addition, the northern part of Thailand observes New Year's events such as Songkran Ordinations, weddings, floating of Bodhi Tree crutches, and raising the ghosts of the gods or grandparents' ghosts at the ghosts of the fields, and livelihoods that are associated with drinking alcohol [20,21]. Therefore, alcohol drinking is intertwined into the fabric of society via rituals. Feasting is also an important factor that encourages drinkers to have a positive attitude towards the drinking outcome, thus resulting in the transmission of alcohol-drinking behaviour from generation to generation. The normalisation of alcohol drinking by adults can be one of the factors that contribute to imitation behaviour and increases the risk of alcohol-drinking behaviour, particularly the creation of bad attitudes that encourage alcohol drinking,

which has become familiar to people in the community and society[22,23]. In addition, some areas in the northeastern region of the country have similar cultural traditions to the northern region[21,24]. Local traditions contribute to the promotion of binge drinking, and the cultural drinking and traditions of the community that connects festivals and merit-based lifestyles throughout the year are the main factors of drinking alcohol among people in rural areas. Community culture affects alcohol consumption among community members. This is evidenced by the role of liquor in rituals and feasts. Alcohol has become part of celebrations, and social and cultural changes have become the drink of humanity [25]. Studies showed that the smuggling of liquor and prevalence of bootleg liquor in the community, which may be a consequence of the increase in alcohol tax, are indications that people prefer to drink cheap alcoholic beverages. However, alcohol is not regulated, including the production of alcohol. There is no quality or risk that drinkers will drink more than the amount required by law, thus causing a lack of awareness to control themselves. Again, in today's age of information technology, public access to alcohol publicity has encouraged people to turn to alcohol drinking; therefore, it is another risk of binge-drinking habits[26-28]. Policy measures that control the production of alcoholic beverages in the community should be promoted in terms of inspection, strict production licence, and publicity for alcoholic beverages.

The surrounding area of the province should be able to describe the culture, traditions, and lifestyle in each province and be able to convey to that region the behaviour of drinking alcohol (Figure 2)[24-25,29]. It can be described as binge drinking in the northern region. This makes the value of alcohol control less than that in other areas, thus causing people in the area to drink alcohol without control. Owing to the tax increase imposed by the government, more people turn to drinking alcohol that is not legal in the community. This type of alcohol is cheap but is not safe, i.e., it is not up to the standard. Cultural traditions and lifestyles that are consistent with the consumption of alcoholic beverages create inappropriate values in the community for the Thai youth in the region where alcohol is produced, thus providing an opportunity to consume alcohol at an early age. It is a major chronic problem affecting life in adulthood. This finding is consistent with past studies that found that populations in the northern and north-eastern regions of the country start drinking alcohol before the age of 20. This affects the drinking behaviour of adults who consume a greater amount of alcohol. This is a risk factor that causes this group of people to consume alcohol more than the legal limit, thus leading to intoxication, binge drinking or heavy drinking, and chronic alcohol addiction. This phenomenon affects the cost of treatment and increases the burden on caregivers, society, and families[22,24,27-28,30-31]. Therefore, it is necessary to take action to manage binge drinking. In particular, a policy that prevents binge drinking in the area should be created to reduce the effects and problems caused by uncontrollable binge drinking[32]. However, measures and laws cannot be easily applied to culture, traditions, and way of life because they are part of a person's belief system. Improving health literacy among individuals to promote health education is one option. Proper decision making is another option to correct binge-drinking habits.

GIS describes spatial relationships in terms of law enforcement, in addition to cultural, traditional, lifestyle factors, and regulations pertaining to alcohol use control. Particularly, access to alcohol distribution points puts you in danger of

binge drinking. According to a prior study, Thailand has implemented legislation regarding the increase of taxes on the type of beverage. Drinking alcohol leads to drinking behaviour. The aim of this policy is to decrease the popularity of alcoholic beverages to improve efficiency. In controlling and managing alcohol-drinking behaviour, the GIS system plays an important role in helping explain behaviour that exceeds regional and provincial drinking limits. In turn, the government and related entities have come to support creative individuals in reducing alcohol consumption, including controlling alcohol-drinking behaviour. Figures 3(A) and 3(B) depict the behaviour of consuming alcohol in excess of legal limits. The surrounding environment also plays an important role in terms of alcohol availability and economic growth of provincial politics. It also influences neighbouring provinces. In Figure 3(B), the correlation between the neighbouring provinces in each region has a significant effect on the prevalence of alcoholic beverages, particularly today. It is more convenient to travel at the end of the year, thus allowing populations in each province to travel to each other more easily than in the past and resulting in the spread of drinking behaviour to neighbouring regions. It is another risk factor that has a broad effect and a tendency to grow continually. According to the findings of this study, the government and related agencies can utilise GIS to effectively manage and limit the area in each province to deter the increase in alcohol consumption as a form of strategy.

GISs can be applied in formulating measures and policies that will promote the creation of healthy behaviours, particularly health literacy for discouraging drinking alcohol. It also promotes policies and measures to control alcohol effectively in Thailand according to the context of culture, traditions, and daily living. In particular, the creation and development of community-level measures to control the consumption and distribution of alcoholic beverages are needed. This is particularly true for grocery stores, pickle shops/liquor kiosks, and stores that have registered or possess licences to sell alcohol but whose licences have expired; participating in communities or provincial areas is an alternative way to raise awareness of the dangers and effects of alcohol on Thai youth, society, and families in all provinces, including the public and private sectors. This approach can play a role in controlling the distribution of alcoholic beverages and promoting the prevention of inappropriate alcohol-drinking behaviour. The participation process will allow each province to develop the potential to enforce measures and laws to regulate the distribution and consumption of alcoholic beverages appropriately in different provinces in terms of tradition, culture, and lifestyle. The strict and serious enforcement of existing laws in all areas, such as taking the floor to check permits, should be coupled with public relations and campaigns to educate and promote values for the owners of the distribution points to create a good model for the point of sale in accordance with the law and to engage the public in the area to monitor actions that violate the law at the point of sale. To continue to manage this problem efficiently and effectively, it is essential to promote and raise awareness of its health effects by promoting health literacy to local residents while engaging all sectors in managing alcohol behavioural issues in all areas with sustainability and perpetual efficiency.

CONCLUSION

Binge-drinking behaviour has long been a chronic problem in Thailand and has negatively affected public health and the economy, thus hampering the development of the Thai population. Thailand has a society that is conducive to risky behaviours and encourages alcohol

consumption beyond the standards set by law. Therefore, it is necessary to control the drinking and distribution of alcoholic beverages in accordance with healthy behaviours to limit the negative effects on the population of Thailand. GISs enable the monitoring of problems of alcohol drinking from a broad perspective and provide details in each province and nearby areas. There is a strong need to apply geospatial systems in health systems to formulate policies and measures that control alcohol-drinking behaviour. Each region of Thailand is appropriate in each local context in different provinces in the country. Policies and measures to control alcohol-drinking behaviour should be established. The results of this study also reflect an efficient and effective management of this problem. The public and private sectors should promote, develop, and raise awareness of the health effects of alcohol by creating appropriate health literacy programs for local residents while engaging all sectors in managing alcohol behaviour in all areas. This approach is sustainable and can have long-term effects on society.

LIMITATIONS

Secondary data were obtained from the NSO of Thailand; therefore, there were limitations in terms of variables and data integrity. Future studies should investigate the reasons why this situation occurred; therefore, a qualitative study should be conducted to determine whether the cultural context and traditional lifestyle can confirm the findings of the quantitative method.

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