

BILL REGER, EDD ■ MARGO G. WOOTAN, DSc ■ STEVEN BOOTH-BUTTERFIELD, EDD ■ HOLLI SMITH, MS

## *1% Or Less:* A Community-Based Nutrition Campaign

Dr. Reger is an Assistant Professor, Department of Community Medicine, West Virginia University, Morgantown. Dr. Wootan is a Senior Scientist, Center for Science in the Public Interest, Washington DC. At the time of this study, Dr. Booth-Butterfield was an Associate Professor, Department of Communication Studies, West Virginia University; he is currently Chief of the Health Communication Research Branch, National Institute for Occupational Safety and Health, Morgantown, West Virginia. Ms. Smith is co-owner of the health consulting firm Positive Energy Presentations and Programs, Clarksburg, West Virginia.

Address correspondence to:

Dr. Wootan, CSPI, 1875 Connecticut Ave. NW, Suite 300, Washington DC 20009; tel. 202-332-9110, ext. 352; fax 202-265-4954; e-mail <mwootan@cspinet.org>.

### S Y N O P S I S

**Objective.** The authors evaluated the effectiveness of a community education campaign to encourage a switch from high-fat (whole and 2%) milk to low-fat (1%, 1/2%, and skim) milk as a way to reduce consumption of saturated fat.

**Methods.** Milk sales data were collected from supermarkets in the intervention and comparison communities for three one-month time periods: at baseline, immediately following the campaign, and six months after the campaign. In addition, trained volunteers conducted pre- and post-intervention telephone surveys.

**Results.** Overall milk sales increased by 16% in the intervention cities following the campaign and remained high at follow-up. Low-fat milk's market share increased from 18% of overall milk sales at baseline to 41% of overall milk sales in the month following the end of the campaign, an increase in market share that was sustained at the six-month follow-up. In the post-intervention telephone survey, 38.2% of those respondents who reported drinking high-fat milk at baseline reported having switched to low-fat milk.

**Conclusion.** A focused message communicated through paid advertising, public relations activities, and community-based education programs increased low-fat and overall milk consumption in one community.

Strategies to cost-effectively change the behaviors of entire communities remain underdeveloped. Although a number of community-based health promotion and disease prevention programs have been effective in lowering the prevalence of cardiovascular disease risk factors in target communities,<sup>1-8</sup> the cost and complexity of such programs have made them difficult to reproduce. In addition, many community-based health promotion programs have had only limited effects on targeted health behaviors.<sup>9,10</sup>

Overconsumption of saturated fat is a major contributor to elevated blood cholesterol levels and heart disease in this country.<sup>11</sup> While many foods contribute to the consumption of saturated fat, whole and 2% milk are among the leading sources<sup>12</sup> (Personal communication, David Haytowitz, U.S. Department of Agriculture, 1995). Although per capita consumption of whole milk has declined 65% and consumption of low-fat (1% and skim) milk has increased three-and-a-half-fold over the past 25 years, high-fat milks still dominate the market.<sup>13</sup> Together, whole milk and 2% milk comprise 75% of total fluid milk consumption in the United States.

Switching to low-fat milk has been shown to be a relatively easy way to significantly reduce consumption of saturated fat.<sup>14,15</sup> (We define low-fat milk as 1%, ½%, and skim milk. High-fat milk is defined as whole and 2% milk.) If an average American child or adult who consumes the average quantities of calories, saturated fat, and milk switched from drinking whole to skim milk, his or her saturated fat consumption could decrease from 12% of total calories to 10%, the level recommended by the *Dietary Guidelines for Americans*,<sup>16</sup> the guidelines on which Federal nutrition policy is based. (These calculations are based on the average saturated fat consumption in the United States [12% of calories];<sup>17</sup> the reference caloric intake of people in the United States 4 years of age and older [2350 calories];<sup>18</sup> the average consumption of fluid milk in the U.S. population [0.9 cups per day];<sup>19</sup> and on totals of 4.5 grams of saturated fat per 0.9 cups of whole milk and 0.27 grams of saturated fat in 0.9 cups of skim milk.<sup>20</sup>)

Milk is one of the largest sources of total fat and saturated fat in the diets of American children.<sup>21</sup> The early stages of coronary atherosclerosis begin in childhood, and children and adolescents with high blood cholesterol levels are more likely to have high cholesterol levels as adults than the general population.<sup>22</sup> Healthy eating patterns in childhood and adolescence help prevent long-term health problems, such as coronary heart disease.<sup>23</sup>

Thus, the *Dietary Guidelines for Americans* recommends that school-age children eat a diet low in total fat, saturated fat, and cholesterol.<sup>16</sup> In addition, the National Institutes of Health encourages the use of skim and 1% milk by children older than 2 years and their families.<sup>22</sup>

The *Dietary Guidelines* also stress the need for increased calcium intake to help reduce the risk of osteoporosis,<sup>16</sup> and milk is a good source of calcium. Low-fat milk provides the same levels of protein, calcium, and vitamins as high-fat milk. Low-fat milk is generally lower or equal in price to whole or 2% milk<sup>24</sup> and is readily available in most supermarkets. Moreover, switching to low-fat milk requires no new preparation or purchasing skills.

The *1% Or Less* campaign is a health education intervention focused on a simple but important dietary change to help reduce saturated fat consumption and the risk of heart disease: the campaign encourages a switch from high-fat milk to low-fat milk for adults and for children over the age of two years.

The concept of the *1% Or Less* campaign was developed in 1994 by the Center for Science in the Public Interest. The first *1% Or Less* demonstration project was conducted from February 22, 1995, to April 13, 1995, in the sister cities of Clarksburg and Bridgeport, West Virginia. In what follows, we report on an evaluation of the effectiveness of this pilot *1% Or Less* project, measured in terms of (a) changes in supermarket milk sales and (b) self-reported changes in the dietary habits of respondents to a telephone survey.

## METHODS

**Intervention and control sites.** The cities of Clarksburg and Bridgeport, West Virginia, have a combined population of approximately 25,000. These cities were chosen for a pilot of the *1% Or Less* campaign in part because heart disease death rates in Harrison County, where Clarksburg and Bridgeport are located, are 13% higher than the national average.<sup>25</sup> In addition, advertising could be cost-effectively targeted to these communities because they have their own media market. Other factors in the selection of the intervention cities were the size of the combined communities and their proximity to the program sponsors, the Center for Science in the Public Interest and West Virginia University.

Wheeling, West Virginia (population 34,000), was chosen as the comparison city because it is similar to the intervention cities in terms of demographic factors such as unemployment rate, per capita income, and median age, according to 1990 Census data. Wheeling is 75

miles from Clarksburg/Bridgeport, and its residents are not exposed to media from the Clarksburg/Bridgeport market.

**Intervention.** Campaign activities included paid advertisements, public relations efforts, and educational programs at supermarkets, schools, worksites.

*Paid advertisements.* One newspaper ad, two 30-second television ads, and two 60-second radio ads were developed by the Los Angeles advertising agency Zimmerman & Markman. The ads encouraged consumers to switch from whole or 2% milk to 1% or skim milk as an easy way to reduce their intake of saturated fat and risk of heart disease. Together, the two television commercials aired a total of 366 times on network-affiliated and cable stations during the first two and last two weeks of the seven-week campaign. Radio ads aired a total of 244 times on five stations over a two-week period during the middle of the campaign. Fourteen quarter-page newspaper ads were placed over the course of the campaign.

*Public relations activities.* Press conferences at the beginning, middle, and end of the campaign resulted in significant local news coverage and some coverage by state and national press. Additional news coverage was obtained by inviting the press to educational programs, sending photographs of campaign events to newspapers, and using other public relations strategies. In all, more than 40 news stories about the campaign appeared in the local newspaper or on radio or television.

*Taste tests.* Trained campaign volunteers conducted blind taste tests at supermarkets, schools, and worksites involving a total of 1910 community members. Participants wore dark sunglasses and were presented with whole, 2%, 1%, and skim milk in random order.<sup>26</sup> After tasting each sample, participants were asked to identify the type of milk and were asked if they liked it. After the taste test, participants were encouraged by the volunteers to switch to 1% or skim milk.

*Supermarket programs.* All eight area supermarkets participated in the Clarksburg/Bridgeport campaign. In addition to hosting taste tests and providing us with milk sales data, supermarkets displayed signs in their dairy cases that encouraged consumers to choose 1% or skim milk.

*School-based educational programs.* The primary goal of the school-based programs was to communicate the cam-

paign message to children and their parents, with the secondary goal of holding events that would interest the news media. Five of the nine area elementary schools conducted *1% Or Less* activities. Those activities included poster, milk-cap-collecting, milk-drinking, and other contests; special assemblies; math lessons involving caloric calculations; and poetry and essay writing about healthy eating.

More than 400 elementary school students entered a *1% Or Less* poster contest. The winning posters were displayed at the local shopping mall and were reproduced in the Sunday newspaper and shown on the evening news.

Student representatives from each local high school, recruited and trained by project staff, joined a Teen Nutrition Team and conducted milk taste tests and other activities in all of the local middle schools.

*Other community education programs.* Local health professionals were trained to give short presentations about nutrition that emphasized the importance of drinking low-fat milk. Those nutrition presentations, as well as milk taste tests, were conducted at worksites and meetings of civic organizations. Approximately 40 presentations were given, to an estimated 2700 community members. In addition, about a dozen ministers included the *1% Or Less* message in church bulletins or at worship services.

**Supermarket milk sales.** Nationally, 76% of milk is sold in supermarkets, with only 2% of sales in convenience stores.<sup>27</sup> We collected milk sales data for all supermarkets in the intervention cities (8 stores) and comparison city (6 stores) for three one-month periods: the month before the campaign began (January 1995), the month following the end of the campaign (May 1995), and the month of October 1995, six months after the end of the campaign.

We collected data on sales of whole, 2%, 1%, ½%, and skim milk. Data on sales of cream, buttermilk, lactose-reduced, and flavored milks were not included.

**Telephone survey.** Trained volunteers conducted telephone surveys in the intervention and comparison communities during the months immediately before and immediately following the campaign. The authors developed training materials and telephone protocols to standardize the surveying process for the volunteer interviewers.<sup>28-30</sup>

The adult in the household with the most recent birthday was interviewed for the pre-intervention survey.<sup>29</sup> Pre-intervention respondents were called again to complete a post-intervention survey. We randomly selected telephone

## “The 1% Or Less campaign . . . encourages a switch from high-fat milk to low-fat milk for adults and for children over the age of two years.”

numbers from the Clarksburg/Bridgeport and Wheeling residential telephone directories. The sampling procedure restricted the survey to households having telephones with listed telephone numbers. According to 1990 U.S. Census data, 8% of occupied households in Clarksburg, 2% in Bridgeport, and 8% in Wheeling do not have telephones.<sup>31</sup> In addition, 18% of West Virginia households are estimated to have unlisted telephone numbers (Personal communication, Lisa Christiansen, Survey Sampling, Inc., Fairfield, Connecticut, 1996).

The 21-question pre-intervention survey focused on household milk purchasing patterns and volume of milk consumed, the respondent's milk taste preferences, demographic characteristics of the respondent, and household income. The 23-question post-intervention survey included many of the pre-intervention questions plus, in the intervention cities, additional questions to evaluate exposure to and impressions of campaign components. Each survey required approximately 10 minutes to complete.

**Statistical analysis.** For the milk sales data, we performed a repeated-measures ANOVA with the three time periods (baseline, post-intervention, and six-month follow-up) as the within-group factor and milk type (high-versus low-fat) and city as the between-group factors. We used t-tests or F-tests to test for statistical significance within the repeated measures analysis. Self-reported milk-drinking habits were analyzed by conducting z-tests on the difference between proportions. We used two-tailed tests with 0.05 as the *alpha* level for all analyses. All analyses were performed using the statistical package SYSTAT, Version 5.0.

### RESULTS

**Taste tests.** Eighty percent of the 1910 taste test participants reported liking the taste of the skim milk sam-

ple, and 94% said they liked the taste of either the 1% milk, the skim milk, or both.

**Supermarket milk sales.** Milk sales were calculated as mean number of gallons sold per supermarket per month and as market share, that is, a percentage of the combined sales of whole, 2%, 1%, ½%, and skim milk.

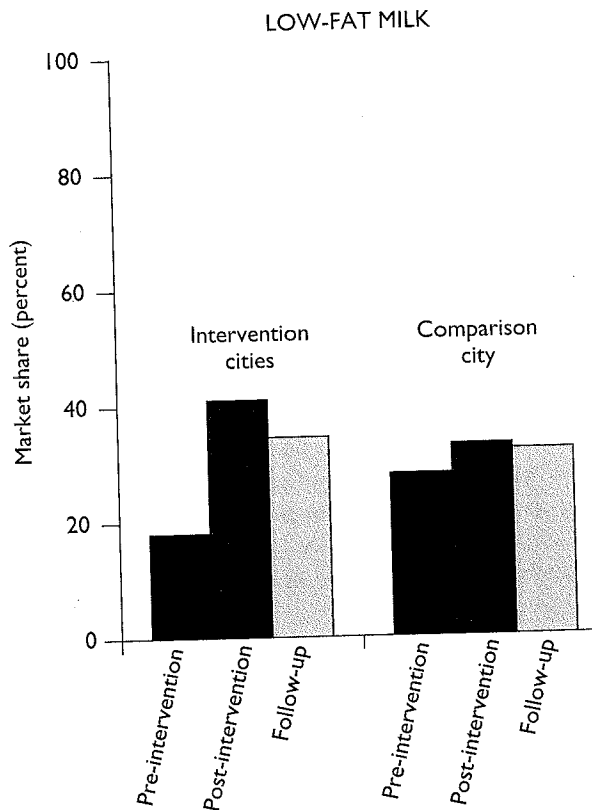
In the intervention cities, low-fat milk's market share more than doubled as overall milk sales increased while in the comparison city, low-fat milk's market share and overall milk sales remained stable over time.

*Low-fat milk sales.* The volume of low-fat milk sold in the intervention cities increased from a mean of 1404 gallons per supermarket per month at baseline to a mean of 3730 gallons per supermarket for the month following the campaign ( $t[48] = 3.61$ ;  $P < 0.01$ ). The combined market share of 1%, ½%, and skim milk more than doubled during the campaign, from 18% of milk sales at baseline to 41% in the month following the campaign (see Figure 1). Low-fat milk's market share did not differ over time in the comparison city.

Six months after the campaign, low-fat milk sales in the intervention cities averaged 35% of milk sales, or 3381 gallons per supermarket per month, a higher volume than at baseline ( $t[48] = 3.07$ ;  $P < 0.01$ ). Low-fat milk sales in the comparison city did not differ significantly across the three time periods: mean sales were 2759 gallons per supermarket per month (28% of overall milk sales) at baseline, 2967 gallons per supermarket per month (33% of overall milk sales) post-intervention, and 3064 gallons per supermarket per month (32% of overall milk sales) at the six-month follow-up.

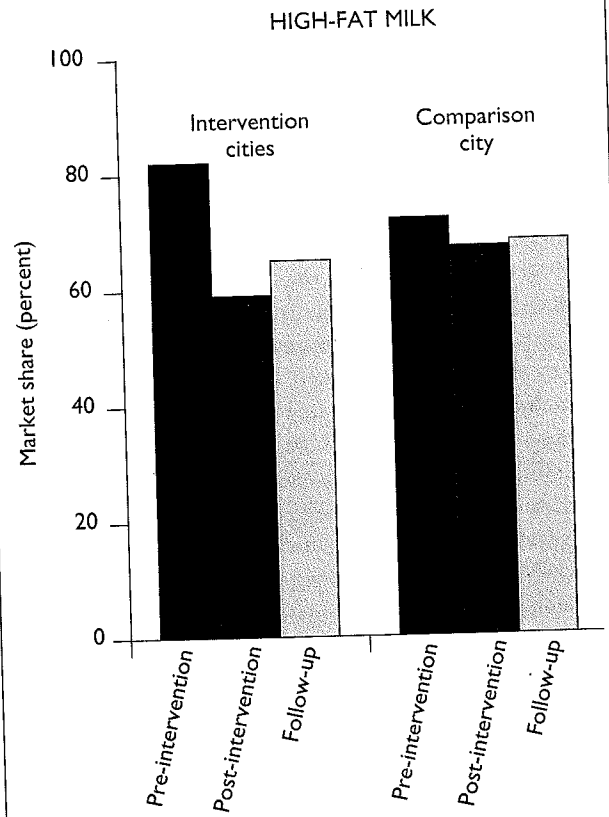
The largest shift in milk sales in the intervention cities was for 1% milk. Sales of 1% milk were four times as high at the six-month follow-up (1562 gallons per supermarket per month) than at baseline (386 gallons per supermarket per month;  $F[1,12] = 6.81$ ;  $P < 0.05$ ).

**Figure 1. Market share of low-fat milk during the month before and month after the 1% Or Less campaign and at six-month follow-up, West Virginia, 1995**



NOTE: Low-fat milk is defined as 1%, ½%, and skim milk.

**Figure 2. Market share of high-fat milk during the month before and month after the 1% Or Less campaign and at six-month follow-up, West Virginia, 1995**



NOTE: High-fat milk is defined as whole and 2% milk.

Skim milk sales increased more than 70%, from 919 gallons per supermarket per month at baseline to 1577 gallons at the six-month follow-up, although the difference was only of borderline statistical significance. Sales of ½% milk increased from 1% to 3% of overall sales.

*High-fat milk sales.* The volume of high-fat milk sold in the intervention cities decreased by 17% from a mean of 6432 gallons per supermarket per month at baseline to a mean of 5365 gallons per supermarket per month for the month following the campaign ( $t[48] = 1.65; P < 0.05$ ). However, a similar decrease in high-fat milk sales was observed in the comparison city: sales decreased from a mean of 7233 gallons per supermarket per month at baseline to a mean of 6103 gallons per supermarket

per month in the month following the campaign ( $t[48] = 1.75; P < 0.05$ ).

At the six-month follow-up, the average volume of high-fat milk sold in the intervention cities was 6403 gallons per supermarket per month. In the comparison city, the average volume of high-fat milk sold was 6489 gallons per supermarket per month at follow-up, compared with 7233 gallons per supermarket per month at baseline.

Sales of high-fat milk in the intervention cities decreased from 82% of overall milk sales at baseline to 59% in the month following the campaign (see Figure 2) and then increased to 65% at the six-month follow-up. In the comparison city, sales of high-fat milk were 72% of overall milk sales at baseline, 67% in the month following the campaign, 68% at the six-month follow-up.

**“Low-fat milk’s market share increased from 18% of overall milk sales at baseline to 41% of overall milk sales in the month following the end of the campaign.”**

*Overall milk sales.* In the intervention cities, the total volume of milk sold was 16% higher for the month following the campaign (9095 gallons per supermarket) than at baseline (7836 gallons per supermarket;  $t[48] = 1.96$ ;  $P < 0.05$ ). At the six-month follow-up, overall milk sales were 25% higher than sales at baseline (9784 gallons per supermarket per month;  $t[48] = 3.02$ ;  $P < 0.01$ ). In the comparison city, overall milk sales were not significantly different before (9992 gallons per supermarket per month), immediately after (9070 gallons per supermarket per month), and six months after the campaign (9553 gallons per supermarket per month).

**Telephone survey.** A total of 732 pre-intervention telephone surveys were completed (370 in the intervention cities and 362 in the comparison city). Of the 732 respondents, 69% (505) completed the post-intervention telephone survey (257 in the intervention cities and 248 in the comparison city).

Participants lost to follow-up were compared with those who responded to both the pre-intervention and post-intervention surveys. No differences were observed in demographics (gender, education, household size, income, job status, or years living in West Virginia) or in milk use (type of milk consumed, amount of milk consumed, frequency of consumption, or place of purchase).

*Demographic characteristics.* The Table shows the demographic characteristics of the 505 telephone survey respondents. The mean age was lower in the intervention cities ( $t[503] = 1.98$ ;  $P < 0.05$ ) than in the comparison city, and the distribution of annual household incomes was different (chi square[7] = 17.03;  $P < 0.05$ ): the intervention cities had more households with both higher and lower incomes than the comparison city.

*Self-reported milk-drinking habits.* In the pre-intervention telephone survey, 12% of respondents in the intervention

**Table. Demographic characteristics of respondents to pre- and post-intervention telephone surveys of milk-drinking habits, Clarksburg/Bridgeport (West Virginia) 1% Or Less campaign, 1995 (N = 505)**

Characteristic	Intervention cities n = 257	Comparison city n = 248	P-value
Mean age (years) . . . . .	48.2	51.5	0.05
Gender (percent of respondents)			
Male . . . . .	33	33	
Female . . . . .	67	67	
Education level (percent of respondents)			
<12 years . . . . .	13	15	
12 years . . . . .	42	35	
>12 years . . . . .	45	50	
Household income <sup>a</sup> (percent of respondents)			
<\$10,000 . . . . .	18	10	0.01
\$10,000 – \$14,999 . . . . .	12	18	
\$15,000 – \$19,999 . . . . .	8	16	0.03
\$20,000 – \$24,999 . . . . .	11	9	
\$25,000 – \$34,999 . . . . .	19	18	
\$35,000 – \$49,999 . . . . .	17	19	
\$50,000 – \$75,000 . . . . .	7	7	
>\$75,000 . . . . .	8	3	

<sup>a</sup>17% of respondents in the intervention cities and 20% in the comparison city refused to answer the survey question about household income.

cities reported that they did not drink milk, compared with 13% in the comparison city.

We compared the types of milk that respondents reported consuming before and after the campaign. In the intervention cities, 38.2% (60/157) of those who described themselves as drinkers of whole milk or 2% milk in the pre-intervention survey reported in the post-intervention survey that they drank low-fat milk, compared with 10.2% in the comparison city ( $z = 5.68$ ;  $P$

< 0.00001). About half (48.7%) of 2% milk drinkers reported having switched to low-fat milk, compared with 10.5% in the comparison city ( $z = 6.26$ ;  $P < 0.00001$ ). The proportion of whole milk drinkers who switched to low-fat milk did not differ significantly between the intervention cities (11.4%) and the comparison city (9.4%). However, 25.0% of whole milk drinkers in the intervention cities switched to 2% milk, making a "one step" change toward milk with a lower fat content. In all, 36.4% of whole milk drinkers reported switching to a milk with a lower fat content after the campaign, compared with 15.6% in the comparison city ( $z = 2.07$ ;  $P < 0.05$ ).

We found no differences between high-fat milk drinkers who switched to low-fat milk and those who did not switch in terms of gender, education level, employment status, household income, or number of years living in West Virginia.

*Campaign exposure.* Ninety percent of post-intervention telephone survey respondents in the intervention cities reported that they had heard of the campaign. Forty-two percent of high-fat milk drinkers who reported exposure to the campaign switched to low-fat milk, compared with 15% of high-fat milk drinkers who were not exposed to the campaign ( $z = 5.52$ ;  $P < 0.000001$ ).

Most of the respondents who were exposed to the campaign saw the paid advertising (93%), news coverage (87%), or both. The number of respondents who were not exposed to the media components of the campaign was too small to allow us to assess the effect of the media on rates of switching from high- to low-fat milk.

Although the results were of only borderline statistical significance, respondents were more likely to report switching from high-fat to low-fat milk if they reported participating in milk taste tests, seeing signs in supermarket dairy cases, or hearing a speaker give a campaign presentation.

## DISCUSSION

The 1% Or Less campaign differs from most nutrition education programs in that it encourages a whole community to make a single dietary change. Most nutrition education focuses on the total diet or on whole food groups. Although consumers could reduce their saturated fat intake through such broad dietary changes, teaching healthy eating one message at a time may be more practical for both health educators and consumers.

Consumer research has shown that many consumers feel overwhelmed and confused by the multitude of

nutrition messages to which they are exposed.<sup>32</sup> We reasoned that a focused message could be more effectively communicated through the mass media than multiple or complicated messages, given the limitations of 30-second commercials and two-minute news stories. We also hypothesized that consumers might feel more willing and able to undertake one behavior change at a time. We hope to test in future campaigns whether success at adopting one change might empower individuals to make other healthy lifestyle changes.

Low-fat milk's market share increased from 18% of overall milk sales at baseline to 41% of overall milk sales in the month following the end of the campaign, and sales were still approximately double the pre-campaign level at the six-month follow-up. Another result of the campaign is that schools in the intervention cities (and the surrounding county) now provide 1% white milk in place of 2% white milk in school cafeterias.

While per capita milk sales in the U.S. increased by 1% between 1995 and 1996,<sup>33</sup> we observed a 25% increase in overall milk sales in the intervention cities from baseline to six-month follow-up. We were unable to discern from our telephone survey whether the increase in overall milk sales was due to new milk drinkers, increased milk consumption by drinkers of low-fat milk, or both. Market research by the milk processing industry has found that concern about the fat content of milk is a major barrier to milk consumption.<sup>34</sup> In reminding consumers about the availability of low-fat milk, the 1% Or Less campaign might have helped to overcome this barrier. A recent study found that women who drink lower-fat milk consume more milk, more calcium, and less saturated fat than women who drink whole milk.<sup>35</sup>

Although the 1% Or Less campaign was conducted at the same time as several advertising campaigns promoting milk consumption, low-fat and overall milk sales increased only in the intervention cities and not in the comparison city. Those campaigns included advertisements sponsored by Dairy Management, Inc. (the national dairy farmers' trade organization) and by regional milk producers and processors as well as the National Fluid Milk Processor Promotion Board's Milk Mustache campaign. Industry advertising campaigns focus on increasing overall milk consumption; only a fraction of the milk processors' advertisements focus on 1% or skim milk, and none of the dairy farmers' advertisements promote consumption of 1% or skim milk.

Milk consumption usually declines as seasonal temperatures rise (beginning around April), and increases as temperatures fall (Personal communication, Jim Miller,

## “Paid advertising was a key component of this *1% Or Less* campaign.”

Department of Agriculture, 1996). Thus, the increase in overall milk sales observed in the intervention cities between January and May is opposite to the usual pattern of seasonal variation in milk sales. However, seasonal variation may have contributed to the increase in milk sales observed at follow-up (between May and October).

Thirty-eight percent of high-fat milk drinkers in the intervention cities reported switching to low-fat milk. High-fat milk's market share in those cities decreased 23 percentage points from baseline to the month following the campaign, and at the six-month follow-up, high-fat milk's market share was still 17 percentage points below baseline sales. However, the volume of high-fat milk sold had returned to a level similar to that at baseline.

One factor that may have reduced the campaign's effect on high-fat milk sales is price. Many Clarksburg/Bridgeport supermarkets ran specials on 2% milk during the campaign and the follow-up period, with price discounts ranging from 10% to 37%. During the follow-up period, for example, six of the eight supermarkets in the intervention cities ran specials on 2% milk (and one special was run on whole milk). In contrast, no specials were run on 1% or skim milk during the campaign or follow-up period. We were unsuccessful in getting the specials discontinued during the study period because most specials were set by supermarkets' corporate headquarters. In future campaigns, we hope to assess the effect of price on milk purchasing patterns.

A number of factors, such as price, reactions to the pre-campaign telephone survey, seasonal variation in milk consumption, random changes in eating habits, and spillover from the *1% Or Less* campaign could have contributed to the decrease in high-fat milk sales observed in the comparison city. For example, although the media markets of the intervention and comparison cities are well separated, the Clarksburg/Bridgeport campaign did attract some national and statewide media attention that might have influenced milk purchasing patterns in the comparison city. In addition, during the study period, one

supermarket chain (which operates three of the six supermarkets in the comparison city) introduced a fortified skim milk product made to look and taste like 2% milk, which may have led some 2% milk drinkers to switch to skim milk.

**Limitations.** The *1% Or Less* campaign in Clarksburg/Bridgeport was an experiment to test a specific method and message in one community, thus limiting the generalizability of the results.<sup>36</sup> The comparison city for this intervention was chosen based on demographic characteristics rather than on milk-drinking habits, and the data show that residents of the comparison city consumed more low-fat milk and less high-fat milk at baseline than those in the intervention cities. The differences between the two communities in baseline milk-drinking habits could be a reflection of differences in nutritional knowledge or attitudes that may limit the comparability of the two communities. Differences between the demographic characteristics and disease rates of West Virginia and other regions of the country also limit the generalizability of the results. Per capita income was 24% lower<sup>37</sup> and educational attainment levels were somewhat lower<sup>38</sup> in West Virginia than U.S. averages (for example, 34% of West Virginians did not graduate high school, compared with a national average of 24%<sup>38</sup>). In addition, heart disease death rates and the prevalence of obesity were both 18% higher in West Virginia than the national average.<sup>39</sup>

Our ability to assess the impact of individual campaign components was limited by several factors. First, almost all respondents were exposed to the campaign's paid advertising and news coverage. Thus, exposure to other components of the campaign was confounded by this media exposure for almost all respondents. In addition, the small number of high-fat milk drinkers exposed to some approaches made it difficult to assess the effects of these approaches.

**Paid advertising.** Paid advertising was a key component of this *1% Or Less* campaign. Food companies have



relied heavily on paid advertising to influence dietary choices. In 1994, for example, the food industry spent \$9.8 billion on advertising.<sup>40</sup> Similarly, mass media provides a way to reach and influence large audiences with health messages.<sup>41-43</sup>

Financial constraints have limited community health programs' ability to use advertising to promote health messages. Most have relied instead on public service announcements (PSAs) to communicate information through the media. However, changes in requirements for public affairs programming, fewer limitations by the Federal Communications Commission on the number of advertisements aired, and the increasing number of public health organizations competing for the public's attention have made it harder to get PSAs aired.<sup>41,44</sup> PSAs tend to be aired infrequently and at nonpeak viewing hours.<sup>45,46</sup> In addition, it is difficult to get hard-hitting messages aired as PSAs because stations will not air PSAs that might offend paying advertisers.<sup>42,46,47</sup> Finally, reaching target audiences is more difficult when ads are placed at the discretion of broadcasters (as with PSAs) rather than when advertising is strategically placed during specific programs.<sup>46,48</sup>

While many health educators may view paid advertising as expensive, more traditional community-based programs are also costly. Surprisingly, we found that local personnel and program costs for the Clarksburg/Bridgeport *1% Or Less* campaign were higher than the advertising costs. (Together, the community-based education components cost approximately \$36,000, compared with \$24,000 for the placement costs for the advertisements. The advertisements themselves were produced as part of the national *1% Or Less* campaign, so production costs were not a factor in this calculation.) Advertising placement cost 96 cents per resident of Clarksburg and Bridgeport (combined population 25,000) or approximately nine cents for each person reached by the television stations used by the campaign. (Approximately 280,000 people regularly watch the local television sta-

tions [Personal communication, Gary Bowden, WBOY-TV, Clarksburg, 1997].)

**Public relations strategies.** In this pilot *1% Or Less* campaign, public relations strategies were used to complement the paid advertising. The news media provide an effective means of communicating health information to the community.<sup>42,49</sup> In addition, public relations campaigns can result in media coverage worth far more money than many program budgets can afford.

**Replicating the model.** In subsequent *1% Or Less* campaigns, we will evaluate the individual components used in the Clarksburg/Bridgeport pilot campaign to determine the relative strength of different educational approaches. For example, in February and March 1996, we conducted a campaign in Wheeling using paid advertising and public relations without any community-based programs. In February and March 1997, we conducted two additional campaigns in West Virginia. In one we used community-based programs and public relations (with no advertising), and in the other we used advertising only (without community-based programs or public relations). The results of those campaigns should help us to better understand which components of this intervention had the greatest impact.

We have developed a detailed guide on how to organize, implement, and evaluate a community-wide *1% Or Less* campaign.<sup>26</sup> *A First Step Toward Healthy Eating: The 1% Or Less Handbook* (with campaign ads and model materials) is available to interested health professionals and community organizations.

This research was supported through a grant from the West Virginia Bureau for Public Health. The authors thank Leslie Quillin and Georgia Hatfield for their help in conducting and evaluating the campaign; Alan Holmes of the West Virginia Bureau for Public Health and Daryth Stallone, PhD, for their assistance with the evaluation; and Howell Wechsler, EdD, June Flora, PhD, and Debra Krummel, PhD, for their review of the manuscript.

References

1. Shea S, Basch CE. A review of five major community-based cardiovascular disease prevention programs: Part II: intervention strategies, evaluation methods, and results. *Am J Health Promotion* 1990;4:279-87.
2. Stern MP, Farquhar JW, Maccoby N, Russell SH. Results of a two-year health education campaign on dietary behavior. *Circulation* 1976;54:826-33.
3. Farquhar JW, Maccoby N, Wood PD, Alexander JK, Breitrose H, Brown BW, et al. Community education for cardiovascular health. *Lancet* 1977;1:1192-5.
4. Maccoby N, Farquhar JW, Wood PD, Alexander J. Reducing the risk of cardiovascular disease: effects of a community-based campaign on knowledge and behavior. *J Comm Health* 1977;3:100-14.
5. Farquhar JW, Fortmann SP, Flora JA, Taylor B, Haskell WL, Williams PT, et al. Effects of community-wide education on cardiovascular disease risk factors: the Stanford Five-City Project. *JAMA* 1990;264:359-65.
6. Farquhar JW, Fortmann SP, Maccoby N, Haskell WL, Williams PT, Flora, JA, et al. The Stanford Five-City Project: design and methods. *Am J Epidemiol* 1985;122:323-34.

7. Vartiainen EP, Puska P, Jousilahti P, Korhonen HJ, Tuomilehto J, Nissinen A. Twenty-year trends in coronary risk factors in North Karelia and in other areas of Finland. *Int J Epidemiol* 1994;23:495-504.
8. Pietinen P, Vartiainen E, Korhonen HJ, Kartovaara L, Uusitalo U, Tuomilehto J, et al. Nutrition as a component in community control of cardiovascular disease (the North Karelia Project). *Am J Clin Nutr* 1989;49:1017-24.
9. Luepker RV, Murray DM, Jacobs DR, Mittelmark MB, Bracht N, Carlaw R, et al. Community education for cardiovascular disease prevention: risk factor changes in the Minnesota Heart Health Program. *Am J Public Health* 1994;84:1383-93.
10. Carleton RA, Lasater TM, Assaf AR, Feldman HA, McKinlay S, and the Pawtucket Heart Health Program Writing Group. The Pawtucket Heart Health Program: community changes in cardiovascular risk factors and projected disease risk. *Am J Public Health* 1995;85:777-85.
11. Public Health Service (US). Healthy People 2000: national health promotion and disease prevention objectives. Washington: Department of Health and Human Services; 1990. Report No.: PHS 91-50212.
12. Block G, Dresser CM, Hartman AM, Carroll MD. Nutrient sources in the American diet: quantitative data from the NHANES II survey. *Am J Epidemiol* 1985; 22:27-40.
13. Department of Agriculture (US). Food consumption, prices, and expenditures, 1996: annual data, 1970-1994. Statistical Bulletin No. 928. Washington: USDA; 1996.
14. Wechsler H, Wernick SM. A social marketing campaign to promote low-fat milk consumption in an inner-city Latino community. *Public Health Rep* 1992;107:202-7.
15. Wechsler H. Evaluation of an educational intervention to promote the selection of low-fat milk in elementary school cafeterias in an inner-city Latino community [dissertation]. New York: Teachers College, Columbia University; 1995.
16. Department of Agriculture (US) and Department of Health and Human Services (US). Dietary guidelines for Americans. Home and Garden Bulletin No. 232. Washington: USDA, DHHS; 1995.
17. Daily dietary fat and total food-energy intakes—NHANES III. *MMWR Morb Mortal Wkly Rep* 1994;43:116-25.
18. Food and Drug Administration (US). Notice on food labeling. *Federal Register* 1990;55:29482.
19. Department of Agriculture (US). Food and nutrient intakes by individuals in the United States, 1989-91. Washington: USDA; 1995. NFS Report No.: 91-2.
20. Department of Agriculture (US). Composition of foods. Handbook 8-1. Washington: USDA; 1976.
21. Thompson FE, Dennison BA. Dietary sources of fats and cholesterol in U.S. children. *Am J Public Health* 1994;84:799-806.
22. National Institutes of Health (US), National Heart, Lung, and Blood Institute, National Cholesterol Education Program. Report of the Expert Panel on Blood Cholesterol Levels in Children and Adolescents. Bethesda (MD): NIH; 1991. NIH Pub. No.: 91-2732.
23. Guidelines for school health programs to promote lifelong healthy eating. *MMWR Morb Mortal Wkly Rep* 1996;45(RR-9):1.
24. Commonwealth of Pennsylvania Milk Marketing Board. Monthly retail price report. Harrisburg: Commonwealth of Pennsylvania Milk Marketing Board; 1995 Mar.
25. West Virginia Department of Health and Human Resources, Bureau of Public Health. Heart disease and stroke: cardiovascular disease in West Virginia. Charleston: Bureau of Public Health; 1993.
26. Center for Science in the Public Interest. A first step toward healthy eating: the 1% Or Less handbook. Washington: CSPI; 1996.
27. Dairy Management, Inc. Fluid milk strategic thinking project. Report #1. Washington: Dairy Management, Inc.; 1996.
28. Department of Health and Human Services, Public Health Service (US). Assessing health risks in America: the Behavioral Risk Factor Surveillance System (BRFSS). Washington: DHHS; 1995.
29. Weisberg HF, Krosnick JA, Bowen BD. An introduction to survey research, polling, and data analysis. 3rd ed. Thousand Oaks (CA): Sage Publications, Inc.; 1996.
30. Frey JH. Survey research by telephone. Newbury Park (CA): Sage Publications, Inc.; 1989.
31. Bureau of the Census (US). 1990 Census of population: social, economic, and housing characteristics: West Virginia. Washington: Bureau of the Census; 1990.
32. American Dietetic Association. Nutrition trends survey. Chicago: American Dietetic Association; 1995.
33. International Dairy Foods Association. Milk facts, 1996 edition. Washington: International Dairy Foods Association; 1996.
34. National Fluid Milk Processors Education Program. KRC Research and Roper Starch Worldwide polls. Washington: National Fluid Milk Processors Education Program; 1994.
35. Guthrie JF. Women's calcium and fat intake patterns by type of milk avoidance [abstract]. *FASEB J* 1996;10:A725.
36. Green SB, Corle DK, Gail MH, Mark SD, Pee D, Freedman LS, et al. Interplay between design and analysis for behavioral intervention trials with community as the unit of randomization. *Am J Epidemiol* 1995;142:587-93.
37. Bureau of the Census (US). Population reports. Washington, DC: Bureau of the Census; 1989.
38. National Center for Health Statistics (US). Digest of educational statistics. Hyattsville (MD): NCHS; 1993.
39. West Virginia Department of Health and Human Resources, Bureau of Public Health. Heart disease and stroke: cardiovascular disease in West Virginia. Charleston: West Virginia Department of Health and Human Resources, Bureau of Public Health; 1993.
40. Department of Agriculture, Economic Research Service (US). Food marketing review, 1994-1995. Agriculture Economic Report No. 743. Washington: USDA; September 1996.
41. Arkin EB. Opportunities for improving the nation's health through collaboration with the mass media. *Public Health Rep* 1990;105:219-23.
42. Wallack L, Dorfman L, Jernigan D, Themba M. Media advocacy and public health. Newbury Park (CA): Sage Publications, Inc.; 1993.
43. Maccoby N, Solomon DS. Heart disease prevention: community studies. In: Rice R, Paisley W, editors. *Public communication campaigns*. Beverly Hills (CA): Sage Publications, Inc.; 1981. p. 105-125.
44. Dorfman L, Wallack L. Advertising health: the case for counter-ads. *Public Health Rep* 1993;108:716-26.
45. Cummings KM, Sciandra R, Davis S, Rimer BK. Results of an antismoking media campaign utilizing the cancer information service. *Monogr Natl Cancer Inst* 1993;14:113-8.
46. Robinson TN. Television advertising for health. *Pediatr Ann* 1995;24:73-8.
47. Atkin C, Arkin EB. Issues and initiatives in communicating health information to the public. In: Atkin C, Wallack L, editors. *Mass communication and public health*. Newbury Park (CA): Sage Publications, Inc.; 1990. p. 13-40.
48. Sutton SM, Balch GI, Lefebvre RC. Strategic questions for consumer-based health communications. *Public Health Rep* 1995;110:725-33.
49. Samuels, SE. Project Lean—lessons learned from a national social marketing campaign. *Public Health Rep* 1993;108:45-53. ■