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Alcohol labelling as a means of promoting public health and safety in Canada: A Rapid Review



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WARNING: Cannabis can be addictive. Up to half of people who use cannabis on a daily basis have work, social or health problems from using cannabis.

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WARNING: Regular use of cannabis can increase the risk of psychosis and schizophrenia. Young people are especially at risk.

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WARNING: Do not use if pregnant or breastfeeding. Using cannabis during pregnancy may harm your baby and result in low birth weight.

Health Canada

The potential of alcohol labelling to promote public health and safety in Canada: A Rapid Review

A report originally prepared for the Alcohol Policy Unit, Health Canada by

Tim Stockwell¹, Thomas Greenfield², David Hammond³, Erin Hobin⁴, Paula O'Brien⁵, Renee O'Leary⁶, Catherine Paradis⁷, Adam Sherk⁸, Kate Vallance⁹ and Ashley Wettlaufer¹⁰

¹ Scientist, Canadian Institute for Substance Use Research and Emeritus Professor, Department of Psychology, University of Victoria, BC, Canada

² Senior Scientist and Scientific Director, Alcohol Research Group, Public Health Institute, Emeryville California, USA

³ Professor, School of Public Health Sciences, University of Waterloo, ON

⁴ Senior Scientist, Public Health Ontario, ON

⁵ Associate Professor, Director of the Health Law and Ethics Network, Melbourne Law School, Australia

⁶ Principal, 21st Century Literature Reviews; Research Affiliate, Canadian Institute for Substance Use Research, University of Victoria, BC

⁷ Interim Associate Director of Research, Canadian Centre on Substance Use and Addiction, Ottawa, ON

⁸ Scientist, Canadian Institute for Substance Use Research, University of Victoria, BC

⁹ Research Associate, Canadian Institute for Substance Use Research, University of Victoria, BC

¹⁰ Research Methods Specialist, Centre for Addiction and Mental Health, ON

**Canadian Institute for Substance Use Research, University of Victoria
February, 2019**

NB An updated version of this report is planned for late 2023 due to national and international interest from governments and public health bodies in alcohol labelling.

Executive Summary

Unlike tobacco, cannabis and packaged foods, there is currently no requirement in Canada to provide alcohol consumers with information about the potential health and safety consequences of its use. This report is intended to inform discussions and future decisions about whether and how to label alcohol containers with information both about potential health risks and strategies to reduce those risks. We have prepared a "rapid review" of Canadian and international literature to address a series of relevant questions regarding whether alcohol warnings need to be introduced in Canada. This involved identifying recent comprehensive and systematic literature reviews as well as key studies identified in these reviews and by an expert panel.

1. How do alcohol labelling practices in Canada compare with those in other countries?

While there is no federal requirement for alcohol warning labels, since 1991 both the Yukon (pregnancy warning) and Northwest Territories (pregnancy and impaired driving warnings) have required post-manufacture labels to be added to all products sold in their government liquor stores. The WHO Global Information System on Alcohol indicates that 47 countries require some kind of health warning out of the 194 countries it includes. Of these, 41 warned about underage drinking, 31 about impaired driving and 27 about drinking alcohol when pregnant. Examples of the warning messages used can be found in the Appendix. No country to date has introduced warnings accompanied by graphic images. Only South Korea so far requires labels warning of potential cancer risks, specifically cancers of the liver, oesophagus and colon. However, Ireland recently passed legislation for alcohol warning labels that will include a cancer message. Also, a recent attempt to study the potential effectiveness of cancer warnings in a real-world experiment was closed down by perceived legal threats from the Canadian alcohol industry.

In relation to ingredient labelling, Canada and 118 other countries require alcohol to be labelled with its percentage alcohol content by volume (ABV). Eight countries now require labels stating the quantity of alcohol contained in terms of either country specific "standard drinks" or "units" of alcohol in order to help people follow low-risk drinking guidelines (LRDGs). As many as 41 also require labelling of other ingredients, notably calorie content. In Canada, drinkers on average receive 250 calories per day from their alcohol consumption.

2. How do the risks of alcohol compare to those from products with mandatory health warnings?

On several key indicators, alcohol use in Canada contributes more harm and economic costs than do either tobacco or cannabis, both of which have strict labelling requirements. The Canadian Substance Use and Harms study estimated that alcohol contributed more (38.1%) to the total \$38.4 billion costs of substance use in 2014 than tobacco (31.2%) and cannabis (7.3%). Alcohol contributed many more deaths (14,800) and hospital admissions (88,000) in

2014 than cannabis (851 and 4000 respectively), though less than tobacco (48,000 and 146,000 respectively). Alcohol contributed to more productive years of life lost in Canada in 2014 (139,000 years) compared with tobacco (105,000) and cannabis (8,000). Expert international reviews of the comparative risks of different substances have ranked alcohol first and cannabis much lower. In a study comparing typical doses of different substances in the population (including nicotine and cannabis) with lethal doses identified from animal studies, only alcohol was categorized as "high risk".

3. How aware are Canadians of alcohol's health risks, low-risk drinking guidelines and the concept of a standard drink?

Studies indicate that less than one third Canadians are aware of serious health risks from alcohol (such as cancer), of LRDGs or the concept of a standard drink. One exception is the population of Québec where Éduc'alcool, an industry-funded education and prevention agency, has run multiple awareness raising campaigns resulting in 80% of men and women being aware of LRDGs. Another exception is Whitehorse, Yukon where cancer warning and LRDG labels were experimentally introduced for one month in late 2017. This resulted in increased knowledge of the alcohol-related cancer risks among liquor store customers to more than 40% and increases in awareness of drinking guidelines to 67%.

4. What are best practices for health warnings on alcohol and other products?

International best practices exist for providing health and safety information regarding food, tobacco, pharmaceuticals and alcohol products. Studies indicate that effective label messages must be large enough to be legible for consumers of all ages, be attributed to a credible authority, be colourful and concise, contain pictorial images or icons and be varied over time. On the basis of Canadian and international studies, the Northern Canadian Alcohol Labelling Study identified the key elements of alcohol warnings to be: (i) warnings of serious health risks, especially those where there was no/little public awareness (ii) national LRDGs and (iii) standard drink information to support compliance with the LRDGs. However, while pictorial icons accompanied these messages, graphic images were not acceptable to the liquor authority in the Yukon, where the labels were experimentally introduced. By law, it was necessary to present the messages both in English and French.

Other guidance from international reviews and studies is that "serious" health messages are more effective than those which use humour, and messages with advice on how to use a product safely are more effective than those advising against any use at all. The international literature also presents examples of the ineffectiveness of voluntary labelling initiatives by manufacturers, in terms of degree of compliance, coverage and the effectiveness of the selected messages.

5. What is the evidence for the effectiveness of alcohol warning labels for various outcomes?

The relevant literature has grown considerably in the past decade and now focuses on a variety of outcomes. For alcohol consumers, these outcomes include attention to the label, comprehension, recall, behavioural intentions and drinking behaviour. More general outcomes include the consumers “right to know”, a relevant consideration given the established Canadian legal precedent requiring producers to warn customers of foreseeable risks. Recent research has also focused upon the impact of awareness of health and safety risks of alcohol on public support for other directly effective alcohol policies.

In the Northern Canadian Alcohol Labelling Study, over 80% of liquor store customers in the Yukon and Northwest Territories were aware of the long-standing alcohol messages that had been in place since 1991. The experimental introduction of cancer warnings for one month resulted in 23.5% more consumers showing prompted awareness of the cancer risk while the introduction of the LRDG messages for a much longer period raised awareness from 31% to 67%. Experimental studies show substantial increases in consumers’ ability to estimate the number of standard drinks in an alcohol container with standard drink labelling. Studies of the US alcohol warning labels in place since 1989, show that they increased conversations about health and safety effects, reduced intentions to drink and drive, and were more likely to be recalled by heavier drinkers i.e. label messages were more likely to be received by those who might most benefit from them.

Consistent with international studies, the Northern Canadian Alcohol Labelling Study found the labels significantly increased intentions to reduce drinking. This study also confirmed that the majority of drinkers support the idea of adding labels on alcohol containers covering health warnings, LRDGs, and standard drink content. US research has demonstrated that public support for warning labels increased after their introduction and has since remained high at between 87% and 94%. Finally, new evidence indicates that awareness of health risks in the population results in increasing support for effective alcohol policies.

6. Conclusions

Since earlier reviews (1, 2), there is now a more substantial body of evidence from published research upon which to make more definitive conclusions about the potential effectiveness of alcohol warning labels as a means of furthering public health and safety objectives. The following broad conclusions are made with a view to informing future Canadian policy-making on this topic.

- a) Alcohol labels can alert consumers to lesser-known risks from its consumption (such as cancer), provide them with LRDGs to help reduce risks, and also standard drink information to help them monitor their consumption. However, while Canada has

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stringent labelling requirements for tobacco and cannabis products, there are none for alcohol.

- b) By comparison, 47 other countries report to WHO that they require some kind of health or safety messaging on alcohol containers.
- c) The disparity between requirements for alcohol in comparison to tobacco and cannabis does not reflect the comparative levels of risk and harm for these products. Alcohol is estimated to be the most hazardous of the three on many indicators and to generate the highest economic costs in Canada.
- d) The lack of health information on alcohol is at odds with established Canadian law which requires producers to warn consumers of foreseeable risks.
- e) Well-designed alcohol warnings can be an effective strategy to increase awareness of health risks, support strategies to reduce risks, increase intentions to reduce hazardous drinking, and increase support for public policies.
- f) Given that the implementation of the Northern Canadian Alcohol Labelling Study was compromised, a comprehensive evaluation of any future labelling initiative in Canada would be valuable.

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Objectives

At the present time, there is no mandatory federal requirement for alcohol containers sold in Canada to display information about potential health or safety risks associated with the use of alcohol (3). The objectives of the present report are as follows:

1. Document health warning labelling requirements currently in place in other countries and compare these with Canada;
2. Compare the harms documented for alcohol use in comparison with other psychoactive substances in Canada and with other risk factors considered in the WHO Global Burden of Disease study;
3. Describe levels of awareness of the risks associated with alcohol use, of national low-risk drinking guidelines, and of the amount of alcohol contained in commonly consumed alcoholic beverages;
4. Describe best practices for the development of health warnings to be placed on products available for purchase;
5. Describe evidence for the potential impact of health warnings on alcohol and comparable products in relation to awareness of risks, intentions to change behaviour to reduce these risks, public support for alcohol labelling, and public support for policies to reduce these risks and behaviour change.

Approach

A broad, systems level perspective is taken in this report that stresses the multiple potential contributions of alcohol labelling. Petticrew et al (4) describe how alcohol consumption and related harms are influenced by complex causal systems of interconnected psychological, behavioural, social, economic, legal, and environmental factors. These factors are shaped by governments (e.g. licensing laws, container labelling and taxation), by consumers (e.g. patterns of alcohol consumption, perception of product risks) and by alcohol industry practices (e.g. advertising and promotions). Similar to the position taken in tobacco control, we suggest that it is insufficient to solely consider the potential for alcohol container labels to directly change population drinking behaviours and risks in isolation from other strategies and policies.

Our approach also considers the potential impacts of alcohol container warnings on more proximal indicators within the expected causal chain. These indicators include the consumers' awareness of alcohol-related health risks and expressed intentions to quit or moderate alcohol use, both overall and in certain high risk situations. Furthermore, health messaging is salient to the issue of alcohol consumers' "right to know" as Canadian manufacturers have a duty to warn about the risks of consumer products, as laid down in

the *Hollis v Dow Corning* 1995 Supreme Court decision (5). Labels may also alert the public to the fact that alcohol is a distinct commodity from other foods and beverages (6). Accordingly, the objective for alcohol labelling should be to effectively raise public awareness and alter knowledge, attitudes, and intentions, without necessarily also changing drinking behaviour. Another consideration is whether the provision of accurate information about the relatively unknown health effects of alcohol influences public support for alcohol policies that effectively minimise risks to public health and safety. Finally, labels may also serve as a modest but important countermeasure to industry efforts to promote alcohol consumption.

Review methods

As a “rapid review”, the present report has been compiled by a process of a) identifying recent systematic and narrative reviews of alcohol labelling and related topics; b) conducting searches for articles listed in these reviews (reference checking); c) conducting searches for the articles that cite these sources (citation chasing); d) compiling the studies into broad topic areas, and e) summarising the types of evidence and broad conclusions warranted in relation to each of the questions 1 to 5 listed above. This process was facilitated by an expert advisory panel with extensive experience with and knowledge of labelling research, variously in the areas of alcohol, tobacco, nutrition and public health related research. The panel helped identified key articles and contributed to assessing the accuracy and comprehensiveness of this summary report. An expert in literature searching and review (RO) assisted the project by identifying relevant reports, creating a portfolio of abstracts and PDF copies of 75 papers.

The search strategy and retrieval methods applied the following criteria:

- Publication years: 2000 to 2018
- Included: (1) research with data on the evidence of label effectiveness and (2) background articles: warning label effectiveness in general, international standard drink and LRDGs, country specific labelling regulations, international alcohol risk awareness, and Canadian comparative burden of morbidity for alcohol and tobacco.
- Excluded by format: book chapters, dissertations.
- Excluded by topic: non-label health warnings (brochures, point-of-sale signage, campaigns).

The 75 references were identified as follows:

Search 1: 68 publications from snowball citation chasing of all publications identified below, starting with an earlier comprehensive, narrative review by Stockwell (2).

Search 2: 5 publications retrieved from reference checking of 2017 and 2018 systematic and comprehensive reviews (3, 7-9).

Search 3: 2 publications retrieved from scholarly database searches, 2017-2018. The database searches and results were as follows:

- Two publications from 151 retrievals from a combined search of Academic Search Premier, CINAHL, Cochrane Systematic Reviews, LGBT life, MEDLINE, PsycARTICLES, Women's Studies Intl., keywords: alcohol+label* (in abstract) AND NOT open label AND NOT off label.
- Zero publications from 59 retrievals Web of Science, keywords: Topic: alcohol labeling AND Topic: substance abuse.
- Zero publications from 7 retrievals Business Source Complete, keywords: alcohol+label*, peer-reviewed.
- Zero publications from 22 retrievals PubMed, keywords: (alcohol+label*) AND (warning OR health OR nutrition OR calories) (in title/abstract).

Expertise of review panel

Members of the expert panel have published analyses of international trade laws as they impact on alcohol labels (PO), evaluated the introduction of US alcohol warning labels (TG), evaluated the impact of tobacco warning labels (DH), evaluated the impact of food and menu labelling on customer purchases in supermarkets and restaurants (EH), conducted a systematic review of standard drink labelling (AW), conducted consumer studies that led to the introduction of standard drink labelling in Australia (TS), published a focus group study of northern Canadians' responses to new evidence informed labels (KV), and estimated the calorie intakes of alcohol consumers in Canada (AS).

In addition to accessing relevant published studies, we also provide summaries of some critical but as yet unpublished research on a world first quasi-experimental introduction of evidence-informed alcohol warning labels to a Canadian jurisdiction, Yukon. This research was funded by Health Canada with co-authors EH and TS as co-principal investigators and other co-authors (DH, TG, KV) as collaborators. The significance of this Northern Canadian Alcohol Labelling Study, is that new evidence-informed labels were experimentally introduced and placed on all alcohol containers in the only government monopoly liquor store in Whitehorse, the largest population centre in Yukon. These labels were designed to reflect the evidence for best practice in alcohol labelling that is summarised in this rapid review. The research is not complete but early findings are provided illustrating impacts on awareness of labelling messages among over 2000 liquor store customers in Whitehorse compared to the control site of Yellowknife in the neighbouring Northwest Territories.

Objective 1: *Alcohol container health and safety-related messages required in Canada versus other countries*

Unlike the case with tobacco, vaping products and cannabis, there is no requirement for alcohol products in Canada to display health warnings. There are, however, two

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jurisdictions, Yukon and Northwest Territories, where the territorial liquor distribution and control authorities have had a directive since 1991 requiring warnings about drinking while pregnant and/or impaired driving and general health harms, the second one modelled upon the US mandated alcohol warning label (see Figure 1 below).

Figure 1: Post-manufacturer warning labels added to alcohol containers in Yukon and Northwest Territories



a. Yukon
(actual size = 3 cm in x 2 cm)



b. Northwest Territories
(actual size = 5 cm x 3 cm)

The Northwest Territories label messages above are identical to the US mandated label except for the US mandated preceding tag line: “GOVERNMENT WARNING: According to the surgeon general...”.

The attempt to introduce and evaluate three new rotating health messages in Whitehorse as part of a Health Canada funded research project (10), the Northern Canadian Alcohol Labelling Study was halted as a result of a perceived threat of legal action against the Yukon Liquor Corporation from national alcohol industry groups, as stated by the Yukon Minister Responsible for Liquor and reported in various media outlets (11, 12). The study eventually continued for a few months with a compromised design and cessation of the use of the rotated cancer warning message. Early results of this study are discussed later in this review.

By contrast to alcohol, Sections 123 (1)(d)-(f) of the Cannabis Regulations (p. 56) require the following front-of-pack warnings/labels to be rotated on cannabis products:

- **WARNING: Cannabis smoke is harmful.** Harmful chemicals found in tobacco smoke are also found in cannabis smoke.
- **WARNING: Do not use if pregnant or breastfeeding.** Using cannabis during pregnancy may harm your baby and result in low birth weight.
- **WARNING: Do not use if pregnant or breastfeeding.** Substances found in cannabis are also found in the breast milk of mothers who use cannabis.
- **WARNING: Do not drive or operate machinery after using cannabis.** More than 4,000 Canadians were injured and 75 died from driving after using cannabis (in 2012).

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- **WARNING: Do not drive or operate machinery after using cannabis.** After cannabis use, coordination, reaction time and ability to judge distances are impaired.
- **WARNING: Cannabis can be addictive.** Up to half of people who use cannabis on a daily basis have work, social or health problems from using cannabis.
- **WARNING: Cannabis can be addictive.** 1 in 11 people who use cannabis will become addicted.
- **WARNING: Cannabis can be addictive.** Up to 1 in 2 people who use cannabis daily will become addicted.
- **WARNING: Regular use of cannabis can increase the risk of psychosis and schizophrenia.** Higher THC content can increase the risk of psychosis and schizophrenia.
- **WARNING: Regular use of cannabis can increase the risk of psychosis and schizophrenia.** Higher THC content can lower the age of onset of schizophrenia.
- **WARNING: Regular use of cannabis can increase the risk of psychosis and schizophrenia.** Young people are especially at risk.
- **WARNING: Adolescents are at greater risk of harms from cannabis.** Early and regular use increases the risk of psychosis and schizophrenia.
- **WARNING: Adolescents are at greater risk of harms from cannabis.** Using cannabis as a teenager can increase your risk of becoming addicted.
- **WARNING: Adolescents are at greater risk of harms from cannabis.** 1 in 6 people who start using cannabis in adolescence will become addicted.

A list of the messages and rules for their application to different types of products can be found here: <https://www.canada.ca/en/health-canada/services/drugs-medication/cannabis/laws-regulations/regulations-support-cannabis-act/health-warning-messages.html>. An even more detailed and comprehensive range of tobacco warning labels are required by Health Canada accompanied by colourful, graphic and often disturbing pictures (see: <https://www.canada.ca/en/health-canada/services/publications/healthy-living/health-labels-cigarettes-little-cigars.html>).

Unlike requirements for labelling the amount of sugar in food (to be given by weight in grams), there is also no requirement for the amount of ethanol in alcoholic beverages to be placed on alcohol containers, whether by weight in grams or, more usefully (13), in terms of Canadian "standard drinks" (=17.05 mL ethanol) per container. Alcohol is the only pre-package beverage to be exempted from the nutrition facts table. Food labels are required to list the serving size, the grams of 13 specified nutrients per serving, and the percentage of their daily value per serving. US food labelling also includes grams, millilitres or litres per standard serving and the number of standard servings in a container.

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The tables below summarise information from the WHO Global Information System on Alcohol and Health (GISAH) (14) regarding current alcohol labelling practices. As shown in Table 1, of the 194 countries included in the Global Alcohol Database, a total of 47 countries require some kind of health warning. Of these, 41 have some kind of warning about underage drinking, 31 about drinking before driving, and 27 about drinking alcohol when pregnant. About half (23) have various minimum requirements for the size of labels. Some countries specify the minimum surface area of a container that the warning must cover (e.g. 10% in Belarus and Latvia, 20% in Honduras and Lithuania) while others specify the size of the written messages (e.g. 6 point font size in Japan, Arial 12 in Malaysia).

Table 1: Warning label requirements in WHO member countries and Canada

	WHO Member Countries	Health Warnings	Health warning types		
			Pregnancy	Underage drinking	Drink driving
	n	n (%)	n (%)	n (%)	n (%)
Americas	35	13 (37.1)	5 (14.3)	6 (17.1)	5 (14.3)
Africa	46	11 (23.9)	6 (13.0)	14 (30.4)	9 (19.6)
Eastern Mediterranean	21	2 (9.5)	1 (4.8)	1 (4.8)	0 (0.0)
Europe	53	13 (24.5)	13 (24.5)	12 (22.6)	11 (20.8)
South-East Asia	11	2 (18.2)	0 (0.0)	1 (9.1)	1 (9.1)
Western Pacific	28	6 (21.4)	2 (7.1)	7 (25.0)	5 (17.9)
Total	194	47 (24.2)	27 (13.9)	41 (21.1)	31 (16.0)
Canada		No	No	No	No

Source: WHO Global Information System on Alcohol and Health (GISAH)

Using an alcohol industry source, the International Alliance for Responsible Drinking (15), warning labels currently used in 41 countries are displayed in the Appendix. In some countries, displaying the warning signs is voluntary e.g. in Australia it is optional to display a pregnancy warning developed by the Drinkwise industry group. As discussed later, studies of voluntary labelling schemes indicate, at best, inconsistent compliance (16). In other countries, labelling is mandatory, but the requirement may only apply to some beverage types or for alcoholic drinks above a certain strength (e.g. Brazil above 13% alcohol/volume). Germany only requires a warning label regarding sales to persons under 18 years of age for *sweetened* alcoholic beverages. The content and design of the mandatory labels varies considerably. Since November 1989, the US, at one extreme, has printed the same small text-only label (invariably in black font on a white background) on alcohol

containers with a message from the US Surgeon General. In Ireland, the Parliament proscribes that alcoholic beverages must bear warnings, but the Minister of Health has the discretion to determine the exact contents of alcohol health warnings within a prescribed range of topics (e.g. pregnancy, cancer risk). South Korea requires all alcohol containers to have one of three possible health warnings displayed, however manufacturers have the choice of which label to apply. One of these labels identifies alcohol as a carcinogen, mentioning both liver cancer and adenocarcinoma specifically. Thailand has considered introducing a policy of tobacco-style graphic images to accompany warning messages on alcohol containers and a campaign was developed, however it has not yet been implemented (17).

In relation to labelling regarding the contents or ingredients of alcoholic drinks, as shown in Table 2, 41 countries require information about calories and/or additives to alcoholic drinks to be labelled on at least one beverage type. Of these 41 countries, labelling is always required for beer, in 39 countries for wine and in only eight countries for spirits. The potential value of calorific labelling is underlined by a Canadian study which found that an average drinker consumes 250 calories, representing 11.2% of their necessary calories, in the form of alcoholic drinks on an average day with male drinkers receiving more than 1/8th of their recommended calories from alcoholic drinks, and female drinkers about 1/12th (18).

Table 2: International requirements for nutritional information labels (i.e., calories and additives) on alcohol containers compared with Canada

	WHO member countries N	Nutritional information on containers			
		Beer n (%)	Wine n (%)	Spirits n (%)	All n (%)
Americas	35	3 (8.6)	3 (8.6)	0 (0.0)	0 (0.0)
Africa	46	16 (34.8)	16 (34.8)	1 (2.2)	1 (2.2)
Eastern Mediterranean	21	4 (19.1)	4 (19.1)	2 (9.5)	2 (9.5)
Europe	53	15 (28.3)	13 (24.5)	3 (5.7)	2 (3.8)
South-East Asia	11	1 (9.1)	1 (9.1)	0 (0.0)	0 (0.0)
Western Pacific	28	2 (7.1)	2 (7.1)	2 (7.1)	0 (0.0)
Total	194	41 (21.1)	39 (20.1)	8 (4.1)	5 (2.6)
Canada		No	No	No	No

Source: WHO Global Information System on Alcohol and Health (GISAH)

A much larger number (119) of countries require simple information about the percentage alcohol content of the beverage to be displayed for all beverages (see Table 3). One country

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requires this information only on beer and spirit containers, and two countries require such labelling only on beer. Eight countries require the number of standard drinks (or ‘units’ as they are known in some countries) to be displayed on alcohol containers.

Table 3: International requirements for alcohol content labelling and minimum size of health message labels in comparison with Canada

	WHO member countries	# Standard drinks displayed on containers	% Alcohol content displayed on containers	Minimum label size required
	n	n (%)	n (%)	n (%)
Americas	35	0 (0.0)	16 (45.7)	7 (20.0)
Africa	46	1 (2.2)	33 (71.1)	2 (4.35)
Eastern Mediterranean	21	2 (9.5)	7 (33.3)	0 (0.0)
Europe	53	3 (5.7)	48 (90.6)	10 (18.9)
South-East Asia	11	0 (0.0)	6 (54.6)	1 (9.1)
Western Pacific	28	2 (7.1)	9 (32.1)	3 (10.7)
Total	194	8 (4.1)	119 (61.3)	23 (11.9)
Canada		No	Yes	NA

Source: WHO Global Information System on Alcohol and Health (GISAH)

Objective 2: *A comparison of the risks associated with alcohol use and those associated with use of other products which are required to display warnings about health risks*

Various objective measures of substance use related harms and costs are available from the Canadian Substance Use and Harms study (19) that enable comparisons between major categories of psychoactive substance. Out of the three main types of psychoactive substances used recreationally in Canada (alcohol, nicotine and cannabis), only alcohol requires no warnings of health risks on products. Nonetheless, alcohol is estimated to be responsible for a major share of harms and associated economic costs of substance use. For example, of the \$38.4 billion that substance use cost Canada in 2014, 38.1% was attributable to alcohol, 31.2% to tobacco and only 7.3% to cannabis. For hospital admissions caused by substance use in that year, approximately 88,000 were attributable to alcohol, 146,000 to tobacco and only 4,000 to cannabis. For substance use related deaths, close to 15,000 were attributed to alcohol, 48,000 to tobacco and only 851 for cannabis. Since many alcohol-related deaths occur from injuries among younger people, in terms of the impact of these deaths on productive years of life lost (i.e. up to 65 years of age), alcohol led the way

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with 139,000, followed by tobacco with 105,000 and cannabis with just over 8,000. A summary of these various harms and economic costs is provided in Table 4 below.

Table 4: A comparison of harms and economic costs, from alcohol, tobacco and cannabis use in Canada, 2014

Outcome	Alcohol	Tobacco	Cannabis	All substances
Deaths	14,827	47,562	851	67,515
Productive years of life lost	138,980	104,869	8,436	351,516
Hospitalisations	87,911	145,801	3,836	255,571
Economic costs	\$14.6 billion	\$12.0 billion	\$2.8 billion	\$38.4 billion

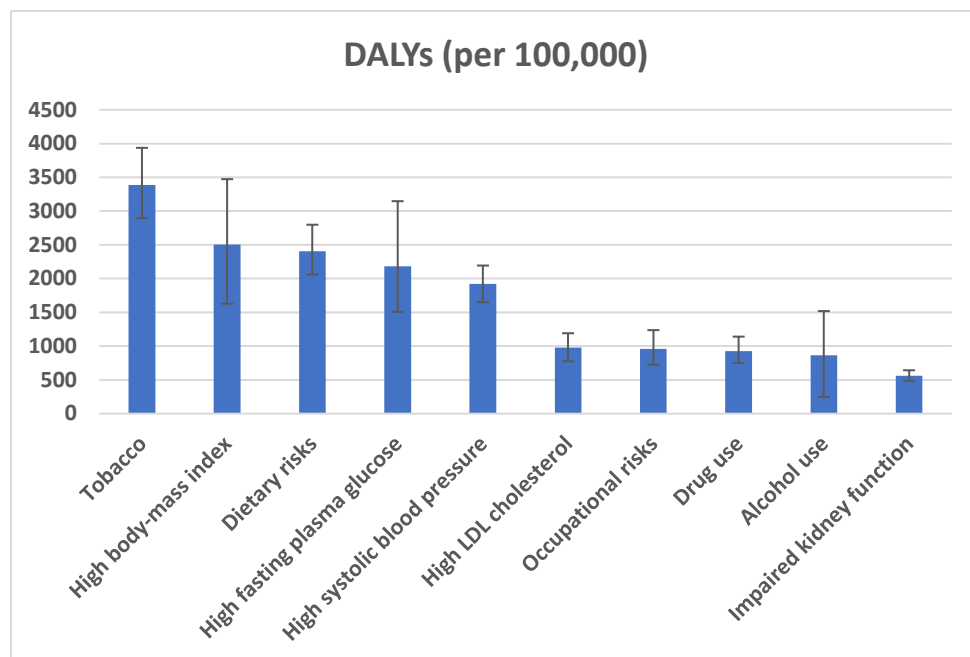
Source: Canadian Substance Use and Harms study (CSUCH, 2018)

A comparison of the estimated harms and costs attributable to each substance is not quite the same as a comparison of risks. A comparison of the risk potential from each type of substance needs to be independent from the prevalence of use of each substance at different levels of intensity. One approach for comparing risks is to collect expert opinion on the relative potential harmfulness of different substances in a systematic, formal Delphi interview study. Two papers published in *The Lancet* (20, 21) used this approach to assess the harm potential of 20 psychoactive substances for both users and for others. These studies involved a panel of experts first independently rating each substance on the risk they posed to users and then reviewing these ratings, and finally striving for consensus. Taking into account the harms both to the user and to other persons, the expert panel concluded that, on the basis of current knowledge, alcohol was more harmful than all other psychoactive substances, including tobacco, while they placed cannabis relatively low on the risk hierarchy (20). More recently, a formal analysis in the *British Medical Journal* (22) compared the risk of cancer for 10 units of alcohol consumed in a week compared with 10 tobacco cigarettes. The authors conclude that for women the risks were exactly equal, but for men the risk from alcohol was half that for cigarettes. This pattern of results can be understood in terms of the high prevalence of breast cancer for women which has a significant alcohol attributable component. It is worth noting, however, that mounting evidence shows that even moderate alcohol use is a risk factor for prostate cancer in men. Given the high prevalence of prostate cancer, the study would have likely calculated that alcohol has an equivalent risk to tobacco for both men and women if alcohol attributable prostate cancer had been taken into account (23, 24). Further supporting the cancer risk of even moderate alcohol intake, a U.S. study found that approximately 30% of alcohol-attributable cancer deaths occurred among those drinking 20 grams or less per day (25).

Another systematic comparison of the contributions to health and safety harms from different risk factors is regularly reported as an outcome of WHO's Global Burden of Disease Study (26). Figure 2 below summarises latest estimates of the top 10 contributing factors to

premature death injury, disease and disability for Canada in 2017, quantified in terms of Disability Adjusted Years of Life Lost. This metric quantifies the years of life lost due to disablement (DALYs) caused by a range of illnesses and injuries by combining these with years of life lost due to death. Out of more than 100 such contributing factors, alcohol use invariably makes the top 10. In the latest assessment, alcohol came in at ninth place with a similar contribution to DALYs as cholesterol in food and all other drugs combined.

Figure 2: WHO estimates of alcohol's contribution to the Global Burden of Disease in comparison with other leading risk factors for disease, injury and premature death for Canada in 2017 (Disability Adjusted Life Years per 100,000 population, DALYs)



Lachenmeier and Rehm (27) used a “margin of exposure” (MOE) measurement for the comparative assessment of the risks from alcohol, cannabis, tobacco, heroin, cocaine and some prescribed medication. This involved estimating lethal doses of each substance established from animal experiments and then relating these to estimated typical doses used by humans. They classified alcohol, nicotine, cocaine and heroin as “high risk” and cannabis as “low risk.” When also taking account of the rates of population use of these substances, only alcohol was classified as a “high risk” substance.

Objective 3: *Describe levels of awareness of the risks associated with alcohol use, low-risk drinking guidelines, and standard drink content of alcoholic beverages*

A systematic review identified 32 studies from 16 countries published worldwide on the topic of public awareness of the cancer risks from drinking alcohol (28). Despite the WHO body, the International Agency for Research on Cancer, having formally confirmed alcohol to be a carcinogen for breast cancer and a range of cancers of the digestive tract since 1988

(29, 30), levels of awareness of this risk were universally low. Slightly higher awareness was reported in the UK and Australia where there had been some geographically limited but hard-hitting campaigns to raise awareness about the risk of breast cancer from alcohol. In keeping with these findings from other developed countries, levels of awareness of some serious risks associated with alcohol use, national low-risk drinking guidelines and the standard drink content of popular alcoholic beverages are mostly very low in Canada. A national survey of Canadians in 2011 found that as many as 70% were unaware of the risk of a range of cancers associated with alcohol use (31). The Northern Canadian Alcohol Labelling Study confirmed this finding with only about one quarter being aware of the causal connection between alcohol use and risk of breast cancer (10).

Across Canada, with the exception of Québec, levels of awareness of the national low-risk drinking guidelines, endorsed by all levels of government in 2008, remain low. Éduc'alcool, a Québec government-funded alcohol education and prevention agency, has run multiple awareness raising campaigns which have resulted in a majority of their population being aware both of national LRDGs and of the definition of a standard drink. Since 2012, a series of surveys of the Québec population has shown that consistently more than 80% of both men and women have been able to specify their respective low-risk drinking guidelines (32, 33).

By contrast, a study of liquor store customers in Victoria, British Columbia in 2014 found that less than a third had heard of the low-risk drinking guidelines or could define a standard drink of their preferred beverage type (13). The recent Northern Canadian Alcohol Labelling Study also found that at baseline only about one third of liquor store customers claim to have heard of national LRDGs. Furthermore, between 60% and 80% of consumers were unable to give an approximately correct answer for the number of standard drinks in containers of beer and spirits (34). Osiowy et al (13) also showed that consumers have even less ability to identify the number of standard drinks in alcohol beverage containers of either unusually high or low percent alcohol content by volume.

Table 5 below summarises recent analyses of the proportions of alcohol attributable diseases resulting in hospital admissions in British Columbia in 2016 that were associated with different levels of personal alcohol consumption (35). It can be seen that as many as 29% of alcohol attributable cancers were experienced by people drinking within the low-risk drinking guidelines. This closely matches an estimate for the US mentioned earlier for cancer risk when drinking up to 10 standard drinks per week (25). Given the low levels of awareness of both cancer risks and low risk guidelines, it is unlikely that many people in Canada are aware that even moderate alcohol use is a risk factor for cancer.

While the above level of risk might be balanced against the possibility that alcohol use in moderation is protective against cardiovascular diseases and diabetes, there is now

mounting scepticism about the scientific basis for this idea. A high-profile \$100 million randomized controlled trial on this topic was initiated by the US National Institutes of Health with funding from the alcohol industry, but the RCT was abandoned due to evidence of improper conduct (<https://www.nih.gov/news-events/news-releases/nih-end-funding-moderate-alcohol-cardiovascular-health-trial>). Systematic reviews of existing studies conclude that evidence for health protection is either greatly reduced or disappears altogether when controls for bias and confounding are introduced (36-39).

Table 5: The estimated prevalence of alcohol attributable hospitalisations for former drinkers and persons drinking above or below Canadian low-risk drinking guidelines

	Prevalence of alcohol attributable conditions							
	Former Drinkers		Drinkers Below Guidelines		Drinkers Above Guidelines		Total	
Condition	N	[%]	N	[%]	N	[%]	N	[%]
Communicable diseases	0	[0]	234	[41]	340	[59]	574	(40)
Cancer	290	[30]	278	[29]	396	[41]	964	(40)
Endocrine conditions	76		-181		-16		-121	
Neuropsychiatric conditions	0	[0]	85	[2]	5,144	[98]	5,229	(40)
Cardiovascular conditions	-71		-968		648		-391	
Digestive conditions	488	[28]	483	[27]	802	[45]	1,774	(40)
All diseases	783	[10]	-69	[-1]	7314	[91]	8,029	(40)

NB Former = former drinkers; Below=below weekly drinking guidelines; Above=above weekly drinking guidelines.

Objective 4: *Describe best practices for effective health warnings to be placed on products*

International best practices have been identified for providing health and safety information regarding food, tobacco, pharmaceuticals and alcohol products. In summary, for optimal impact research suggests that health messages or warnings need to be sufficiently large as to be readily legible for consumers of all ages, to be colourful and concise, to contain graphic images, and to be varied over time to maintain their salience to consumers (41, 42).

Recommended elements of health and safety warnings

A recent systematic review and meta-analysis by Purmehdi et al of research evaluating the components of effective warning labels across multiple consumer goods estimated 243 effect sizes across multiple types of outcomes from 66 primary studies (43). The consumer products included alcohol and tobacco but also a wide range of other consumer goods, such as power tools and ladders. Warnings of immediate negative consequences were more effective than those of remote risks e.g. the immediate danger from using a power tool

versus the future risk of cancer from smoking. Purmehdi et al concluded also that advice on safer use was more readily heeded than advice to reduce or quit. The review identified evidence to support:

- the effectiveness of complementary media conveying consistent messages to those on the labels;
- the importance of frequency of exposure to the label messages;
- the use of pictorial images or icons to increase effectiveness, especially when conveying fear-eliciting consequences;
- the importance of label information being prominent, in terms of the size and placement of the label on the product.

A major conclusion from the Purmedhi et al study is that warning labels "reframed in a safe-use format could better contribute to reducing harmful consumption" as opposed to messages warning against any use at all of the product. *Recommended elements of alcohol warning labels*

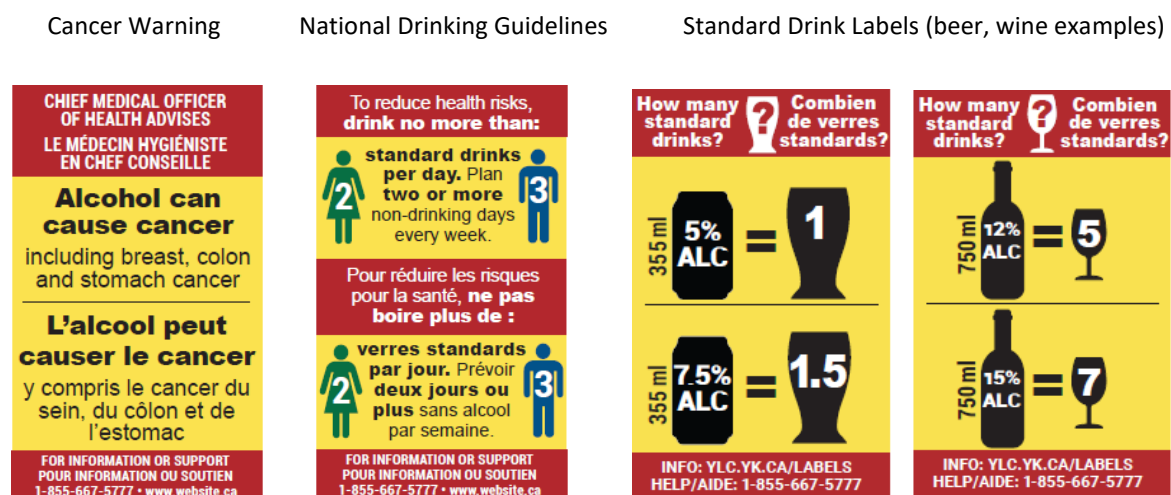
A number of recent studies tested prototype alcohol labels or label elements including label content (34, 44, 45). The results of these studies suggest that rotating a suite of negatively framed specific health messages about largely unknown alcohol-related harms (e.g., bowel cancer, diabetes, mental health) are most effective. Some studies also demonstrated the specific efficacy of using graphic images and plain packaging on alcohol containers. Detailed and specific guidance is provided by this body of literature indicating such details as the use of contrasting colour, inclusion of a border, and use of both text and images/symbols/pictograms to enhance the noticeability of warnings while improving consumers' information processing and message acceptance (34, 46).

Martin-Moreno et al (47) conducted a systematic review of studies testing the components of effective alcohol labels. They concluded that five categories are potentially useful for consumers: (i) a list of ingredients, (ii) nutritional information, (iii) serving size and servings per container, (iv) a definition of 'moderate' intake and (v) a health warning.

The elements identified by Martin-Moreno et al (47) correspond quite closely to the elements identified earlier in this report that were incorporated into the labels, which were tested in the Northern Canadian Alcohol Labelling Study and which were developed through a process that involved multiple steps over several years. Firstly, a RCT among a panel of 2000 adults drinkers residing in Ontario was conducted in which a range of different alcohol messages with different content, size, colour and imagery were presented (34) based on the published literature. Three content areas were selected: (i) warnings on serious health risks, especially those where there was no/little public awareness; (ii) national low-risk drinking guidelines, and (iii) standard drink information to assist consumers to comply with the guidelines. In terms of label presentation and format, the use of colour, pictorial icons and

a larger size proved to be the most effective. Next, a series of focus groups was conducted in four communities across Yukon to further test these different label elements (48). The focus groups of Yukon residents indicated strong support to include these kinds of messages on alcohol containers, with particular interest in the alcohol and cancer warning (48). At the same time, a consultation with the Yukon Liquor Corporation, the government alcohol retail monopoly, made it clear that graphic images or pictures such as those used on tobacco warning labels would not be permitted. Furthermore, all messages were required to be in both English and French, which further restricted their length and level of detail. Conforming to these inputs, the three separate labels depicted below in Figure 3 were designed based on the results of the two studies, with provision for the main messages to be rotated.

Figure 3: Warning labels trialled in the Yukon



There is also evidence that the tone and framing of warning messages is important for respondents' ratings of their believability and impact. For example, different alcohol and cancer warnings were particularly well-received in a UK study if they were positively framed, referred to specific forms of cancer, and used language like "increases risk of cancer" as compared to negatively framed messages, those referring to cancer in general, and those using the term "can cause cancer" (49). Thomson et al (50) suggest serious messages are more effective than humorous messages, and that messages should strike a balance between whole-of-population and targeted audiences (e.g., youth).

Standard drink labelling

Martin-Moreno et al (47) noted concerns raised in an Australian focus group study regarding labels that indicated "servings per container" or standard drink information (51) would be used by young drinkers to help them purchase drinks containing the most alcohol they could afford. Kerr and Stockwell (52) also reviewed a range of both published and unpublished studies on standard drink labelling and offered a rebuttal to this concern. They cited

evidence that more consumers stated that they would use standard drink information to drink within low-risk drinking guidelines than those who stated that they would use labelling information to buy the most alcohol for the least cost.

This finding is supported by a published Canadian study (13) and the as yet unpublished findings from the Northern Canadian Alcohol Labelling Study. In the latter, a total of 776 customers of the Whitehorse liquor store were asked questions about positive and negative reasons for using standard drink labels after being exposed for a two-month period to standard drink labels at that store. Among those providing usable responses, 28.5% said they would "ever use this information to compare brands to get the most alcohol for the least amount of money". By contrast, 56% said they would "ever use this information to help yourself or someone else stay within the daily drink limit advised by in the low-risk drinking guidelines". In other words, twice as many consumers said they would use the standard drink labelling information for positive rather than negative purposes.

The individuals who say they would use standard drink information to choose the cheapest alcohol per dollar are likely already high-risk drinkers. It is not clear whether, in practice, standard drink labels would make much difference to the quantity of alcohol they would have purchased anyway if only provided with the current required information on price and percent alcohol content. This topic will be explored in future analyses of the Northern Canadian Alcohol Labelling Study.

In a more recent study of young consumers' understanding of the standard drink content of their beverages, Coomber, Jones and colleagues reported (53) that 80% had seen the Australian standard drink labels. They report that those who had seen the labels were significantly more likely to be able to correctly identify the number of standard drinks in alcoholic beverages. In addition, they reported that three quarters of the sample supported the addition of such labels to alcohol containers. The authors recommended that standard drink labels need to be supplemented by information on low-risk drinking guidelines in order to motivate use of the standard drink labels, especially among heavier drinkers.

Mandatory versus voluntary industry-led initiatives

In relation to alcohol labels in particular, there is mounting evidence that voluntary initiatives usually have low or, at best, incomplete uptake across many segments of the industry (16). Petticrew and colleagues (16) evaluated the effectiveness of a UK "national responsibility deal" between government and the alcohol industry, which included the voluntary addition by producers and retailers of the calorific content of drinks Petticrew et al (54). They examined websites and product labelling in 55 representative supermarkets and found no information on calorie content either on line or on product labels. While compliance was stronger in relation to other types of label (e.g. units of alcohol), the

authors concluded that "labelling information frequently falls short of best practice, with font and logos smaller than would be accepted on other products with health effects" (16).

A qualitative study in France exploring drinkers' perceptions of voluntary alcohol warning labels observed that the labels suffered from poor visibility due to their size, location, and outdatedness, and also from competition with other marketing design elements on the container. The participants found the labels to be vague, lacking in credibility, and ineffective in terms of causing participants to feel concerned about risks and influencing consumption habits (55).

An Australian study (56) evaluated the ability of alcohol consumers to recall labelling messages designed by the alcohol industry-funded body DrinkWise. Among a sample of 561 young Australian drinkers, none could spontaneously recall (unprompted) the campaign logo, and the highest rate of recall for any specific message was 16%. The messages themselves were criticized as being vague and non-confronting. Further, a 2017 report commissioned by the Australian Government found that only 48% of alcohol brands on the market used the DrinkWise pregnancy and alcohol warning labels (57).

Tinawi and colleagues (58) conducted a rigorous survey of the presence of various alcohol-industry designed warning labels on a standard basket of alcohol products across multiple liquor stores in New Zealand. Overall the voluntary labelling initiative was described as "highly deficient" by the report authors, with at best partial labelling of products observed and a bias towards including pregnancy and alcohol warnings (80% of samples) versus those warning about the dangers of impaired driving (19%).

Objective 5: *Describe evidence for the potential impact of alcohol warning labels on awareness of risks, behavioural intentions, public support and drinking behaviour*

Studies investigating the potential effectiveness of alcohol warning labels can be classified into the following broad categories:

1. Population surveys of attitudes to warning labels, knowledge of messages, and relationships to drinking behaviours. These surveys have been conducted both in countries that have introduced warning labels and those that have not.
2. Laboratory studies in which participants are exposed to alternative label messages using experimental designs.
3. Controlled evaluation studies conducted before and after the introduction of specific alcohol warning labels. Stronger designs include a control jurisdiction which is otherwise comparable but has not been exposed to the labelling intervention. The best examples of these are the evaluations of the introduction of the US warning labels in 1989 (59) and the new Northern Canadian Alcohol Labelling Study, despite industry interference in the implementation of its planned study design (10).

4. Literature reviews of published literature. The best examples of these have undertaken systematic literature searches conducted by authors who are independent from alcohol industry funding (60).

Examples of all of these study types, each with their unique strengths, were identified for this rapid review and are discussed below in relation to a range of possible outcomes in relation to increased awareness of risks, behaviour change, and increased support for alcohol policies.

Returning to Purmehdi et al's recent systematic review and meta-analysis of warning labelling across multiple consumer goods, including alcohol (43), the authors examined evidence for effectiveness across a cascading series of outcomes. They started with the more proximal yet critical outcomes in the expected causal pathway, such as attention (the warning being noticed) and culminating in an intention to change behaviour or actual behaviour change. The authors provided a conceptual model of a multi-stage process involving a cascade of effects that need to occur for warning labels to impact behaviour. Outcomes were assessed across different studies including impacts on attention, comprehension, recall, judgement and behaviour. Labels carrying a message to reduce levels of use or to quit use of the product showed decreasing effect sizes across this cascade, with greater effects for attention and knowledge, and the smallest effects on purchasing decisions and behaviour. Nonetheless, significant effect sizes were estimated for both moderation and quit messages for behaviour change but these are combined effect sizes across multiple products. The reviewers concluded that evidence for effectiveness of warning labels is more substantial and robust for tobacco, for example, than for alcohol, e.g. (61).

As stated above in the Approach section above, evaluations of health warnings need to take a broad perspective and not narrowly focus on whether consumer behaviour change can be demonstrated directly as a result of labels alone (4). Multiple individual, cultural, social, economic, and corporate influences determine patterns of alcohol use and related harms in the population. Warning labels can contribute to a comprehensive approach to limiting alcohol use in multiple ways. These include:

- providing consumers with information they value about the potential negative consequences of using a product and how to reduce these (62);
- raising awareness of negative consequences that are not widely known; conveying health information at both the point of purchase and of consumption (34);
- reinforcing intentions to cut down or quit;
- increasing public support for other more effective interventions that can directly impact on levels of alcohol use and related harms in a population (e.g., interventions increasing alcohol price, and restricting accessibility and marketing).

Impact on awareness

The Northern Canadian Alcohol Labelling Study illustrates how clear, colourful and evidence-informed alcohol health messages can be effective in raising awareness of health risks and LRDGs, while also significantly strengthening intentions to reduce alcohol consumption (63). This real-world study involved assessing randomly selected liquor store customers' awareness of alcohol labels, knowledge of messages, drinking behaviour, and support for labelling and other alcohol policies in an intervention site, Whitehorse, Yukon as compared with the control site of Yellowknife, Northwest Territories. In both cities, the research focused on government-owned liquor retail outlets with almost complete monopolies of the local off-premise alcohol markets. For over 25 years, government mandated warning labels regarding pregnancy and/or impaired driving (see Figure 1) had been manually applied at both the intervention and control sites. Rates of awareness of these labels at baseline were comparable, with 80.5% in Whitehorse and 86.8% in Yellowknife.

Among the intervention labels tested in Whitehorse, the controversial cancer warning label (see earlier Figure 2) was implemented for approximately one month in late 2017 along with the label depicting Canadian low-risk drinking guidelines. Just under 100,000 labels were applied during this month, approximately half of each label type. A follow-up survey conducted 2 to 3 months later found unprompted recall of the cancer label message increased by 23.5% in the intervention compared with only 0.6% at the control site. The warning was more likely to be recalled by respondents with high education and adequate literacy.

A second follow-up survey was conducted in the summer of 2018 after the LRDG label had been applied to the great majority of alcohol containers sold in the Whitehorse liquor store for four-months and the standard drink labels for two-months. Approximately 300,000 more labels were applied during this period, roughly half of each of the two permitted label types. Early results concerning participants' awareness of Canada's LRDGs are made available confidentially in this report to Health Canada. Across the three survey waves, baseline (N = 505), first follow-up (N = 783) and second follow-up (N = 776), awareness of the LRDGs increased significantly at each point from 31% at baseline, to 51% in Wave 2, and 67% by Wave 3. There were smaller increases in awareness of the LRDGs in the control site (Yellowknife), from 35% at baseline to 43% by Wave 3. A cohort of liquor store respondents was embedded within each survey sample so that some respondents had already been interviewed at least once when they were introduced to the LRDGs. Some of those participating in the study may also have been exposed to national media attention on alcohol labelling and related health issues generally; this may have contributed to increased awareness of the LRDGs at both sites. However, substantially larger effect sizes were observed for awareness of the LRDGs at the intervention site.

Significant increases were also detected in participants' knowledge of own-gender daily LRDGs at both sites, again with larger increases for the intervention site. Among participants in Whitehorse (intervention site), 18% at baseline knew the daily guideline for their gender, with 31% in Wave 2, and 39% in Wave 3. In Yellowknife (control site), 12% were able to correctly specify the daily guideline for their own gender, with 15% in Wave 2 and 28% in Wave 3. Again, there is the possibility of a survey or learning effect, as a cohort of respondents participating in two or more survey waves are embedded within the total sample. Similar results were also observed in a Canadian web-based panel study (34) that found that experimentally adding standard drink labels increased from 13% to 59% the number of liquor store customers able to correctly identify the number of standard drinks in an alcohol container of their favourite beverage.

Studies conducted to evaluate the impact of the US health warnings introduced in 1989 have demonstrated that they increased awareness of risks among drinkers, especially among heavy drinkers. Greenfield et al (59) reported that among the 43% of the 10,000 adults in their 1994 survey who claimed to have seen the US alcohol warning labels, most recalled seeing a message warning of "birth defects" from drinking during pregnancy (81%). Recall of an impaired driving message was somewhat lower (46%) and recall of a message regarding operating machinery was the lowest (39%). "Recall" of control messages that were not actually used (concerning cancer and arthritis) was substantially lower. Kaskutas and Graves (64) reported that women of childbearing age were also especially likely to recall seeing the message about birth defects.

Other studies of the impact of the US alcohol warning labels suggest that one mechanism through which they might increase public awareness of messages could be by stimulating conversations on alcohol-related topics. Early studies analyzing surveys conducted before and shortly after the introduction of the US alcohol warning labels found significant increases in the likelihood of respondents reporting having discussed risks of alcohol consumption with someone (6), a trend that was especially strong among those who recalled seeing the label. A later analysis reported that pregnant women who saw the labels were still more likely to discuss this issue (65). Furthermore, a "dose-response" effect was detected such that the more types of warnings that had been seen (e.g. advertisements, point-of-sale promotions, in magazines and on containers), the more likely respondents were to have had conversations about the topic of alcohol and pregnancy.

Notwithstanding the poor design of the US alcohol warning labels in terms of noticeability, readability and variation, studies of their impact are highly significant in the literature as the before and after surveys, with control surveys in Canada, were conducted with rigour. Further, the intervention was comprehensive in that all alcohol containers were impacted – and have been for now 40 years. Another consistent finding in relation to awareness raising was another "dose response" effect whereby heavier and more frequent drinkers were

significantly more likely to recall all of the various messages (59). As a medium for communicating health and safety information to consumers, this suggests that alcohol labelling has the unique virtue of better reaching those consumers whose levels of use puts them at greatest risk and hence the need of warnings.

Ability to follow guidelines

Australian and Canadian studies with alcohol consumers have demonstrated that in the absence of standard drink labels, consumers have considerable difficulty understanding the number of standard drinks contained in their favourite beverages and, hence, in following LRDGs.

Wettlaufer (60) conducted a systematic review of studies regarding the utility and effectiveness of labelling alcohol containers with the number of standard drinks. Eleven studies were found worldwide which, overall, indicated that standard drink labelling could increase consumers awareness of standard drinks and also their ability to follow LRDGs. However, it was noted that these were experimental studies and no real-world evaluation of their impact in practice had been reported. The Northern Canadian Alcohol Labelling Study was the first formal controlled real-world evaluation of the introduction of standard drink labelling. A recent Australian study found that 80% of young drinkers were aware of standard drink labels on alcohol containers (53). Australia has had compulsory standard drink labels showing the number of Australian standard drinks to one decimal point on each bottle or can since 1995 (66).

As discussed earlier, two quite recent Canadian studies with online and in-person experimental designs, one in Ontario (34) and one in BC (13), demonstrated that providing consumers with standard drink labels on alcohol containers helped them improve their estimates of the number of standard drinks in their preferred beverages. In the absence of such labelling, substantial errors were made by consumers when trying to estimate their consumption, especially for products with unusually high or low strength alcohol. As also mentioned earlier, the preliminary results of the Northern Canadian Alcohol Labelling Study found that consumers said they were twice as likely to use the standard drink labels to help them comply with LRDGs than to get the most “bang for their buck” i.e. the strongest alcohol for the least money (63).

Intentions to change behaviour

Studies from the field of tobacco control have demonstrated that health warnings can increase intentions to quit smoking or cut down (67). A wide range of studies from different countries and with different research designs find evidence that alcohol warning labels, especially those with designed consistent with best practices, can also significantly influence expressed intentions to reduce alcohol consumption.

An experimental study conducted with German students presented two types of labels: one with “negative” messages about health effects and one with messages designed to counteract positive expectations about the effects of drinking. Both types of labels were shown to significantly reduce intentions to drink (68). However, another experimental study conducted in the UK tracked participants’ eye movements and concluded that drinkers paid minimal attention to alcohol industry-designed warning labels (69). Furthermore, even when the messages were highlighted to ensure drinkers paid attention to them, no measurable effects were detected on study participants’ intentions to drink. The authors interpret their findings as reflecting the less than optimal design of these specific industry-initiated warning labels.

Another UK experimental study presented three types of labels on alcohol containers to drinkers: one with no warning, one with a text message about negative health effects and one with text message plus a graphic, fear-arousing image (41). All the warning labels increased expressed intentions to reduce alcohol consumption, with a larger effect size for the graphic warning labels. A Dutch experimental study also compared the reactions of alcohol consumers to three types of warning label: a control, one with fear arousing content, and another providing advice on coping strategies to cut down or stop drinking (70). The fear arousing warning label was especially effective at increasing intentions to cut down or quit drinking.

Early analyses of the Northern Canadian Alcohol Labelling Study detected small, but significant, changes in the liquor store customers’ expressed intentions to cut down on their drinking in the intervention site (Whitehorse, Yukon) versus the control site (Yellowknife, Northwest Territories). Intentions to reduce drinking increased by about 4% in the intervention site compared with a reduction of 1% in the control site (63). Females were significantly more likely to report intentions to reduce drinking.

Impact on public support for alcohol policies

Studies of the level of public support for alcohol policies have shown that educational initiatives such as alcohol warning labels tend to have the highest levels of support. In a review of population surveys conducted in the US and Canada before and after the introduction of the US warning labels in 1989, Room and colleagues reported support for alcohol warning labels rose, between 1989 and 1991, from 75% to 86% in Ontario and from 87% to 91% in the US (71). Furthermore, support for warning labels increased after their introduction even though levels of support for alternative policies (e.g. higher prices, reduced availability) reduced over the same period. High levels of public support for adding nutritional and health information on alcohol containers, usually in the range of 80 to 90%, have also been confirmed by studies in other countries e.g. Australia (50).

An Australian study found that increased awareness of the health risks of alcohol is associated with high levels of support for effective alcohol policies concerning pricing, availability, and advertising (72). Knowledge of alcohol as a risk factor for cancer was a significant predictor of support for all policies, while level of alcohol consumption was inversely related to policy support. This study highlights another possible role of health messaging on alcohol containers: by increasing public awareness of serious health risks, alcohol labelling may serve to increase public support for other more directly effective alcohol policies.

The Northern Canadian Alcohol Labelling Study will also be able to directly test in a powerful real-world natural policy experiment whether exposure to warning labels increases support for alcohol policies. Analysis of relevant data to address this question is currently underway.

Impact on behaviour

Reviews of the extensive literature on the US experience with warning labels find only limited evidence that alcohol warning labels directly impact drinking behaviour. A large longitudinal study of US high school children found changes in their awareness and knowledge related to seeing the warning labels but no evidence of changes in drinking behaviour per se (73). A small, uncontrolled study of pregnant women found evidence that recalling seeing pregnancy warnings on alcohol containers was associated with reduced consumption, but only among those who were light drinkers before they were pregnant. No effect on consumption was detected for heavier drinkers (74). Analyses of the multiple cross-sectional US population surveys have reported some evidence that people recalling seeing the message about impaired driving are less likely to report driving after having had too much alcohol or drinking before having to drive (59), which the authors term self-regulation strategies or precautionary behaviours (75). In more recent analyses of US population survey data, Greenfield and colleagues report that people who recall seeing the US impaired driving warnings are more likely to intervene and attempt to stop someone driving who appears impaired (76).

Some past reviews of the literature on alcohol warning labels, especially those produced by alcohol industry funded groups (77, 78), have concluded that alcohol education messages are “too complex” to be put on small labels and that they have no useful effect as there is no evidence for behaviour change. Reviews prepared by public health orientated researchers (1, 2), on the other hand, have been more likely to note problems with the design of the labels considering the evidence of general effectiveness of warning labels across a wide range of other consumer products (47), in particular tobacco (67). Even with the sub-optimal format of the US warning labels, important quasi-experimental findings have identified their effects on awareness, message-relevant conversations, and the adoption of potentially precautionary strategies to reduce drunk driving by individuals and collaterals. In addition, labels appear to be an important factor in the strong and increasing

public acceptance of the US labelling policy. Results of experimental studies in which evidence informed features have been added to alcohol containers in a laboratory situation have been quite encouraging, e.g. (34).

The Northern Canadian Alcohol Labelling Study was explicitly designed from the perspective that behaviour change might be possible if evidence-informed, enhanced labels were introduced with carefully designed focus group-tested messages of sufficient size using colour and imagery. Results of the Wave 2 data support this conclusion, at least in relation to self-reported impacts on drinking. At this first follow-up point, two months after the cancer warning and LRDG labels had been added to alcohol containers at the intervention site in Whitehorse for just one month, respondents at the intervention site reported being significantly more likely to reduce their drinking than in the control site (63). Between baseline and the second follow-up (Wave 3), 3% more respondents in the intervention site report drinking less because of the labels compared with 8% fewer in the control site, a net difference of approximately 11%. Future analyses will examine potential impacts on alcohol sales at the two sites using sales data provided by the Yukon and Northwest Territories liquor distribution boards, as well as more powerful analyses across all three waves of surveys conducted for this study. Evidence for a causal role of the labels behind this effect will be explored by determining if these effects are particularly pronounced at the intervention site for participants who recall seeing the labels.

Conclusions

Since earlier reviews (1, 2), there is now a more substantial body of evidence from published research upon which to make more definitive conclusions about the potential effectiveness of alcohol warning labels as a means of furthering public health and safety objectives. The following broad conclusions are made with a view to informing future Canadian policy-making on this topic.

1. Alcohol labels can alert consumers to lesser-known risks from its consumption (such as cancer), provide them with LRDGs to help reduce risks, and also standard drink information to help them monitor their consumption. However, while Canada has stringent labelling requirements for tobacco and cannabis products, there are none for alcohol.
2. By comparison, 47 other countries report to WHO that they require some kind of health or safety messaging on alcohol containers.
3. The disparity between requirements for alcohol in comparison to tobacco and cannabis does not reflect the comparative levels of risk and harm for these products

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since alcohol is estimated to be the most hazardous on many indicators and to generate the highest economic costs in Canada.

4. The lack of health information on alcohol is at odds with established Canadian law which requires producers to warn consumers of foreseeable risks.
5. Well-designed alcohol warnings can be an effective strategy to increase awareness of health risks, support strategies to reduce risks, increase intentions to reduce hazardous drinking, and increase support for public policies.
6. Given that the implementation of the Northern Canadian Alcohol Labelling Study was compromised, a comprehensive evaluation of any future labelling initiative in Canada would be valuable.

References

1. AGOSTINELLI G., GRUBE J. W. Alcohol counter-advertising and the media. A review of recent research, *Alcohol Res Health* 2002: 26: 15-21.
2. STOCKWELL T. A Review Of Research Into The Impacts Of Alcohol Warning Labels On Attitudes And Behaviour: Centre for Addictions Research of BC; 2006.
3. WETTLAUER A., CUKIER S. N., GIESBRECHT N. Comparing Alcohol Marketing and Alcohol Warning Message Policies Across Canada, *Subst Use Misuse* 2017: 52: 1364-1374.
4. PETTICREW M., SHERMILT I., LORENC T., MARTEAU T. M., MELENDEZ-TORRES G. J., O'MARA-EVES A. et al. Alcohol advertising and public health: systems perspectives versus narrow perspectives, *J Epidemiol Community Health* 2017: 71: 308-312.
5. *Hollis v. Dow Corning Corp.*: Supreme Court of Canada; 1995.
6. KASKUTAS L., GREENFIELD T. K. First effects of warning labels on alcoholic beverage containers, *Drug Alcohol Depend* 1992: 31: 1-14.
7. BURTON R., HENN C., LAVOIE D., O'CONNOR R., PERKINS C., SWEENEY K. et al. A rapid evidence review of the effectiveness and cost-effectiveness of alcohol control policies: an English perspective, *The Lancet* 2017: 389: 1558-1580.
8. HASSAN L. M., SHIU E. A systematic review of the efficacy of alcohol warning labels: Insights from qualitative and quantitative research in the new millennium, *Journal of Social Marketing* 2018: 8: 333-352.
9. SHERMILT I., HENDRY V., MARTEAU T. M. What do we know about the effects of exposure to 'Low alcohol' and equivalent product labelling on the amounts of alcohol, food and tobacco people select and consume? A systematic review, *BMC Public Health* 2017: 17: 29-29.
10. VALLANCE K., T S., HAMMOND D., SHOKAR S., SCHOUERI-MYCHASIW N., GREENFIELD T. et al. Keeping consumers in the dark about alcohol and cancer: Industry interference in implementing and evaluating evidence-informed warning labels in Canada, in press.
11. AUSTEN I. Yukon Government Gives In to Liquor Industry on Warning Label Experiment. *New York Times*; 2018.
12. WILT J. Alcohol industry officials lobbied Yukon to halt warning label study. *The Globe and Mail*; 2018.
13. OSIOWY M., STOCKWELL T., ZHAO J., THOMPSON K., MOORE S. How much did you actually drink last night? An evaluation of standard drink labels as an aid to monitoring personal consumption, *Addict Res Theory* 2015: 23: 163-169.
14. WHO. WHO Global Information System on Alcohol and Health; 2010.
15. INTERNATIONAL ALLIANCE FOR RESPONSIBLE DRINKING. Health warning label requirements; 2018.
16. PETTICREW M., DOUGLAS N., KNAI C., DURAND M. A., EASTMURE E., MAYS N. Health information on alcoholic beverage containers: has the alcohol industry's pledge in England to improve labelling been met?, *Addiction* 2016: 111: 51-55.
17. O'BRIEN P. Australia's double standard on Thailand's alcohol warning labels, *Drug and Alcohol Review* 2013: 32: 5-10.
18. SHERK A., NAIMI T., STOCKWELL T., HOBIN E. Calorie Intake from Alcohol in Canada: Why New Labelling Requirements are Necessary, *Canadian Journal of Dietetic Practice and Research* 2019.
19. CANADIAN SUBSTANCE USE COSTS AND HARMS SCIENTIFIC WORKING GROUP. Estimating Canadian Substance Use Costs and Harms (2007–2014). (Prepared by the Canadian

- Institute for Substance Use Research and the Canadian Centre on Substance Use and Addiction.) Ottawa, Ont.: Canadian Centre on Substance Use and Addiction, 2018.
20. NUTT D. J., KING L. A., PHILLIPS L. D. Drug harms in the UK: a multicriteria decision analysis, *The Lancet* 2010: 376: 1558-1565.
 21. NUTT D., KING L. A., SAULSBURY W., BLAKEMORE C. Development of a rational scale to assess the harm of drugs of potential misuse, *The Lancet* 2007: 369: 1047-1053.
 22. HYDES T., BURTON R., INSKIP H., BELLIS M., SHERON N. A comparison of gender-linked cancer risks between alcohol and tobacco: how many cigarettes are there in a bottle of wine?, *BMC Pub Health* In press.
 23. BAGNARDI V., ROTA M., BOTTERI E., TRAMACERE I., ISLAMI F., FEDIRKO V. et al. Alcohol consumption and site-specific cancer risk: a comprehensive dose-response meta-analysis, *Br J Cancer* 2015: 112: 580-593.
 24. ZHAO J., STOCKWELL T., ROEMER A., CHIKRITZHS T. Is alcohol consumption a risk factor for prostate cancer? A systematic review and meta-analysis, *BMC Cancer* 2016: 16: 845.
 25. NELSON D. E., JARMAN D. W., REHM J., GREENFIELD T. K., REY G., KERR W. C. et al. Alcohol-Attributable Cancer Deaths and Years of Potential Life Lost in the United States, *Am J Public Health* 2013: 103: 641-648.
 26. GLOBAL BURDEN OF DISEASE STUDY. Global Burden of Disease Study 2017 (GBD 2017) Results. , Seattle, United States: Institute for Health Metrics and Evaluation (IHME), 2017; 2017.
 27. LACHENMEIER D. W., REHM J. Comparative risk assessment of alcohol, tobacco, cannabis and other illicit drugs using the margin of exposure approach, *Sci Rep* 2015: 5: 8126.
 28. SCHEIDELER J. K., KLEIN W. M. P. Awareness of the Link between Alcohol Consumption and Cancer across the World: A Review, 2018: 27: 429-437.
 29. CANCER I. A. F. R. O. IARC Monographs on the Evaluation of the Carcinogenic Risks to Humans: Alcohol Drinking Lyon, France: IARC; 1988.
 30. INTERNATIONAL AGENCY FOR RESEARCH ON CANCER. Alcohol Consumption and Ethyl Carbamate. IARC monographs on the evaluation of carcinogenic risks to humans, Lyon, France: IARC; 2010.
 31. CANCER C. P. A. Alcohol Use and Cancer in Canada; 2011.
 32. ÉDUC'ALCOOL. Éduc'alcool Newsletter, Montreal, Quebec; 2016.
 33. PARADIS C., DEMERS A., PICARD E. Alcohol consumption: a different kind of Canadian mosaic, *Canadian Journal of Public Health-Revue Canadienne De Sante Publique* 2010: 101: 275-280.
 34. HOBIN E., VALLANCE K., ZUO F., STOCKWELL T., ROSELLA L., SIMNICEANU A. et al. Testing the Efficacy of Alcohol Labels with Standard Drink Information and National Drinking Guidelines on Consumers' Ability to Estimate Alcohol Consumption, *Alcohol Alcohol* 2018: 53: 3-11.
 35. SHERK A., THOMAS, G., CHURCHILL, S., AND STOCKWELL, T. . Does drinking within low risk drinking guidelines prevent alcohol harms? Alcohol-attributable deaths and hospitalizations experienced by drinkers above and below Canadian guidelines., (under review).
 36. HOLMES M. V., DALE C. E., ZUCCOLO L., SILVERWOOD R. J., GUO Y., YE Z. et al. Association between alcohol and cardiovascular disease: Mendelian randomisation analysis based on individual participant data; 2014.
 37. STOCKWELL T., ZHAO J., PANWAR S., ROEMER A., NAIMI T., CHIKRITZHS T. Do "Moderate" Drinkers Have Reduced Mortality Risk? A Systematic Review and Meta-Analysis of

- Alcohol Consumption and All-Cause Mortality, *Journal of Studies on Alcohol and Drugs* 2016: 77: 185-198.
38. ZHAO J., STOCKWELL T., ROEMER A., NAIMI T., CHIKRITZHS T. Alcohol Consumption and Mortality From Coronary Heart Disease: An Updated Meta-Analysis of Cohort Studies, *Journal of Studies on Alcohol and Drugs* 2017: 78: 375-386.
 39. ORTOLÁ R., GARCÍA-ESQUINAS E., LÓPEZ-GARCÍA E., LEÓN-MUÑOZ L. M., BANEGAS J. R., RODRÍGUEZ-ARTALEJO F. Alcohol consumption and all-cause mortality in older adults in Spain: an analysis accounting for the main methodological issues, 2019: 114: 59-68.
 40. PUBLIC LAW NO 100-690. Alcoholic Beverage Labeling Act of 1988, Washington, D.C.: 100th Congress, 2nd session; 1988.
 41. WIGG S., STAFFORD L. D. Health Warnings on Alcoholic Beverages: Perceptions of the Health Risks and Intentions towards Alcohol Consumption, *PLoS One* 2016: 11: e0153027.
 42. AL-HAMDANI M., SMITH S. M. Alcohol Warning Label Perceptions: Do Warning Sizes and Plain Packaging Matter?, *J Stud Alcohol Drugs* 2017: 78: 79-87.
 43. PURMEHDI M., LEGOUX R., CARRILLAT F., SENECA S. The Effectiveness of Warning Labels for Consumers: A Meta-Analytic Investigation into Their Underlying Process and Contingencies, *Journal of Public Policy & Marketing* 2016: 36: 36-53.
 44. COOMBER K., HAYLEY A., GIORGI C., MILLER P. G. A Qualitative Investigation of Australian Young Adult Responses to Pictorial and Graphic Alcohol Product Warnings, 2017: 47: 622-637.
 45. BLACKWELL A. K. M., DRAX K., ATTWOOD A. S., MUNAFÒ M. R., MAYNARD O. M. Informing drinkers: Can current UK alcohol labels be improved?, *Drug Alcohol Depend* 2018: 192: 163-170.
 46. MONK R. L., WESTWOOD J., HEIM D., QURESHI A. W. The effect of pictorial content on attention levels and alcohol-related beliefs: An eye-tracking study, *J Appl Soc Psychol* 2017: 47: 158-164.
 47. MARTIN-MORENO J. M., HARRIS M. E., BREDÁ J., MOLLER L., ALFONSO-SANCHEZ J. L., GORGOJO L. Enhanced labelling on alcoholic drinks: reviewing the evidence to guide alcohol policy, *Eur J Public Health* 2013: 23: 1082-1087.
 48. VALLANCE K., ROMANOVSKA I., STOCKWELL T., HAMMOND D., ROSELLA L., HOBIN E. "We Have a Right to Know": Exploring Consumer Opinions on Content, Design and Acceptability of Enhanced Alcohol Labels, *Alcohol Alcohol* 2018: 53: 20-25.
 49. PETTIGREW S., JONGENELIS M., CHIKRITZHS T., SLEVIN T., PRATT I. S., GLANCE D. et al. Developing cancer warning statements for alcoholic beverages, *BMC Public Health* 2014: 14: 786.
 50. THOMSON L. M., VANDENBERG B., FITZGERALD J. L. An exploratory study of drinkers views of health information and warning labels on alcohol containers, *Drug Alcohol Rev* 2012: 31: 240-247.
 51. JONES S. C., GREGORY P. The impact of more visible standard drink labelling on youth alcohol consumption: Helping young people drink (ir)responsibly?, *Drug and Alcohol Review* 2009: 28: 230-234.
 52. KERR W. C., STOCKWELL T. Understanding standard drinks and drinking guidelines, *Drug Alcohol Rev* 2012: 31: 200-205.
 53. COOMBER K., JONES S. C., MARTINO F., MILLER P. G. Predictors of awareness of standard drink labelling and drinking guidelines to reduce negative health effects among Australian drinkers, *Drug Alcohol Rev* 2017: 36: 200-209.

Alcohol labelling and public health in Canada

54. PETTICREW M., DOUGLAS N., KNAI C., MAANI HESSARI N., DURAND M. A., EASTMURE E. et al. Provision of information to consumers about the calorie content of alcoholic drinks: did the Responsibility Deal pledge by alcohol retailers and producers increase the availability of calorie information?, *Public Health* 2017: 149: 159-166.
55. DOSSOU G., GALLOPEL-MORVAN K., DIOUF J. F. The effectiveness of current French health warnings displayed on alcohol advertisements and alcoholic beverages, *Eur J Public Health* 2017: 27: 699-704.
56. COOMBER K., MARTINO F., BARBOUR I. R., MAYSHAK R., MILLER P. G. Do consumers 'Get the facts'? A survey of alcohol warning label recognition in Australia, *BMC Public Health* 2015: 15: 816.
57. MILLER S. Second evaluation of the voluntary labelling initiative to place pregnancy health warnings on alcohol products, Australia; 2017.
58. TINAWI G., GRAY T., KNIGHT T., GLASS C., DOMANSKI N., WILSON N. et al. Highly deficient alcohol health warning labels in a high-income country with a voluntary system, *Drug Alcohol Rev* 2018: 37: 616-626.
59. GREENFIELD T., GRAVES K., KASKUTAS L. Long-term effects of alcohol warning labels: Findings from a comparison of the United States and Ontario, Canada, *Psychology & Marketing* 1999: 16: 261-282.
60. WETTLAUER A. Can a Label Help me Drink in Moderation? A Review of the Evidence on Standard Drink Labelling, *Subst Use Misuse* 2018: 53: 585-595.
61. WILKINSON C., ROOM R. Warnings on alcohol containers and advertisements: International experience and evidence on effects, *Drug and Alcohol Review* 2009: 28: 426-435.
62. GIESBRECHT N., WETTLAUER A., SIMPSON S., APRIL N., ASBRIDGE M., CUKIER S. et al. Strategies to reduce alcohol-related harms and costs in Canada: A comparison of provincial policies, *International Journal of Alcohol and Drug Research* 2016: 5: 13-33.
63. HOBIN E., VALLANCE K., ZUO F., STOCKWELL T., ROSELLA L., SIMNICEANU A. et al. Communicating risks to drinkers: a real-world study testing the impact of enhanced alcohol labels with a cancer warning and national drinking guidelines., (under review).
64. KASKUTAS L. A., GRAVES K. Relationship between Cumulative Exposure to Health Messages and Awareness and Behavior-Related Drinking during Pregnancy, *Am J Health Promot* 1994: 9: 115-124.
65. KASKUTAS L. A., GREENFIELD T., LEE M. E., COTE J. Reach and Effects of Health Messages on Drinking during Pregnancy, *J Health Educ* 1998: 29: 11-20.
66. STOCKWELL T., SINGLE E. Standard unit labelling on alcohol containers. In: Plant M., Single E. & Stockwell T., editors. *Alcohol: Minimising the Harm*, London, England: Freedom Association Press Ltd.; 1997.
67. HAMMOND D., FONG G. T., McDONALD P. W., CAMERON R., BROWN K. S. Impact of the graphic Canadian warning labels on adult smoking behaviour, *Tob Control* 2003: 12: 391.
68. GLOCK S., KROLAK-SCHWERDT S. Changing outcome expectancies, drinking intentions, and implicit attitudes toward alcohol: a comparison of positive expectancy-related and health-related alcohol warning labels, *Applied Psychology, Health and Well-being* 2013: 5: 332-347.

Alcohol labelling and public health in Canada

69. KERSBERGEN I., FIELD M. Alcohol consumers' attention to warning labels and brand information on alcohol packaging: Findings from cross-sectional and experimental studies, *BMC Public Health* 2017: 17.
70. DE WILDE C. The effects of alcohol warning labels on different age groups in the Netherlands, *Student Undergraduate Research E-journal* 2016: 2.
71. ROOM R., GIESBRACHT N., GRAVES K., GREENFIELD T. Trends in public opinion about alcohol policy initiatives in Ontario and the US 1989-91, *Drug and Alcohol Review* 1995: 14: 35-47.
72. BUYKX P., LI J., DE MATOS E. G., GAVENS L., HOOPER L., WARD B. et al. Factors associated with public support for alcohol policy in England: a population-based survey, *The Lancet* 2016: 388: S31.
73. MACKINNON D. P., NOHRE L., PENTZ M. A., STACY A. W. The alcohol warning and adolescents: 5-year effects, *Am J Public Health* 2000: 90: 1589-1594.
74. HANKIN J. R., FIRESTONE I. J., SLOAN J. J., AGER J. W., GOODMAN A. C., SOKOL R. J. et al. The Impact of the Alcohol Warning Label on Drinking during Pregnancy, *Journal of Public Policy & Marketing* 1993: 12: 10-18.
75. GREENFIELD T. K., KASKUTAS L. A. Early impacts of alcoholic beverage warning labels: national study findings relevant to drinking and driving behavior, *Safety Science* 1993: 16: 689-707.
76. TAM T. W., GREENFIELD T. K. Do Alcohol Warning Labels Influence Men's and Women's Attempts to Deter Others from Driving When Intoxicated?, *Human factors and ergonomics in manufacturing* 2010: 20: 538-546.
77. Policy Review: Health Warning Labels: International Alliance for Responsible Drinking; 2016.
78. STOCKLEY C. S. The effectiveness of strategies such as health warning labels to reduce alcohol-related harms — an Australian perspective, *International Journal of Drug Policy* 2001: 12: 153-166.
79. CHASSEVENT-PAJOT A., GUILLOU-LANDRÉAT M., GRALL-BRONNEC M., WAINSTEIN L., PHILIPPE H.-J., LOMBRIL P. et al. [Epidemiological study on addictive behaviours during pregnancy in a university department], *J Gynécol Obstét Biol Reprod (Paris)* 2011: 40: 237-245.

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
Argentina	Labels of all alcohol beverages must include “Drink in moderation” “Not to be sold to anyone under 18 years of age”	Law no. 24.788 of 5 March 1997: National Law on the Prevention of Alcoholism, Art 5	
Australia	[pending introduction of warning on drinking during pregnancy]	Australia and New Zealand Ministerial Forum on Food Regulation Communiqué 11 October 2018	Alcohol producers may apply the "Get the facts" logo and additional issue-specific message “It is Safest Not to Drink While Pregnant” or the “pregnant lady” pictogram developed by DrinkWise Australia
Bolivia	Labels of all alcohol beverages must include the warnings: “Excessive consumption of alcohol is harmful to health” “Sale prohibited to minors below 18”	Law 259 of 2012 on Control of Sale and Consumption of Alcohol Beverages	
Brazil	Beverages with 13%ABV and above: "Avoid Excessive Alcohol Consumption."	Law N.9.294, 15 July 1996 and Decree No. 2.018 of 1 October 1996	Beverages below 13% ABV: sale and consumption of the product are only for persons older than 18 years See Conselho Nacional de Autorregulamentação Publicitária, CONAR

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries (continued)

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
Chile			<p>Compañía Cervecerías Unidas S.A. (CCU) places warnings on its products:</p> <p>“CCU asks you to drink responsibly”</p> <p>“Product for those 18 and older”</p>
China	Labels of beverages of above 0.5%ABV are required to include "Excessive drinking is harmful to health" or “Pregnant women and children shall not drink”	GB10344-2005 General Standard for the Labeling of Prepackaged Alcohol Beverages GB 2758-2012 National Food Safety Standards Fermented Alcohol Beverages and their Integrated Alcohol Beverages Art 4.4	
China	Labels of beverages of above 0.5%ABV are required to include "Excessive drinking is harmful to health" or “Pregnant women and children shall not drink”	GB10344-2005 General Standard for the Labeling of Prepackaged Alcohol Beverages GB 2758-2012 National Food Safety Standards Fermented Alcohol Beverages and their Integrated Alcohol Beverages Art 4.4	

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries (continued)

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
Chinese Taipei	<p>Labels of all alcohol beverages must state "Excessive consumption of alcohol is harmful to health" or one of the following:</p> <ol style="list-style-type: none"> 1. To be safe, don't drink and drive. 2. Excessive drinking is harmful to you and others. 3. Drinking is prohibited if under 18 years old. 4. Large quantity intake of alcohol product in a short period of time is lethal. 5. Other warnings approved by the central competent authority. <p>Warnings must be on contrasting background of font size at least 2.65 mm and be placed in a conspicuous place on the container's largest external surface.</p>	Regulations Governing the Labeling of Alcohol	

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries (continued)

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
India	effective April 1, 2019: Labels of all beverages of greater than 0.5%ABV shall include the following warning in not less than 3mm size: “Consumption of alcohol is injurious to health. Be safe – don’t drink and drive”. The warning must be in English or in the official state or regional language. Labels of wines must include a non-vegetarian logo if processing aids of animal origin were used.	Food Safety and Standards Authority of India (FSSAI), effective April 1, 2019: Food Safety and Standards (Alcoholic Beverages) Regulations, 2018	
Indonesia	Labels of alcohol beverages must state "Alcohol beverage" and bear the warning "Those under age 21 and pregnant women should not drink" in Indonesian.	Ministry of Trade Regulation 15/M-DAG/Per/3/2006	
Ireland	The Minister of Health is empowered to prescribe the content of warnings on the danger of alcohol consumption, the danger of alcohol consumption when pregnant, the direct link between alcohol and fatal cancers, and details of a government website providing public health information in relation to alcohol consumption.	Public Health (Alcohol) Act 2018	

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries (continued)

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
Israel	<p>Labels of beverages of up to 15.5%ABV must include “Warning: Contains alcohol - it is recommended to refrain from excessive consumption”.</p> <p>Labels of beverages of 15.5%ABV and higher must include “Warning: Excessive consumption of alcohol is life threatening and is detrimental to health!”</p>	<p>Regulations limiting the advertising and marketing of alcohol beverages (Health Warning)</p> <p>30 July 2013</p>	
Japan			<p>Displayed in an easy-to-read location on the container, using uniform Japanese font, at least 6 pts in size:</p> <p>“Be careful not to drink in excess”</p> <p>“Drink in moderation”</p> <p>“Drinking alcohol during pregnancy or nursing may adversely affect the development of your fetus or child”</p> <p>Self-Regulatory Code of Advertisement Practices and Container Labeling for Alcohol Beverages (2016)</p>

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries (continued)

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
Kenya	<p>Labels of all beverages of 0.5%ABV or higher must include at least two of these health warning messages, on no less than 30% of the total surface area of the package, in English or Kiswahili, and on a rotating basis:</p> <p>"Excessive alcohol consumption is harmful to your health";</p> <p>"Excessive alcohol consumption can cause liver cirrhosis";</p> <p>"Excessive alcohol consumption impairs your judgment";</p> <p>"Do not drive or operate machinery";</p> <p>"Not for sale to persons under the age of 18 years".</p>	<p>Alcoholic Drinks Control Act 2010, Art 32</p>	

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries (continued)

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
Korea, Republic of	<p>Labels of beverages of 1%ABV or higher must include one of three warnings:</p> <p>Drinking during pregnancy increases the risk for congenital anomaly. Alcohol is [a] carcinogen, so excessive drinking causes liver cancer, gastric adenocarcinoma and so on.</p> <p>Drinking during pregnancy, underage drinking, and excessive drinking cause congenital anomaly, brain development disruptions and cancer, respectively.</p> <p>Drinking during pregnancy increase[s] the risk for congenital anomaly, Excessive drinking cause[s] stroke, memory loss and dementia.</p>	<p>National Health Promotion Act Enforcement Decree of the National Health Promotion Act Ministry of Health and Welfare Notice No. 2016-488 Administrative Notice of Proposed Partial Amendment to Notification on Phrase of Warning against Smoking and Excessive Drinking, etc.</p>	
Lithuania	<p>Labels of distilled beverages of 1.2%ABV or higher and fermented beverages of 0.5% or higher are required to include a pictogram warning of the potential effects of drinking alcohol during pregnancy.</p>	<p>Alcohol Control Law Article 9</p>	

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries (continued)

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
Malaysia	Labels of beverages of 2%ABV or higher must include, in a non-serif font of not less than 12 pt size, the words 'MEMINUM ARAK BOLEH MEMBAHAYAKAN KESIHATAN' ('Alcohol can harm health')	Food (Amendment) Regulations (2016)	
Mauritius	All alcohol beverages shall bear a label both in English and French indicating that an excessive consumption of alcohol drinks causes serious health, social and domestic problems.	Government notice No.1 of 2009 Public Health (Prohibition on Advertisement, Sponsorship and Restriction on Sale and Consumption in Public Places, of Alcoholic Drinks) Regulations 2008	

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries (continued)

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
Mexico	<p>Labels of alcohol beverages of 2.0% to 55%ABV must include "The abuse of the consumption of this product is harmful to health." The warning must be in uppercase and in a contrasting colour. The required size of lettering varies by beverage ABV. Labels of alcohol beverages of higher than 6.0%ABV: Of three pictogram warnings (against consumption by minors aged under 18 and by pregnant women and against driving under the influence of alcohol), either all three must be included simultaneously, or a single one may be included in which case the pictogram chosen must be changed on a rotating principle every four months. Labels of alcohol beverages with of 2.0-6.0%ABV must display a modified pictogram warning against consumption by minors aged under 18. Labels of alcohol beverages of below 2.0% ABV must include "This product contains % of alcohol. Not recommended for children."</p> <p>Labels may voluntarily include "For more information visit the page: www.conadic.salud.gob.mx, where there is information on the harmful use of alcohol".</p>	<p>Mexican Official Standard NOM-142-SSA1 / SCFI-2014 Alcohol beverages, Sanitary specifications, Sanitary and commercial labeling, 9.7.2</p> <p>Regulation on Sanitary Control of Products and Services, Appendix</p>	

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries (continued)

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
Mozambique	Labels of all alcohol beverages must contain the following phrase in upper case, easily readable letters: "Sale to and consumption by persons under 18 years of age is prohibited."	Decree No 54/2013 Regulation on the control of the production, marketing and consumption of alcohol beverages	
New Zealand	[pending introduction of warning on drinking during pregnancy]	Australia and New Zealand Ministerial Forum on Food Regulation Communiqué 11 October 2018	
Nicaragua	Labels of all beverages of higher than 0.5%ABV must include a cautionary panel with the message "excessive consumption of alcohol beverages is harmful to health" or similar.	Official Gazette No.163 of 28 August 2014 transposing Central American Technical Regulation RTCA 67.01.05:11 Alcoholic Beverages Labeling Requirements	
Peru	Labels of all fermented and distilled beverages must contain, on an area no smaller than 10% of the packaging, in easily readable capital letters, the phrase "Excessive drinking of alcohol beverages is harmful."	Law 28681 Regulating the Marketing, Consumption and Advertising of Alcohol Beverages 2006	

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries (continued)

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
Russian Federation	Labels of wine and spirits, including vodka, must contain the message "Alcohol is not for children and teenagers up to age 18, pregnant and nursing women, or for persons with diseases of the central nervous system, kidneys, liver, and other digestive organs."	Ministry of Health Decree No. 49 of 19 January 2007	
Slovenia	Labels of foodstuff containing alcohol (not alcohol beverages) must include a warning that they are not suitable for children, printed in capital letters that are clearly visible, readable and are a distinctly different colour from the background.	Act Restricting the Use of Alcohol 2003 Art 6	

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries (continued)

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
South Africa	<p>(1) Container labels for alcohol beverages must contain at least one of the (79) health messages, which must be in black on a white background, visible, legible, and indelible and must be at least one eighth of the total size of the container label:</p> <p>“Alcohol abuse is dangerous to your health”</p> <p>“Alcohol is addictive”</p> <p>“Alcohol increases your risk to personal injuries”</p> <p>“Alcohol is a major cause of violence and crime”</p> <p>“Drinking during pregnancy can be harmful to your unborn baby”</p> <p>“Don’t drink and walk on the road, you may be killed”</p> <p>“Alcohol reduces driving ability, don’t drink and drive”</p>	<p>Regulations Relating to Health Messages on Container Labels of Alcoholic Beverages, 24 August 2007 for the Foodstuffs, Cosmetics and Disinfectants Act 1972</p>	

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries (continued)

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
Thailand	<p>Warning pictures and messages for disadvantages or dangers of alcohol beverages shall be made in pictures with 4 colors ..., provided that each form shall be used for 1,000 containers, of size no less than 50% for square and 40% for cylindrical containers of the total container:</p> <p>“Liquor drinking may cause cirrhosis and sexual impotency”</p> <p>“Liquor drinking may cause less consciousness and death”</p> <p>“Liquor drinking is dangerous to health and causes less consciousness”</p> <p>“Liquor drinking is harmful to you and destroys your family”</p> <p>“Drunk driving may cause disability or death”</p>	Alcohol Beverage Control Act B.E. 2551 (2008)	
Togo	Packaging of alcohol beverages must bear the warning "seriously damages health" and the ABV of the beverage.	Law 2009-007 Health Code Art 91	

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries (continued)

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
Turkey	Labels of all alcohol beverages must include the text "Alcohol is not your friend." and three pictograms: against drinking by minors aged below 18, against drinking by pregnant women, and against driving under the influence of alcohol.	Tobacco and Alcohol Regulatory Authority, Communique on warning messages to be affixed on the packaging of alcoholic beverages per Law No. 6487 of 11/06/2013	
United Kingdom			<p>The Department of Health Guidance: Communicating the UK Chief Medical Officers' low risk drinking guidelines 2017 recommends the following messages:</p> <ul style="list-style-type: none"> -The UK Chief Medical Officers recommend adults do not regularly drink more than 14 units per week. -Drinkaware.co.uk -It is safest not to drink alcohol when pregnant, or symbol to that effect <p>See also Portman Group Communicating alcohol and health-related information (September 2017) and the British Retail Consortium (BRC) initiative on labeling (2017)</p>

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries (continued)

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
United States	<p>The health warning statement must appear on the brand label or separate front label, or on a back or side label, separate and apart from all other information. It must be readily legible under ordinary conditions, and must appear on a contrasting background. Labels bearing the warning must be firmly affixed to the container. Minimum type size is specified for containers of various sizes.</p> <p>“GOVERNMENT WARNING: (1) According to the Surgeon General, women should not drink alcoholic beverages during pregnancy because of the risk of birth defects. (2) Consumption of alcoholic beverages impairs your ability to drive a car or operate machinery, and may cause health problems”</p>	<p>Title 27: Alcohol, Tobacco and Firearms. Part 16 – Alcoholic Beverage Health Warning Statement, § 16.21 Mandatory Label Information</p>	

Appendix: Warning labels currently mandated or permitted on a voluntary basis in different countries (continued)

Country/Territory	Mandated Warnings	Authority	Voluntary Warnings
Uzbekistan	Labels of all alcohol beverages of greater than 1.5% ABV must include the following warning, occupying not less than 40% of the label area: "The excessive consumption of alcohol beverages leads to severe diseases of the human nervous system and internal organs." The content of the warning shall be reviewed every five years.	Law 302 On restriction of Distribution and Taking of Alcohol and Tobacco Products and Ministry of Health Regulation No. 311 of 17 November 2011	
Zimbabwe	Labels of all alcohol beverages of 0.2%ABV or higher must bear two warnings: "Alcohol may be hazardous to health if consumed to excess, the operation of machinery or driving after the consumption of alcohol is not advisable." "Not for sale to persons under the age of 18 years."	Statutory Instrument 25 of 2001 Food and Food Standards (Alcoholic Beverages) Regulations	