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Using Mass Media to Promote Healthy Eating: A Community-Based Demonstration Project¹

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INTRODUCTION

Background. Many question whether mass media, in the absence of other programming, can produce significant and sustained behavior change.

Methods. The 1% Or Less campaign in Wheeling, West Virginia (population 35,000), used paid advertising and public relations to encourage members of one community to switch from whole or 2% milk (high-fat milk) to 1% or fat-free milk (low-fat milk). The study used a quasi-experimental research design with one intervention city and one comparison city. The effectiveness of the campaign was evaluated by collecting milk sales data from supermarkets and conducting pre- and post-intervention telephone surveys in intervention and comparison cities.

Results. In the intervention city, low-fat milk sales increased from 29% of overall milk sales before the campaign to 46% of sales in the month following the campaign. The increase was maintained at the 6-month follow up. According to the telephone surveys, 34.1% of high-fat-milk drinkers reported switching to low-fat milk in the intervention community compared with 3.6% in the comparison community ($z = 13.1$, $P < 0.0001$).

Conclusions. A media-only approach was sufficient to encourage a significant proportion of the people in one community to alter the dietary habit targeted by the intervention. © 1999 American Health Foundation and Academic Press

Key Words: milk; nutrition; diet; food habits; advertising; public relations; mass media; primary prevention; health education; health behavior.

Unhealthy behaviors such as tobacco use, poor diet, physical inactivity, and alcohol abuse are the leading causes of death in the United States [1]. Yet, we still do not know what are the most outcome-effective and cost-effective ways to change the health behaviors of communities [2].

Numerous multidimensional, community health education programs have attempted to answer this question and have used strategies such as community organization and education; face-to-face counseling; health care-, worksite-, and school-based interventions; and mass media campaigns [3-13]. However, many community health programs have: (a) been expensive to implement and maintain, (b) been difficult to replicate, (c) had shortcomings in their research design, or (d) had a limited effect on the targeted health behaviors or risk factors [3,4,7,8,13,14].

To increase our understanding of how best to change the health behaviors of communities, we conducted a series of 1% Or Less campaigns in West Virginia. The first 1% Or Less campaign, conducted in Clarksburg and Bridgeport, used a combination of paid advertising, public relations, and community-based programs in schools, worksites, and supermarkets [15]. That intervention successfully motivated many community members to switch to low-fat milk,³ doubling low-fat milk sales in 7 weeks.

The second 1% Or Less campaign, which was conducted in Wheeling and is described in this article, differed from the first in that it used only mass media to promote low-fat milk consumption. The campaign was designed to test whether mass-media approaches, in the absence of other programming, are effective in

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³ Throughout this paper, high-fat milk is defined as whole and 2%, and low-fat milk as 1%, $\frac{1}{2}$ and fat-free milk.



changing one important dietary habit. Many health educators believe that media, in the absence of other programming, is unlikely to produce significant or sustained behavior change [4,16-20]. Mass media approaches often are employed to promote healthy lifestyles to communities, but they are usually used in conjunction with other health education programming.

The type of mass media used in the campaign is distinctive. The Wheeling 1% Or Less campaign used a mixture of public relations strategies to generate media coverage of the campaign message and paid advertising. Public relations have been used in many community-wide campaigns that promoted healthy eating [3,6-8,10,12,21,22]. In contrast, paid advertising has rarely been used in nutrition education programs [23]. Paid advertising, however, has been used to communicate nonsmoking messages [16,17,24-28].

The message of the 1% Or Less campaign also is unique. Most nutrition education programs focus on the whole diet or on entire food groups. In contrast, 1% Or Less encourages adults and children over the age of 2 years to make one simple but important dietary change: to switch from whole or 2% milk to 1% or fat-free (skim) milk. The campaign focuses on milk primarily because of its importance to health. Milk is the third largest source of saturated fat in the diets of American adults and the largest source in children's diets [29,30]. Consumption of saturated fat is the strongest dietary determinant of plasma low-density lipoprotein (LDL) cholesterol levels and a contributor to cardiovascular disease [31,32], the leading cause of death for American men and women [33].

The behavior targeted by the campaign also was chosen because it could be addressed by a message that could be communicated easily to the public. The ultimate goal of the investigators is to reduce the intake of foods high in saturated fat to help decrease heart disease risk. However, we broke this complex behavior into steps that are more achievable and easier to communicate. After conducting a careful assessment of what Americans are eating and determining that just six types of food contribute half of the saturated fat consumed by American adults [29], we chose one of those foods as the focus of the campaign. The campaign could have focused, for example, on switching from butter and stick margarine to a lower-fat tub margarine or choosing reduced-fat cheese in place of full-fat cheese, but we chose to start with milk.

In this article, we report on the effectiveness of a media-only approach to change one important dietary habit.

METHODS

Two communities in West Virginia were selected for this campaign based on their similar demographic characteristics according to data from the U.S. Census and

the West Virginia Bureau for Public Health. Wheeling, West Virginia, a city of 35,000 residents, served as the intervention community, and Parkersburg, West Virginia, population 34,000, served as the comparison city. A distance of 110 miles separates the two cities. The cities have distinct media markets (i.e., the newspapers and television and radio stations from each city do not reach residents of the other city).

Intervention

The Wheeling 1% Or Less campaign was conducted for 6 weeks in February and March of 1996. The campaign messages, advertisements, and public relations strategies were the same as those used in the previous 1% Or Less campaign conducted in 1995 in Clarksburg and Bridgeport, West Virginia [15], and as described in *A First Step toward Healthy Eating: The 1% Or Less Handbook* [34].

Paid advertisements. The intervention used paid advertising on television and radio and in newspapers. Ninety-eight broadcast television, 168 cable television, 120 radio, 1 daily newspaper, and 5 weekly newspaper advertisements were placed. The advertisements used a health message appeal and encouraged a switch from whole or 2% milk to 1% or fat-free milk as an easy way to cut saturated fat intake and reduce the risk of heart disease. A professional agency developed and placed the advertising. The cost of placing the advertisements was \$26,000, similar to the \$24,000 ad budget for the Clarksburg/Bridgeport campaign.

Public relations. The intervention also used public relations events to generate news coverage of the campaign message. In the intervention city, news directors and other media gatekeepers were approached to encourage them to cover the campaign. The public relations strategy included the following media events: (a) a kick off press conference, (b) a midcampaign press conference that featured prominent local physicians, (c) a press release announcing the midcampaign results, (d) two milk taste test events that stressed that low-fat milk tastes good, and (e) a press conference at the end of the campaign. A campaign advisory board of 25 community leaders and local health professionals was formed to provide credibility for the campaign and guidance on implementing the campaign.

Cost. The total cost of implementing and evaluating the Wheeling 1% Or Less campaign was approximately \$43,000, compared with \$61,000 for the Clarksburg/Bridgeport campaign. Those estimates include the cost of salaries, the placement of advertisements, materials for educational and public relations activities, and data collection. They do not include the cost of developing the campaign messages, materials, or advertisements.

We estimated the number of people reached by the campaign message from the number of households that regularly view the local television stations (personal communication, conversation, Jim Roberts, WTRF-TV, Wheeling, WV, 1997; personal communication, conversation, Gary Bowden, WBOY-TV, Clarksburg, WV, 1997) and average household size in the United States [35].

Measures

Pre- and postintervention telephone surveys. Pre- and postintervention telephone surveys were conducted during the month immediately before and the month immediately after the campaign by trained community volunteers. Random-digit dialing was used to contact residential households. A list of all possible phone numbers for each Wheeling and Parkersburg phone prefix was generated by the West Virginia Bureau for Public Health, the numbers were put in random order, and business numbers were removed from the list. Active records were worked until they either became completed interviews or, after six attempts to reach the number, were replaced by new numbers according to the calling protocols. The adult in the household who had the most recent birthday was interviewed for the preintervention survey. After the campaign ended, preintervention survey respondents were called again to complete the postintervention survey. The results presented in this paper are based on the cohort in each city who participated in both surveys. The 35-question precampaign survey and 29-question postcampaign survey were similar to those used in the Clarksburg/Bridgeport 1% Or Less campaign [15] and required approximately 10 min to complete.

The precampaign survey focused on milk drinking habits, demographics, and other questions. The postcampaign survey included many of the questions from the precampaign survey. In the intervention city, the postcampaign survey also included questions about whether respondents saw or heard a lot, some, or no ads or news stories about the campaign and assessed their impressions of those ads and news stories.

Although the survey instrument was not validated, switching from high-fat to low-fat milk was assessed by a concurrent measure: supermarket milk sales.

Supermarket milk sales. At baseline, 92% of the telephone survey respondents reported purchasing milk in supermarkets. Thus, milk sales data were collected for the month before, the month after, and the month 6 months after the campaign from eight of the nine individual grocery stores in the intervention city and six of the seven supermarkets in the comparison city. (One supermarket in the intervention city was closed the month for which baseline data were collected and, thus, was excluded from all analyses. One store

in the comparison city declined to participate in the program.) Reported milk sales data include unflavored whole, 2%, 1%, $\frac{1}{2}$ %, and fat-free milk. Together those types of milk constitute 94% of the beverage milk consumed nationally [36]. The reported data do not include cream, buttermilk, lactose-reduced, or flavored milks.

Statistical Analysis

The milk sales data were analyzed using a repeated-measures ANOVA with three monthly time periods (baseline, postintervention, and 6-month follow up) as the within-group factor and city as the between-group factor. If we found a significant interaction, we conducted more focused analyses on milk sales within each city. Specific contrast tests within the repeated-measures analysis were conducted using *F* tests. Self-reported milk drinking habits were analyzed by conducting *z* tests on the difference between proportions. Tests of statistical significance also were determined using χ^2 analyses. We used two-tailed tests with 0.05 as the α level for all analyses. Analyses were performed using the statistical package SYSTAT, Version 5.0.

RESULTS

The intervention established the Wheeling 1% Or Less campaign as newsworthy. More than 25 television, radio, and newspaper stories reported on the campaign, including a five-part television news series, five front-page articles in the daily newspapers, and a newspaper editorial that endorsed the campaign.

Supermarket Milk Sales

Figure 1 illustrates that the market share for low-fat milk increased from 29% of overall milk sales before the campaign to 46% of sales in the month after the campaign. At the 6-month follow up, low-fat milk constituted 42% of supermarket milk sales. Volume sales of low-fat milk averaged 3,383, 5,182, and 4,380 gallons

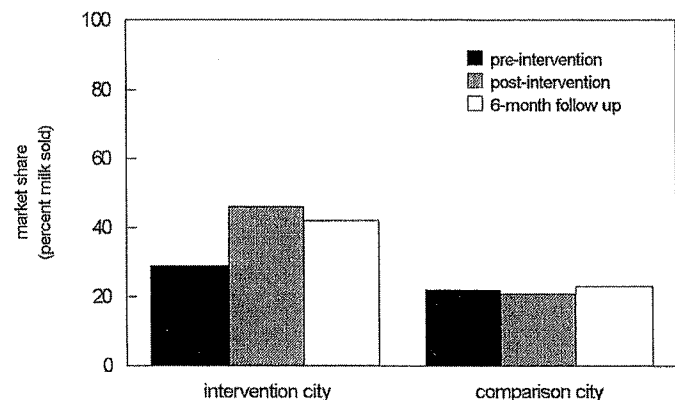


FIG. 1. Sales of low-fat milk in supermarkets in the intervention and comparison communities.

per supermarket per month for the months before, after, and 6-months after the campaign, respectively ($F [2,14] = 8.91, P < 0.003$). In contrast, no significant variation was observed in the sales of low-fat milk between those periods in the comparison city. Market shares were 22, 21, and 23 percent of overall milk sales, and volume sales were 1,998, 2,051, and 1,856 gallons per supermarket per month for the months before, after, and 6-months after the campaign, respectively ($F [2, 10] < 1.00, P = 0.7$).

Figure 2 shows how the market share for high-fat milk decreased in the intervention community from 71% of overall milk sales before the campaign to 54% and 58% in the months immediately after and 6 months after the campaign, respectively. Volume sales of high-fat milk decreased significantly in the intervention community from an average of 8,135 gallons per supermarket per month before the campaign to 6,224 and 6,156 gallons in the month after and the month 6 months after the campaign ($F[2, 14] = 9.29, P < 0.003$). Across the same periods, high-fat milk sales in the comparison community were 78, 79, and 77 percent of overall milk sales and averaged 7,271, 7,731, and 6,127 gallons per supermarket per month for the months before, after, and 6 months after the campaign, respectively ($F[2, 10] = 2.88, P = 0.102$).

In the intervention city, overall milk sales were not significantly different between the month before and month after the campaign. Overall milk sales in the intervention city averaged 11,518, 11,406, and 10,535 gallons per supermarket per month for the months before, after, and 6 months after the campaign, respectively ($F < 1.0$). In the comparison city, sales were 9,268, 9,782, and 7,984 gallons per supermarket per month for the same periods ($F < 1.0$).

Telephone Survey Results

Preintervention telephone surveys were completed by 366 respondents in the intervention city and 374

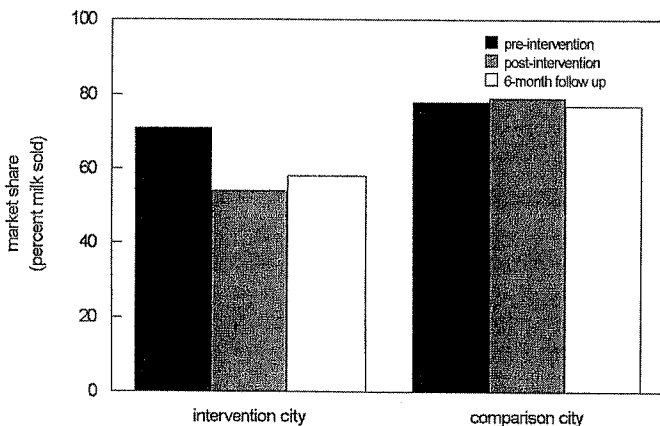


FIG. 2. Sales of high-fat milk in supermarkets in the intervention and comparison communities.

in the comparison city. Postintervention surveys were completed by 73% of those called at baseline. They were administered to 285 respondents in the intervention community and 258 in the comparison community, for a total of 543 completed surveys. Respondents lost to follow-up were compared with those who completed both the pre- and postintervention surveys. Statistically significant differences were observed on three variables. Those lost to follow-up (a) were more likely to live in households that used high-fat milk ($\chi^2 [4] = 11.3, P < 0.05$); (b) had lower educational attainment levels ($\chi^2 [7] = 35.5, P < 0.0001$); and (c) had more lower-income households and fewer higher-income households ($\chi^2 [12] = 35.9, P < 0.0001$) than those who completed both surveys. No differences were observed for gender, race, job status, years living in West Virginia, or personal milk use.

For respondents who completed both the pre- and postintervention telephone surveys, there were no significant differences between the intervention and comparison cities for any demographic characteristics assessed including race, education, gender, years living in West Virginia, income, employment, and age (Table 1). However, significant baseline differences between the two cities were observed regarding the respondents' use of milk. Respondents in the intervention city were more likely to (a) drink milk ($\chi^2 [2] = 8.9, P < 0.01$); (b) drink low-fat milk ($\chi^2 [5] = 24.9, P < 0.0001$); and (c) purchase milk at supermarkets ($\chi^2 [5] = 16.8, P <$

TABLE 1

Demographic Characteristics of the Telephone Survey Respondents in the Intervention and Comparison Communities^a

Characteristic	Intervention (n = 285)	Comparison (n = 258)
Mean age (years)	49.5	51.5
Gender (% of respondents)		
Male	33	34
Female	67	66
Education (% of respondents)		
<12 years	12	15
12 years	38	40
>12 years	50	45
Household income (% of respondents)		
<\$10,000	15	13
\$10,000-\$14,999	13	16
\$15,000-\$19,999	12	11
\$20,000-\$24,999	9	9
\$25,000-\$34,999	15	15
\$35,000-\$49,999	16	18
\$50,000-\$75,000	11	13
>\$75,000	9	5

^a There were no statistically significant differences in the demographic variables of the respondents between the intervention and comparison cities.

0.005) than were respondents in the comparison community.

Table 2 shows the number of respondents who reported drinking each type of milk in the pre- and postintervention telephone surveys. Like the milk sales data, the survey results reveal a significant shift from high-fat to low-fat milk in the intervention city versus the comparison city. In the intervention city, 34.1% of high-fat milk drinkers switched to low-fat milk, compared with 3.6% in the comparison city ($z = 13.1, P < 0.0001$). Most of the change occurred among respondents who were drinking 2% milk: 43.6% of 2% milk drinkers in the intervention city reported switching to low-fat milk compared with 3.2% of the comparison respondents ($z = 10.85, P < 0.0001$). There was no significant difference in the number of whole-milk drinkers who switched to 1% or fat-free milk in the intervention city (5.9%) compared with the comparison city (4.7%).

No statistically significant differences were found in demographic characteristics between high-fat milk drinkers who switched to low-fat milk and high-fat milk drinkers who did not switch. The power to detect such differences was in excess of 0.80. Race, gender, education level, job status, household income, number of years living in West Virginia, and body mass index (calculated from self-reported heights and weights) were not found to be associated with respondents' decision to switch from high-fat to low-fat milk.

TABLE 2

Self-Reported Milk-Drinking Habits in the Intervention and Comparison Communities before and after the Campaign^a

Number drinking each milk type, precampaign	Number drinking each milk type, postcampaign				Precampaign total
	Whole	2%	1%	Fat-free	
Intervention community					
Whole	25	7	1	1	34
2%	2	55	29	15	101
1%	0	2	34	2	38
Fat-free	1	8	10	59	78
	28	72	74	77	251
Postcampaign totals					
Comparison community					
Whole	32	9	0	2	43
2%	5	87	1	2	95
1%	0	1	7	3	11
Fat-free	4	12	3	53	72
	41	109	11	60	221
Postcampaign totals					

^a The row values represent the number of respondents who reported drinking each type of milk in the precampaign telephone survey. The column values represent the number of respondents who reported drinking each type of milk in the postcampaign telephone survey. Non-milk drinkers are not included.

Approximately 84% of respondents in the intervention community reported seeing a lot or some of the campaign's television advertisements, 46% recalled hearing the radio ads, and 82% reported exposure to campaign news coverage.

Campaign Cost

The Wheeling campaign had the potential to reach approximately 420,000 people in Wheeling and the surrounding area which was exposed to the campaign's television advertisements. The Clarksburg/Bridgeport campaign had the potential to reach about 280,000 people. The cost of the Wheeling campaign divided by the number of people reached by the campaign was estimated to have been 10 cents per person, compared with 22 cents per person for the Clarksburg/Bridgeport campaign.

DISCUSSION

Mass media has been used extensively by the food industry to try to influence Americans' dietary choices. For example, in 1994, the food industry spent \$9.8 billion on direct advertising and food processors spent an additional \$15.8 billion on coupons, incentives, discounts, and other promotions [37]. Although numerous health education campaigns have included mass media approaches, many health educators question whether mass media can change health behaviors in the absence of other programming [4,16-20].

The 1% Or Less campaign conducted in Wheeling, West Virginia, used a media-only approach to influence one important dietary behavior. The campaign used paid advertisements on television and radio and media relations strategies to generate (free) news coverage of the campaign message. The results show that the media approaches used in this campaign were effective in changing the targeted health behavior in this community. As a result of the 6-week media campaign, 34% of high-fat-milk drinkers reported switching to low-fat milk, and low-fat milk sales increased from 29% of overall milk sales to 46%, an effect that lasted at least 6 months after the intervention ended.

While others have found mass media alone to be ineffective, the 1% Or Less campaign used mass media to encourage large-scale and sustained changes in a health behavior. Many health education campaigns tackle multiple or complex behaviors. While we were interested in modifying a complex behavior—the consumption of saturated fat—we broke that complex behavior into steps that were easier for consumers to understand, easier for consumers to do, and easier to communicate through mass media. In addition, the 1% Or Less campaign skillfully executed its media plan. The ads and press materials included strongly worded messages that clearly communicated the benefits of

drinking low-fat milk and the negative attributes of high-fat milk in a memorable way. For example, the ads compared the saturated fat content of one glass of whole milk to that of five strips of bacon. At press events, we displayed tubes of fat that compared the amount of fat in half-gallons of whole, 2%, 1%, and fat-free milk. Many public health campaigns, especially those run or funded by governments, use mildly worded, vague messages to avoid upsetting anyone, including the food and other industries.

Another strength of the 1% Or Less campaign is that it used paid advertising. Many other health education campaigns use public service announcements (PSAs). Paid advertisements offer several advantages over PSAs. Paid advertising can be strategically placed to reach a target audience, whereas PSAs are placed at the discretion of broadcasters in whichever programming slots happen to be available [20,38]. In addition, it is difficult to achieve strong message reinforcement with PSAs because they are aired infrequently and at non-peak viewing hours [16,20,24].

The results of the Wheeling 1% Or Less campaign compare favorably with the results of the first 1% Or Less campaign conducted in Clarksburg and Bridgeport, West Virginia [15]. That campaign included media approaches similar to those used in the Wheeling campaign. However, the media messages in the Clarksburg/Bridgeport campaign were reinforced by extensive educational activities in schools, worksites, community service organizations, and supermarkets. The Clarksburg/Bridgeport intervention resulted in 38% of high-fat-milk drinkers switching to low-fat milk and an increase in low-fat milk sales from 18 to 41% of overall milk sales.

The results of the media-only (Wheeling) campaign are encouraging compared with those for the media-plus-community-programs (Clarksburg/Bridgeport) campaign. The final market shares for low-fat milk were similar in both communities immediately following their campaigns. Forty-six percent of milk sales were 1% or fat-free after the media-only campaign compared with 41% after the media-plus-community-programs campaign. The campaigns' effect on low-fat milk sales held well at the 6-month follow-up after both the media-only campaign (42% of milk sales) and the media-plus-community-programs campaign (35% of milk sales). Yet, the media-only campaign had half the number of broadcast television advertisements run in the media-plus-community-programs campaign. Although a similar amount of money was spent on advertising in both campaigns, the Wheeling media market is larger and more expensive and, thus, a similar budget purchased fewer advertisements in Wheeling. In addition, the media-only campaign was much easier to conduct. Community organizing is labor intensive and time

consuming. Finally, the media-only campaign in Wheeling was less expensive than the earlier campaign that included community-based programs.

We believe that mass media was sufficient to change the targeted behavior because we crafted a simple, understandable message and communicated it effectively. As a result, the media-only and media-plus-community-programs campaigns produced similar effects. Paid advertising and news coverage can reach more people with the campaign message than can community programs. We worked very hard in Clarksburg/Bridgeport and had good community involvement, yet reached less than 20% of the population. The ads and news coverage reached 80 to 95% of the population in Wheeling and Clarksburg/Bridgeport according to our telephone surveys. In addition, advertising provides more message reinforcement than do community programs. The ads aired several times a day for 6 weeks. The community programs were a one-time interaction.

Although advertising is expensive, so are personnel, materials, mailings, and other components of community organizing. An assessment of the cost of the two campaigns as a function of the number of people exposed to the campaign message shows that the media-only campaign cost approximately half that of the more extensive media-plus-community-programs campaign. The media-only campaign cost approximately 10 cents per person compared with 22 cents per person for the media-plus-community-programs campaign.

Although the per person costs for media-based nutrition education campaigns are modest, campaigns may seem unaffordable for communities with larger media markets. The advertising placement costs for 1% Or Less campaigns similar to that conducted in Wheeling, West Virginia, would be approximately \$70,000 in Richmond, Virginia, and \$200,000 in Seattle, Washington (personal communication, Jan Crawford, Jan Crawford Communications, Paris, VA, 1995). However, community-based programs in large communities reach only a small fraction of the population or are expensive.

A number of factors limit the generalizability of this study. Ideally, community intervention research is conducted in a cluster of randomly assigned treatment and control communities [39]. Available funding limited this investigation to one treatment and one comparison community. In addition, differences in baseline milk drinking habits may limit the comparability of the intervention and comparison communities. The telephone survey suggested that respondents in the intervention community consumed more low-fat milk at baseline than did those in the comparison community. However, based on the proportion of low-fat milk sold in supermarkets in the intervention (29%) and comparison (22%) communities at baseline, the difference in consumption was not statistically significant ($F [1,12] =$

1.58, $P < 0.20$). Furthermore, the comparison community for this intervention was chosen based on demographic characteristics (according to U.S. Census and state public health data) rather than on milk drinking habits. Nevertheless, some of the most well-respected community health programs used a single intervention or single control community [3,5,7,11,13] or had similar problems in the comparability of the intervention and comparison communities [40].

A media-only approach may not be effective for some nutrition messages. For example, a campaign to promote whole-grain consumption would likely need to include advocacy efforts to increase the availability and variety of whole-grain products sold in grocery stores, restaurants, bakeries, bagel shops, and other food establishments. In addition, advertising and news stories may be less effective for promoting more complex dietary behaviors. However, complex dietary messages could be broken down into a series of simple messages to make them easier to communicate through the mass media. The message to reduce saturated fat consumption could be broken down into a series of messages that address the top sources of saturated fat in Americans' diets, as we have done with the 1% Or Less campaign. Since six types of food (cheese, beef, milk, baked goods, margarine, and butter) contribute approximately half of the saturated fat consumed by the average American adult [29], a modest number of relatively simple messages could go a long way toward reducing saturated fat consumption. In addition to the 1% Or Less message, other key messages to help reduce saturated fat consumption might include choosing a lower-fat tub margarine instead of stick margarine or butter; choosing reduced-fat cheese in place of full-fat cheese; and ordering sandwiches or burgers without the cheese [41].

Despite limitations, the Wheeling 1% Or Less campaign offers an interesting model to health and nutrition educators. It provides an example of how mass media, in the absence of additional programming, can be used effectively, at a reasonable cost, to promote healthy eating.

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