Effect of a price discount and consumer education strategy on food and beverage purchases in remote Indigenous Australia: a stepped-wedge randomised controlled trial

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Summary

Background Evidence is mounting that price discounts can be effective in improving diet. This study examined the effectiveness of a 20% price discount on food and drink purchases with and without consumer education in remote Indigenous Australia.

Methods A 20% discount on fruit, vegetables, water, and artificially sweetened soft drinks was applied for 24 weeks in 20 communities in remote Indigenous Australia where the community store was managed by the Arnhem Land Progress Aboriginal Corporation (ALPA) or Outback Stores (OBS) in a stepped-wedge randomised trial. Communities were randomly allocated to a fixed framework of five sets of four stratified by store association; ten stores (two in each set) were randomly assigned to receive consumer education. A store from each of the ALPA and OBS store groups (contained in separate opaque envelopes) was selected, and stores in turn continued to be consecutively allocated to the fixed store set framework, starting with the first store slot in the first store set, until all stores had been allocated. The effect of the discount on the weight of fruit and vegetables purchased (the primary endpoint) was assessed using weekly store sales data and mixed models per protocol. We did sensitivity analyses by repeating the analyses with the outliers included and repeating the analyses for the primary outcome measure removing each store one at a time. This trial was registered with Australian New Zealand Clinical Trials Registry, number ACTRN12613000694718.

Findings Weekly store sales data on all food and drink products sold in 20 stores were collected from July 1, 2012, to Dec 28, 2014. Price discount alone was associated with a 12·7% (95% CI 4·1–22·1) increase in purchases in grams of fruit and vegetables combined (primary outcome), and a 19·8% (6·2–35·1) increase post discount (after *vs* before); an effect of 12 g and 18 g per capita per day. Sensitivity analyses did not modify the results for the primary outcome measure.

Interpretation A 20% discount can only increase fruit and vegetable purchases to help protect against obesity and diet related disease to a certain extent. Large discounts might have a greater impact than small discounts. Creative merchandising approaches to consumer education could also be considered alongside fiscal interventions to achieve marked improvements in diet.

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Introduction

Poor diet has surpassed tobacco use as the leading preventable risk factor for the global burden of disease.[1] Low fruit and vegetable intake is one of the top ten risk factors contributing to mortality worldwide.[2] Socioeconomically disadvantaged populations tend to consume fewer fruit and vegetables and have a disproportionate burden of preventable diseases.[3] Indigenous Australians are one of the most disadvantaged populations in Australia and have a burden of disease 2·3 times that of non-Indigenous Australians.[4] Around 37% of this disease burden is preventable by reducing exposure to modifiable risk factors, such as dietary factors, which account for 10% of the total disease burden and 15% of the health gap between Indigenous and non-Indigenous Australians.[4]

Evidence is mounting that price discounts are effective in improving diet;[5–10] the evidence for nutrition education about food purchasing is less clear, and evidence of the effectiveness of these strategies in socioeconomically disadvantaged populations is scarce.[6] Compensatory purchasing of non-targeted food and beverages in the context of price discounts is also poorly understood, as is its effect on total dietary intake and health outcomes.[11] The financial effect of fiscal strategies on retail performance is also poorly understood.[12]

Price, preference, convenience, product quality, and advertising are key drivers of consumer behaviour and diet.[13] In theory, price discounts or subsidies provide a fiscal incentive for consumers to purchase more of a target food, with the effect being an improvement in overall diet.[14] A review in 2010 of studies from the USA

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Research in context

Evidence before this study

We searched PubMed, EBSCO, and Science Direct databases on May 8, 2014, with the search terms "Fast food*", "convenience store*", "take away*", "restaurant*", "dining room*", "cafeteria*", "café*", "diner", "food store*", "food outlet*", "corner store*", "supermarket*", "grocer*", "vending machine*", "automatic food dispenser*", "community store*", "diet", "nutrition", "food*", "vegetable*", or "fruit*", "availab*", "affordab*", "access*", "strateg*", "promotion*", "program*", "initiative*", "intervention*", "practice*", "marketing*", "activit*", or "food quality" for papers published in English, Portuguese, or Spanish. The results of this systematic review have been published in *BMC Public Health* in 2014. The evidence shows that there is mounting evidence that price discounts are effective in increasing healthy food purchasing. The evidence for nutrition education in modifying purchasing is less clear, and evidence of the effectiveness of these strategies in socioeconomically disadvantaged populations is scarce. To date, and to our knowledge, three randomised controlled trials (RCTs) have assessed the effectiveness of a price discount on food purchasing with and without nutrition education in socioeconomically disadvantaged populations. Results from all three studies showed an effect on fruit or vegetable purchases with the price discount, no additional benefit when combined with nutrition education, and no effect on fruit or vegetable purchases with nutrition education alone.

Added value of this study

To our knowledge, this is the first price discount trial done in a largely socioeconomically disadvantaged population, that has applied the intervention to the whole of population, and that assessed change using objective store sales data. Our data add valuable evidence to the understanding of fiscal interventions on food and drink purchasing because it examined the effect of all food and drink purchases. Our findings are consistent with previous price discount RCTs—ie, that a price discount on fruit and vegetables can increase fruit and vegetable purchases.

Implications of all the available evidence

A 20% discount can only increase fruit and vegetable purchases to levels that help protect against cardiovascular disease, cancer, diabetes, and obesity, to a certain extent. The findings of the SHOP@RIC trial suggest that incremental improvements in fruit and vegetable purchasing could potentially be achieved with sizeable price discounts applied and promoted at regular intervals on a rotating range of fruit and vegetables. A price increase (or tax) on sugar-sweetened soft drinks might need to be implemented alongside a price discount to negate the consequential increase in calories purchased and to encourage a reduction in sugar sweetened soft drink consumption. A consumer education strategy that uses retail merchandising practices to promote the purchase of healthy foods and discourages the purchase of less healthy foods, alongside fiscal interventions, might help achieve the improvements in diet needed to substantially affect health at a population level.

on price elasticity of demand showed that fruit has favourable price elasticity of 0·70 and vegetables of 0·58—ie, a 10% reduction in the price of these foods would increase purchases on average by 7·0% and 5·8%, respectively.[15] However, the authors concluded that changes in prices alone were not likely to increase the consumption of fruit and vegetables to recommended levels, but when combined with public education campaigns and other regulations affecting the food environment, price changes might have a multiplicative effect that could substantially improve diets.[15]

Nutrition education interventions, including effective behaviour change techniques such as goal-setting and practical skill-building strategies, show some promise in promoting increased fruit and vegetable purchasing and consumption.[16–18]

To date, three randomised controlled trials (RCTs) have assessed the effectiveness of a price discount on food purchasing with and without nutrition education including socioeconomically disadvantaged populations.[19–21] All three RCTs showed an effect on fruit or vegetable purchases with the price discount, no additional benefit when combined with nutrition education, and no effect on fruit or vegetable purchases with nutrition education alone.

These RCTs provide high-quality evidence on the effect of food pricing strategies with and without nutrition education. However, evidence on the effects of food pricing strategies on whole populations and on compensatory purchasing, both of which are required to estimate population level cost benefits of fiscal interventions, is scarce.[10,22,23] Despite the rapidly growing literature about food pricing strategies, there is still little high-quality evidence on healthy store retailing, in which nutrition education approaches to encourage healthy food purchasing are implemented at the point of sale in the store setting.[12]

Whole population RCTs assessing point-of-sale interventions are difficult to do because of the risk of contamination from adjacent retailers. The Northern Territory of Australia provides a unique and ideal trial location because communities are sparsely located and community stores are the main food source for most people.[24] In this context, store-level purchasing is a powerful proxy of community-level diet.[25]

SHOP@RIC (Stores Healthy Options at Remote Indigenous Communities) was a trial done in partnership with two major food retail associations in the Northern Territory of Australia: the Arnhem Land Progress Aboriginal Corporation (ALPA) and Outback