Sugar-sweetened beverages tax

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The intervention

- For this study, a tax on sugar sweetened beverages (SSBs) was defined as an additional 20% sales tax (scenario analyses investigated different tax rates). SSBs included soft drinks; flavoured water; sports, energy, and fruit drinks; and cordials (concentrates) containing added sugar (scenario analyses investigated expanding the definition to also include flavoured milks).
- The effect of the tax was modelled across Socioeconomic Index for Areas (SEIFA) quintiles.

What we already know

- Consumers are sensitive to price changes with respect to SSBs.
- Over 35 countries have implemented taxes on SSBs.
- Previous real-world evaluations of a tax on SSBs in Mexico show that the tax led to a reduction of SSBs purchases for the total population, with larger reductions in lower-income households.

Key elements of the modelled intervention

- The change in intake of SSBs was based on an Australian study that derived own-price elasticities and cross-price elasticities across income groups, based on supermarket purchases.
- Change in SSBs consumption due to the tax was converted to changes in daily energy intake. Subsequent change in weight was calculated based on published relationships between changes in energy expenditure and body weight at the population level.
- Costs included implementation, administration and compliance of the tax based on United States estimates. Cost of passing the legislation was calculated for Australia.
- Out-of-pocket taxes was estimated for each SEIFA quintile.
- Different tax rates were analysed by varying the percentage of sales tax (10%-30%) as well as a rate of $0.50 per litre.

Key findings

- A 20% SSB tax would lead to an average decrease of approximately 60kJ per day, health adjusted life year (HALY) gains of 175,300, half of which would accrue to the two lowest quintiles, as well as healthcare cost savings of $1,733 million over the lifetime of the population.
- Annual tax paid per capita was estimated to be $3.80 higher in the lowest SEIFA quintile (most disadvantaged), compared to the highest quintile.
- Annual tax revenue was estimated at $642.9m.
- The tax is cost-effective under all tax scenarios, with the highest HALY gains under a 30% tax.

Conclusion

A tax on SSBs is estimated to be cost-effective and to increase health equity. Whilst the most disadvantaged group would pay the most tax per capita, the difference is less than $5 per year. The substantial tax revenue raised could be earmarked to disadvantaged groups. The widespread implementation of SSB taxes globally indicates its feasibility in the Australian context.

Scenarios description and cost-effectiveness results

Table 1 *Description of selected scenarios*

	Base case 20% tax	Scenario 1 30% tax	Scenario 2 10% tax	Scenario 3 50c/litre tax	Scenario 4 20% tax includes flavoured milk
Risk factor(s) addressed by intervention	BMI				
Population targeted	Australian population, aged 2-100 years				
Weighted average reduction in body weight, kg (95% UI)	0.47kg (0.19 to 0.72)	0.69kg (0.65 to 0.73)	0.26kg (0.25 to 0.28)	0.32kg (0.30 to 0.34)	0.68kg (0.38 to 0.72)
Effect decay	100% maintenance of effect				
Costs included	Implementation, administration and compliance related to the tax, including cost of passing legislation.				
Type of model used	Population model with quality of life in children				

Notes: BMI: body mass index; c: cent; kg: kilogram; m: metre; UI: uncertainty interval

Table 2 *Cost-effectiveness results for base case by SEIFA quintiles, mean (95%UI)*

	Quintile 1 (most disadvantaged)	Quintile 2	Quintile 3	Quintile 4	Quintile 5 (least disadvantaged)
Total HALYs gained	52,300 (15,400 to 85,200)	49,900 (28,200 to 71,500)	48,800 (19,700 to 75,300)	31,700 (26,300 to 38,800)	27,400 (12,700 to 42,700)
Total healthcare cost savings	$435M ($308M to $564M)	$430M ($247M to $606M)	$394M ($335M to $461M)	$294M ($241M to $358M)	$255M ($218M to $296M)

Notes: HALY: health adjusted life year; M: million; SEIFA: Socioeconomic Index for Areas; $: 2010 Australian dollars

Table 3 *Cost-effectiveness results of scenarios, total population, mean (95%UI)*

	Base case	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Total HALYs gained	175,300 (68,700 to 277,800)	224,500 (91,600 to 346,000)	89,000 (33,600 to 144,800)	167,500 (148,500 to 189,600)	192,700 (75,800 to 301,000)
Total intervention costs	$120M ($92M to $162M)				
Total healthcare cost savings	$1.7B ($650M to $2.7B)	$2.5B ($2.2B to $2.8B)	$958M ($830M to $1.1B)	$1.8B ($1.6B to $2.0B)	$1.9B ($718M to $3.0B)
Total net cost *	-$1.7B (-$1.9B to -$1.5B)	-$2.1B (-$3.4B to -$670M)	-$650M (-$1.2B to -$72M)	-$1.5B (-$1.7B to -$1.3B)	-$1.4B (-$2.4B to -$357M)
Mean ICER	Dominant (Dominant to Dominant)				
Probability of being cost-effective #	100%				
Overall result	**Dominant**				

*Notes: Dominant: the intervention is both cost-saving and improves health; B: billion; HALY: health adjusted life year; ICER: incremental cost effectiveness ratio; M: million; $ 2010 Australian dollars; * Negative total net costs equate to cost savings; # The willingness-to-pay threshold for this analysis is $50,000 per HALY.*

Figure 1 ***Cost–effectiveness plane***

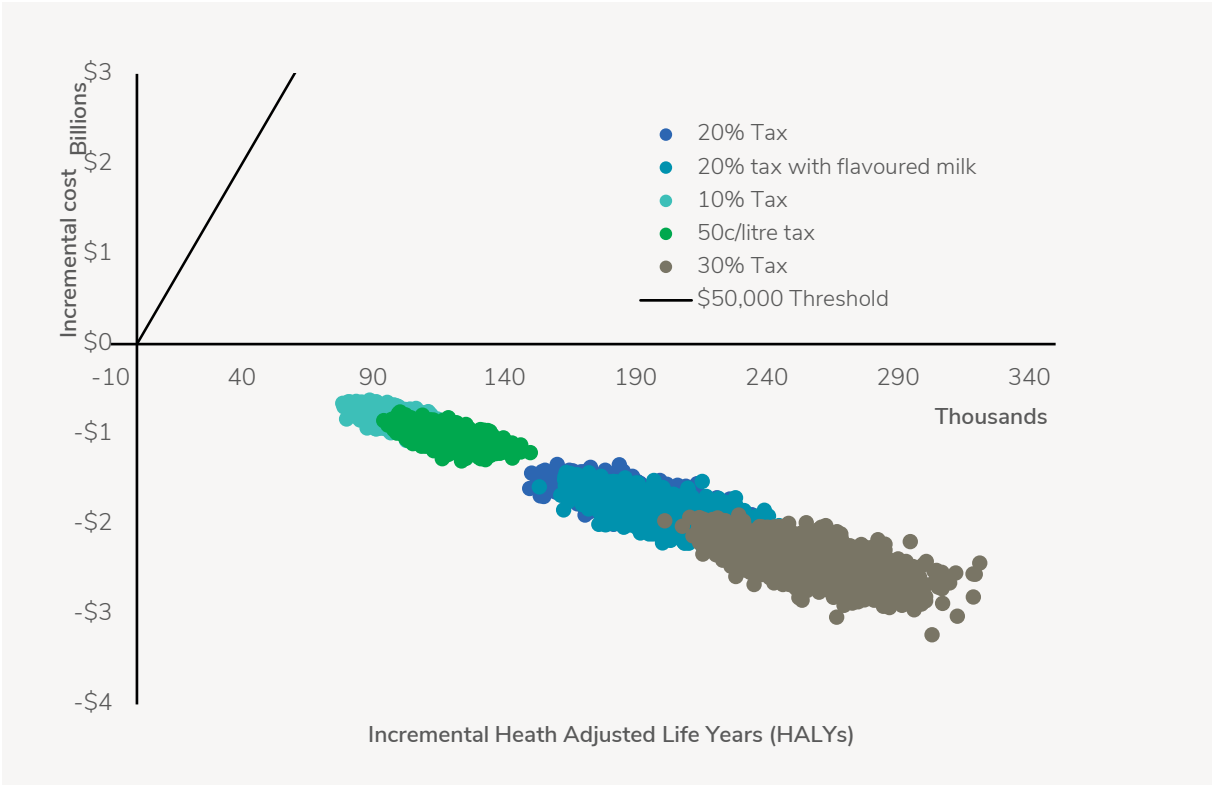
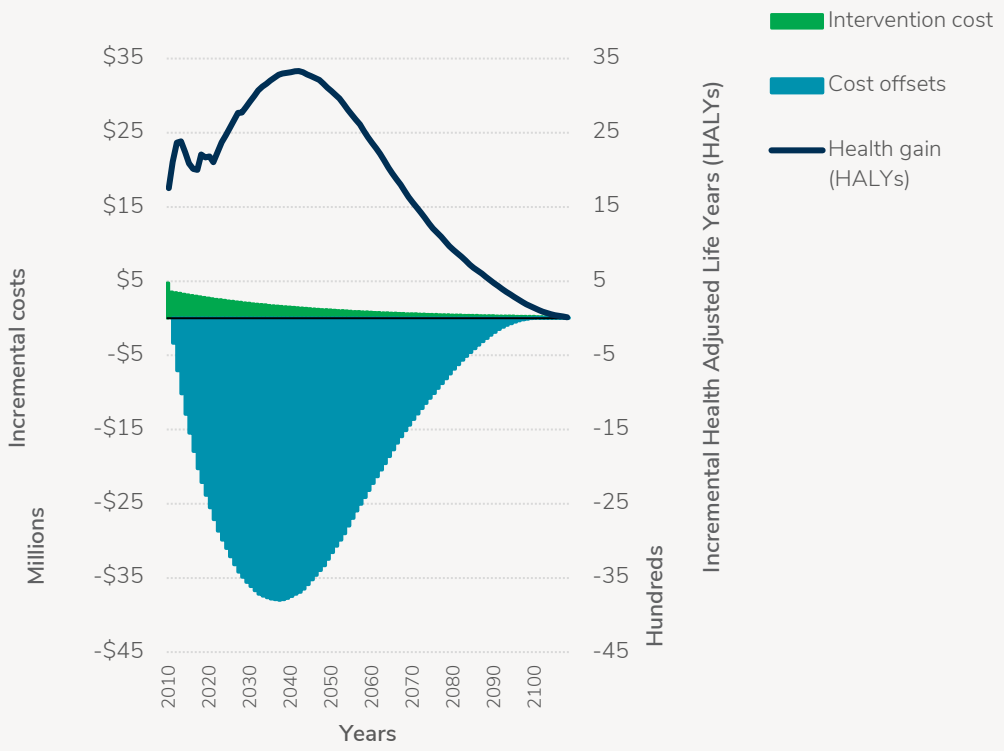


Figure 2 ***Costs, cost offsets and health gains over time (base case)***



Implementation considerations

Consideration	Details	Assessment
Strength of evidence	Low certainty of effect for BMI and body weight outcomes due to absence of relevant studies. Systematic reviews and meta-analyses provide evidence support the causative role of SSBs in obesity[1].	Low
	Medium certainty of effect for the impact of taxes on SSBs on diet. This is based on evidence of price elasticity of demand for SSBs from real world data in Australia, implementation of SSBs taxes in other countries (e.g., Mexico), and parallel evidence from tobacco taxes. Long-term compensatory behaviours not well-established.	Medium
Equity	The estimated annual tax paid per capita was $3.80 higher in the lowest quintile when compared to the highest. Quantitative evaluation showed that half of the total health gains accrue to the two most disadvantaged quintiles. Healthcare cost savings as a percentage of household expenditure were highest in the most disadvantaged groups.	Neutral
Acceptability	**Government:** The current government has stated that they do not support a tax on SSBs at this time. Over 35 countries have implemented SSB taxes globally, and acceptability in Australia may increase as more countries around the globe implement this type of tax.	Medium
	Industry: The beverage and sugar industries have stated their opposition to taxes on SSBs.	Low
	Public: There have been no nationally representative studies, however Australian evidence shows that if revenue from a SSB tax was earmarked for subsidising healthy food and/or tackling childhood obesity, public support for such a tax would likely be strong.	Medium
Feasibility	Over 35 countries have implemented taxes on SSBs, and several reports have outlined the mechanisms for doing so in Australia.	High
Sustainability	Due to the regulatory nature of the intervention, sustainability is likely to be high, although there would likely be ongoing pressure from the food industry to remove the tax. The impact is likely to be sustained based on history of tobacco taxes, although may require periodic increases in the tax rate.	High
Other considerations	Consumption of SSBs in Australia has been declining over recent years. If this trend continues, the contribution of SSBs to mean population energy intake may be lower than estimated in this analysis. The effect of manufacturers or retailers absorbing part of the tax could decrease the impact of the tax and the resulting health benefits; however, based on our predicted results for a 50% pass-through, the healthcare cost savings are nevertheless likely to be substantial. There could be an additional `halo effect' from the introduction of the tax caused by increased public health awareness of the role of SSBs in obesity, leading to further decrease in purchasing of SSBs, over and above what has been included in this analysis. Reformulation (to reduce sugar content) has occurred in the UK in response to the introduction of a tax on SSBs – the potential impact of reformulation has not been included in this analysis.	

Notes: BMI: Body mass index; SSBs: sugar-sweetened beverages

[1] Taylor R, Scragg R, Quigley R. Do Sugary Drinks Contribute To Obesity In Children? New Zealand: Scientific Committee of the Agencies for Nutrition Action 2005. Malik VS, Schulze MB, Hu FB. Intake of sugar-sweetened beverages and weight gain: a systematic review. Am J Clin Nutr. 2006;84(2):274-88.
Vartanian LR, Schwartz MB, Brownell KD. Effects of soft drink consumption on nutrition and health: a systematic review and meta-analysis. Am J Public Health. 2007;97(4):667-75.