

Effect of restricted retail merchandising of discretionary food and beverages on population diet: post-trial follow-up of a pragmatic randomised controlled trial



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Summary

Background Healthy Stores 2020 tested a co-designed strategy restricting retailer merchandising of unhealthy foods in a community-level pragmatic, partially randomised, parallel group trial in 20 remote Australian Aboriginal and Torres Strait Islander community stores. We aimed to evaluate the impact of Healthy Stores 2020 on free sugar sales 24-weeks post-trial.

Methods Twenty stores were randomly assigned by a statistician using a single sequence of random assignments to the intervention group, in which a strategy restricted merchandising of unhealthy food (either six or seven strategy components), or to a control group of usual retail practice. The trial was done in partnership with an Indigenous organisation operating in remote Australia. In the post-trial period (24 weeks), immediately following the 25-week RCT, intervention stores (n = 10) continued the strategy but with no external implementation support, and control stores (n = 10) continued usual practice. The primary outcome was impact on purchases (weekly sales data) of free sugars from all foods and beverages (g/MJ) using mixed models. Secondary outcomes included total food and beverage dollars and gross profit (AUD\$) and strategy implementation (number of strategies with full implementation assessed via photographic data collected). Trial registration, ACTRN12618001588280.

Findings We observed a difference in sales of total free sugars to energy between the treatment and control groups post-trial (−4.6%, 95% CI −7.1, −1.9). Between group differences in total food and beverage and gross profit dollars were 7.0% (0.9, 13.5) and 11.4% (4.6, 18.6), respectively. Two intervention stores had full implementation of all strategy components and eight intervention stores had compliance with at least four of the seven strategy components at post-trial end.

Interpretation A health-enabling retail intervention showed an effect on sugar reduction in the post-trial period without adversely impacting profit.

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Research in context

Evidence before this study

There are limited real-world multi-component RCTs of food retail interventions modifying the in-store environment to promote healthy purchasing and dietary behaviours. A systematic review of RCTs aimed at changing purchasing behaviours through food retail interventions, published in 2018, identified eight studies altering the store environment and observed mixed results. A search of the Medline and CINAHL databases, between 01/01/2018 and 01/06/2025, using the terms “randomised controlled trial” AND “food retail” AND intervention AND nutrition (with spelling variations), identified two additional RCTs involving multi-component food retail interventions published since the aforementioned review. First, an RCT with 12 Dutch supermarkets, found no statistically significant change in diet quality or healthy purchasing with an intervention comprising of nudging and pricing strategies compared to control. Second, the Healthy Stores 2020 strategy, the first food retail intervention to focus on the restriction of retailer merchandising of unhealthy food products, successfully led to a reduction in the sales of free sugars. However, no studies could be identified that assessed the fidelity and impact of food retail interventions in the post research phase. A 2022 systematic review of reviews on the factors influencing implementation, sustainability, and scalability of food retail interventions found a considerable lack of research evaluating interventions beyond the intervention stage. Research specifically focussing on the impact of food retail interventions once research implementation support has

been removed, and the enabling factors, is essential to advance this evidence base and create real world public health impact.

Added value of this study

This study provides evidence of the 24-week post-trial impact of a multi-component food retail strategy that restricted the retailer merchandising of unhealthy foods and beverages with no loss to profit. The co-design of the strategy with the Arnhem Land Progress Aboriginal Corporation and their staff, strong organisational commitment to the strategy, and strategy alignment with community health goals contributed to this. The results advance knowledge on the factors enabling impact of food retail interventions post research, particularly the context specific factors in very remote Aboriginal and Torres Strait Islander communities and the capacity of quasi-commercial retail entities to enact self-regulation with improvement in public health outcomes.

Implications of all the available evidence

Impactful health-enabling food retail interventions can be achieved with a strong commitment from retailers and ongoing resource capacity for strategy implementation, monitoring, and review. This study provides evidence to inform public and private regulation of retail food environments to improve the healthiness of consumer purchasing and thereby contribute to addressing the diet-related burden of disease.

Introduction

Poor diet is a major contributor to non-communicable diseases (NCDs) and the third leading risk factor for premature death globally.¹ In Australia (2018–2019), 24 billion dollars, representing one-third of health spending, was attributable to treatment of preventable NCDs including cancer, respiratory disease, type 2 diabetes and heart disease.² There is inequity in the distribution of NCDs, with populations who have been marginalised, colonised, and/or do not have equitable access to resources and health-care, carrying the most burden.³ In Australia, Aboriginal and Torres Strait Islander Peoples carry a disproportionate burden of NCDs and the intergenerational consequences of this for their Peoples, communities, and knowledges.³

As reported for the overall Australian population, discretionary foods (non-recommended foods in the Australian Dietary Guidelines, typically high in free

sugars, salt and/or saturated fat) contribute a high proportion of energy intake in the Aboriginal and Torres Strait Island population. Free sugars, the term used by the World Health Organization (WHO), are defined as both added sugars such as sucrose, and those naturally present in honey, syrups, fruit juices and fruit juice concentrates.⁴ Free sugars on average make up 14% of energy intake among the Aboriginal and Torres Strait Island population,⁵ exceeding the World Health Organization’s recommendation to limit free sugars to 10% of total energy intake.⁴ Excess free sugar intake is associated with the risk of unhealthy weight gain, obesity and obesity-related NCDs, including type 2 diabetes, heart disease, and certain cancers.⁴

The Australian *National Preventive Health Strategy* has targets to add an additional three years of life lived in full health for Aboriginal and Torres Strait Islander Peoples, and to reduce intake of discretionary foods and

free sugars in the general population by 2030.⁶ Reducing risk exposure to poor diets, through government regulation such as restricted access, taxes and regulation on food and beverage marketing could prevent a large proportion of NCDs for all Australians and thus contribute to meeting such targets.⁷ There has been success in reducing tobacco consumption in Australia through tax excises and restricted promotion.⁸ Yet there is resistance of the government in Australia to apply the same regulatory pressure to the food and beverage industry.⁹

A large proportion of household food purchases are made in retail food environments, and thus present a key opportunity for regulation of food and beverage marketing.¹⁰ Evidence shows effectiveness in improving the healthiness of consumer purchasing with interventions modifying elements of product, promotion, placement, and price in food retail stores.¹¹ Aboriginal and Torres Strait Islander community leaders in remote Australia are driving and leading voluntary action in the commercial food retail sector as owners of community stores. This self-regulatory action offers a unique case-study to examine what is possible when commercial entities are prepared to put the health of their communities at the forefront of their policies.

The Healthy Stores 2020 (HS2020) strategy was a co-designed real-world food retail intervention tested in a multi-store randomised control trial (RCT) in remote Australian Aboriginal and Torres Strait Islander communities in 2018.¹² Healthy Stores 2020 was conducted in partnership with the Arnhem Land Progress Aboriginal Corporation (ALPA), a food retail organisation consisting of an all-Aboriginal board with 25 Aboriginal community owned stores in 24 communities across the Northern Territory and Northern Queensland. ALPA is a unique commercial entity within the Australian food retail sector as a not-for-profit corporation in which commercial activities fund economic development and benevolent programs in their member communities. HS2020 used a seven-component strategy of restricted retailer promotion and placement of targeted unhealthy food and beverages. Examples of strategy components included no placement of discretionary foods and beverages in high traffic areas, and the removal of sugar-sweetened beverages over 600 ml within refrigerators. The trial was effective, resulting in a statistically significant 2.8% reduction in the percent of free sugars (g/total MJ) purchased while not affecting profitability.¹²

Successful strategy implementation in intervention stores during the trial was attributed to ALPA's strong sense of social purpose and alignment of the strategy with community need.¹³ ALPA has demonstrated a history of prioritising nutrition goals in their communities, for example, ALPA first developed a Health and Nutrition strategy for its stores in the 1980's and supports nutrition promotion activities within their stores

and communities. The community-represented ALPA board members had concerns about the high level of sugar intake and associated health outcomes in their communities, thus HS2020 was perceived to be highly aligned with community need. Follow-up evaluation of HS2020 and the knowledge of the trial's effectiveness and feasibility from the perspective of store operators provides a foundation to assess the impact of health-enabling self-regulatory action post-trial.

The aim of this study was to evaluate the effectiveness of the HS2020 strategy post-trial by reporting on impact on sales of free sugar and strategy implementation during the 24-weeks post-trial.

Methods

Study design and participants

HS2020 was a community-level, pragmatic, partially randomised, parallel group trial, which aimed to evaluate the impact of a strategy to reduce merchandising of discretionary products on customer purchasing and business performance.^{14,15} The strategy was conceptualised and co-designed in partnership with ALPA: potential strategies were presented to the ALPA Board who determined what would or would not be acceptable and feasible to the community, and further strategy refinement occurred over multiple meetings with ALPA and their participation in an expert working group. Twenty-five stores operating in very remote Aboriginal and Torres Strait Islander communities in the Northern Territory and Queensland owned or managed by ALPA were invited to participate in HS2020. ALPA stores are geographically isolated from service centres, with food being transported by road, sea barge or small aircraft, or all three. Comprehensive methods of the HS2020 RCT, the study context, and the co-design approach have been described in detail in the study protocol and the primary RCT publication.^{12,16}

Randomisation

The random allocation ratio was 1:1, with stores either allocated to intervention (implemented the HS2020 strategy) or control (usual store practice). Treatment effect was assessed as the difference in outcomes with the strategy compared with no strategy (baseline and control). Randomisation was performed by a statistician after recruitment was complete, using a computer-generated randomisation list. The randomisation was based on a single sequence of random assignments. Allocation was concealed. Partial randomisation occurred because two of the stores, which were in the same community, were allocated together.

Procedures

The HS2020 strategy included seven components (Table 1; Appendix Table A1), with three related to restricted retailer promotion and placement of

The Healthy Stores 2020 strategy

All RED ^a products	1	No promotional activity on discretionary food and beverages, including no price promotions or discounts, volume promotions, posters, or shelf stripping
	2	No misleading promotional activity on food and beverages (e.g., fruit and vegetable fridge branding on a fridge containing confectionery, or sugar-free stripping in front of sugar-sweetened beverages in fridges)
	3	No visible availability of discretionary food and beverages at counter, ends of aisles, and other high-traffic areas (e.g., front and end-of-aisle displays)
Targeted RED products	4	Reduced facings confectionery and sweet biscuits, and table sugar limited to one bay
	5	Reduced refrigerator facings for targeted beverages
	6	Soft drink beverage units of more than 600 ml not permitted in fridges (only in stores with no competitor retail outlet; n = 6), but still available for sale not chilled
	7	Floor sticker (showing amount of sugar per 1.25 L soft drink), shelf stripping (giving a warning of high sugar), and floor sticker promoting water as the healthiest choice

"Targeted" refers to specific foods and beverages that are high in free sugars and targeted in the HS2020 strategy (confectionery, sweet biscuits, and beverages and soft drinks classified as red). Table reprinted with permission from Brimblecombe et al. (2020).¹² ^aProducts classified as red based on Arnhem Land Progress Aboriginal Corporation's Nutrition and Health Strategy (Appendix Table A2).

Table 1: Seven components of the Healthy Stores 2020 strategy.

discretionary food and beverage products and four specifically targeting the largest contributors to free sugars (table sugar, sugar-sweetened beverages, confectionery and sweet biscuits). Due to ALPA's concerns about potential adverse business outcomes, strategy component 6 (no soft drinks units more than 600 ml in refrigerators) was only implemented where there was no competitor store in the community (6 stores). Intervention stores with a competitor store in the community (4 stores) implemented the other six strategy components. Control stores continued normal business practice during the strategy period including implementation of the ALPA Health and Nutrition Strategy.

At the end of a 12–13 week baseline period (June–Sept 2018), strategy set-up occurred in intervention stores over a two-week period by an ALPA team and/or research team. The strategy was maintained by store managers and their staff until trial-end (Dec 2018; 12–13 weeks). Compliance with the strategy was monitored during this period with phone calls every two weeks from a research assistant using a merchandising checklist and through routine communication and in-store nutrition audits from the ALPA nutritionist and/or ALPA area manager. In the post-trial period (Dec 2018–May 2019; 24 weeks), all intervention stores were instructed by ALPA to continue the HS2020 strategy until trial results were finalised and available. Support provided from the research team during the trial period (i.e., in the form of fortnightly phone calls to store managers) did not continue in the post-trial period, however internal support from ALPA continued as per their usual business. This included: policy compliance checks on routine store visits by ALPA's nutritionist and area managers (where policy compliance included ALPA-wide policy for all stores, plus HS2020 specific policy for intervention stores); briefing new store managers in intervention stores

about the HS2020 strategy by ALPA's nutritionist; ALPA's nutritionist continued to ensure that promotions developed by the merchandising team were in line with the HS2020 strategy in all stores.

Outcomes

The primary outcome was the difference in change in free sugars purchased relative to energy purchased (g/total MJ energy) with the strategy compared to no strategy.¹² Secondary outcomes were free sugars relative to energy purchased (free sugars g/total MJ); weight relative to energy purchased (g/total MJ); and dollar value relative to total dollars (% total \$) for discretionary food and beverages, targeted food and beverages, targeted beverages, targeted soft drinks, targeted table sugar, targeted confectionery, targeted sweet biscuits, non-targeted beverages, and non-targeted soft drinks. Discretionary food and beverage products were those classified as red according to the Arnhem Land Progress Aboriginal Corporation's Health and Nutrition Strategy (Appendix Table A2).¹⁷ "Targeted" refers to specific foods and beverages that are high and free sugars and targeted in the HS2020 strategy (confectionery, sweet biscuits, and beverages and soft drinks classified as red). Business outcomes were total dollars (AUD\$) for gross profit (product sell price minus cost) of all food and beverages. Additionally, strategy implementation in the post-trial period was assessed.

Purchasing outcomes were derived using sales data provided by ALPA for each store. Weekly sales data were collected showing total unit quantity, dollar value (AU\$) for each product sold by each store in each week. Food and beverage products were linked to nutrient composition information using the Australian AUS-NUT 2011–2013 food composition database¹⁸ to derive free sugars (grams free sugars per total MJ from all foods and beverages) and weight (grams purchased per total MJ from all foods and beverages) outcomes. Gross

profit data for the post-trial period were not available for three stores as they were no longer managed by ALPA and their data had been deleted; two stores were in the intervention group (both six-component strategy) and one store in the control group. Therefore, gross profit data for 17 stores (those which there were data for stores for all time periods) were included in the 24-week post-trial analysis.

Photographic evidence was collected in all stores by members of the research team using a data collection protocol at three timepoints: baseline (T1, July/Aug 2018), trial-end (T3, Nov 2018), and post-trial end (T4 May 2019; 24 weeks post-trial completion); providing cross-sectional snapshots of strategy implementation (photographic data checklist in [Appendix A1](#)). T2 photographic evidence was taken at implementation set-up and has been presented elsewhere.¹² A procedure for counting facings for sweet biscuits, confectionery and targeted drinks was followed ([Appendix A2](#)). Facing counts on sweet biscuits, confectionery, and targeted drinks were counted by two researchers (SD and SH). Where there was a difference of over 3%, facings were recounted. Instances of non-compliance to the strategy were recorded by a researcher (SD) and counted for each strategy component for each store. The number and percentage change in facings for sweet biscuits, confectionery, and targeted drinks for the T1 and T3 timepoints were compared to the T4 timepoint to assess 'reduced facings' for strategy components four and five.

Full implementation of each strategy component allowed for minor instances of non-compliance, providing a realistic representation of normal store practice. It can be assumed that minor instances of non-compliance observed in the photographic evidence, which provided a cross-sectional snapshot of the strategy, would be corrected through the support processes provided by ALPA. Full implementation was therefore assessed as only minor instances of non-compliance (e.g., 2 or less observed instances of promotions on discretionary food and beverages) using assessment criteria for each of the seven strategy components ([Appendix Table A3](#)). Implementation outcomes were the number of strategy components (out of six or seven) with full implementation by each intervention store at post-trial end.

Statistical analysis

For the Healthy Stores 2020 trial, we anticipated a difference with the strategy versus no strategy of approximately -8% to -9% in total free sugar (g/total MJ), and -10% in targeted products.¹⁶ The estimated effect sizes were based on Batis and colleagues¹⁹ reported effect of an 8% tax applied by the Mexican Government on non-essential energy-dense foods, where low socioeconomic status households purchased, on average, 10.2% less taxed foods than expected (-44 g, -72 to -16,

per capita per month). Using 20 weeks of data for 20 remote stores (i.e., from the Stores Healthy Options Project in Remote Indigenous Communities study¹⁶), we found a 95% CI with a width of 3.6 for the difference in free sugars for two randomly chosen groups of 10 stores. A corresponding power calculation was not necessary²⁰; however, we estimated the Healthy Stores 2020 trial would likely have approximately 90% power to detect a treatment effect of a 6% reduction in the primary outcome (free sugars g/total MJ), as described in our protocol.¹⁶

Impact of the Healthy Stores 2020 strategy on purchases post-trial was evaluated via Stata, version 16, as per the registered analysis plan, using longitudinal data analysis models on weekly outcomes with fixed effects for week, intervention stores during-trial, and intervention stores post-trial, random effects for store, and residuals with autoregressive structure of order 1. Outcomes were log-transformed before analysis because variables were not normally distributed. Treatment effect is expressed as a relative percentage difference (95% CIs). Residuals were checked for normality. Analyses were done consistently with those in the initial strategy RCT analysis, which had one deviation from the study protocol, where weekly rather than two-weekly data were used to account for staggering of implementation over two weeks.^{12,16}

A sensitivity analysis was performed for the primary outcome of free sugars to energy from all foods and beverages (g/total MJ energy) whereby each store was dropped one at a time and the main analysis was repeated without that store's data to assess if any one store was driving the overall effect. A simple ANCOVA analysis was also performed. In addition, an analysis by allocation was performed where the data for the two stores that were allocated together were combined ($n = 19$ stores; 9 control, 10 intervention). Further details of the primary, sensitivity and ANCOVA analyses are provided in the [Appendix \(Appendix A3\)](#).

Ethics

Ethics approval was granted by the Human Research Ethics Committee and Aboriginal sub-committee of Northern Territory Health and Menzies School of Health Research (HREC-2019-3048) and Far North Queensland HREC (HREC-18-QCH-23-1211). Research was conducted in line with the Australian Code for the Responsible Conduct of Research and National Health and Medical Research Council Guidelines on the ethical conduct in research with Aboriginal and Torres Strait Islander Peoples and Communities.²¹

Role of the funding source

No funding body had a role in the design of the study and collection, analysis, and interpretation of data and/or in writing the manuscript.

Results

Between June 13 and Aug 15, 2018, 20 ALPA stores (from the 25 invited) operating in 19 communities in the Northern Territory (14 stores) and Queensland (6 stores) consented to participate in the HS2020 trial and were randomly assigned to intervention (10 stores) or control (10 stores) (Fig. 1), with all stores analysed for the primary outcome. The same 20 stores continued the study in the post-trial period. Characteristics of the participating stores and communities are reported in Table 2.

Impact on purchases

The Healthy Stores 2020 strategy resulted in lower sales of total free sugars (g/total MJ) post-trial (percentage difference -4.6%, 95% CI -7.1 to -1.9; Table 3, strategy vs no-strategy). Reductions in free sugars and weight were observed in all targeted secondary outcomes except table sugar, confectionery, and sweet biscuits. Post-trial between group differences in free sugars from targeted beverages (-11.2%, -15.4 to -6.7) and targeted soft drinks (-19.0%, -24.7 to -12.8), and in weight of non-targeted beverages (10.0% relative percentage change in g/total MJ, 3.7-16.7) and non-targeted soft drinks (19.8%, 4.4-37.6) were also observed (Table 3). Total food and beverage dollars were 7.0% (95% CI

0.9%-13.5%) higher post-trial compared to no strategy. In the 17 stores for which gross profit data were available, gross profit was also greater post-trial (11.4%, 4.6-18.6). The difference of -4.6% in sales of total free sugars (g/total MJ) observed between groups post-trial was higher than the published difference of -2.8% observed for the trial.

The impact on free sugars seen post-trial remained when the analysis was repeated with each of the 20 stores removed one by one (sensitivity analysis 2a; Appendix Figure A1). In the simple ANCOVA analysis, the direction of the treatment effect for all outcome measures remained consistent, but had wider confidence intervals (sensitivity analysis 2b; Appendix Table A4). Consistency in the direction of the treatment effect for all outcome measures was also observed in the analysis by unit of allocation (n = 19 units) (Appendix Table A5). Table 4 shows purchasing outcome summarised descriptive values for baseline, trial and post-trial for control and intervention groups.

Strategy implementation

Two intervention stores had all strategy components (6/6 and 7/7) fully implemented, four stores had fully implemented six of the seven strategy components applied in their stores, and the remaining four stores



Fig. 1: Trial profile. *Two stores in the same community were allocated together, therefore n = 19 by unit of allocation. The two stores grouped together received control.

had at least 50% of the six or seven strategy components fully implemented (Appendix Table A6).

The number of stores with full implementation of each strategy component is presented in Table 5. All intervention stores had full implementation of component 2 (two or less instances of misleading promotional activity). The other six strategy components had over 60% of stores (that could be assessed) with full implementation. Eight out of 10 stores complied with component 1 (two or less instances of promotions) and component 7 (only one component of health promoting material missing). Component 2 also had the highest level of implementation amongst control stores (eight stores). Description of occurrences of non-compliance with the strategy components are presented in Appendix Table A7.

The majority of intervention stores had reductions in facings for sweet biscuits (seven stores), confectionery (eight stores), and targeted beverage (seven stores) at post-trial end (T4) compared to baseline (T1) (Appendix Table A8; Appendix Figures A2 and A3). All intervention stores reduced bays of table sugar compared to baseline. Reduction in facings in control stores (T4 compared to T1) was minimal for sweet biscuits, and an increase in confectionery facings was observed for seven stores. Five control stores reduced facings for targeted beverages and reduced or showed no change in the number of table sugar bays (T4 compared to T1).

Discussion

The aim of this study was to report on the post-trial impact on purchases of a health-enabling food retail intervention, by an Aboriginal-owned quasi-commercial not-for-profit entity. A reduction in the sales of free

	All stores (n = 20)	Intervention (n = 10)	Control (n = 10)
Population			
Population per community	16,070 (total combined)	578 (368–947)	814 (507–947)
% Aboriginal and/or Torres Strait Islander	–	94 (91–95)	92 (86–94)
Location			
Northern Territory	14 (70%)	7 (70%)	7 (70%)
Queensland	6 (30%)	3 (30%)	3 (30%)
Nearest food retail outlet outside of community			
By air or sea	8 (40%)	5 (50%)	3 (30%)
By road	12 (60%)	5 (50%)	7 (70%)
Distance, km	103 (48–119)	77 (32–107)	106 (65–171)
Competitor store			
Yes	9 (45%)	4 (40%)	5 (50%)
No	11 (55%)	6 (60%)	5 (50%)
Alternate food outlets in community			
Yes	8 (40%)	4 (40%)	4 (40%)
No	9 (45%)	5 (50%)	4 (40%)
Unsure	3 (15%)	1 (10%)	2 (20%)
ALPA owned			
Yes	12 (60%)	6 (60%)	6 (60%)
No	8 (40%)	4 (40%)	4 (40%)

Data are n (%) or median (IQR). Table reprinted with permission from Brimblecombe et al. (2020).¹²
ALPA = Arnhem Land Progress Aboriginal Corporation.

Table 2: Store and community characteristics.

sugars with the strategy was observed post-trial (–4.6% relative reduction in g/MJ) and total food and beverage dollar spend and gross profit were not adversely impacted. Considering support for the intervention by the research group was removed at the end of the HS2020 trial, compliance with strategy implementation and the observed impact reflects the strong commitment by ALPA to continue the strategy post-trial.

	Free sugars (g/total MJ)		Weight, relative (g/total MJ)		Dollars (AUD\$)	
	Post-trial	Trial ^a	Post-trial	Trial ^a	Post-trial	Trial ^a
Food and beverages, total	–4.6% [–7.1, –1.9]	–2.8% [–4.9, –0.7]	0.5% [–1.9, 2.9]	0.5% [–1.9, 2.9]	7.0% [0.9, 13.5]	N/A
Food and beverages, discretionary	–5.0% [–7.6, –2.3]	–3.1% [–5.2, –0.9]	–8.5 [–11.6, –5.4]	–5.4% [–8.1, –2.6]	N/A ^c	–1.8% [–3.6, 0.0]
Food and beverages, targeted	–5.1% [–7.9, –2.3]	–3.4% [–5.7, –1.0]	–10.2 [–13.7, –6.5]	–7.0 [–10.2, –3.6]	N/A	–3.1% [–5.7, –0.5]
Food, discretionary non-targeted	–3.7 [–8.5, 1.4]	0.3% [–4.2, 5.0]	–2.7 [–6.2, 0.9]	0.9% [–2.0, 3.9]	N/A	–1.0% [–3.3, 1.4]
Beverages, targeted	–11.2% [–15.4, –6.7]	–6.8% [–10.9, –2.6]	–12.2 [–16.4, –7.9]	–8.4% [–12.3, –4.3]	N/A	–3.4% [–6.7, –0.1]
Soft drinks, targeted	–19.0% [–24.7, –12.8]	–13.4% [–18.7, –7.7]	–19.1 [–24.8, –12.9]	–13.2% [–18.5, –7.6]	N/A	–5.7% [–10.0, –1.3]
Table sugar, targeted	4.9% [–1.0, 11.2]	–2.3% [–8.6, 4.5]	4.9 [–1.0, 11.2]	–2.3% [–8.6, 4.4]	N/A	–4.9% [–11.7, 2.4]
Confectionery, targeted	0.3% [–7.1, 8.3]	–7.5% [–14.3, –0.2]	2.5 [–4.5, 9.9]	–4.6% [–11.1, 2.3]	N/A	–2.2% [–8.8, 4.8]
Sweet biscuits, targeted	0.2% [–8.5, 9.0]	4.7% [–3.0, 12.5]	0.9 [–7.5, 9.7]	3.2% [–4.3, 11.0]	N/A	0.9% [–5.8, 7.9]
Beverages, non-targeted	N/A	N/A	10.0% [3.7, 16.7]	10.1% [4.2, 16.4]	N/A	10.9% [6.8, 15.2]
Soft drinks, non-targeted	N/A	N/A	19.8% [4.4, 37.6]	23.5% [10.2, 38.5]	N/A	17.4% [6.0, 30.1]
Food and beverages, total gross profit dollars ^{a,b}	N/A	N/A	N/A	N/A	11.4% [4.6, 18.6]	5.0% [–1.9, 12.4]

Results are from the mixed models described in Appendix A3. N = 10 each for control and intervention. Discretionary food and beverage products were those classified as red according to the Arnhem Land Progress Aboriginal Corporation's Nutrition and Health Strategy (Appendix Table A4). "Targeted" refers to specific foods and beverages that are high and free sugars and targeted in the HS2020 strategy (confectionery, sweet biscuits, and beverages and soft drinks classified as red). ^aResults reprinted with permission from Brimblecombe 2020.¹² ^bn = 17 stores. ^cNot included in post-trial analysis as gross profit dollars is the key business-related outcome.

Table 3: Between-group differences (intervention stores—control stores) for purchasing outcomes during trial (Sept–Dec 2018) and post-trial (Dec 2018–May 2019).

	Baseline ^a		Trial ^a		Post-trial	
	Control	Intervention	Control	Intervention	Control	Intervention
Free sugars (g/total MJ)						
Food and beverages, total	14.3 (1.3)	14.7 (1.2)	14.8 (1.3)	14.8 (1.2)	14.7 (1.3)	14.4 (1.2)
Food and beverages, discretionary	14.0 (1.3)	14.4 (1.2)	14.5 (1.3)	14.5 (1.2)	14.4 (1.3)	14.1 (1.3)
Food and beverages, targeted	12.6 (1.4)	13.0 (1.2)	13.2 (1.4)	13.2 (1.3)	13.0 (1.4)	12.8 (1.3)
Beverages, targeted	5.0 (1.3)	5.6 (1.4)	5.7 (1.3)	6.1 (1.5)	5.6 (1.3)	5.5 (1.4)
Soft drinks, targeted	3.0 (1.6)	3.5 (1.5)	3.2 (1.6)	3.2 (1.7)	3.0 (1.5)	2.8 (1.6)
Table sugar, targeted	6.1 (1.7)	4.7 (2.2)	6.1 (1.7)	4.5 (2.4)	6.1 (1.7)	4.8 (2.2)
Confectionery, targeted	0.8 (1.3)	1.0 (1.3)	0.6 (1.3)	0.7 (1.3)	0.6 (1.4)	0.8 (1.3)
Sweet biscuits, targeted	0.3 (1.3)	0.3 (1.7)	0.3 (1.2)	0.3 (1.8)	0.3 (1.3)	0.3 (1.5)
Weight (g/total MJ)						
Food and beverages, total	153.4 (1.1)	166.3 (1.3)	158.3 (1.1)	173.5 (1.3)	151.7 (1.1)	162.1 (1.3)
Food and beverages, discretionary	70.6 (1.3)	79.8 (1.3)	73.4 (1.3)	78.6 (1.3)	71.0 (1.3)	73.1 (1.3)
Food and beverages, targeted	55.0 (1.4)	63.4 (1.3)	58.2 (1.4)	62.6 (1.4)	56.0 (1.3)	57.8 (1.3)
Beverages, targeted	45.3 (1.4)	53.1 (1.5)	48.9 (1.4)	52.7 (1.5)	46.6 (1.4)	47.7 (1.5)
Soft drinks, targeted	30.1 (1.6)	35.8 (1.5)	32.0 (1.6)	32.3 (1.7)	30.6 (1.5)	28.9 (1.6)
Table sugar, targeted	6.1 (1.7)	4.7 (2.2)	6.1 (1.7)	4.5 (2.4)	6.1 (1.7)	4.8 (2.2)
Confectionery, targeted	1.5 (1.3)	1.9 (1.3)	1.3 (1.3)	1.5 (1.2)	1.3 (1.3)	1.6 (1.3)
Sweet biscuits, targeted	1.3 (1.3)	1.3 (1.7)	1.1 (1.2)	1.2 (1.8)	1.2 (1.3)	1.2 (1.5)
Beverages, non-targeted	25.8 (1.4)	30.8 (1.9)	27.7 (1.4)	37.3 (2.0)	24.8 (1.5)	33.2 (1.9)
Soft drinks, non-targeted	3.4 (1.9)	5.6 (1.7)	3.5 (1.9)	7.2 (1.8)	3.2 (1.8)	6.5 (1.9)

Data are geometric mean (geometric SD) for baseline, trial, and post-trial periods. Analysis done on summarised dataset (weekly values summed for during trial and post-trial periods for each store; absolute values calculated as weekly means to account for different number of weeks for the baseline, trial and post-trial periods). N = 10 each for control and intervention. Discretionary food and beverage products were those classified as red according to the Arnhem Land Progress Aboriginal Corporation's Health and Nutrition Strategy (Appendix Table A4). "Targeted" refers to specific foods and beverages that are high and free sugars and targeted in the HS2020 strategy (confectionery, sweet biscuits, and beverages and soft drinks classified as red). ^aResults reprinted with permission from Brimblecombe 2020.¹²

Table 4: Descriptive summary of purchasing outcomes data at baseline, trial, and post-trial for control and intervention.

The success of the initial trial, including its feasibility, contributed to the decision by ALPA to continue the strategy.¹³ The reporting of preliminary trial results

(after May 2019) to the ALPA board and subsequently to the Independent Aboriginal boards of ALPA managed stores, resulted in all stores agreeing to adopt the strategy into policy. This led to the HS2020 strategy and a subsequent 15 sugar-reduction actions being embedded in ALPA's Health and Nutrition Strategy by 2020 and investment in an additional nutrition position to support its implementation.

This research contributes to the limited evidence on the use of self-regulation by smaller quasi-commercial entities with a strong sense of social purpose. Research to date on self-regulation by the food industry has primarily focused on the actions of powerful transnational commercial entities operating entirely in the private sector,²² largely finding voluntary actions ineffective at achieving meaningful improvements in the healthiness of food environments.^{23,24} The commercial sector is diverse, also spanning not-for profit and quasi-commercial entities, and less attention has been placed on the ability of such commercial entities to positively influence health.²²

Mandatory government regulation is usually viewed as the only effective approach to change harmful industry practices impacting public health. However, attempt for government regulation is often met with resistance from food industry actors, resulting in weak policy and mixed outcomes for public health.²⁵ Self-

	Intervention stores	Control stores
1. No promotional activity on discretionary products	8/10 (80%)	5/10 (50%)
2. No misleading promotional activity	10/10 (100%)	8/10 (80%)
3. No visible availability at high traffic areas of discretionary products	6/10 (60%)	5/10 (50%)
4. Reduced facings for confectionery and sweet biscuits, and table sugar stocked to one bay or less (reduced from T1 and maintained from T3)	7/10 (70%)	0/10 (0%)
5. Reduced refrigerator facings for targeted drinks (reduced from T1 and maintained from T3)	7/10 (70%)	5/9 ^a (56%)
6. No units >600 ml of targeted soft drink in refrigerators	5/6 ^b (83%)	0/10
7. HS2020 health promoting material	8 (80%)	strategy not assessed

Discretionary food and beverage products were those classified as red according to the Arnhem Land Progress Aboriginal Corporation's Health and Nutrition Strategy (Appendix Table A4). "Targeted" refers to specific foods and beverages that are high and free sugars and targeted in the HS2020 strategy (confectionery, sweet biscuits, and beverages and soft drinks classified as red). ^an = 9 photographic evidence missing for one store at T1 and T3. ^bn = 6 stores implementing modified six-component strategy; T1—baseline time point, Jul/Aug 2018; T2—following set up time point, Sep/October 2018; T3—during trial time point, Nov 2018; T4—post-trial time point, May 2019.

Table 5: Number and percentage of stores obtaining full implementation across intervention (n = 10) and control (n = 10) stores at post-trial end (T4) for each strategy component.

regulation, voluntary initiatives co-designed with or led by industry, can therefore present a pragmatic approach to improve the healthiness of food environments. Much of the evidence to date however concerns self-regulatory policy that is implemented by large profit-driven corporations, usually in response to consumer concerns, to create differentiation from competitors, and to delay or avoid government regulation,²⁵ and has shown to have little impact on diet-related NCDs.^{26,27} In comparison, this research suggests self-regulation can be effective when implemented by a quasi-commercial entity who prioritise the improvement of health outcomes in a local community context and where compliance is closely monitored and supported. Unique to this setting is that the study stores are Aboriginal owned businesses with community-elected Aboriginal and Torres Strait Islander directors. In this context, Indigenous knowledge that centres on the well-being of the community plays an integral role in shaping the business decisions.

Implementation of health-enabling initiatives in the post-research phase requires dedicated resources, including continued leadership, monitoring, and guidance on compliance. The internal capacity of ALPA and championing of the strategy by the ALPA nutritionist was critical to strategy compliance post-trial, as it involved regular communication with store managers, area managers, and suppliers, in regards to compliance, monthly audits of stores, and continued training of new staff. The reduction in sales of free sugars observed post-trial, outside of research support, is evidence of ALPA's strong support for the successful HS2020 strategy.

Factors enabling compliance with the HS2020 strategy align with evidence on the implementation of food retail interventions outside of research.²⁸ Themes influencing implementation sustainability identified in the literature are trust and partnership between the retailer and interventionist, and co-design of the intervention. Healthy Stores 2020 engaged in a co-design process with the ALPA board, store managers and staff throughout all stages of intervention development.^{12,13} The co-design process with ALPA and remote communities considered alignment of the strategy impact, commercial risk, and community need, which likely contributed to the strong organisational commitment to the strategy and successful post-trial implementation. Low complexity in strategy implementation and no adverse impact on gross profit are also key factors identified in the literature for implementation sustainability success.²⁸ Store managers indicated that the HS2020 strategy was straightforward to integrate into workflows and maintain, though some strategy components required good nutrition knowledge and ongoing stocking training for staff.¹³

The impact on free sugar sales was largely driven by lower sales from targeted beverages. Compliance with strategy components targeting sugar-sweetened

beverages was high, although the impact on sales of sugar-sweetened beverages may also reflect the high purchasing and consumption of these products in Aboriginal and Torres Strait Islander remote communities and therefore the considerable potential for improvement. Approximately 67% of free sugars consumed by Aboriginal and Torres Strait Islander Peoples in 2012–2013 came from beverages, of which 28% was soft drinks, sports and energy drinks.⁵ At baseline, intervention stores in remote communities on average purchased 24% of total free sugars from sugar-sweetened soft drinks,¹² higher than the 15% of free sugars contributed from soft drinks purchases in the general Australian population in 2020–21.²⁹ Factors likely to part contribute to higher consumption include the forced disruption to traditional diets and introduction of westernised diets resulting from colonisation, socio-economic inequalities, affordability, and accessibility barriers to healthy food options due to remoteness, and environmental factors (e.g., real and perceived concerns about water quality, and lack of facilities to cool water in high temperature climates).^{30,31}

Self-regulation is limited as risks to profits can outweigh potential health benefits when there is not an even playing field for all commercial entities. Risks to profit in remote Aboriginal and Torres Strait Islander communities can also risk financial viability of these small stores and therefore food security of the community. Without government regulation, commercial interests will continue to conflict with the need for health-enabling retail interventions. Furthermore, the continuation of HS2020 post-trial required internal capacity (adequate support through staffing) from the retail organisation to monitor and support compliance. The level of support required is challenging for a not-for-profit organisation and may not be realistic for all retailers in the remote food retail context. As the not-for-profit remote food retail sector can make a significant contribution to progressing national health prevention strategy targets, government commitment to supporting a workforce within this sector could help store directors and operators with the implementation of evidence-based interventions within remote stores to improve health.

In this post-trial analysis the intervention remained largely a controlled study due to ALPA's instructions to maintain the strategy in intervention stores and continue usual business practice in control stores, thus potential confounders were reduced. A limitation of the gross profit analysis was that data were only available for 17 stores; however consistent results were found for total food and beverage dollars. Total food and beverage dollars (for which we had a complete dataset of 20 stores) is a comparable indicator to gross profit. However, from a retailer perspective, gross profit also accounts for the percentage mark up on products costs. Although we had a smaller sample of stores for gross

profit, we found that both these indicators increased post-trial (11.4% [4.6–18.6]; 7% [0.9–13.5]). Compliance data were collected at only one time point at the end of the 24-week post-strategy period in this analysis. In the RCT analysis, strategy compliance was assessed using data collected at multiple timepoints providing a strict measure of implementation. Multiple statistical comparisons were made, thereby increasing the chance of statistically significant results.

Contextual factors specific to remote Aboriginal and Torres Strait Islander communities may limit the generalisability of our findings to other populations. For example, there could be resistance to the HS2020 strategy from retailers where profit is the primary motive or where retailers are unable to provide the resources required for strategy set-up and maintenance. Some customers in remote communities do not have refrigerators to cool ambient temperature beverages, thus strategies to remove targeted soft drinks from refrigerators may have more impact within this context. Furthermore, children are given agency at a young age within remote communities and often make purchases in stores.³² Considering children are more susceptible to marketing strategies³³ the effect of the HS2020 strategy may have more potential to impact purchasing in remote communities compared to mainstream supermarkets.

This research contributes to the gap in the literature on the effectiveness of food retail interventions post research. Further research on the ongoing impact of the strategy in ALPA's nutrition policy along with 15 subsequent sugar reduction actions and additional nutrition support invested by ALPA to support implementation would be valuable for informing future policy across remote Aboriginal and Torres Strait Islander communities. Research investigating the transferability of the HS2020 strategy to non-remote stores settings would also inform retail policy more broadly and national policy such as the National Strategy for Food Security in Remote Aboriginal and Torres Strait Islander Communities 2025–2035, the National Preventive Health Strategy 2021–2030, the National Obesity Strategy 2022–2032, and the Australian National Diabetes Strategy 2021–2030. In conclusion, this study found a health-enabling retail intervention, when adopted as voluntary policy by a quasi-commercial retail entity with strong social purpose, was effective at reducing free sugars with no adverse impact on business outcomes.

Contributors

All authors contributed to study design, strategy components, interpretation, and manuscript writing. JB and CLM conceived the study with Arnhem Land Progress Aboriginal Corporation (ALPA). JB led the study with ALPA. EMc analysed sales data and prepared sales data results. SD analysed and prepared adherence data results. SD, JB, and EMc drafted the manuscript. MDC advised on statistical analysis and interpretation. EMI advised on cultural protocols. KDS led the study

within ALPA. AG managed the study. All authors reviewed the manuscript and approved the final version. No funding body had a role in the design of the study and collection, analysis, and interpretation of data and/or in writing the manuscript. All authors have access to the data, and EMc and SD verified the data. All authors accept responsibility to submit for publication.

Data sharing statement

Data sharing will be considered on contact with the senior author (JB).

Consent for publication

Prior informed consent was given by all participating stores and ALPA for this project to be published. ALPA reviewed and approved this manuscript prior to its submission.

Declaration of interests

AP receives grant funding from the National Health and Medical Research Council, and has been a board director at VicHealth and Western Health in Australia. All other authors declare no competing interests.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.lanwpc.2025.101673>.

References

- 1 Gilmore AB, Fabbri A, Baum F, et al. Defining and conceptualising the commercial determinants of health. *Lancet*. 2023;401:1194–1213.
- 2 Australian Institute of Health and Welfare. *Health System Spending Per Case of Disease and for Certain Risk Factors [Internet]*. Canberra: AIHW; 2022. Available from: <https://www.aihw.gov.au/reports/health-welfare-expenditure/health-system-spending-per-case-of-disease/contents/about>.
- 3 Productivity Commission. *Closing the Gap Annual Data Compilation Report July 2023*. Canberra: Productivity Commission; 2023. Available from: <https://www.pc.gov.au/closing-the-gap-data/annual-data-report/2023/report>.
- 4 World Health Organization. *Reducing Free Sugars Intake in Adults to Reduce the Risk of Noncommunicable Diseases*. WHO; 2023.

- Available from: <https://www.who.int/tools/elena/interventions/free-sugars-adults-ncds>.
- 5 Australian Bureau of Statistics. 4727.0.55.009 - Australian Aboriginal and Torres Strait Islander Health Survey: Consumption of Added Sugars, 2012-2013. Canberra: ABS; 2016. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4727.0.55.009~2012-13~Main%20Features~Key%20Findings~1#:~:text=4727.0.,of%20Added%20Sugars%2C%202012%2D13&text=In%202012%2D13%2C%20Aboriginal%20and,teaspoons%20of%20white%20sugar>1.
 - 6 Department of Health. National Preventative Health Strategy 2021-2030. Canberra: Department of Health; 2021. Available from: https://www.health.gov.au/sites/default/files/documents/2021/12/national-preventive-health-strategy-2021-2030_1.pdf.
 - 7 World Health Organization. Global Action Plan for the Prevention and Control of Non-communicable Diseases. Geneva: WHO; 2013. Available from: <https://www.who.int/publications/i/item/9789241506236>.
 - 8 Australian Institute of Health and Welfare. Alcohol, Tobacco and Other Drugs in Australia. Canberra: AIHW; 2023. Available from: <https://www.aihw.gov.au/reports/alcohol/alcohol-tobacco-other-drugs-australia/contents/drug-types/tobacco>.
 - 9 Baker P, Gill T, Friel S, Carey G, Kay A. Generating political priority for regulatory interventions targeting obesity prevention: an Australian case study. *Soc Sci Med*. 2017;177:141-149.
 - 10 Sacks G, Schultz S, Grigsby-Duffy L, et al. Inside Our Supermarkets Australia 2020 - Assessment of the Healthiness of Australian Supermarkets. Melbourne: Deakin University; 2020. Available from: <https://preventioncentre.org.au/wp-content/uploads/2021/10/Inside-our-supermarkets-Assessment-of-the-healthiness-of-Australian-supermarkets.pdf>.
 - 11 Cameron AJ, Charlton E, Ngan WW, Sacks G. A systematic review of the effectiveness of supermarket-based interventions involving product, promotion, or place on the healthiness of consumer purchases. *Curr Nutr Rep*. 2016;5:129-138.
 - 12 Brimblecombe J, McMahon E, Ferguson M, et al. Effect of restricted retail merchandising of discretionary food and beverages on population diet: a pragmatic randomised controlled trial. *Lancet Planet Health*. 2020;4:e463-e473.
 - 13 Brimblecombe J, Miles B, Chappell E, et al. Implementation of a food retail intervention to reduce purchase of unhealthy food and beverages in remote Australia: mixed-method evaluation using the consolidated framework for implementation research. *Int J Behav Nutr Phys Act*. 2023;20:20.
 - 14 Oetzel J, Scott N, Hudson M, et al. Implementation framework for chronic disease intervention effectiveness in Māori and other indigenous communities. *Global Health*. 2017;13:69.
 - 15 Oetzel J, Scott N, Hudson M, et al. He Pikinga Waiora Implementation Framework: a tool for chronic disease intervention effectiveness in Māori and other indigenous communities. *Int J Integr Care*. 2018;18:1-2.
 - 16 Brimblecombe J, Ferguson M, McMahon E, et al. Reducing retail merchandising of discretionary food and beverages in remote Indigenous community stores: protocol for a randomized controlled trial. *JMIR Res Protoc*. 2019;8:e12646.
 - 17 Northern Territory Government Department of Education. School nutrition and healthy eating policy. Available from: <https://education.nt.gov.au/media/docs/policies/health,-safety,-wellbeing-and-behaviour/canteen,-nutrition-and-healthy-eating/policies-and-guidelines/school-nutrition-and-healthy-eating-policy.pdf>; 2023.
 - 18 Food Standards Australia New Zealand. AUSNUT 2011-2013 [Internet]. FSANZ; 2021. Available from: <https://www.foodstandards.gov.au/science-data/food-composition-databases/ausnut>.
 - 19 Batis C, Rivera JA, Popkin BM, Taillie LS. First-year evaluation of Mexico's tax on nonessential energy-dense foods: an observational study. *PLoS Med*. 2016;13:e1002057.
 - 20 Bland JM. The tyranny of power: is there a better way to calculate sample size? *BMJ*. 2009;339:b3985.
 - 21 National Health and Medical Research Council. Ethical Conduct in Research with Aboriginal and Torres Strait Islander Peoples and Communities: Guidelines for Researchers and Stakeholders. Canberra: Commonwealth of Australia; 2018.
 - 22 Lacy-Nichols J, Nandi S, Mialon M, et al. Conceptualising commercial entities in public health: beyond unhealthy commodities and transnational corporations. *Lancet*. 2023;401:1214-1228.
 - 23 Landwehr SC, Hartmann M. Industry self-regulation of food advertisement to children: compliance versus effectiveness of the EU Pledge. *Food Policy*. 2020;91:101833.
 - 24 Boyland EJ, Harris JL. Regulation of food marketing to children: are statutory or industry self-governed systems effective? *Public Health Nutr*. 2017;20:761-764.
 - 25 Buse K, Tanaka S, Hawkes S. Healthy people and healthy profits? Elaborating a conceptual framework for governing the commercial determinants of non-communicable diseases and identifying options for reducing risk exposure. *Global Health*. 2017;13:34.
 - 26 Jones A, Magnusson R, Swinburn B, et al. Designing a healthy food partnership: lessons from the Australian food and health dialogue. *BMC Public Health*. 2016;16:651.
 - 27 Potvin Kent M, Dubois L, Wanless A. Self-regulation by industry of food marketing is having little impact during children's preferred television. *Int J Pediatr Obes*. 2011;6:401-408.
 - 28 Gupta A, Alston L, Needham C, et al. Factors influencing implementation, sustainability and scalability of healthy food retail interventions: a systematic review of reviews. *Nutrients*. 2022;14:294.
 - 29 Australian Bureau of Statistics. Apparent Consumption of Selected Foodstuffs, Australia [Internet]. Canberra: ABS; 2022. Available from: <https://www.abs.gov.au/statistics/health/health-conditions-and-risks/apparent-consumption-selected-foodstuffs-australia/latest-release#added-and-free-sugars>.
 - 30 Thurber KA, Long J, Salmon M, Cuevas AG, Lovett R. Sugar-sweetened beverage consumption among Indigenous Australian children aged 0-3 years and association with sociodemographic, life circumstances and health factors. *Public Health Nutr*. 2020;23:295-308.
 - 31 Wright KM, Dono J, Brownbill AL, et al. Sugar-sweetened beverage (SSB) consumption, correlates and interventions among Australian Aboriginal and Torres Strait Islander communities: a scoping review. *BMJ Open*. 2019;9:e023630.
 - 32 Kruske S, Belton S, Wardaguga M, Narjic C. Growing up our way: the first year of life in remote Aboriginal Australia. *Qual Health Res*. 2012;22:777-787.
 - 33 Boyland E, McGale L, Maden M, et al. Association of food and nonalcoholic beverage marketing with children and adolescents' eating behaviors and health. *JAMA Pediatr*. 2022;176:e221037.