FOOD STANDARDS Australia New Zealand
Te Mana Kounga Kai – Ahitereiria me Aotearoa

Consumer Literature Review for P1049 –Update

Consumer value, perceptions and behaviours in relation to carbohydrate and sugar claims on alcoholic beverages

January 2025

Executive summary

Food Standards Australia New Zealand (FSANZ) has prepared an update to a rapid systematic review undertaken in 2023, which examined the available evidence on consumer value, perceptions and behaviours in response to carbohydrate and sugar claims on alcoholic beverages. This report outlines the methodological approach to the update, summarises the new evidence available, and draws conclusions based on the totality of the evidence. It is intended to be read in conjunction with the original literature review[1] and subsequent consumer research[2] undertaken by FSANZ.

Searches of electronic databases and submissions from stakeholders were used to identify the eight studies included in this update. The update includes peer-reviewed articles published in academic journals as well as grey literature (unpublished research produced by non-governmental agencies). Findings across studies were narratively synthesised and considered in relation to the findings of FSANZ's 2023 literature review and 2024 consumer research.

Overall, the findings of the update are broadly consistent with the findings of FSANZ's 2023 literature review. The addition of recent, higher quality research undertaken with primarily Australian samples strengthens the available evidence base.

The key findings of the update, considered within the context of FSANZ's 2023 literature review and 2024 consumer research, are described below. The total number of studies cited for each research question includes the eight studies identified in this update, 12 studies identified through FSANZ's 2023 literature review, and 22 studies identified in FSANZ's 2021 literature review on energy labelling (as reported on in FSANZ's 2023 literature review).

Consumer understanding of the nutritional properties of alcoholic beverages

The update identified one additional (high quality) study that addressed consumer understanding of the nutritional properties of alcoholic beverages. Findings are consistent with the previously available evidence, and the conclusions of FSANZ's 2023 literature review remain unchanged.

Findings from all 28 relevant studies indicate that consumers generally have a poor understanding of the nutritional properties of alcoholic beverages (based on their general knowledge).

Two studies found they tend to overestimate the sugar content of all types of alcoholic beverages (wine, beer, spirits, cider, 'ready to drink' premixed spirits [RTDs]). Three studies found they tend to overestimate the carbohydrate content of beer.

The findings of 22 studies indicate that only a minority of consumers are able to correctly estimate the energy content of alcoholic beverages, or to rank the relative energy content of different alcoholic beverages. Consumers do not understand that the main source of energy in most alcoholic beverages comes from the alcohol itself. Instead, consumers believe that sugar or carbohydrates are the main sources.

[1] P1049 consumer literature review (2023)

[2] P1049 consumer research report (2024)

Consumer value of carbohydrate and sugar claims on alcoholic beverages

One additional (low quality) study was identified that addressed consumer value of carbohydrate and sugar claims on alcoholic beverages. Findings are consistent with the previously available evidence, and the conclusions of FSANZ's 2023 literature review remain unchanged.

Findings from all four relevant studies indicate that consumers generally value sugar claims (and sugar information more broadly) on alcoholic beverages. Findings from two studies indicate they may also value carbohydrate claims on alcoholic beverages, however the evidence is less clear in this regard.

Consumer perceptions of carbohydrate and sugar claims on alcoholic beverages

Seven additional studies (three high, two medium, and two low quality) were identified that addressed consumer perceptions of carbohydrate and sugar claims on alcoholic beverages. Findings regarding the effects of claims on consumers' perceptions of healthiness, sugar content, and energy content are consistent with the previously available evidence. New evidence has been identified in relation to the effects of claims on perceptions of alcohol content and health risks associated with alcoholic beverages.

Findings from eleven studies, and the results of FSANZ's consumer research (2024), indicate that carbohydrate and sugar claims cause consumers to perceive alcoholic beverages as healthier, less harmful to health, lower in sugar, lower in energy, more helpful for weight management and/or more suitable as part of a healthy diet than the same beverages without a claim. Two studies that reported participants' mean rating of the healthiness of alcoholic beverages found, consistent with FSANZ's consumer research, carbohydrate and sugar claims do not cause consumers to perceive alcoholic beverages as being overall healthy, unharmful to health, helpful for weight management, and/or suitable as part of a healthy diet.

Two high quality studies, and FSANZ's consumer research (2024), found that carbohydrate and sugar claims do not affect consumer perceptions of alcohol content when both front- and back-of-pack labelling is available to consumers.

Consumer behaviours in response to carbohydrate and sugar claims on alcoholic beverages

Two additional studies (one high quality, one low quality) were identified that examined consumer behaviours in response to carbohydrate and sugar claims on alcoholic beverages. The high quality findings are consistent with the previously available evidence around consumption intentions.

Findings from two studies, and the results of FSANZ's consumer research (2024), indicate that carbohydrate and sugar claims have no effect on consumers' consumption intentions. That is, they have no effect on the number of drinks consumers intend to consume and do not effect consumers' intention to try, purchase, or binge drink alcoholic beverages. One low quality study showed mixed effects on consumption intentions, however due to methodological concerns confidence in this finding is low.

FSANZ's consumer research (2024) indicates that carbohydrate and sugar claims have no effect on consumers' likelihood of modifying food intake or physical activity to compensate for the energy from alcoholic beverages. This is inconsistent with one study identified in FSANZ's 2023 literature review, however this discrepancy can be explained by the difference in samples (young women may be more likely to undertake compensatory behaviours

relative to the general population) and the fact that FSANZ provided participants with nutrition information, including energy content information, while the Cao et al. (2023) study did not.

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Introduction

In 2022-23, FSANZ undertook a rapid systematic literature review to examine the available evidence on consumer value, perceptions and behaviours in response to carbohydrate and sugar claims on alcoholic beverages (FSANZ 2023) to inform Proposal P1049. This literature review was published alongside the Proposal P1049 Call for Submissions on 24 July 2023.

Given the length of time that has passed since the literature review was completed, and the availability of new evidence, FSANZ has undertaken a supplementary literature review to update the evidence base.

The supplementary literature review investigated the same four research questions that were addressed in the original review:

1. What do consumers understand about the nutritional properties of alcoholic beverages? In particular, what do they understand about the sugar, carbohydrate and energy content?
2. Do consumers value sugar and carbohydrate claims on alcoholic beverages?
3. Do sugar and carbohydrate claims influence consumer perceptions of alcoholic beverages? In particular, do such claims influence perceived energy content and/or perceived healthiness?
4. Do sugar and carbohydrate claims on alcoholic beverages influence consumer behaviour? In particular, do such claims influence alcohol intake and/or other health-related behaviours (e.g., exercising behaviour)?

This report outlines the methodological approach to the supplementary literature review, summarises the new evidence available, and draws conclusions based on the totality of the evidence. It is intended to be read in conjunction with the original literature review (FSANZ 2023) and subsequent consumer research undertaken by FSANZ (FSANZ 2024).

Methods

Literature search strategy

FSANZ undertook a supplementary systematic search for literature on consumer value, perceptions and behaviours in relation to carbohydrate and sugar claims on alcoholic beverages. The search strategy adopted was similar to that utilised in the 2022 literature review. Literature was identified by:

- Searching online databases for peer-reviewed studies published between May 2022 (the date of the previous literature search) and December 2024;
- Receiving published and unpublished research relevant to the review from stakeholders; and
- Searching references obtained through the Call for Submissions process.

A total of eight full-text documents were included in the update. The literature search and screening process was conducted by four officers. More details on the literature search strategy and research review process are available in Appendix 1.

Study quality assessment

In the same manner as the 2023 literature review, the quality of each included study was assessed using a revised version of the Quality Assessment Tool for Studies with Diverse Designs (QATSDD) (Sirriyeh et al., 2012). The QATSDD was chosen because eligible studies were expected to vary in design. The revised QATSDD consists of a total of 14 items (12 items for quantitative or qualitative studies, 14 items for mixed-design studies) that may be broadly categorised into the following themes/quality criteria:

- Theoretical/conceptual framework and research aims;
- Sampling and recruitment methods;
- Procedural details;
- Data collection tools;
- Data analyses;
- Ethics; and
- Strengths and limitations.

Each item is rated according to the degree to which each quality criteria is met: 0 = no mention at all; 1 = very slightly met; 2 = moderately met; 3 = completely met (except for the ethical approval criteria which is rated on a dichotomous scale of 0 or 3). The revised QATSDD is further described in Appendix 2, and a full copy of the revised QATSDD is provided in Table A2.

Based on the revised QATSDD criteria, studies were evaluated as being "low," "medium," or "high" in overall quality. Low quality studies were those that rated poorly on many criteria (i.e., had a total rating of less than 50%[3]), and/or had missing methodological details or inadequately reported results, which made it difficult to have confidence in the findings. Medium quality studies were those that rated poorly on some criteria, but there were no major concerns regarding the methodology or reporting of results, and therefore it was possible to have some confidence in the findings. These studies tended to have total ratings that were greater than 50%, but less than 70%. High quality studies rated highly on most criteria, and there were no concerns regarding the methodology or reporting of results, and therefore it was possible to have a high-level of confidence in the findings. These studies tended to have total ratings that were greater than 70%.

The quality evaluations of each study are reported in Appendix 3, along with an overview of general study characteristics. Study quality assessments were conducted by two officers.

Evidence synthesis

The evidence from each study was collated thematically under the research questions in order to present a narrative overview of the available evidence. Use of meta-analysis was not appropriate given the varied designs and measures used across studies.

The level of confidence in the conclusions drawn for each research question is described using a narrative approach. This is because there is currently no available tool that may be used to quantitatively synthesise confidence in the findings from studies that used diverse designs. However, considerations were given to the general principles of the Grading of

[3] Total ratings for each study were calculated by summing the ratings of each criteria and dividing this by the maximum possible total rating and multiplying by 100 (as described in Sirriyeh et al., 2012).

Recommendations, Assessment, Development and Evaluations (GRADE) framework (Guyatt et al., 2011) when narratively synthesising confidence in the findings. That is, consideration was given to the quality of the individual studies (as assessed by the revised QATSDD), the consistency of findings across studies, and the directness of the measures (e.g., self-reported hypothetical measures of behaviour lack directness).

Write-up and synthesis was conducted by two officers.

The draft literature review was internally reviewed by FSANZ staff members. Time constraints did not allow for external peer review to occur for this update.

Findings

Overview of study characteristics

Eight unique studies were eligible for inclusion. Four studies were peer-reviewed articles published in academic journals, and four were grey literature (unpublished research produced by non-government agencies).

Seven studies recruited participants from Australia. No studies recruited participants from New Zealand. One study recruited participants from Canada.

Four studies used experimental designs (two between-subjects, and two within-subjects). Three studies used quantitative surveys, and one study used a qualitative survey.

Three studies were high quality according to the revised QATSDD. Two were medium quality, and three were low quality. The most common reason for medium quality ratings was the use of a research design that was not the optimal approach to meet the research objectives. The most common reason for low quality ratings was missing methodological information.

Appendix 3 provides an overview of the characteristics and quality ratings for each study. Studies are grouped in tables by the four overarching research questions of the literature review (consumer understanding about the nutritional properties of alcoholic beverages [Table A3.1], consumer value of claims on alcoholic beverages [Table A3.2], effects of claims on consumer perceptions [Table A3.3], effects of claims on consumer behaviours [Table A3.34]). Note that some studies reported findings relevant to more than one research question, therefore some studies are repeatedly described across Tables A3.1-A3.4.

Research question 1: Consumer understanding of the nutritional properties of alcoholic beverages

One additional study was identified that addressed consumer understanding of the nutritional properties of alcoholic beverages.

A cross-sectional quantitative survey (Bowden et al. 2022; high quality) analysed data from 801 Australian adult consumers of alcohol (consumed alcohol at least monthly over the past year). The sample included an oversample of parents of children under 18 years of age, as it was part of a broader survey that examined levels of parental drinking in the presence of children. Participants were asked “When you have an alcoholic drink, how often do you drink lower carb [carbohydrate] alcohol because you are concerned about the calories/kilojoules.” Responses were collected on a five-point Likert scale with the responses “Always”, “Most of the time”, and “Sometimes” categorised as ‘Yes’, and “Rarely” or “Never” categorised as ‘No’.

Close to half of respondents (46.4%) reported drinking 'lower carb' alcohol because of energy-related concerns. There was no statistically significant difference by gender. This suggests that a substantial proportion of consumers do not understand that the energy in alcoholic beverages primarily comes from the alcohol itself.

Synthesis of findings

Based on the findings of 27 studies, FSANZ's 2023 literature review concluded that consumers generally have a poor understanding of the nutritional properties of alcoholic beverages (based on their general knowledge). They tend to overestimate the sugar content of all types of alcoholic beverages (wine, beer, spirits, cider, 'ready to drink' premixed spirits [RTDs]) and overestimate the carbohydrate content of beer. Only a minority of consumers are able to correctly estimate the energy content of alcoholic beverages, or to rank the relative energy content of different alcoholic beverages. Consumers do not understand that the main source of energy in most alcoholic beverages comes from the alcohol itself. Instead, consumers believe that sugar or carbohydrates are the main sources.

The additional study found in this update is consistent with the 2023 literature review finding that consumers do not understand that the main source of energy in most alcoholic beverages comes from the alcohol itself, and believe that sugar or carbohydrates are the main sources. The conclusions of FSANZ's 2023 literature review remain unchanged.

Research question 2: Consumer value of carbohydrate and sugar claims on alcoholic beverages

One additional study was identified that addressed consumer value of carbohydrate and sugar claims on alcoholic beverages.

A cross-sectional survey undertaken by the Cancer Council NSW (Wellard-Cole, 2023; low quality) asked 1,513 participants from NSW questions about alcohol. Of this sample, 16% reported never drinking alcohol. Other relevant sample characteristics (such as age, gender, education, income, etc.) were not reported.

Participants were asked to rate their level of support for alcohol labelling initiatives, of which two are of relevance to Proposal P1049: "Information about the amount of energy (kilojoules), sugar and/or carbohydrates on alcohol labels" and "Nutrition claims (e.g. 'low sugar' or 'low carb') on alcohol labels". 74% of respondents supported the provision of information about energy, sugar and/or carbohydrates on alcohol labels, while 17% neither supported nor opposed, 4% opposed, and 2% didn't know. 62% of respondents supported nutrition claims such as 'low sugar' or 'low carb' on alcohol labels, while 28% neither support nor opposed, 8% opposed, and 3% didn't know.

Synthesis of findings

Based on the findings of four studies (two medium quality and two low quality), FSANZ's 2023 literature review concluded that consumers generally value sugar claims (and sugar information more broadly) on alcoholic beverages. It found that consumers may also value carbohydrate claims on alcoholic beverages, however the evidence was less clear as the results were not generalisable to all types of alcoholic beverages.

The additional study found in this update provides further evidence that consumers value 'low sugar' and/or 'low carb' claims on alcoholic beverages, with the majority supporting and very few opposing their presence on alcohol labels. However, as the study does not distinguish between consumers' value of 'low sugar' and 'low carb' claims, the evidence does

not increase the level of confidence in consumer value of 'low carb' claims, which was less clear. The conclusions of FSANZ's 2023 literature review remain unchanged.

Research question 3: Consumer perceptions of carbohydrate and sugar claims on alcoholic beverages

Seven additional studies were identified that addressed consumer perceptions of carbohydrate and sugar claims on alcoholic beverages. There were three high quality studies, two medium quality studies, and two low quality studies. Two high-quality studies used experimental (between-subjects) designs, while the other used a quantitative cross-sectional survey design. One medium quality study used a quantitative cross-sectional survey design, while the other used a qualitative survey design. The two low quality studies used experimental (within-subjects) designs. One high quality study was based on a Canadian sample, whereas the other six studies were based on Australian samples.

One experimental study (Hobin et al., 2024; high quality) investigated the effect of sugar claims, presented together with energy claims, on Canadian consumers' perceptions of a mock vodka-based RTD. In this study, 5500 consumers aged 18-64 years were randomly allocated to view front and back-of-pack images of six labelling variations of the mock RTD: (1) included nutrient content claims ("0g sugar, 90 calories") and nutrition declaration; (2) nutrition declaration only; (3) no nutrition content claim or nutrition declaration; (4) nutrition content claim, nutrition declaration and health warning label; (5) nutrition declaration and health warning label; (6) health warning label only. Only results for variations (1), (2) and (3) are discussed further, as the variations that included health warning labels are out of scope of this literature review. After exclusion for withdrawn consent, completion of survey too quickly, or failed data checks, 831 participants were included in analysis for the variation 1; 807 for variation 2; and 811 for variation 3. Linear regression was used to compare perceived product characteristics, perceived product health risks, and intentions to consume, and pairwise comparisons were undertaken between the mean rating of the variations.

Participants were asked to rate the beverage on a number of product characteristics (appeal, healthiness, calorie content, sugar content, alcohol content, harmfulness to health) "compared to other alcoholic beverages you can buy in stores" on a seven-point Likert scale, where 1 = "A lot less [healthy/lower in calories etc.]", 4 = "No difference" and 7 = "A lot [more healthy/higher in calories, etc.]".

Participants were also asked to rate the extent to which they agreed or disagreed that the alcoholic beverage would increase their risk of cancer or makes them concerned about the health effects of drinking alcoholic beverages on a seven point Likert scale, where 1 = "Strongly disagree", 4 = "Neutral", and 7 = "Strongly agree".

Table 1 below shows the Beta coefficients, 95% Confidence Intervals (CI) and, where available, mean rating for these outcomes. It is important to note that the study design does not enable the effects of sugar claims to be distinguished from that of energy content claims.

Compared to participants who saw the alcoholic beverages with both nutrition content claims and nutrition declaration, participants who saw the beverages with only nutrition declaration information rated these as slightly but statistically significantly less (relatively) healthy, higher in calories, and higher in sugar (all $p < 0.05$). There were no interaction effects with either age or gender (both $p > 0.05$). This indicates that alcohol labels with nutrition content claims ("0g sugar, 90 calories") and nutrition declarations have a small positive effect on perceptions of relative healthiness, calorie and sugar content compared to labels that only have nutrition declarations. There was no statistically significant effect on product appeal, perceptions of alcohol content, harmfulness to health, cancer risk, or health concerns (all $p > 0.05$).

Compared to participants who saw the alcoholic beverages with both nutrition content claims and nutrition declaration, participants who saw the beverages with neither nutrition content claims or nutrition declaration rated them as somewhat less (relatively) healthy, higher in calories, and higher in sugar. They were also slightly less appealing. This indicates that alcohol labels with nutrition content claims ("0g sugar, 90 calories") and nutrition declarations have a moderate positive effect on perceptions of relative healthiness, calorie and sugar content and a small positive effect on appeal compared to alcohol labels that have neither nutrition content claims or nutrition declarations. There was no statistically significant effect on overall perceptions of alcohol content, harmfulness to health, cancer risk, or health concerns (all $p > 0.05$).

Table 1. Effect of label condition on perceived product characteristics and health risks (Hobin et al. 2024)

Outcome	Nutrition content claim and nutrition declaration Mean rating, β (95% CI)	Nutrition declaration only Mean rating, β (95% CI)	No nutrition content claim or nutrition declaration Mean rating, β (95% CI)
Perceived product characteristics			
Relative healthiness[4]	4.9[a] mean rating, reference	4.7[b], **-0.21*** (-0.33, -0.09)	4.4[c], **-0.52*** (-0.64, -0.40)
Lower calories (reverse coded)	reference	**-0.26*** (-0.40, -0.12)	**-0.55*** (-0.69, -0.41)
Lower sugar (reverse coded)	reference	**−0.36*** (−0.52, −0.21)	**−1.27*** (−1.43, −1.11)
Lower alcohol strength (reverse coded)	reference	0.02 (−0.09, 0.12)	0.06 (−0.04, 0.17)
Appealing	4.6 mean rating, reference	4.6 mean rating, −0.02 (−0.16, 0.12)	4.4 mean rating, **−0.16*** (−0.30, −0.02)
Perceived product health risks			
Cancer risk	4.0 mean rating, reference	4.0 mean rating, 0.00 (−0.17, 0.17)	4.1 mean rating, 0.09 (−0.07, 0.26)
Health concerns	reference	−0.06 (−0.22, 0.10)	−0.09 (−0.25, 0.07)
Relative harmfulness to health[2]	reference	0.07 (−0.04, 0.17)	0.19* (0.09, 0.30)

* Statistically significant difference between Beta coefficients ($p < 0.05$).
NB: Different letters indicate significant differences in mean rating between variations.

An experimental study undertaken by the Cancer Council Victoria (Haynes, Talati et al. 2024; high quality) investigated the effect of a number of claims, including 'low carb' and 'low sugar' claims, with a sample of 1,009 Australians aged 18-24 years. In this study, participants were randomly allocated to one of three beverage types - beer, cider, or RTDs – with the pre-requisite that they had consumed that type of drink in the last year. Participants were then randomly allocated to one of two conditions: claims or control. Participants viewed 10 different beverage images (for the claim condition, participants saw 5 x claims [low carb/low

[4] The study reports these result as 'healthy' and 'harmful to health', however the questions that elicited this data was explicitly comparative, asking them to rate the healthiness or harmfulness to health of the beverage "compared to other alcoholic beverages you can buy in stores". As such, it is reported here as 'relative healthiness' and 'relative harmfulness' to more accurately capture the comparative element of the question.

sugar, low calorie, natural, organic, preservative free] on 2 x beverages of their beverage type) in a random order. 'Low carb' was only shown on beer, and 'low sugar' was only shown on cider and RTDs, to reflect the typical use of these claims in the Australian marketplace.

Participants were given the option to click to view the rear label, and nutrition information in the form of energy statements (as proposed under Proposal P1059) was provided on the back-of-pack. Labels in the claim condition had an energy statement with additional lines specifying carbohydrate and sugar content. Energy content values were consistent across both the claim and control conditions.

While viewing the images, participants were asked to rate their level of agreement, on a seven-point Likert scale from 'strongly disagree' to 'strongly agree', that the item is: healthy, harmful to health, high in sugar, high in kilojoules/calories, high in alcohol content, natural, contains a lot of additives, helpful for weight management, suitable as part of a healthy diet, and appealing. Only results for 'low carb' and 'low sugar' were provided in the report, and were combined for analysis. Only measures relating to healthiness, harmfulness, sugar content, energy content, alcohol content, weight management, and suitability as part of a healthy diet are discussed as the other measures are out of scope for this literature review.

As shown in Table 2 below, participants rated products with claims as statistically significantly healthier, less harmful to health, lower in sugar, lower in kilojoules/calories, more helpful for weight management, and more suitable as part of a healthy diet than products without claims (all $p < .05$). The strength of the relationship was negligible (i.e. a correlation coefficient less than ±.30; Hinkle et al. 2003) for 'healthy', 'harmful to health', and 'suitable as part of a healthy diet', was low (i.e. a correlation coefficient between .30 and .50 or -.30 and -.50) for 'high in kilojoules/calories' and 'helpful for weight management', and was moderate (i.e. a correlation coefficient between .50 and .70 or -.50 and -.70) for 'high in sugar'. Participants did not rate the beverages regardless of the presence or absence of claims as overall healthy, unharmful to health, helpful for weight management, or suitable as part of a healthy diet. However, participants rated products *without* carbohydrate and sugar claims as 'high in sugar' and 'high in kilojoules/calories' and did not rate products *with* carbohydrate and sugar claims as high in either sugar or kilojoules/calories. Carbohydrate and sugar claims had no effect on perceptions of alcohol content.

One minor limitation associated with this study is that the stimuli did not include the format or content of nutrition information that is mandatory for alcoholic beverages carrying a carbohydrate or sugar content claim. That is, the stimuli for the claim condition presented an energy statement modified to declare carbohydrate and sugar content through additional lines, which is not currently permitted and is not proposed to be permitted under Proposal P1059 – Energy labelling on alcoholic beverages. Alcoholic beverages carrying carbohydrate or sugar content claims are required to present a full Nutrition Information Panel, declaring energy in kilojoules, protein, fat, saturated fat, carbohydrate, sugars, dietary fibre, and sodium content. It is unclear whether, or to what extent, this would have impacted on the study results.

Table 2. Effect of label condition on perceived product attributes (Haynes, Talati et al. 2024)

	Effects of condition (low sugar/carb claim versus control) on ratings		Product attribute ratings by claim condition, where 1 = strongly disagree and 7 = strongly agree (estimated marginal means)	
Product attributes	**Coefficient (standard error)**	***p* value**	**Control condition**	**Low sugar/carb claim condition**
Healthy	0.25 (0.07)	.001	2.98 [a]	3.24 [b]
Harmful to health	-0.15 (0.07)	.045	4.76 [a]	4.62 [b]
High in sugar	-0.77 (0.13)	<.0001	4.33 [a]	3.62 [b]
High in kilojoules/calories	-.041 (0.07)	<.0001	4.26 [a]	3.85 [b]
High alcohol content	-0.12 (0.08)	.125	4.05	3.94
Helpful for weight management	0.44 (0.08)	.003	2.90 [a]	3.34 [b]
Suitable as part of a healthy diet	0.24 (0.08)	.003	3.06 [a]	3.30 [b]

NB: Estimated marginal mean values with different superscripts differed at $p < .05$.

Another study undertaken by the Cancer Council Victoria (Haynes, Ilchenko et al. 2024; medium quality) examined the effect of 'health-related claims', including 'low carb' and 'low sugar', on consumers' perception of the healthiness of alcoholic beverages in a nationally representative sample of 2,322 Australian adults aged 18-65 years. Of these, those who reported consuming alcohol in the 12 months prior to the survey were included in the analysis (n = 1,960).

Participants were asked to indicate on a five-point Likert scale (Strongly agree, Agree, Neither agree nor disagree, Disagree, Strongly disagree; or Don't know/can't say) to what extent they agreed or disagreed that each of the following claims on the label of an alcoholic beverage meant the product was 'better for you': natural, organic, vegan, low carb, low sugar, low calorie, preservative-free, gluten-free, seltzer, and light in alcohol. Only results for 'low carb' and 'low sugar' are discussed further, as other claims were out of scope for this literature review.

For analysis, the sample was adjusted to the Australian population based on age, smoking status, low-income status, geographic location and language spoken. Responses indicating 'Don't know/can't say' were excluded. The proportion of respondents who answered 'Don't know/can't say' was reported for as a range for all claims presented (n = 53-139, 2.3-6.5%).

Table 3 below shows the proportion of participants who agreed that a low carb or low sugar claim means the product is 'better for you', after exclusion of 'Don't know/can't say' responses. In the remaining sample, 48.8% of participants agreed that 'low carb' means the product is 'better for you', and 55.7% agreed in respect of 'low sugar'.

For 'low carb' claims, participants classified as high SES were significantly less likely to agree the product was 'better for you' than low SES ($p < 0.01$), and participants who drank

on less than one day per month were significantly less likely to agree the product was 'better for you' than those who drank on 5 or more days per week ($p < 0.05$).

For 'low sugar' claims, women were significantly more likely than men to agree that 'low sugar' means the product was 'better for you' ($p < 0.05$), and participants aged 45-65 years and those who drank on less than one day per month were significantly less likely to agree the product was 'better for you' than participants aged 18-24 years and people who drank on 5 or more days per week, respectively (both $p < 0.05$).

Table 3. Proportion of sample agreeing that a 'low carb' or 'low sugar' claim on an alcoholic beverage means the product is 'better for you'

	Agrees that the claim means the product is 'better for you' (%, [95% confidence intervals])	
	Low carb	Low sugar
Sample (n = 1,821 - 1,907)	48.8 (46.0, 51.6)	55.7 (52.9, 58.5)
By gender		
Man (reference)	-	52.7 (48.7, 56.7)
Woman	-	58.7 (54.7, 62.6) *
By age group (years)		
18-24	-	62.7 (55.1, 70.3)
25-44	-	55.3 (51.0, 59.6)
45-65	-	53.4 (49.2, 57.7) *
By SES (SEIFA[5] tertile)		
Low (reference)	51.6 (46.5, 56.7)	-
Mid	50.9 (46.6, 55.1)	-
High	40.7 (35.1, 46.3) **	-
By alcohol consumption		
≥ 5 days/week (reference)	53.8 (46.4, 61.1)	55.3 (48.1, 62.4)
1-4 days/week	51.0 (46.8, 55.3)	59.3 (55.2, 63.5)
1-3 days/month	46.2 (40.4, 51.9)	55.0 (49.2, 60.8)
< 1 day/month	43.2 (36.3, 50.2) *	48.4 (41.4, 55.5) *

Bolded text indicates differs significantly from reference category. * $p < 0.05$, ** $p < 0.01$
Note: blank cells indicate association $p \geq 0.25$ and therefore not included in regression model.

Methodological choices associated with the survey design and analysis mean that these results should be interpreted with some caution. The wording of the survey question (which asked participants to indicate their level of agreement/disagreement that a low carb/low sugar claim meant the product was 'better for you') does not define a point of comparison. As such, the comparator would likely vary between participants. As the point of comparison is unknown, it is not clear whether the beverage imagined by the participant as being labelled with 'low sugar' or 'low carb' would or would not be 'better for you' than the imagined comparator.

It is also unclear how participants interpreted the phrase 'better for you'. In the study discussion, the 'better for you' measure is described as representing the proportion of participants who thought a product was 'healthier'. However, this phrase may have been

[5] Socio-Economic Indexes for Areas

interpreted differently by each participant, for example to mean ‘better for you’ with respect to price, suitability for the drinking occasion, personal preferences, reputation or image, etc.

Finally, the exclusion of participants who said they ‘Don’t know/can’t say’ if the product with a claim was ‘better for you’ from the analysis makes interpreting the findings challenging. The proportion of the sample excluded due to answering ‘Don’t know/can’t say’ was reported for as a range for all claims presented (n = 53-139, 2.3-6.5%). As such, it is unclear what proportion of the sample said ‘Don’t know/can’t say’ for the ‘low carb’ and ‘low sugar’ claims and how the inclusion of these responses in the analysis would impact the proportions of agreement reported, or whether significant differences found between various demographics group would still hold if these responses were incorporated into the analysis.

As noted for research question 1, a cross-sectional quantitative survey (Bowden et al. 2022; high quality) analysed data from 801 Australian adult consumers of alcohol (consumed alcohol at least monthly over the past year). The sample included an oversample of parents of children under 18 years of age, as it was part of a broader survey that examined levels of parental drinking in the presence of children. Participants were asked “When you have an alcoholic drink, how often do you drink lower carb [carbohydrate] alcohol because you are concerned about the calories/kilojoules.” Responses were collected on a five-point Likert scale with the responses “Always”, “Most of the time”, and “Sometimes” categorised as ‘Yes’, and “Rarely” or “Never” categorised as ‘No’.

Close to half of respondents (46.4%) reported drinking ‘lower carb’ alcohol because of energy-related concerns. There was no statistically significant difference by gender. This suggests that a substantial proportion of consumers perceive alcohol beverages with ‘low carb’ claims to be lower in energy than a comparable alcoholic beverage without a claim.

The George Institute undertook an experimental (within-subjects) study with a nationally representative sample of 1,356 Australian adult consumers of alcohol to investigate the effect of carbohydrate and sugar claims on consumer perceptions of a range of alcohol products (Yusoff et al. 2024; low quality). Respondents were randomised to either a sugar claims condition, where they saw mock premix, cider, and wine products, or a carbohydrate claims condition, where they saw mock cider, beer, and spirits products. Participants were shown three variants of the three different products. They were first shown each alcoholic beverage without a claim and asked to rate the healthiness of the product on a five-point Likert scale, where 1 = “Very unhealthy” to 5 = “Very healthy”. They were then shown the same alcoholic beverage with a specific claim (e.g. ‘< 2g sugar/carbs’) followed by the same alcoholic beverage with a general claim (e.g. ‘low sugar/carbs’). Respondents ranked the healthiness of the product on the same five-point Likert scale each time.

Limited detail on the results was available. No descriptive data was provided, and it is also not known whether the findings were statistically significant (no *p* values or confidence intervals were provided). Odds ratios were calculated to determine the extent to which exposure to claims influenced healthiness perceptions. The study found that respondents had three times greater odds of considering the same product to be healthy when it displayed a sugar claim, and two times greater odds of considering the same product to be healthy when it displayed a carbohydrate claim. Further, younger drinkers (aged 18-24 years) had 1.5 times greater odds of rating products with sugar claims as healthy compared to older respondents.

It is important to note that the non-randomised order in which participants viewed the products is likely to have impacted on the results. The identical nature of the beverages, and the absence of any claims on the first beverage shown may have made the claims more salient on subsequent beverages. The first beverage shown (without a claim) may also have set a baseline against which later beverages were compared. This design leads to a relative rather than an absolute rating of healthiness. Separately, as no nutrition information was

provided on the labels (as required by the Code when making a carbohydrate or sugar claim), the results may not be generalisable to the current regulatory context.

Alcohol Change Australia (2023; low quality) placed two questions in a cross-sectional omnibus survey of a nationally representative sample of 1,000 Australian adult consumers.

For the first question, participants were shown images of the same alcoholic apple cider in the following order: a) cider with no nutrition content claim; b) cider with 'low carb' claim; c) cider with 'low sugar' claim. All participants viewed all images and the order in which they viewed them was not randomised. Participants were asked to rate the healthiness of each of the products on a seven-point Likert scale, where 1 = "Not at all healthy" and 7 = "Very healthy".

As shown in Table 4 below, around a third of the participants rated cider products with 'low carb' and 'low sugar' claims as healthier than an identical product with no claim. The proportion of people who understood that alcohol is unhealthy fell from 48% to 40% when a 'low carb' claim was added, and to 37% when a 'low sugar' claim was added. Mean ratings of healthiness significantly differed between alcoholic beverages with no claims, 'low carb' claims, and 'low sugar' claims, however all mean ratings were below the midpoint on a scale of 1 (not at all healthy) to 7 (very healthy).

It is important to note that the non-randomised order in which participants viewed the products is likely to have impacted on the results. The identical nature of the compared beverages, and the absence of any claims on the first beverage may have made the claims more salient on subsequent beverages. The first beverage shown (without a claim) may also have set a baseline against which later beverages were compared, leading to a relative rather than an absolute rating of healthiness. This design leads to a relative rather than an absolute rating of healthiness. Separately, as no nutrition information was provided on the labels (as required by the Code when making a carbohydrate or sugar claim), the results may not be generalisable to the current regulatory context.

Table 4. Perceived healthiness of alcohol products – aggregated response options (n = 1000; Alcohol Change Australia 2023).

Stimuli	Unhealthy % (n)	Neutral % (n)	Healthy % (n)	Mean (SD)
Apple cider with no claim	48% (480)	29% (286)	23% (234)	3.45 (1.46)[a]
Apple cider with 'low carb' claim	40% (395)	29% (289)	32% (316)	3.76 (1.44)[b]
Apple cider with 'low sugar' claim	37% (374)	27% (266)	36% (360)	3.87 (1.51)[c]

Note: Mean values with different superscripts differed at $p < .001$.

One qualitative survey with a broadly representative sample of 497 Australian women (Pitt et al. 2023; medium quality) sought to investigate how women conceptualise 'low calorie' and 'low sugar' alcohol products, and their influence on attitudes and behaviours. Participants were shown a social media post that displayed an RTD alcohol product with 'no sugar' and 'only 85 calories' claims on the label. Participants were asked how they thought 'low-calorie' or 'low sugar' products might influence women's alcohol use. They were also asked questions relating to their reasons for purchasing (or not purchasing) 'low-calorie' or 'low-sugar' alcohol products, and perceptions about the influence of these products on women and their alcohol use. The broader survey included a range of pictorial examples of different alcohol marketing strategies.

Some women (proportion not reported) suggested that 'low calorie' or 'low sugar' alcohol products provide an alternative for women who need to change their alcohol consumption, or

who were becoming more health or body conscious. Participants thought that these products would appeal to women because of societal pressure for women to be concerned about their weight. Some women, most commonly aged 35-54 years, were concerned that these products could encourage women to drink more. Some participants, particularly younger women (proportion not reported), state that drinking these types of products made them feel 'less guilty' about their alcohol consumption. This was either because they believed they were consuming fewer calories or because they believed that the alcohol product was healthier for them. For example, "I wanted the same effects, but I didn't want to feel bad about myself" (27 year old woman). However, some women were sceptical about the health benefits of these products.

A limitation of the study design (written qualitative survey) is that it can be challenging to interpret the tone of responses and there is no opportunity for probing questions. It is also important to note that, as this study provided stimuli that included both low calorie and low sugar claims, it is not possible to distinguish the influence of these different types of claims on consumers' responses.

Synthesis of findings

Based on four studies, FSANZ's 2023 literature review concluded that sugar and carbohydrate claims may cause consumers to make inaccurate assumptions about alcoholic beverages. In particular, low carbohydrate claims on beer may cause consumers to perceive these beverages as healthier than other types of beer and/or healthy in an absolute sense. One study found that low sugar claims on ciders and RTDs cause young women (aged 18-35 years) to perceive the beverages as healthier, more suitable as part of a healthy diet, better for weight management, less harmful to health, lower in sugar, lower in kilojoules/calories, and lower in alcohol content.

FSANZ's subsequent consumer research (FSANZ 2024) found that claims have a small effect on consumers' perceptions of alcoholic beverages. Alcoholic beverages with carbohydrate or sugar claims are seen as being healthier, less harmful to health, and lower in energy than the same alcoholic beverage with no claim. However, consumers do not perceive alcoholic beverages as being overall healthy, unharmful to health, or low in energy regardless of the presence or absence of claims. There is no effect on consumers' perception of the alcohol content of the beverages.

The additional studies found in this update are broadly consistent with the previously available evidence.

The studies strengthen the finding that carbohydrate and sugar claims have a small effect on consumers' perceptions of the healthiness, sugar, and energy content of the beverages, causing consumers to perceive them as healthier, less harmful to health, lower in sugar, lower in energy, more helpful for weight management, and/or more suitable as part of a healthy diet than beverages without a claim. Two studies that reported participants' mean rating of the healthiness of alcoholic beverages (Alcohol Change Australia, 2023; low quality and Haynes, Talati et al. 2024; high quality) found, consistent with FSANZ's consumer research (2024) that consumers do not perceive alcoholic beverages with 'low carb' or 'low sugar' claims as overall healthy, unharmful to health, helpful for weight management, and/or suitable as part of a healthy diet.

Two high quality studies that examined consumers' perceptions of alcohol content (Haynes, Talati et al. 2024, and Hobin et al. 2024) found that carbohydrate and sugar claims had no statistically significant effect on perceptions of alcohol content. This is consistent with FSANZ's consumer research (2024) but is in contrast to the findings of a study reported in FSANZ's 2023 literature review (Cao et al. 2023), which found that young women perceived alcoholic beverages with 'low sugar' claims as lower in alcohol content. Sensitivity analyses

conducted by Hobin et al. (2024) and FSANZ (2024) found there was no significant effect of age or gender on perceptions of alcohol content. This discrepancy may be explained by the fact that Cao et al. (2023) only showed participants front-of-pack labelling, while Haynes, Talati et al. (2024), Hobin et al. (2024) and FSANZ (2024) showed both front-of-pack and back-of-pack labelling that was consistent with that available in the marketplace relevant to the study sample. In particular, Australian consumers may be used to looking for standard drink information as a measure of alcohol content in back-of-pack standard drink logos/iconography that are commonly used in the Australian/New Zealand marketplace.

Hobin et al. (2024) investigated the effects of sugar (and energy) content claims on perceived product health risks and found that they have no statistically significant effect on perceptions of cancer risk, health concerns, or harmfulness to health. Perceptions of cancer risk and health concerns have not been measured by prior studies, so this is a new finding that contributes to the evidence base. However, the lack of an effect on perceptions of harmfulness to health is in contrast to both Haynes, Talati et al. (2024) and FSANZ's consumer research (2024), which found that claims have a small/weak effect on consumers' perceptions of harmfulness, causing them to perceive alcoholic beverages as less harmful to health. This discrepancy may be due to the different samples (Canada vs Australia), and caution is thus advised when interpreting the other results around health risks.

Considered together, the totality of evidence indicates that carbohydrate and sugar claims cause consumers to perceive alcoholic beverages as healthier, less harmful to health, lower in sugar, and lower in energy than the same beverages without a claim. However, they do not cause consumers to perceive alcoholic beverages as being overall healthy, unharmful to health, low in energy, helpful for weight management, or suitable as part of a healthy diet. The weight of evidence also indicates that carbohydrate and sugar claims do not affect consumer perceptions of the alcohol content. While one Canadian study found that carbohydrate and sugar claims do not decrease consumer perceptions of risk (cancer risk, health concerns) associated with alcoholic beverages, this may not be generalisable to Australian and New Zealand populations.

Research question 4: Consumer behaviours in response to carbohydrate and sugar claims on alcoholic beverages

Two additional studies were identified that examined consumers' behavioural intentions in response to carbohydrate and sugar claims on alcoholic beverages. One was an experimental (between-subjects) study and one was a cross-sectional quantitative survey. The experimental study was undertaken with a Canadian sample, whereas the cross-sectional survey was undertaken with an Australian sample.

One experimental study (Hobin et al., 2024; high quality) investigated the effect of a sugar claim, presented together with an energy claim ('0g sugar, 90 calories') and nutrient declaration, on Canadian consumers' consumption intentions in respect of a mock vodka-based RTD. In this study, 5500 consumers aged 18-64 years were randomly allocated to view front and back-of-pack images of six labelling variations of the mock RTD: (1) included nutrient content claims ("0g sugar, 90 calories") and nutrition declaration; (2) nutrition declaration only; (3) no nutrition content claim or nutrition declaration; (4) nutrition content claim, nutrition declaration and health warning label; (5) nutrition declaration and health warning label; (6) health warning label only. Only results for variations (1), (2) and (3) are discussed further, as the variations that included health warning labels are out of scope of this literature review. After exclusion for withdrawn consent, completion of survey too quickly, or failed data checks, 831 participants were included in analysis for the variation 1; 807 for variation 2; and 811 for variation 3. Linear regression was used to compare perceived product characteristics, perceived product health risks, and intentions to consume, and pairwise comparisons were undertaken between the mean rating of the variations.

Participants were asked four questions around consumption intentions. Participants were asked to rate how likely they would be to try the alcoholic beverage, buy it for themselves, or binge drink the beverage (defined as drinking 5 or more [if male] or 4 or more [if female] cans on one occasion). Responses were captured on a seven-point scale where 1 = "Very unlikely", 4 = "Neutral" and 7 = "Very likely". Participants were also asked "If this alcoholic beverage was available to you at no financial cost, how many cans would you drink over the next 7 days?" Participants could input a numeric response within the range of 0–60.

As shown in Table 5 below, no statistically significant effects were found for any of the purchase or consumption measures (all $p > 0.05$). This indicates that the presence of the nutrition content claims ("0g sugar, 90 calories") and a nutrient declaration did not influence either purchase or consumption intentions.

Table 5. Effect of label condition on intentions to consume (Hobin et al. 2024)

Outcome	Nutrition content claim and nutrition declaration Mean rating, β (95% CI)	Nutrition declaration only Mean rating, β (95% CI)	No nutrition content claim, nutrition declaration Mean rating, β (95% CI)
How likely to try	reference	0.01 (−0.17, 0.19)	−0.14 (−0.32, 0.03)
How likely to buy	4.7 mean rating, reference	4.7 mean rating, 0.05 (−0.14, 0.24)	4.6 mean rating, −0.19 (−0.38, 0.00)
How likely to binge drink	reference	−0.01 (−0.19, 0.18)	0.08 (−0.27, 0.11)
How many cans/serves	reference	0.40 (−0.26, 1.07)	0.13 (−0.53, 0.74)

As previously described, Alcohol Change Australia (2023; low quality) placed two questions in a cross-sectional omnibus survey of a nationally representative sample of 1,000 Australian adult consumers. The first question showed participants three apple ciders, the first with no claim, the second with a 'low carb' claim, and the third with a 'low sugar' claim and asked participants to rate the healthiness of each (see Research Question 3). In the second of the questions, participants were asked "If you were to see the following messages on the label of an alcoholic drink, how would these impact your alcohol use?" The messages were 'low carb' and 'low sugar'. Response options were: "It would increase how many of these beverages I drink", "It would not change how many of these beverages I drink", "It would decrease how many of these beverages I drink" and "Don't know/can't say".

Table 6. Anticipated change in consumption (Alcohol Change Australia, 2023)

Claim	Decrease consumption % (n)	No change in consumption % (n)	Increase consumption % (n)	Don't know	Mean (SD)
Low carb	12% (120)	59% (592)	13% (129)	16% (159)	.01 (.55)
Low sugar	13% (126)	54% (535)	20% (195)	14% (144)	.07 (.60)

Note: Mean ratings are based on a scale from -1 'Decrease consumption' to 1 'Increase consumption', excluding 'Don't know'.

As shown in Table 6 above, approximately equal proportions of respondents reported that they would increase (12%) and decrease (13%) their consumption of an alcoholic beverage with a 'low carb' claim, while the majority (59%) reported that they would not change their consumption and 16% did not know. In contrast, more respondents indicated that they would

increase their consumption of an alcoholic beverage with a 'low sugar' claim (20%) than would decrease it (13%), although the majority (54%) reported that they would not change their consumption, and 14% did not know. People were statistically more likely to report increasing their consumption of beverages with a 'low sugar' claim than they were a 'low carb' claim ($p < .001$).

Synthesis of findings

Based on two studies, FSANZ's 2023 literature review found there was no clear evidence to suggest that sugar and carbohydrate claims affect consumers' level of alcohol intake.

FSANZ's consumer research (FSANZ 2024) found that carbohydrate and sugar claims have no effect on consumers' consumption intentions (i.e. the number of alcoholic drinks they intend to consume).

The additional studies found in this update are broadly consistent with this evidence base. The high quality, experimental study (Hobin et al. 2024; high quality) found that sugar (and energy) content claims have no statistically significant effect on consumers' likelihood to try, purchase, or binge drink alcoholic beverages. Neither did they have a statistically significant effect on the number of drinks consumers intend to consume. Alcohol Change Australia's study (2023; low quality) found that approximately equal proportions of consumers reported they would increase or decrease their alcohol consumption of beverages labelled with 'low carb' claims. This is consistent with the existing evidence base.

In contrast to the existing evidence base, the Alcohol Change Australia study found that a relatively greater proportion of consumers would increase (20%) rather than decrease (13%) their consumption of 'low sugar' beverages. However, methodological limitations associated with this study mean there is relatively low confidence in these findings.

Based on one study (Cao et al. 2023), FSANZ's 2023 literature review found the presence of a claim may make young women consumers less likely to exercise, and less likely to change their diet, in order to compensate for the energy from alcoholic beverages.

FSANZ's consumer research (FSANZ 2024) found that carbohydrate and sugar claims have no effect on consumers' likelihood of modifying food intake or physical activity when demographic factors are controlled for. The discrepancy with the findings in Cao et al. (2023) may be explained by the difference in samples (young women vs general population) and the fact that FSANZ provided participants with nutrition information, including energy content information. Cao et al. (2023) did not provide participants with mandatory nutrition information on the beverages, and was not able to control for demographic factors due to their sample targeting young women consumers.

No additional studies were found in this update that investigated the effect of claims on consumers' compensatory behavioural intentions, such as modifying food intake or physical activity to compensate for the energy from alcoholic beverages.

Considered together and taking into account the quality assessments and generalisability of the studies, the totality of evidence indicates that carbohydrate and sugar claims have no effect on consumers' consumption intentions, and have no effect on their likelihood of modifying food intake or physical activity to compensate for the energy from alcoholic beverages. No studies were identified that investigated the effect on potential substitution behaviours, such as substituting one type of alcoholic beverage for another.

Strengths and limitations

The evidence base regarding Australian and New Zealand consumers' value, perceptions, and behaviours in response to carbohydrate and sugar claims on alcoholic beverages has been strengthened by the consideration of seven recent publications based on Australian samples (which can be considered to be reasonably analogous to New Zealand consumers).

The addition of three high quality studies and two medium quality studies has increased confidence in the conclusions to research questions 1 (consumer understanding of the nutritional properties of alcoholic beverages), 3 (consumer perceptions of carbohydrate and sugar claims on alcoholic beverages), and 4 (consumer behaviours in response to carbohydrate and sugar claims on alcoholic beverages).

The addition of another study that addressed research question 2 (consumer value of carbohydrate and sugar claims on alcoholic beverages), although low quality, has further extended the consistency of findings. However, caution is still advised when interpreting the findings relevant to consumer perceptions of carbohydrate claims on beer, as the additional study was not able to distinguish between consumer value of 'low carb' and 'low sugar' claims and the studies that address carbohydrate claims on beer are all of low quality.

The use of multiple officers in the screening and quality assessment of the literature (including double-screening and double-assessing in instances where there was uncertainty) increases the reliability of these processes. However, it is acknowledged that most of the references were not double-screened or double-assessed. This was necessary in order to provide a timely evidence synthesis, and is common when conducting rapid systematic reviews (Tricco et al., 2015).

Relevant literature was found from searching databases that were available to FSANZ. It is therefore possible that additional relevant literature was missed from other databases. In addition, searching reference lists and citing studies of all obtained studies was not undertaken for this update due to time constraints. However, the possibility of missing relevant studies was somewhat mitigated by including studies that were submitted to FSANZ through the public Call for Submissions process and inviting stakeholders to submit research through subsequent targeted stakeholder consultations.

Independent, academic peer review of this update was not undertaken due to time constraints.

Conclusions

The purpose of this update was to review the evidence regarding consumer value, perceptions and behaviours in response to carbohydrate and sugar claims on alcoholic beverages that had become available since FSANZ first reviewed the consumer evidence in 2023.

The update examined literature from May 2022 – December 2024, and identified eight unique studies, which varied in quality and methodology. The update also included consideration of FSANZ's consumer research, undertaken in 2024 to supplement the available evidence base.

The conclusions reached from considering the totality of the consumer evidence available are outlined below, by research question.

Research question 1: Consumer understanding of the nutritional properties of alcoholic beverages

FSANZ's 2023 literature review concluded that consumers generally have a poor understanding of the nutritional properties of alcoholic beverages (based on their general knowledge). They tend to overestimate the sugar content of all types of alcoholic beverages (wine, beer, spirits, cider, RTDs) and overestimate the carbohydrate content of beer. Only a minority of consumers are able to correctly estimate the energy content of alcoholic beverages, or to rank the relative energy content of different alcoholic beverages. Consumers do not understand that the main source of energy in most alcoholic beverages comes from the alcohol itself. Instead, consumers believe that sugar or carbohydrates are the main sources.

One additional study was found that was consistent with the finding in FSANZ's 2023 literature review that consumers do not understand that the main source of energy in most alcoholic beverages comes from the alcohol itself, and believe that sugar or carbohydrates are the main sources. The conclusions of FSANZ's 2023 literature review remain unchanged.

Research question 2: Consumer value of carbohydrate and sugar claims on alcoholic beverages

FSANZ's 2023 literature review concluded that consumers generally value sugar claims (and sugar information more broadly) on alcoholic beverages. It found that consumers may also value carbohydrate claims on alcoholic beverages, however the evidence was less clear as the results were not generalisable to all types of alcoholic beverages.

The single additional study found in this update provides further evidence that consumers value 'low sugar' and/or 'low carb' claims on alcoholic beverages, with the majority supporting and very few opposing their presence on alcohol labels. However, as the study does not distinguish between consumers' value of 'low sugar' and 'low carb' claims, the evidence does not increase the level of confidence in consumer value of 'low carb' claims, which was less clear. The conclusions of FSANZ's 2023 literature review remain unchanged.

Research question 3: Consumer perceptions of carbohydrate and sugar claims on alcoholic beverages

FSANZ's 2023 literature review concluded that sugar and carbohydrate claims may cause consumers to make inaccurate assumptions about alcoholic beverages. In particular, low carbohydrate on beer may cause consumers to perceive these beverages as healthier than other types of beer and/or healthy in an absolute sense. Low sugar claims on ciders and RTDs were found to cause young women (aged 18-35 years) to perceive the beverages as healthier, more suitable as part of a healthy diet, better for weight management, less harmful to health, lower in sugar, lower in kilojoules/calories, and lower in alcohol content.

FSANZ's subsequent consumer research (FSANZ 2024) found that claims have a small effect on consumers' perceptions of alcoholic beverages. Alcoholic beverages with carbohydrate or sugar claims are seen as being healthier, less harmful to health, and lower in energy than the same alcoholic beverage with no claim. However, consumers do not perceive alcoholic beverages as being overall healthy, unharmful to health, or low in energy regardless of the presence or absence of claims. There was no effect on consumers' perception of the alcohol content of the beverages.

The additional studies found in this update are broadly consistent with the previously available evidence.

The studies strengthen the finding that carbohydrate and sugar claims have a small effect on consumers' perceptions of the healthiness, sugar, and energy content of the beverages, causing consumers to perceive them as healthier, lower in sugar, and lower in energy compared to beverages without a claim. However, consumers do not perceive alcoholic beverages with either 'low carb' or 'low sugar' claims as overall healthy.

One high quality study (Hobin et al. 2024) found that sugar (and energy) content claims have no effect on consumer perceptions of alcohol content. This is consistent with FSANZ's consumer research (2024), but is in contrast to the findings of one high quality study (Cao et al. 2023) in FSANZ's 2023 literature review, which found that young women perceived alcoholic beverages with 'low sugar' claims as lower in alcohol content. Sensitivity analyses conducted by Hobin et al. (2024) and FSANZ (2024) found there was no significant effect of age or gender on perceptions of alcohol content. This discrepancy may be explained by the fact that Cao et al. (2023) only showed participants front-of-pack labelling of foreign alcoholic beverages, while Hobin et al. (2024) and FSANZ (2024) showed both front-of-pack and back-of-pack labelling that was consistent with that available in the marketplace relevant to the study sample. In particular, Australian consumers may be used to looking for standard drink information (as a measure of alcohol content) in back-of-pack standard drink logos/iconography that are commonly used in the Australian/New Zealand marketplace.

One high quality study found that sugar (and energy) content claims have no statistically significant effect perceptions of cancer risk, health concerns, or harmfulness to health (Hobin et al. 2024). Perceptions of cancer risk and health concerns have not been measured by prior studies, so this is a new finding that contributes to the evidence base. However, the lack of an effect on perceptions of harmfulness to health is in contrast to FSANZ's consumer research (2024), which found that the claims cause consumers to perceive alcoholic beverages as less harmful to health.

Considered together, the totality of evidence indicates that carbohydrate and sugar claims cause consumers to perceive alcoholic beverages as healthier, lower in sugar, and lower in energy than the same beverages without a claim. However, they do not cause consumers to perceive alcoholic beverages as being overall healthy, unharmful to health, or low in energy. The weight of evidence also indicates that carbohydrate and sugar claims do not effect consumer perceptions of alcohol content, and there is evidence that carbohydrate and sugar claims do not decrease consumer perceptions of health risks (cancer risk, health concerns) associated with alcoholic beverages.

Research question 4: Consumer behaviours in response to carbohydrate and sugar claims on alcoholic beverages

FSANZ's 2023 literature review found there was no clear evidence to suggest that sugar and carbohydrate claims affect consumers' level of alcohol intake. However, one study found the presence of a claim may make young women consumers less likely to exercise, and less likely to change their diet, in order to compensate for the energy from alcoholic beverages.

FSANZ's consumer research (FSANZ 2024) found that carbohydrate and sugar claims have no effect on consumers' consumption intentions (i.e. the number of alcoholic drinks they intend to consume) or their likelihood of modifying food intake or physical activity.

The additional studies found in this update are broadly consistent with the previous evidence base. The high quality, experimental study (Hobin et al. 2024; high quality) found that sugar (and energy) content claims have no statistically significant effect on consumers' likelihood to try, purchase, or binge drink alcoholic beverages. Neither did they have a statistically significant effect on the number of drinks consumers intend to consume. Alcohol Change Australia's study (2023; low quality) found that approximately equal proportions of consumers

reported they would increase or decrease their alcohol consumption of beverages labelled with 'low carb' claims. This is consistent with the existing evidence base.

In contrast to the existing evidence base, the Alcohol Change Australia study found that a relatively greater proportion of consumers would increase (20%) rather than decrease (13%) their consumption of 'low sugar' beverages. However, methodological limitations associated with this study mean there is relatively low confidence in these findings.

Considered together and taking into account the quality assessments and generalisability of the studies, the totality of evidence indicates that carbohydrate and sugar claims have no effect on consumers' purchase or consumption intentions, or their likelihood of modifying food intake or physical activity to compensate for the energy from alcoholic beverages.

References

Alcohol Change Australia. (2023). *Omnibus survey results: Carbohydrate and sugar claims on alcohol products*. Report. Submitted through Call for Submissions. Summary report available at: https://alcoholchangeaus.org.au/poll-results-carbohydrate-and-sugar-claims-on-alcohol-products/ Accessed December 2024.

Bowden, J., Harrison, NJ., Caruso, J., Room, R., Pettigrew, S., Olver, I., and Miller, C. (2022). Which drinkers have changed their alcohol consumption due to energy content concerns? An Australian survey. *BMC Public Health*, 22, 1775. https://doi.org/10.1186/s12889-022-14159-9

Cao, S., Tang, C., Carboon, I., Hayward, C., Capes, H., Chen, YJM, Brennan, E., Dixon, H., Wakefield, M., Haynes, A. (2023). The health halo effect of 'low sugar' and related claims on alcoholic drinks: an online experiment with young women. *Alcohol and Alcoholism, 58*(1), 93-99. https://doi.org/10.1093/alcalc/agac054

Fenton, L., Lauckner, H., & Gilbert, R. (2015). The QATSDD critical appraisal tool: comments and critiques. *Journal of Evaluation in Clinical Practice, 21*(6), 1125-1128. https://doi.org/10.1111/jep.12487

FSANZ. (2021). *Consumer literature review and meta-analysis for W1135: Consumer value/motivation, understanding and behaviour in relation to energy content information on alcoholic beverages*. Report. Accessed September 2024.

FSANZ. (2023). *Consumer literature review for P1049: Consumer value, perceptions and behaviours in relation to carbohydrate and sugar claims on alcoholic beverages*. Report. Accessed September 2024.

Guyatt, G., Oxman, A. D., Akl, E. A., Kunz, R., Vist, G., Brozek, J., ... & Schünemann, H. J. (2011). GRADE guidelines: 1. Introduction—GRADE evidence profiles and summary of findings tables. *Journal of Clinical Epidemiology, 64*(4), 383-394. https://doi.org/10.1016/j.jclinepi.2010.04.026

Haynes, A., Ilchenko, E., Dixon, H., and Morley, B. (2024). Prevalence and predictors of misperceptions of 'better-for-you' alcohol products among Australian adult drinkers. *Health Promotion International*. 39, daae134. https://doi.org/10.1093/heapro/daae134

Haynes, A., Talati, Z., Keric, D., Stafford, J., Sartori, A., Myers, G., Martin, J., McAleese, A., McCausland, T., Wakefield, M., and Dixon, H. (2024) *The effect of low sugar and low carb claims on young adults' perceptions of alcohol products*. Unpublished report.

Hinkle, DE., Wiersma W., Jurs, SG. (2003) *Applied Statistics for the Behavioral Sciences*. 5th ed. Boston: Houghton Mifflin.

Hobin, E., Thielman, J., Forbes, SM., Poon, T., Bélanger-Gravel, A., Demers-Potvin, É., Haynes, A., Li, Y., Niquette, M., Paradis, C., Provencher, V., Smith, BT., Wells, S., Atkinson, A., and Vanderlee, L. (2024). Can a health warning label diminish the persuasive effects of health-oriented nutrition advertising on ready-to-drink alcohol product packaging? A randomized experiment. *Addiction*. 119, 1238-1252. https://doi.org/10.1111/add.16475

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2010). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *International Journal of Surgery, 8*(5), 336-341. https://doi.org/10.1016/j.ijsu.2010.02.007

Pitt, H., McCarthy, S., Keric, D., Arnot, G., Marko, S., Martino, F., Stafford, J., Thomas, S. (2023). The symbolic consumption processes associated with 'low-calorie' and 'low-sugar' alcohol products and Australian women. *Health Promotion International*, 38, 1-13. https://doi.org/10.1093/heapro/daad184

Sirriyeh, R., Lawton, R., Gardner, P., & Armitage, G. (2012). Reviewing studies with diverse designs: the development and evaluation of a new tool. *Journal of Evaluation in Clinical Practice, 18*(4), 746-752. https://doi.org/10.1111/j.1365-2753.2011.01662.x

Tricco, A.C., Zarin, W., Antony, J., Hutton, B., Moher, D., Sherifali, D., & Straus, S. E. (2016). An international survey and modified Delphi approach revealed numerous rapid review methods. *Journal of Clinical Epidemiology, 70*, 61-67. https://doi.org/10.1016/j.jclinepi.2015.08.012

Wellard-Cole, L. (2023). *NSW Community Survey on Cancer Prevention 2022.* Report prepared by the Cancer Council NSW. Accessed December 2024.

Yusoff, A., Sträuli, B., Jongenelis, M., Bowden, J., Bartram, A., Brownbill, A., Jones, A., Norris, C., Stafford, J., O'Brien, P., and Pettigrew, S. (2024). *Sugar and carbohydrate claims affect perceptions of alcohol healthiness.* Report prepared by The George Institute for Global Health. Accessed December 2024.

Appendices

Appendix 1: Literature review methods

The literature review method adopted in this update were aligned with the 2022 literature review (FSANZ 2023).

All decisions regarding inclusion/exclusion criteria were made prior to the literature search commencing, except where otherwise stated.

Inclusion criteria

The review included studies that examined:

- Consumer understanding of the nutritional properties (sugar, carbohydrate, energy content) of alcoholic beverages
- Consumer value of sugar and carbohydrate claims regarding alcoholic beverages
- Consumer perceptions of sugar and carbohydrate claims regarding alcoholic beverages
- Consumer behaviours in relation to sugar and carbohydrate claims regarding alcoholic beverages

No restrictions were placed with respect to study type (e.g., experiments, surveys, focus groups, interviews, observational studies), participant characteristics (e.g., age, geographic location, level of alcohol consumption) or specific outcome measures (e.g., hypothetical self-reported measures of alcohol consumption, actual volume of alcohol consumed within a lab setting, etc.). Rather, this information was coded for each study (see 'Data extraction' below). Studies were defined as primary research papers where empirical data were collected/reported. Grey literature was also included.

No restrictions were placed on the format of the sugar/carbohydrate claim. That is, studies were included that examined consumer responses to claims that were presented on the label of an alcoholic beverage, on a poster advertising alcoholic beverages, and were provided as a general statement e.g. studies that generally asked participants about "low-carb beer" without showing them a particular type of label/claim.

Studies examining consumer value of sugar/carbohydrate content information on alcoholic beverages in general (i.e., where it is not clear whether participants were referring to a NIP or claim format[6]) were also included for comprehensiveness, given the limited number of studies that were available to address this question.

Exclusion criteria

Searches were limited to papers available in English and published from May 2022 (the date the last literature search was conducted) to December 2024.

The following studies were excluded:

[6] A nutrition content claim (e.g., "low carbohydrate beer") differs from nutrition content information provided in a NIP which has a numerical format (e.g., carbohydrates: *x*g per serving; *x*g per 100 ml).

- Studies examining sugar and carbohydrate claims (or sugar and carbohydrate content information) specifically in relation to non-alcoholic beverages and foods.
- Studies examining consumers perceptions of sugar and carbohydrates more broadly (i.e. not specifically asked in relation to alcoholic beverages).
- Studies examining consumer perceptions of the general healthiness of alcoholic beverages (beyond that of energy, sugar and carbohydrate information).
- Systematic reviews.

Online database searches

One officer searched for literature included in this supplementary review. The databases and search strings used are outlined below.

The following six databases were searched via EBSCO Discovery:

- Science Direct
- Food Science Source
- FSTA – Food Science and Technology Abstracts
- MEDLINE with Full Text
- SocINDEX with Full Text
- EconLit with Full Text

The searches were limited to peer-reviewed journal articles in English, using simple Boolean search term combinations. The same search strings were used as were employed in the 2022 literature review. These are:

Search string 1[7]*:*

TI (alcohol* OR beer* OR wine* OR spirit OR liquor) AND AB (carb* OR sugar* OR nutri*) AND AB ((perc* OR interpret* OR influenc* OR intent* OR behav* OR purchas*) OR (know* OR understand* OR aware* OR belie*)) NOT (ferment* OR bacteria* OR “fatty liver” OR “oxidative stress” OR biomarker* OR molecul* OR receptor* or mice OR rat* or ferment*)

Search string 2:

AB consumer* AND AB alcohol* AND (sugar* OR carbohydrate*) AND label*

Search string 3:

TI (alcohol* OR beer* OR wine* OR spirit OR liquor) AND AB (carb* OR sugar* OR nutri*) AND AB (value* OR seek* OR motivat*) NOT (ferment* OR bacteria* OR “fatty liver” OR “oxidative stress” OR biomarker* OR molecul* OR receptor* or mice OR rat* or ferment*)

[7] ‘TI’ indicates that the terms must be in the title of the study. ‘AB’ indicates that the terms must be in the abstract of the study.

Other sources/grey literature

Further literature was obtained from stakeholders during the Call for Submissions for P1049 and targeted consultations held for Proposal P1059 – Energy labelling on alcoholic beverages.

Research review process

The search process identified 848 potentially relevant documents. References were exported to Excel, and exact duplicates were removed using Excel's data management tools.

Out-of-scope papers were removed based on title and/or abstract. Finally, documents identified as out-of-scope on the basis of full-text review were excluded. This resulted in eight full-text documents being included. Screening was undertaken by four officers.

Figure A1 shows the total number of documents retrieved at various stages of the review process. The information depicted in Figure A1 is based on the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA; Moher et al., 2010).

Data extraction

The data extracted from each study included: Study aims, study design, sample characteristics and sampling strategy, summary of data collection methods and analyses, relevant findings, research question(s) addressed relevant to the literature review, information relevant to the quality assessment (see Table A2 in Appendix 2). The data was summarised for each study and is presented in Appendix 3.

Data extraction was split between four officers.

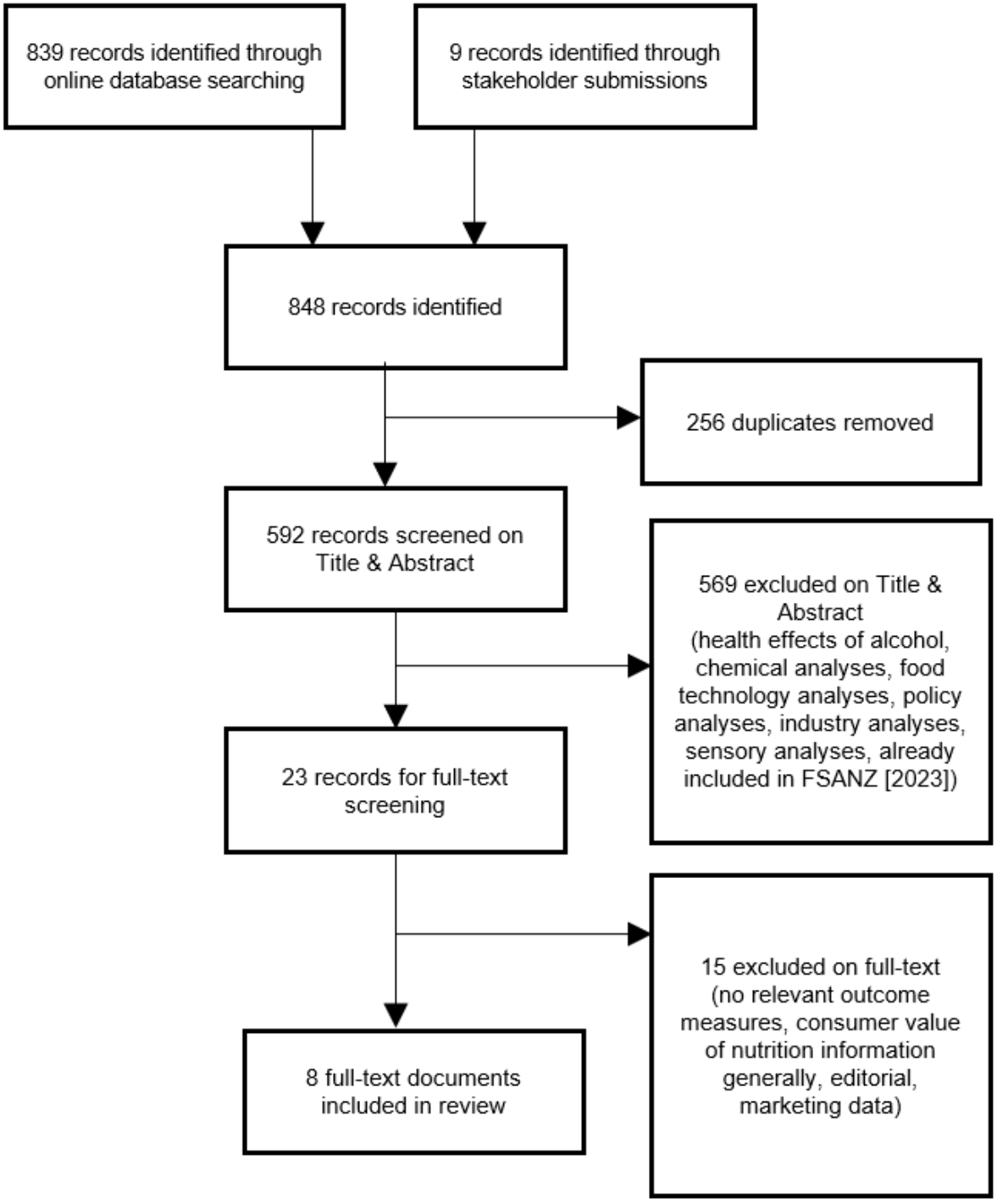

Figure A1: Number of documents retrieved at various stages of the review process.

Appendix 2: Revised QATSDD

The original QATSDD has been shown to produce reliable and valid quality assessments for studies with diverse designs (Sirriyeh et al., 2012). However, recent criticism of the tool suggests there is a need to further define the language used (Fenton et al., 2015). Fenton et al. (2015) suggested that the criteria be further described, with specific examples incorporated for each criterion. The revised version of the QATSDD utilised in the current review therefore further elaborates on the criteria outlined in the original QATSDD tool. Additionally, items that were deemed to be assessing similar criteria were merged for ease of use, and an item assessing ethical approval was also added.

As with the original QATSDD, not all criteria in the revised QATSDD were applicable to all studies (as some criteria were only relevant to quantitative studies, or to qualitative studies).

The revised QATSDD consists of a total of 14 items (12 items for quantitative or qualitative studies, 14 items for mixed-design studies). A full copy of the revised QATSDD is in Table A2.

Table A2. Revised Quality Assessment Tool for Studies with Diverse Designs (QATSDD)

Theme	Criteria number	Criteria	0 = Not at all	1 = Very slightly	2 = Moderately	3 = Complete
Research Back ground and Aims	1	Explicit theoretical or conceptual framework. Consider: • Review of previous relevant studies/literature • Rationale for the study and how it links together with the discussion of the results • Application of existing theory (e.g. Theory of planned behaviour, Health motivation theory) or descriptive consideration of key concepts and their inter-relationships	No mention at all.	Reference to broad theoretical basis i.e., some general details – very limited justification for the study and/or very limited discussion of how results related to the literature or theories.	Reference to a specific theoretical basis. i.e., more specific details than rating 1. E.g., strong justification for the study in the introduction based on existing literature or theories, but limited discussion of how the results of the study relate to literature or theories (or vice versa).	Explicit statement of theoretical framework and/or constructs applied to the research. Justifies what the current study will add to the existing body of evidence, with thorough discussion of consistencies/inconsistencies with results from prior studies (theorises possible reasons for inconsistencies/what all results taken together imply about a phenomenon/construct). Note that reference to a theoretical model may not be necessary for an applied study (descriptive consideration of key concepts and their inter-relationships may suffice).
	2	Statement of aims/objectives in main body of report.	No mention at all.	General reference to aim/objective at some point in the report including abstract.	Reference to broad aims/objectives in main body of report.	Explicit statement of aims/objectives in main body of report.
	3	Clear description of research setting. Consider: • Who (specific target population) • What (clear research problem/question being studied in the target population) • Where (where the research took place, e.g., in lab/online/at home, and where participants were from) • When (when the research took place) • This criteria is not about a description of the data collection procedure or tools.	No mention at all.	General description of research area and background. Very general target population for research question stated e.g., 'consumers of alcohol'. Most other dot points not covered.	General description of research problem in the target population. Most dot points covered.	Specific description of the research problem and target population in the context of the study. All dot points covered.

	4	Fit between stated research question and research design. Consider: • Research design e.g. experimental versus cross-sectional designs. This criteria is not about data collection tools. • Experimental designs are appropriate for establishing cause and effect e.g., the effect of labelling on behaviour. Whereas qualitative studies or surveys may be better suited to answer questions regarding consumer perceptions.	No research question/aim/objective stated.	Research design/approach can only address some aspects of the research question.	Research design/approach can address the research question but there is a more suitable alternative that could have been used or used in addition.	Research design/approach selected is the most suitable approach to attempt to answer the research question
Sampling and recruitment	5	Evidence of sample size considered in terms of analysis. Consider: • Discussion of smallest sample cell • Oversampling demographics of interest with low prevalence	No mention at all.	Basic explanation for choice of sample size. Evidence that size of the sample has been considered in study design. E.g., vague reference to other studies without further explanation.	Evidence of consideration of sample size in terms of saturation/information redundancy or to fit generic analytical requirements. E.g., mentions calculations or saturation requirements but the final sample was unable to completely meet these (e.g., necessary sample for main effect has been met but not for subgroup analyses, or numbers approach but don't quite meet the target), or mentions generic sample requirements that may not necessarily generalise to the current study requirements.	Explicit statement of data being gathered until information redundancy/saturation was reached or to fit exact calculations for analytical requirements. E.g., mentions exact calculations/saturation requirements and these were met.
	6	Representative sample of target group of a reasonable size Consider:	No statement of target group.	Sample is limited but represents some of the target group or	Sample is somewhat diverse but not entirely representative, e.g. inclusive of all age	Sample includes individuals to represent a cross section of the target population, considering

		• Online panels may limit ability to achieve a representative sample • Convenience samples may limit ability to achieve a representative sample • Demographic characteristics of the sample – is any subgroup over- or under-represented? E.g., if the aim of the study was to answer a research question regarding participants of various ages, then the sample is not representative if, for example, a very small percentage of the sample were young adults, and the majority were within an older age bracket.		representative but very small.	groups, experience but only one workplace. Requires discussion of target population to determine what sample is required to be representative.	factors such as experience, age and workplace.
	7	Detailed recruitment data • Describes the process of recruitment as well as response rates, drop-out rates etc.	No mention at all, or only final N reported.	Minimal recruitment data, e.g. no. of questionnaires sent and no. returned. Or only final N reported plus clear description of recruitment method.	Most recruitment information but not complete account, e.g. full recruitment figures but no information on strategy used. Or clear description of recruitment method and recruitment figures, except one figure missing (e.g., number dropped out and final N reported, but no information on N who declined to participate).	Complete data regarding no. approached, no. recruited, attrition/drop-out data where relevant, method of recruitment.
Procedural details	8	Description of procedure for data collection. Consider: • The order in which participants completed tasks/questionnaires. • Description of the data collection tools e.g., question wording/response options/stimuli given to participants. Note this is different from criteria 9 below which assesses whether the data collection tools were appropriate to use; criteria 8 assesses whether an adequate description was provided of the tools themselves.	No mention at all.	Very basic and brief outline of data collection procedure, e.g. 'using a questionnaire distributed to staff'.	States each stage of data collection procedure but with limited detail, or states some stages in details but omits others.	Detailed description of each stage of the data collection procedure.

Data collection tools **(Quantitative)**	9	Data collection tools justified, reliability and validity assessed. Consider: • Questionnaires, measures and stimuli used • Reliability indicates consistency e.g., if you tested a group of participants at time 1, then tested them again at time 2, the results should be the same/consistent between time 1 and time 2 (test-retest reliability). • Validity indicates that the measurement tool is measuring what it is intended to e.g., use of piloting or statistical assessment of tools where appropriate. • If ratings differ for different tools used, then take an average, e.g. if a measure is a 2, but stimuli are a zero, the rating will be 1.	No mention at all.	Very limited consideration of reliability/validity of data collection tool(s) e.g., generally and accurately explains why the construct to be measured is appropriate, without reference to the actual measurement tool(s) or any reliability/validity assessments. Or vaguely states that the tools were based on a review of the literature without citations or further elaboration.	Some evidence that the reliability/validity of the data collection tool(s) has been considered e.g. based on use in a cited prior similar study but without reference to any reliability/validity assessments. Or some attempt to assess reliability and validity but insufficient (e.g., unsuccessful attempt to establish test-retest reliability but no further action is taken).	Reliability and validity of all major tool(s) has been established. Note that the authors do not need to assess reliability and validity themselves; reporting these based on prior studies may suffice if based on similar populations.
Data collection tools **(Qualitative)**	10	Format and content of data collection tool justified. Consider: • Questions/schedules/stimuli/guides used for interview/focus groups • How were the questions/guides developed? Based on existing theory/literature? • Previously tested/piloted. • Consideration of leading/biased questions.	No mention at all	Very limited consideration of quality of data collection tool(s) e.g., generally and accurately explains why the topics are appropriate to include in the guide to answer the research question(s), but questions or guide not piloted or used in a prior study. Or vaguely states that the tools were based on a review of the literature without citations or further elaboration.	Some evidence that the quality of the data collection tool(s) has been considered e.g. based on use in a cited prior similar study without further explanation. No major concerns in terms of leading/biased questions, but could benefit from further consideration or elaboration of the dot points.	Quality of all major tool(s) has been established, e.g., clearly justified based on detailed explanation of a prior study/literature. No concerns regarding leading or biased questions. Note that if a mixed design study had one minor qualitative component where participants are simply given the opportunity to provide further comments on a construct/topic, e.g., “do you have any further comments about….” Then this may be rated here as a 3, as long as there are no concerns regarding leading/biased questions.
Data analysis **(Quantitative)**	11	Data analysis approach justified and undertaken appropriately Consider:	No mention at all, or the analytical approach does not even broadly match the type of data.	**Most of the dot points have NOT been considered**, reported on or	**Most of the dot points have been addressed**. Analysis allows reasonable	All dot points haven been considered where relevant. Method of analysis selected is the most suitable approach,

		• Do statistical tests match the type of data? • Were multiple tests accounted for to control for type 1 error? e.g., via Dunnett's, Tukey or Bonferroni corrections. However less of a concern if p values are very high anyway (>0.05), or very small (<0.001). • Were confounding variables considered? (e.g., entered as covariates) • Were statistical assumptions acknowledged where relevant? (e.g., multicollinearity for regression, or tests of normality where relevant). Means and SDs are not appropriate for interpreting skewed data (medians and interquartile ranges would provide a more accurate representation of group data in this case) • Proportional data: Fisher's test should be used over Chi square test if low frequencies (n<5 in a group/cell). • Could the study benefit from additional analyses to provide greater insight? • Results adequately reported to support conclusions e.g., descriptive statistics, p values, etc.		correctly applied, but the analytical approach broadly matches the type of data. E.g., use of a one-way between-subjects ANOVA is appropriate to analyse multiple group levels of a single independent variable. However correction for multiple testing/statistical assumptions/control for covariates not considered or reported on.	conclusions to be made from results but could still benefit from further consideration from the list of dot points, (e.g., consideration of statistical assumptions, or additional analyses could provide greater insight). However note that if most points have been addressed, but serious concerns remain that would significantly impact confidence in results (e.g., confounding variables), then the study should not be granted a 2 for this criteria.	and results are adequately reported to support conclusions.
Data analysis **(Qualitative)**	12	Analytical approach justified and assessment of reliability of analytic process Consider: • Approach to analysis described e.g., grounded theory, thematic coding. • how did they develop codes, themes. • techniques to increase trustworthiness in results e.g. multiple researchers, interrater reliability, member-checking (i.e., returning data to participants to check for accuracy and resonance with their experiences), audit trail, reflexive process, negative case search (i.e., searching for and discussing elements of the data that do not support or appear to contradict	No mention at all of the approach to analysis	Basic description of approach to analysis (e.g., themes coded from the data vs. use of an existing coding scheme that was developed prior to data collection), but **most of the dot points missing, not considered or incorrectly applied,** i.e., no or limited description of techniques to increase trustworthiness in	**Most of the dot points have been addressed**. Analysis allows reasonable conclusions to be made from results but could still benefit from further consideration from the list of dot points. E.g., justified description of how themes were coded, but only use of one or two techniques to ensure trustworthiness in results, only a few instances where	All dot points have been considered where relevant. Method of analysis selected is the most suitable approach. Use of a range of methods to enhance trustworthiness in results, and results are adequately reported to support conclusions.

		patterns or explanations that are emerging from data analysis). • discussion of subjective influences of analysis • Results adequately reported to support conclusions e.g., use of participant quotes.		results, no further details of how codes were developed, missing information when reporting results.	results could be reported more clearly to support conclusions.	
Ethics	13	Ethics approval	No mention at all.	N/A	N/A	Ethics approval obtained.
Strengths and limitations	14	Strengths and limitations critically discussed?	No mention at all.	Very limited mention of strengths and limitations with omissions of many key issues.	Discussion of some of the key strengths and weaknesses of the study but not complete.	Discussion of strengths and limitations of all aspects of the study including design, measures, procedure, sample & analysis.

Appendix 3: Study characteristics and quality assessments

Table A3.1. Additional studies examining consumer understanding of the nutritional content of alcoholic beverages (n = 1)

Study	Sampling approach	Participant characteristics	Design/stimuli/measures	Key findings	Quality
Bowden et al. (2022)	801 respondents who reported having consumed alcohol at least monthly over the last year. Recruited via email based on having participated in previous survey research. Quotas applied for gender (approximately equal) and being a parent of a child under 18 years of age (50% or greater).	50.2% female 49.8% male 18-29 years: 12.4% 30-44 years: 69.2% 45-59 years: 52.9% Primary/highschool: 18.4% Certificate/diploma: 41.6% Bachelor degree or higher: 40.1% < $80,000: 37.8% $80,001 - $120,000: 28.3% > $120,000: 33.8% SEIFA quintiles 1-2: 29.7% SEIFA quintiles 3-5: 70.3% Major city: 82.2% Rural/remote: 17.8% In paid employment: 77.4% Not employed: 22.6% Parent of child < 18: 73.8% Not: 26.2% Average daily alcohol consumption Above long-term risk guideline: 43.9% Within long-term risk guideline: 56.1% Daily/weekly alcohol consumption: 77.9% Monthly alcohol consumption: 22.1%	Quantitative (online) survey, undertaken as part of a broader survey about levels of parental drinking in the presence of children. Participants were asked “When you have an alcoholic drink, how often do you drink lower carb [carbohydrate] alcohol because you are concerned about the calories/kilojoules.” Responses were collected on a five-point Likert scale with the responses “Always”, “Most of the time”, and “Sometimes” categorised as ‘Yes’, and “Rarely” or “Never” categorised as ‘No’.	46.4% of respondents reported drinking lower-carb alcohol because of energy-related concerns. There was no statistically significant difference by gender.	High. Rated highly on all criteria. Clear methodology and reporting of results with appropriate statistical analysis. No rationale provided for sample size.

Table A3.2. Additional studies examining consumer value of carbohydrate and sugar claims on alcoholic beverages (n = 1)

Study	Sampling approach	Participant characteristics	Design/stimuli/measures	Key findings	Quality
Wellard-Cole (2023)	1,513 respondents. No sampling approach identified.	Participant demographic characteristics not reported. 16% reported never drinking alcohol. Of participants who drank alcohol, 56% had 1-2 standard drinks on a typical drinking session. On average, those who drank alcohol consumed 6.5 standard drinks per week.	Quantitative (online) survey. Participants were asked to rate their level of support for various alcohol labelling initiatives.	74% of respondents supported "information about the amount of energy (kilojoules), sugar and/or carbohydrates on alcohol labels". 21% neither supported nor opposed, 3% opposed, and 2% didn't know. 62% of respondents supported "nutrition claims (e.g. 'low sugar' or 'low carb') on alcohol labels", 28% neither supported not opposed, 8% opposed, and 3% didn't know.	Low Rated poorly on most criteria. Missing methodological and results information (procedure, questions, and data analytical approach was not reported. Recruitment method not identified. Demographic characteristics not identified.)

Table A3.3 Additional studies examining consumer perceptions of carbohydrate and sugar claims on alcoholic beverages (n = 6)

Study	Sampling approach	Participant characteristics	Design/stimuli/measures	Key findings	Quality
Alcohol Change Australia (2023)	Nationally representative sample of 1,000 Australian consumers. Recruited through PureProfile.	Aged 18+ No other demographic characteristics reported.	Online experimental (within-subjects) design, as part of an omnibus survey. Details of other questions asked in the omnibus survey are not provided. Participants were shown images of three alcoholic apple ciders in a set order: 1) Cider with no claim 2) Cider with 'low carb' claim 3) Cider with 'low sugar' claim Participants were asked to rate the healthiness of each of the ciders on a seven-point Likert scale, where 1 = "Not at all healthy" and 7 = "Very healthy".	Cider with no claims: 48% rated as unhealthy 29% rated as neutral 23% rated as healthy. Mean = 3.45 (SD 1.46) Cider with 'low carb' claim: 40% rated as unhealthy 29% rated as neutral 32% rated as healthy Mean = 3.76 (SD 1.44) Cider with 'low sugar' claim: 37% rated as unhealthy 27% rated as neutral 36% rated as healthy Mean = 3.87 (SD 1.51) Mean rating was statistically significantly different between all three beverages ($p < .001$).	Low Rated poorly on most criteria. Missing methodological information (broader survey context, nationally representative demographics, rationale for sample size). Inappropriate design to examine perceptions of absolute healthiness.
Bowden et al. (2022)	801 respondents who reported having consumed alcohol at least monthly over the last year. Recruited via email based on having participated in previous survey research. Quotas applied for gender (approximately equal) and being a parent of a child under 18 years of age (50% or greater).	50.2% female 49.8% male 18-29 years: 12.4% 30-44 years: 69.2% 45-59 years: 52.9% Primary/high school: 18.4% Certificate/diploma: 41.6% Bachelor degree or higher: 40.1% < $80,000: 37.8% $80,001 - $120,000: 28.3% > $120,000: 33.8% SEIFA quintiles 1-2: 29.7% SEIFA quintiles 3-5: 70.3% Major city: 82.2% Rural/remote: 17.8%	Quantitative (online) survey, undertaken as part of a broader survey about levels of parental drinking in the presence of children. Participants were asked "When you have an alcoholic drink, how often do you drink lower carb [carbohydrate] alcohol because you are concerned about the calories/kilojoules." Responses were collected on a five-point Likert scale with the responses "Always", "Most of the time", and "Sometimes" categorised as 'Yes', and "Rarely" or "Never" categorised as 'No'.	46.4% of respondents reported drinking lower-carb alcohol because of energy-related concerns. There was no statistically significant difference by gender.	High. Rated highly on all criteria. Clear methodology and reporting of results with appropriate statistical analysis. No rationale provided for sample size.

Study	Sampling approach	Participant characteristics	Design/stimuli/measures	Key findings	Quality
		In paid employment: 77.4% Not employed: 22.6% Parent of child < 18: 73.8% Not: 26.2% Average daily alcohol consumption Above long-term risk guideline: 43.9% Within long-term risk guideline: 56.1% Daily/weekly alcohol consumption: 77.9% Monthly alcohol consumption: 22.1%			
Haynes, Ilchenko et al. 2024	Nationally representative sample (by gender, age, and state/territory) of 1,960 Australian adults who had consumed alcohol in the past 12 months. Recruited through web panel provider (PureProfile), which used survey adverts disseminated via email and the panel dashboard. Sample was weighted to match Australian population benchmarks (age, smoking status, low-income status, geographic location, and language spoken at home).	Male: 50.2% Female: 49.5% Other: 0.2% Prefer not to say: 0.1% 18-24 years: 16.1% 25-44 years: 40.1% 45-64 years: 43.8% High school or lower: 23.7% Some tertiary: 75.3% Not disclosed: 1.0% Low SES: 29.5% Mid SES: 48.4% High SES: 22.0% Unknown SES: 0.1% Location: Metro: 66.5% Regional: 33.5% Consumes alcohol: ≥ 5 days/week: 14.1% 1–4 days/week: 42.5% 1–3 days/month: 25.0% < 1 day/month: 18.3%	Quantitative (online) cross-sectional survey. Participants were asked: “Thinking about what you might see on the label of an alcoholic drink, to what extent do you agree or disagree that the following features mean that an alcoholic drink is *better for you*?” A series of marketing cues were presented to participants, including ‘Natural’ and ‘Preservative free’. Those relevant to the current review were: ‘Low carb’ and ‘Low sugar’. Responses were collected on a five-point Likert scale labelled: “Strongly agree”, “Agree”, “Neither agree nor disagree”, “Disagree”, “Strongly disagree” or “Don’t know/can’t say”. The cue ‘Light in alcohol’ was used as a point of comparison.	Proportion of respondents who agreed that the cue meant that the product is ‘better for you’: Low carb: 48.8% Low sugar: 55.7% Light in alcohol: 53.4% Proportion of respondents who rated the cue the same as or better than ‘light in alcohol’: Low carb: 75.9% Low sugar: 79.7% Young adults were more likely to perceive ‘low sugar’ as ‘better for you’ (62.7%) than older adults (53.4%). Women were more likely to believe that ‘low sugar’ means ‘better for you’ (58.7%) than men (51.5%). People from a low SES area were more likely to perceive	Medium Rated high on some criteria. However, other areas were rated poorly. Missing methodological reason (detailed rationale for sample size, no consideration of reliability or validity of questions). Better research design (RCT) available to answer research questions.

Study	Sampling approach	Participant characteristics	Design/stimuli/measures	Key findings	Quality
				'low carb' as 'better for you' (66.2%) compared to people from a high SES area (54.5%). People who drank alcohol on at least 5 days per week were more likely to believe that 'low carb' and 'low sugar' were 'better for you' (52.8% and 55.3% respectively) compared to those who drank less than once a month (43.2% and 48.4% respectively).	
Haynes, Talati et al. 2024	1,009 18-24 year old Australians recruited from non-probability opt-in online panel. Recruitment quotas applied to ensure equal representation of men/women and from all Australian states/territories. Excluded people who ere employed (or had close friends or family employed) in the alcohol, healthcare, nutrition or dietetics, marketing, or market research industries; or were pregnant, breastfeeding, or trying to conceive.	Mean age: 20.6 (2.0 SD) Women: 52.3% Men: 45.7% Non-binary: 1.7% Prefer not to say: 0.3% Less than tertiary education: 54.1% Some tertiary education: 45.9% Metropolitan: 81.5% Regional: 18.5% Low SES (quintiles 1, 2) by area: 17.3% Mid-high SES (quintiles 3,4, 5) by area: 82.7% Low risk drinking guidelines Not exceeded: 51.8% Exceeded: 48.2%	Online experimental (mixed) design. Participants were allocated to one of three product category arms (RTD, beer, or cider) with the prerequisite that they had consumed that type of product in the past year. Participants were then randomised to either a claims or control condition. Participants viewed 10 product images (5 x claims [low carb/low sugar], low calorie, natural, organic, preservative free], with each claim appearing on 2 x different products) in a random order. 'Low carb' claims were displayed in the beer product arm, and 'low sugar' claims were displayed in the cider and RTD arms, consistent with the use of such claims on alcohol products on the Australian market. Each product image was accompanied by a caption that state the product name, volume, and alcohol content. Participants were provided	People who saw beverages with claims (vs without claims) rated the beverages as significantly healthier (mean: 3.24 vs 2.98, p = .001), less harmful to health (mean: 4.62 vs 4.76) p = .045), lower in sugar (mean: 3.62 vs 4.33, p < .0001), lower in kilojoules/calories (mean: 3.34 vs 2.90, p < .0001), more helpful for weight management (mean: 3.34 vs 2.90, p < .0001), and more suitable as part of a healthy diet (mean: 3.20 vs 3.06, p = .003). There was no effect on perceptions of alcohol content, or product appeal.	High Rated highly on most criteria. Clear methodology and reporting of results with appropriate statistical analysis. Most appropriate research design. No rationale provided for sample size, or discussion of reliability or validity of measures.

Study	Sampling approach	Participant characteristics	Design/stimuli/measures	Key findings	Quality
		AUDIT_C score: Mean 4.6 (2.3 SD)	with an option to click to view the rear label of the product, which included nutrition information. Participants rated each alcohol product on the following measures, in a randomised order, on a seven-point 'strongly disagree' to 'strongly agree' Likert scale. "This item is… a) Healthy b) Harmful to health c) High in sugar d) High in kilojoules/calories e) High in alcohol f) Helpful for weight management g) Suitable as part of a healthy diet h) Appealing"		
Hobin et al. 2024	Nationally representative sample (by age, gender, and province) of 5,063 Canadian adults. Recruited through survey-sampling company Leger Opinion. Respondents in Canadian territories were excluded.	Age range: 18-64 years Men: 48.4% Women: 51.6% White: 72.8% Other than white: 24.5% Don't know: 2.6% High school: 15% Trades/college/some uni: 37.8% Bachelor or above: 46.7% Don't know: 1.0% Annual household income: <$50k: 21.6% $50 - < $100k: 34.5% $100k - < $150k: 21.4% $150k and greater: 14.3% Don't know/prefer not to say: 8.3% AUDIT-C score (>=3/4 is hazardous use) AUDIT-C score <3/4: 47.5%	Online experimental (between-subjects) design. Participants were randomised to one of six label conditions. The relevant conditions for this review were: a) Nutrition content claims ('0g sugar' and '90 calories') and nutrition declaration. b) Nutrition declaration c) No nutrition content claims, no nutrition declaration, no health warning label. Participants were shown a generic branded single-serve RTD vodka-based hard soda beverage container that had been digitally altered from existing alcohol products. Participants viewed the alcohol container with their label condition and were asked to rate it relative to other alcoholic beverages available to buy in stores on: healthiness, calorie content (reverse coded), sugars content (reverse coded), alcohol strength (reverse coded), appeal, perceived health harm, cancer risk, and	Compared to participants who saw the alcoholic beverages with both nutrition content claims and nutrition declaration, participants who saw the beverages with only nutrition declaration information rated these as statistically significantly less (relatively) healthy, higher in calories, and higher in sugar (all $p < 0.05$). There were no interaction effects with either age or gender (both $p > 0.05$). There was no statistically significant effect on product appeal, perceptions of alcohol content, harmfulness to health, cancer risk, or health concerns (all $p > 0.05$). Compared to participants who saw the alcoholic beverages with both nutrition content claims and nutrition declaration, participants who	High. Rated highly on all criteria. Clear methodology and reporting of results with appropriate statistical analysis.

Study	Sampling approach	Participant characteristics	Design/stimuli/measures	Key findings	Quality
		AUDIT-C score >=3/4: 53.2%	health concerns. Responses were provided on a seven-point scale (1, strongly disagree; 4, neutral; 7, strongly agree).	saw the beverages with neither nutrition content claims or nutrition declaration rated them as somewhat less (relatively) healthy, higher in calories, and higher in sugar. They were also slightly less appealing. There was no statistically significant effect on overall perceptions of alcohol content, harmfulness to health, cancer risk, or health concerns (all p > 0.05).	
Pitt et al. 2023	497 Australian adult women who had consumed alcohol in the last year, were an Australian resident, and had sufficient English language proficiency. Soft quotas for age and state/territory. Qualtrics sourced sample from partner panel companies.	Age range: 18-88 years Mean: 46.1 (SD 17.67) 18-34 years: 30.4% 35-54 years: 35.2% 55+ years: 34.4% 100% female High school: 32.4% Vocational: 34.8% Bachelors: 22.7% Postgrad: 10.0% Full time: 37.4% Part-time: 24.9% Unemployed: 2.6% Homemaker: 8.5% Retired: 20.3% Student: 1.6% Other: 2.6% Consumes alcohol: < once a month: 18.1% About 1 day/month: 10.5% 2-3 days/month: 20.7% 1-2 days/week: 27.8% 3-4 days/week: 12.1% 5-6 days/week: 6.4% Every day: 4.4%	Qualitative (online) survey. Participants were provided with a social media post which showed an RTD alcohol product containing 'no sugar' and 'only 85 calories' claims'. No questions reported.	Some women believed that 'low calorie' or 'low sugar' products provided an alternative for women who needed to change their alcohol consumption, or who were becoming more health or body conscious. Some participants, particularly younger women, stated that drinking these types of products made them feel 'less guilty' about their alcohol consumption. This was either because they felt that they were consuming fewer calories or because they believed that the alcohol product was healthier for them. Some women were sceptical about the true health benefits of these products.	Medium. Rated poorly on some criteria (e.g. data collection tools, detailed rationale for sample size, broader survey context). Some concerns about design of study, which did not allow for consideration of tone or for follow-up/probing questions. The large sample enabled by the chosen design was not used to provide a sense of the proportion of respondents who held different views. Nevertheless, strong theoretical framework, data analysis and reporting, and a

Study	Sampling approach	Participant characteristics	Design/stimuli/measures	Key findings	Quality
		Preferred alcohol product: Wine: 39.2% Spirits: 20.5% Pre-mixed spirits: 14.5% Cocktails: 8.9% Beer: 8.7% Cider: 8.2% Purchased low calorie/low sugar: Yes 45.9% No 54.1%			qualitative design is appropriate for the research questions.
Yusoff et al. 2024	1,356 Australian adult consumers aged 18+ years who consumed alcohol at least once per month. Recruited through PureProfile.	No participant characteristic provided.	Online experimental (within-subjects) design. Participants were randomised to either a sugar claims condition or a carbohydrate claims condition. Participants were shown three variants of three different products. People in the sugar claim condition saw mock premix, cider, and wine products. Those in the carbohydrate claim condition saw mock cider, beer, and spirits products. Participants were shown the variants in a set order: a) Beverage with no claim b) Beverage with specific claim (e.g. '< 2g sugar') c) Beverage with general claim (e.g. 'low sugar') Participants were asked to rank each product on a five-point Likert scale, from 'Very unhealthy' to 'Very healthy'.	Compared to when they viewed an alcohol product without a claim, respondents were three times more likely to consider the same product to be healthy when it displayed a sugar claim. Compared to when they viewed an alcohol product without a claim, respondents were twice as likely to consider the same product to be healthy when it displayed a carbohydrate claim. Younger drinks (aged 18 – 24 years) were 1.5 times more likely to view products with sugar claims as healthy compared to older respondents.	Low. Rated poorly on most criteria. Missing methodological information (demographic characteristics, sample rationale, data analysis methods). Inappropriate research design to answer the research question.

Table A3.3. Additional studies examining consumer behaviours in response to carbohydrate and sugar claims on alcoholic beverages (n = 2)

Study	Sampling approach	Participant characteristics	Design/stimuli/measures	Key findings	Quality
Alcohol Change Australia (2023)	Nationally representative sample of 1,000 Australian consumers. Recruited through PureProfile.	Aged 18+ No other demographic characteristics reported.	Quantitative (online) omnibus survey. Details of other questions asked in the omnibus survey are not provided. Participants were asked "If you were to see the following messages on the label of an alcoholic drink, how would these impact your alcohol use?" The messages were 'low carb' and 'low sugar'. Response options were: "It would increase how many of these beverages I drink", "It would not change how many of these beverages I drink", "It would decrease how many of these beverages I drink" and "Don't know/can't say".	Low carb message: 12% decrease consumption 59% no change in consumption 13% increase consumption Low sugar message: 13% decrease consumption 54% no change in consumption 20% increase consumption	Low Missing methodological information (broader survey context, nationally representative demographics, rationale for sample size, unclear data analysis techniques).
Hobin et al. 2024	Nationally representative sample (by age, gender, and province) of 5,063 Canadian adults. Recruited through survey-sampling company Leger Opinion. Respondents in Canadian territories were excluded.	Age range: 18-64 years Men: 48.4% Women: 51.6% White: 72.8% Other than white: 24.5% Don't know: 2.6% High school: 15% Trades/college/some uni: 37.8% Bachelor or above: 46.7% Don't know: 1.0% Annual household income: <$50k: 21.6% $50 - < $100k: 34.5% $100k - < $150k: 21.4% $150k and greater: 14.3% Don't know/prefer not to say: 8.3% AUDIT-C score (>=3/4 is hazardous use) AUDIT-C score <3/4: 47.5%	Online experimental (between-subjects) design. Participants were randomised to one of six label conditions. The relevant conditions for this review were: d) Nutrition content claims ('0g sugar' and '90 calories') and nutrition declaration. e) Nutrition declaration f) No nutrition content claims, no nutrition declaration, no health warning label. Participants were shown a generic branded single-serve RTD vodka-based hard soda beverage container that had been digitally altered from existing alcohol products. Participants viewed the alcohol container with their label condition and were asked how likely they would be to try, buy, and binge drink (defined as consuming 4 or more (for women) or 5 or more (for men) drinks in one occasion) the alcoholic beverage. Responses were provided on a seven-point scale (1, very unlikely; 4, neutral, 7, very likely).	No statistically significant effects were found for any of the consumption measures, such as likeliness to try, likeliness to buy, likeliness to binge drink, or number of drinks intended to be consumed (all $p > 0.05$).	High. Rated highly on all criteria. Clear methodology and reporting of results with appropriate statistical analysis.

Study	Sampling approach	Participant characteristics	Design/stimuli/measures	Key findings	Quality
		AUDIT-C score >=3/4: 53.2%	Participants were also asked how many cans they would drink over the next 7 days if the alcoholic beverage was available to them free of charge. Responses were provided as open text (i.e. enter number: _____ cans).		