



香港中文大學
The Chinese University of Hong Kong



香港中文大學醫學院
Faculty of Medicine
The Chinese University of Hong Kong

**Health and Medical Research Fund
Research Fellowship Scheme**

Evaluating the impact of sugar-sweetened beverages tax in Hong Kong: An integrated study

Professor Marc KC Chong

JC School of Public Health and Primary Care, Faculty of Medicine
The Chinese University of Hong Kong



Centre for
Health Systems &
Policy Research

Project team



PI, fellowship applicant



Dr Matteo M Galizzi (Fellowship advisor)

Associate Professor of Behavioural Science
Co-Director of Executive MSc in Behavioural Science
Department of Psychological and Behavioural Science

The London School of Economics and Political Science



Prof. EK Yeoh



Prof. Benny CY Zee



Prof. KWAN Hoi Shan



Prof. Eliza LY Wong



Prof. Hong Fung

Sugar-sweetened beverages

- Sugar: Desirable sweet flavor → commercial importance in food market and are widely presented in food; from snacks and desserts to beverages and dishes served in restaurants.
- However, since sugar is also an easily absorbable source of energy intake, consuming high amount of it could lead to various health conditions, such as significant **weight-gain**, **obesity** and **hypertension**.



Taxation on sugar-sweetened beverages

- Unlike fat or sodium or other many nutrients, WHO does not have a recommended daily intake value for sugar as a reference.
 - though its latest suggestion is having less than 5% of daily energy from free sugar
- Sugar tax: Public Health Strategy to combat the adverse effects of excessive sugar consumption
 - A meta-analysis confirmed the effectiveness of SSB taxes, yet NONE of the included studies was conducted in Asia (Cabrera Escobar et al. 2013)

Box 1. Sugar taxes around the world

Various countries have introduced taxes targeting high-added-sugar products in order to counter the rising problems of obesity and diet-related disease. The tax base (i.e. which products are subject to the tax) varies across countries. For example, only sugary soft drinks are targeted in the US, whereas chocolate, sweets and all non-alcoholic beverages that contain added sugar or sweeteners are taxed in Norway.

Country	Tax base includes:
Australia	Soft drinks, confectionery, biscuits, bakery products
Finland	Soft drinks, sweets, ice cream
France	Drinks containing added sugar or sweeteners
Hungary	Sugary drinks, sweets, biscuits, ice cream, chocolate, jams
Mexico	Non-alcoholic and non-dairy drinks with added sugar
Norway	Non-alcoholic beverages containing added sugar or sweeteners, chocolate, sweets
US (some states)	Sugary soft drinks

Source: Table 1, annexe 2 of Public Health England, *Sugar Reduction: The Evidence for Action*, October 2015, <https://www.gov.uk/government/publications/sugar-reduction-from-evidence-into-action>.

Hattersley and Mandeville (2023) highlighted that national SSB taxes only encompass a only 10% of the population in East Asia and the Pacific region.



Update



World Bank Group. 2023. *Global SSB Tax Database*. Washington, DC: World Bank Group.

- Studies in India, the United States (US), Chile and Australia have all shown reduction in average purchase after imposing or raising taxes on high-sugar SSB (usually excluding dairy-products); and also reduced mean sugar intake even after considerations of substitution effect
- Nevertheless, a recent observational study indicated although the increase of tax could result in an observable change in the purchases of SSB, the small change was unlikely to affect the prevalence of obesity and non-communicable diseases



Why Hong Kong?

- According to Hong Kong government statistics, the average daily intake of sugar is about 53g, above the WHO suggested level of 5% of total energy intake, meaning around 25g and 19g per day, for a standard 2000kcal and 1500kcal daily diet for man and woman respectively.
- Hong Kong: An **affluent** setting in East Asia with a GDP per capita at 44481.34 US dollars in 2021, faces 39% overweight population and related disease burdens.
- Around 32% of total sugar consumption coming from **non-alcoholic beverages**, including non-diet soft drinks.

Why Hong Kong?



31°C 香港時間：2022年6月17日 (週五) 16:33 | 訊

熱門關鍵字： 消委會 香港小姐 超市大搜查 尋人記II

話題 健康 親子 娛樂 新聞 休閒消費

沈帥青：保障港人健康 要靠徵稅減糖？

City 00:10 2018/11/13

香港商報 今日 商報

零食加稅害苦基層

2018年 06月 06日 07:44 香港商報

The News Lens 關鍵評論

最新文章 | 政治與政策 全球與區域 社會與公眾 財經與商業 藝術與文化 教育與知識 生活與休閒 趨勢報告

烏克蘭最新局勢

快睇哪裡買一次查

沖繩返還50週年

民進黨派系解密

精準醫療發展

永續價值

2016/11/03, 健康

「三高」引致健康問題，應否開徵「糖稅」和「鹽稅」？



食力 foodNEXT

登入/註冊



食專題

食科學

食新聞

食生活

食專欄



HOME / 最新 / 專題 / 專題與內文



「糖」成為全球健康新公敵！徵收「糖稅」真的能打擊肥胖問題嗎？

通識攻略：徵糖稅成效存疑

兒童癡肥成世界各國問題，為減少兒童攝取過量糖分，各地政府出奇招，英國政府宣布將於兩年內針對含糖量過高的飲品徵收糖稅，更估計可為庫房帶來約五億二千萬鎊。相關計劃宣布後，部分汽水公司股價應聲下挫，徵收糖稅能否有效令兒童體重下降？以健康為由徵稅，是否合理？ 相關新聞刊 A 2 8



香港中文大學
The Chinese University of Hong Kong



香港中文大學醫學院
Faculty of Medicine
The Chinese University of Hong Kong

Questions

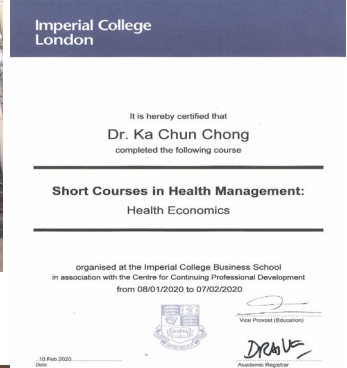
1. How much taxation would cause a reduction of consuming the SSB by the Hong Kong people? (i.e. 'willingness to pay')
2. Which population affected much by the policy?
3. Will the taxation policy generate a long term benefit in terms of a reduction of overweight, obesity, and type 2 diabetes?



My training programme

- Short course named “**Health Economics**” lasts for one month with around 3 to 5 lectures and computing/tutorial sessions every week
 - Learning outcome: To analyze principles of microeconomics and their application to healthcare
 - Guest lecturer: Dr. Matteo Galizzi
- Training experience:
 - Classroom learning + Mentorship
 - Collaboration + supervision for project
 - Refine the proposal!
 - Established connections for future investigations

Imperial College London

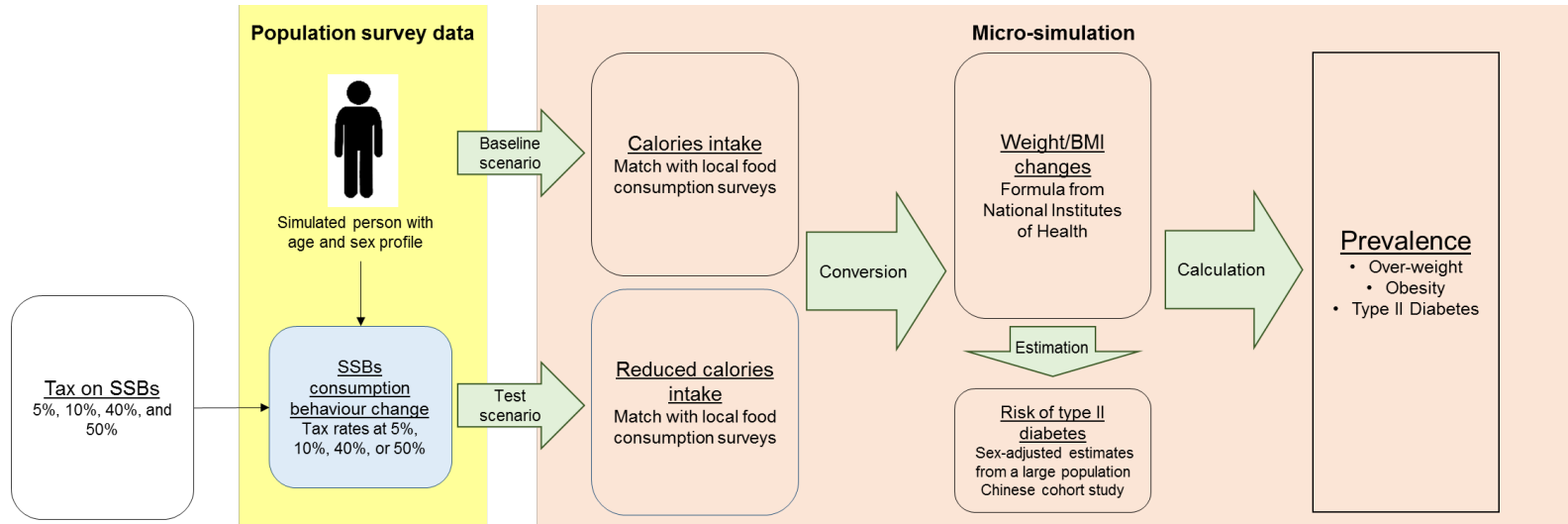


Integrated study methodology

- **1. Population survey:** to obtain the public perspective on their willingness to pay taxes for a SSB product and their corresponding socio-economic status and SSB consumption behavior.
 - SSB: All non-alcoholic water-based beverages with added sugar e.g., non-diet soft drinks/sodas, flavored juice drinks, sweetened tea/coffee drinks.
 - A cross-sectional study ($n=1,000$) via random telephone survey (contingent valuation method) from May to June 2020 in Hong Kong
- Willingness to pay: the accepted price that he/she is willing to pay for the SSB products, without reducing the consumptions, under a taxation scenario.
 - Four scales of tax payment were tested: 5%, 10%, 40%, and 50% of the current market price

Study methodology

- **2. Mathematical modelling:** To assess the impact of different taxation rates on the prevalence of overweight, obesity, and type 2 diabetes over a 10-year trend.



Results

- Response rate: 59.1%.
- 67% were female and 47% aged between 34 and 63 years
- Purchase habits: **One-third** of adult participants consumed **>3 servings** of sweetened tea or coffee in a week.
- 5% tax scenario: Greater proportion of participants was willing to maintain their purchase of sweetened tea/coffee
- An average reduction of 34% and 39% in purchase was observed for 5% and 10% taxation rates, respectively, for all SSBs.

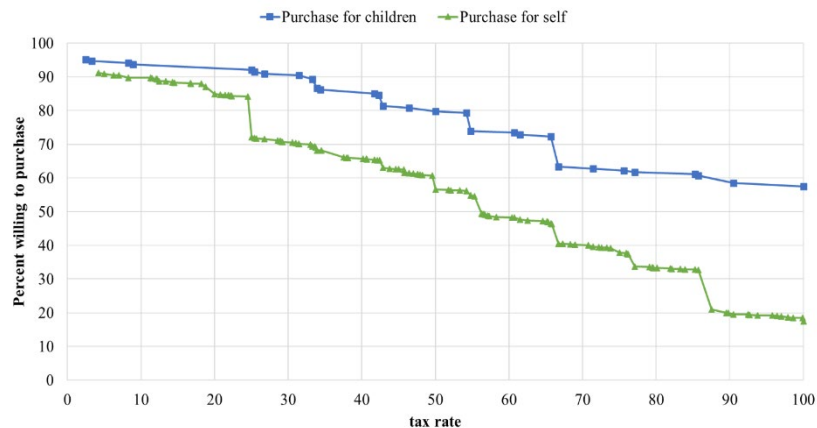
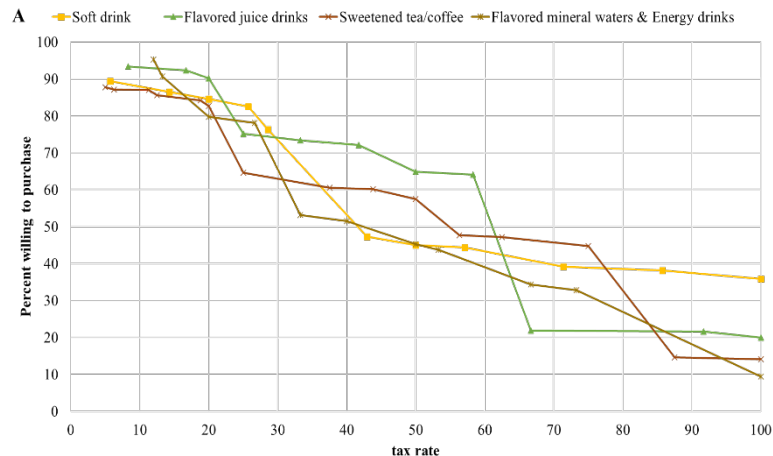
Table 2

Proportions of individuals willing to pay for sugar-sweetened beverages and self-reported percentage reductions in purchase at different tax scenarios by beverage types in Hong Kong 2020.

	Tax rate (%)	Price (in USD) ²	N	n (%) willing to pay for SSB	Self-reported % reduction in purchase, mean \pm SD
All SSBs ^a	5	1.67	227	165 (72.7)	33.6 \pm 27.7
	10	1.75	221	149 (67.4)	38.6 \pm 28.1
	40	2.23	209	103 (49.3)	50.8 \pm 32.4
	50	2.39	188	89 (47.3)	61.9 \pm 30.9
Non-diet soft drinks	5	0.92	70	50 (71.4)	27.3 \pm 24.0
	10	0.97	54	41 (75.9)	29.2 \pm 16.6
	40	1.23	65	32 (49.2)	50.0 \pm 30.5
	50	1.32	53	31 (58.5)	69.5 \pm 24.0
Flavored juice drinks	5	1.61	107	80 (74.8)	45.0 \pm 31.7
	10	1.68	88	67 (76.1)	42.4 \pm 31.8
	40	2.14	86	40 (46.5)	47.6 \pm 31.8
	50	2.30	84	45 (53.6)	62.6 \pm 28.5
Sweetened tea/coffee	5	2.14	150	120 (80.0)	40.8 \pm 28.2
	10	2.24	152	105 (69.1)	41.1 \pm 25.5
	40	2.86	129	76 (58.9)	58.9 \pm 29.7
	50	3.06	128	70 (54.7)	60.9 \pm 31.4
Flavored mineral waters and energy drinks	5	2.01	10	19 (67.9)	28.7 \pm 24.8
	10	2.10	2	11 (91.7)	50.0
	40	2.67	4	4 (50.0)	67.5 \pm 33.0
	50	2.87	6	2 (25.0)	83.3 \pm 25.8

Results

- Maximum willingness to pay (WTP_M) by the types of sugar-sweetened beverages in different percentage (%) increase in price for adults



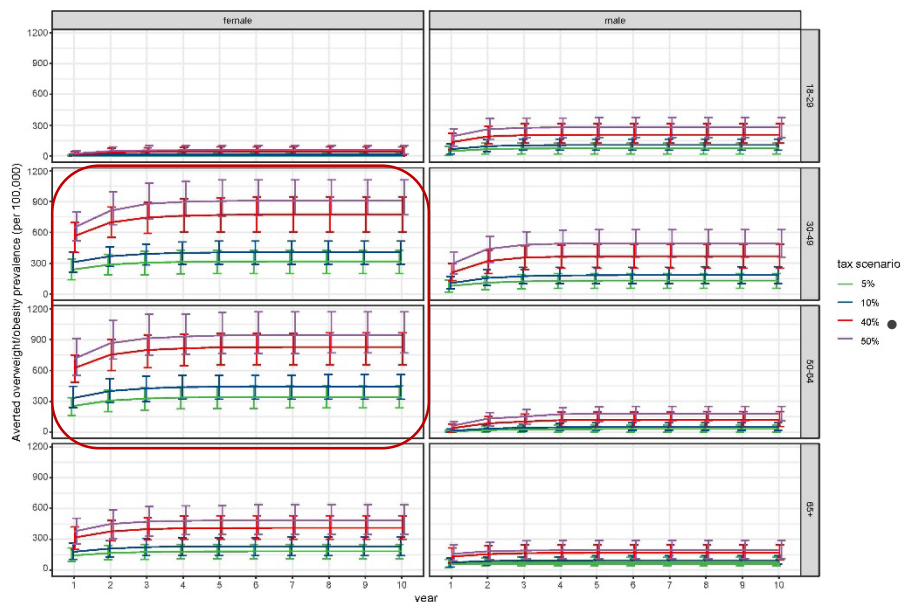
- Note:* **WTP_M**: Maximum willingness to pay, defined as the **highest accepted price** that a participant consuming SSB products without a change of purchase behaviour.
- Association analysis: A low SES was significantly associated with a lower WTP_M for all SSBs when comparing with the middle-SES group.



Results

- Model simulation for the averted prevalence when comparing with a scenario without any SSB tax:

Overweight/Obesity



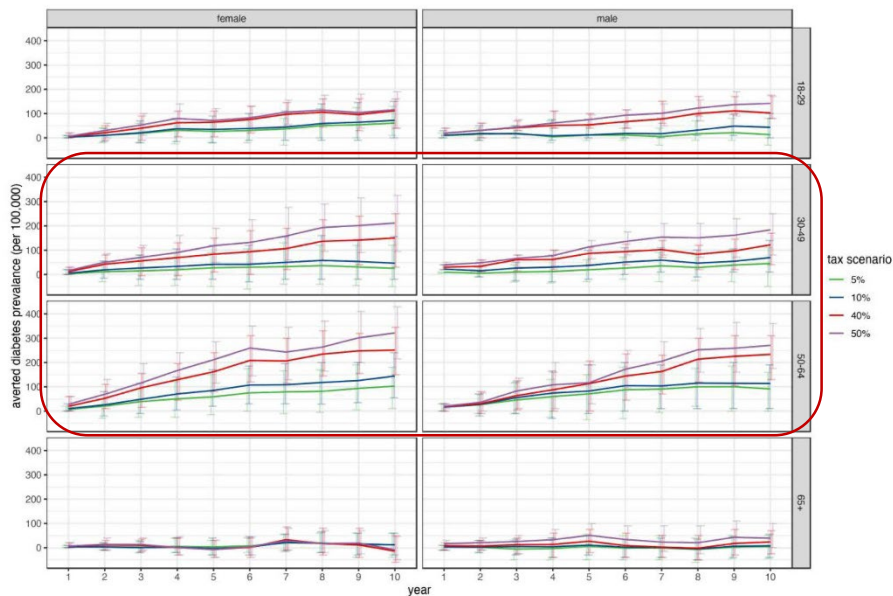
- In our 10-year simulation, a steady decline in population body weight was observed in the first six years.
 - Of all individuals, the mean averted prevalence of overweight/obesity at the sixth year was 1,161.6 (95% UI: 944.8 to 1365.3) and 1,532.7 (95% UI: 1344.8 to 1770.5) per 100 thousand population, respectively, when the tax rate was set at 5% and 10%.
- Specifically, **females aged 50 to 64 years** showed the highest number of cases transiting back to a normal BMI level.
 - When the tax rate was 40%, this subgroup had a substantial reduction in overweight/obesity prevalence of 827.0 cases per 100,000 population (95% UI: 654.8 to 960.5) at the sixth year.



Results

- Model simulation for the averted prevalence when comparing with a scenario without any SSB tax:

Type 2 diabetes



- Similarly, the effect of SSB taxation on T2DM was more apparent in several age-and-sex specific groups.
- The influence of SSB taxation on T2DM prevalence was notably greater within the **age group of 30-49 and 50-64 years**, while no discernible effect was observed among individuals aged 65 years and older.
 - Specifically, 208.0 cases were averted (95% UI: 120.0 to 310.0) in females and 144.0 cases were averted (95% UI: 44.7 to 235.0) in males per 100,000 population by the sixth year, when a 50% tax rate is imposed.



Discussion

- Hong Kong, an affluent setting in Asia has been discussing the feasibility of the policy on SSB tax as an effective strategy to reduce sugar uptake and in a long run to decrease the burden from non-communicable diseases.
- Local population had a high frequency of purchasing SSB products
 - Given a general taxation scenario (i.e., 5% and 10% of the current price), **one-fourth to one-third of the population** would change their consumption behavior of SSB products
 - Higher than Mexico having 26% reduction of SSB consumption
 - The behaviour change is also better than that in another study in Chile
 - In line with an observational study that the reduction in SSB consumption was the greatest **among low-SES households**



Discussion

- Among the SSB products, a little bit stronger WTP in **sweetened tea/coffee** was observed.
 - Probably due to a regular consumption in the daily lives of the local population
- A typical taxation scenario (e.g., 10%) of the current price could change the purchasing behaviors in one-fourth to one-third of the population, corresponding to a mean averted prevalence of overweight/obesity at the sixth year **~1,000 to 2,000** per 100 thousand population
 - Slightly lower than Mexican study (10% tax with 3.9% obesity reduction)
 - But was similar with the results in UK
- Diabetes prevalence at year six of ~300 per 100 thousand population
 - Consistent to studies in India and Australia



Discussion

- Our simulation results suggest the impact of SSB tax was more apparent in several age-and-sex specific groups.
 - Changes were more pronounced among **middle-aged adults**, but not elderly.
- Regarding gender disparities, we noticed a greater impact on female obesity/overweight, while no significant gender differences were found regarding T2DM prevalence.
 - This finding diverges from the German study → the prevalence of obesity among German males was much higher!
 - The social, political, and cultural factors in these two regions may also contribute to variations in the impact of SSB tax.



Recommendation

1. Consideration of a **pilot scheme** of SSB tax for the high sugar-content SSB products with a stronger willingness to change (e.g., non-diet soft drinks), as similar with the **tiered system** of sugar tax in the United Kingdom.
2. Given an age-sex heterogeneity of consumption behaviour as well as taxation impacts, other policy interventions such as warning labels of high-sugar content may be considered to supplement the implementation of SSB tax.
3. While the SSB tax could generate a revenue to government, the **feasibility** and the industrial compliance of SSB tax require a further evaluation before an implementation.

Thanks!

Acknowledgement

We would like to thank the Centre for Health Behaviors Research (CHBR) for conducting the telephone survey. This project is supported by **Health and Medical Research Fund Research Fellowship Scheme** (Ref. no.: 04180017) – Evaluating the impact of sugar-sweetened beverages tax in Hong Kong: An integrated study. The Centre for Health Systems and Policy Research funded by the Tung Foundation is acknowledged for the support throughout the conduct of this study.

Publication: Wang J, Wei Y, Galizzi MM, Kwan HS, Zee BCY, Fung H, Yung TKC, Wong ELY, Yue Q, Lee MKL, Wu Y, Wang K, Wu H, Yeoh EK, Chong KC. Evaluating the impact of sugar-sweetened beverages tax on overweight, obesity, and type 2 diabetes in an affluent Asian setting: A willingness-to-pay survey and simulation analysis. *Prev Med.* 2024 Jul;184:107994. doi: 10.1016/j.ypmed.2024.107994.

