

Alcohol Consumption in British Columbia and Canada: A Case for Liquor Taxes that Reduce Harm

Tim Stockwell, Basia Pakula, Scott Macdonald, Jinhui Zhao, Dan Reist, Gerald Thomas and Ajay Puri (Centre for Addictions Research of BC), Jane Buxton and Andrew Tu (BC Centre for Disease Control), Cameron Duff (Research and Youth, Vancouver Coastal Health)

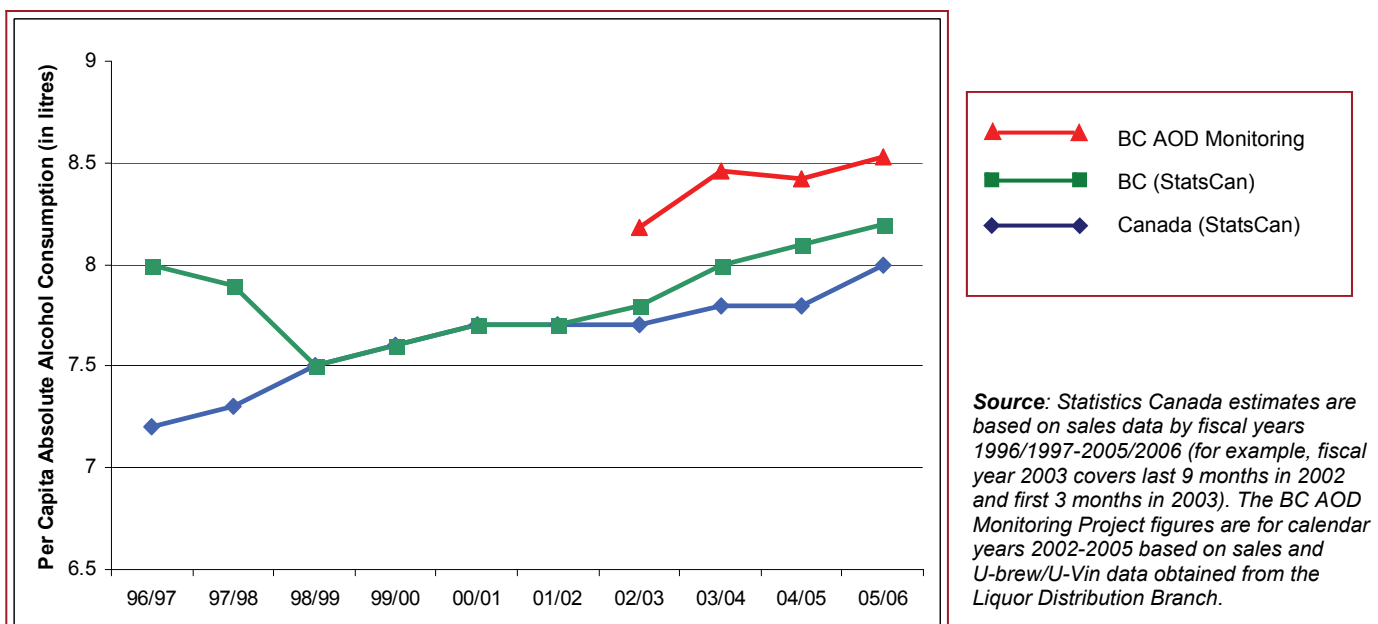
Bulletin 3 - December 2007

Overview

- Alcohol consumption in Canada has increased by over 11% in the past decade.
- Per adult absolute alcohol consumption in British Columbia has increased from 8.18 litres in 2002 to 8.53 litres in 2005.
- Since 2002 the numbers of hospitalizations and neuro-psychiatric deaths attributable to alcohol in BC have increased by 11.7% and 18%, respectively.
- In 2005 there were an estimated 25,194 alcohol-related injuries and illnesses in BC requiring hospitalization compared with 4,817 related to illicit drug use.
- There is extensive scientific evidence to support the use of pricing and taxation strategies as effective means of reducing alcohol consumption and related harms.
- In British Columbia such strategies are readily achievable because the government alcohol monopoly directly controls liquor prices.
- 65% of the coolers now sold in BC contain 7% alcohol content and have an average price of \$5.41 per litre, compared with \$8.07 for coolers with a 5-5.9% alcohol content.
- We recommend that liquor prices more closely reflect alcohol content and that these are regularly updated with the cost of living.
- Beers and coolers with low alcohol content should have significantly lower price 'mark-ups' applied to give manufacturers, retailers and consumers incentives to produce, market and consume these products.
- Minimum prices also need to be set and updated regularly to ensure there are no cheap high strength products available.
- We also recommend that a "nickel a drink" tax be introduced to generate \$95.7 million per annum for treatment and prevention programs.
- Detailed results are available at the BC Alcohol and Other Drug Monitoring website (www.AODmonitoring.ca)

Revised January 29, 2008

Figure 1: Per adult absolute alcohol consumption in BC and Canada, fiscal years 1996/7-2005/6



Introduction

In recent years, per adult¹ consumption of alcohol has been rising steadily in British Columbia (BC) and in Canada as a whole. In Canada, alcohol sales per adult (in litres of absolute alcohol) have increased by over 11% in the past decade and by 5.1% (from 7.7 to 8.2) in BC in the 2003-2006 fiscal period (Statistics Canada Online Reports²). More complete figures from the BC Alcohol and Other Drug (AOD) Monitoring Project suggest that the actual per adult consumption of absolute alcohol (in litres) in BC has increased from 8.18 in 2002 to 8.53 in 2005 (see *Figure 1*). An analysis of the 2004 Canadian Addiction Survey found that a substantial proportion of alcohol is consumed in excess of Canadian guidelines, placing BC drinkers at elevated risk for short and/or long-term harm (Stockwell *et al*, in press; see also Stockwell *et al*, 2005).

Alcohol consumption and hazardous drinking are highly relevant from a public health perspective – research has shown a strong positive correlation between drinking levels and patterns of alcohol use and alcohol related harm (e.g., see Babor *et al*, 2003). In fact, BC has seen an increase in the number of alcohol-related deaths, injuries and illnesses in the province and in most individual health authorities (see BC

AOD Monitoring Project website³). It follows that alcohol consumption is placing an increasingly heavy social and economic burden on the province. The total estimated costs of alcohol abuse in BC are at \$2.2 billion per annum, considerably higher than those associated with illicit substance use (Rehm *et al*, 2006).

In this bulletin, new data are presented on patterns, distribution and trends in alcohol consumption and related harm in British Columbia from the BC AOD Monitoring Project. Analyses are provided on the extent to which BC liquor store prices provide incentives to consumers for low risk consumption by examining drink prices for different strengths of beer and coolers. Independent reviews of the international literature have identified pricing and taxation strategies as among the most effective policies available to government to combat alcohol abuse (e.g., Babor *et al*, 2003; Toumbourou *et al*, 2007). A CARBC report (Stockwell *et al*, 2006) on pricing and taxation has identified a number of broad approaches for using alcohol taxation strategies to reduce harm. These are discussed in light of the new data from the BC AOD Monitoring Project, with a goal to reduce alcohol consumption and related harm in the province.

Methods

Alcohol Consumption Data

Alcohol consumption figures were calculated using official BC alcohol sales and U-Brew/U-Vin data obtained from the Ministry of Public Safety and Solicitor General Liquor Distribution Branch (LDB). Population data were obtained from BC Statistics (2006) and included population estimates (1986-2005) and projections (2006-2031) by regional districts. Socio-economic variables for each district were obtained from the BC Statistics Website.⁴

The sales data were collapsed into 28 BC regional districts and into 4 or 5 week periods for the fiscal years 2001-2005; they were also broken down by type of beverage (beer, ciders/coolers, wines and spirits), with groupings based on the percent of absolute alcohol for each product. The U-Brew/U-Vin data were obtained by BC municipalities for years 2002-2005. The volume of absolute alcohol from U-Brew/U-Vin production was calculated for BC regional districts by calendar year. The Canadian Addiction Survey (Health Canada, 2004) was used to estimate per adult consumption from home-brew production.

Morbidity and Mortality Data

Alcohol, illicit drug and tobacco related mortality and morbidity data for each substance were tabulated between

regions and over time. Mortality data by BC health authorities, with age breakdowns and sex for ICD-10 codes, were received from the BC Vital Statistics Agency by calendar year. Hospital separation data were requested from the BC Ministry of Health for the same ICD-10 codes. For conditions known to be only partly attributable to the use of these various substances, standard attributable fractions were applied following those employed by Rehm *et al* (2006). All rates were standardized by age and sex using the 2001 BC population as the standard. Permission to share results was obtained from the BC Ministry of Health Data Steward and the BC Provincial Health Officer.

Market Share and Price Data

Market share and price data were calculated based on BC alcohol consumption data and the BC alcohol beverage products data obtained from the LDB. Beer and cooler products were classified into different strength categories. Analyses estimated percentages of beers and coolers in the market by product bands, mean alcohol content in litres of absolute alcohol, mean dollars per standard drink and mean dollars per litre of drink for each strength category.

¹Throughout this report, per adult alcohol consumption refers to alcohol consumption of persons aged 15 and over.

²<http://www.statcan.ca/bsolc/english/bsolc?catno=63-202-XandCHROPG=1>

³<http://www.AODmonitoring.ca>

⁴<http://www.bcstats.gov.bc.ca/>

Findings

Statistics Canada data on sales of alcoholic beverages (in litres of absolute alcohol) show that per adult consumption of alcohol has increased by over 11% in Canada in the past decade (from 7.2 in 1996/1997 to 8.0 in 2005/2006), and by 5.1% (from 7.7 to 8.2) in BC in the fiscal years 2003-2006 (where fiscal year 2003, for example, covers last 9 months in 2002 and first 3 months in 2003) (see Statistics Canada Online Reports⁵). Recent figures from the BC AOD Monitoring Project suggest that the actual per adult consumption of absolute alcohol (in litres) in BC has increased from 8.18 in 2002 to 8.53 in 2005 (see *Figure 1*). The Monitoring Project provides more complete figures since it includes data on U-Brew and U-Vin production. In addition, the factors used to make absolute alcohol conversions are more accurate as they use empirically derived strength categories for each product type rather than averages used by Statistics Canada. A comparison of the two datasets indicates that Statistics Canada figures underestimate consumption, partially due to the conservative conversion factors used. The Statistics Canada conversion factors are 5% for coolers and 11.5% for wines, however, the actual average percent of absolute alcohol in coolers and wines is 6.72% and 12.2%, respectively (see Macdonald *et al*, 2007).

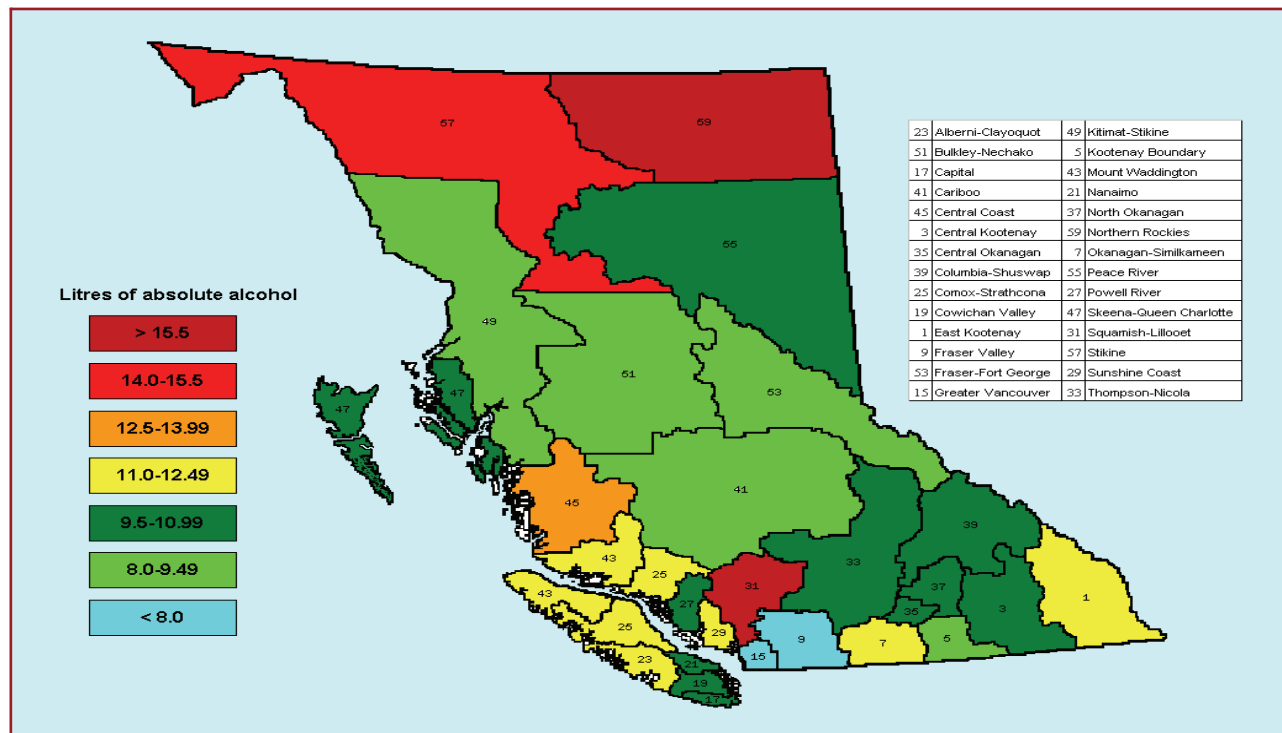
The recent figures from the BC Monitoring Project are more complete than Statistics Canada data; however, they likely still underestimate consumption. Additional consumption from home-brew production was estimated from the 2004

CAS data at 4.3% of total consumption. The home-brew figure is likely conservative because self-reported data underestimate actual consumption (Stockwell *et al*, 2004). Estimates from other sources such as illegal sales and cross-border shopping will be made in the future.

While the total per adult absolute alcohol consumption increased across most BC regions and the province as a whole, important regional differences are observed. *Figure 2* shows consumption of alcohol across the 28 BC regional districts in 2005. The lowest levels (under 8 litres of absolute alcohol per adult) are noted in the Fraser Valley and the Greater Vancouver districts. The highest levels of alcohol consumption are noted in the northern regions and the interior district of Squamish/Lillooet, consistently above 14 litres of absolute alcohol per adult. U-Brew/U-Vin production accounted for 4% of total consumption in 2004.

Importantly, an analysis of the CAS data showed that a substantial proportion of alcohol is consumed in excess of Canadian guidelines: 21.5% of BC drinkers are at elevated risk for short-term harm from their drinking, and 54% of all alcohol consumption in BC places the drinker at elevated risk for short- and/or long-term harm (Stockwell *et al*, in press; 2005). A comparison of alcohol consumption with the mortality and morbidity data suggests that the higher rates and more risky patterns of alcohol consumption in BC are mirrored by higher rates of alcohol-related problems in the

Figure 2: Per adult absolute alcohol consumption in BC regional districts in 2005



Source: Liquor Distribution Branch.

Note: Data analysed by the Centre for Addictions Research of BC for the BC AOD Monitoring Project

⁵ <http://www.statcan.ca/bsolc/english/bsolc?catno=63-202-XandCHROPG=1>

province. Since 2002 the numbers of hospitalizations and neuro-psychiatric conditions attributable to alcohol in BC have increased by 11.7% and 18%, respectively. Furthermore, in the period between 2001 and 2005, the age and sex standardized mortality rate of neuro-psychiatric conditions 100% attributable to alcohol has risen by 13.8% (Buxton *et al*, 2007).

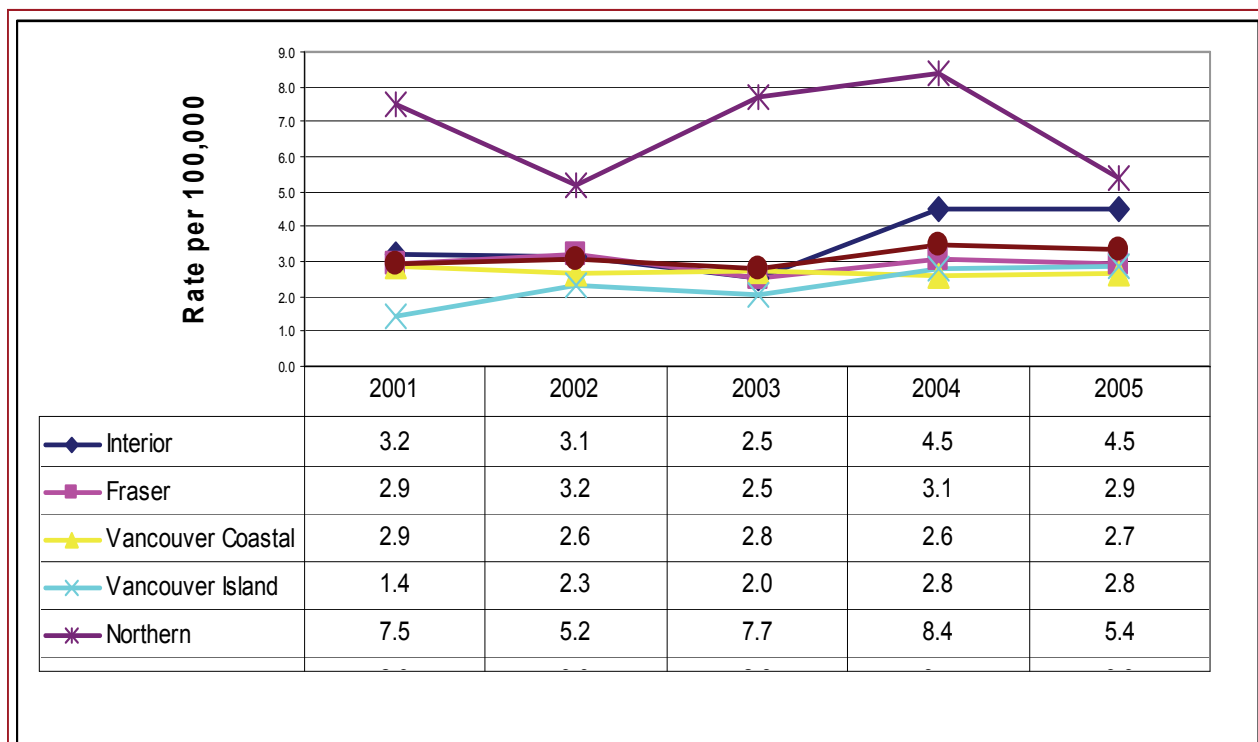
Figure 3 shows age and sex standardized mortality rates of neuro-psychiatric conditions 100% attributable to alcohol by health authority for the 2001-2005 period. Alcohol related deaths are highest among residents in the Northern and Interior health authorities. A similar pattern is noted for hospitalization rates: in the years 2002-2005, the Northern health authority had the highest age and sex standardized rate of hospital discharges attributable to alcohol followed by the Interior health authority (see Figure 4). To put this data in perspective with other substances in BC, in 2005, there were 25,194 alcohol related injuries and illnesses requiring hospitalization compared with 27,622 related to tobacco and 4,817 related to illicit drug use. Hospital admissions attributable to alcohol are approximately five times greater than those attributable to illicit drugs (Buxton *et al*, 2007). In general, the total economic costs of alcohol consumption are significantly higher than those estimated for illicit drugs (2.2 billion per annum for alcohol compared with 1.5 billion for illicit drugs) (Rehm *et al*, 2006).

Alcohol continues to be an important factor in illicit drug use in the province. A pilot study of club drug users in Vancouver

and Victoria (n=84) conducted as part of the Monitoring Project showed that almost 59% of males and 52% of females in the sample reported exceeding the low-risk guidelines for alcohol use sometime over the previous weekend. Risky substance combinations were also identified, with 43% of the sample reporting simultaneous use of both alcohol and marijuana on the previous weekend and 14% reporting simultaneous use of alcohol and cocaine (Duff *et al*, 2007).

Analyses were conducted of alcohol sales data obtained from the LDB for the financial year 2005/2006 to examine existing incentive structures to produce, sell and drink products with higher versus lower alcohol content. The results show that the incentives currently provided to consumers in BC favour high alcohol content beverages. Table 1 assesses market shares and retail prices per unit of alcohol for different strength beers. The unit of alcohol used here is a Canadian standard drink (13.6g of alcohol or 17.24ml of ethanol, roughly equivalent to one bottle of beer; a 5oz glass of wine or a 1.5oz shot of liquor). What is striking is that retail prices per unit of alcohol are highest for the lowest alcohol content beers. When price per litre of beverage regardless of alcohol content is examined, the low alcohol content beers are still slightly more expensive than regular strength beers. A similar analysis for coolers presented in Table 2 yields even more striking incentives in favour of higher versus lower alcohol content coolers. The market share of low strength beers and coolers is extremely low (under 1%).

Figure 3: Age and sex standardized mortality rates of neuro-psychiatric conditions 100% attributable to alcohol by Health Authority, 2001-2005



Source: BC Vital Statistics.

Note: Data analyzed by the BC Centre for Disease Control for the BC AOD Monitoring Project

Table 1: Market share and price incentives for consumers to drink different strength beers in BC, 2005/6*

Strength	Percentage of beer market	Number of brands	Mean alcohol content	Mean \$ per standard drink	Mean \$ per litre of drink
<4.0%	0.22	3	3.70	2.57	5.57
4.0-4.9%	14.38	95	4.49	2.18	5.68
5.0-5.9%	80.75	348	5.11	1.81	5.39
6.0-6.9%	2.60	42	6.26	1.81	6.62
7.0+%	2.05	33	8.14	1.50	7.12
Total	100	521	5.27	1.87	5.65

* Based on an analysis of product prices as of June 2007 (estimates corrected as of January 2008)

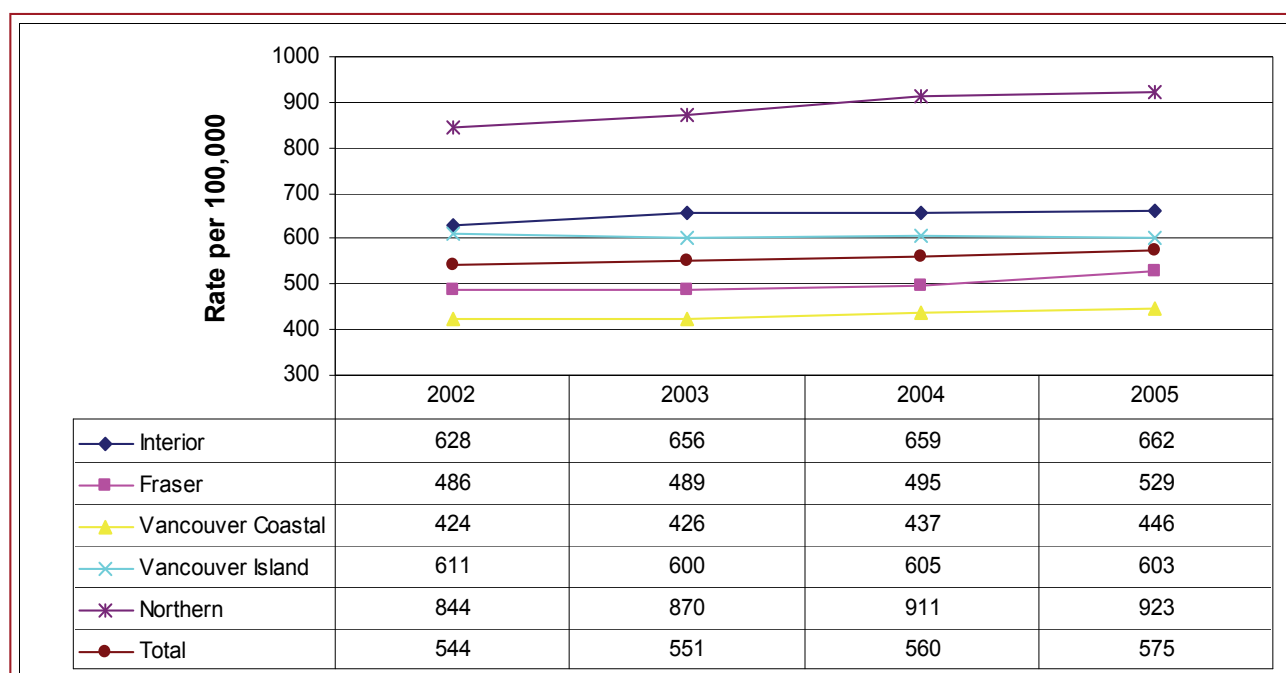
Table 2: Market share and price incentives for consumers to choose different strength coolers in BC, 2005/6*

Strength	Percentage of cooler market	Number of brands	Mean alcohol content	Mean \$ per standard drink	Mean \$ per litre of drink
4.0-4.9%**	0.89	Unknown	Unknown	Unknown	Unknown
5.0-5.9%	12.78	35	5.06	2.74	8.07
6.0-6.9%	9.30	14	6.10	1.94	6.87
7.0%	77.03	91	7.00	1.33	5.41
Total	100	140	6.43	1.74	6.22

* Based on an analysis of product prices as of June 2007 (estimates corrected as of January 2008)

** Data on market share but not product prices was available for this small category of coolers

Figure 4: Age and sex standardized rates of hospital discharges attributable to alcohol by health authority, 2002-2005



Source: Ministry of Health.

Note: Data analyzed by the BC Centre for Disease Control for the BC AOD Monitoring Project

Discussion

Corresponding to the changes in per adult alcohol consumption, there have been increases in alcohol related deaths and hospitalizations in BC as a whole and in most individual health authorities. Although the highest rates of these harms are found in the North of the province, in terms of overall numbers, many more people living in the Lower Mainland are affected. Furthermore, high levels of risky patterns of drinking are observed, and include combinational use of alcohol with other substances as well as consumption in excess of Canadian drinking guidelines. The current price incentives provided to manufacturers, retailers and consumers in favour of products with higher alcohol content are particularly troubling. While the price information presented here relates specifically to beers and coolers, similar issues apply to the prices of different strength wines and spirits.

There is overwhelming scientific evidence that the goal of reducing alcohol consumption and related harm can be achieved with the use of pricing and taxation strategies. Independent reviews of the international literature have identified pricing and taxation as among the most effective policies available to government to combat alcohol abuse (Babor *et al.*, 2003; Toumbourou *et al.*, 2007). In Canada, a CARBC report (Stockwell *et al.*, 2006) on pricing and taxation originally commissioned by Health Canada and the Canadian Centre on Substance Abuse identified three broad approaches for using alcohol taxation strategies to reduce harm:

(1) taxing the alcohol content of drinks; (2) linking tax rates to the cost of living; and (3) raising small additional taxes to fund treatment and prevention programs.

There is strong evidence from other countries for the effectiveness of such tax changes. A relevant example is Australia, with the major success of low to mid-strength beers (2.5% to 3.8% alcohol by volume), after tax incentives to encourage the production of these products were introduced in the late 1980s (Stockwell & Crosbie, 2001). The market share of these beverages in terms of value reached 40% of the total Australian beer market by the late 1990s. These products are also widely used at large-scale sporting venues as a way of reducing problems with alcohol-related violence. In addition, excise tax rates in Australia are now updated quarterly in line with Consumer Price Index (CPI). It is highly likely that these changes partly account for a reduction in deaths caused by alcohol consumption, paralleled by a decline in Australian per capita consumption in the 1990s (Chikritzhs *et al.*, 2003). In the small jurisdiction of the Northern Territory, a five cents per standard drink tax on higher alcohol content drinks was shown to save over \$124 million in health care and policing costs over a four-year period (Stockwell *et al.*, 2001). A follow-up study employing rigorous comparisons with neighbouring states of Western Australia and Queensland confirmed the earlier findings but, sadly, also showed an increase in alcohol caused deaths following the

abolition of the 5 cent a drink tax (Chikritzhs *et al.*, 2005). Unlike Canadian jurisdictions, Australian states and territories are no longer able to raise taxes on alcohol, tobacco or fuel (Stockwell & Crosbie, 2001).

Recommendations

Similar strategies to those implemented in Australia are urgently needed in BC to address the growing harms attributable to alcohol. This would also aid in decreasing the economic burden of alcohol consumption in the province. Based on the available scientific evidence, the following strategies are recommended, with a goal of reducing alcohol consumption and related harm in British Columbia. While the recommendations are based on data specific to BC, we suggest that these strategies would also be relevant to other Canadian jurisdictions.

1. Provide incentives for the production, sale and consumption of lower alcohol content products

In order to remedy the currently low prices for beverages with higher alcohol content, we recommend an adjustment of the relevant prices or “mark-ups” according to bands of alcoholic strength. We recommend a retail price advantage per litre of beverage of at least one dollar for products with a strength below 4.0% compared with higher strength beers. Using available data from the LDB, we estimate this would result in a loss of \$7.8 million revenue. This amount would be more than compensated for if recommendation 3 below was also implemented. A new CARBC study recently found that a sample of beer drinking students were unable to tell the difference between a 3.8% and a 5.3% beer and enjoyed themselves equally in a simulated social drinking situation (Segal *et al.*, 2007).

2. Ensure that alcohol prices keep pace with the cost of living

While the sales tax structure in Canada (GST and PST) ensures that government tax revenues will increase with rising production costs and consumer prices, this is not necessarily the case with the standard mark-ups used to determine final retail prices in BC liquor stores. We also recommend, therefore, that standard CPI adjustments are made to all mark-ups at least twice a year in order to prevent alcoholic beverages from becoming cheaper in real terms over time.

3. Create a “nickel a drink” harm reduction levy to fund new addiction treatment and prevention programs

The Senate report on mental health and addiction by Kirby-Keon (2006) recommended an additional five-cent per standard drink on alcoholic beverages with strengths of 4% or

more by volume in order to raise much needed funds for the overstretched mental health and addictions treatment system in Canada. Such “hypothecated taxes” or special levies have been applied on alcohol in many jurisdictions in order to raise earmarked funds for prevention and treatment purposes. In Canada, Quebec raises funds for prevention and public awareness programs from a small alcohol tax while similar schemes have been implemented in Washington State and New Zealand for a number of years. While raising taxes on alcohol is not usually popular according to public opinion polls, when these funds are earmarked for areas of high need directly relevant to the tax, these tend to be well received (Stockwell *et al*, 2006). In British Columbia, a five-cent increase in taxation per standard drink for beers and coolers with a strength of 4% or more, wines greater than 11% and for all liquor, would generate additional revenue of \$95.7 million in 2005/6 prices. The need for improved resources for the addiction treatment system and for prevention programs is widely accepted in BC and it can be expected that such a tax would be well received. We recommend that a new “nickel a drink” tax on all beers and coolers with a strength of 4% or greater, wines greater than 11%, and for all liquor, be

introduced to generate additional revenue for treatment and prevention programs. Another model to consider would be a smaller tax combined with similar levies on tobacco products and on gambling.

The above recommendations are all consistent with those contained in a) a new Canadian alcohol policy document prepared by a National Alcohol Strategy Working Group (2007) and published by Health Canada; b) a recent BC Ministry of Health (2007) policy document concerned with strategies to prevent harmful substance use; and c) the Kirby-Keon Senate report into mental health and addiction in Canada. It is also noteworthy that two of the very few low alcohol beers produced in Canada with a strength between 2.5% and 4% are made in BC (Pacific Light and Doc Hadfield’s Pale Ale). In this way, BC has an opportunity to take a national lead in responding effectively to the problems of harmful substance use and addiction, generate additional resources for much needed treatment and prevention programs, reduce needless premature death, injury and illness and promote local industry while, in all likelihood, carrying public opinion. It is hard to imagine a policy to promote the public good with a stronger pedigree.

References

- BC Statistics. (2006). Population Projections – BC and Regional. Retrieved April 20, 2007 from <http://www.bcstats.gov.bc.ca/data/pop/pop/popproj.asp#admin>
- BC Ministry of Health. (2006). Following the Evidence: Preventing harms from substance use in British Columbia. Government of British Columbia, Victoria, BC, Canada. Retrieved November 19, 2007 from http://www.carbc.ubc.ca/pubs/FollowingEvidence_web.pdf
- Babor, T., Caetano, R., Caswell, S., Edwards, G., Giesbriecht, N., Hill, L., Holder, H., Homel, R., Osterberg, E., Rehm, J., Room, R., & Rossow, I. (2003). *Alcohol: No ordinary commodity – research and public policy*. Oxford: Oxford University Press.
- Buxton, J., Tu, A., & Stockwell, T. (2007). Tracking Trends of Alcohol and Other Substance Use through Mortality and Morbidity Data. In *Mapping Substance Use in BC and Canada: A Report of the BC Pilot Alcohol and Other Drug Monitoring Project* (pp. 175-196). Prepared by the Centre for Addictions Research of BC and the BC Mental Health and Addictions Research Network. November 2007.
- Chikritzhs, T., Catalano, P., Stockwell T., Donath S., Ngo H., Young D., & Matthews S. (2003). Australian Alcohol Indicators, 1990-2001: Pattern of alcohol use and related harms for Australian states and territories. National Drug Research Institute, Curtin University of Technology, Perth, West Australia.
- Chikritzhs, T., Stockwell, T., & Pascal, R. (2005). The impact of the Northern Territory’s living with alcohol program, 1992-2002: revisiting the evaluation. *Addiction*, 100, 1625-1636.
- Duff, C., Michelow, W., Chow, C., & Ivsins, A. (2007). The Canadian Recreational Drug Use Survey and the Canadian Adult Sentinel Survey of Injection Drug Use. In *Mapping Substance Use in BC and Canada: A Report of the BC Pilot Alcohol and Other Drug Monitoring Project* (pp. 175-196). Prepared by the Centre for Addictions Research of BC and the BC Mental Health and Addictions Research Network. November 2007.
- Health Canada. (2004). *Canadian Addiction Survey: A national survey of Canadians’ use of alcohol and other drugs: Prevalence of use and related harms*. Ottawa: Canadian Executive Council on Addictions.
- Kirby, The Honourable Michael J. . Kirby, Chair & The Honourable Wilfred Joseph Keon, Deputy Chair. (2006). *Out of the Shadows at Last: Highlights and Recommendations: Final Report of the Standing Senate Committee on Social Affairs, Science and Technology*. Ottawa: Senate of Canada, May 2006.
- Macdonald, S., Pakula, B., Zhao, J., & Stockwell, T. (2007). Per Adult Consumption of Alcohol in British Columbia: 2002 to 2005. In *Mapping Substance Use in BC and Canada: A Report of the BC Pilot Alcohol and Other Drug Monitoring*

References (continued)

- (Continued) *Project (pp. 197-220)*. Prepared by the Centre for Addictions Research of BC and the BC Mental Health and Addictions Research Network.
- National Alcohol Strategy Working Group. (2007). Towards a culture of moderation: Recommendations for a National Alcohol Strategy. Ottawa: Health Canada, 2007.
- Rehm, J., Baliunas, D., Brochu, S., Fischer, B., Gnam, W., Patra, J., Popova, S., Sarnocinska-Hart, A., & Taylor, B. (2006). *The Costs of Substance Abuse in Canada 2002*. Ottawa, ON: Canadian Centre on Substance Abuse.
- Rehm, J., Baliunas, D., Brochu, S., Fischer, B., Gnam, W., Patra, J., Popova, S., Sarnocinska-Hart, A., & Taylor, B. (2006). *The Costs of Substance Abuse in Canada 2002*. Ottawa, ON: Canadian Centre on Substance Abuse.
- Segal, D., Stockwell, T., & Prince, M. (2007). Low Alcohol Alternatives: A Promising Strategy For Reducing Alcohol Related Harm. Centre for Addictions Research of BC, University of Victoria, British Columbia, Canada.
- Stockwell, T., Chikritzhs, T., Hendrie, D., Fordham, R., Ying, F., Phillips, M., Cronin, J., & O'Reilly, B. (2001). The public health and safety benefits of the Northern Territory's Living with Alcohol program. *Drug and Alcohol Review*, 20(2), 167-180.
- Stockwell, T., & Crosbie, D. (2001). Supply and demand for alcohol in Australia: relationships between industry structures, regulation and the marketplace. *International Journal of Drug Policy*, 12(2), 139-152.
- Stockwell, T., Donath, S., Cooper-Stanbury, M., Catalano, P., & Mateo, C. (2004). Under-reporting of alcohol consumption in household surveys: a comparison of quantity-frequency, graduated-frequency and recent recall. *Addiction*, 99(8), 1024-1033.
- Stockwell, T., Sturge, J., & Macdonald, S. (2005). Patterns of drinking in British Columbia: an analysis of the 2004 Canadian Addictions Survey. CARBC statistical bulletin #1, University of Victoria, British Columbia.
- Stockwell, T., Leng, J., & Sturge, J. (2006). Alcohol pricing and public health in Canada: issues and opportunities. CARBC Technical report, Vancouver, BC.
- Stockwell, T., Buxton, J., Chow, C., Cohen, I., Corrado, R., Duff, C., Ivsins, I., Kerr, T., Marsh, D., Macdonald, S., Michelow, W., Nicholson, D., Pakula, B., Puri, A., Rehm, J., Richard, K., Saewyc, E., Sturge, J., Zhao, J., & Brown, D. (2007). *Mapping Substance Use in BC and Canada: A Report of the BC Pilot Alcohol and Other Drug Monitoring Project*. Prepared by the Centre for Addictions Research of BC and the BC Mental Health and Addictions Research Network.
- Stockwell, T., Zhao, J., & Thomas, G. (In press). Should alcohol policies aim to reduce total alcohol consumption? New analyses of Canadian drinking patterns. *Addiction Research and Theory*.
- Toumbourou, J.W., Stockwell, T., Neighbours, C., Marlatt, G.A., Sturge, J., & Rehm, J. (2007). Interventions to reduce harm associated with adolescent substance use. *The Lancet*, 369(9570), 1391-1401.

ACKNOWLEDGEMENTS

We are indebted to BC Mental Health and Addiction Services (BCMHAS), Health Canada, the BC Mental Health and Addictions Research Network, Vancouver Island Health Authority, Vancouver Coastal Health, the BC Ministry of Health, Fraser Health Authority and the BC Ministry of Public Safety and Solicitor General for their financial support of the BC Alcohol and Other Drug Monitoring Project which has provided the data for this report. The opinions and recommendations included here do not necessarily represent the views of Health Canada, BC Mental Health and Addiction Services or the other funding bodies.

Recommended citation:

Stockwell, T., Pakula, B., Macdonald, S., Buxton, J., Zhao, J., Tu, A., Reist, D., Thomas, G., Puri, A., & Duff, C. (2007). Alcohol Consumption in British Columbia and Canada: A Case for Liquor Taxes that Reduce Harm. CARBC statistical bulletin #3, University of Victoria, British Columbia.