Health and economic effects of increased taxation on tobacco, alcohol, and sugar-sweetened beverages in China: a modelling study

Tiange Chen, Jinyi Zhu, Sian Tsuei, Yunyun Jiang, Yunting Zheng, Duo Xu, Hongqiao Fu**

Summary

Background China faces substantial burdens from tobacco, alcohol, and sugar-sweetened beverage (SSB) consumption, yet tax increases on these products have been stagnant. Existing evidence on the health, economic, and fiscal effects of such taxes in China is limited, which hinders tax reforms on tobacco and alcohol and implementation of SSB excise taxes. We aim to quantify the potential effects of increasing these taxes in China.

Methods We modelled the health, macroeconomic, and fiscal consequences under different tax increase scenarios in China between 2026 and 2050. Years of life gained (YLGs), deaths averted, and additional fiscal revenue were estimated using a cohort state-transition model incorporating age-specific, sex-specific, and income-specific demographic projections, consumption patterns, price elasticities, and relative risk estimates. Macroeconomic benefits were calculated through enhanced labour supply and reduced health-care expenditures using a health-augmented macroeconomic model. Sensitivity analyses were conducted to account for parameter and structural uncertainties.

Findings From 2026 to 2050, under 20% price increases through tax hikes, taxation of tobacco, alcohol, and SSBs would generate 20·58 million (95% uncertainty interval 12·53–29·19), 9·02 million (5·61–12·92), and 3·67 million (2·40–5·05) YLGs, respectively, and avert 0·86 million (0·53–1·23), 0·36 million (0·22–0·51), and 0·13 million (0·09–0·19) deaths, respectively. Health benefits were concentrated among lower-income groups and males. These health improvements would translate into macroeconomic gains equivalent to 0·043% (0·031–0·060), 0·034% (0·024–0·047), and 0·0016% (0·0013–0·0019) of total gross domestic product, respectively. Additional fiscal revenues would total ¥4·53 trillion (3·70–5·50) for tobacco, ¥2·00 trillion (1·75–2·29) for alcohol, and ¥295·5 billion (227·9–377·1) for SSBs. Higher taxes would yield greater health, economic, and equity gains, but fiscal revenues would decline beyond certain tax share levels (72% for tobacco, 59% for alcohol, and 40% for SSBs).

Interpretation Increasing excise taxes on tobacco, alcohol, and SSBs in China can simultaneously generate health benefits, macroeconomic gains, and additional fiscal revenues, as well as improve equity.

Funding National Social Science Fund of China, the Taikang Yicai Public Health and Epidemic Control Fund, and Bill & Melinda Gates Foundation.

Lancet Public Health 2025; 10: e1025–35

Published Online November 9, 2025 https://doi.org/10.1016/S2468-2667(25)00256-7

See Comment page e1009

For the Chinese translation of the abstract see Online for appendix 1

*Contributed equally

School of Public Health, Peking University Health Science Center, Beijing, China (T Chen MPH, H Fu PhD); **Department of Health Policy, Vanderbilt University School of Medicine, Nashville, TN, USA** (J Zhu PhD); **Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada** (S Tsuei PhD); **Faculty of Health Sciences, Simon Fraser University, Burnaby, BC, Canada** (S Tsuei PhD); **Department of Public Finance, School of Economics, Peking University, Beijing, China** (Prof Y Jiang PhD); **School of Health Management, Fujian Medical University, Fuzhou, China** (Y Zheng PhD); **Institute of Population and Labor Economics, Chinese Academy of Social Sciences, Beijing, China** (D Xu PhD)

Correspondence to: Dr Hongqiao Fu, Department of Health Policy and Management, School of Public Health, Peking University Health Science Center, Beijing 100191, China **hofu90@hsc.pku.edu.cn**

Introduction

The consumption of tobacco, alcohol, and sugar-sweetened beverages (SSBs) is a leading preventable risk factor for non-communicable diseases globally. Tobacco smoking alone caused 7·3 million deaths and over 180 million disability-adjusted life-years (DALYs) in 2021.[1,2] Alcohol use ranked among the top ten leading risk factors for both deaths and DALYs worldwide in 2021.[1,2] Excess SSB consumption has also grown as a driver of non-communicable diseases, with global deaths attributed to high SSB intake increasing by nearly threefold from 1990 to 2021.[1,2]

Health taxes on harmful products are widely recognised as one of the most cost-effective interventions to reduce these burdens.[3,4] WHO has therefore recommended increasing the prices of tobacco, alcohol, and sugary drinks by at least 50% through excise taxes by 2035.[5] Even though this approach can raise both health status and government revenue,[3,6,7] many countries' implementation still falls substantially short of WHO targets. Since the effect of increased taxes depends on each country's consumption, demographic, and tax collection patterns, some governments, especially those in low-income and middle-income countries, are concerned that such tax increases might undermine economic development, tax revenue, and equity if they simply adopt WHO's recommendations without adjusting them to the countries' contexts.[8–10]

China has faced high disease burden due to these harmful products. China is the world's largest consumer of tobacco and, in 2021, smoking was the leading single risk factor for DALYs and the second-leading cause of

Research in context

Evidence before this study

We searched PubMed, Web of Science, Google Scholar, and China National Knowledge Infrastructure databases for studies published between Jan 1, 2000, and Aug 31, 2025, using various combinations of the terms "China", "tobacco", "alcohol", "sugar-sweetened beverage", "taxation", "price increase", "modelling", "health gains", "economic evaluation", "macroeconomic outcomes", and "fiscal outcomes", without any language restrictions. China is among the largest global consumers of tobacco, alcohol, and sugar-sweetened beverages (SSBs), and faces substantial health and economic burdens from these products. Health taxes are widely recognised as one of the most cost-effective interventions to reduce these burdens. However, China's tax rates for tobacco and alcohol remain far below WHO's recommendations or global averages, and an excise tax on SSBs is absent. This policy gap partly reflects the lack of up-to-date domestic evidence to address policy makers' concerns about possible adverse economic and fiscal impacts. We identified several modelling and empirical studies assessing the impact of tobacco, alcohol, or SSB taxation in China. Most focused on a single product, and generally found reductions in consumption, increases in tax revenue, and associated health gains. However, no study to date has comprehensively and systematically evaluated the distributional health, macroeconomic, and fiscal outcomes from increasing taxes on tobacco, alcohol, and SSBs.

Added value of this study

This study simultaneously assesses potential health, macroeconomic, and fiscal gains of raising taxes on tobacco, alcohol, and SSBs in China, using a cohort state-transition model and a subsequent health-augmented macroeconomic model. Our findings show that even a modest 20% price increase can yield substantial health benefits, macroeconomic gains, and additional fiscal revenues. Further increases in taxation would consistently yield greater health, macroeconomic, and equity gains. Fiscal revenues also rise until tax shares in retail prices reach about 72% for tobacco, 59% for alcohol, and 40% for SSBs, after which they decline despite continued health and economic benefits. These findings contribute to identifying feasible policy zones to simultaneously safeguard public health and strengthen fiscal capacities.

Implications of all the available evidence

Current evidence provides robust support for the implementation of higher taxes on tobacco, alcohol, and SSBs in China. Such policies can simultaneously generate substantial health, economic, and fiscal benefits, alongside progressive distributional effects.

premature death,[1,2] while alcohol use was among the top ten risk factors for mortality and health loss in China.[1,2] Recent estimates suggest that the number of deaths attributed to SSBs in China increased by approximately 9 times between 1990 and 2019.[1,2] More importantly, China has made little progress in reducing the consumption of these products, although the Healthy China 2030 strategy announcement in 2016 set a quantitative smoking reduction target and emphasised curbing harmful alcohol use and promoting healthy diets. Over the past two decades, the prevalence of smoking has remained largely unchanged;[11,12] the consumption of spirits, beer, and wine has remained a similar pattern;[13] and SSB consumption per capita even increased more than 10 times.[14]

Despite these challenges, taxation on tobacco, alcohol, and SSBs in China has faced little adjustment. Total taxes account for only about 50% of the retail price of cigarettes in China,[12] far below the WHO-recommended level of 75% or more.[15] This rate lags behind those of other countries, such as the UK and Thailand, where tobacco taxes make up around 80% of the retail price. Excise taxes on alcoholic beverages in China also remain low (excise taxes on beer and spirits accounted for 2·1% and 16·3% of the price of the most sold brands, respectively, in 2022), compared with the global average (17·2% for beer and 26·5% for spirits).[16] Moreover, China currently has no dedicated excise tax for SSBs aside from the 13% value-added tax. More details on these products' taxes are provided in appendix 2 (pp 3–6).

See Online for appendix 2

These policy-implementation gaps partly reflect Chinese policy makers' concerns about the potential economic and fiscal downsides of increased taxation. For example, policy makers worry that higher tobacco or alcohol taxes might reduce government revenues or even hurt economic activity, given the importance of tax revenues and job opportunities from the monopolistic tobacco and alcohol companies, and there are also industry narratives questioning the progressivity of such policies.[12,13,17] Although several modelling and empirical studies have examined the effects of such tax adjustments in China,[18–23] the evidence base remains scarce and fragmented. Most studies focused on a single product and assessed outcomes from either a health or an economic perspective, without integrating these dimensions. Consequently, generating robust, comprehensive, up-to-date evidence on the effects on health, economics, and equity is essential for building a compelling policy strategy and facilitating the implementation of increased taxes on tobacco, alcohol, and SSBs in China.

This study aims to estimate the potential health gains, macroeconomic benefits, and fiscal effects of raising tobacco, alcohol, and SSB taxes in China.

Methods

Model overview

We developed a cohort state-transition model and applied a health-augmented macro model to estimate the health, macroeconomic, and fiscal consequences of increased

taxation on tobacco, alcohol, and SSBs in China over a 25-year period from 2026 to 2050. We examined scenarios of retail price increases by 20% and 50% for all three products through excise tax hikes, following previous studies that examined the effectiveness of such increases to reduce consumption.[19,24] We also modelled a scenario for tobacco taxation with the WHO's recommended tax share of 75%.[15] Moreover, since higher tax rates might discourage consumption and limit tax revenue, we identified the fiscal revenue-maximising tax share for each product by examining the consequences across the full range of tax shares.

Our modelling framework adhered to established approaches that link taxation policies to health and economic outcomes through a causal pathway encompassing price changes, consumption responses, health-risk modifications, and consequent health and economic effects (figure 1). Briefly, this study simulated tax-induced consumption changes using product-specific price elasticities. We then applied potential impact fractions to translate reduced exposure into shifts in mortality risk, and used a life-table approach to estimate the resulting gains in survival and life-years. These health outcomes were subsequently fed into a macroeconomic model via changes in labour supply and health-care costs, while fiscal outcomes were derived from the tax structure and the simulated consumption changes.

The study population comprised the projected Chinese population in 2026, stratified by age, sex, and income group. We employed dynamic population projections from 2026 to 2050, accounting for births, deaths, and ageing processes based on the UN World Population Prospects.[25] Data sources for model inputs and parameters are shown in appendix 2 (pp 53–56).

The main outputs of the modelling analysis included health effects (years of life gained [YLGs] and deaths averted), macroeconomic effects (changes in total gross domestic product [GDP], GDP per capita, and GDP share), and fiscal effects (additional tax revenue generated), calculated as the differences between each policy scenario and the business-as-usual (BAU) scenario from 2026 to 2050. Macroeconomic and fiscal outcomes were discounted at an annual rate of 3%,[26] and health outcomes were undiscounted in the main analysis. All analyses were implemented in R (version 4.2.3). Patient consent and ethical approval were not required because all data used were de-identified, aggregated data from public databases.

Modelling health outcomes

We estimated YLGs and deaths averted under different policy scenarios by modelling changes in consumption from tax-induced price increases, and then applying a life-table approach to translate these consumption changes into reductions in health risks.[27–29]

Changes in consumption were modelled by applying demographic-specific price elasticities to BAU consumption patterns. We derived BAU consumption for tobacco, alcohol, and SSBs by demographic groups from national surveys[11,30–32] and data from the Global Burden of Diseases, Injuries, and Risk Factors Study 2021.[33] Future consumption trends from 2026 to 2050 were projected based on previous studies[34,35] or using historical data (appendix 2 pp 18–20). Tobacco consumption was represented by cigarette consumption, given that manufactured cigarettes account for 96·7% of tobacco products use among smokers in China.[30] Alcohol consumption was stratified by beverage type (ie, beer, wine, or spirits) and we assumed that the level of increased prices would be the same across all three beverage categories.[35] Based on previous evidence, greater price elasticity was applied to lower-income groups for all products.[19,21,36–38] For tobacco products, we further assumed higher elasticity among younger populations,[19] whereas for alcohol and SSBs, no age variation in elasticity was applied due to mixed evidence.[36,39] We assumed a 100% tax pass-through rate to retail prices following published literature[19,24] and evaluated alternative assumptions (75% and 125%) in the sensitivity analyses. In addition, we incorporated cross-product policy effects under concurrent tax increases in the sensitivity analyses.

Under each policy scenario, changes in consumption were translated into modified all-cause mortality rates using the potential impact fraction, which estimates the proportional change in mortality resulting from changes in risk factor exposure.[40] We calculated separate potential impact fractions for each demographic stratum and product category. For tobacco, consistent with previous studies,[19,41] we assumed that health benefits accrue exclusively from smoking cessation rather than from

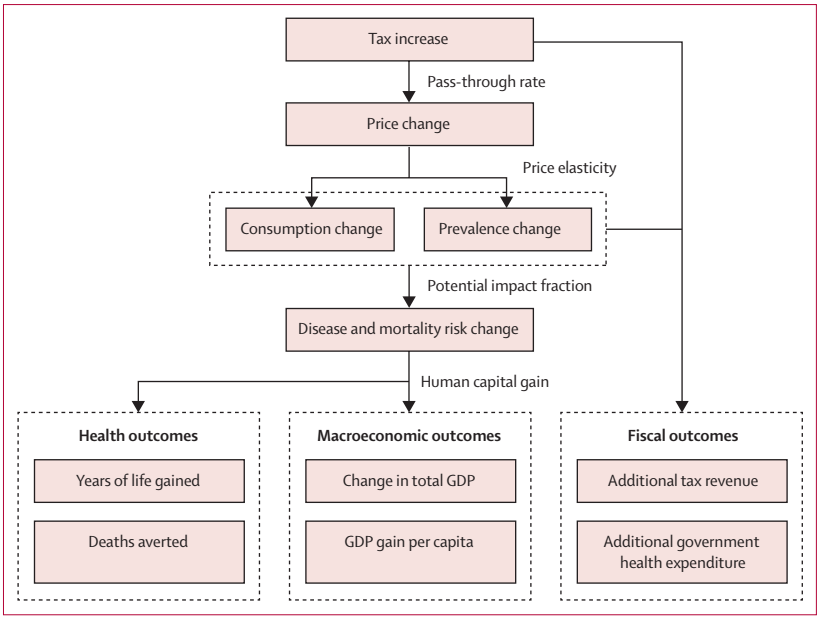

Figure 1: **Conceptual framework of the model**
GDP=gross domestic product.

reduced intensity among continuing smokers, with greater relative risk reductions for smoking cessation at younger ages.[42,43] The proportion of smoking cessation was determined by participation elasticity, which was assumed to be half of the total price elasticity.[44,45] For alcohol and SSBs, dose–response relationships between levels of consumption and mortality risk were applied.[46–48] We assumed immediate change in consumption upon policy implementation,[49] and the sensitivity analyses accounted for potential latency between the changes in consumption and subsequent health risk reductions.

YLGs and deaths averted were estimated by comparing life tables between BAU scenarios and policy scenarios. We constructed BAU life table using the most recent UN World Population Prospects estimates.[50] This life table was used as a fixed reference for all projection years (2026–50). For each tax scenario, we applied the modified age-specific and sex-specific all-cause mortality rates to the reference life table. YLGs were calculated as the difference in total person-years lived between the policy and BAU scenarios during 2026–50, and deaths averted as the corresponding difference in total deaths. Further details of the methodology are provided in appendix 2 (pp 7–32).

Modelling macroeconomic gains

Given the changes in consumption of tobacco, alcohol, and SSBs due to tax-induced price increases, we used the health-augmented macroeconomic model from Bloom and colleagues to quantify macroeconomic gains under various policy scenarios.[51] This model links health gains to economic growth by treating health capital as a key determinant of capital accumulation and overall economic productivity, allowing a comprehensive assessment of the economic benefits of increased taxes. It has been applied in previous studies to estimate the macroeconomic burden of diseases and the potential gains from policy interventions.[51–53]

We projected aggregate GDP for 2026–50 under both the BAU and tax-increase scenarios. BAU economic growth trends were based on Organisation for Economic Co-operation and Development long-term GDP forecasts.[54] Under the tax-increase scenarios, we modelled two pathways through which health improvements affect economic growth. The first pathway concerns human capital, where price-induced reductions in consumption translates into declines in mortality and morbidity, thereby increasing the effective labour supply among the working-age population. Age-specific human capital was assessed using the Mincer equation[55] that links educational attainment and work experience to earnings, with population, labour participation, and education data as inputs. The second pathway relates to physical capital accumulation, in which reductions in risk-factor-related medical spending increase savings available for physical investment and facilitate capital accumulation over time. The data sources of key inputs and parameters and further model implementation details are provided (appendix 2 pp 33–52). All results are reported in consumer-price-index-deflated 2025 Chinese yuan (¥1=US$0·14, based on 2025 exchange rates).

Modelling fiscal revenues

Additional tax revenues were estimated as the difference in tax collections between BAU and policy scenarios. The calculation was performed separately for each age-sex-income group based on the reduction in consumption (as described in the previous section), the increase in taxes per unit of product, and the change in the number of alive consumers in each group, with results subsequently aggregated across all strata. When calculating the changes in fiscal revenues, we did not distinguish revenues from excise tax, value-added tax, and additional taxes reflected in unit retail prices. Data on BAU price and tax share are presented in appendix 2 (pp 53–56).

We also assessed the inclusion of net profit remittances from state-owned enterprises (SOEs) as government fiscal revenue in the sensitivity analyses. In China, tobacco production and distribution are monopolised by the state-owned China National Tobacco Corporation, which remits about 25% of its net profits to the government. Similarly, approximately 50% of alcohol production is state-owned. Reduced consumption of these products could potentially decrease government revenues through lower SOE profit remittances. To estimate the net change in government revenue, we therefore combined the additional tax revenue from higher taxation with reductions in profit remittances.

Sensitivity analyses

We conducted probabilistic sensitivity analyses using Monte Carlo simulation (1000 iterations) to capture uncertainties in input data and parameters (appendix 2 pp 15–17). The 2·5th and 97·5th percentiles from these 1000 simulations were reported as the 95% uncertainty intervals (UIs).

We also conducted sensitivity analyses with consideration of several key policy-related assumptions: (1) tax pass-through rate at 0·75 and 1·25; (2) cross-product interaction effects of the increased tax; (3) latency of policy effect; (4) assuming static prevalence and consumption levels; (5) alternative price elasticity assumption for alcohol and SSBs; (6) including additional health gains from reduced smoking intensity; (7) including net SOE profit remittances as government revenue; (8) capital depreciation rate at 3% and 10%; and (9) discounting health and economic outcomes both at 0% and 3% (appendix 2 pp 23–28, 46–48).

Role of the funding source

The funders of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

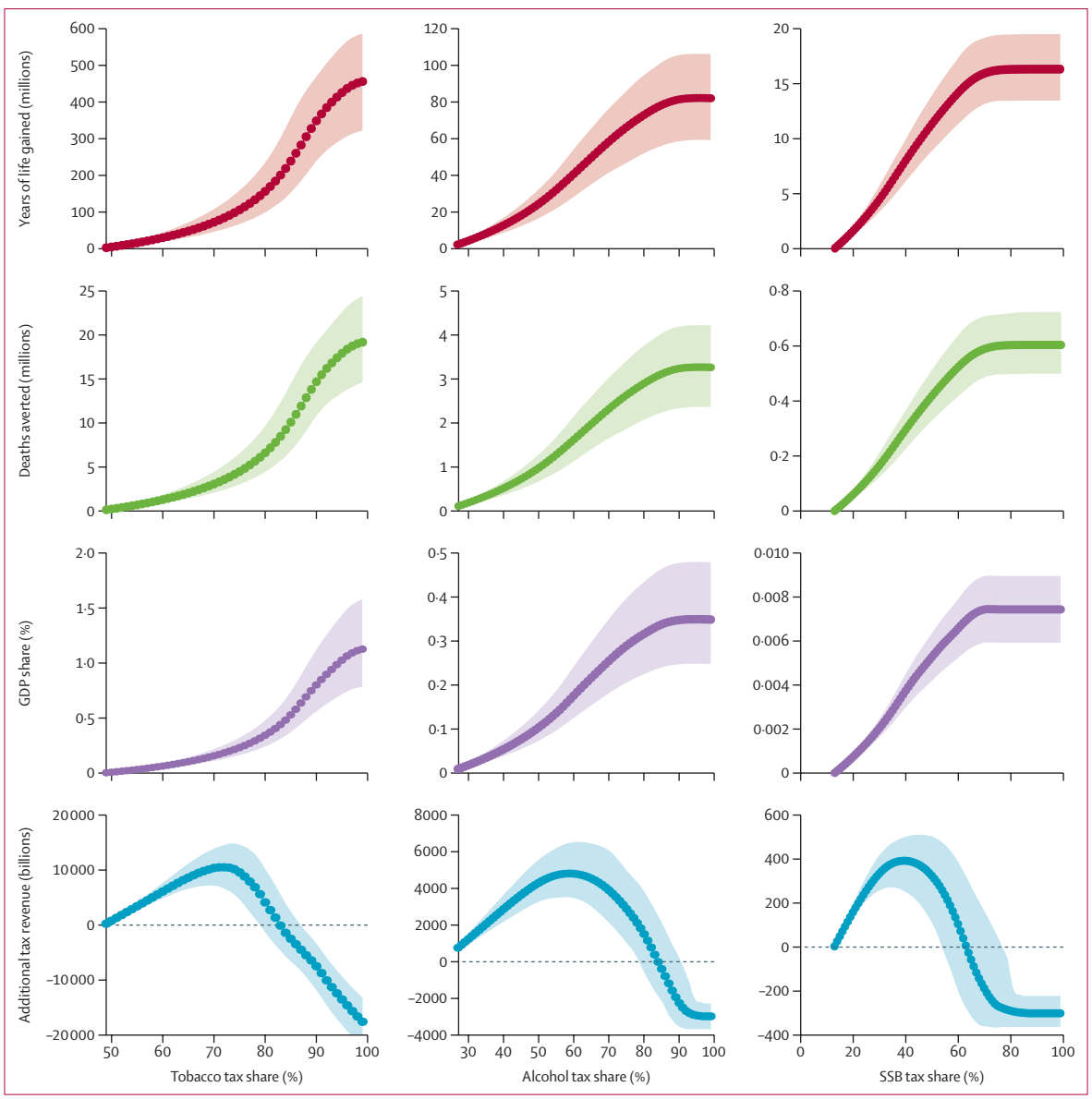

Figure 2: **Estimated health, macroeconomic, and fiscal gains from increasing taxation of tobacco, alcohol, and SSB, 2026–50**
Graphs show the incremental health, economic, and fiscal gains relative to the BAU scenario as the tax share of retail price increases. At very high tax shares, the implied retail prices would lie beyond empirically observed or policy-relevant ranges (eg, at a 99% tax share, the price increase is ~5060% for tobacco, 7251–8291% for alcohol, and 8612% for SSBs). At such price levels, consumption approaches zero, so the tail of the curve appears flat. The pattern of macroeconomic gains closely parallels that of health outcomes, as enhanced labour supply and reduced health-care expenditures are similarly driven by reductions in premature mortality. BAU tax shares are 48·4% for tobacco; 16·1% (beer), 22·8% (wine), and 26·5% (spirits) for alcohol; and 12·9% for SSBs. Dotted lines are means and shaded areas are 95% uncertainty intervals. BAU=business-as-usual. GDP=gross domestic product. SSB=sugar-sweetened beverage.

Results

Our modelling analyses show that increasing taxes on tobacco, alcohol, and SSBs in China could drive substantial health gains from 2026 to 2050. As tax shares for tobacco, alcohol, and SSBs increase, health gains would consistently increase (figure 2), plateauing only when consumption approaches zero at high tax shares (appendix 2 pp 70–72).

Among the three products, increasing tobacco taxation would yield the largest health benefits, with 20·58 million (95% UI 12·53–29·19) YLGs and 0·86 million (0·53–1·23) deaths averted under a 20% price increase scenario (table 1). When considering a 50% price increase scenario, the corresponding estimates would be 51·46 million (31·34–72·98) YLGs and 2·16 million (1·34–3·07) deaths averted. Raising the price of tobacco products by approximately 106% to reach the WHO-recommended 75% tax share scenario would lead to 109·08 million (66·43–154·67) YLGs and avert 4·58 million (2·83–6·50) deaths. The benefits for alcohol

	Tobacco tax*			Alcohol tax†		SSB tax‡	
	20% price increase	50% price increase	75% of price	20% price increase	50% price increase	20% price increase	50% price increase
Years of life gained, millions							
Total (2026–50)	20·58 (12·53–29·19)	51·46 (31·34–72·98)	109·08 (66·43–154·67)	9·02 (5·61–12·92)	22·47 (13·99–32·17)	3·67 (2·40–5·05)	8·70 (5·84–11·76)
Annual average, millions per year	0·82 (0·50–1·17)	2·06 (1·25–2·92)	4·36 (2·66–6·19)	0·36 (0·22–0·52)	0·90 (0·56–1·29)	0·15 (0·10–0·20)	0·35 (0·23–0·47)
By income quintile							
1 (poorest)	7·53 (4·62–10·81)	18·81 (11·56–27·03)	39·87 (24·50–57·25)	3·18 (1·67–4·97)	7·89 (4·16–12·33)	1·00 (0·45–1·61)	2·10 (1·11–2·86)
2	5·85 (3·55–8·49)	14·62 (8·89–21·23)	30·99 (18·84–45·00)	2·47 (1·31–3·82)	6·15 (3·26–9·50)	0·85 (0·39–1·39)	2·05 (0·97–3·08)
3	4·08 (2·36–5·96)	10·20 (5·89–14·91)	21·63 (12·49–31·61)	1·68 (0·89–2·59)	4·19 (2·22–6·46)	0·73 (0·34–1·16)	1·82 (0·86–2·90)
4	1·89 (1·01–2·82)	4·73 (2·53–7·06)	10·02 (5·36–14·96)	1·09 (0·58–1·69)	2·73 (1·46–4·22)	0·58 (0·28–0·92)	1·44 (0·71–2·31)
5 (richest)	1·24 (0·64–1·96)	3·09 (1·61–4·91)	6·56 (3·42–10·40)	0·61 (0·32–0·96)	1·52 (0·81–2·40)	0·51 (0·25–0·84)	1·28 (0·61–2·09)
By sex							
Female	1·07 (0·66–1·51)	2·67 (1·64–3·78)	5·67 (3·49–8·01)	0·41 (0·25–0·58)	1·02 (0·64–1·46)	1·86 (1·13–2·72)	4·40 (2·77–6·30)
Male	19·51 (11·90–27·81)	48·79 (29·75–69·52)	103·41 (63·07–147·32)	8·61 (5·35–12·35)	21·46 (13·35–30·70)	1·81 (0·90–2·70)	4·30 (2·26–6·23)
Deaths averted, millions							
Total (2026–50)	0·86 (0·53–1·23)	2·16 (1·34–3·07)	4·58 (2·83–6·50)	0·36 (0·22–0·51)	0·89 (0·55–1·27)	0·13 (0·09–0·19)	0·32 (0·21–0·43)
Annual average, thousands per year	34·4 (21·2–49·2)	86·4 (53·6–122·8)	183·2 (113·2–260·0)	14·4 (8·8–20·4)	35·6 (22·0–50·8)	5·2 (3·6–7·6)	12·8 (8·4–17·2)
By income quintile							
1 (poorest)	0·32 (0·19–0·46)	0·79 (0·48–1·14)	1·68 (1·01–2·42)	0·13 (0·07–0·20)	0·31 (0·16–0·49)	0·04 (0·02–0·06)	0·08 (0·04–0·11)
2	0·25 (0·14–0·36)	0·61 (0·36–0·89)	1·30 (0·76–1·89)	0·10 (0·05–0·15)	0·24 (0·13–0·37)	0·03 (0·01–0·05)	0·08 (0·04–0·11)
3	0·17 (0·10–0·26)	0·43 (0·25–0·66)	0·91 (0·52–1·39)	0·07 (0·04–0·10)	0·17 (0·09–0·25)	0·03 (0·01–0·04)	0·07 (0·03–0·11)
4	0·08 (0·04–0·12)	0·20 (0·10–0·30)	0·42 (0·22–0·64)	0·04 (0·02–0·07)	0·11 (0·06–0·17)	0·02 (0·01–0·03)	0·05 (0·03–0·08)
5 (richest)	0·05 (0·02–0·09)	0·13 (0·06–0·22)	0·27 (0·13–0·46)	0·02 (0·01–0·04)	0·06 (0·03–0·09)	0·02 (0·01–0·03)	0·05 (0·02–0·08)
By sex							
Female	0·04 (0·02–0·05)	0·09 (0·05–0·13)	0·19 (0·11–0·26)	0·02 (0·01–0·02)	0·04 (0·02–0·06)	0·07 (0·05–0·10)	0·17 (0·11–0·24)
Male	0·83 (0·51–1·18)	2·07 (1·28–2·95)	4·40 (2·72–6·23)	0·34 (0·21–0·49)	0·85 (0·53–1·21)	0·06 (0·03–0·10)	0·15 (0·07–0·22)

Values in parentheses are 95% uncertainty intervals. Years of life gained and deaths averted are incremental compared with the BAU scenario. Results by income quintiles and by sex are 25-year cumulative totals (2026–50). All health outcomes are undiscounted. BAU=business-as-usual. SSB=sugar-sweetened beverage. *BAU tax share is 48·4%; the corresponding shares for 20% and 50% price increases are 57% and 66%, respectively. †BAU tax shares are 16·1% for beer, 22·8% for wine, and 26·5% for spirits; under 20% price-increase scenarios, tax shares are 30%, 36%, and 37% for beer, wine, and spirits, respectively; under 50% price-increase scenarios, tax shares are 44%, 48%, and 50% for beer, wine, and spirits, respectively. ‡BAU share is 12·9%; under 20% and 50% price-increase scenarios, tax shares are 27% and 42%, respectively.

Table 1: **Estimated health gains from increasing tobacco, alcohol and SSB taxation, 2026–50**

taxation would be roughly half of that of tobacco. Alcohol taxation hikes would lead to 9·02 million (5·61–12·92) YLGs and avert 0·36 million (0·22–0·51) deaths under 20% price increases. These health gains would rise to 22·47 million (13·99–32·17) YLGs and 0·89 million (0·55–1·27) deaths averted under 50% price increases. Similarly, a 20% price increase for SSBs would lead to 3·67 million (2·40–5·05) YLGs and avert 0·13 million (0·09–0·19) deaths, while a 50% price increase results in 8·70 million (5·84–11·76) YLGs and 0·32 million (0·21–0·43) deaths averted.

Stratified outcomes show that health gains are progressively distributed across socioeconomic groups, with larger gains among lower-income quintiles (table 1). For example, under the 20% price increase scenario of tobacco taxation, the poorest income quintile would gain 7·53 million (95% UI 4·62–10·81) years of life, compared with 1·24 million (0·64–1·96) for the richest

quintile. Similar patterns carry through for the health gains from increased alcohol and SSB taxes. In terms of benefit by sex, health gains from increased tobacco and alcohol taxation are notably larger among males, consistent with the substantially higher prevalence of consumption of these products among males. By contrast, health gains from SSB tax increases are more equally distributed between sexes. Age-stratified results show that the largest share of health gains occurred among adults aged 45–64 years across all tax scenarios (appendix 2 pp 57–58).

Higher taxes on tobacco, alcohol, and SSBs would also yield measurable macroeconomic gains (table 2). As tax shares increase relative to retail prices, macroeconomic gains rise steadily and approach a plateau as consumption becomes negligible (figure 2). Increasing tobacco prices by 20% through higher taxes would result in economic gains of ¥2·25 trillion (95% UI 1·61–3·19) in total and ¥1595 (1145–2265) per capita from 2026 to 2050, equivalent to 0·043% (0·031–0·060) of total GDP during this period. A 20% price increase on alcohol is associated with estimated economic gains of ¥1·76 trillion (1·27–2·47) in total and ¥1248 (903–1756) per capita, representing 0·034% (0·024–0·047%) of GDP. For SSBs, a similar 20% price increase would generate modest gains, amounting to ¥83·7 billion (68·1–103·0) in total and ¥59·4 (48·4–73·1) per capita. These economic gains would be equivalent to 0·0016% (0·0013–0·0019) of total GDP over this period. Macroeconomic gains would be substantially larger under the 50% price increase scenarios across all three product categories (table 2).

	Tobacco tax*			Alcohol tax†		SSB tax‡	
	20% price increase	50% price increase	75% of price	20% price increase	50% price increase	20% price increase	50% price increase
Total GDP, billion ¥	2245·5 (1612·2–3189·6)	5811·8 (4172·8–8255·1)	11 945·5 (8576·5–16 967·2)	1756·8 (1271·1–2472·9)	4738·7 (3430·8–6666·4)	83·7 (68·1–103·0)	210·8 (171·5–259·4)
Gains per capita, ¥	1594·5 (1144·8–2264·9)	4126·9 (2963·0–5861·8)	8482·3 (6090·1–12 048·2)	1247·5 (902·6–1756·0)	3364·9 (2436·2–4733·7)	59·4 (48·4–73·1)	149·7 (121·8–184·2)
GDP share, $\times 10^{-3}$ %	43·4 (30·5–60·3)	112·2 (78·9–156·0)	230·6 (162·1–320·6)	33·9 (24·0–46·7)	91·5 (64·8–126·0)	1·6 (1·3–1·9)	4·1 (3·2–4·9)

Values in parentheses are 95% uncertainty intervals. Results are incremental compared to the BAU scenario. Results are 25-year cumulative totals (2026–50). All economic outcomes are discounted at 3%. BAU=business-as-usual. SSB=sugar-sweetened beverage. GDP=gross domestic product. *BAU tax share is 48·4%; the corresponding shares for 20% and 50% price increases are 57% and 66%, respectively. †BAU tax shares are 16·1% for beer, 22·8% for wine, and 26·5% for spirits; under 20% price-increase scenarios, tax shares are 30%, 36%, and 37% for beer, wine, and spirits, respectively; under 50% price-increase scenarios, tax shares are 44%, 48%, and 50% for beer, wine, and spirits, respectively. ‡BAU share is 12·9%; under 20% and 50% price-increase scenarios, tax shares are 27% and 42%.

Table 2: **Estimated macroeconomic gains from increasing tobacco, alcohol, and SSB taxation, 2026–50**

	Tobacco tax*			Alcohol tax†		SSB tax‡	
	20% price increase	50% price increase	75% of price	20% price increase	50% price increase	20% price increase	50% price increase
Total additional tax revenue of 2026–50, billion ¥	4531·1 (3704·9 to 5502·3)	9000·9 (7291·5 to 10 978·5)	10 785·0 (8349·1 to 13 822·5)	2002·3 (1750·5 to 2289·9)	3872·9 (3244·3 to 4611·4)	295·5 (227·9 to 377·1)	387·2 (234·1 to 510·8)
Annual average, billion ¥	181·2 (148·2 to 220·1)	360·0 (291·7 to 439·1)	431·4 (334·0 to 552·9)	80·1 (70·0 to 91·6)	154·9 (129·8 to 184·5)	11·8 (9·1 to 15·1)	15·5 (9·4 to 20·4)
By income quintile							
1 (poorest)	1034·1 (820·6 to 1267·7)	1620·2 (1176·4 to 2093·0)	223·0 (–742·7 to 1244·6)	326·2 (239·1 to 424·2)	417·0 (59·3 to 785·9)	17·2 (–6·8 to 42·8)	–28·3 (–50·1 to 55·3)
2	1103·3 (886·0 to 1353·9)	2055·7 (1583·6 to 2611·0)	1813·1 (838·4 to 2985·7)	393·7 (322·7 to 482·1)	675·0 (409·5 to 969·6)	33·5 (12·4 to 56·0)	–1·3 (–53·5 to 93·0)
3	1059·6 (863·4 to 1296·3)	2213·4 (1768·7 to 2771·2)	3028·8 (2114·1 to 4147·1)	432·3 (368·1 to 502·8)	869·5 (670·2 to 1083·4)	57·4 (37·0 to 79·9)	65·1 (–15·6 to 155·0)
4	631·0 (505·5 to 768·6)	1426·2 (1132·5 to 1760·5)	2432·2 (1808·9 to 3176·7)	428·3 (367·6 to 496·5)	933·4 (765·7 to 1131·0)	83·0 (62·3 to 107·3)	145·2 (77·0 to 221·6)
5 (richest)	703·1 (566·2 to 862·4)	1685·3 (1330·1 to 2083·0)	3287·8 (2517·5 to 4190·5)	421·8 (366·7 to 478·7)	978·0 (844·1 to 1130·7)	104·4 (81·9 to 131·5)	205·7 (142·5 to 277·8)
By sex							
Female	140·0 (114·5 to 169·3)	271·75 (219·6 to 332·2)	310·7 (239·1 to 398·9)	99·3 (86·8 to 113·2)	195·3 (165·3 to 230·5)	156·9 (121·0 to 200·2)	205·2 (123·1 to 301·7)
Male	4391·0 (3589·8 to 5332·0)	8729·1 (7069·7 to 10 651·9)	10 474·3 (8112·1 to 13 436·8)	1903·0 (1663·5 to 2176·9)	3677·7 (3078·9 to 4380·2)	138·6 (106·9 to 176·8)	181·2 (108·7 to 266·4)

Values in parentheses are 95% uncertainty intervals. Results by income quintile and by sex are 25-year cumulative totals (2026–50). All fiscal outcomes are discounted at 3%. BAU=business-as-usual. SSB=sugar-sweetened beverage. *BAU tax share is 48·4%; the corresponding shares for 20% and 50% price increases are 57% and 66%, respectively. †BAU tax shares are 16·1% for beer, 22·8% for wine, and 26·5% for spirits; under 20% price-increase scenarios, tax shares are 30%, 36%, and 37% for beer, wine, and spirits, respectively; under 50% price-increase scenarios, tax shares are 44%, 48%, and 50% for beer, wine, and spirits, respectively. ‡BAU share is 12·9%; under 20% and 50% price-increase scenarios, tax shares are 27% and 42%, respectively.

Table 3: **Estimated additional fiscal revenues from increasing tobacco, alcohol, and SSB taxation, 2026–50**

The results also suggest substantial incremental fiscal revenues relative to the BAU scenario from increasing taxes on the three products (table 3). For tobacco, the cumulative extra tax revenue generated between 2026 and 2050 is estimated to be ¥4·53 trillion (95% UI 3·70–5·50) in the 20% price-increase scenario and ¥9·0 trillion (7·29–10·98) in the 50% price-increase scenario. If China could reach the WHO-recommended 75% tax share scenario, the government would gain an additional ¥10·79 trillion (8·35–13·82). These results suggest that the Chinese Government would obtain extra tax revenues from tobacco sales, with annual averages of ¥181·2 billion (148·2–220·1), ¥360·0 billion (291·7–439·1), and ¥431·4 billion (334·0–552·9) under the 20%, 50%, and 75% price increase scenarios, respectively. For alcohol, increased tax revenue in total during this period would be ¥2·00 trillion (1·75–2·29) at a 20% price increase, rising to ¥3·87 trillion (3·24–4·61) at a 50% increase. For SSBs, increased fiscal revenue would be ¥295·5 billion (227·9–377·1) under a 20% price increase and ¥387·2 billion (234·1–510·8) under a 50% increase, much smaller than the corresponding estimates for tobacco and alcohol. More importantly, we find that additional tax revenue exhibits an inverted U-shaped relationship with tax shares for all three products, peaking at a certain level and then declining, a pattern known as the Laffer curve.[56] Figure 2 shows that peak revenues occur at tax shares of approximately 72% for tobacco products, 59% for alcoholic beverages, and 40% for SSBs. Under the extreme scenario of a 99% tax share where consumption approaches zero, the model projects an average annual decrease in tax revenue of ¥644·15 billion (477·07–822·16) for tobacco, ¥119·03 billion (90·80–147·07) for alcohol, and ¥12·03 billion (8·90–14·50) for SSBs.

The distributional outcomes of additional tax revenue vary by products and tax level (table 3). For tobacco, under a 20% price increase, lower-income groups would contribute a disproportionately higher share of the additional tax burden. However, as the tax share increases, the fiscal burden becomes progressive due to higher baseline exposure to tobacco and greater price sensitivity among lower-income groups. At a 75% tax share scenario, the richest quintile contributes ¥3·29 trillion, in contrast to ¥2·23 trillion from the poorest group. For alcohol, the poorest quintile contributes 16·3% (¥326·2 billion) of the additional fiscal revenue under the 20% price increase scenario, and this share would decrease to 10·8% (¥417·0 billion) under a 50% price increase. A similar pattern in progressivity is observed for SSB taxation. Consistent with the health outcomes, incremental fiscal contributions for increased tobacco and alcohol taxation are predominantly from males and from adults aged 25–64 years, whereas contributions from SSB taxation are more evenly distributed between sexes and age groups (appendix 2 pp 57–58).

The results of sensitivity analyses examining key model assumptions are presented in appendix 2 (pp 59–74). When considering cross-product policy effects that assume moderate substitution between the three products, health gains from tobacco and alcohol taxation would be reduced by 15–25% while tax revenues increase (appendix 2 p 61). Incorporating plausible latency in health risk reduction modestly reduces health gains by 12–27%, without affecting the tax revenue (appendix 2 pp 62–63). Including additional health gains from reduced smoking intensity among continuing smokers increases tobacco-related health benefits (appendix 2 p 66). Accounting for potential declines in SOE profit remittances would decrease additional fiscal gains by 3·4% for tobacco and 3·2% for alcohol under 20% price increase scenarios (appendix 2 p 67). Alternative assumptions on other key model parameters, including discount rates (appendix 2 pp 59–60), tax pass-through rates (appendix 2 pp 73–74), static prevalence and consumption levels without future trend projections (appendix 2 p 64), age-specific price elasticities for alcohol and SSBs (appendix 2 p 65), and capital depreciation rates (appendix 2 p 68) result in modest changes in outcome magnitudes without altering the conclusion of our study.

Discussion

To the best of our knowledge, this study is the first to comprehensively assess the potential health and economic gains that could be made by raising taxes on tobacco, alcohol, and SSBs within the Chinese context. Given the politically contentious prospect of enacting such a tax increase, we implemented a robust modelling approach that combined a cohort state-transition model evaluating health and fiscal outcomes with a health-augmented macroeconomic framework to capture broader economic consequences. Our findings showed net positive outcomes across all major domains, where such tax increases could generate substantial health benefits, economic gains, and government revenues over a 25-year period. To provide nuanced targets for policy implementation, we further estimated the effects of tax share increases across a comprehensive continuum (from current levels to very high levels). This analysis enabled us to identify optimal policy zones where health and economic benefits could synergise.

The alignment of the projected results with official statistics suggests the validity of our model estimates. According to the China Tax Yearbook 2023,[57] the combined value-added and excise tax revenues from the tobacco sector were ¥780·2 billion, and from the alcohol and beverage sector were ¥112·7 billion. These values fall within the 95% UIs of our model's implied BAU tax revenues, which equal the tax revenue loss projected under the extreme scenario of a 99% tax share where consumption approaches zero.

The potential health benefits from taxation increases are remarkable. Even modest tax hikes leading to price increases of 20% on tobacco, alcohol, and SSBs would prevent over 1·3 million deaths and generate more than

33 million YLGs over the next 25 years, representing reductions of more than 6% in tobacco-related, alcohol-related, and SSB-related deaths compared with the BAU scenario. These health gains would be concentrated among lower-income populations, who exhibit higher price sensitivity and greater baseline consumption of health-harming products. The results suggest that such taxation policies could achieve dual health objectives: improving overall population health and alleviating health inequities. These findings align with global studies showing that taxation increases can consistently reduce the consumption of harmful products and generate health benefits, particularly among vulnerable groups.[24,58–63]

The health benefits would also translate to considerable financial outcomes, potentially generating 0·08% of the total GDP in China between 2026 and 2050 under the 20% price increase scenario. Higher price increases through tax hikes would generate larger net macroeconomic gains. Even moderate tax increases can generate substantial fiscal effect. For example, a 20% retail price increase can yield an additional ¥4·53 trillion (tobacco), ¥2·00 trillion (alcohol), and ¥295·5 billion (SSBs) over 25 years—averaging ¥181 billion, ¥80 billion, and ¥12 billion per year, respectively. Collectively, these increased annual revenues equal 11·3% of the Chinese Government's health expenditures in 2023.

Notably, we found that the relationship between fiscal revenue and tax share is non-monotonic. The peak tax shares for tobacco, alcohol, and SSBs, under which fiscal revenues are maximised, are at 72%, 59%, and 40% of their retail prices, respectively. Beyond this, further tax hikes would reduce total revenue despite continued health gains due to lower consumption of these products. These thresholds offer clear guidance for fiscally oriented policy makers about how far such taxation measures can go without jeopardising fiscal sustainability. In addition to overall fiscal benefits, our analysis suggests that well designed health taxes can be progressive. Critics often oppose tobacco, alcohol, and SSB taxes as regressive, since those with lower income might disproportionately consume such products.[7,64] However, our analysis revealed that the progressivity depends on the level of tax. At a moderate tax rate (eg, a 20% price increase for tobacco and alcohol), lower-income groups bear relatively higher tax burdens. However, when price increases through tax hikes exceed 50%, revenue collection shifts decisively toward affluent households. The Chinese Government can leverage these non-linear dynamics to implement health taxes that advance equity, making progressive health taxation an actionable, evidence-based strategy.

Increased tax revenues from tobacco, alcohol, and SSBs can be earmarked for government health expenditures. These additional revenues offer a solution to China's pressing health financing challenges, including rapidly rising costs and the pressures associated with an ageing population.[65] International evidence, including from the Philippines, Thailand, Mexico, and Viet Nam, shows the effectiveness of increasing tax revenues in addressing country-specific health financing challenges.[66–68] However, since the government also has agencies that benefit directly from profits of tobacco and alcohol sales, dedicating all additional tax revenues to health programmes might raise tension within the government. To mitigate such political headwind, the Chinese Government could allocate a fixed share (eg, 20–40%) of additional tax revenues to general fiscal budgets. Moreover, experience from the UK and the Philippines has shown that raising the tax gradually (eg, 5–10% annually over 3–5 years) could minimise sudden disruptions to the consumers and industry.[68–70] In China's case, such a gradual approach could also provide time for governmental agencies' adjustments. Sudden large hikes could substantially reduce industry revenues, lower employee incomes, and destabilise local government revenue, particularly in regions of China with concentrated production (eg, Yunnan for tobacco or Sichuan for spirits).

We note several limitations. First, the accuracy of parameters has a large effect on our modelling results. We obtained several parameters (eg, price elasticity and health-consumption relationships) from previous studies, and these might shift with future socioeconomic changes. Therefore, the estimated health and economic effects should be interpreted with caution, and results should be updated as new data emerge. Second, data limitation precluded modelling behavioural adaptation, including consumer evasion (eg, illicit trade, home-made wines, traditional alcoholic beverages, and tax-avoidant products) and industry responses (eg, product reformulation and targeted marketing).[7,71,72] The government needs to monitor these behaviours and take supporting measures. Future studies should seek to incorporate unrecorded consumption patterns when better data become available. Third, data constraints prevented precise quantification of cross-product substitution or complementary effects under simultaneous taxation. Our conservative assumption of interproduct substitution probably underestimated net health and economic benefits. Fourth, we did not evaluate the effects of different types of tax structures (eg, specific *vs* ad valorem levies; alcohol content-based *vs* volume-based taxation) due to data limitations.[73] Moreover, health gains are probably underestimated due to positive externalities. For example, we did not consider reduced second-hand smoke among non-smokers and lower alcohol-related violence in the modelling analysis.[74,75] Finally, future research could explore how health taxes interact with complementary measures such as education campaigns, marketing restrictions, and cessation support.

Despite these limitations, this study provides robust, multidimensional evidence supporting the expedited implementation of increased taxes on tobacco, alcohol, and SSBs in China. Against the dual backdrop of the

Healthy China 2030 initiative and slowing economic growth, such policies offer a timely, evidence-based solution to simultaneously safeguard public health and strengthen fiscal resilience.

Contributors

HF and TC contributed to the study design and conceptualisation. TC, DX, HF, and JZ contributed to the methodology. TC and DX implemented the modelling analysis. TC, HF, and DX wrote the original draft. ST, JZ, YJ, and YZ revised and edited the draft. HF, TC, and DX have directly accessed and verified the underlying data reported in the manuscript. HF, TC, and DX were responsible for the decision to submit the manuscript. All authors discussed the results, commented on the manuscript, and approved the final version.

Declaration of interests

We declare no competing interests.

Data sharing

All data used in this study are publicly available, and readers can access them via the references provided in the Article and appendix 2.

Acknowledgments

We acknowledge financial support from the National Social Science Fund of China (22&ZD143), the Taikang Yicai Public Health and Epidemic Control Fund (grant number XY240927100000), and Bill & Melinda Gates Foundation (grant number OPP1178967). We thank Yiwen Ma for her excellent assistance on data collection.

References

1 GBD 2021 Risk Factors Collaborators. Global burden and strength of evidence for 88 risk factors in 204 countries and 811 subnational locations, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021. *Lancet* 2024; **403:** 2162–203.

2 Institute for Health Metrics and Evaluation. GBD Results. https://vizhub.healthdata.org/gbd-results (accessed Sept 29, 2025).

3 Jain V, Baker P, Chalkidou K. Harnessing the power of health taxes. *BMJ* 2020; **369:** m1436.

4 Burton R, Henn C, Lavoie D, et al. A rapid evidence review of the effectiveness and cost-effectiveness of alcohol control policies: an English perspective. *Lancet* 2017; **389:** 1558–80.

5 WHO. The 3 by 35 initiative. https://www.who.int/initiatives/3-by-35 (accessed July 4, 2025).

6 McHardy J, Blanco Marquizo A, Bettcher D, Gakidou E. Policy view: worldwide patterns of tobacco use with recommendations for tobacco control. *Lancet Respir Med* 2025; **13:** 756–68.

7 Paraje GR, Jha P, Savedoff W, Fuchs A. Taxation of tobacco, alcohol, and sugar-sweetened beverages: reviewing the evidence and dispelling the myths. *BMJ Glob Health* 2023; **8** (suppl 8)**:** e011866.

8 Siu E, Thow AM. Linking health and finance ministries to improve taxes on unhealthy products. *Bull World Health Organ* 2022; **100:** 570–77.

9 Singh A, Smith K, Hellowell M, et al. An exploration of stakeholder views and perceptions on taxing tobacco, alcohol and sugar-sweetened beverages in Ghana. *BMJ Glob Health* 2023; **8** (suppl 8)**:** e012054.

10 Lwin KS, Koon AD, Rasanathan K, et al. Framing health taxes: learning from low- and middle-income countries. *BMJ Glob Health* 2023; **8** (suppl 8)**:** e012955.

11 Zhang M, Yang L, Wang L, et al. Trends in smoking prevalence in urban and rural China, 2007 to 2018: findings from 5 consecutive nationally representative cross-sectional surveys. *PLoS Med* 2022; **19:** e1004064.

12 Chan KH, Xiao D, Zhou M, Peto R, Chen Z. Tobacco control in China. *Lancet Public Health* 2023; **8:** e1006–15.

13 Hu A, Jiang H, Dowling R, et al. The transition of alcohol control in China 1990–2019: Impacts and recommendations. *Int J Drug Policy* 2022; **105:** 103698.

14 Li D, Yu D, Zhao L. Trend of sugar-sweetened beverage consumption and intake of added sugar in China nine provinces among adults. *Wei Sheng Yan Jiu* 2014; **43:** 70–72 (in Chinese).

15 WHO. Promoting taxation on tobacco products. https://www.who.int/europe/activities/promoting-taxation-on-tobacco-products (accessed July 4, 2025).

16 WHO. Global Report on the use of alcohol taxes, 2023. https://www.who.int/publications/i/item/9789240086104 (accessed Oct 18, 2025).

17 Hu T, Mao Z, Shi J, Chen W. Tobacco Taxation and Its Potential Impact in China. Paris: International Union Against Tuberculosis and Lung Disease, 2008.

18 Zhai T, Wang J, Li L, Si W. Taxing sugar-sweetened beverages in China: by volume or sugar content? A consumer welfare approach. *J Integr Agric* 2024; **23:** 4237–49.

19 Verguet S, Gauvreau CL, Mishra S, et al. The consequences of tobacco tax on household health and finances in rich and poor smokers in China: an extended cost-effectiveness analysis. *Lancet Glob Health* 2015; **3:** e206–16.

20 Levy D, Rodríguez-Buño RL, Hu T-W, Moran AE. The potential effects of tobacco control in China: projections from the China SimSmoke simulation model. *BMJ* 2014; **348:** g1134.

21 Zhai T, Li L, Wang J, Si W. Will the consumption tax on sugar-sweetened beverages help promote healthy beverage consumption? Evidence from urban China. *China Econ Rev* 2022; **73:** 101798.

22 Zhao S. A study on China's tobacco taxation and its influencing factor on economic growth. *Front Psychol* 2022; **13:** 832040.

23 Liu Z, Li S, Zhao Y. Does it really reduce obesity? Substitution effects of sugar-sweetened beverage tax—empirical evidence from China. *J Nutr* 2025; **155:** 2057–68.

24 Summan A, Stacey N, Birckmayer J, Blecher E, Chaloupka FJ, Laxminarayan R. The potential global gains in health and revenue from increased taxation of tobacco, alcohol and sugar-sweetened beverages: a modelling analysis. *BMJ Glob Health* 2020; **5:** e002143.

25 UN Population Division. World population prospects 2024. https://population.un.org/wpp/ (accessed April 10, 2025).

26 Neumann P, Ganiats TG, Russell LB, Sanders GD, Siegel JE, eds. Cost-effectiveness in health and medicine, 2nd edn. New York, NY: Oxford University Press, 2016.

27 Blakely T, Moss R, Collins J, et al. Proportional multistate lifetable modelling of preventive interventions: concepts, code and worked examples. *Int J Epidemiol* 2020; **49:** 1624–36.

28 Trieu K, Huang L, Aminde LN, et al. Estimated health benefits, costs, and cost-effectiveness of implementing WHO's sodium benchmarks for packaged foods in India: a modelling study. *Lancet Public Health* 2024; **9:** e852–60.

29 Blakely T, Cleghorn C, Mizdrak A, et al. The effect of food taxes and subsidies on population health and health costs: a modelling study. *Lancet Public Health* 2020; **5:** e404–13.

30 Chinese Center for Disease Control and Prevention. China adult tobacco survey 2018. https://extranet.who.int/ncdsmicrodata/index.php/catalog/803 (accessed Jan 22, 2025).

31 Zhao Z, Wang L, Zhang M, et al. Geographic distribution of alcohol use among Chinese adults—China, 2015. *China CDC Wkly* 2020; **2:** 98–103.

32 Xu X, Piao W, Fang H, et al. Beverage consumption of children and adolescents aged 6–17 years—China, 2016-2017. *China CDC Wkly* 2021; **3:** 279–84.

33 Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2021 (GBD 2021) Dietary Risk Exposure Estimates 1990–2021. https://ghdx.healthdata.org/record/ihme-data/gbd-2021-dietary-risk-exposure-estimates-1990-2021 (accessed Oct 18, 2025).

34 GBD 2021 Tobacco Forecasting Collaborators. Forecasting the effects of smoking prevalence scenarios on years of life lost and life expectancy from 2022 to 2050: a systematic analysis for the Global Burden of Disease Study 2021. *Lancet Public Health* 2024; **9:** e729–44.

35 WHO. Global information system on alcohol and health. https://www.who.int/data/gho/data/themes/global-information-system-on-alcohol-and-health (accessed Aug 2, 2025).

36 Guindon GE, Zhao K, Fatima T, et al. Prices, taxes and alcohol use: a systematic umbrella review. *Addiction* 2022; **117:** 3004–23.

37 Jiang H, Livingston M, Room R, Callinan S. Price elasticity of on- and off-premises demand for alcoholic drinks: a Tobit analysis. *Drug Alcohol Depend* 2016; **163:** 222–28.

38 Chen D, Abler D, Zhou D, Yu X, Thompson W. A meta-analysis of food demand elasticities for China. *Appl Econ Perspect Policy* 2016; **38:** 50–72.

39 Wright A, Smith KE, Hellowell M. Policy lessons from health taxes: a systematic review of empirical studies. *BMC Public Health* 2017; **17:** 583.

40 Barendregt JJ, Veerman JL. Categorical versus continuous risk factors and the calculation of potential impact fractions. *J Epidemiol Community Health* 2010; **64:** 209–12.

41 Asian Development Bank. Tobacco taxes: a win-win measure for fiscal space and health. 2012. https://www.adb.org/publications/tobacco-taxes-win-win-measure-fiscal-space-and-health (accessed Oct 18, 2025).

42 Jha P, Ramasundarahettige C, Landsman V, et al. 21st-century hazards of smoking and benefits of cessation in the United States. *N Engl J Med* 2013; **368:** 341–50.

43 Cho ER, Brill IK, Gram IT, Brown PE, Jha P. Smoking cessation and short- and longer-term mortality. *NEJM Evid* 2024; **3:** a2300272.

44 Fuchs A, Gonzalez Icaza MF, Paz DP. Distributional effects of tobacco taxation: a comparative analysis. The World Bank, 2019. https://doi.org/10.1596/1813-9450-8805 (accessed Oct 18, 2025).

45 Mao Z, Hu D, Ynag G. Demand of different income groups for cigarettes and impact of increasing tax on smokers. *Chinese J Evidence-Based Medicine* 2005; **5:** 291–95 (in Chinese).

46 Millwood IY, Im PK, Bennett D, et al, and the China Kadoorie Biobank Collaborative Group. Alcohol intake and cause-specific mortality: conventional and genetic evidence in a prospective cohort study of 512 000 adults in China. *Lancet Public Health* 2023; **8:** e956–67.

47 Qin P, Li Q, Zhao Y, et al. Sugar and artificially sweetened beverages and risk of obesity, type 2 diabetes mellitus, hypertension, and all-cause mortality: a dose-response meta-analysis of prospective cohort studies. *Eur J Epidemiol* 2020; **35:** 655–71.

48 Malik VS, Li Y, Pan A, et al. Long-term consumption of sugar-sweetened and artificially sweetened beverages and risk of mortality in US adults. *Circulation* 2019; **139:** 2113–25.

49 Young DJ, Bielińska-Kwapisz A. Alcohol taxes and beverage prices. *Natl Tax J* 2002; **55:** 57–73.

50 UN Population Division. Data portal. https://population.un.org/dataportal/home?df=0143c0e6-e5b3-4380-95ae-fb9ac9b565cf (accessed April 10, 2025).

51 Bloom DE, Chen S, Kuhn M, McGovern ME, Oxley L, Prettner K. The economic burden of chronic diseases: estimates and projections for China, Japan, and South Korea. *J Econ Ageing* 2020; **17:** 100163.

52 Chen S, Kuhn M, Prettner K, Bloom DE. Noncommunicable diseases attributable to tobacco use in China: macroeconomic burden and tobacco control policies. *Health Aff (Millwood)* 2019; **38:** 1832–39.

53 Fu H, Tsuei S, Zheng Y, et al. Effects of comprehensive smoke-free legislation on smoking behaviours and macroeconomic outcomes in Shanghai, China: a difference-in-differences analysis and modelling study. *Lancet Public Health* 2024; **9:** e1037–46.

54 Organisation for Economic Co-operation and Development. Real GDP long-term forecast. https://www.oecd.org/en/data/indicators/real-gdp-long-term-forecast.html (accessed June 18, 2025).

55 Heckman JJ, Lochner LJ, Todd PE. In: Chapter 7. Earnings functions, rates of return and treatment effects: the mincer equation and beyond. In: Handbook of the Economics of Education. Elsevier, 2006: 307–458.

56 Trabandt M, Uhlig H. The Laffer curve revisited. *J Monet Econ* 2011; **58:** 305–27.

57 China Taxation Administration. China Tax Yearbook 2023. Beijing: China Tax Publishing House, 2023 (in Chinese).

58 Popkin BM, Ng SW. Sugar-sweetened beverage taxes: lessons to date and the future of taxation. *PLoS Med* 2021; **18:** e1003412.

59 Neufeld M, Rovira P, Ferreira-Borges C, et al. Impact of introducing a minimum alcohol tax share in retail prices on alcohol-attributable mortality in the WHO European Region: A modelling study. *Lancet Reg Health Eur* 2022; **15:** 100325.

60 Pichon-Riviere A, Alcaraz A, Palacios A, et al. The health and economic burden of smoking in 12 Latin American countries and the potential effect of increasing tobacco taxes: an economic modelling study. *Lancet Glob Health* 2020; **8:** e1282–94.

61 Spencer G, Nugent R, Mann N, et al. Equity implications of tobacco taxation: results from WHO FCTC investment cases. *Tob Control* 2024; **33** (suppl 1)**:** s27–33.

62 Ng CS, Au M, Ma R, Leung JYY, Quan J. The impact of alcohol pricing policies on public health in Hong Kong, China: a modelling study. *Lancet Reg Health West Pac* 2022; **26:** 100510.

63 Allcott H, Lockwood BB, Taubinsky D. Should we tax sugar-sweetened beverages? An overview of theory and evidence. *J Econ Perspect* 2019; **33:** 202–27.

64 Backholer K, Sarink D, Beauchamp A, et al. The impact of a tax on sugar-sweetened beverages according to socio-economic position: a systematic review of the evidence. *Public Health Nutr* 2016; **19:** 3070–84.

65 Zhai T, Goss J, Dmytraczenko T, Zhang Y, Li J, Chai P. China's health expenditure projections to 2035: future trajectory and the estimated impact of reforms. *Health Aff (Millwood)* 2019; **38:** 835–43.

66 Cashin C, Sparkes S, Bloom D. Earmarking for health: from theory to practice. Geneva: World Health Organization, 2017. https://iris.who.int/handle/10665/255004 (accessed Aug 12, 2025).

67 Tangcharoensathien V, Vathesatogkit P, Buasai S. Tying health taxes to health promotion is popular and effective in Thailand. *BMJ* 2024; **385:** q540.

68 Kaiser K, Bredenkamp C, Iglesias R. Sin tax reform in the Philippines: transforming public finance, health, and governance for more inclusive development. Washington, DC: World Bank, 2016.

69 Republic of the Philippines. Republic Act no. 10351. Dec 19, 2012. https://www.officialgazette.gov.ph/2012/12/19/republic-act-no-10351/ (accessed July 4, 2025).

70 Dickson A, Gehrsitz M, Kemp J. Does a spoonful of sugar levy help the calories go down? An analysis of the UK soft drinks industry Levy. https://www.iza.org/publications/dp/14528/does-a-spoonful-of-sugar-levy-help-the-calories-go-down-an-analysis-of-the-uk-soft-drinks-industry-levy (accessed Oct 18, 2025).

71 Blecher E. Taxes on tobacco, alcohol and sugar sweetened beverages: linkages and lessons learned. *Soc Sci Med* 2015; **136-137:** 175–79.

72 Prieger JE. Tax evasion and illicit cigarettes in California: prevalence and demand-side correlates. *Crime Law Soc Change* 2022; **78:** 427–51.

73 Meier PS, Holmes J, Angus C, Ally AK, Meng Y, Brennan A. Estimated effects of different alcohol taxation and price policies on health inequalities: a mathematical modelling study. *PLoS Med* 2016; **13:** e1001963.

74 Cook PJ, Durrance CP. The virtuous tax: lifesaving and crime-prevention effects of the 1991 federal alcohol-tax increase. *J Health Econ* 2013; **32:** 261–67.

75 Gruber JH, Mullainathan S. Do cigarette taxes make smokers happier. *BE J Econ Anal Policy* 2005; **5:** 00001015151538063714 12.