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Quantity Discounts for Regular Soda Fountain Drink Offerings in Fast-Food Restaurants in Two U.S. States

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Key Findings

- **Regular soda fountain drink offerings in a sample of fast-food restaurants in Illinois and Wisconsin cost 10 cents per ounce and 12 cents per 10 calories, on average, and ranged in size from 20-42 ounces and 90-390 calories.**
- **There were substantial quantity discounts for regular soda fountain drink offerings. On average, the price was only 63% higher for a beverage double the size.**

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Introduction

Fast-food purchases account for one-fifth of U.S. household food budgets,[1] with 36% of children and 37% of adults consuming fast food on a given day.[2,3] On average, fast food accounts for 14% of daily calories consumed by children and 11% of daily calories consumed by adults.[2,4] Fast-food meals are high in calories as well as sodium, saturated fat, and sugar.[5] Fast-food consumption is associated with higher caloric intake and poorer diet quality among both children and adults,[6,7] and, in turn, poor diet quality is associated with a variety of adverse health conditions.[8,9] Beverages specifically are a significant contributor to sugar content in fast-food meals,[5] and consumption of sugar-sweetened beverages (SSBs) is associated with obesity, type 2 diabetes, and cardiovascular disease.[10]

Quantity discounts, where the price per unit of a product is lower for larger purchases (e.g., a 12-ounce soda costs $1.00 while a 24-ounce soda costs $1.50), incentivize the purchase of larger portion sizes.[11] Because exposure to larger portion sizes has been found to be associated with increased consumption of food,[12,13] quantity discounts could contribute to increased consumption and associated potential health risks. There is limited research on the extent of quantity discounts in fast-food restaurants. One study found evidence of quantity discounting for combination meals but did not examine quantity discounting for specific meal components, such as SSBs.[14] Another study examined pricing of SSBs across both food stores and fast-food restaurants and found evidence of quantity discounting in food stores, with regular soda costing 2.5-3.3 cents/ounce on average for family sizes compared to 7.2 cents/ounce for individual sizes.[15] That study did not directly examine quantity discounting within fast-food restaurants.

Using baseline data collected for a larger evaluation of an Illinois act requiring healthier beverage defaults with kids' meals,[16] this study provides evidence on the extent of quantity discounts for regular soda fountain drink offerings in fast-food restaurants.

Methods

As described in a previous brief,[16] fast-food restaurants from 12 national chains were sampled from select counties in Illinois and neighboring Wisconsin. Field audits were conducted from October 29 – November 18, 2021, while data on online offerings for the same restaurants were collected from November 18-24, 2021. The current brief relies exclusively on data collected from the interior of the restaurant's physical location. While the larger study focused on kids' meal offerings, data were also collected and coded on potential substitutes, including beverage offerings on the general interior menu board examined in the current analysis.

This analysis relied on coding of regular soda fountain drink offerings included on the general interior menu board. The price and size were recorded for each available beverage size. Size was recorded in ounces if possible and in calories if ounces were not available. Where calories were given as a range (e.g., across different brands offered on the same machine), the midpoint of that range was used for analyses. Where possible, calorie ranges were obtained for regular

soda offerings only, but sometimes calorie ranges could only be obtained across all beverage types offered on the machine, which could have included, e.g., sports drinks. Also, where possible, calorie ranges were obtained separately for each fountain drink size offered, but in some cases, ranges could only be obtained across all sizes offered.

A total of 201 restaurants were sampled, including replacement restaurants where an originally sampled restaurant could not be audited. Of those, 26 could not be coded for the interior menu board (including 22 where the interior was closed/not accessible, 1 where the data collector was asked to leave before photos could be taken, and 3 that were drive-thru only), and one did not have any regular soda fountain drink offerings. The remaining 174 restaurants offered 492 regular soda fountain drink options, counting different sizes separately. Data on size were available for 468 of these offerings in 171 restaurants; of those, data on price were available for 449 offerings in 167 restaurants. This allowed the computation of 353 pairwise comparisons in 124 restaurants to assess quantity discounts across different regular soda fountain drink sizes within the same restaurant, excluding 4 restaurants for which data on price and size were only available for one size and 39 restaurants for which separate size information was not available for each size offered (e.g., single calorie range listed across sizes).

To measure the extent of the quantity discount from one size to another, an elasticity measure was computed. This measure equaled the percentage difference in price from one size to the other divided by the percentage difference in size. If there were no quantity discount (e.g., the price was 50% higher to purchase a 50% larger size), this measure would equal one. Values less than one would correspond to quantity discounts; e.g., if the price was only 10% higher to purchase a 50% larger size, this measure would equal 0.2. Summary statistics on size in ounces or calories, price per ounce or per 10 calories, and the quantity discount elasticity were computed in Stata/SE 13.1.

Results

Table 1 shows statistics on sizes offered, prices, and quantity discounts for regular soda fountain drink offerings. On average, where size in ounces was available, offerings were 28 ounces; where only calories were available, offerings were 200 calories. In either metric, there was substantial variability in size, with a standard deviation of 6 ounces or 78 calories and ranges (not shown in table) of 20-42 ounces and 90-390 calories. Offerings cost 10 cents per ounce (roughly comparable to a previous estimate of 6.6 cents/ounce[15] after accounting for inflation) and 12 cents per 10 calories, on average. On average, the quantity discount elasticity was 0.63, indicating that doubling the fountain drink size selected would only cost 63% more.

TABLE 1 **Statistics on sizes offered, prices, and quantity discounts for regular soda fountain drink offerings in fast-food restaurants in Illinois and Wisconsin, 2021**

	Mean (SD)
Ounces (n=38)	28 (6)
Calories (n=430)	200 (78)
Price, cents per ounce (n=38)	10 (2)
Price, cents per 10 calories (n=411)	12 (4)
Quantity discount elasticity (n=353)	0.63 (0.96)

Sample sizes are in terms of distinct beverage offerings counting different sizes separately, except for quantity discount elasticity, where the sample size is in terms of pairwise comparisons across different sizes within restaurants. Size was recorded in ounces if possible and in calories if ounces were not available.

Conclusion

This study provides evidence of substantial variation in sizes offered of regular soda fountain drinks in fast-food restaurants and provides the first evidence to our knowledge regarding the extent of quantity discounts for SSBs in fast-food restaurants. The substantial quantity discounting found could play an important role in incentivizing regular soda consumption with concomitant health risks, emphasizing the potential importance of both policy and voluntary initiatives to encourage healthier consumption patterns.

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