

The Healthy Weight Commitment Foundation Pledge

Calories Purchased by U.S. Households with Children, 2000–2012

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Context: An independent evaluation of the Healthy Weight Commitment Foundation (HWCF) marketplace pledge found that the participating companies met and exceeded their interim 2012 sales reduction pledge.

Evidence acquisition: This follow-up study conducted in 2013 used purchase data from 2000 to 2012 among U.S. households with children and compared trends in calorie purchases of HWCF, non-HWCF name brands, and private label (PL) products in the pre-pledge period (2000–2007) and the post-pledge period (2008–2012); controlled for potential effects of concurrent changes in demographic and economic factors, including the Great Recession and food prices; and assessed whether the HWCF marketplace pledge was associated with reductions in consumer packaged goods (CPG) calorie purchases by households with children.

Evidence synthesis: There has been a significant per capita decline in average daily CPG caloric purchases between 2000 and 2012 among households with children from all brand categories. Based on pre-pledge trends, declines in CPG caloric purchases were already occurring. However, post-pledge reductions in calories purchased from HWCF brands were less than expected, and reductions in calories purchased from non-HWCF name brands and PLs were greater than expected after economic, sociodemographic, and secular factors were accounted for.

Conclusions: If the 16 HWCF companies had been able to maintain their pre-pledge trajectory, there should have been an additional 42 kcal/capita/day reduction in calories purchased from HWCF products in 2012 among households with children. A lack of change in total CPG calories purchased between 2011 and 2012 calls into question the sustainability of the decline and a need for continued monitoring.

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Introduction

An independent evaluation of the pledge by 16 major Healthy Weight Commitment Foundation (HWCF) food-manufacturing companies^a to collectively reduce their U.S. calorie sales in 2012 relative to 2007 found that they met and surpassed their

goal.¹ Given the HWCF's stated focus on childhood obesity, this paper seeks to assess the impact of the HWCF marketplace pledge on changes in consumer packaged goods (CPG) purchases among U.S. households with children from 2000 through 2012.

Additionally, beyond simply looking at the observed changes, this paper seeks to provide a better estimate of the “true” impact of the pledge by adjusting for a number of concurrent factors that may have influenced purchasing behaviors. These include the economic downturn known as the “Great Recession” (December 2007 to June 2009²), the ensuing economic stagnation, and high unemployment rates; global rise in food prices^{3–5} and price differentials across brands; and concurrent socio-demographic changes (household composition, racial/ethnic makeup, and income status) of the U.S. population.

Indeed, evaluating the independent effects of collective HWCF company product and marketing changes is

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^aThe sixteen companies are Bumble Bee Foods, LLC; Campbell Soup Company; ConAgra Foods; General Mills, Inc.; Kellogg Company; Kraft Foods, Inc. (now split into Kraft Foods, Inc and Mondelez International); Mars, Incorporated; McCormick & Company, Inc.; Nestlé USA; PepsiCo, Inc.; Post Foods/Ralston Foods, LLC; Hillshire Brands (previously Sara Lee Corporation); The Coca-Cola Company; The Hershey Company, The J.M. Smucker Company, and Unilever.

challenging because (1) there is no “control group” in this natural experiment and (2) there is no summary of how CPG caloric changes were achieved (e.g., combinations of changes in product formulation, portion size/packaging, pricing, promotion). Nonetheless, there is information on CPG purchases (of HWCF and non-HWCF products) in the years before the pledge (2000–2007) and the years after the pledge (2008–2012).

A basic approach to assess the HWCF pledge would be to compare how the absolute and relative calories purchased changed in the pre-pledge period compared to the post-pledge period, and how these varied for HWCF products versus non-HWCF products. However, this approach assumes that the portfolio of HWCF and non-HWCF products are similar and comparable, non-HWCF companies would not alter their behaviors because of knowledge of the pledge by HWCF companies, and that other factors (e.g., economy, prices, sociodemographic composition) would not affect purchases of HWCF versus non-HWCF products differentially.

Therefore, this study also estimates a counterfactual^{6,7}—by modeling what caloric purchases would have been in the absence of the pledge based on trends in U.S. caloric purchases of foods and beverages prior to the pledge, taking concurrent economic and sociodemographic factors into account. The goal was to compare this counterfactual to what was observed during the post-pledge period in order to more accurately assess whether the HWCF pledge was associated with greater reductions in CPG calorie purchases in total, and by HWCF versus non-HWCF (composed of non-HWCF name brands and private labels [PLs]), compared to what might have been expected without the pledge.

To ensure the highest scientific integrity and quality, an independent Evaluation Advisory Committee of eminent scholars provided scientific review and advice.⁸ A critical dimension of all work is reproducibility in decisions regarding the methods and metrics used.

Methods

Data Sources

For reproducibility of findings, we used existing publically or commercially available data that were not reliant on proprietary data from the 16 companies. [Appendix A](#) describes the various data sources used and how they were linked, with the main data source being the 2000–2012 Nielsen Homescan purchase data. A detailed review of these sources is provided elsewhere.⁹ Analyses were conducted in 2013.

For this paper, identification of HWCF products in each year was based on information on the brand and manufacturer of each Universal Product Code (UPC) provided by Nielsen Homescan. This approach differed from that used in the previous paper¹ because it

was not possible to reliably or consistently find information about the sales, acquisitions, joint manufacturing, or shared distributions of brands from the 16 HWCF companies going back to 2000.

Additionally, it was not possible to apply the inclusion and exclusion criteria to reliably distinguish those products considered to belong to the HWCF companies across 13 years of data in a logical manner given mergers, acquisitions, and changes in distribution agreements across the companies. [Appendix Table B1](#) describes key differences and similarities between this and the previous paper.

Measures

Among U.S. households with children, the measurements of interest were (1) total CPG calories purchased per capita per day; (2) CPG calories purchased from HWCF name-brand products per capita per day; (3) CPG calories purchased from non-HWCF name-brand products per capita per day; and (4) CPG calories purchased from PL products per capita per day. CPG purchases were further disaggregated into calories from foods versus beverages.

Data Analysis

The 2000–2012 Nielsen Homescan household CPG food and beverage purchase data were used to estimate trends in calories purchased per capita per day among U.S. households with children (61,126 unique households). These data were weighted to be nationally representative using Nielsen’s annual household weights. Statistically significant differences in the calories purchased between 2007 (baseline) and 2012 (interim year), and the annualized absolute and relative changes in calories purchased between the pre- and post-pledge periods, were assessed without controlling for other factors. Analyses were conducted using Stata, version 12 (StataCorp LP, College Station TX).

In addition to the weighted trends, models adjusting for changes in the U.S. sociodemographic composition; market-level unemployment rates (as a measure of economic health); and food prices were used to estimate the number of calories purchased in the absence of changes in these factors over the 13-year period. Maximum likelihood random effect models with clustering at the household level were used to derive the model-adjusted trends in CPG calories purchased in 2000–2012. [Appendix C](#) presents the variables and modeling specifications used in the sample of households with children aged 2–18 years in 2000–2012, which included 655,637 household-quarter observations from 61,126 unique households. Analyses were conducted using Stata, version 12.

Effect of the HWCF Marketplace Pledge

An important question is whether the HWCF marketplace pledge resulted in greater changes in the CPG calories purchased than would have been expected in the absence of such a pledge. However, because this was a natural experiment, hypothetical counterfactuals are necessary. The use of counterfactuals in observational studies are common in helping address both issues of “selectivity” of involvement in the pledge (i.e., unobserved heterogeneity) and “contamination effects” due to responses to the knowledge of the pledge.^{6,7}

The counterfactuals are particularly important for two reasons. First, even though the HWCF pledge sought to reduce an absolute

amount of calories, it is also important to understand if reductions by the HWCF companies sped up after the pledge (relative change). Second, there are no non-HWCF brands to compare to these global giants in their control over selected sections of the CPG food and beverage sector.

Estimates from the aforementioned random effects models were used to predict the caloric purchases for every observation in our sample for each year, while controlling for the numerous variables described in Appendix C. Next, trend analyses were conducted using the predicted values from the pre-pledge period (2000–2007, 8 years) to project estimated post-pledge period (2008–2012, 5 years) values assuming a quadratic time trend, which provided a better fit (higher R^2) across all models than a simple linear trend.

This allowed us to create a post-pledge counterfactual trajectory based on pre-pledge trends. The comparison of these post-pledge counterfactual values to the adjusted post-pledge values determines whether the HWCF marketplace pledge resulted in more or fewer calories purchased compared to the trajectory that was already present before the pledge. Analyses were conducted using Stata, version 12.

Results

Among households with children, the unadjusted trends show that CPG food and beverage purchases fell from 2000 to 2012 (Figure 1). The unadjusted changes in calories purchased per capita per day between 2007 and 2012 were –101 kcal among households with children—

representing –66 kcal from HWCF products, –23 kcal from non-HWCF name-brand products, and –12 kcal from PL products. Additionally, relative declines in calories purchased from 2000 to 2012 were larger from beverages than from food products. Appendix B provides details on the comparison these findings to those from the previous paper on calorie sales.¹

Table 1 compares the annualized absolute and relative changes in the average daily per capita calories purchased during the pre-pledge period (2000–2007) and post-pledge period (2008–2012) by brand category. These annualized changes assume a linear time-trend and were derived by dividing the difference between 2000 and 2007 by seven, and by dividing the difference between 2008 and 2012 by four. Total CPG calories purchased declined more quickly in both absolute and relative terms during the post-pledge period compared to the pre-pledge period. Purchases of HWCF products had the greatest absolute and relative declines in the post-pledge period, and the post-pledge rate of decline was statistically steeper than the pre-pledge period.

Declines in calories purchased from non-HWCF name-brand products slowed down in the post-pledge period, but not significantly so, whereas purchases of calories from PL products showed large absolute and

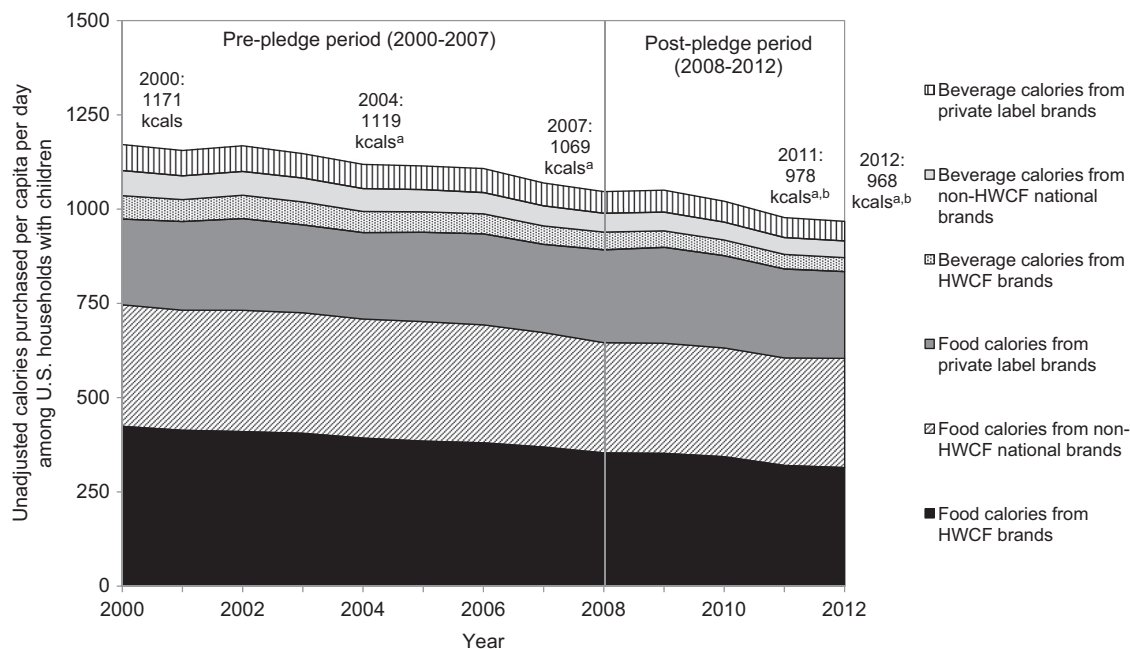


Figure 1. Unadjusted trends in consumer packaged goods calories purchased by brand category among households with children

Source: Calculations based in part on data reported by Nielsen through its Homescan Services for the food and beverage categories. Copyright © 2013, The Nielsen Company.

Note: Weighted to be nationally representative.

^aStatistically different from 2000 at $p < 0.001$.

^bStatistically different from 2007 at $p < 0.001$.

HWCF, Healthy Weight Commitment Foundation.

Table 1. Unadjusted change in consumer packaged goods calories purchased among U.S. households with children, 2000–2007 versus 2008–2012

Unadjusted CPG calories purchased per capita per day	Unadjusted mean calories (SEs)				Unadjusted annualized absolute change (calories/year)		Unadjusted annualized relative change (% points/year)	
	2000	2007	2008	2012	Pre-pledge 2000–2007	Post-pledge 2008–2012	Pre-pledge 2000–2007 (ref, 2000)	Post-pledge 2008–2012 (ref, 2008)
All CPG brands of foods and beverages	1171.23 (4.40)	1069.43 (3.37)	1046.55 (3.52)	968.00 (3.45)	−14.54	−19.64 ^a	−1.24	−1.88
CPG foods, all brands	973.83 (3.77)	906.68 (2.95)	892.14 (3.06)	834.30 (2.85)	−9.59	−14.44 ^a	−0.99	−1.62
CPG beverages, all brands	197.41 (1.06)	162.75 (0.71)	154.41 (0.74)	133.33 (0.73)	−4.95	−5.27	−2.51	−3.41
Brands included in HWCF pledge	486.03 (2.22)	417.84 (1.62)	400.72 (1.59)	351.84 (1.70)	−9.74	−12.22 ^a	−2.00	−3.05
CPG foods from HWCF brands	423.98 (1.97)	369.01 (1.48)	353.62 (1.43)	314.61 (1.55)	−7.85	−9.75	−1.85	−2.76
CPG beverages from HWCF brands	62.04 (0.57)	48.83 (0.33)	47.10 (0.36)	37.23 (0.34)	−1.89	−2.47	−3.04	−5.24
Non-HWCF name brands	389.15 (1.76)	356.97 (1.33)	342.12 (1.38)	333.96 (1.41)	−4.60 ^b	−2.04 ^b	−1.18	−0.60
CPG foods from non-HWCF name brands	322.52 (1.50)	303.55 (1.16)	292.28 (1.19)	289.69 (1.25)	−2.71 ^b	−0.65 ^b	−0.84	−0.22
CPG beverages from non-HWCF name brands	66.63 (0.52)	53.42 (0.37)	49.84 (0.39)	44.27 (0.37)	−1.89	−1.39 ^b	−2.83	−2.80
Private labels/store brands	296.05 (1.91)	294.62 (1.45)	303.71 (1.58)	281.83 (1.67)	−0.20 ^b	−5.47 ^{a,b}	−0.07	−1.80
CPG foods from private label brands	227.32 (1.61)	234.12 (1.26)	246.25 (1.38)	230.00 (1.68)	0.97 ^b	−4.06 ^{a,b}	0.43	−1.65
CPG beverages from private label brands	68.73 (0.56)	60.50 (0.38)	57.47 (0.38)	51.83 (0.39)	−1.18	−1.41	−1.71	−2.45

Source: Calculations based in part on data reported by Nielsen through its Homescan Services for the food and beverage categories for the U.S. market. Copyright © 2013, The Nielsen Company.
 Note: Unadjusted means are weighted using Nielsen-provided household weights. Annualized changes assumes a linear time-trend and were derived by dividing the difference between 2000 and 2007 by 7, and by dividing the difference between 2008 and 2012 by 4.

^aPost-pledge purchases is statistically different from the pre-pledge purchases at $p < 0.001$ using Wald test.

^bChange in caloric purchases from non-HWCF name brands or private label/store brands is statistically different from change in caloric purchases from HWCF brands at $p < 0.001$. CPG, consumer packaged goods; HWCF, Healthy Weight Commitment Foundation.

relative declines in the post-pledge period. In comparing the annualized rate of decline across brand categories, caloric purchases from HWCF products declined more steeply than those for non-HWCF name brands and for PLs in both the pre- and post-pledge periods. Additionally, beverage calories purchased fell steadily over time, whereas food calories appeared to have fallen at a faster pace in the post-pledge period compared to the pre-pledge period.

Appendix Table C1 shows the maximum likelihood random effects model estimates and SEs for total CPG calories purchased among households with children to provide an example of the variables used in the model specification. For interpretability, Figure 2 presents the 2000–2012 trends in the adjusted CPG calories purchased among households with children by brand category after accounting for a number of factors such as household composition, race/ethnicity, education, income, market quarter-level unemployment, and food prices where people reside. The changes in total adjusted calories purchased are much steeper than the unadjusted values shown in Figure 1, indicating that concurrent economic and sociodemographic changes actually dulled the general downward trend.

Appendix Table C2 presents these adjusted calories purchased by brand category among CPG foods and beverages, with SEs and 99.9% CIs. Sensitivity analyses

that account for variation in less reliable and missing caloric information over time and by brand category found that these controls did not affect the adjusted calories purchases over time.

The comparison of adjusted CPG caloric purchases among households with children between 2007 and 2012 showed a statistically significant ($p < 0.001$) decline of 206 kcal/capita/day, representing -96 kcal from HWCF brands, -63 kcal from non-HWCF name brands, and 47 kcal from PL brands (Appendix Table C2).

To determine whether the HWCF marketplace pledge resulted in greater changes in CPG calories purchased relative to those expected in the absence of the pledge, the model-adjusted post-pledge values were compared to the best-fit post-pledge counterfactual (quadratic time trend). Consistent with the unadjusted results that assume a linear time-trend in Table 1, the post-pledge reductions in total adjusted CPG calories purchased were greater compared to the counterfactual (pre-pledge trend) among U.S. households with children (Figure 3A). Figure 3B–D shows the results by brand category.

However, unlike the unadjusted results, which assume a linear time-trend, we found that the pledge was not associated with greater declines in HWCF caloric purchases, once we accounted for economic, sociodemographic, and secular factors. In fact, the declines in

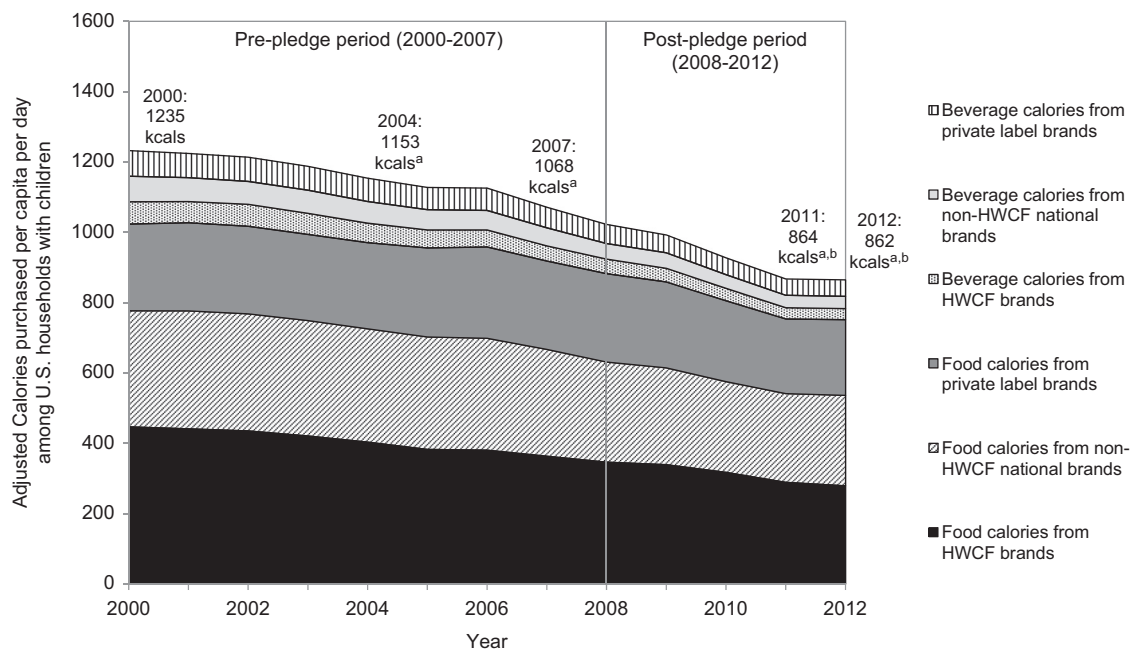


Figure 2. Model-adjusted trends in consumer packaged goods calories purchased by brand category among households with children

Source: Calculations based in part on data reported by Nielsen through its Homescan Services for the food and beverage categories. Copyright © 2013, The Nielsen Company.

^aStatistically different from 2000 at $p < 0.001$.

^bStatistically different from 2007 at $p < 0.001$.

HWCF, Healthy Weight Commitment Foundation.

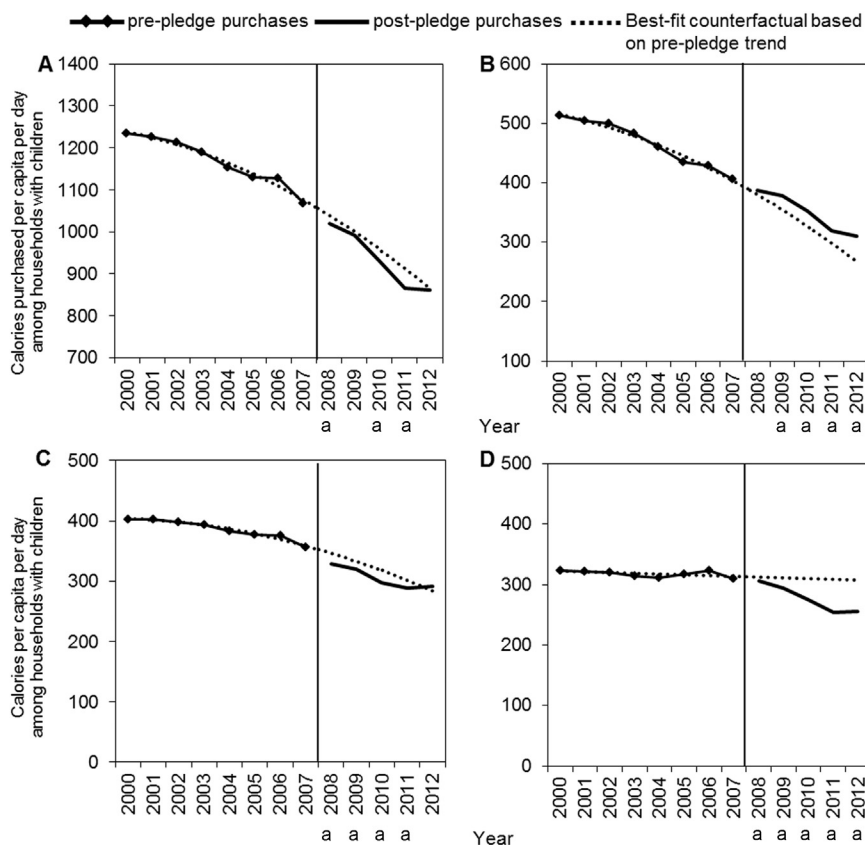


Figure 3. Post-pledge predicted total consumer packaged goods calories purchased compared to estimated counterfactual trends among households with children

Source: Calculations based in part on data reported by Nielsen through its Homescan Services for the food and beverage categories. Copyright © 2013, The Nielsen Company.

A. Total consumer packaged goods calories purchased.

B. Healthy Weight Commitment Foundation consumer packaged goods calories purchased.

C. Other name-brand consumer packaged goods calories purchased.

D. Private label consumer packaged goods calories purchased.

^aDenotes significant difference compared to best-fit counterfactual (dotted line) at $p < 0.001$.

calories purchased from HWCF brands were lower than expected from the counterfactual (Figure 3B). Meanwhile, declines in calories purchased from non-HWCF products were higher than expected based on the counterfactual between 2008 and 2011 (Figure 3C), and declines in calories purchased from PL products were higher than expected throughout the entire post-pledge period (Figure 3D). Appendix Table C3 presents the comparison of the predicted post-pledge purchases to the best-fit counterfactual trend used to determine statistically significant differences at $p < 0.001$.

For simplicity, only results comparing caloric changes for HWCF versus non-HWCF (non-HWCF name brands plus PLs) are presented in investigating the adjusted trends in food calories and beverage calories purchased compared to the best-fit counterfactuals. For both foods and beverages, declines in calories purchased from HWCF brands were not as great as the counterfactual (Figures 4A and 5A). Reductions in calories purchased from non-

HWCF brands were greater than expected by the post-pledge counterfactuals for foods (Figure 4B) and for beverages at least until 2011 (Figure 5B).

We also highlight results from two food categories that contribute substantially to total calories purchased by U.S. households with children for which HWCF brands have significant market share—grain products and sweets and snacks.^{1,8,10,11} Regardless of brand category, reductions in calories purchased from grain products were statistically larger than the counterfactuals (Appendix Figure C1). For sweets and snacks, results show that although calories purchased from HWCF sweets and snacks declined, the post-pledge reduction were statistically smaller than the pre-pledge trends indicate. Reductions in calories purchased from non-HWCF sweets and snacks were statistically greater than expected based on pre-pledge trends (Appendix Figure C2).

Comparative trends in calories purchased from carbonated soft drinks alone are also of interest as they are also

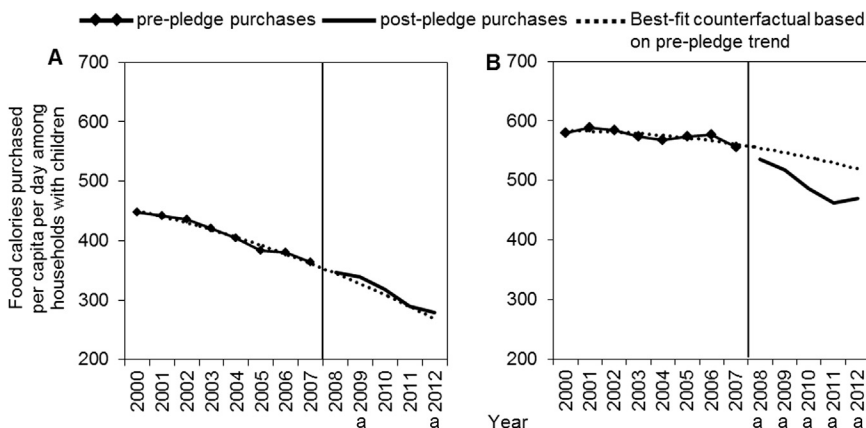


Figure 4. Post-pledge predicted consumer packaged goods food calories purchased compared to estimated counterfactual trends among households with children.

Source: Calculations based in part on data reported by Nielsen through its Homescan Services for the food and beverage categories. Copyright © 2013, The Nielsen Company.

A. Healthy Weight Commitment Foundation consumer packaged goods foods.

B. Non-Healthy Weight Commitment Foundation consumer packaged goods foods.

^aDenotes significant difference compared to best-fit counterfactual (dotted line) at $p < 0.001$.

targets of reduction with significant HWCF market share.^{1,8} Regardless of brand category, these reductions were not as great as expected given pre-pledge trends even though calories purchased from carbonated soft drinks continued to fall after 2007 (Appendix Figure C3). There also was an increase of calories purchased from carbonated soft drinks between 2010 and 2012.

Discussion

We found that the unadjusted difference in caloric purchases by U.S. households with children between

2007 and 2012 showed a 101 kcal/capita/day reduction due to a 66 kcal decline from the HWCF brands, 23 kcal decline from non-HWCF brands, and a 12 kcal decline from PL products. Reductions by all U.S. households were generally lower and comparable to findings from the previous study (Appendix Table B2). In the post-pledge period, total unadjusted CPG calories purchased declined more steeply in both absolute and relative terms, than during the pre-pledge period owing to faster declines from both HWCF and PL products. Additionally, the unadjusted annualized rate of decline was the steepest for HWCF products in both the pre- and post-pledge periods.

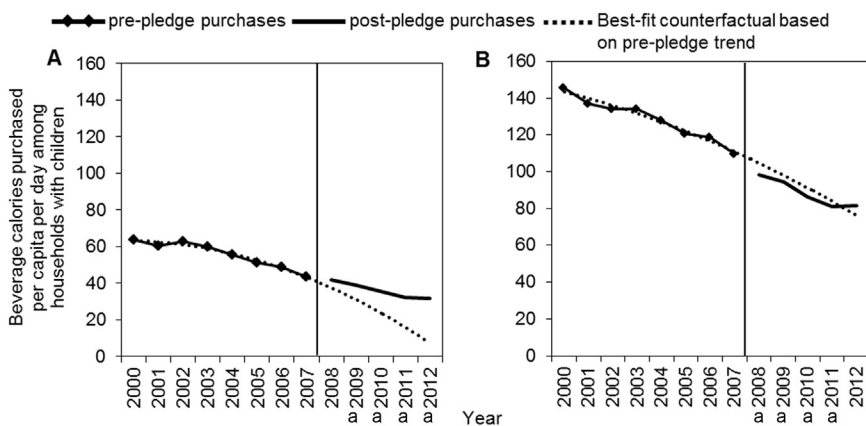


Figure 5. Post-pledge predicted consumer packaged goods beverage calories purchased compared to estimated counterfactual trends among households with children.

Source: Calculations based in part on data reported by Nielsen through its Homescan Services for the food and beverage categories. Copyright © 2013, The Nielsen Company.

A. Healthy Weight Commitment Foundation consumer packaged goods beverages.

B. Non-Healthy Weight Commitment Foundation consumer packaged goods beverages.

^aDenotes significant difference compared to best-fit counterfactual (dotted line) at $p < 0.001$.

These overall reductions could be explained by a number of supply-side mechanisms, including, but not limited to, manufacturers creating, marketing, and selling lower-calorie offerings from reformulated existing products or creating new products; reducing package sizes or increasing price per volume or weight and thus reduce sales without necessarily affecting revenue; and shifts in market share across brand categories. It is challenging to disentangle whether, and how much, each of these factors may have contributed to the noted reductions, but findings from other studies suggest that there may be some portfolio changes toward less energy dense products.^{1,12–14}

There are also demand-side factors that may have affected purchasing behavior, such as consumers choosing healthier options, changing sociodemographic composition, rising food prices, or the Great Recession, which began at the end of 2007, and its aftermath.¹⁵ After adjusting for the Great Recession, food price shifts, and changes in the sociodemographics of the U.S. population, we found that the decline in CPG purchases were even larger (i.e., in the absence of these factors, U.S. households with children would have purchased even fewer CPG calories).

The estimates show that if economic and sociodemographic conditions had remained constant over time, households with children would have reduced their total CPG food and beverage purchases by 206 kcal/capita/day between 2007 and 2012, through reductions of 96 kcal from HWCF brands, 63 kcal from non-HWCF name brands, and 47 kcal from PLs. This may be due to simultaneous declines in away-from-home eating^{4,16–18} and households eating out less during the recessionary period and buying more CPGs that mimic restaurant foods (e.g., frozen entrees/pre-prepared/ready-to-heat dishes) as found by recent market research.^{15,19,20}

Some recent studies using both National Health and Nutrition Examination Survey (NHANES) and food purchase data in the past decade also support this possibility for both children and adults.¹⁵ Consequently, one might expect that as the economy improves, purchased CPG calories may fall even more as consumers begin eating out more again, assuming all else stays the same.

Although not the focus of this paper, it should be noted that food prices generally had the expected negative relationship with caloric purchases ([Appendix Table C1](#)). Additionally, there was a strong negative time-trend, which is consistent with other recent papers^{15,17} and suggests that public health efforts to educate and encourage consumers to make healthier choices along with shifts in programs such as the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) may be succeeding.^{21,22}

Indeed, this study found that CPG calories purchased among U.S. households with children were already falling prior to the HWCF marketplace pledge, but the declines in adjusted total calories purchased fell more quickly during the 5-year pledge period (2008–2012) than during the preceding 8-year pre-pledge period (2000–2007). In investigating the contribution of HWCF versus non-HWCF products to the accelerated decline during the post-pledge period, we found that the rates of decline in both food and beverage calories purchased from HWCF brands were slower than their pre-pledge trajectories, but this effect was more than offset by declines in non-HWCF brands (both non-HWCF name brands and PLs) that outpace the pre-pledge trajectory.

Given that the reductions from HWCF products were already on a downward trajectory before the pledge, these findings may raise questions about the extent to which the HWCF companies made further reductions after 2007, as well as about the impact and meaningfulness of their pledge. Based on the best-fit counterfactual, we should have expected an additional 42 kcal/capita/day reduction from calories purchased from HWCF products in 2012 among households with children if the 16 HWCF companies had been able to maintain their pre-pledge trajectory.

This is in context of the Children's Food and Beverage Advertising Initiative (CFBAI), another voluntary industry effort that includes 13 HWCF companies. Studies on the CFBAI found that less than 50% of products in TV ads seen by children are covered by self-regulation, and products advertised on children's versus general-audience programming and by CFBAI- versus non-CFBAI-member companies were of lower nutritional quality.²³ Therefore, these companies need to do more to limit their marketing of less healthy products to children and expand their portfolio of healthier offerings given that the profitability from the "better for you" products appear promising.^{12,14}

Another important finding is lack of change in calories purchased by households with children between 2011 and 2012 across all brands, but particularly from non-HWCF name brands and PL products. The observed plateauing in trends since 2011 raises a major public health concern. In this and other studies, declines in household calorie purchases were largely driven by purchases among households with children during the 2000–2011 period.¹⁵

Recent studies have reported marked reductions in daily caloric intake particularly from beverages among children during the 2003–2010 period.^{8,24} Other scholars have noted a stabilization in obesity rates among U.S. children and in lower-income WIC preschoolers in selected states,^{25–28} including the recent finding of a

significant decrease in obesity among U.S. preschoolers and no significant changes in obesity prevalence in youth or adults between 2003–2004 and 2011–2012.²⁹

However, the findings in this study raise the question of whether we may be beginning to see a plateauing (and possible reversal) in the recent favorable shift in food purchasing and dietary intake behavior, and whether this may be more pronounced among specific subpopulations, such as African American and Latino children and adolescents, as other studies suggest.^{30–32} Careful continued monitoring of food marketing, purchases, and intake is needed to address this critical issue. Future evaluations of HWCF marketplace pledge effects will examine differences in these trends by race/ethnicity, income, and age groups.

Limitations

The complexity of this evaluation effort and the limitations in available data sources led to several study limitations. One limitation stems from the lack of information regarding the quality and the comprehensiveness of the Nutrition Facts Label (NFL) data. NFL data precision may be compromised by both labeling measurement buffers allowed³³ and limitations in current legal reporting rules.

Moreover, caloric information for 6.8%–13% of the volume purchased were based on higher-level averages and were not product- or brand-specific, or were missing between 2000 and 2012, varying by brand category (Appendix Table A3). Sensitivity analyses accounting for the less reliable and missing caloric information by brand category over time found that these controls did not affect the predicted calorie purchases over time. In addition, it is not possible to know who the actual manufacturers of PL products are, as HWCF or non-HWCF name-brand companies may manufacture some of these PL products.

A critical test of the HWCF changes is ultimately how they affect the dietary intake of U.S. children. We are currently linking the UPC of every CPG food and beverage available since 2007 with the U.S. Department of Agriculture data used in NHANES from 2007–2008 through 2011–2012.³⁴ Among other important research questions, this will allow us to assess the associations between the HWCF efforts and measured changes in U.S. diets, particularly those of children in lower income and racial/ethnic populations at greatest risk for childhood obesity. This is important given the large waste component,³⁵ which suggests that reductions in calories consumed may not be as large as found in the reductions in calories sold or purchased, particularly from foods.³⁶

Additionally, because this current evaluation focuses on the CPG sector of foods sold, non-CPG sources are not well represented in this study.^{37,38} The lack of data on

non-store sources of foods (e.g., food service, schools), or loose/unpackaged products (e.g., bulk nuts or grains, loose fruits and vegetables, cut-to-order raw meats, deli meats or cheeses), means that we are also unable to directly address the potential offsetting of purchases from these other parts of the food supply.³⁹ However, a recent paper¹⁵ documents parallel findings between analyses of Homescan household purchases in 2000–2011 and NHANES 2003–2010, where both data sources showed greater relative caloric declines among children compared to adults, as well as greater reductions from beverages compared to foods.

Lastly, this study focuses on calories because of its direct relationship with obesity and does not look at other nutrients of concern. Although our findings appear promising from a caloric purchase standpoint, this does not mean that the U.S. food supply and diet has improved: Both children and adults still consume excess solid fats, added sugars, and sodium.^{10,11,40–42} Therefore, future research should focus on changes in other key macro- and micronutrients, particularly solid fats, added sugars, and sodium.

Conclusions

Although the previous paper¹ found that the 16 HWCF companies met and substantially exceeded their collective U.S. sales reduction goal for the interim 2012 evaluation, it did not examine the effects on households with children or control for significant economic or demographic changes that may help explain the observed reductions. This paper found that consistent with the previous paper, there was a significant per capita decline in CPG caloric purchases between 2000 and 2012 among household with children from all brand categories, but food waste and measurement issues mean that these results will be reflected in a smaller declines in caloric intake.

After adjusting for sociodemographic and economic factors, calories purchased from HWCF products had the steepest decline in both the pre- and post-pledge periods, but the post-pledge declines from HWCF products were less than what would have been expected given the pre-pledge trends. Lastly, the lack of change in total CPG calories purchased by households with children between 2011 and 2012 calls into question the sustainability of the decline and the need for continued monitoring regardless of brand or manufacturer.

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Appendix

Supplementary data

Supplementary data associated with this article can be found at <http://dx.doi.org/10.1016/j.amepre.2014.05.030>.