

Preventing Unhealthy Weights: A Tax on Sugar Sweetened Beverages (SSBs) as Part of the Solution

Childhood Obesity Foundation, January 2011

Key Messages

- The health and economic burden of obesity and associated chronic diseases will overwhelm our province and our population in coming years.
- There is strong and convincing evidence linking SSBs with excess weight gain in both children and adults.
- The academic research is biologically plausible and is consistent with common sense.
- A significant proportion of the Canadian population, beginning early in childhood, regularly consume SSBs and are therefore put at risk for developing unhealthy weights.
- Similar to our experience with tobacco, we know that educating consumers to reduce their intake of SSBs is not enough to counterbalance the aggressive marketing of these products.
- Over 90% of British Columbians recognize the detrimental effects of SSBs and over 70% support taxation if revenue is targeted to health promotion.
- Taxing SSBs would capture the societal costs of these products and facilitate personal responsibility for the increased cost to the health care system generated by their regular consumption
- Taxing SSBs would generate revenue for prevention as well as reduce consumption of these products.
- Obesity is regressive as low income groups are particularly susceptible but a tax on SSBs would be progressive if the proceeds are properly allocated as low income groups could reap the most benefits.

Scope of the Problem

Canada, like many nations, is in the midst of an epidemic of overweight and obesity. Currently, 59% of adult Canadians are either overweight or obese.^[i] There has also been a dramatic increase in unhealthy weights in children. In 1978 only 15% of children were overweight or obese. By 2004 Statistics Canada found that 29% of adolescents had unhealthy weights.^[ii] Most adolescents do not outgrow this problem and in fact, many continue to gain excess weight.^[iii] If current trends continue, by 2040 up to 70% of adults aged 40 years will be either overweight or obese.^[iv]

Adults who have unhealthy weights are at increased risk of heart disease^[v], cancer^[vi], strokes and type 2 diabetes.^[vii] The direct cost of obesity related disease to B.C. taxpayers is estimated at over 450 million dollars per year^[viii] and affected adults may die up to 3 to 7 years earlier than counterparts with a healthy weight.^[ix] The resultant toll in dollar's cost and lives lost is a call for action. Obesity is difficult to reverse and public health measures must include effective prevention beginning in childhood.

Excessive weight gain is the result of an imbalance of energy consumed and energy expended. Improving the health of our population will require efforts to both increase physical activity and to decrease unnecessary caloric consumption. While no single solution will help everyone, there is sufficient evidence that some specific approaches will benefit a significant proportion of the population. One of the lessons learned from the war against tobacco is that the scientific literature is seldom unanimous and when the public good is challenged by a major health risk, decisions to act must be made on the best available evidence and not delayed while waiting for unanimity. [x]

Most experts now agree that in the battle against obesity, there is compelling evidence to aggressively pursue two components of the energy equation: excess screen time (which reduces physical activity and promotes poor nutrition) and the consumption of sugar sweetened beverages (excess calories). [xi]

Why target Sugar Sweetened Beverages (SSBs) ?

Numerous studies have linked SSBs with excess weight gain in both children [xii], [xiii] and adults [xiv],[xv] Calories derived from soft drinks are of particular concern as people seldom compensate for their consumption of high calorie liquids by decreasing their intake of solid foods. [xvi] In some studies, participants who drank sugary drinks during the day actually ate more than those who drank water. [xvii],[xviii] This leads to a positive energy balance (excess energy intake) which can cause weight gain. It only takes 150-300 excess calories per day to gain a pound of fat per month [xix] and each additional 300 ml of a soft drink increases a child's risk of being overweight by 60%. [xx]

SSBs are aggressively and effectively marketed in Canada. In Quebec 17% of preschoolers drink SSBs daily. [xxi] In addition, over half of male Canadian teens report having had a soft drink the previous day and the average serving size was over 700 ml, containing over 300 calories. [xxii] An overweight 15 year old male would have to jog 40 minutes to compensate for these calories and even more effort would be required to lose weight. For most teens it would be much simpler (and practical) to not drink the calories in the first place. In fact, a recent American study reported that overweight teens who stopped drinking SSBs for six months experienced significant improvements in weight status. [xxiii]

Although the majority of studies have shown a link between SSB consumption and obesity there are some studies that question the link between SSBs and obesity [xxiv]. In order to detect the effect of SSBs studies must be well designed, prospective cohort studies with objective measurement of BMIs and carefully defined subject groups. Even studies with large numbers of subjects will fail to detect the link between SSBs and weight gain if these standards are not employed.

With a complex problem like obesity, where many factors contribute, it is essential that the evidence used to document the link between SSBs and weight gain be carefully evaluated and that "... greater emphasis be placed on larger studies of longer duration that are better powered to detect an effect." [xxv] When rigorous standards are applied the resulting studies provide a plausible biological basis for concern and strong evidence that targeting sugar sweetened beverages will benefit those most affected by overweight and obesity.

Most of us realize that anyone trying to lose weight, or avoid gaining excess weight, should eliminate sugary drinks. In our recently completed survey, 95% of Canadians recognized that the consumption of sugary drinks increased the risk for an unhealthy weight[xxvi]. Moreover, for most Canadians, a healthy sugar free thirst quencher is available for free from the tap. Common sense is supported by accurate controlled studies. In just such a study, when adult volunteers drank 350 cal of a SSB per day for three weeks, in addition to their normal diet, they consistently gained weight[xxvii]. If the reader doubts these results he or she can perform a similar experiment at home.

As a result of a thorough review of all the evidence, recommendations to reduce SSB consumption have come forth from the Centers for Disease Control in Atlanta [xxviii], the Institute of Medicine[xxix] and the American Academy of Pediatrics[xxx]. The Canadian Pediatric Society is considering a similar recommendation. It has been pointed out in The Journal of the American Medical Association that "... reducing sugar sweetened beverage consumption may be the best single opportunity to curb the obesity epidemic".[xxxi]

In order to motivate the public to reduce SSB consumption they must be informed of the risks associated with SSB consumption but this measure alone is unlikely to be sufficient. Even well funded social marketing campaigns to inform the public about the risks associated with SSBs are likely to be dwarfed by industry efforts to market these products. More importantly, recent work has suggested that education alone has little effect on SSB consumption whereas price increases significantly reduces the sales of SSBs[xxxii].

In summary, the case for taxing SSBs is based on 5 main points:

- 1) It is clear that SSBs possess unique properties which make regular consumers of these products particularly susceptible to excess weight gain.
- 2) There is a strong body of evidence demonstrating that the regular consumption of SSBs is associated with a significant increase in the risk of having an unhealthy weight.
- 3) Canadian data indicates that a significant percentage of our population regularly consume these products – beginning in childhood.
- 4) It is logical to assume that widespread consumption of SSBs leads to an increased prevalence of overweight and obesity and an increased cost to the healthcare system.
- 5) The public health experience from the fight against tobacco has taught us that although public education is necessary, it is unlikely to have sufficient impact on consumption of a product unless education is combined with taxation.

Sugar Sweetened Beverages are not a Necessity

The increase in the consumption of SSBs is primarily due to the industry's investments in innovation and marketing. Due to the substantial increase in the profit margin of SSBs over the last 30 years, the industry has had ample resources to invest in persuading consumers to purchase their products.

Although food and water are essential to life, soft drinks are not. They are high in calories and low in other nutrients. These products should be viewed as liquid candy and therefore consumed with moderation and not as hydration sources. Taxing food staples puts low income groups at risk for “going hungry” but no one will “go thirsty” as a result of a tax on SSBs as the best thirst quencher, water, is widely available for free.

Taxing SSBs is an Appropriate Step for Government

The citizens of British Columbia have designated the oversight and running of the health care system to the provincial government. The lion’s share of British Columbian’s tax dollars go towards health care. Obesity related treatment costs are substantial and if we want to effectively deal with health care system wait lines, we must deal with waistlines. Competent management of the health care system requires that resources be spent on prevention of obesity as well as treatment of its effects. This fact has been well recognized by the government of B.C. and is the rationale behind Act Now and the multitude of programs resulting from it. The BC Pediatric Society and the Heart and Stroke Foundation of BC, as part of initiatives by the B.C. Healthy Living Alliance which were funded by Act Now BC , has created a curriculum based SSB reduction module for children, called Sip Smart BC. Taxing SSBs is a logical extension of programs such as this and of the ongoing efforts by government to promote healthy active living. Widespread over consumption of SSBs are a significant contributor to the obesity epidemic and the beverage industry invests a significant portion of the proceeds from the sale of SSBs into marketing these products. It is reasonable for government to apply a tax on SSBs so that the sales of these products can also help offset the societal costs SSBs generate and fund countermarketing. The majority of the population supports taxing SSBs.

Impact of Sugar-Sweetened Beverages on other Aspects of Health

Type 2 diabetes

- Two major prospective surveys have reported a link between the regular consumption of soft drinks and the risk of Type 2 Diabetes in adults[xxxiii],[xxxiv].

Dental Caries

- Among young people aged 1 to 5, the consumption of soft drinks has been associated with an increase in the risk of developing dental cavities by 80-100% [xxxv],[xxxvi].
- The acidity that is specific to sweet beverages, and diet drinks, also causes dental erosion. An irreversible phenomenon, dental erosion causes several types of permanent damage, including poor enamel and hypersensitivity to cold, heat, sugar and touch[xxxvii].

SSBs and bone health

- A 2006 study suggests that colas, in particular, may be associated with poor bone health. The impact of drinking cola on bone density was attributed to phosphoric acid, which is only present in colas[xxxviii].

A Public Finance Issue

The cost of obesity and its related diseases does not only affect obese individuals, it becomes an "economic burden" for the whole population when health care costs are shared.

In British Columbia

Costs of the obesity epidemic and related chronic illnesses represent an economic burden for the provincial population. The Ministry of Health has estimated the direct cost of obesity related illness to be over 450 million dollars per year.

In Canada

In 2005, according to estimations, pathologies, disabilities and deaths associated with chronic illnesses cost Canada more than \$80 billion annually[xxxix].

Significant Resources must be dedicated to prevention

The Health budget currently consumes the largest share of the provinces resources. It has been estimated that if the current growth rate of health care costs is not restrained, that the Ministry of Health budget will soon account for 70% of all revenues. This growth will crowd out other vital spheres such as education and the environment. Growing rates of unhealthy weights will only accelerate the growth in health care expenditure.

If we want improve wait times we must deal with waist lines

In the long term, the only way to reduce the increasing demand for health care and the growing challenge of waiting lines is to prevent people from getting in line in the first place. This means we must invest in chronic disease prevention. Prevention requires dedicated resources to:

- Support ongoing actions for the promotion of healthy lifestyles and increase investments in the prevention of weight-related problems
- Develop our cities to encourage active and collective transportation and increase opportunities for physical activity
- Treat obesity

We live in a time of increasing cost pressures on the health care system combined with public reluctance to expansion of the tax base. Initiatives to increase health promotion in order to reign in health care spending are necessary yet unaffordable without increasing government revenue. One publicly acceptable solution would be a "health promotion" tax on SSBs.

Taxing Sugar Sweetened Beverages

The Childhood Obesity Foundation recommends that provincial policy makers seriously consider the benefits of imposing a special "health promotion tax"(HPT) on all SSBs. We propose defining SSBs as all beverages with added sugar or other caloric sweeteners such as high fructose corn syrup, including sodas, sports drinks,

sweetened teas, vitamin waters, fruit drinks and energy drinks. The Institute of Medicine of the National Academies has stated that implementing a tax in order to discourage the consumption of food with low nutritional value, such as sugar-sweetened beverage products appears to be one of the most promising strategies governments have in the fight against obesity[xi]. The application of such a tax measure would be restricted to sugar sweetened beverages as these products have been identified by the scientific literature as one of the important risk factors in the obesity epidemic and they can be clearly defined by regulations

Objectives of Taxation

The proposed tax on sugar sweetened beverages would achieve 4 main objectives:

- Capture the societal cost (externalities) of these products in order to offset the increased health care costs they cause. Studies have indicated that approximately 20% of obesity can be attributed to SSB consumption[xli],[xlii]. This would amount to 90 million dollars of our health care budget.
- Facilitate personal responsibility as those who consume the most SSBs (and therefore are more likely to incur additional costs to society) pay a greater price as the cost of the tax is passed on to consumers.
- Generate revenue for reinvestment in prevention (social marketing, enhance availability for physical activity for persons of all ages etc).
- Reduce the consumption of SSBs.

Public Support

We recently surveyed British Columbians and found that 70% would support a HPT on SSBs as long as the proceeds are used for health promotion. The Select Standing Committee on Finance and Government Services report on the Budget 2011 Consultation also recommends that government engage in a dialogue with British Columbians about measures to reduce the consumption of sugar-sweetened beverages, such as pop, fruit drinks, energy drinks and vitamin waters[xliii].

Various Options for Economic Models[1]

Several economic taxation models could be used to tax sugar-sweetened beverages and we have chosen to explore one option while leaving the details to be explored by experts in this field.

A Special Tax

Application of a special tax on SSB's

- A deduction based on an "excise tax" model would be applied to SSB's and collected from producers and importers as is currently the case with alcoholic beverages.
- Unlike sales taxes, the consumer does not notice the taxation at the time of the purchase, as the tax is integrated to the manufacturer's production cost or required by the importer.

- For example, a special tax of \$0.40/litre for beer and \$0.89/litre for wines and spirits is collected in Quebec through the producer or the importer. The producer must fill out an alcoholic beverage production declaration form (VDZ 498) to which he joins the payment for the tax.

Expected Revenue from a “Health Promotion Tax” on SSB’s

A special tax on SSB’s could follow the same model as for alcoholic beverages. Estimated revenues from such a tax could be on the order of \$87 M per year:

- The average Canadian consumes at least 66 Liters of SSB’s per year.[xliv]
- There are 4,400, 000 residents in British Columbia.
- British Columbians therefore consume approximately 290 million liters of SSB’s per year.
- A thirty cent per liter tax could be expected to yield 87 million dollars per year.

Potential Impact of Taxation on the Consumption of SSBs

Several studies address the impact of price on consumption and body weight:

- Body Mass Index (BMI) is difficult to change in the short-term. However, a 10% increase in the price of high calorie foods has been estimated to result in a small reduction of BMI, 0.22 over 2 years and 1 to 2 over 20 to 30 years[xlv].

The city of New York proposed a \$0.01 tax per ounce (33 cents per liter) on SSBs that would increase the price of soft drinks by 17% on average. They estimated that this would reduce consumption by 10%[xlvi].

- The consumption of sugar-sweetened beverages varies a great deal within the population. Those who consume the highest quantities of SSBs are more sensitive to price increases and more likely to reduce their consumption based on price[xlvii]. In a Norwegian study, the increase in the price of soft drinks by 10.8% reduced consumption by nearly 7% in the "lowest" consumption group, by 17% in the "highest" consumption group, and by an average of 9.5% globally. A 27.3% increase of the price was associated with a 17% reduction of consumption among the least significant consumers, a 44% decrease in the group with the highest consumption and an average reduction of 24% in the total population [xlviii].
- In an American study on low income households, a 10% increase in the price of SSBs was associated with an 8% reduction of consumption[xlix].
- A recent study on point of purchase price increases for SSBs found that a price increase of 35% on regular SSBs reduced their consumption by 26%[l]and although reductions were enhanced by an education campaign the education campaign itself seemed to have no independent effects.

A Health Promotion Tax (HPT) would not be an instant solution to the obesity epidemic but would form part of an effective public policy attack on the problem . It would capture the externalities of SSB’s and enhance personal responsibility for weight related societal

costs. Increasing the price of SSB's would reduce consumption and provide needed resources to treat obesity related illness and to promote healthy active living.

Education Alone is Insufficient

Educating the public about the harm of excessive SSB consumption is necessary but is unlikely to be sufficient to trigger substantive change. The experience from tobacco showed that sales dropped directly in relation to rising prices [ii]. Even well funded efforts to persuade the public to consume fruits and vegetables have failed to meaningfully change dietary habits [iii].

The effects of a school based SSB education campaign has been shown to wane over a few years once the program had ended. [iii]. There is good evidence that amongst adults, education alone has a minor effect on soft drink sales compared to the effects of price increases [iv]. In addition these products have become progressively cheaper to produce over the last 30 years, leaving ample profits for industry to invest in marketing.

Budgets for SSB countermarketing are likely to be dwarfed by industry efforts and their sustainability is questionable. These programs are unlikely to succeed unless accompanied by significant price increases in these products. Although the HST is now applied to SSBs it is likely of insufficient magnitude to effect important change given an estimated price elasticity of 0.8 for SSBs [v]. As such, one would expect that a 13% price increase in SSBs would trigger a 10% drop in sales.

An additional HPT on SSBs would increase the price into a significant range and send a signal to the public about the provincial government's concerns regarding the health effects of these products.

Criticisms of a Health Promotion Tax

- **Junk food escapes**
- The literature on which solid foods are significant contributors to obesity is less clear than the association between SSBs and unhealthy weights. It would therefore be quite difficult to define "junk food" whereas "junk drinks" are more easily defined.
- **SSBs are being unfairly targeted as the body treats all calories the same, regardless of source**
- In fact, the source of the calories is the critical element in the body recognizing fullness [vi]. It is very difficult to consume excessive calories by ingesting only fruit and vegetables as the properties of these foods trigger satiety at modest levels of caloric intake. SSBs are particularly well suited to promote weight gain in that they fail to induce fullness and are marketed as beverages, often to accompany calorically dense meals.
- **Diet drinks are excluded**
- There is no conclusive evidence linking diet drinks to the development of unhealthy weights and therefore no reason to impose a tax on these products.

- **Taxing SSBs is “Social Engineering”**
- Social engineering is the term given to efforts to influence popular attitudes and social behaviors on a large scale. It is applicable both to industry efforts to entice consumers to consume SSBs and to government efforts to counter this process. Social engineering for the public good is as acceptable as social engineering for private profit
- **Individual responsibility vs. the “Nanny State”**
- The imposition of a HPT on SSBs facilitates each individual paying the cost for his or her choices. Currently consumers of these products trigger increased health care costs to society at large without them paying any additional costs. A HPT would correct this state and capture the externalities of the products.
- In addition, considerable information asymmetry exists as consumers are inundated with messaging extolling the virtues of these products with little or no information about the negatives. The imposition of a HPT, and the messaging around it, would level the information playing field and facilitate informed freedom of choice. Nothing would be forbidden but consumers would be better informed and a greater proportion of the actual societal cost of the product would be born by the purchaser.
- **Just as with cigarettes and alcohol, those who consume the most will be the least swayed by price**
- SSB consumption should be quite price sensitive (elastic) as unlike cigarettes and alcohol there is likely little serious dependency on SSB's. A Norwegian study has shown that people who consume the highest quantities of sugar-sweetened beverages are more sensitive to price increases and more likely to reduce their consumption based on price^[lviii].
- **An HPT would be regressive taxation as the poor are disproportionately affected.**
- Obesity is regressive and an HPT would be progressive. The poor are disproportionately affected by obesity and they have the fewest resources available to correct unhealthy weights. If the proceeds from the HPT are used to subsidize the cost of good nutritional choices and of physical activity opportunities then lower income groups would disproportionately benefit from such a tax. Although calories from sugary drinks are cheaper than calories from fruits and vegetables, the challenge is to reduce the consumption of excess calories these products provide – not to replace them with more expensive alternatives. Consumers can easily switch to tap water for hydration and avoid not only the HPT but the extra calories as well.
- **HPT will be too low to affect consumption of SSBs**
- Numerous studies have suggested that price increases will curtail consumption.^[lviii]
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- It is reasonable to assume that the beverage industry prices their products knowing as prices increase, sales (and profit) decline. Current prices reflect their estimations of declining sales and profits if beverage prices were to increase beyond current levels.
- Aside from the health benefits the HPT would provide by reducing consumption of SSBs, revenues generated by the tax should be reinvested in obesity prevention measures, further increasing the utility of a HPT.
- Kelly Brownell, Psychology Professor and Director of the Rudd Center for Food and Policy and Obesity at Yale University, has suggested that to observe real changes, we should alter the economic balance between healthy foods and "unhealthy foods". The HPT could finance measures to make healthy foods more accessible.

About the Childhood Obesity Foundation

Founded in 2004 and a Canadian registered charity since 2006, the mission of the Childhood Obesity Foundation is to identify, evaluate and promote best practices in healthy nutrition and physical activity to reduce the prevalence of childhood obesity. The vision of the Childhood Obesity Foundation is children and youth of Canada free of chronic diseases that ensue from obesity. For more details please visit us at: www.childhoodobesityfoundation.ca

[1] The economic model above is presented to allow easy multiplication and determine the required tax rate to have a significant impact on the consumption of SSBs.

[i] Tjepkema M. Measured Obesity: Adult obesity in Canada: Measured height and weight. Statistics Canada Catalogue no. 82-620-MVE2005001

[ii] Shields M. Overweight and obesity among children and youth. Statistics Canada catalogue 82-003

[iii] Singh AS, Mulder C, Twisk JWR. (2008) Tracking of childhood overweight into adulthood: a systematic review of the literature. Obesity Reviews 9. 474-488

[iv] Le Petit C, Berthelot JM. Obesity: a Growing Issue. Statistics Canada catalogue no 82-618-MWE2005003

[v] Zalesin K, Franklin BA, Miller WM, Petersen ED. Impact of Obesity on Cardiovascular Disease – Endocrinology Metabolism Clinics North America- 01-SEP-2008;37(3): 663-84

[vi] Danaei G. et al. (2005) Causes of Cancer in the world: comparative risk assessment of nine behavioural and environmental risk factors. Lancet,; 366, 1786-1793

[vii] Smith SC. Multiple Risk Factors for Cardiovascular Disease and Diabetes Mellitus. (2007) American Journal of Medicine., Vol 120 (3A)

[viii] Appendix B, BC Government Select Standing Committee on Health Report on Childhood Obesity, 2006

- [ix] Peeters A, et al. (2003). Obesity in adulthood and its consequences for life expectancy: A life table analysis. *Annals of Internal Medicine*, 138, 24-32.
- [x] Yack D, McKee M, Lopez A, Novotny. (2005). Improving diet and physical activity: 12 lessons from controlling tobacco smoking. *BMJ*;330; 898-900
- [xi] Barlow S, and the expert committee. (2007). Expert committee recommendations regarding the prevention, assessment and treatment of child and adolescent overweight and obesity: Summary Report. *Pediatrics*, Vol 120, Supplement 4, December 2007, S 164-192.
- [xii] 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):667-675.
- [xiii] Malik VS, Willett WC, Hu FB. Sugar sweetened beverages and BMI in children and adolescents: reanalyses of a meta-analysis. *Am J Clin Nutr*. 2009; 89: 438-439.
- 14 Schulze MB, Manson JE, Ludwig DS, Colditz GA et al. Sugar sweetened beverages, weight gain and incidence of type 2 diabetes in young and middle-aged women. *JAMA*. 2004; 292: 927-934.
- 15 Dhingra R, Sullivan L, Jacques PF, Wang TJ et al. Soft drink consumption and risk of developing cardiometabolic risk factors and the metabolic syndrome in middle-aged adults in the community. *Circulation*. 2007; 116:480-488.
- [xvi] DiMaggio DP, Mattes RD. (2000). Liquid versus solid carbohydrate: effects on food intake and body weight. *International Journal of Obesity*. 24, 794-800.
- [xvii] Soenen S, Westerterp-Plantenga MS. (2007), No differences in satiety or energy intake after high-fructose corn syrup, sucrose or milk preloads. *Am J Clin Nutr*;86;1586-94
- [xviii] Mourao DM, Bressan J, Campbell WW, Mattes RD. (2007). Effects of food form on appetite and energy intake in lean and obese young adults. *International journal of Obesity*. 31;1688-1695
- [xix] Bray G, Champagne CM. (2005). Beyond Energy Balance: there is More to Obesity than Kilocalories. *J Am diet Assoc*. 2005; 105:S17-S23
- [xx] Ludwig DS, Peterson KE, Gortmaker SL. (2001). Relation between consumption of sugar sweetened drinks and childhood obesity: a prospective, observational analysis. *Lancet*, 357, 505-08.
- [xxi] DuBois L, Farmer A, Girard M, Peterson K (2007). Regular sugar sweetened beverage consumption between meals increases risk of overweight among preschool aged children. *Journal of the American Diet Assoc*, 107, 924-934.
- [xxii] Garriguet D. (2008). Beverage consumption of children and teens. *Health Reports*. Vol 19, no 4. December 2008. Statistics Canada.
- [xxiii] Ebbeling CB, Feldman HA, Soganian SK et al. (2006). Effects of decreasing SSB consumption on body weight in adolescents: a randomized controlled pilot study. *Pediatrics*, 117, 673-80.
- [xxiv] Forshee RA, Anderson PA, Storey ML. Sugar-sweetened beverages and body mass index in children and adolescents: a meta-analysis. *Am J Clin Nutr* 2008; 87:1662-71.
- [xxv] Malik VS, Popkin B, Bray GA, Despres JP et al. Sugar Sweetened Beverages, Obesity, Type 2 Diabetes and Cardiovascular Disease Risk. *Circulation*. 2010; 121: 1356-1364.

- [xxvi] CACO survey, April 2010
- [xxvii] Tordoff MG, Alleva AM. Effect of drinking soda sweetened with aspartame or high-fructose corn syrup on food intake and body weight. *American Journal of Clinical Nutrition* 1990; 51(6):963-9.
- [xxviii] Centers for Disease Control and Prevention. State Nutrition, Physical Activity and Obesity (NPAO) Program, Technical Assistance Manual. 2008.
- [xxix] Local Government Actions to Prevent Childhood Obesity. (2009). Report Brief. September 2009. Institute of Medicine.
- [xxx] Ibid Barlow
- [xxxi] Apovian CM (2004). *JAMA* 292:979.
- [xxxii] Block JP, Chandra A, McManus KD, Willett WC. Point of purchase price and education intervention to reduce consumption of sugary soft drinks. *Am J Public Health*. Published online ahead of print June 17, 2010; e1-e7. doi:10.2105/AJPH.2009.175687.
- [xxxiii] Schulze MB, Manson JE, Ludwig DS, Colditz GA, Stampfer MJ, Willett WC, Hu FB. Sugar-sweetened beverages, weight gain, and incidence of type 2 diabetes in young and middle-aged women. *JAMA*. 2004;292(8):927-934.
- [xxxiv] Palmer JR, Boggs DA, Krishnan S, Hu FB, Singer M, Rosenberg L. Sugar-sweetened beverages and incidence of type 2 diabetes mellitus in African American women. *Arch Intern Med*. 2008;168(14):1487-1492.
- [xxxv] Marshall TA, Levy SM, Broffitt B, Warren JJ, Eichenberger-Gilmore JM, Burns TL, Stumbo PJ. Dental caries and beverage consumption in young children. *Pediatrics*. 2003;112(3 Pt 1):e184-e191.
- [xxxvi] Sohn W, Burt BA, Sowers MR. Carbonated soft drinks and dental caries in the primary dentition. *J Dent.Res*. 2006;85(3):262-266.
- [xxxvii] Ordre des hygiénistes dentaires du Québec. Effets néfastes des boissons énergisantes sur votre santé buccodentaire
- [xxxviii] Tucker KL, Morita K, Qiao N, Hannan MT, Cupples LA, Kiel DP. Colas, but not other carbonated beverages, are associated with low bone mineral density in older women: The Framingham Osteoporosis Study. *Am.J Clin.Nutr*. 2006;84(4): 936-942.
- [xxxix] Organisation mondiale de la santé (2005). Prévention des maladies chroniques : un investissement vital. Genève ; OMS : 34 pages.
- [xl] Lynn Parker, Annina Catherine Burns, and Eduardo Sanchez, Editors; Committee on Childhood Obesity Prevention Actions for Local Governments; Institute of Medicine; National Research Council, Local Government Actions to Prevent Childhood Obesity, 2009, 140 pages. <http://www.nap.edu/catalog/12674.html>
- [xli] Woodward-Lopez G, Kao J, Ritchie L. To What extent have sweetened beverages contributed to the obesity epidemic?, *Public Health Nutrition*. 2010
- [xlii] Slater J, Green C, Sevenhuysen G, Edginton B, et al. The growing Canadian energy gap: more the can than the couch? *Public Health Nutrition*. 2009. 12(11), 2216-2224.
- [xliii] www.leg.bc.ca/budgetconsultations
- [xliv] Refreshment Canada, 2010

[xlvi] http://www.economist.com/businessfinance/PrinterFriendly.cfm?story_id=14120903

[xlvi] Sugar-sweetened Beverage Tax Toolkit, New York City Health Department

[xlvii] Sugar-sweetened Beverage Tax Toolkit, New York City Health Department

[xlviii] Gustavsen G. Public Policies and the Demand for Carbonated Soft Drinks: A Censored Quantile Regression Approach. 2005 International Congress, August 23-27, 2005, Copenhagen, Denmark. European Association of Agricultural Economists. 2005. Ref Type: Abstract

[xliv] Lin BH, Guthrie JF. How do low-income households respond to food prices? 2007 Sep. Economic Information Bulletin Number 29-5. 1-4 p.

[i] Block JP, Chandra A, McManus KD, Willett WC. Point of purchase price and education intervention to reduce consumption of sugary soft drinks. Am J Public Health. Published online ahead of print June 17, 2010; e1-e7. doi:10.2105/AJPH.2009.175687.

[ii] Tobacco study

[iii] 5 alive campaign

[iii] Janet James, Peter Thomas, and David Kerr. Preventing childhood obesity: two year follow-up results from the Christchurch obesity prevention programme in schools (CHOPPS), BMJ Oct 2007; 335: 762; doi:10.1136/bmj.39342.571806.55

[liv] Block JP, ibid

[lv] Block JP, ibid.

[vi] Swinburn BA, Caterson I, Seidell JC, James WPT. Diet, nutrition and the prevention of excess weight gain and obesity. Public Health Nutrition: 2004: 7(1A), 123-146.

[vii] Gustavsen G. Public Policies and the Demand for Carbonated Soft Drinks: A Censored Quantile Regression Approach. 2005 International Congress, August 23-27, 2005, Copenhagen, Denmark. European Association of Agricultural Economists. 2005. Ref Type: Abstract

[viii] Yen S, Lin B, Smallwood D, et al. "Demand for Non-alcoholic Beverages: the Case of Low-income Households." Agribusiness, 20(3): 309–321, July 2004. Robert Woods Johnson Foundation