

Research and Professional Briefs

Choices Made by Low-Income Women Provided with an Economic Supplement for Fresh Fruit and Vegetable Purchase

DENA R. HERMAN, PhD, MPH, RD; GAIL G. HARRISON, PhD; ELOISE JENKS, MEd, RD

ABSTRACT

Vouchers for fresh fruit and vegetable purchase were provided to low-income women participating in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in Los Angeles, CA. As the program is currently constituted, the supplemental foods provided contain no fresh produce except for carrots for exclusively breastfeeding women. This study investigated whether providing supplemental financial support specifically for purchase of fresh fruits and vegetables would result in high uptake of the supplement, and what the individuals would choose to purchase. A total of 602 women enrolling for postpartum services at three selected WIC program sites in Los Angeles were recruited. Sites were assigned to intervention with vouchers redeemable at a local supermarket, a nearby year-round farmers' market, and a control site with a minimal non-food incentive. Vouchers were issued bimonthly, at the level of US \$10/wk, and carried out for 6 months. Of 454 participants who completed the study (75.4%), 86% were Hispanic, 7% non-Hispanic black, and 7% of other ethnic backgrounds. Assessment of uptake was by voucher redemption rates and was approximately 90% for both groups. Participants reported purchasing a wide variety of items at both sites. The 10 most frequently mentioned items were oranges, apples, bananas, peaches, grapes, tomatoes, carrots, lettuce, broccoli, and potatoes. In conclusion, low-income women used the supplement provided almost fully, and purchased a wide variety of fresh

fruits and vegetables for their families. No particular barriers arose to redemption of the vouchers by either the participants or the retail vendors.

J Am Diet Assoc. 2006;106:740-744.

Greater consumption of fruits and vegetables is associated with a reduced risk of cancer (1,2); stroke and, perhaps, other cardiovascular diseases (3); and type 2 diabetes (4). In addition, increased fruit and vegetable consumption may be useful in weight maintenance or intentional weight loss (5). Recommendations from various national and international agencies are that optimal diets for preventing chronic disease should include 400 to 800 g/day fruits and vegetables (1), or five to nine servings (6). The recent report of the Dietary Guidelines Advisory Committee in the United States (5) recommends five to 13 servings per day, or 2½ to 6½ cups/day depending on energy needs. Current intakes in most populations are less than these recommendations (7). In the United States, the National Cancer Institute reports that the average total fruit and vegetable consumption for individuals 2 years of age and older has remained fairly steady at 4.5 servings in 1989 to 1991, 4.9 servings in 1994 to 1996, and 4.7 servings in 1999 to 2000 (7). Individuals at lower income and education levels tend to consume fewer fruits and vegetables than those with more education and higher income (6). There have been a number of interventions designed and implemented to inform the public of the benefits of greater fruit and vegetable consumption. In the United States, the most recognized is the National Cancer Institute's "5 A Day for Better Health" campaign, a national health education campaign that was designed based on a program originating in California in the late 1980s (8).

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is a large public health program in the United States designed to provide supplemental foods of high nutritional quality, nutrition education, and referral to health care for low-income and nutritionally at-risk women during pregnancy and the postpartum period and to their infants and young children up to the age of 5 years (9). The program was established in the mid-1970s and has grown steadily. Currently more than 7½ million individuals are served by the program (9). The WIC program currently reaches approximately half of all newborn infants and their mothers, and 25% of young children in the United States (9). The WIC program was designed and first implemented at

D. R. Herman is an adjunct assistant professor, Department of Community Health Sciences, University of California at Los Angeles School of Public Health; G. G. Harrison is a professor, University of California at Los Angeles School of Public Health and University of California at Los Angeles Center for Health Policy Research; and E. Jenks is an executive director, Public Health Foundation Enterprises WIC Program, Los Angeles, CA.

Address correspondence to Dena R. Herman, PhD, MPH, RD, Senior Scientist, Nutrilite, Division of Access Business Group, 5600 Beach Blvd, Buena Park, CA 90621-2007. E-mail: dherman@ucla.edu

Copyright © 2006 by the American Dietetic Association.

0002-8223/06/10605-0012\$32.00/0

doi: 10.1016/j.jada.2006.02.004

a time when a predominant concern was undernutrition in low-income populations. The enabling legislation directed the program to focus on providing foods that were good sources of calcium, iron, vitamin A, vitamin C, and high-quality protein, because these were at the time the nutrients shown to be relatively lacking in the diets of low-income women and children. The food packages have changed little since the program's beginnings (10,11). Supplemental foods are provided (usually through vouchers redeemable at retail stores) as specified amounts of foods tailored to individual needs from the following list: milk, cheese, eggs, infant formula, fortified cereals, fruit juice, peanut butter, or dry beans. A modification to the food package for exclusively breastfeeding women was made in 1992, to include fresh carrots and canned tuna (10,11).

Over the last several years there has been considerable discussion of the possibility of adding fresh fruits and vegetables to the WIC food packages for women and children, given the current evidence of their value in the construction of optimal diets (2,3). Therefore, the objectives of the current study were to: a) evaluate the extent to which participants would take advantage of a subsidy specifically targeted for fruits and vegetables (12,13), b) determine which of the specific eligible items should be restricted or left to the individual participant's choice (this is important given that the nutrient content of fruits and vegetables varies widely and the program has a mandate to provide sources of nutrients shown to be lacking in the diets of the target populations), and c) assess the practicality of vouchers for fresh produce at the retail level in terms of the retail vendor's responsibilities.

METHODS

A nonequivalent control-group design intended to measure the effectiveness of two interventions to increase the consumption of fresh fruits and vegetables among postpartum WIC-participant women and their families was used. A total of 602 women (approximately 200 per site) enrolling for WIC program services were recruited at three selected WIC program centers in suburban areas of Los Angeles, CA, between February and August 2001. Participants were recruited sequentially, including the first 200 eligible at each site. The study sites (two intervention and one control) were selected based on similarity with regard to caseload, distribution of ethnic backgrounds of participants, and geographic proximity of supermarkets, grocery stores, and farmers' markets. To ensure equal access to a variety of fresh fruits and vegetables at each of the study sites, centers selected for participation each had a major supermarket chain store and a certified year-round farmers' market within walking distance (not more than ½ mile) from the WIC program site. Eligibility criteria for the individual participants included women who: a) had recently delivered and recertified for WIC participation as either a breastfeeding or nonbreastfeeding postpartum woman, b) were English- or Spanish-speaking, and c) were at least 18 years of age. Seventy-five percent of recruited participants (454) completed the entire study including all interviews. Drop-out rates for each of the sites were as follows: 30% for the supermarket, 16% for the farmers' market, and 29% for the control. The primary reason for leaving the study was

“moving away” (approximately 90%). Other reasons included “no time” due to going back to work (5%) and no longer participating in the WIC program (no longer income eligible, 5%).

After a 2-month monitoring period to verify participants' current fruit and vegetable intake (using 24-hour quantitative dietary recalls), participants at the two intervention sites were issued \$10* worth of vouchers per week, in \$10 units for the supermarket site and in \$2 units for the farmers' market site, to buy produce of the participant's choice. Vouchers were issued bimonthly and could be spent over the ensuing 2-month period at any time. At the control site, no fruit and vegetable subsidy was implemented but participants were provided with a lesser-value set of coupons (\$13/month) redeemable for disposable diapers, in compensation for their time participating in interviews. Redemption rates for these coupons were not tracked. Participants were instructed on the proper use of the vouchers at each of the sites, but apart from the regular WIC classes, no additional nutrition education information was provided for this study. Participants were interviewed by specially trained WIC nutritionists, in English or Spanish according to the participant's preference, six times in the two intervention sites and four times at the control site over a period of 14 months (baseline, 2 months after baseline, end of 6-month intervention, and 6 months after the end of the intervention). Recruitment of individuals spanned a 6-month period, ensuring that information on consumption of fruits and vegetables included all seasons. Quantitative, 24-hour dietary recalls were conducted at four interviews for all participants; in addition, at the intervention sites, two extra interviews spaced 2 months apart were conducted to obtain information on the fruits and vegetables purchased with the vouchers. Specifically, participants were asked to respond to the question, “What did you buy with your fruit and vegetable coupons last week?” Voucher redemption rates were obtained from scanned data from the supermarket's corporate headquarters. In the farmers' market condition, vouchers presented for purchase were collected by the farmers' market manager and turned in to the city government's accounting department for tallying; vouchers were then mailed to the study's research staff, who recounted the redeemed vouchers and logged the tallies into an electronic database. The study protocol was reviewed and approved by the institutional review board/human subjects protection committee of both the University of California at Los Angeles and Public Health Foundation Enterprises, Inc, City of Industry, CA.

RESULTS

Participants' demographic characteristics approximated those of Public Health Foundation Enterprises, Inc's WIC program, with 86.3% Hispanic, 6.6% non-Hispanic black, 3.9% non-Hispanic white, 3.0% Asian American, and 0.2% Native American. The average age was 27.2 years (median 27 years, range 17 to 43 years), average educational level was 10±3.5 years (median 10 years, range 0

**All dollar amounts are US dollars.*

Table. Individual fruits and vegetables as percent of total fruit and vegetable items reported purchased by participants in the Los Angeles, CA WIC^a program during the 6-month fruit and vegetable voucher intervention period, by site

Farmers' Market Site				Supermarket Site			
Fruits	%	Vegetables	%	Fruits	%	Vegetables	%
Apples	25.4	Tomatoes	14.2	Bananas	28.3	Carrots	18.8
Oranges	19.2	Lettuce	13.2	Apples	26.5	Tomatoes	15.4
Peaches	13.9	Broccoli	11.7	Oranges	15.8	Lettuce	14.3
Grapes	8.4	Carrots	9.8	Grapes	4.9	Broccoli	11.5
Strawberries	7.1	Potatoes	9.1	Pears	4.1	Potatoes	10.4
Watermelons	4.7	Green beans	7.1	Watermelons	4.0	Squash	3.9
Cantaloupes	4.5	Corn	5.0	Peaches	3.5	Onions	3.8
Pears	4.1	Squash	4.7	Strawberries	2.3	Spinach	2.7
Bananas	3.2	Spinach	4.4	Cantaloupes	1.9	Zucchini	2.6
Plums	3.1	Zucchini	4.0	Papayas	1.5	Cauliflower	2.4
Nectarines	2.0	Onions	2.2	Melons	1.4	Cabbages	2.1
Grapefruits	0.9	Cauliflower	2.1	Pineapples	1.1	Cucumbers	2.0
Apricots	0.7	Cucumbers	2.0	Plums	1.0	Green beans	1.9
Melons	0.5	Cabbages	2.0	Mangos	1.0	Corn	1.3
Tangerines	0.5	Cilantro	1.7	Nectarines	0.7	Avocados	1.1
Cherries	0.4	Avocados	1.5	Lemons	0.5	Chili peppers	1.1
Mandarins	0.4	Radishes	1.0	Apricots	0.3	Cilantro	0.7
Raspberries	0.3	Bell peppers	1.1	Cherries	0.3	Celery	0.7
Blueberries	0.2	Celery	0.6	Limes	0.3	Bell peppers	0.4
Limes	0.2	Green onions	0.4	Tangerines	0.3	Chayote	0.4
Mangos	0.1	Chili peppers	0.3	Guavas	0.3	Mushrooms	0.3
Pineapples	0.1	Mixed salad	0.2	Coconuts	0.1	Mixed salad	0.3
Pomegranates	0.1	Eggplants	0.2	Honeydews	0.1	Beets	0.3
Papayas	0.1	Bean sprouts	0.2	Grapefruits	0.1	Sweet potatoes	0.3
Kiwis	0.1	Asparagus	0.2	Mandarins	0.1	Radishes	0.2
Guavas	0.1	Garlic	0.2	Kiwis	0.1	Peppers	0.2
		Beets	0.2			Green onions	0.1
		Artichokes	0.2			Garlic	0.1
		Winter squash	0.2			Eggplants	0.1
		Romaine	0.1			Bean sprouts	0.1
		Swiss chard	0.1			Asparagus	0.1
		Green peas	0.1			Mustard greens	0.1
		Bay leaves	0.1			Green peas	0.1
		Pumpkins	0.1				
Total: 1,136 items		Total: 1,262 items		Total: 812 items		Total: 950 items	

^aWIC=Special Supplemental Nutrition Program for Women, Infants, and Children.

to 19 years), and average family size was 3.9±1.3 people (median 4 people, range 2 to 11 people). Mean (±standard deviation) household income was \$1,233±\$654/mo (median \$1,154/month, range \$0 to \$3,640/mo). These characteristics were similar across all three sites.

In all, \$44,000 worth of vouchers were issued for the supermarket and \$44,960 for the farmers' market. Redemption rates were 90.7% for the farmers' market and 87.5% for the supermarket. The Table shows the specific fruits and vegetables reported purchased by the participants with their vouchers. These data are presented in terms of frequency, because quantities were not reported. Quantitative consumption of fruits and vegetables from the dietary recalls will be reported elsewhere.

Overall, participants reported purchasing 27 and 26 different fruits and 34 and 33 different vegetables in the farmers' market and supermarket outlets, respectively. Five fruits and five vegetables accounted for

about 70% of the items reported for each group, with only minor differences in items. The 10 most frequently reported items were oranges, apples, bananas, peaches, grapes, tomatoes, carrots, lettuce, broccoli, and potatoes. A larger number of item purchases were reported for the farmers' market condition (29% more fruits and 25% more vegetables), although the total number of types of fruits and vegetables did not differ significantly between the two conditions. With regard to the 10% of vouchers not redeemed, participants were queried at each interview about whether or not they had redeemed all their vouchers and if not, why not. Most (22.6% of unredeemed vouchers) gave responses indicating that they still intended to use remaining vouchers. The next most common response was "too busy" (16.3%). A few reported vouchers lost or stolen, or that they had no storage or working refrigerator. Responses indicating that the amount was too much to use effi-

ciently were few (2.7% “too much to spend at once,” 2.3% “still have fruits and vegetables”).

DISCUSSION

Results show that a subsidy directed to fresh fruits and vegetables was almost fully used by this population and that a wide variety of fresh fruits and vegetables was purchased. With the exception of lettuce and grapes, which were among the most popular vegetables and fruits, respectively, all of the most frequently purchased items were significant sources of potassium, vitamin C, vitamin A, and/or dietary fiber—food components determined to be of high priority in revising WIC food packages by a recent Institute of Medicine study (11,14). The amount of the subsidy in this study (\$40/month) was greater than would likely be feasible in a program such as WIC (the current retail value of the food package excluding the fruit and vegetable vouchers for postpartum women in this local WIC program ranges from \$56.14 to \$76.62 depending on breastfeeding status). A higher-than-realistic level was chosen to ascertain whether the demand would be saturated at a lower level; the very high redemption rates for coupons in this study lead us to conclude that a fresh produce subsidy would be approximately fully used, at least at levels up to that provided in this study. Seasonality of fruit and vegetable intake was accounted for by enrolling participants over a 6-month period and then following up each participant for a total of 14 months. Despite a differential dropout rate at the intervention sites, use of the two supplements was almost identical. Therefore, any bias in the use of these vouchers among sites was not suspected.

Dietetics professionals can capitalize on the ability of WIC participants to choose fresh produce and can encourage them to include it not only in their own daily diets, but also in those of other family members.

In terms of generalizing the results of this study to other US locations, it would probably not be expected that participants enjoy such a wide variety of fresh produce as they did in this study. However, participants nationwide would be likely to use a similar supplement to make good choices from the fresh produce that is available to them.

Lastly, neither the supermarket nor the farmers' market found the study particularly burdensome, but rather were positive about their participation. No specific barriers arose to redemption of the vouchers by participants or retailers.

CONCLUSIONS

The variety of choices shown in this study leads us to conclude that low-income consumers make wise, varied, and nutritious choices from available produce and that the potential for dietary improvement with a targeted subsidy that allows free choice within the fresh produce

category is significant. Dietetics professionals can capitalize on the ability of WIC participants to choose fresh produce and can encourage them to include it not only in their own daily diets, but also in those of other family members. In situations in which the availability of fresh produce is limited because of seasonality, dietetics professionals can remind WIC participants of how to include frozen and canned variants to ensure the maximum intake of important vitamins, micronutrients, and fiber.

This study was supported in part by the California Cancer Research Program, California Department of Health Services, No. 00-00758K-20148; US Department of Agriculture No. 43-3AEM-1-80038 through the University of California at Davis; the National Institutes of Health through the UCLA Cancer Education and Career Development Program in the Division of Cancer Prevention and Control Research; UCLA/Jonsson Comprehensive Cancer Center (No. 5R25 CA87949) and the UCLA Clinical Nutrition Research Unit (No. 5PO1CA42710); and the American Society of Nutrition Sciences, Community and Public Health Nutrition Research Interest Section.

We thank Shelley Lander and Yvette Young at the Corporate Headquarters of Food4Less in Los Angeles, CA, and Steve Whipple, Manager of the Culver City Farmers' Market, for their assistance and support in conducting this study. We are also grateful to the staff and clients at the Public Health Foundation Enterprises WIC centers, whose time and dedication made the study possible.

References

1. World Cancer Research Fund and American Institute for Cancer Research. *Food, Nutrition, and the Prevention of Cancer*. Washington, DC: American Institute for Cancer Research; 1997.
2. International Agency for Research on Cancer, World Health Organization. *IARC Handbooks of Cancer Prevention: Fruits and Vegetables*. Lyon, France: IARC Press; 2003.
3. Bazanno LA, He J, Ogden LG, Loria CM, Vupputuri S, Myers L, Whelton PK. Fruit and vegetable intake and risk of cardiovascular disease in US adults: The first National Health and Nutrition Examination Survey Epidemiologic follow-up study. *Am J Clin Nutr*. 2002;76:93-99.
4. Ford ES, Giles WH, Dietz WH. Prevalence of the metabolic syndrome among US adults: Findings from the Third National Health and Nutrition Examination Survey. *J Am Med Assoc*. 2000;287:356-359.
5. 2005 Dietary Guidelines Advisory Committee. *2005 Dietary Guidelines Advisory Committee Report*. Washington, DC: US Department of Health and Human Services and US Department of Agriculture; 2004. Available at: <http://www.health.gov/dietaryguidelines/dga2005/report/>. Accessed September 26, 2005.
6. National Cancer Institute. Research/Formative.html. Available at: <http://www.5aday.gov>. Accessed September 26, 2005.
7. National Cancer Institute. *Prevention*. Available at: <http://progressreport.cancer.gov/doc.asp?pid=1&did=2005&mid=vc&chid=21>. Accessed March 16, 2006.

8. Foerster SB, Kizer KW, Disogra LK, Bal DG, Krieg BF, Bunch KL. California's "5 a day—For better health!" campaign: An innovative population-based effort to effect large-scale dietary change. *Am J Prev Med.* 1995;11:124-131.
9. US Department of Agriculture and Economic Research Service. *Briefing Room, The WIC Program.* Available at: <http://www.ers.usda.gov/Briefing/WIC/>. Accessed March 16, 2005.
10. Centers for Disease Control and Prevention. 1996. Nutritional status of children participating in the Special Supplemental Nutrition Program for Women, Infants, and Children—United States, 1988-1991. From the Centers for Disease Control and Prevention. *JAMA.* 275;10:750-752.
11. Institute of Medicine of the National Academies. *WIC Food Packages: Time for a Change.* Washington, DC: National Academy Press; 2005.
12. Herman DR, Harrison GG, Jenks E. The effect of the WIC program on food security status of pregnant, first-time participants. *Family Econ Nutr Rev.* 2004; 16:21-29.
13. Institute of Medicine of the National Academies. *WIC Nutrition Risk Criteria: A Scientific Assessment.* Washington, DC: National Academy Press; 1996.
14. Institute of Medicine of the National Academies. *Proposed Criteria for Selecting the WIC Food Packages.* Washington, DC: National Academy Press; 2004.