

The frequency and magnitude of price-promoted beverages available for sale in Australian supermarkets

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Poor dietary intakes and obesity are leading risk factors for preventable non-communicable diseases such as diabetes, heart disease and some cancers.¹ In Australia, two-thirds of adults and one-quarter of all children were overweight or obese in 2014-15.² The food environment is a key driver of these public health issues due to the ubiquitous availability and marketing of cheap energy-dense, nutrient-poor foods and beverages that contain excessive amounts of sugar, salt and saturated fats.³ Non-alcoholic beverages, including sugar-sweetened beverages (SSBs), are the largest contributors to added sugars in the daily diets of Australians (37%)^{4,5} and have thus been identified as a key policy target to improve population diets.⁶

Price promotions (also referred to as 'temporary price discounts' or 'specials') are widely used by retailers and food manufacturers to influence consumer purchasing patterns. Price promotions result in a short-term sales uplift of a particular product by enticing consumers to purchase in greater quantities and/or temporarily switch brands or shopping habits.⁷ Accordingly, the UK government and public health groups in Australia have recently called for regulations restricting price promotions on unhealthy foods and beverages as part of a broader regulatory strategy to address childhood obesity.⁸⁻¹⁰ Beverage price promotions are of particular interest given the potential of price promotions to undermine SSB taxes, which have now been introduced in more

Abstract

Objective: Price promotions are used to influence purchases and represent an important target for obesity prevention policy. However, no long-term contemporary data on the extent and frequency of supermarket price promotions exists. We aimed to evaluate the frequency, magnitude and weekly variation of beverage price promotions available online at two major Australian supermarket chains over 50 weeks.

Methods: Beverages were categorised into four policy-relevant categories (sugar-sweetened beverages, artificially-sweetened beverages, flavoured milk and 100% juice, milk and water). The proportional contribution of each category to the total number of price proportions, the proportion of price promotions within the available product category, the mean discount, and weekly variation in price promotions were calculated.

Results: For Coles and Woolworths respectively, 26% and 30% of all beverages were price promoted in any given week. Sugar-sweetened beverages made up the greatest proportion of all price promotions (Coles: 46%, Woolworths: 49%). Within each product category, the proportion of sugar-sweetened and artificially-sweetened beverages that were price promoted was similar, higher than the other categories and reasonably constant over time. Diet drinks and sugar-sweetened soft drinks were most heavily discounted (by 29-40%).

Conclusions: Beverage price promotions are used extensively in Australian supermarkets, undermining efforts to promote healthy population diets.

Implications for public health: Policies restricting price promotions on sugar-sweetened beverages are likely to be an important part of strategies to reduce obesity and improve population nutrition.

Key words: Sugar-sweetened beverages, food policy, price promotions, obesity

than 30 jurisdictions.⁶ SSB taxes aim to reduce demand for SSBs via an increase in their prices. In contrast, price promotions aim to increase demand via a temporary reduction in prices and may thereby attenuate the effects of a SSB tax. Similar policies to restrict the influence of price promotions on alcohol have previously been recommended in Australia,¹¹ with legislative bans on multi-buys implemented in Scotland in 2011.¹²

The limited evidence examining the extent of beverage price promotions to date suggests that SSBs are more commonly price promoted compared to non-sugary beverages. A cross-sectional in-store audit of price promotions across a nation-wide sample of food stores (including 955 supermarkets) in the United States during 2010-12 revealed that there was a higher prevalence of price promotions among SSBs

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(18.2%) compared to non-sugary beverages (12.1%).¹³ Similarly, a four-week examination of beverage price promotions in New Zealand during 2007 highlighted that less healthy beverages, such as SSBs (44.1%), were more likely to be price promoted compared to healthier beverages (14.9%).¹⁴ However, these studies were short-term and were conducted eight and eleven years ago, respectively. With significant week-to-week fluctuation in price promotions, a current assessment to quantify price promotions throughout the year is required to understand which products are promoted, the degree of price discounting and how trends vary across seasons.

In this study, we conducted a weekly systematic audit of all non-alcoholic beverage price promotions available for sale online at two major Australian supermarket chains (accounting for 67% of the grocery market share),¹⁵ over 52 weeks. We additionally audited all non-alcoholic beverages available for sale online at each supermarket (with and without a price promotion) to calculate the proportion of each beverage category that was price promoted each week. We aimed to examine the frequency and magnitude of beverage price promotions, and whether this differed by beverage category or season.

Methods

Data collection

Data was collected weekly for 52 weeks from November 2016 to November 2017 from the online websites of the two major Australian supermarket chains, Coles and Woolworths. Weekly data collection was selected to align with the price promotion cycle in these supermarkets (updated weekly on Wednesdays). The following data was collected weekly for all non-alcoholic beverage product types (single purchase items that may include, for example, a single can or a 24-pack of cans; hereafter referred to as 'beverage/s') where the sale price was less than the regular retail price: product name, volume, pack size, regular retail price, promotional price and whether the promotion was a 'multi-buy' promotion. A price promotion was defined as a temporary price reduction. Products advertised as 'everyday low price' were not considered a price promotion as the prices for these items did not vary across weeks. A 'multi-buy' price promotion was defined as a price promotion that required consumers to purchase more than one unit to receive the discount (i.e.

two for \$15, three for \$10; two for the price of one). Data was not collected for beverages requiring significant preparation before consumption, such as tea, coffee beans, chocolate syrups and drink powders (with the exception of cordial, a concentrated sugar-sweetened beverage requiring water for preparation, being a popular children's beverage in Australia). A complete audit of the price of all ready-to-drink beverages and cordials (regardless of whether they were price promoted or not) was conducted in May 2017 by one member of the research team (BG). This audit was conducted manually by recording the data into a Microsoft Excel™ spreadsheet and combined with the weekly data on price-promoted beverages to determine the proportion of each beverage category that was price promoted each week.

Four trained researchers collected the data on a rotating roster. For the first 26 weeks, price data was manually collected by entering the product information into an excel spreadsheet. For the remaining 26 weeks, data collection was conducted using an automated online scraping tool, which extracted and exported the necessary information into a spreadsheet. This data was manually checked each week to ensure information was extracted for the correct number of products, with a random 50 products checked for data accuracy (all of which indicated 100% accurate data extraction). Two weeks of data were excluded due to data collection errors, leaving 50 weeks of data for analysis.

Table 1: Categories for beverages sold at the two major Australian supermarkets (Coles and Woolworths) between November 2016 and November 2017.

Major category	Sub-major category
Sugar-Sweetened Beverages (SSBs)	Soft drink
	Flavoured water, ice tea, sports or energy drinks
	Fruit-flavoured drinks (<99% juice)
	Flavoured mineral water (sugar-sweetened)
	Cordial
Artificially-Sweetened Beverages (ASBs)	Diet soft drink
	Diet flavoured water, ice tea, sport drinks or energy drinks
	Flavoured mineral water (no sugar)
	Diet cordial
Flavoured milk and 100% juice	Flavoured milk 100% fruit or vegetable juice
Milk and water	Plain full- or low-fat milk
	Plain still or sparkling water

The validity of using online data for this project was confirmed in a prior study where we tested the correlation between food and beverage availability and price, online and in-store, for both Coles and Woolworths. In that study, we randomly selected 96 products from four categories (breakfast cereals, cereal based bars, juices and sugar-sweetened beverages) using the Australian Food Switch database (>40,000 supermarket food and beverage products).¹⁶ We found a high correlation (>90%) for the availability of products and the presence of price promotion for a given product, online and in-store (unpublished results).

Beverage classification

Each beverage was classified into one of four policy-relevant⁶ categories ('SSBs', 'Artificially-Sweetened Beverages' (ASBs), 'flavoured milk and 100% juice', 'milk and water'; see Table 1). Flavoured milk and 100% fruit or vegetable juices were not included in the SSB category because, although these products contain sugar, they typically have a higher nutritional value compared to other SSBs, and consequently are often exempt from interventions and policies targeting sugary drinks, including most SSB taxes.⁶ Milk and water were purposely classified as distinct from ASBs because of the nutritional importance of these products within a healthy diet.¹⁷

Data analysis

The proportion of beverages on price promotion in any given week within the available product category (number of price-promoted beverages within a product category/total number of beverages within that beverage category), and the proportional contribution of each beverage category to the total number price-promoted beverages (number of all price-promoted beverages within a product category/total number of price-promoted beverages), was calculated. We additionally calculated the mean discount (%) for each beverage category across the 50 weeks for each beverage category.

Weekly variation in the proportion of each price-promoted beverage category and the proportion of multi-buys for each beverage category was assessed graphically over the one-year of data collection.

Analyses were conducted using Microsoft Excel™.

Results

Price promotions

Across both supermarkets, an average of 971 beverages product types were available for sale each week (Coles n=960; Woolworths n=982), of which 40% were SSBs (Coles n=381; Woolworths n=397), 13 and 15% for ASBs (Coles n=120; Woolworths n=143), 28 and 24% for flavoured milks and 100% juice (Coles n=270; Woolworths n=236) and 20 and 21% for plain milk and water (Coles n=189; Woolworths n=206) (Table 2).

On average, in any given week 26% and 30% of all beverages were price promoted for Coles and Woolworths, respectively (Table 2). When examining price promotions within each policy-relevant beverage category, findings from both supermarkets indicated that the proportions of price promotions within beverage categories was similar for SSBs and ASBs (Coles: 30% of all SSBs vs. 33% of all ASBs; Woolworths: 37% of all SSBs vs. 38% of all ASBs), with this finding being consistent across the 50 weeks of the study. The proportion of price-promoted products was lowest for the 'milk and water' category with a weekly average of 14% for Coles and 15% for Woolworths (Table 2).

Across all price-promoted beverages (not within beverage categories), the greatest number of price promotions were for SSBs (46% and 49% for Coles and Woolworths, respectively), followed by flavoured milk and 100% juice (27% and 22% of all price-promoted beverages for Coles and Woolworths, respectively), ASBs (16% and 18% of all price-promoted beverages for Coles and Woolworths, respectively) and water and plain milk (11% and 10% of all price-promoted beverages for Coles and Woolworths, respectively). In total, 73% and 71% of price promotions (across all price-promoted beverages) were for sugary drinks (SSBs and flavoured milk and 100% juice combined), at Coles and Woolworths, respectively.

Across the year, the mean price reduction for all beverages was similar for both supermarkets at -33% for Coles and -26% for Woolworths. Price-promoted diet soft drinks (Coles: -40%; Woolworths: -34%) and diet flavoured water, ice tea, sports and energy drinks (Coles: -40%; Woolworths: -29%) were most heavily discounted, followed by sugar-sweetened soft drinks (Coles: -39%; Woolworths: -34%).

Table 2: Weekly mean number and proportion of beverages on price promotion, by beverage category, for the two major Australian Supermarkets (Coles and Woolworths) between November 2016 and November 2017.

Beverage Category	Beverages in product line, n (% of all beverages)	Mean number of price promoted beverages per week, n (SD)	Mean % of product line price promoted (SD)	Mean % of all beverage price promotions (SD)	Mean price change, % (SD)
Coles					
Total	960 (100)	247 (30)	26 (3)	100	-33 (9)
SSBs	381 (40)	115 (18)	30 (5)	46 (4)	-36 (11)
Cordial	47 (5)	11 (7)	23 (15)	4 (3)	-27 (9)
Flavoured water, ice tea, sports and energy drinks	94 (10)	27 (7)	28 (7)	11 (2)	-38 (10)
Fruit-flavoured drink (<99%)	79 (8)	25 (8)	31 (11)	10 (3)	-33 (14)
Flavoured mineral water (sugar-sweetened)	21 (2)	7 (4)	32 (21)	3 (2)	-36 (6)
Soft drink	140 (15)	46 (9)	33 (6)	19 (3)	-39 (10)
ASBs	120 (13)	40 (7)	33 (6)	16 (2)	-39 (9)
Diet cordial	8 (1)	1 (2)	14 (27)	0 (1)	-32 (11)
Diet flavoured water, ice tea, sports and energy drinks	27 (3)	8 (3)	30 (10)	3 (1)	-40 (8)
Flavoured mineral water (no sugar)	31 (3)	7 (4)	22 (14)	3 (1)	-35 (8)
Diet soft drink	54 (6)	24 (4)	44 (8)	10 (2)	-40 (10)
Flavoured milk and 100% juice	270 (28)	66 (14)	24 (5)	27 (5)	-26 (9)
Flavoured milk	73 (8)	19 (8)	26 (12)	8 (3)	-25 (8)
100% fruit or vegetable juice	197 (21)	47 (13)	24 (6)	19 (4)	-27 (9)
Milk and Water	189 (20)	27 (7)	14 (4)	11 (3)	-32 (10)
Milk	137 (14)	16 (5)	12 (4)	7 (2)	-30 (11)
Water	52 (5)	11 (4)	21 (7)	4 (2)	-34 (9)
Woolworths					
Total	982 (100)	297 (54)	30 (6)	100	-26 (11)
SSBs	397 (40)	145 (27)	37 (7)	49 (4)	-28 (12)
Cordial	62 (6)	15 (8)	24 (13)	5 (2)	-21 (8)
Flavoured water, ice tea, sports and energy drinks	106 (11)	45 (9)	43 (9)	15 (3)	-28 (12)
Fruit-flavoured drink (<99%)	84 (9)	31 (8)	36 (10)	10 (2)	-22 (10)
Flavoured mineral water (sugar-sweetened)	39 (4)	10 (6)	27 (14)	3 (2)	-29 (7)
Soft drink	106 (11)	44 (12)	42 (11)	15 (3)	-34 (10)
ASBs	143 (15)	55 (11)	38 (8)	18 (3)	-30 (11)
Diet cordial	13 (1)	6 (4)	49 (30)	2 (1)	-19 (5)
Diet flavoured water, ice tea, sports and energy drinks	39 (4)	15 (4)	39 (10)	5 (1)	-29 (11)
Flavoured mineral water (no sugar)	31 (3)	8 (4)	26 (12)	3 (1)	-28 (8)
Diet soft drink	60 (6)	25 (7)	41 (12)	8 (2)	-34 (10)
Flavoured milk and 100% juice	236 (24)	66 (19)	28 (8)	22 (4)	-20 (8)
Flavoured milk	75 (8)	17 (8)	23 (11)	6 (3)	-21 (8)
100% fruit or vegetable juice	161 (16)	49 (16)	30 (10)	16 (4)	-20 (8)
Milk and Water	206 (21)	30 (10)	15 (5)	10 (3)	-23 (9)
Milk	140 (14)	15 (5)	11 (4)	5 (2)	-22 (9)
Water	66 (7)	15 (6)	23 (10)	5 (2)	-24 (9)

Note:

Mean % of each product line promoted each week (third data column) was calculated by dividing the total number of price promoted products within a product category by the total number of products available within the category; % of all price promotions (fourth data column) was calculated by dividing the total number of price promoted beverages within a category by the total number of price promoted beverages.

The proportion of each beverage category that was price promoted each week was relatively constant over time for both supermarkets, with both Coles and Woolworths demonstrating a peak during the week of December 14th for both SSBs and ASBs (Figure 1). The proportion of SSBs and

ASBs price promoted in any given week was similar across the year.

Multi-buy price promotions

On average, in any given week, 4% and 8% of all beverages were available as a multi-buy promotion (a subset of price-promoted

beverages) in Coles and Woolworths, respectively (Table 3). A similar proportion of all SSBs and ASBs were promoted as multi-buys at each store (Coles: 6% and 7% of all SSBs and ASBs, respectively; Woolworths: 11% and 12% for all SSBs and all ASBs).

Of all multi-buy promotions in a given week, the majority were for the SSB category (52% and 59% for Coles and Woolworths, respectively). When combining all sugary drinks (SSBs, flavoured milks and 100% juice), the multi-buys for these beverages made up more than three-quarters of all multi-buy offers (Coles: 74%, Woolworths: 75%). The proportion of multi-buys offered within each beverage category was variable across beverage categories and across supermarkets. Within the beverage categories available at Coles, multi-buys were most common within the flavoured mineral water (sugar-sweetened) category (Coles: 16%, Woolworths: 12%), whereas for Woolworths, beverages within the categories flavoured water, ice teas, sports and energy drinks (Coles: 3%, Woolworths: 14%) and artificially sweetened water, ice teas, sports drinks were most commonly promoted as a multi-buy (Coles: 4%; Woolworths: 15%).

Discussion

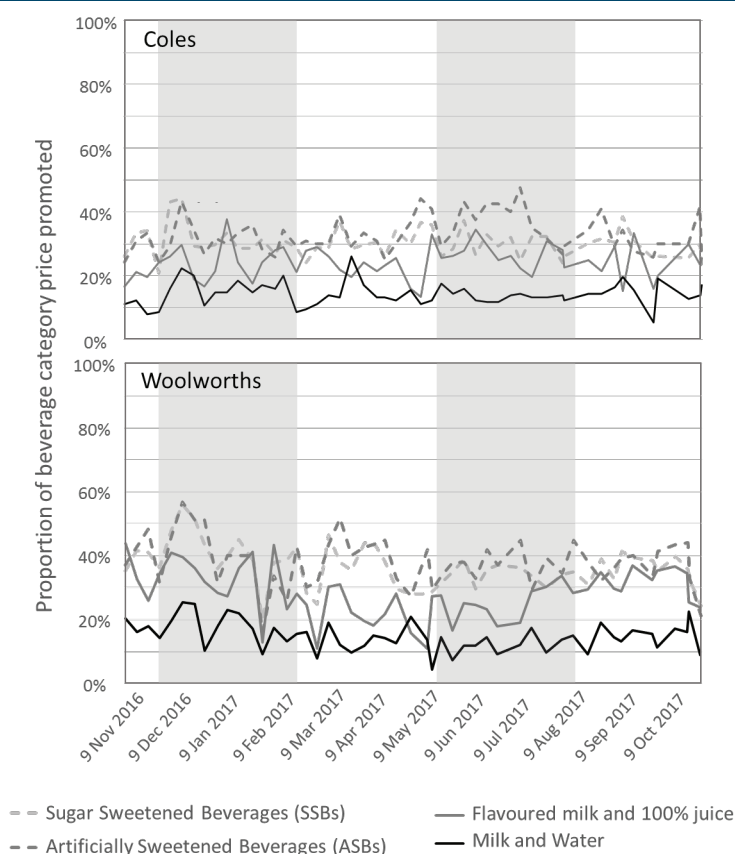
This is the first study to systematically and comprehensively quantify the extent and magnitude of price-promoted beverages available for sale, over a 12-month period, in Australian supermarkets. We demonstrate that the frequency of price promotions for sugary drinks (SSBs, flavoured milk and 100% juice combined) is approximately proportional to their availability. On average, sugary drinks constitute two-thirds of all beverage product types available for sale and around two-thirds of all price-promoted beverages in any given week. Within each beverage category, the proportion of all beverage products available for sale with a price promotion did not markedly differ for SSBs and ASBs (approximately one-third of all SSBs and ASBs are price promoted in any given week). The mean discount for price-promoted beverages is also similar across beverage types, with an overall mean price discount of 33% and 26% for Coles and Woolworths, respectively.

Our conclusions are similar to previous international studies of shorter duration. A 2007 four-week audit of beverage

price promotions in four New Zealand supermarkets reported that the majority of all price promotions were for 'red' (drink less) beverages (44.1%) compared to 'amber' (drink in moderation; 40.9%) and 'green' (drink most) beverages (14.9%).⁽¹⁴⁾ Our study further revealed that a much higher proportion of all price promotions were for sugary beverages (73% and 71% for Coles and Woolworths, respectively) compared to non-sugar beverages. Similarly, a 2010-12 cross-sectional audit of price promotions in 955 US supermarkets showed a greater prevalence of price promotions among SSBs (18.2%) compared to non-sugary beverages (12.1%) products.¹³ However, our contemporary results suggest that this proportion is much higher and, on average, approximately one-third of all SSB products are price promoted.

The strengths of our study include the comprehensive nature of data collection, covering 50 weeks of price promotions cycles within a year, across all seasons and holiday events. Our data is further strengthened by our audit of all beverages available for sale, which allowed us to examine the extent of price promotions relative to their availability. However, this complete audit of all available beverages was also limited to just one collection point, mid-way through the data collection period. Our study is further limited to the availability of price promotions and does not reflect customer purchasing behaviour. The health implications of beverage price promotions depend on their influence on healthy and unhealthy beverage choices – a function of both the frequency and magnitude of price promotions on healthy and unhealthy beverages and consumer responses to such price promotions. While studies from the UK and US show that the impact of price promotions on purchasing behaviour is similar for healthy and less healthy foods,^{18,19} comparable analyses are not available in the Australian context. Finally, it is important to acknowledge that 'everyday low prices' were not included as a price promotion in our study as we were interested in temporary (not 'everyday') price reductions. Australian supermarkets use 'everyday low prices' on items such as plain milk as a tactic to increase market competitiveness, which may explain the lower proportion of price promotions in the water and plain milk category.

Figure 1: Weekly variation in the proportion of each beverage category price promoted at Coles and Woolworths.



Note: shading on graph represents seasons: December-February (Summer); March-May (Autumn); June-August (Winter); September-November (Spring)

Policy implications

We show that, in any given week, the proportion of price-promoted SSBs and ASBs is similar (Coles: 30% of all SSBs, vs. 33% of all ASBs; Woolworths: 37% of all SSBs vs. 38% of ASBs), indicating that these supermarkets do not distinguish between healthy and less healthy beverages when setting price promotions. Rather, it is likely that these supermarkets use price promotions as a way of increasing store traffic and overall sales. Nevertheless, the ubiquity of price promotions on sugary drinks supports recent calls by public health coalitions and governments for a ban on unhealthy food and beverage price promotions.⁸⁻¹⁰ A modelling study from the UK further supports these policy recommendations, finding that, on average, one-fifth of the volume of price-promoted food and beverages sold can be considered to be in addition to what would be sold were the promotion not in place (i.e. on top of the substitution effect from non-price-promoted products).²⁰ We are not aware of any empirical studies examining behavioural responses to removing price promotions on sugary drinks. Such evidence would help refine these policy recommendations.

This research highlights that public health SSB pricing interventions may need to extend beyond a tax on SSBs and consider policies that reduce the influence of price promotions on consumer purchasing behaviour. With international SSB taxes commonly set at 10-20%, the magnitude and regularity of SSB price promotions may attenuate the impact of any future SSB tax in Australia.⁶ Policies that reduce the influence of SSB price promotions, such as restrictions on unhealthy beverages (and food), would create an even pricing playing field across all supermarkets and may ameliorate any financial impact to industry – a core concern for industry lobbyists. Alternative policy options may include a restriction on the advertising of price promotions in-store, as has been suggested by the Scottish government,²¹ however, more research is required to understand the impact of such policies on beverage choices and population health.

Our results demonstrating that the availability of sugary drinks is proportional to price promotion frequency, suggest that interventions to increase the relative availability of healthier beverages, compared to unhealthy beverages, may also

Table 3: Weekly mean number and proportion of beverages on 'multi-buy' price promotion, by product category, for the two major Australian Supermarkets (Coles and Woolworths) between November 2016 and November 2017.

Beverage Category	Mean number of multi-buy beverages per week, n (SD)	Mean % of product line (SD)	Mean % of all multi-buys (SD)
Coles (Total)	41 (25)	4 (3)	100
SSBs	22 (16)	6 (4)	52 (16)
Cordial	2 (4)	3 (8)	2 (6)
Flavoured water, ice tea, sports and energy drinks	3 (3)	3 (4)	9 (13)
Fruit-flavoured drink (<99%)	5 (6)	7 (7)	12 (12)
Flavoured mineral water (sugar-sweetened)	3 (4)	16 (21)	9 (11)
Soft drink	9 (8)	6 (6)	21 (16)
ASBs	8 (6)	7 (5)	21 (11)
Diet cordial	1 (2)	7 (20)	1 (3)
Diet flavoured water, ice tea, sports and energy drinks	1 (2)	4 (6)	4 (7)
Flavoured mineral water (no sugar)	2 (3)	8 (11)	6 (8)
Diet soft drink	4 (3)	7 (6)	10 (8)
Flavoured milk and 100% juice	9 (8)	3 (3)	22 (21)
Flavoured milk	0 (0)	0 (0)	0 (0)
100% fruit or vegetable juice	9 (8)	5 (4)	22 (21)
Milk and water	1 (2)	1 (1)	5 (15)
Milk	0 (1)	0 (1)	3 (14)
Water	1 (1)	1 (2)	2 (6)
Woolworths (Total)	79 (30)	8 (3)	100
SSBs	47 (20)	11 (5)	59 (6)
Cordial	3 (5)	5 (8)	4 (6)
Flavoured water, ice tea, sports and energy drinks	16 (7)	14 (7)	20 (8)
Fruit-flavoured drink (<99%)	11 (6)	13 (8)	15 (9)
Mineral water (sugar sweetened)	5 (5)	12 (12)	6 (5)
Soft drink	12 (8)	11 (8)	14 (8)
ASBs	17 (9)	12 (6)	21 (6)
Diet cordial	2 (3)	13 (20)	2 (3)
Diet flavoured water, ice tea, sports and energy drinks	6 (3)	15 (8)	8 (4)
Flavoured mineral water (no sugar)	3 (3)	9 (10)	4 (4)
Diet soft drink	7 (5)	11 (8)	8 (5)
Flavoured milk and 100% juice	11 (5)	5 (2)	16 (7)
Flavoured milk	2 (1)	2 (2)	2 (2)
100% fruit or vegetable juice	10 (4)	6 (3)	13 (6)
Milk and water	3 (3)	2 (2)	4 (3)
Milk	1 (2)	1 (1)	1 (2)
Water	3 (3)	4 (4)	3 (3)

inadvertently reduce the number of price promotions for sugary drinks. However, any such changes would need to be monitored carefully to determine if the changes are likely to have the intended public health impact.

Conclusion

Price promotions are used extensively for beverages sold in Australian supermarkets, with the vast majority of available price promotions for sugary drinks, undermining efforts to promote healthy population diets. Policies to restrict price promotions on SSBs are likely to be an important part of any approach to reduce obesity and improve

population nutrition. Empirical studies to evaluate the likely impact of such a policy are clearly required.

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