The effect of a change to healthy vending in a major Australian health service on sales of healthy and unhealthy food and beverages

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1. Introduction

Vending machines predominantly offer discretionary, packaged foods and beverages, high in sugar, saturated fat and/or sodium (Byrd-Bredbenner et al., 2012), and contribute to 4% of sugar-sweetened beverage (SSB) intake in US adults (An & Maurer, 2016). Excessive consumption of these types of items has been shown to contribute to weight gain, obesity, cardiovascular disease, diabetes, some cancers, and in the case of SSBs, dental caries (National Health and Medical Research Council and Food for Health - Dietary Guidelines for Australian Adults, 2003). Vending machines are consequently recognised as a potential point of intervention to shift the population towards healthier food choices (Grech & Allman-Farinelli, 2015).

However, as vending machines have traditionally provided mainly discretionary food and beverages, it is unclear if and to what extent consumers would shift their purchases if healthier items were offered. There is also a concern that implementing such changes may lead to a substantial decline in overall sales — a perceived financial risk for those who receive revenue from the vending machines (Brown & Tammineni, 2009).

Previous studies have examined the effect of increasing healthy food and decreasing unhealthy food options in vending machines on the sales of healthy items and/or overall sales in the US (Brown & Tammineni, 2009; Fiske & Cullen, 2004; French et al., 2010; Hoerr & Louden, 1993; Wilbur, Zifferblatt, Pinsky, & Zifferblatt, 1981), the Netherlands (Kocken et al., 2012) and New Zealand (Gorton, Carter, Cvjetan, & Ni Mhurchu, 2010), with settings encompassing schools (Brown & Tammineni, 2009; Kocken et al., 2012), a teacher's lounge (Fiske & Cullen, 2004), a workplace (Wilbur et al., 1981), a hospital (Gorton et al., 2010), a university (Hoerr & Louden, 1993) and bus garages (French et al., 2010).

Four studies report the effect of increasing the availability of healthier foods and/or beverages and decreasing the availability of unhealthy foods and/or drinks, with or without basic point of sale information (Fiske & Cullen, 2004; Gorton et al., 2010; Hoerr & Louden, 1993; Kocken et al., 2012). Of these, two reported no change in healthy snack purchases and a decrease in unhealthier snack purchases (Hoerr & Louden, 1993; Kocken et al., 2012), with either a corresponding 15% reduction (Hoerr & Louden, 1993) or no change (Kocken et al., 2012) in overall sales. The third study found a reduction in unhealthy macro-nutrients being sold, with no change in overall sales (Gorton et al., 2010). The final study reported no change in healthy item purchases or overall sales, and did not report changes to unhealthy product sales (Fiske & Cullen, 2004).

Whilst these studies provide important insights into the role of healthy vending policies on consumer purchases, the majority of the evidence to date is derived from relatively short term studies (<12 months), which do not have controls and/or account for pre-intervention trends in food and beverage sales. Furthermore, no

studies have conducted a comprehensive exploration of the underlying mechanisms and contextual factors that drive any changes in consumer purchase following vending policy implementation. This is essential for policy refinement to optimize health and financial outcomes, and for translations of policies to different settings and contexts.

In 2012 a large metropolitan health service in Australia implemented state government guidelines for the provision of healthy food and drink in public hospitals (State Government of Victoria and Healthy choices: food and drink guidelines for Victorian public hospitals, 2010). As part of this they sought to improve the availability and promotion of healthier options within the independently-owned retail outlets, event catering, and vending machines, while decreasing the availability of the unhealthiest options. This policy implementation was an opportunity to examine the effects of a change to healthier vending availability options on the sales of healthy and unhealthy food and beverages, as well as assessing whether a change in overall revenue was experienced.

Aim: We aimed to examine the change in consumer purchase of healthy and unhealthy foods and beverages from vending machines, following the introduction of a healthy vending machine policy, in a hospital setting, using monthly time series sales data collected for 30-months prior and 12-months post policy implementation.

2. Methods

A mixed method explanatory sequential design (Creswell & Plano Clark, 2011) was adopted, with a time series analysis of monthly itemised sales data used to inform and guide the development of the qualitative research component (Fig. 1). Stakeholder interviews were conducted to understand the context within which the policy was implemented, and to explore factors that may explain the impact of the policy on sales of healthy and unhealthy foods and beverages.

This design allows for explanatory factors and mechanisms behind the quantitative results to be explored using qualitative inquiry methods (Creswell & Plano Clark, 2011), effectively integrating the strengths of complementary methods (Morgan, 1998). Quantitative and qualitative results were analysed and reported separately, and drawn together in the discussion. Interpreting the results in the context of the particular setting provides a deeper understanding of the processes and factors leading to the observed outcomes. This may aid other organizations in the decision of

whether or not to implement a similar policy, what resources are required, potential pitfalls and enablers, and the outcomes of the policy that are not captured in sales data.

2.1. Context

The health service operates three major hospital sites plus additional settings for a range of other services. In total, 37 vending machines were located across these three sites, with 33 machines located at the largest site which is located closest to the central business district.

The health service adopted the *Healthy Choices: food and drink guidelines for Victorian public hospitals* (Healthy Choices) (State Government of Victoria and Healthy choices: food and drink guidelines for Victorian public hospitals, 2010), which guides health services to reduce the proportion of unhealthy food and beverages available for sale, and increase the availability of healthy options. These guidelines classify food and beverages into 'red', items that should be limited, 'amber', items to be chosen carefully, and 'green', the best choices. Classification is based on nutrients such as saturated fat, sugar, sodium, fibre, and energy content (see (The Victorian Healthy Eating Enterprise and Services, 2015) for further detail on classification). Consistent with these guidelines, following policy implementation by the health service, the proportion of 'red' items available in each vending machine across the health service was no more than 20% of displayed products, 'green' made up at least 50% of displayed products, and 'amber' contributed the remaining. There was basic communication at point-of-sale as to the meaning of the classification, and items were labelled with their classification. All products were coded by an accredited dietician at the health service. These classifications were obtained and used in this study. The health service conducted audits every three to six months to ensure compliance with the policy.

The supplier maintains and stocks the vending machines, and gives the health service a fixed percentage commission on each item sold in exchange for selling items on the health service grounds. As part of the policy implementation the vending services were publicly tendered in a competitive process. Respondents were required to demonstrate their capacity to comply with Healthy Choices, as well as submitting a proposal regarding commission rates and other factors. The supplier who was appointed offered higher commission rates than previously, and also changed the location and size of some vending machines within the health service.

2.2. Sales data analysis

Itemised, monthly sales data from all 37 vending machines from 30 months prior to, and 12 months post-policy implementation was obtained from the supplier. We examined the change in the number of items sold by category ('red', 'amber', 'green'), and in total, as well as changes in revenue by category and overall. We also examined number of items sold and revenue for food and drinks items separately. As the health service received a fixed percentage commission rate on every item sold, revenue was measured as the sales value of items sold. We further examined the change in total volume of 'red' drinks sold, and the sugar content within all drinks sold. Volume of drinks was identified from the itemised sales data. Sugar content was identified from manufactures websites. All of the above analyses were conducted using a single group interrupted time series design to assess the effect of the Healthy Choices policy on the sales of food and beverages, using Stata SE 14 with the ITSA package (Linden, 2015). The intervention was modelled to commence 1st April 2012. Autocorrelation and possible heteroscedasticity were accounted for by applying ordinary least squared
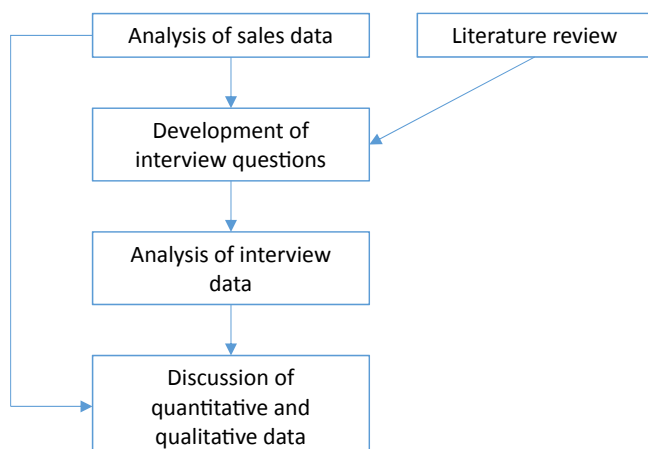
Fig. 1. Integration of quantitative and qualitative data analysis and discussion.