

Applied Research Brief: Nutrition/Health Policy

The Positive Influence of State Agricultural Marketing Programs on Adults' Fruit and Vegetable Consumption

Elizabeth A. Howlett, PhD; Scot Burton, PhD; Christopher L. Newman, PhD; Michel A. Faupel, MS

Abstract

Purpose. To assess whether state-sponsored agricultural marketing programs had a positive influence on adult consumers' fruit and vegetable consumption.

Design. Differences in fruit and vegetable consumption between 2000 and 2005 in states that initiated marketing campaigns during this period and those that did not were examined.

Subjects. A representative sample ($n = 237,320$) of adults aged 18 and older from states with and without marketing programs was used. The study used data from the 2000 and 2005 Behavioral Risk Factor Surveillance System.

Measures. The number of fruit and vegetable servings per week and the percentage of respondents consuming five or more servings of fruits and vegetables per day were examined.

Analysis. Between-subjects analysis of variance and logistic regression.

Results. In the absence of a marketing campaign, there was a significant decrease in fruit and vegetable consumption between 2000 and 2005. In states with campaigns, consumption remained stable or increased. Marketing effects were stronger for women than for men.

Conclusions. State-sponsored agricultural marketing programs had favorable effects on consumers' consumption of fruits and vegetables. (*Am J Health Promot* 2012;27[1]:17–20.)

Key Words: Nutrition, Agriculture, NHANES Agricultural Marketing Programs, Fruit and Vegetable Consumption, Prevention Research. Manuscript format: research; Research purpose: program evaluation; Study design: quasi-experimental; Outcome measure: behavioral; Setting: national; Health focus: nutrition; Strategy: skill building/behavior change; Target population age: adults; Target population circumstances: geographic location

Elizabeth A. Howlett, PhD, and Scot Burton, PhD, are with the Sam M. Walton College of Business, and Michel A. Faupel, MS, is with the Applied Sustainability Center, University of Arkansas, Fayetteville, Arkansas. Christopher L. Newman, PhD, is with the Department of Marketing, University of Mississippi, Oxford, Mississippi.

Send reprint requests to Elizabeth A. Howlett, PhD, Department of Marketing and Logistics, Sam M. Walton College of Business, University of Arkansas, Fayetteville, AR 72701; ehowlett@uark.edu.

This manuscript was submitted September 23, 2010; revisions were requested April 20, and June 14, 2011; the manuscript was accepted for publication June 27, 2011.

Copyright © 2012 by American Journal of Health Promotion, Inc.
0890-1171/12/\$5.00 + 0
DOI: 10.4278/ajhp.100923-ARB-316

PURPOSE

Increasing local fruit and vegetable consumption has been viewed as a market-based means to increase family farm revenue.¹ Consequently, a

number of state-sponsored agricultural marketing programs promoting the consumption of foods grown in-state were established following passage of the Emergency Agricultural Assistance Act of 2001.² However, information

regarding their effectiveness is limited, contradictory, and inconclusive.^{3,4}

This study examined whether state-sponsored marketing programs have a positive influence on fruit and vegetable consumption. Prior to 2000, less than half of all states had an agricultural marketing program, but usage grew dramatically in the past decade.² There are many similarities across state agricultural programs. For example, 16 states use the words “grow” or “grown” in their slogans, whereas others use a shape of their state in their logos. Many states also use common methods of advertising like television, print, and radio advertising.⁵

These advertising appeals and promotions encouraging the consumption of state-grown foods may have a positive influence on the consumption of both locally and nonlocally grown fruit and vegetables by drawing consumers' attention to fresh produce. The promotion of local foods may also contribute to the development of more healthful food habits.⁶ For example, consumers who develop a preference for local blueberries may continue to purchase blueberries available from nonlocal suppliers.

METHODS

Design

We used a 2×2 pretest-posttest quasi-experimental design with factors of time (2000 vs. 2005) and presence or absence of state-sponsored marketing program (comparison group of states with no programs vs. treatment group of states with marketing programs implemented after 2000 and were ongoing in 2005). Because females tend to be somewhat more health conscious than males, and

given that prior research has shown that women typically consume more fruits and vegetables than men, marketing campaigns may influence men and women differently.⁶ Thus, differences across gender were examined.

Sample

The Behavioral Risk Factor Surveillance System, an ongoing, state-based survey of the U.S. population aged 18 and older, was the source of our data.⁷ Our analyses included 80,192 adults aged 18 and older from the 2000 survey and 157,128 adults from the 2005 survey with complete consumption and demographic data. Data from the 2000 and 2005 surveys were selected because this allows us to compare consumption before and after the initiation of marketing programs in states with and without these programs. In 2000, there were 26 states without programs.² Between 2001 and 2004, 17 states initiated marketing programs to specifically promote the consumption of in-state fruits and vegetables. Nine states remained without programs in 2005.² Analyses were performed for these 26 states.

Measures

Two calculated variables constructed by the Centers for Disease Control and Prevention (CDC) served as dependent measures. The CDC created the *fruit and vegetable servings* variable by summing the following six variables assessing servings per day: fruit juice, fruit, green salads, potatoes, carrots, and vegetables. We converted this number of servings per day to a weekly value for ease of analyses and interpretation. The second dependent variable was calculated from the *summary index for fruit and vegetable consumption*. Consistent with the five or more servings per day criterion endorsed by the CDC and the objectives of Healthy People 2010, each respondent's average fruit and vegetable servings per day were placed in one of two categories, either less or more than five servings per day.⁸ A more thorough description of these CDC measures is provided in the National Health and Nutrition Examination Survey codebooks.⁷

Analysis

We initially examined effects related to the absolute number of servings of fruits and vegetables consumed using a $2 \times 2 \times 2$ analysis of variance

(ANOVA). Effects of the time frame and state-sponsored marketing campaign (established or not established) were examined across gender. To account for possible demographic changes between states with and without marketing programs, respondents' ages, education levels, income, and marital status were included as covariates in the model. (Demographic profiles are available upon request.) A demographic comparison of respondents in states with and without branding programs revealed no substantial differences between the groups. Given the guideline to consume five or more servings per day, we converted the quantitative number of servings to a nominal dependent variable and then performed a logistic regression in which the five or more servings per day criterion (0 = no; 1 = yes) served as the dependent variable. For both analyses, the two independent variables were state-sponsored marketing campaign (established or not established) and time frame (2000 vs. 2005). Independent variables were mean centered prior to creating the interaction term between time frame and presence/absence of the campaign.⁹

RESULTS

The Table presents ANOVA results for the weekly fruit and vegetable consumption measure. Across states, weekly consumption was greater in states with marketing programs than in states without marketing programs ($\bar{X} = 27.10$ vs. $\bar{X} = 26.45$, $F = 65.3$, $p < .0001$). Consumption decreased between 2000 and 2005 ($\bar{X} = 27.26$ vs. $\bar{X} = 26.29$, $F = 145.2$, $p < .0001$) and women consumed more fruits and vegetables than men ($\bar{X} = 28.41$ vs. $\bar{X} = 25.14$, $F = 1638.8$, $p < .0001$). More importantly and consistent with our primary research question, the marketing campaign by time interaction was significant ($F = 91.8$, $p < .0001$). As shown in the upper portion of the Figure, fruit and vegetable consumption in 2000 (i.e., prior to the marketing campaigns) was similar across states. However, in the absence of a marketing campaign, there was a significant decrease in the number of fruit and vegetable servings consumed per week between 2000 and 2005 ($\bar{X} = 27.32$ vs. $\bar{X} = 25.58$, $p < .05$). In

states initiating campaigns, consumption remained unchanged ($\bar{X} = 27.20$ vs. $\bar{X} = 27.0$, $p > .10$). We also performed a mixed-design ANOVA at the state level by aggregating the individual level data and creating a data set with 26 observations (one for each state) with the average consumer fruit and vegetable consumption data. State marketing program (either absent or present in 2005) served as a between-subjects factor and consumption in 2000 and 2005 was a within subjects factor. The focal interaction of interest was significant ($F_{1,24} = 4.46$, $p < .05$), which indicates that the favorable effect of the state branding program was significant even with a much lower level of statistical power.

As shown in the Table, the two-way interaction between the branding campaign and gender was also significant ($F = 12.9$, $p < .0001$). Although men in states with marketing campaigns consumed somewhat more fruits and vegetables than men in states without these programs ($\bar{X} = 25.33$ vs. $\bar{X} = 24.96$, $p < .05$), the difference was more striking for women. Consumption among women was higher in states with marketing programs than in states without campaigns ($\bar{X} = 28.88$ vs. $\bar{X} = 27.94$). In sum, in contrast to the significant drop in consumption in states without state-sponsored branding, the weekly number of servings of fruits and vegetables in states with marketing campaigns remained relatively stable over time.

The results of the logistic regression demonstrated that the percentage of consumers meeting the five-a-day criteria was greater in states with marketing campaigns. There were significant positive effects of campaign, time frame, and campaign by time frame interaction. In states with marketing campaigns, those meeting the target amount (five or more servings) increased from 24% prior to the campaigns to 26.5% after campaign initiation ($z = 10.25$, $p < .001$). In contrast, the percentage meeting the five-a-day criterion was unchanged (23.7% vs. 23.2%) across the time frame in the absence of campaign. This suggests that state agriculture campaigns had a positive effect on the percentage of people consuming five or more daily servings of fruit and vegetables.

Table
Effects on Mean Number of Servings of Fruits and Vegetables Consumed Weekly*

| | ANOVA Results | | Cell Means Across Conditions | |
|------------------------------------|---------------|--------------------|------------------------------|-------|
| | F Values | Significance Level | Men | Women |
| Independent variables | | | | |
| G | 1638.76 | <0.0001 | | |
| SMC | 65.3 | <0.0001 | | |
| TF | 145.22 | <0.0001 | | |
| Interaction terms | | | | |
| SMC*TF | 91.75 | <0.0001 | | |
| TF*G | <1 | >0.10 | | |
| SMC*G | 12.91 | <0.0001 | | |
| SMC*TF*G | <1 | >0.10 | | |
| Covariates | | | | |
| Education | 2083 | <0.0001 | | |
| Marital status | 21.77 | <0.0001 | | |
| Income | 11.83 | <0.001 | | |
| Age | 1048 | <0.0001 | | |
| Preprogram (2000) | | | | |
| State marketing program instituted | | | | |
| No | | | 25.8 | 28.85 |
| Yes | | | 25.41 | 28.99 |
| Ongoing program (2005) | | | | |
| State marketing program instituted | | | | |
| No | | | 24.13 | 27.04 |
| Yes | | | 25.24 | 28.77 |

* ANOVA indicates analysis of variance; G, gender; SMC, state-sponsored marketing program; and TF, time frame. SMC has two levels, states with and without a program in 2005. TF also has two levels, preprogram (2000) and ongoing program (2005).

We extended this logistic regression analysis to include changes in consumption when gender was included in this model. Gender, the interaction between gender and campaign, and the interaction between campaign, gender, and time were significant. As shown in the bottom of the Figure, the effects of the campaigns were somewhat stronger for females than for males. In states with campaigns, the percentage of men who met the criterion significantly increased from 18.8% prior to the campaign to 19.8% after campaign initiation. In contrast, the percentage of men who met the five-a-day criterion decreased slightly across time frames in the absence of a campaign (18.8% to 18.5%). For females, the percentage who met the five-a-day criteria significantly fell from 27% in 2000 to 26.1% in 2005 in states without campaigns. However, in states with campaigns the percentage for females significantly increased from 27.6% to 30.1%. These findings suggest

that marketing campaigns had a favorable influence on fruit and vegetable consumption, and that this effect was greater for women than for men.

DISCUSSION

Summary

Increasing local fruit and vegetable consumption has been viewed as a means to enhance family farm revenue; thus, a number of states established agricultural marketing programs to promote the consumption of foods grown in-state.¹ The results of this research provide evidence that these programs do increase overall consumption. Consistent with prior research, this research indicates that only a small percentage of Americans consume the recommended daily amounts of fruits and vegetables.⁶ Moreover, the findings show a significant decrease in fruit and vegetable servings between the 2000 and 2005 data collection periods. However, the results

show a favorable effect of campaigns on the overall consumption of fruits and vegetables; the national decline in fruit and vegetable consumption was stemmed in states with marketing campaigns. In contrast, in states without campaigns, consumers ate 1.7 fewer servings of fruits and vegetables. The general pattern of results is also similar for the five-a-day consumption criteria; there is no change in consumption in states without campaigns, but states with campaigns experienced increased consumption.

In addition, results show that gender moderates the effectiveness of the marketing campaigns over time. Females seem to benefit somewhat more from the campaigns than males. Although fruit and vegetable consumption by both males and females increased in states with campaigns, the increase was greater for women. Females have been shown to be more nutrition conscious than males, which supports the conclusion that they responded more favorably to the promotional campaign. This suggests that marketing campaigns may be somewhat widening the gender gap for fruit and vegetable consumption. This is particularly evident for the five-a-day consumption measure. The percentage of males in states with marketing campaigns who met the five-a-day criteria increased by roughly 1.0%, whereas the percentage of women increased almost 2.5%.

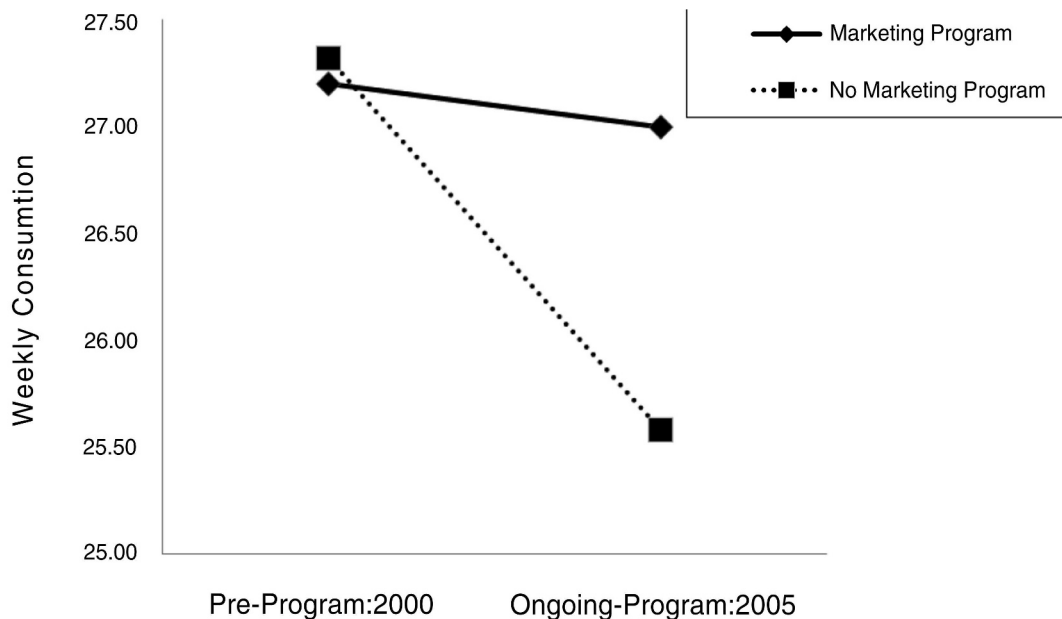
Limitations

It should be recognized that in quasi-experimental studies such as this, random assignment to conditions is not feasible. Consequently, specific causal conclusions should not be inferred. The analyses consider only the broad aggregate level of findings, and relatively modest changes at this aggregate level may mask larger changes within more specific consumer segments. Refining analyses to understand changes over time for more specific segments offers a future research opportunity.

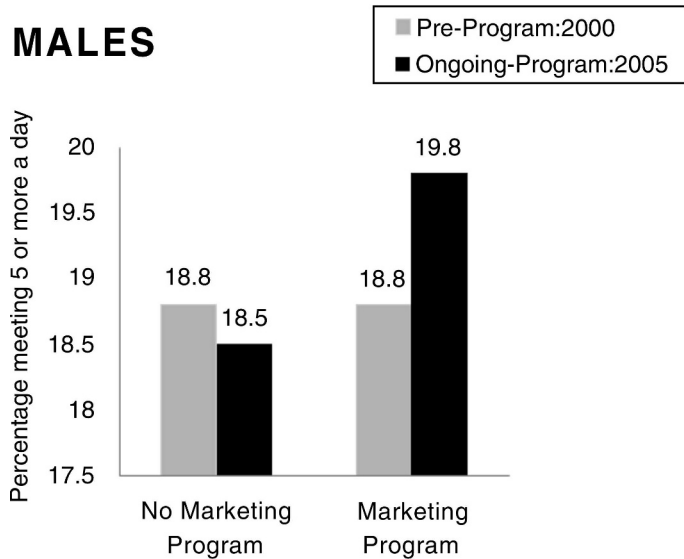
Significance

Results suggest that initiation of state-sponsored marketing campaigns has a favorable overall impact on fruit and vegetable consumption. Whether increases in sales will offset the costs of implementing these programs remains to be seen, but the intangible benefits of increases in healthier consumption should not be overlooked.

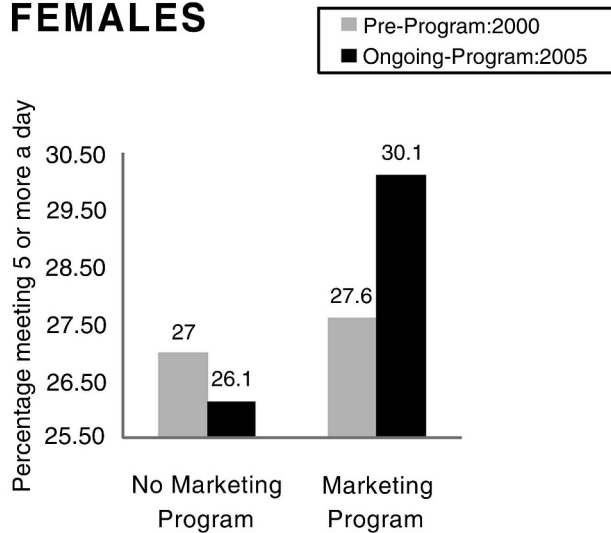
Figure
Effects of State Agricultural Marketing Campaigns on Weekly Consumption and Percentage of Males and Females Who Meet the Five-a-Day Criteria



MALES



FEMALES



References

- Patterson PM. State-grown promotion programs: fresher, better? *Choices*. 2006;21:41-46.
- Onken KA, Bernard JC. Catching the local bug: a look at state agricultural marketing programs. Available at: www.choicesmagazine.org/magazine/print.php?article=112. Accessed July 28, 2010.
- Uva W. Effectiveness and impact of regional identity. Available at: http://aged.ces.uga.edu/browseable_folders/power_points/Marketing/Effectiveness_and_Impact_of_Regional_Identity.ppt. Accessed July 20, 2010.
- Ward RW, Chang J, Thompson S. Commodity advertising: theoretical issues relating to generic and brand promotions. *J Agribus*. 1985;1:269-276.
- Chittenden J. State branding program benefits growers, processors, retailers, and consumers. Available at: <http://www.agmkt.state.ny.us/AD/release.asp?ReleaseID=1313>. Accessed January 20, 2011.
- Blanck HM, Galuska DA, Gillespie C, et al. Fruit and vegetable consumption among adults—United States, 2005. *MMWR Morb Mortal Wkly Rep*. 2007;56:213-217.
- National Center for Chronic Disease Prevention and Health Promotion. Behavioral risk factor surveillance system. Available at: <ftp://ftp.cdc.gov/pub/Data/Brfss/userguide.pdf>. Accessed July 28, 2010.
- Centers for Disease Control and Prevention. 5 a day works! 2005. Available at: www.cdc.gov/nccdp/dnpa/nutrition/health_professionals/programs/5aday_works.pdf. Accessed July 1, 2010.
- Aiken LS, West SG. *Multiple Regression: Testing and Interpreting Interactions*. Newbury Park, Calif: Sage; 1991.