

Temporal Trends in Key Lifestyle Risk Factors in Thailand Compared with Global Averages with Projections to 2030: WHO Data (2000–2022)

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Abstract

OBJECTIVES: To evaluate temporal trends in four key lifestyle risk factors—tobacco use, alcohol consumption, obesity, and physical inactivity—in Thailand, and to compare these trends with regional and global patterns using World Health Organization (WHO) data.

MATERIALS AND METHODS: This ecological time-trend study used secondary aggregated data from the World Health Organization Global Health Observatory (WHO's GHO). National estimates for Thailand were compared with South-East Asia and global averages from 2000 to 2022, with projections to 2030. Trends were analyzed across four indicators: smoking prevalence, alcohol consumption, obesity prevalence, and insufficient physical activity, using the age group specified by the WHO for each indicator. Temporal trends were assessed using linear regression models, with projections to 2030 derived from the fitted models.

RESULTS: Smoking prevalence declined steadily in Thailand from 26.8% in 2000 to 17.8% in 2022. Alcohol consumption showed a modest reduction but remained consistently higher than global and regional averages, with intake peaking at 9.4 litres per capita in both 2004 and 2006. In contrast, obesity prevalence increased from 5.7% to 15.4%, while physical inactivity rose markedly from 14.7% to 31.2%, exceeding global levels after 2018. Parallel upward trends in physical inactivity and obesity suggest a potential interaction between sedentary behavior and metabolic risk. Projections indicate continued increases in obesity and inactivity by 2030.

CONCLUSION: Thailand demonstrates a shifting non-communicable disease risk profile, with improvements in smoking but worsening trends in obesity and physical inactivity. Although alcohol consumption has shown a modest decline over time, it remains persistently higher than both regional and global averages, with a substantial burden driven by premature mortality and patterns of episodic heavy drinking. These findings highlight the need for integrated, long-term public health strategies addressing structural determinants of lifestyle behaviors. Comparative analysis suggests that global benchmarks may provide useful references for national policy planning.

Keywords: lifestyle risk factors; non-communicable diseases; tobacco use; alcohol consumption; obesity; physical inactivity; temporal trends; health projections.

Lifestyle behaviors play a central role in shaping population health across the life course, as evidenced by longitudinal studies demonstrating that trajectories of smoking, alcohol consumption, and physical activity are associated with subsequent health outcomes.¹ This empirical evidence aligns with the conceptual framework of lifestyle medicine, which emphasizes lifestyle behaviors as the cornerstone of population health and long-term health trajectories.²

Patterns of tobacco use, alcohol consumption, physical activity, and obesity are strongly influenced by social, economic, and environmental contexts, which shape health behaviors at both individual and population levels and together define population exposure to major modifiable health risks.^{3,4}

The cumulative impact of adverse lifestyle patterns is reflected in the growing global burden of non-communicable diseases (NCDs), which continue to account for the majority of morbidity and mortality worldwide.⁵ Tobacco use, alcohol consumption, obesity, and physical inactivity have been consistently identified as major, modifiable lifestyle-related risk factors contributing to cardiovascular disease, diabetes, cancer, premature mortality, and rising healthcare costs.⁶ Consequently, these factors represent priority targets for prevention-oriented health systems and population-level policy interventions.

In Thailand, ongoing socioeconomic development and demographic changes including urbanization, shifts in age structure, and evolving lifestyle patterns reflect broader transitions observed across South-East Asia and have important implications for population health trends.⁷ Over the past decade, the country has experienced substantial urbanization and population aging, which may influence lifestyle behaviors and NCD risk profiles in ways that differ from global averages. Although national surveys and international monitoring systems have documented trends in individual lifestyle risk factors in Thailand, most existing analyses remain country-specific and descriptive, limiting their utility for benchmarking progress against global trends.

Comparative time-trend analyses using standardized international data are essential for contextualizing national trends within broader global and regional health trajectories, enabling assessment of the direction and magnitude of change over time and facilitating interpretation of whether national patterns align with or diverge from global averages.⁸ In the context of Thailand, while descriptive analyses of lifestyle risk factor trends have been conducted at the country level, there remains a need to extend these observations through comparative approaches that leverage international data sources.⁹ Furthermore, longitudinal examination of trends may reveal periods of acceleration, stagnation, or reversal within specific domains, providing valuable insights into the potential impact of public health interventions.

The WHO's GHO offers harmonized and publicly available indicators that enable consistent cross-country comparisons and longitudinal analyses of key lifestyle-related risk factors.¹⁰ Using these data, the ecological time-trend analysis covered smoking prevalence, alcohol consumption, obesity prevalence, and physical inactivity in Thailand between 2000 and 2022, with comparisons against corresponding South-East Asian and global estimates.

The analytical framework was designed to identify periods of acceleration, stagnation, or reversal in national trends. The findings may inform lifestyle medicine strategies, guide NCD prevention efforts, and support public health planning in Thailand and South-East Asia.

Although both national and international surveillance data are available, most existing analyses rely on annual or cross-sectional estimates of individual lifestyle risk factors, with limited evaluation of long-term trends within a unified analytical framework. In addition, these risk factors are often examined in isolation, with minimal integration across related domains.

As a result, there remains a lack of comprehensive comparative analyses that assess multiple lifestyle risk factors simultaneously in Thailand. To date, no study has systematically examined trends across all four major domains—tobacco use, alcohol consumption, obesity, and physical inactivity—while comparing them with regional and global benchmarks. This gap is important, as these risk factors frequently coexist and interact, collectively contributing to the burden of NCDs at the population level.

Addressing this gap through a comprehensive comparative time-trend analysis may provide a more holistic understanding of Thailand's evolving risk profile and support more coordinated and effective public health strategies. The primary objective of this study was to evaluate temporal trends in four key lifestyle risk factors in Thailand between 2000 and 2022 and to compare these trends with South-East Asian and global estimates using data from the WHO's GHO. A secondary objective was to project these trends to 2030.

Material and Methods

This study used secondary aggregated data on four lifestyle risk factors that were extracted by the research team from the WHO's GHO open-access data repository (<https://www.who.int/data/gho>), covering annual national, regional, and global estimates from 2000 to 2022; as the dataset is publicly available, de-identified, and aggregated, no individual-level data were accessed. National estimates for Thailand were compared with the corresponding South-East Asian regional and global estimates obtained from the WHO Global Health Observatory to examine temporal trends in key lifestyle risk factors between 2000 and 2022.

Four lifestyle risk factor indicators were analyzed: smoking prevalence, alcohol consumption, obesity prevalence, and insufficient physical activity. Indicator definitions were based on the WHO's GHO metadata and are presented in Table 1. For each indicator and year within the study period (2000–2022), estimates for Thailand, South-East Asia, and the global average were extracted from the GHO database.

To assess temporal trends, linear regression models were fitted to each indicator over time, with calendar year as the independent variable. The fitted models were used to generate linear projections to 2030 for each indicator and region. Figure 1 presents 95% confidence intervals for Thailand's projections.

Temporal Trends in Key Lifestyle Risk Factors in Thailand Compared with Global Averages with Projections to 2030: WHO Data (2000–2022)

Table 1: Definition of Lifestyle Risk Factor Indicators.

Variables	Definition
Tobacco smoking (%)	Proportion of adults aged ≥ 15 years who currently smoke any tobacco product.
Total alcohol per capita consumption (Litres of pure alcohol)	Total alcohol consumption per adult aged ≥ 15 years per year, measured as litres of pure alcohol. It includes the sum of three-year average recorded consumption (production, import, export, sales, or taxation data) and unrecorded consumption (alcohol not taxed or outside governmental control), adjusted for tourist consumption based on UN tourism statistics.
Obesity (%)	Percentage of adults aged ≥ 18 years with body mass index (BMI) ≥ 30 kg/m ² .
Insufficient physical activity (%)	Percentage of adults aged ≥ 18 years who do not meet WHO physical activity recommendations • <150 minutes of moderate-intensity activity per week, or • <75 minutes of vigorous-intensity activity per week, or equivalent.

Ethical Considerations

This study used publicly available, de-identified, and aggregated data. No human participants were involved, and no identifiable individual-level data were accessed. Therefore, ethical approval was not required, and informed consent was not required.

Results

From 2000 to 2022, Thailand experienced substantial changes in key behavioral and lifestyle risk factors compared with global trends. Alcohol consumption in Thailand remained consistently higher than the global average throughout the study period. Alcohol intake peaked between 2004 and 2006 at 9.4 litres per capita before declining after 2008. From 2010 onward, consumption stabilized at approximately 7.6–8.0 litres per capita. Although this reflects a modest reduction from peak levels, alcohol consumption in Thailand persistently exceeded the global mean.

Obesity prevalence demonstrated a continuous upward trajectory. The proportion of adults with BMI ≥ 30 kg/m² increased steadily from 5.7% in 2000 to 15.4% in 2022, representing nearly a threefold increase over two decades. While Thailand's obesity prevalence remained lower than the global average throughout the period, the gap progressively narrowed, indicating convergence toward global levels. Physical inactivity showed a similarly concerning pattern. The prevalence of insufficient physical activity more than doubled, rising from 14.7% in 2000 to 31.2% in 2022. The increase was

gradual but persistent, particularly after 2010. Notably, from 2018 onward, Thailand's inactivity prevalence exceeded the global average, suggesting a shift from historically lower inactivity levels to comparatively higher risk.

In contrast to these worsening trends, smoking prevalence declined over time. Current smoking prevalence decreased from 26.8% in 2000 to 17.8% in 2022. This downward trend was consistent with global patterns and represents the only major behavioral risk factor in this dataset showing sustained improvement.

Discussion

This study analyzed trends in four major lifestyle risk factors in Thailand from 2000 to 2022, comparing them with global and South-East Asia averages using WHO data. The findings show varied trends across risk factor domains and include a forecast analysis up to 2030.

Smoking

Smoking prevalence in Thailand declined steadily during the study period, falling from 26.8% in 2000 to 22.2% in 2010 and further to 17.8% in 2022. This represents an absolute reduction of 9.0 percentage points between 2000 and 2022. This pattern is broadly consistent with global trends. Worldwide smoking prevalence decreased from 26.9% in 2000 to 22.1% in 2010 and 18.3% in 2022, corresponding to an absolute reduction of 8.6 percentage points over the same period.

Table 2: Lifestyle related risk factors by region and year.

Indicator	Region	2000	2010	2022	Absolute Change 2000–2022	2030 (Projected)
Current smoking prevalence (%)	Thailand	26.8	22.2	17.8	−9.0	14.4
	South-East Asia	33.0	26.2	20.9	−12.1	16.1
	Global	26.9	22.1	18.3	−8.6	14.9
Alcohol per capita consumption (l)	Thailand	8.7	7.6	7.6	−1.1	6.9
	South-East Asia	2.5	2.8	3.2	+0.7	3.4
	Global	5.6	5.8	5.5	−0.1	5.4
Obesity prevalence (%)	Thailand	5.7	9.2	15.4	+9.7	18.2
	South-East Asia	2.9	5.1	9.6	+6.7	11.6
	Global	14.5	18.6	23.6	+9.1	27.2
Insufficient physical activity (%)	Thailand	14.7	20.7	31.2	+16.5	36.2
	South-East Asia	17.6	20.3	25.3	+7.7	27.8
	Global	25.5	25.7	27.3	+1.8	27.6

Note: Absolute changes were calculated using unrounded estimates; minor discrepancies may occur because the displayed values were rounded to one decimal

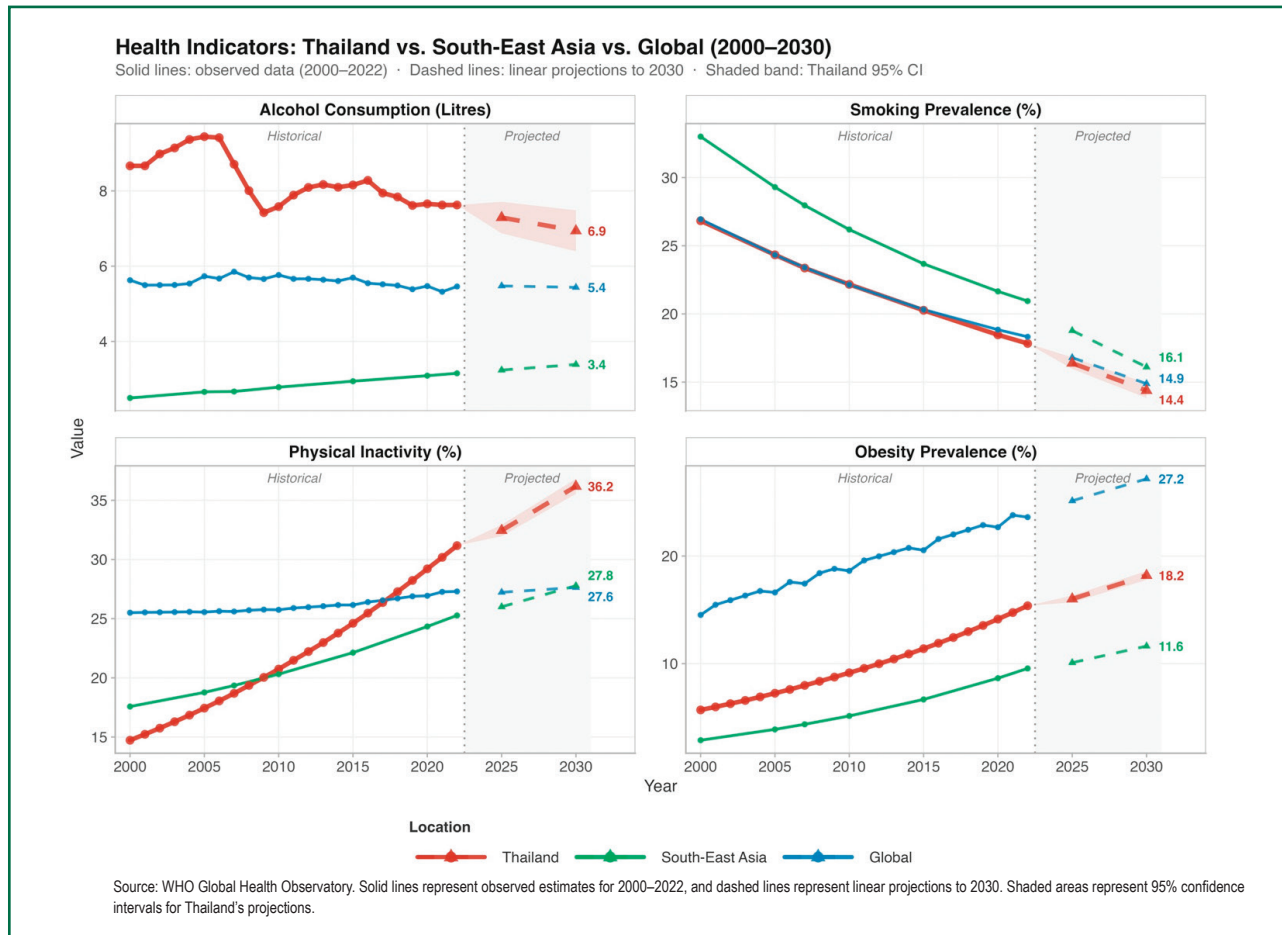


Figure 1. Observed trends from 2000 to 2022 and linear projections to 2030 for four lifestyle risk factors in Thailand, South-East Asia, and globally. Shaded areas represent 95% confidence intervals for Thailand's projections.

At the regional level, South-East Asia experienced a more pronounced reduction, with smoking prevalence falling from 33.0% in 2000 to 26.2% in 2010 and 20.9% in 2022, with an overall decline of 12.1 percentage points. If current trends continue, smoking prevalence in Thailand is projected to fall further to approximately 14.4% by 2030. This level would be close to the projected global prevalence of 14.9% and slightly below the projected South-East Asia average of 16.1%.

These findings suggest that Thailand has achieved substantial progress in tobacco control, although other lifestyle-related risk factors are emerging as growing public health concerns. This reduction likely reflects the long-standing implementation of comprehensive tobacco control measures in Thailand, including taxation policies, advertising restrictions, smoke-free regulations, and public health campaigns aimed at reducing tobacco use. In addition, Thailand established Provincial Tobacco Products Control Committees (PTPCCs) across all 77 provinces under the Tobacco Products Control Act (B.E. 2560)¹¹, further strengthening policy enforcement at the local level.

Thailand has been recognized as one of the early adopters of comprehensive tobacco control strategies in South-East Asia, with policy measures aligned with the WHO Framework

Convention on Tobacco Control (FCTC).^{12,13} Similar reductions in smoking prevalence have also been observed globally following the implementation of strong tobacco control policies.

However, emerging tobacco products may complicate future surveillance. In recent years, the increasing availability and use of electronic cigarettes may have altered smoking behaviors and affected population-level estimates.¹⁴ Although Thailand has prohibited the importation and sale of electronic cigarettes since 2014¹⁵, with stricter enforcement introduced under the Customs Act in 2017¹⁶, informal markets remain widespread.¹⁷ This may continue to influence tobacco use patterns and introduce bias in population-based estimates.

Alcohol

Alcohol consumption presents a significant economic challenge for Thailand. In 2021, the total estimated economic cost attributable to alcohol consumption was 165,450.5 million baht, equivalent to 1.02% of Thailand's GDP and approximately 2,500 baht per capita. Premature mortality accounted for the largest proportion of the total cost (95.45%), with an estimated 22,804 alcohol-attributable premature deaths.¹⁸

Over the past two decades, alcohol consumption in Thailand has shown a moderate decline, decreasing from 8.7 litres per capita in 2000 to 7.6 litres in 2022 (absolute change -1.1 litres). This reduction may be attributed to the implementation of a comprehensive alcohol control policy framework, including restrictions on availability, strict advertising bans, and excise taxation. These measures are consistent with the WHO “best buy” interventions for the prevention of NCDs.¹⁹ Despite this reduction, alcohol consumption in Thailand remained higher than both the South-East Asia average (3.2 litres) and the global average (5.5 litres) in 2022. At the regional level, alcohol consumption in South-East Asia increased from 2.5 litres in 2000 to 3.2 litres in 2022 (absolute change, +0.7 litres), while global consumption remained relatively stable (5.6 to 5.5 litres; absolute change -0.1 litre). Several structural factors may contribute to Thailand’s relatively higher consumption level, including higher economic development compared with some neighbouring countries,²⁰ tourism activity, and differences in drinking norms across the region.

Alcohol consumption in Thailand is also characterized by episodic heavy drinking. A national survey analysis using data from 61,708 respondents reported a binge drinking prevalence of 11.47%, indicating that approximately one in nine working-age adults engages in binge drinking behavior, with gaps in alcohol control law enforcement associated with higher levels of binge drinking.²¹

These findings are particularly concerning given the strong association between alcohol consumption and major NCDs, including cardiovascular diseases, liver cirrhosis, and certain cancers.¹⁸ Although national alcohol control policies exist, shortcomings in enforcement and regulation especially regarding availability and marketing may contribute to consistently high levels of consumption and patterns of episodic heavy drinking.

Strengthening policy implementation and developing targeted interventions for high-risk populations may be essential to reduce alcohol-related harm and support effective NCD prevention in Thailand.

Obesity

Obesity prevalence increased markedly in Thailand during the study period. The prevalence rose from 5.7% in 2000 to 9.2% in 2010 and further to 15.4% in 2022, representing an absolute increase of 9.7 percentage points over the 22-year period—approximately a three-fold increase since 2000. Although obesity prevalence in Thailand remains lower than the global average (23.6% in 2022), the gap between Thailand and global estimates has gradually narrowed over time.

The upward trend observed in Thailand is consistent with global patterns, where obesity rates are rising due to structural factors such as urbanization, dietary shifts toward energy-dense foods, and increasingly sedentary lifestyles. These changes are widely described as part of the nutrition

transition, which has been observed in many low- and middle-income countries undergoing rapid socioeconomic and demographic change.^{22,23}

Within the regional context, obesity prevalence in Thailand has remained consistently higher than the average observed across South-East Asia. In 2022, obesity prevalence in Thailand reached 15.4%, compared with 9.6% in South-East Asia, and the absolute increase between 2000 and 2022 was larger in Thailand (+9.7 percentage points) than in the region as a whole (+6.7 percentage points). This pattern suggests that Thailand may be experiencing a more advanced stage of nutrition transition compared with some neighboring countries.^{22,23} If current trends continue, obesity prevalence in Thailand is projected to reach approximately 18.2% by 2030, which may contribute to a growing burden of metabolic disorders and cardiovascular disease.

This trend is particularly concerning given the strong association between obesity and metabolic disorders such as type 2 diabetes, hypertension, and dyslipidemia, which are major contributors to the NCDs burden. In Thailand, these patterns may be further driven by increased consumption of energy-dense and ultra-processed foods, as well as more sedentary lifestyles associated with urban living. Moreover, higher consumption of ultra-processed foods has been significantly associated with an increased risk of all-cause mortality.²⁴

Compared with tobacco and alcohol control, strategies targeting obesity require greater attention to food environments and the promotion of physical activity.^{21,22} Strengthening preventive strategies and implementing early interventions, especially among younger populations, may be essential to curb the rising trend of obesity and its long-term health consequences.

Physical inactivity

Among the risk factors examined, insufficient physical activity showed the most pronounced increase. The prevalence of insufficient physical activity in Thailand rose substantially over the study period, eventually exceeding the South-East Asian average and, from approximately 2018 onward, remained consistently higher than both regional and global averages, suggesting that sedentary behaviours may be expanding more rapidly in Thailand than in many other settings.

In this analysis, the prevalence of insufficient physical activity in Thailand increased from 14.7% in 2000 to 31.2% in 2022, representing an absolute increase of 16.5 percentage points. This change was considerably larger than the global trend, which increased modestly from 25.5% to 27.3% (+1.8 percentage points), and also exceeded the regional increase observed in South-East Asia, where prevalence rose from 17.6% to 25.3% (+7.7 percentage points).

Physical inactivity is a well-established risk factor for NCDs²⁵ and has also been linked to poorer mental health outcomes and reduced quality of life.²⁶

While insufficient physical activity has increased worldwide (+1.8), the increase in Thailand has been larger (+16.5). This pattern may partly reflect structural changes associated with urbanization, including increased reliance on motorized transport, more sedentary occupations, and reduced opportunities for routine physical activity in daily life. Factors such as rapid city growth, increased use of motor vehicles, a rise in sedentary jobs, and more time spent on screens all appear to play a role in reducing overall physical activity. Urban design and transport systems strongly impact how populations engage in physical activity.^{27,28}

The growing prevalence of insufficient physical activity observed in Thailand is consistent with global patterns reported in large international analyses. A pooled analysis of population-based surveys across 168 countries estimated that approximately one quarter of adults worldwide do not meet recommended physical activity levels, highlighting physical inactivity as a major global public health challenge.²⁹

Physical inactivity is a well-established risk factor for obesity, cardiovascular disease, and other NCDs. The concurrent rise in obesity prevalence observed in this study further suggests a potential interaction between sedentary behaviour and metabolic risk factors in the Thai population, which may also be influenced by environmental and urban design factors affecting daily movement patterns.²⁸

When examining physical inactivity alongside obesity, a parallel upward trend is observed, with increases in physical inactivity preceding a subsequent rise in obesity prevalence, particularly after 2010. This temporal pattern suggests a potential interaction between sedentary behavior and metabolic risk factors, whereby increasing physical inactivity may contribute to the development of obesity over time.

The concurrent rise in these two risk factors reflects the clustering of interrelated lifestyle risks that may amplify the burden of NCDs at the population level. These findings highlight the need for both short-term and long-term policy responses. Immediate strategies may focus on promoting physical activity through public health campaigns and community-based interventions, while long-term approaches should address structural determinants, including urban design, transportation systems, and food environments, to support sustained behavioral change.

In addition to individual temporal trends, the present findings further support potential interactions among key lifestyle risk factors. The observed parallel increase in obesity and insufficient physical activity is consistent with the concept of a shared behavioral and metabolic pathway. This aligns with findings reported by Chimoriya et al.,³⁰ who demonstrated low levels of physical activity and higher

sedentary behavior among adults with overweight/obesity and type 2 diabetes in Nepal, and suggested that promoting physical activity and reducing sedentary behavior may help mitigate the burden of NCDs.³⁰

In contrast, tobacco use and alcohol consumption demonstrated a less consistent pattern. While these behaviors are often clustered together due to shared social and behavioral determinants, the dissociation observed in Thailand may reflect differences in the implementation and effectiveness of public health policies, cultural norms, and regulatory environments, as observed in countries such as the United States, Singapore, and the Philippines. Evidence from these settings indicates that tobacco control measures are generally more straightforward to implement and have achieved greater effectiveness compared with alcohol control policies, which tend to be more fragmented and less consistently enforced.^{31,32}

Taken together, these findings highlight the importance of considering the co-occurrence and interaction among multiple lifestyle risk factors when designing population-level interventions. Interventions targeting more than one behavior simultaneously may be more effective in the prevention and management of chronic diseases.^{33,34} Such integrated approaches may therefore play a key role in reducing the overall burden of NCDs. Further research is needed to advance the science of multiple health behavior change and to develop comprehensive strategies addressing these interrelated risk factors. Future studies incorporating individual-level data and multivariable approaches are warranted to better elucidate the magnitude and direction of these interactions.

Limitations and Recommendations

This study relied on secondary aggregated WHO data; therefore, conventional risk-of-bias assessment tools were not applicable. Data consistency was ensured by including indicators with stable definitions across years and verifying estimates against WHO metadata documentation. In addition, subgroup analyses by gender or socioeconomic status were not performed, which may limit the ability to identify disparities within the population.

An additional observation from the comparative analysis is that Thailand's risk factor trends often appear closer to global averages than to regional South-East Asian patterns. This may reflect Thailand's level of socioeconomic development, urbanization, and demographic transition, which may resemble patterns observed in upper-middle-income countries rather than the regional average. From a policy perspective, this suggests that global benchmarks may, in some contexts, provide a more appropriate reference for national health planning than regional averages alone.

Based on the overall findings of this study, multifactorial approaches targeting co-occurring risk factors may be more effective than single-behavior interventions, particularly in the context of increasing physical inactivity and obesity.

Future studies could improve by examining gender-specific differences, as risk factors like smoking, alcohol use, inactivity, and obesity vary between men and women. Social and occupational roles influence exposure and vulnerability. Gender-disaggregated analyses offer detailed risk profiles and help guide targeted, equitable public health strategies.

Conclusion

The findings of this study suggest a clear shift in Thailand's NCD risk profile. While reductions in smoking and the stabilization of alcohol consumption reflect the success of existing control measures, the continued rise in obesity and physical inactivity is increasingly concerning. These trends highlight the need for stronger efforts to promote active

lifestyles and healthier environments, alongside more integrated approaches to obesity prevention. Strengthening policies that support physical activity and healthy weight management will be essential to reduce the growing burden of lifestyle-related diseases and sustain progress in NCD prevention in Thailand.

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Conflicts of Interest

The authors declare no conflict of interest related to this study.

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