

Title: Canada's First Sugar-Sweetened Beverage Tax: Evaluating its Real-Life Implementation in Newfoundland and Labrador on Beverage Intake

Rationale for Importance of Project:

Excessive sugar-sweetened beverage (SSB) intake is linked to risks of 12 cancers.^{2,3} In Canada, NL has among the highest intake of SSBs⁴, the highest age-standardized incidence rate for all cancers, and notably higher rates of colorectal cancer (CRC).⁵ Of all diet-related cancers, CRC has the highest estimated direct and indirect health care costs due to excessive SSB intake and inadequate milk intake. NL residents consume the least plain water and milk out of all provinces.⁴ Existing public health and educational strategies seem to be ineffective in curtailing these unhealthy practices in NL. **On Sept. 1, 2022, NL introduced a tax on SSBs – the first province to do so.** Previous research suggests that SSB taxes are effective financial disincentives that support shifts in consumer purchasing and eating behaviour.^{2,7} An experimental marketplace study in Canada gave participants \$5 and asked them to 'purchase' a product.⁷ The study tested four beverage taxes compared to a no-tax control and found that all sugar tax types were associated with purchasing beverages containing up to 20% less sugar and calories.⁷ In Canada, an SSB tax is estimated to prevent 667,431 cases of obesity, 21,777 cases of cancers, 488,778 Disability Adjusted Life Years, and 13,206 deaths over 25 years.⁸ However, **the effectiveness of the tax will be influenced by its type, magnitude, SSB coverage, signaling effect, pass-through, and industry factors (e.g. supply, promotion).** Studies of SSB taxes showed that the pass-through of the tax cost to consumers varies in amount (0% to >100%)^{9,10} and by beverage¹¹ and store type.^{11,12} Additionally, our research team has noticed that NL stores are inconsistent in how they communicate the tax to consumers on the shelf tag, display the tax amount, and apply the tax. Thus, **it is crucial to collect implementation data to estimate the impact of the policy.**

Research Objectives and Hypothesis:

This research project will evaluate the implementation of Canada's first SSB tax to understand the policy one year after its start. Since the tax was introduced, the research team has noticed inconsistencies in the tax implementation by store type and ownership. Thus, we intend to investigate the fidelity and effectiveness of the policy.¹

This grant will support answer the following research questions: **(1) How is the SSB tax implemented by stores in NL? (2) Is there a relationship between the store level of the tax implementation and beverage purchasing and intake in youth and adult consumers in NL?** We hypothesize that store sales and consumer purchasing will differ between stores implementing the SSB tax as intended and those with low fidelity of implementation.

Description of Approach/Methods for Project:

Expanding on an existing study, this project uses a longitudinal design to evaluate store and consumer outcomes before and after the SSB tax is implemented. We have established a quasi-experimental pre-/post-study with a cohort of stores and consumers with which we are collecting data on beverage pricing/promotions, and consumer awareness/behaviours. In this study, we will use the RE-AIM framework¹³ to estimate the Reach, Adoption, Implementation, and Maintenance of the SSB tax (Study 1) and estimate the Effectiveness of the SSB tax (Study 2).

Study 1: Reach, Adoption, Implementation, and Maintenance of the SSB tax

Using stratified random sampling, a cohort of 65 stores (15 grocery, 40 convenience, 5 drug, 5 pharmacies; 51 urban; 14 rural) were selected in NL. We have completed store audits at three intervals between June and August 2022 (pre-tax) using a paper-based Beverage Tax Food Store Observation Form adapted for Canada, which has high inter-rater reliability.¹⁴ Trained research

assistants recorded pricing and promotion data on 53 beverages identified a priori. All store audits and double checked and verified through photos.

To answer our question, **how is the SSB tax implemented in stores in NL**, we are seeking funds to: (i) expand data collection and analysis to include measures of SSB tax implementation in the store audit; (ii) complete post-tax store audits in rural NL (urban NL post-tax audits are funded by an existing grant) between June and August 2023; and (iii) purchase a sample of beverages from each store type to collect receipt-based data to fill gaps in observational audits.

First, the new measures of SSB tax implementation will be collected – research staff will visit stores to take pictures of shelf labels, describe how the tax is visible to consumers, track the tax amount applied to each beverage/size, and count the number of the NL Government ‘Rethink Your Drink’ posters. These new measures are currently being piloted. Secondly, this project will require staff to visit 14 stores in three rural regions (Bonavista, Burin, Northern Peninsula). Staff who collected pre-tax data in these regions are no longer available; thus, we will hire new staff and cover travel costs. Finally, we will make one-time purchases of 15 beverages (single-serving colas, energy drinks, waters, etc., in sugar and non-sugar varieties) from 14 stores, varying by type and owner, one year following the tax start date. Receipt data is an important measure missing from our existing grant that would help us understand the adoption of the tax at the point of purchase and prevent underestimating the application of the tax by stores. Collecting both shelf label and receipt data is critical since they provide information to consumers at different points of decision-making (pre-/post- purchase) which impacts in-store choices.

Using our expanded store audit data, we will measure the SSB tax: (i) visibility (% of shelf labels on which tax is displayed), (ii) scope (% of beverages on which tax is correctly applied), and (iii) rate (% of the \$0.20/litre rate passed through to consumers). Stores with 95% of these outcomes will be classified as ‘implementers’ of the tax. We will run cross-tabulations and Pearson’s Chi-Square to evaluate the proportion of stores by *type* (grocery, convenience, dollar, drug) and *owner* (Sobeys, Loblaws, other) that are ‘implementers’. Generalized estimating equations will be constructed with SAS 2022 to estimate a marginal model for the effect of *store type*, *owner*, and *time* on continuous implementation outcomes: visibility, scope, and rate.

Study 2: Effectiveness of the SSB tax

Using convenience sampling, we established a longitudinal cohort of youth (10-18 years; in progress) and adults (19 years and older; n=444) in NL. We administered an online survey with adults in August 2022 (youth survey pending) that collected demographic, knowledge (SSB and tax attitudes) and eating/purchasing behaviours. The survey includes validated measures that capture frequency and volume of beverage intake.¹⁵ Our survey will estimate: (i) SSB and water purchasing, (ii) consumption, (iii) tax awareness, (iv) perceived impact of the SSB tax on purchasing, and (v) attitudes towards beverages.

To answer our question, **is there a relationship between tax implementation level and beverage purchasing and intake**, we are seeking funds to: (i) expand consumer survey to collect store-level exposures so that we can estimate the impact of store-level SSB tax implementation on consumer behaviour, (ii) link participants to their ‘usual store’, and (iii) conduct test hypotheses on the relationship between store implementation and beverage intake.

First, we will design new survey questions to identify the store where each participant most often purchase groceries (food and beverages, asked separately). We will ask about shopping habits and how long the identified store has been their ‘usual store’ to estimate exposure to pre-/post-SSB tax implementation. We believe this measure is a reasonable proxy for tax exposure and will allow us to differentiate between participants who are regularly exposed to

'implementers' versus non-'implementers' to test the impact of full tax implementation on behavioural and attitudinal outcomes. We will code participants according to their 'usual store' by store type, name, owner, and implementation status as per Study 1.

Finally, to test the hypothesis that regular store exposure to SSB tax "implementers" vs. "non-implementers" is associated with a variety of outcomes (including SSB purchasing, consumption, awareness of the SSB tax, and SSB-related attitudes), we will construct difference-in-difference models to estimate the impact of regular shopping at an implementer store on relevant outcomes after adjusting for individual-level co-variates (age and gender). Models for youth and adult participants will be run separately. Analyses will be completed with SPSS Statistics with a significance level set at $p < 0.05$. We will seek ethics approval through a study amendment.

Significance / Relevance of Project Findings to Dietetic Practice

Water is recommended as the 'drink of choice' in the 2019 Canada's Food Guide, however there are a number of alternative beverages in the food system that compete for consumers' choice. Policy interventions to support healthy beverage choices are crucial to creating healthy food environments in Canada and will be used by dietitians in public health, policy, food service, industry, and clinical practice to support healthy practices in their clients. Our project will reveal real-life implementation of an SSB tax and support complex practice and policy decisions about healthy food environments and policy at multiple jurisdictional levels (i.e. institutional to federal). Our results will provide Canadian data on how an SSB tax can operate as a determinant of food choice, and informing future intervention strategies. Our findings will have significant implications in NL which has extreme rates of food insecurity, healthcare costs, and SSB intake, and low intake of plain water and milk;⁴ the effects of the SSB tax should be detectable in the population, with the potential for significant public health impacts. The NL Government announced the tax fewer than two years before it was implemented, providing retailers insufficient time to understand what is expected of them when implementing the tax. **This study is thus necessary to obtain the relevant, specific, detailed, and representative data that dietitians, researchers and policymakers will rely on in the coming years to estimate the impact of the tax and its success as a healthy eating intervention for Canadians.**

Time Required to Complete the Project

Store audits will be done Jul-Oct'23. We will redesign, program, and test our consumer survey in Aug'2023, to be administered Sep-Nov'23. Store audit data entry will occur Nov'23 and Mar'24. Stores will be coded as 'implementers' and consumers linked to their 'usual' store Mar-Jun'24. Data analysis will occur Jul-Sep'24. Knowledge exchange Oct'24-Jun'25.

Budget Projections

We have completed significant work to evaluate the NL SSB tax, made possible through start-up funds of the research team, small, short institutional grants, and a proof-of-concept Action-22 grant from the Canadian Cancer Society/Canadian Institutes of Health Research. To continue to collect post-tax data, we are requesting \$20,000 (see table).

Category	Rationale	Amount
Salaries (Year 1,2)	Research Coordinator (\$30/hour*317 hours (0.1 FTE))	\$9,510.00
Salaries (Y1)	Research Assistants (\$24.74/hour*180 hours)	\$4,453.20
Supplies (Y1)	Beverage Purchasing (15 beverages*15 stores*\$3.14/bev)	\$706.80
Travel (Y1)	Rural fieldwork in 3 communities: \$1,090+\$1,090+\$2,150	\$4,330.00
Dissemination (Y2)	Conference (\$500); knowledge translation (\$500)	\$1,000.00
Total		\$20,000.00

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