

Original Research

Trying to Lose Weight: Diet Strategies among Americans with Overweight or Obesity in 1996 and 2003

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ABSTRACT

Background Health professionals recommend that individuals with overweight and obesity lose weight by reducing energy intake while maintaining a healthful diet. This study was designed to examine trends in weight loss attempts and strategies for adults with overweight or obesity among different sociodemographic groups.

Methods Data from the 1996 and 2003 Behavioral Risk Factor Surveillance System were used to estimate changes in weight loss attempts and strategies across population groups. Data were analyzed in 2009.

Results Slightly more adults with overweight or obesity attempted weight loss in 2003 compared to 1996. There were substantial changes in the diet approaches reported: rates of those using energy restriction to lose weight doubled between 1996 and 2003, whereas low-fat dieting decreased by one third. Hispanic and less-educated adults did not shift away from low-fat diets. Attempted weight loss was associated with higher fruit and vegetable consumption for most population groups.

Conclusions Increasingly more adults with overweight or obesity tried to lose weight through energy reduction, but some at-risk groups did not follow this beneficial trend between 1996 and 2003. Dietetics practitioners and public health campaigns should target such groups with concrete recommendations to reduce energy intake while maintaining a healthful diet, including adequate consumption of fruit and vegetables.

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Many Americans struggle to lose weight and are looking for guidance on appropriate weight loss strategies. Based on clear findings (1) that the macronutrient composition of diets is unrelated to weight loss, clinicians, as well as public health campaigns, have focused recent weight loss education efforts on energy restriction while encouraging a healthful overall diet (2,3).

Despite the increased focus on energy restriction in expert weight loss recommendations, public interest in diets limiting intake of particular macronutrients without emphasizing energy restriction persists (4). While many different diet strategies have been popularized in the United States (3), this research focuses on low-fat diets. Low-fat diets were widely promoted in the 1990s (2,4), receiving significant expert endorsement (eg, American Heart Association), drawing many adherents, and prompting food manufacturers to flood the market with low-fat products (5). Determining the extent and speed with which different population groups have shifted away from low-fat diets to strategies focusing on energy restriction could inform clinical and public health responses to ongoing misconceptions about weight loss (6-9).

In addition to encouraging weight loss through energy restriction, the National Heart, Lung, and Blood Institute's clinical guidelines for the treatment of overweight and obesity emphasize the importance of implementing a weight maintenance program to prevent commonly experienced weight regain (10). As a part of this program, the National Heart, Lung, and Blood Institute guidelines recommend consumption of diets rich in fruit and vegetables as good sources of vitamins, minerals, and fiber, which may aid in weight maintenance (10). In observational studies, higher fruit and vegetable consumption has been linked to long-term weight maintenance (11,12). Limited experimental evidence suggests that increasing fruit and vegetable consumption may aid in weight loss when combined with energy restriction or reduction in dietary fat (13-15). Diets rich in fruit and vegetables also reduce chronic disease risk, which is particularly elevated in overweight and obese populations (10,16). Given the low rates of adequate fruit and vegetable consumption in the United States (17) and clinical and public health recommendations to consume low-energy diets rich in fruit and vegetables to lose or maintain weight (2,18), it is important to determine whether those trying to lose weight consume adequate amounts of fruit and vegetables.

This study used data from the 1996 and 2003 Behavioral Risk Factor Surveillance System (BRFSS) to examine nationwide trends in reported weight loss diet strat-

egies for Americans with overweight or obesity (19,20). Specifically, the analysis assessed changes in the prevalence of reported weight loss attempts and key diet strategies among adults with overweight or obesity between 1996 and 2003, identified sociodemographic differences in these trends, and estimated the association between trying to lose weight and reported consumption of diets rich in fruit and vegetables.

METHODS

Sample

The study source is the BRFSS, which provides state-specific estimates of health conditions, preventive health practices, and risk behaviors among adults in the United States. The BRFSS is a random-digit-dial telephone survey conducted by state health departments on independent probability samples of state residents aged 18 years or older. It is the world's largest ongoing telephone health system survey; it has grown to include more than 350,000 adults annually. The survey data are weighted by race/ethnicity, age, and sex to represent the probability of selection and each state's population. A detailed description of the BRFSS data and methodology is available elsewhere (19,20).

The analysis draws data from the earliest (1996) and latest years (2003) of the BRFSS in which fruit and vegetable and weight control modules were administered in all states. There were 124,085 participants in 1996 and 264,684 respondents in 2003, a much larger sample in the later wave because the BRFSS increased participation over time. Exclusion criteria included participants under age 18 years; missing age or older than age 85 years; pregnant women; and participants missing information for questions about weight or height, reported fruit and vegetable consumption, reports of trying to lose weight and diet-related questions from the weight control module, and sociodemographic characteristics (education, sex, or race/ethnicity). Participants reporting attempts to lose weight but not reporting using either diet or physical activity weight loss strategy were also excluded. Another important restriction was limiting this sample to adults with overweight or obesity (body mass index [BMI] of 25 and above). Normal weight and underweight people were excluded to address weight loss attempts and strategies among those at elevated risk for excessive weight-related diseases. After all exclusions, 57,464 individuals in 1996 and 136,756 participants in 2003 remained eligible for analysis.

This study was deemed exempt from institutional review board approval under federal regulation 45 CFR §46.101(b).

Measures

Weight Loss and Diet Strategies. The weight control module starts with a question to all participants: "Are you now trying to lose weight?" If the response is negative, the module continues with, "Are you now trying to maintain your weight, that is to keep from gaining weight?" Only participants reporting affirmatively to either of the two questions are asked the questions "Are you trying to eat fewer calories or less fat to lose weight (or keep from

gaining weight)?" and "Are you using physical activity or exercise to lose weight (or keep from gaining weight)?" Our analysis focused on self-reported attempts to lose weight (with a yes/no indicator for trying to lose weight) and several key diet strategies evaluated in the BRFSS: trying to eat fewer calories vs trying to eat less fat vs trying to eat both fewer calories and less fat. Note that these diet strategies were assessed among adults reporting weight loss attempts. The high percentage of participants with overweight or obesity reporting using diet methods to lose weight (about 90%) and the lack of evidence supporting exercise as a weight loss strategy (21) prompted us to concentrate on diet practices in this analysis.

Fruit and Vegetable Consumption. The BRFSS module on fruit and vegetables poses the same six questions in all survey years the module was administered. Probed by interviewers to consider the food they usually eat or drink at home and away from home, participants report the frequency of consuming fruit (excluding fruit juice), green salad, potatoes (excluding french fries, fried potatoes, and potato chips), carrots, other vegetables, and fruit juice. Interviewers give examples of frequency responses ("twice a week, three times a month, and so forth"), but no definition of a serving size. Participants can report the frequency of eating or drinking per day, week, month, year, or never. These responses are used to create the daily number of servings of individual food items, which are summed to construct the measures of total daily fruit consumption, total vegetable consumption, and total fruit and vegetable consumption (sum of the two measures).

The assessment of fruit and vegetable consumption was based on a summary fruit and vegetable servings index available in the survey. It categorizes the daily intake of fruit and vegetable servings on a 4-point scale, including less than once per day or never, once but less than three times per day, at least three but less than five times per day, and five or more times per day. A variable was created for whether individuals reported eating the Centers for Disease Control and Prevention recommended intake—at the time of the survey—of a minimum of five daily servings of fruits and vegetables (18).

Weight status was assessed based on the BRFSS self-reported body measurements with participants assigned into three weight groups: overweight (BMI=25 to 29.99), obese Class I (BMI=30 to 34.99), and obesity Class II/III (BMI ≥35). There were no significant differences in either the prevalence of weight loss attempt, diet practices, or fruit and vegetable intake between adults with BMI of 35 to 39.99 and BMI ≥40, so these groups were combined.

Statistical Analysis

Comparative analyses of sociodemographic differences in weight loss practices across population groups and their changes over time focused on rates of trying to lose weight, diet strategies used, and reported fruit and vegetable consumption in 1996 and 2003. Differences in means between groups were tested using *t* tests, and associations between categorical variables were assessed using χ^2 tests. Stratifying by sex, weight status, race/ethnicity, and education, the hypothesis that weight loss

Table 1. Trends in prevalence of trying to lose weight among adults with overweight or obesity (n=194,220) between 1996 and 2003

Characteristic	1996		2003	
	Men (n=29,554)	Women (n=27,910)	Men (n=65,679)	Women (n=71,077)
	← % ^a →			
Overall	41.7	62.9 ^b	44.1 ^c	64.9 ^{bc}
Body mass index				
25-24.99	35.1	59.2	34.6	59.3
30-34.99	58.4 ^b	68.4 ^b	59.5 ^b	70.2 ^b
35 and above	65.5 ^b	70.9 ^b	69.9 ^b	75.2 ^{bc}
Race/ethnicity				
White	42.2	63.3	44.7 ^c	65.8 ^c
African American	35.4 ^b	58.5 ^b	40.5 ^{bc}	60.7 ^b
Hispanic	41.5	65.5	43.1	65.1
Other	48.3	67.3	44.4	64.7
Education				
Less than high school	34.2 ^b	51.2 ^b	37.3	54.0 ^b
High school	38.1	61.8	39.9	62.4
Some college/technical school	44.2 ^b	67.9 ^b	45.7 ^b	68.7 ^b
College graduate and above	46.9 ^b	69.7 ^b	48.9 ^b	70.2 ^b
Professional advice to lose weight				
Not received	36.3	56.5	37.2	58.6 ^c
Advice received	73.8 ^b	82.4 ^b	77.5 ^{bc}	82.8 ^b

^aThe reported estimates are percentages weighted to be nationally representative.
^bRates of trying to lose weight different within groups (body mass index: compared to overweight; race/ethnicity: compared to white non-Hispanic adults; education: compared to people with high school diploma; professional advice: compared to not receiving advice to lose weight) significant at $P<0.01$.
^cRates of trying to lose weight different between 1996 and 2003 significant at $P<0.01$.

practices in the group remained unchanged between 1996 and 2003 was tested using a *t* test.

To determine whether trying to lose weight was associated with fruit and vegetable consumption and if this relationship differed across demographic groups, a multivariate linear probability regression model for the dichotomous measure of meeting the five per day fruit and vegetable servings* was estimated. The model was run separately for men and women from the 1996 survey, the 2003 wave and the combined 1996 and 2003 sample. It included measures of trying to lose weight, weight group, age, race/ethnicity, education, household income, receiving professional advice to lose weight, and a year dummy in the combined 1996 and 2003 sample. Interactions between trying to lose weight and race/ethnicity, weight group, education and income were considered, and those with significant effects such as weight group and race/ethnicity were retained. To account for the complex sampling design and obtain nationally representative estimates, individual sample weights were used in all analyses. The Huber-White estimator of variance was used to calculate standard errors. All analyses were con-

*While one typically does not include truly dichotomous outcomes in linear regression models, the underlying distribution of fruit and vegetable consumption can be considered continuous with a true zero point and infinite possible positive true values.

ducted using Stata (version 9.0, 2008, Stata Corporation, College Station, TX).

RESULTS

Trying to Lose Weight

The prevalence of adults with overweight or obesity attempting weight loss varied significantly across demographic groups (Table 1). Women with overweight or obesity were 1.5 times more likely to attempt weight loss than men, and they started doing so at much lower BMI levels. The sex difference in trying to lose weight diminished with increasing BMI, but remained statistically significant. Although the differences in attempted weight loss by sex and degree of overweight were most notable, there were also significant gradients by education and race. The least educated participants (less than high school) were the least likely to try to lose weight even though they had significantly higher rates of obesity, especially severe forms (eg, among the least educated, 7.4% and 13.7% of men and women, respectively, had BMI of ≥ 35 in 2003; for men and women with a graduate degree, these rates were 4.6% and 5.4%, respectively). African Americans were less likely to try to lose weight than white non-Hispanic and Hispanic individuals. It is notable that Hispanic adults with overweight or obesity had rates of attempted weight loss similar to white non-Hispanic participants. Receiving professional advice to lose weight was associated with considerably

Table 2. Trends in prevalence of diet methods among adults with overweight or obesity who are dieting to lose weight, 1996 and 2003 (n=92,596)

Characteristic	1996			2003		
	Fewer calories	Less fat	Fewer calories and less fat	Fewer calories	Less fat	Fewer calories and less fat
	← % ^a →					
Overall	11.3	41.6	47.1	24.9 ^b	29.1 ^b	46.0
Sex						
Male	13.2	40.3	46.5	26.2 ^b	28.9 ^b	44.8
Female	9.6 ^c	42.8 ^c	47.6	23.7 ^{bc}	29.2 ^b	47.1 ^c
Body mass index						
25-24.99	10.7	42.7	46.6	25.3 ^b	29.3 ^b	45.3
30-34.99	12.3	40.7	46.9	24.2 ^b	29.0 ^b	46.7
35 and above	11.7	38.5 ^c	49.7	24.6 ^b	28.6 ^b	46.8
Race/ethnicity						
White	9.9	40.9	49.1	26.0 ^b	25.1 ^b	48.8
African American	16.0 ^c	39.8	44.2 ^c	22.8 ^{bc}	34.5 ^{bc}	42.7 ^c
Hispanic	13.6 ^c	46.9 ^c	39.5 ^c	21.8 ^{bc}	43.8 ^c	34.3 ^c
Other	17.4 ^c	43.6	38.9 ^c	21.8 ^c	31.1 ^{bc}	47.1
Education						
Less than high school	13.5	43.8	42.7	21.1 ^b	39.9 ^c	38.9 ^c
High school	12.2	41.6	46.2	23.9 ^b	32.5 ^b	43.6
Some college/technical school	10.7	43.3	45.9	24.6 ^b	28.8 ^{bc}	46.5 ^c
College graduate	9.6 ^c	38.6	51.8 ^c	27.3 ^{bc}	22.1 ^{bc}	50.5 ^c
Professional advice to lose weight						
Not received	11.7	42.9	45.4	25.8 ^b	29.6 ^b	44.6
Advice received	10.3	38.6 ^c	51.1 ^c	22.9 ^c	28.1 ^b	48.9 ^c

^aThe reported estimates are percentages weighted to be nationally representative.

^bDiet methods different between 1996 and 2003 significant at $P < 0.01$.

^cDiet methods different within groups (sex: compared to males; body mass index: compared to overweight; race/ethnicity: compared to whites; education: compared to people with high school diploma; professional advice: compared to not receiving advice to lose weight) significant at $P < 0.01$.

higher rates of attempted weight loss, for example, almost doubling rates for men.

A greater proportion of adults with overweight or obesity tried to lose weight in 2003 than in 1996, although the increase was relatively modest (53% vs 51%, $P < 0.01$). This increase was twice as high for men as for women, which reduced the sex difference in attempted weight loss. The largest gains in rates of attempted weight loss between 1996 and 2003 emerged for African-American men with overweight or obesity, white non-Hispanic participants, and women with BMI ≥ 35 . Although some sociodemographic differences in attempted weight loss narrowed during this time, significant gradients remained, especially by education (Table 1).

Weight Loss Strategies

Among adults with overweight or obesity trying to lose weight, about 86% of men and 92% of women reported either eating less energy (energy restriction), or eating less fat (low-fat dieting), or following both strategies. Between 1996 and 2003, there were substantial changes in the distribution of these diet approaches among adults with overweight or obesity trying to lose weight (Table 2). The proportion of people who reported using energy restriction alone doubled during this period with even larger increases for women and highly educated partici-

pants. At the same time, the low-fat diet without energy restriction dropped in prevalence by one third, with greater reductions among college graduates and white non-Hispanic participants. In contrast, Hispanic and least-educated individuals continued to use low-fat dieting without energy restriction at virtually the same rate in 2003 as in 1996.

Fruit and Vegetable Consumption

As hypothesized, adults with overweight or obesity trying to lose weight were more likely to report consuming the recommended servings of fruit and vegetables than their peers not attempting weight loss, by about five percentage points (Table 3). Even with this gain, only a quarter of them met the recommendation for fruit and vegetable consumption, which highlights inadequate fruit/vegetable intake in this population. Attempting to lose weight was associated with higher rates of meeting the recommended intake of fruit and vegetables across most population groups, with the largest difference among those with BMI of 35 and above. However, such differences in fruit and vegetable intake were small for minorities and men. Despite all the promotional messages in recent years to increase fruit and vegetable consumption, rates of meeting the recommended intake of five servings of

Table 3. Rates of meeting recommended 5-per-day fruit and vegetable servings among adults with overweight or obesity (n=194,220), 1996 and 2003

Characteristic	1996		2003	
	Trying to lose weight	Not trying to lose weight	Trying to lose weight	Not trying to lose weight
	←————— % ^a —————→			
Overall	24.5	20.7 ^b	23.8	18.8 ^{bc}
Sex				
Male	19.9	19.1	18.7	16.9 ^{bc}
Female	28.8	24.3 ^b	28.5	22.6 ^b
Body mass index				
25-24.99	25.3	21.6 ^b	25.1	19.5 ^{bc}
30-34.99	23.4	18.8 ^b	22.6	17.5 ^b
35 and above	23.3	13.7 ^b	22.2	15.2 ^b
Race/ethnicity				
White	25.2	20.6 ^b	24.2	18.1 ^{bc}
African American	20.1	19.2	23.6	18.5 ^b
Hispanic	23.1	21.2	20.9	20.3
Other	28.4	27.8	26.8	23.9
Education				
Less than high school	22.4	20.0	21.3	16.4 ^{bc}
High school	21.8	17.2	20.7	16.0 ^b
Some college/technical school	25.3	22.3 ^b	23.9	18.9 ^{bc}
College graduate	28.3	24.8 ^b	27.7	23.4 ^b
Professional advice to lose weight				
Not received	23.6	20.9 ^b	23.1	18.8 ^{bc}
Advice received	26.8	18.6 ^b	25.5	18.4 ^b

^aThe reported estimates are percentages weighted to be nationally representative.
^bRates of meeting 5-day fruit and vegetables intake are significantly different between trying and not trying to lose weight, at $P<0.01$.
^cRates of meeting 5-per-day fruit and vegetables intake significantly different between 1996 and 2003 at $P<0.01$.

fruit and vegetables per day decreased between 1996 and 2003 for adults with overweight or obesity (from 22.6% to 21.5%, $P<0.01$), and the reduction was even larger among those not trying to lose weight.

There was a significant association between trying to lose weight and fruit and vegetable consumption at the recommended levels, after controlling for the effect of sociodemographic factors and body weight (Table 4). In the pooled sample of 1996 and 2003 data[†], attempted weight loss was associated with about a two-percentage point increase in rates of meeting the recommended fruit and vegetable intake for men ($P<0.05$) and a six-percentage point increase for women ($P<0.01$). Education of above high school degree, high income, Hispanic ethnicity, older age (65 to 84 years for men and 45 to 84 years for women), and receiving professional advice to lose weight were all associated with higher rates of eating the recommended servings of fruit and vegetables. In contrast, men below age 55 years or with BMI of 35 and

above and all obese women were significantly less likely to report the recommended intake of fruit and vegetables.

Consistent with the univariate analysis, the association between trying to lose weight and reported fruit and vegetable consumption varied across sociodemographic and weight group characteristics (estimated as interaction effects of these factors with trying to lose weight). Significant interactions with weight loss attempt for race/ethnicity and weight group, but not for education or income, were identified. For example, Hispanic men and women trying to lose weight were less likely to meet the recommended fruit and vegetable intake (four- to five-percentage point reduction respectively, $P<0.05$), which negated the beneficial main effect of being Hispanic for those attempting weight loss. At the same time, obese men with BMI of 35 and above and all obese women had higher fruit and vegetable consumption if they attempted to lose weight (six- and three-percentage point increase, respectively, $P<0.01$), lessening the adverse direct effect of their BMI on fruit and vegetable consumption.

DISCUSSION

To our knowledge, this is the first study to evaluate how sociodemographic factors are associated with trends in

[†]The models estimated separately for 1996 and 2003 had similar results for women, but for men the association between trying to lose weight and fruit/vegetable intake was significant only in 2003.

Table 4. Association between trying to lose weight and meeting recommended 5-per-day fruit and vegetable servings, for adults with overweight or obesity (n=194,220)

Characteristic	Pooled 1996 and 2003 Data	
	Men (n=95,233)	Women (n=98,987)
	←— $\beta \pm$ robust standard error ^a —→	
Attempted weight loss	.02*±.006	.06**±.007
Body mass index 30-34.99	-.01±.009	-.04**±.009
Body mass index 35 and above	-.05**±.012	-.08**±.012
Body mass index 30-34.99 attempting weight loss	-.01±.012	.03**±.012
Body mass index 35 and above attempting weight loss	.06**±.016	.03*±.014
African American	.02±.010	.01±.011
Hispanic	.05**±.013	.05**±.017
Other race	.07**±.018	.07**±.025
African American attempting weight loss	-.02±.016	-.02±.014
Hispanic attempting weight loss	-.04*±.019	-.05*±.021
Other race attempting weight loss	-.04±.027	-.02±.032
High school graduate	-.01±.008	.02*±.008
Some college	.03**±.009	.07**±.009
College graduate and above	.06**±.009	.12**±.009
Age 25-34	-.04**±.011	.01±.012
Age 35-44	-.04**±.011	.01±.012
Age 45-54	-.04**±.011	.04**±.012
Age 55-64	-.02±.011	.08**±.012
Age 65-74	.04**±.012	.14**±.013
Age 75-84	.06**±.016	.17**±.014
Income quartile 2	.01±.007	.01±.007
Income quartile 3	.01±.008	.01±.009
Income quartile 4	.02**±.008	.04**±.010
Income missing	.02±.009	.01±.008
Professional advice to lose weight	.01*±.007	.02**±.006
Year 2003	-.02**±.005	-.02**±.005

^aThe Table reports regression coefficients from the linear probability models estimated for meeting the 5-per-day intake recommendation, estimates are weighted.
*P<0.05.
**P<0.01.

weight loss attempts and diet strategies in a national sample of American adults with overweight or obesity. Findings from this study are consistent with data from prior research, which suggests that a greater proportion of women and white non-Hispanic adults try to lose weight (22-24). Only slightly more people with overweight or obesity attempted weight loss in 2003 compared to 1996, an interesting finding in light of escalating obesity rates, emerging research, and media attention on the obesity epidemic. The larger increase in attempted weight loss for men narrowed the 1996 sex gap while some at-risk groups (Hispanics, African-American women) saw no changes. Likewise, differences in attempted weight loss by education remained largely unchanged from 1996 to 2003.

Differences in trends of weight loss attempts by race/ethnicity were also evident in the diet strategies assessed in the BRFSS (energy reduction, fat reduction, or both approaches). The percentage of American adults with overweight or obesity attempting to lose weight by reducing fat intake who did not also purposefully target energy

reduction dropped by almost one third between 1996 and 2003, with the most pronounced declines in the highly educated groups. The notable exception to this downward trend was no change in the use of low-fat dieting by Hispanic and low-educated adults with overweight or obesity trying to lose weight. This is an informative outcome for public health campaigns and clinicians promoting weight control in at-risk groups. Although reducing fat intake may result in consuming less energy, limiting fat intake without energy intake reduction will not lead to weight loss (2,25). Further, there is some evidence that low-fat products may actually increase energy intake through a halo effect whereby individuals estimate products to be more healthful than they actually are due to a low-fat tag or other health claims (26). It is unclear why Hispanic individuals did not move away from low-fat diets toward energy restriction (for which rates doubled), but this should be assessed in current samples, and if still present, addressed by dietetics practitioners and public health experts.

Consistent with studies in adolescents and a smaller

evaluation in adults, this study found that weight loss attempt was associated with increased fruit and vegetable consumption (27,28). Perhaps because women are more receptive to public health messages, the association between trying to lose weight and adequate fruit and vegetable intake was stronger for women than men. Some population groups, specifically Hispanic adults, did not appear to improve fruit and vegetable intake when trying to lose weight.

Professional advice to lose weight was strongly correlated with trying to lose weight; however, this advice had a weaker association with meeting fruit and vegetable intake recommendations. Clinicians and public health campaigns should better integrate advice on weight loss with campaigns focused on improving overall diet quality such as increasing fruit and vegetable intake. Although there are a few studies that assess the content of clinician advice on adults' weight loss (29,30), most research focuses on whether weight loss advice was actually given (31-35). Due to the dearth of research on content of such advice, it is difficult to determine whether changes in clinician advice have paralleled the changes in individuals' diet strategies. However, American Dietetic Association position papers on weight management during the last 12 years have consistently promoted strategies that reduce energy intake via low-fat, low-energy diets (36-38).

There are several limitations to our study. The use of self-reported weight loss attempt likely overestimates the prevalence of dieting behavior due to social desirability bias and the possible incongruence between behavior and reported intent. Similarly, BMI is likely underestimated due to self-reported body weight and height (39-41). The study used self-reported data on fruit and vegetable consumption and, although suggesting very low rates of adequate intake in the population, it may inaccurately represent individual intake due to social desirability bias and reporting errors. The use of a short-form, nonquantitative food frequency questionnaire to assess fruit and vegetable consumption limits the study's ability to identify portion size; therefore, the reported number of servings of fruits and vegetables per day may be under- or overestimated. Similarly, variety and preparation method of fruit and vegetable choices were not assessed. The survey only assessed fat or energy weight loss strategies, which does not capture the range of all possible diet strategies (eg, lowering carbohydrate, glycemic index, energy density, or increasing fiber) and precludes any analyses of trends and sociodemographic patterns for such alternative approaches to dieting. In addition, given the recent public health focus on the importance of adequate intake of healthful fats (1,42), the study would have been strengthened by information on reduction of fat intake by type of fat. Finally, even using the most recent BRFSS data on weight loss and fruit and vegetable consumption only described patterns in 2003, so more recent changes should be evaluated as new data become available.

Overall, this study documents that at least half of adults with overweight or obesity are trying to lose weight, but important differences in the prevalence of weight loss attempts persist, particularly by sex, race, and education level. National efforts to encourage healthful weight control strategies among low-literacy popula-

tions should be increased. Lower rates of the key effective diet strategies such as energy restriction among Hispanic and low-educated adults highlight the need for increased attention to developing interventions, communication, and policy approaches that acknowledge the importance of cultural differences in dietary patterns. A recent review of the effectiveness of weight-loss interventions among Hispanics in the United States found that few published programs made substantive changes to the weight loss protocols developed for white non-Hispanic subjects and that these interventions were not effective for Hispanic subjects (43). However, efforts to tailor dietary advice to Hispanic populations should recognize both the differences between ethnic subgroups and the importance of acculturation of dietary practices. Although a few studies have found no relationship between acculturation and fat intake and a negative relationship between acculturation and total fruit and vegetable intake, much more work is needed to understand how diet is affected by the increasing regional and socioeconomic diversity within the Hispanic community (44).

CONCLUSIONS

We observed a significant shift in the diet strategies among those overweight and obese American adults trying to lose weight from 1996 to 2003. This suggests the need for increased attention in national dietary surveillance to how changes in dieting behavior affect diet quality, and how demographic factors moderate the effect of dieting on health. The shift in diet strategies highlights the utility of tracking the effect of nutrition information dispersed via national campaigns and popular media on dietary behavior trends.

STATEMENT OF POTENTIAL CONFLICT OF INTEREST:

No potential conflict of interest was reported by the authors.

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