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SPECIAL ARTICLE

# Rebates to Incentivize Healthy Nutrition Choices in the Supplemental Nutrition Assistance Program

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Price incentives, or rebates, have been proposed as one promising strategy for improving diet quality among Supplemental Nutrition Assistance Program participants. This paper explores the existing evidence on effectiveness of rebates in this program. In particular, this paper considers findings from a recent RCT of Supplemental Nutrition Assistance Program rebates, the U.S. Department of Agriculture Healthy Incentives Pilot, in the context of the broader literature on rebate strategies. The paper concludes that rebates have a moderate impact on food intake, at moderate cost relative to alternative interventions. There is further evidence that implicit promotional effects may contribute to impacts of rebate interventions, beyond the impacts of price effects alone. However, existing studies on complementary effects of explicit promotion have been limited by relatively small sample sizes and correspondingly low power to detect differences. This appears to be a promising area for future research.
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## INTRODUCTION

The Supplemental Nutrition Assistance Program (SNAP) is the bulwark of U.S. food assistance, aiming to alleviate food insecurity among low-income American households. Prior research suggests SNAP successfully achieves this primary goal,[1–9] but diet quality in SNAP households remains poor, even compared to otherwise similar low-income groups.[10–13] Serving nearly one in seven Americans,[14] SNAP provides an opportunity to improve diet quality among a large fraction of American families.[15]

This paper considers one potential strategy for improving diet quality of SNAP participants: offering price incentives, or rebates, for purchase of healthful foods.[15–21] The paper draws in large part on results from the largest test of a SNAP rebate to date, the U.S. Department of Agriculture's Healthy Incentives Pilot (HIP). HIP offered a 30% rebate for SNAP purchases of targeted fruits and vegetables; an RCT assessed impacts. This paper discusses the theory of action for rebates from economic and other perspectives, briefly describes HIP and key results, and discusses these results in the context of the broader literature on rebates.

## ECONOMIC THEORY AND BEYOND

The economic theory of action underlying rebates is straightforward. A basic principle of consumer economics is that "demand curves slope down"; that is, as a good's price falls, purchases of that good rise. A SNAP rebate operates like a conventional retail coupon. A consumer buys the targeted food and receives a rebate to the household's SNAP electronic benefit transfer (EBT) account. Thus, the net price of the targeted food is lower by the rebate amount, such that targeted food purchases would be expected to rise. The implicit further assumption is that those additional purchases will be consumed, so that targeted food intake will also increase. In addition to this price effect, a rebate may increase spending on both targeted and non-targeted foods through an income effect by boosting total available SNAP benefits; however, because the rebate amount is likely to be small, in practice, income effects are typically trivial in size relative to price effects.[22,23]

Andreyeva et al.[24] surveyed evidence on price responsiveness of food purchases. Price responsiveness is conventionally measured as an elasticity, that is, percentage

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change in purchases associated with a percentage change in price. Extrapolating directly from Andreyeva and colleagues' elasticity estimates of 0.70 for fruits and 0.58 for vegetables suggests a 30% rebate like the HIP rebate would increase fruit and vegetable spending by about 19% in the general population. Price responsiveness in lower-income, higher-risk groups like SNAP participants may be greater,[25–29] suggesting HIP impacts might be larger, though the literature is not conclusive on this point.[30–36]

Elasticity-based projections of rebate impacts are informative only to the extent that SNAP rebates operate as a simple price drop. There are several reasons why SNAP rebates might not operate as a simple price drop.

1. **Lack of uniformity.** The rebate is received only if the targeted food is purchased both using SNAP benefits and at a participating retailer. That is, the rebate does not uniformly apply to all targeted food purchases. Rebate participants could respond by purchasing targeted foods using SNAP benefits, at participating retailers, and shifting other purchases to cash as needed. To the extent that they do so, it does not matter that the price drop is not uniform. However, changing where one shops or how one pays may entail added time or transportation costs. This suggests SNAP rebate impacts might be smaller in practice than implied by an elasticity-based projection.
2. **Increased stigma.** A targeted rebate could increase stigma associated with SNAP participation, paralleling concerns related to proposals to restrict SNAP purchases of particular foods.[37] SNAP participants might worry about incorrectly calculating rebate amounts or identifying qualifying foods, potentially leading to public confrontations with cashiers. Increased stigma would directly discourage rebate use, suggesting smaller impacts in practice than implied by an elasticity-based projection.
3. **Incomplete awareness.** Because a SNAP rebate is credited to participants' EBT accounts and not incorporated into posted prices, participants must be aware of the rebate prior to purchase in order for the rebate to have an impact. For a universally implemented rebate, participant outreach and education can ensure high program awareness. However, for smaller, short-duration programs with limited promotion, limited awareness could reduce impacts relative to elasticity-based projections.
4. **Increased cognitive burden.** The estimates of Andreyeva et al.[24] are based on observed responses to simple price variation. For consumers making purchase decisions in response to posted prices, the cognitive challenge is minimal: read the displayed price; make a purchase decision. By contrast, to compute the effective price of a rebate-qualifying item, the consumer must do a percentage calculation. Such computations are challenging for many Americans, especially those with lower educational attainment.[38] Relative to the general population and to income-eligible nonparticipants, SNAP participants are less educated.[39] Evidence from transfer programs indicates that this type of computation is cognitively challenging.[40–42] To the extent that increased cognitive burden increases rebate transaction costs, this would also suggest smaller impacts than implied by an elasticity-based projection.
5. **Imperfect understanding.** Determining whether a particular item qualifies for a rebate may present additional complexity. For example, if canned peaches in 100% fruit juice earn the rebate, but canned peaches in light syrup do not (because of added sugar), a shopper facing a shelf full of canned peaches must first identify which specific products are eligible, then mentally calculate post-rebate prices, and finally compare those adjusted prices to posted prices for non-eligible items. Errors in these calculations would decrease rebate impacts on targeted foods relative to an elasticity-based projection if participants mistakenly assume that some qualifying items do not in fact earn the rebate. On the other hand, errors could also lead to a spillover effect on non-qualifying items if participants assume that those foods do earn the rebate.
6. **Promotional effects.** The rebate program itself serves as a promotional message for the targeted good. This is conventionally understood as part of the role of coupons for consumer purchases.[43] Implicit promotional effects could increase impacts relative to elasticity-based projections.

This is the theory; HIP provides empirical random assignment evidence on a rebate program implemented on a large sample.

## THE HEALTHY INCENTIVES PILOT

The U.S. Department of Agriculture's Food and Nutrition Service designed HIP to test the impact of a price rebate on fruit and vegetable consumption among SNAP participants. This section describes HIP implementation and evaluation findings to inform the discussion to follow. Bartlett and colleagues[22] provide further detail and full evaluation results. Klerman et al.,[23] Wilde and colleagues,[44] and Olsho et al.[45] present key results and further interpretation.

### Healthy Incentives Pilot Implementation and Evaluation

The Massachusetts Department of Transitional Assistance implemented HIP in Hampden County, MA, which spans a mix of urban, rural, and suburban areas. During the 12-month pilot in 2011–2012, HIP participants received a 30% rebate for purchases of targeted fruits and vegetables (TFVs) at participating retailers, using SNAP benefits. The rebate was credited to participants' EBT accounts at time of purchase and could be spent on any SNAP-eligible foods and beverages. Eligible TFVs included fresh, frozen, canned, and dried fruits and vegetables without added sugars, fats, oils, or salt (with some exceptions). White potatoes, dried beans and peas, and 100% fruit juice were excluded. TFVs are the same categories of fruits and vegetables eligible for the Special Supplemental Nutrition Program for Women, Infants, and Children voucher.

The HIP evaluation randomly selected 7,500 SNAP households to receive the rebate on eligible SNAP purchases; the other 47,595 SNAP households in Hampden County were ineligible for the rebate, continuing to receive SNAP benefits as usual. The evaluation collected EBT administrative data on SNAP utilization and HIP rebates earned for all 55,095 SNAP households. For a random sample of SNAP participants, the evaluation also conducted a three-wave household survey: a baseline wave conducted 1–3 months prior to implementation, and two follow-up waves at 4–6 and 7–9 months after initial rebate eligibility. The two follow-up surveys included 24-hour recall of dietary intake collected using the Automated Multiple Pass Method,[46] which accounts for all prior-day consumption, including both foods that did and did not qualify to earn the HIP rebate, and reduces under-reporting relative to other survey-based dietary assessment methods such as food frequency questionnaires.[47] Within each round, a 10% subsample of respondents completed a second 24-hour recall 7–10 days after the first to facilitate estimation of usual intake. The final analytic sample included 3,919 dietary recall interviews across the two follow-up rounds, representing 2,009 SNAP participants. To collect richer detail on participant experiences with HIP, the evaluation additionally conducted six participant focus groups timed to coincide with follow-up data collection (half in each round), with eight to ten participants per group.

Retailer participation in HIP was voluntary. Participating stores accounted for roughly 60% of total county SNAP redemptions. The paper returns to the implications of less than universal retailer participation below.

For HIP to affect purchase decisions, participants needed to know about the program and how it worked. However, to avoid disappointing or confusing non-HIP participants, promotional efforts were intentionally limited. The Department of Transitional Assistance developed direct mailings for HIP participants, including simple, colorful brochures. Receipts issued to HIP participants in stores with electronic cash registers included HIP rebate earning totals. Late in the evaluation, the Department of Transitional Assistance developed signage for use by HIP retailers. Even then, to avoid confusing non-HIP participants, the signage was designed to identify HIP-eligible foods without explicitly referencing the rebate; for example, by quoting the slogan "It's HIP to be healthy!" adjacent to the HIP logo, without mention of the rebate itself.

## Healthy Incentives Pilot Impacts on Intake

Table 1 presents major results for HIP impacts on dietary intake. The primary outcome for the evaluation was intake of TFVs, the fruits and vegetables qualifying for the rebate; in the RCT context, a simple comparison of means across HIP and non-HIP groups provides an unbiased estimate of impacts. However, this paper reports regression-adjusted means from ordinary least squares models including baseline characteristics to improve model precision. HIP participants reported consuming almost one-quarter cup more TFVs at follow-up than non-HIP participants, a 26% difference. Positive impacts were found for both targeted fruits and targeted vegetables considered separately; estimated elasticities were 0.76 for fruits and 0.99 for vegetables. These point estimates are moderately higher than those estimated by Andreyeva and colleagues,[24] though their 95% CIs include the estimates of Andreyeva et al.[23]

Even though 100% fruit juice did not qualify to earn the HIP rebate, HIP participants also consumed more 100% fruit juice than did non-HIP participants. Furthermore, the estimated elasticity for juice intake was similar to the elasticity for TFVs, but significantly different from the elasticities for other non-TFV items. That is, HIP participants increased 100% fruit juice intake effectively as if juice purchases had actually earned the rebate.

Between impacts on 100% fruit juice and TFVs, the total HIP impact on all fruits and vegetables was roughly one third of a cup. In net, this implies that HIP closed about one fifth of the "fruit and vegetable gap," that is, the gap between observed intake and the *Healthy People 2020* recommendation of 3.6 cups per day.[49]

## Healthy Incentives Pilot Impacts on Spending

To support secondary analyses of spending impacts, the evaluation collected two types of spending data: self-reported fruit and vegetable spending from participant surveys, and EBT transactions data on SNAP expenditures on TFVs. The former measure encompasses all fruit and vegetable spending, whereas the latter includes only SNAP spending in HIP-participating supermarkets and superstores. A detailed account given elsewhere[22,44] suggests that TFV spending in HIP-participating supermarkets and superstores

**Table 1.** Healthy Incentives Pilot Impacts on Fruit and Vegetable Intake ($n$=3,919 Recalls From 2,009 Respondents)[a]

| Outcome[b] | Non-HIP group, mean[c] (SE) | HIP group, mean[c] (SE) | Impact (levels), *B* (SE) | Price elasticity, $\eta$[d] (SE) | *p*-value[e] |
|---|---|---|---|---|---|
| All fruits and vegetables (cup-eq) | 2.294 (0.055) | 2.616 (0.060) | **0.323 (0.080)** | **−0.463 (0.117)** | **<0.001*****|
| Targeted fruits and vegetables (cup-eq) | 0.910 (0.035) | 1.149 (0.043) | **0.238 (0.054)** | **−0.873 (0.199)** | **<0.001***** |
| Fruits (cup-eq) | 0.465 (0.024) | 0.571 (0.030) | **0.106 (0.038)** | **−0.757 (0.269)** | **0.005***** |
| Vegetables (cup-eq) | 0.445 (0.021) | 0.578 (0.025) | **0.133 (0.032)** | **−0.995 (0.242)** | **<0.001***** |
| Non-targeted fruits and vegetables (cup-eq) | 1.383 (0.037) | 1.467 (0.040) | 0.084 (0.055) | −0.203 (0.133) | 0.129 |
| Acquired outside stores (cup-eq) | 0.152 (0.015) | 0.171 (0.016) | 0.018 (0.023) | −0.395 (0.490) | 0.420 |
| From prepared foods (cup-eq) | 0.304 (0.013) | 0.307 (0.013) | 0.002 (0.019) | −0.024 (0.213) | 0.909 |
| Legumes (cup-eq) | 0.114 (0.007) | 0.106 (0.007) | −0.008 (0.010) | 0.239 (0.279) | 0.391 |
| White potatoes (cup-eq) | 0.359 (0.017) | 0.336 (0.017) | −0.023 (0.024) | 0.217 (0.226) | 0.336 |
| 100% fruit juice (cup-eq) | 0.453 (0.023) | 0.549 (0.029) | **0.095 (0.036)** | **−0.698 (0.267)** | **0.009***** |

[a]Estimated via ordinary least squares regression models adjusting for blocking and stratification variables (Hampden County geography, household size and composition, gender of household head, and implementation wave); AMPM interview characteristics (first or second interview, weekend indicator, and respondent characterization of intake relative to usual levels); respondent demographics (baseline age group, gender, and race/ethnicity); usual reported intake measures from the EATS instrument; and baseline composite scale measures of availability of fruits and vegetables in the home; positive attitudes about foods, fruits, and vegetables; and perceived barriers to grocery shopping and to consumption of fruits and vegetables. All analyses incorporated sampling weights accounting for the unequal probability of respondent selection across strata and for survey nonresponse. To account for respondents with more than one follow-up interview, SEs and test statistics are heteroscedasticity-robust and clustered at the respondent level.
[b]Outcome data from sampled respondent survey, pooled early and late post-implementation sample. Units for outcomes defined as described in the Food Pattern Equivalents Database.[48]
[c]Regression-adjusted mean intake.
[d]Price elasticity calculated by dividing estimated impact expressed in proportional terms by the proportional change in the price of targeted fruits and vegetables earning the HIP rebate (−0.3).
[e]Boldface indicates difference in regression-adjusted means between HIP group and non-HIP group was statistically significant; two-sided test: *$p<0.05$; **$p<0.01$; ***$p<0.001$.
HIP, Healthy Incentives Pilot; AMPM, Automated Multiple Pass Method; EATS, Eating at America's Table Screener.

comprised approximately 80% of total fruit and vegetable spending.

Table 2 compares HIP impact estimates for these two alternative data sources. Self-reported spending on fruits and vegetables was $6.15 higher among HIP participants than among non-HIP participants; EBT spending on TFVs in HIP-participating supermarkets and superstores was $1.19 higher. These estimates imply elasticities of 0.28 and 0.37, respectively—substantially lower than elasticities for intake. Although precision of the survey-based elasticity estimates is insufficient to definitively compare impacts between self-reported TFV intake and spending elasticity measures,[44] elasticities from the EBT data are estimated quite precisely. In fact, the EBT-based TFV spending elasticity measure is significantly smaller than the survey-based TFV intake elasticity measure.

These results are noteworthy for two reasons. First, a rational response to the HIP rebate would be to maximize rebate earnings by shifting TFV spending to HIP-participating retailers. Because supermarkets and superstores comprise the great majority of HIP-participating retailers, the EBT-based TFV spending impact would be expected to be similar in magnitude to the impact on survey-based spending on all fruits and vegetables. In fact, there is a nearly fivefold difference. Second, comparing spending and intake elasticities implies that, puzzlingly, TFV intake was more responsive to HIP than was TFV purchasing.

## Implications for Theory

In sum, HIP results are not fully consistent with a simple economic theory of action. In particular, this simple economic theory cannot explain why there was an impact on 100% fruit juice, which did not qualify to earn the rebate; why the impact on self-reported total fruit and vegetable spending was so much higher than the impact on TFV spending observed in the EBT data; or why TFV intake was more responsive to the rebate than TFV spending.

Although lack of uniformity may have been an issue for some, this factor cannot explain the observed discrepancies. HIP participants may have partially shifted TFV purchases to their SNAP benefits in participating retailers. About 28% of HIP participants reported they had changed

**Table 2.** Healthy Incentives Pilot Impacts on Fruit and Vegetable Spending, in Dollars[a]

| Outcome[b] | Non-HIP group, mean[b] (SE) | HIP group, mean[b] (SE) | Impact (levels), $B$ (SE) | Price elasticity, $\eta$[c] (SE) | $p$-value[d] |
|---|---|---|---|---|---|
| All fruit and vegetable spending (self-report)[e] | 72.02 (2.06) | 78.17 (1.95) | **6.15 (2.69)** | **−0.285 (0.125)** | **0.022*** |
| TFV spending in HIP supermarkets/ superstores (EBT data)[f] | 10.86 (0.05) | 12.05 (0.15) | **1.19 (0.16)** | **−0.365 (0.049)** | <**0.001***** |

[a]Estimated via ordinary least squares regression models adjusting for blocking and stratification variables (Hampden County geography, household size and composition, gender of household head, and implementation wave); and respondent demographics (baseline age group, gender, and race/ ethnicity). Self-reported fruit and vegetable spending regressions additionally adjusted for usual reported intake measures from the EATS instrument; and baseline composite scale measures of availability of fruits and vegetables in the home; positive attitudes about foods, fruits, and vegetables; and perceived barriers to grocery shopping and to consumption of fruits and vegetables. All analyses incorporated sampling weights accounting for the unequal probability of respondent selection across strata, and for survey nonresponse if applicable. To account for respondents with more than one follow-up observation, SEs and test statistics are heteroscedasticity-robust and clustered at the respondent level.
[b]Regression-adjusted mean intake.
[c]Price elasticity calculated by dividing estimated impact expressed in proportional terms by the proportional change in the price of targeted fruits and vegetables earning the HIP rebate (−0.3).
[d]Boldface indicates whether difference in regression-adjusted means between HIP group and non-HIP group was statistically significant; two-sided test: *$p<0.05$; **$p<0.01$; ***$p<0.001$.
[e]Outcome data from sampled respondent survey, primary shopper module, pooled early and late post-implementation sample ($n$=2,708).
[f]Outcome data from EBT transaction data, pooled across March–October 2012 ($n$=45,912 households per month).
EBT, Electronic Benefit Transfer, HIP, Healthy Incentives Pilot; EATS, Eating at America's Table Screener, TFV, targeted fruits and vegetables.

where they shopped for fruits and vegetables because of HIP. In addition, HIP impacts on the EBT-based TFV spending measure did not differ for participants who had primarily shopped in non-participating retailers prior to the pilot. If participants had not shifted at least some of their TFV expenditures, higher impacts would be expected among those already shopping at HIP-participating stores. However, total rebate redemptions in HIP-participating retailers were low, suggesting most TFV purchases were not shifted.

Increased stigma associated with HIP participation also cannot explain these discrepancies. A few smaller retailers (grocery and convenience stores) reported moderate increases in checkout time, but the great majority of HIP purchases took place in large supermarkets or superstores with electronic cash registers that automatically identified HIP-eligible food purchases and credited EBT accounts, decreasing likelihood of increased stigma from HIP. Indeed, HIP participant satisfaction with the program was high, with the great majority indicating they would like to keep participating if HIP were to continue.

It does seem likely that imperfect awareness of HIP and increased cognitive burden diminished observed impacts. More than a third of HIP participants in the early implementation survey and almost a quarter in the late implementation survey said they had not heard of HIP. Nearly a third reported that HIP was hard to understand or that they did not know how HIP worked, and focus group participants exhibited substantial confusion about rebate mechanics. These factors probably diluted HIP impacts on TFV spending and intake in general. However, one would not have expected these factors to explain the specific discrepancies identified above.

On balance, then, major competing explanations for all three discrepancies in the HIP findings are (1) imperfect participant understanding of which fruits and vegetables qualified for the rebate and (2) promotional effects.

A quarter of HIP participants said it was hard to remember which fruits and vegetables earned the rebate; this survey finding was corroborated by focus group participants. Also consistent with this explanation, 100% fruit juice impacts significantly decreased between follow-up survey rounds, plausibly due to participant learning over time. Imperfect understanding of this form might explain the first two observed discrepancies: individuals purchased (and then consumed) more 100% fruit juice because they mistakenly thought it earned the rebate; total self-reported spending on fruits and vegetables was larger than observed spending on TFVs alone because it included spending on non-qualifying items. However, it is unclear why imperfect understanding would cause TFV intake to be more responsive to HIP than TFV spending.

Promotional effects are a plausible competing explanation. If HIP successfully promoted fruit and vegetable products as healthful, it might have induced spillover effects on spending for 100% fruit juice and other items not earning the rebate. In addition, if promotional effects increased participant likelihood of actually consuming fruits and vegetables after purchase, net effects on TFV intake would be larger than effects on TFV spending, as observed. Finally, promotional effects could induce greater self-reporting of fruit and vegetable intake and purchasing among HIP participants; such social desirability bias could artificially inflate estimated impacts on self-reported outcomes and thus magnify discrepancies with the observational EBT data.

In net, HIP results seem consistent with a major role for a promotional theory of action in conjunction with pure price effects. Inasmuch as this interpretation is correct, a larger rebate might not have a much larger impact, and a smaller rebate might not have a much smaller impact. On the other hand, a broad-based program might have larger impacts. A greater proportion of retailers would likely participate. Retailers with a significant SNAP clientele would promote targeted foods with shelf tags or other signage, increasing promotional effects and reducing participant confusion. Finally, word of mouth over time would increase program awareness and understanding.

## DISCUSSION

The HIP evaluation is the only large, random assignment study of a SNAP rebate program incentivizing healthful food purchases in multiple retailer types. However, there are numerous smaller experimental studies of rebates for healthful foods more broadly (recently reviewed by An[50]). Focusing on experimental studies because of their strong internal validity, this section reviews the literature for key insights on considerations raised above.

### Lack of Uniformity

Most prior experimental research on rebates has been conducted in limited settings (e.g., a single grocery store, or, at most, several supermarkets in a single chain), with participants recruited from consumers already shopping at that location.[51–53] Thus, before HIP, it was unclear whether and to what extent consumers shift purchasing to maximize rebate earnings. Although Ni Mhurchu and colleagues[51] conducted sensitivity analyses showing no difference in impacts among more-frequent/loyal supermarket customers, with a relatively small sample, ability to detect subgroup differences was limited. HIP findings suggest that rebates induce SNAP participants to shift some targeted food purchases to participating retailers when coverage is not uniform; however, this shifting is only partial.

The HIP evaluation did not directly examine whether SNAP participants are willing not just to increase targeted food purchases in retailers where they already shop but to shop at new retailers in response to the rebate. This would not be an issue for a SNAP rebate program with universal retailer participation. However, many recently funded SNAP rebate programs are limited to farmers' markets. More than 500 such farmers' market incentive programs currently operate across the U.S.,[54] and the recent U.S. Department of Agriculture Food Insecurity Nutrition Incentive grant program continues to award funding for similar efforts.[55] As farmers' market purchases constituted just 0.02% of SNAP spending nationwide in 2015,[56] for these programs to materially affect nutrition outcomes among SNAP participants, they must necessarily attract new shoppers to farmers' markets. To the extent that SNAP participants are constrained or unwilling to change where they shop, one would expect larger rebate impacts in supermarket or superstore settings, since that is where the great majority of SNAP spending occurs.

### Stigma

Stigma associated with SNAP participation in general appears to be a legitimate concern.[57] Indeed, the shift in the 1990s from paper food stamps to EBT was intended in part to reduce stigma. However, the HIP evaluation found no evidence of increased stigma associated with rebate use. This may be because in most settings HIP was implemented automatically via electronic cash registers. By contrast, incentive programs at farmers' markets, which most commonly use SNAP benefits to purchase coupons or tokens to be exchanged for goods, are viewed as stigmatizing by some stakeholders.[58] In implementing rebates in SNAP, then, rebate form may matter.

### Awareness, Cognitive Burden, and Understanding

Rebate impacts necessarily depend on participant awareness[17,59]; as noted above, a nontrivial proportion of HIP participants were not aware of the pilot, likely diluting overall impacts. Ni Mhurchu et al.[51] similarly note that, because participants eligible to receive price discounts in their study were notified only by hardcopy mailings, impacts were likely attenuated. Increased awareness of a more broadly rolled out SNAP rebate would likely increase rebate effects over time, all else equal.

In addition to implications for stigma discussed above, a SNAP rebate's form may also influence relative cognitive burden and participant understanding of which foods qualify. Richards and Sindelar[59] argue that a HIP-like rebate strategy represents lower cognitive burden than a targeted coupon, as the rebate is credited automatically for a wide range of eligible foods without additional shopper effort. However, SNAP participants would presumably still need to correctly identify qualifying foods and determine their discounted price before making purchase decisions. HIP results imply that if cognitive burden is the primary consideration, a coupon for a fixed dollar amount is likely less burdensome; however, both logistical concerns[17,41] and aforementioned concerns about stigma favor automatic percentage rebates. Regardless of rebate form, measures such as shelf tags with discounted prices may be useful in achieving desired effects.

### Promotional Effects

It seems likely that implicit promotional effects increased HIP impacts. However, HIP results are silent on whether more-robust promotional efforts would have further magnified HIP's effects.

Other studies have explicitly considered rebates in relation to promotional or informational interventions. Indeed, several studies include rebates as just one part of wider promotional efforts, including components such as distribution of flyers/educational materials and public announcements for cafeteria interventions,[60–62] vending machine nutrition labeling,[63] and in-store prompting and free samples at grocery stores.[64]

This type of blended intervention mirrors commercial advertising efforts, which commonly pair discounts or coupons with promotional activities. This strategy implicitly assumes complementary effects of price and promotion. Glanz and Yaroch[65] suggest that promotion enhances effects of other interventions to improve nutrition behavior, including price changes and coupons. Gollwitzer[66] posits reverse complementarities, arguing that price interventions reinforce effects of concurrent behavioral interventions.

Many other field studies have explicitly compared effects of price reductions and promotional or informational activities, alone and in combination.[51–53,67–78] With one exception,[69] all found significant effects of price changes. Some also found independent impacts of promotional or informational activities, particularly when those activities were relatively intensive—for example, a nutrition class or counseling, as compared with nutritional labels or flyers.[70–72,75–78] No studies found larger effects for promotional or informational activities than for price reductions. However, several studies found larger impacts for price reductions than for promotional or informational activities, or that impacts for promotional or informational activities were statistically significant only in combination with price reductions.[51,67,68,70,74,78] For those studies explicitly testing whether price reductions paired with promotional activities had larger impacts than price reductions alone, small samples likely limited the power to detect differences.[52,53,72,75–77] One farmers' market study[70] did find greater impacts for a $20 fruit and vegetable voucher paired with a 20-minute educational intervention than for the voucher alone; by contrast, a restaurant-based intervention of a 20%–30% price discount found perverse effects of health messaging on purchases.[73]

In sum, there is strong evidence that rebate strategies can alter purchasing and intake behavior, and some evidence that promotional and informational strategies can be successful. On balance, though, there is little evidence that impacts of price rebates can be materially enhanced through addition of promotional or informational activities. However, absence of evidence should not be mistaken for evidence of absence: Much larger samples are needed to definitively rule out complementary effects. And the prevalence of conventional marketing efforts pairing price discounts and promotion seems inconsistent with these findings.

## CONCLUSIONS

Available policy evidence—from HIP and smaller experimental studies—suggests rebates moderately impact food intake, at moderate cost. Nationwide expansion of HIP would be cost effective, comparing favorably to alternative interventions for increasing fruit and vegetable intake.[79] Rebate impacts appear to operate through both price effects and through informational and promotional pathways. Though some experimental studies have examined complementary effects of promotion and rebates, they have been limited by small sample sizes and correspondingly low power to detect differences. This is a promising area for future research.

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