
Measuring Dietary Behaviors Among Adolescents

FREDERICK TROWBRIDGE, MD
BETH COLLINS, HSD, MPH

GA. Dr. Trowbridge is a Youth Risk Behavior Surveillance System Chairperson and Director, Division of Nutrition. Dr. Collins is a Health Education Specialist, Surveillance and Evaluation Research Branch, Division of Adolescent and School Health.

Both authors are with the National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta,

MODERN AMERICAN DIETARY patterns are associated with five of the ten leading causes of death among adults (1,2). For the two out of three Americans who do not smoke and do not drink excessively, dietary patterns, more than any other patterns of behavior, markedly influence health status (1). Dietary patterns developed during youth may contribute to obesity, unsafe weight-loss practices, and eating disorders, and may increase risk for several important chronic diseases later in life (3).

This paper describes development of questions related to dietary behaviors for the Youth Risk Behavior Surveillance System (YRBSS) questionnaire. The YRBSS Panel participants (see Appendix I, page 56) first identified major short- and long-term health outcomes associated with dietary behaviors. Guided by national health objectives for the year 2000 (4), we developed questions that would elicit information on priority dietary behaviors among adolescents.

Short-Term Health Outcomes

Many American youth experience problems related to obesity, including psychological dysfunction, orthopedic problems, abnormal glucose tolerance, hypertension, and elevated cholesterol and triglyceride levels that persist into adulthood (5,6). Although difficult to quantify, obesity may be increasing among adolescents ages 12-17 (7).

The adverse social and psychological consequences of obesity in youth may be as detrimental as long-term physical health problems (8). Obesity in adolescence has been associated with less acceptance by peers, with discrimination by significant adults, and with poor body image and poor self-concept (9). Obesity in adolescence also has been related to depression, problems in family relations, and poor school performance (10).

At the same time that obesity poses health risks for Americans of all ages, undernutrition from inappropriate

weight-loss practices and dietary deficiencies represents a special problem for youth. Undernutrition generally is associated with economically deprived or geographically isolated populations. Undernutrition also can occur, however, among youth as a result of the perception of thinness as an ideal of physical beauty. Adolescents may practice potentially dangerous weight-control strategies, including low-calorie and unbalanced diets, diet pills, diuretics, laxatives, and self-induced vomiting (11,12). Females often begin their first reducing diet by age 16 (13). Even normal-weight girls as young as age 10 report they would feel better about themselves and would look better if they were thinner (14).

Overemphasis on thinness during adolescence also may contribute to the increasing incidence of anorexia nervosa and bulimia in the United States (15,16). Adolescent females represent a high-risk population for the development of these two health problems and compose 90-95 percent of all patients with eating disorders (17). Compared with adolescents with normal eating patterns, those with disturbed eating attitudes and behaviors perceive a greater discrepancy between their actual and ideal weight and have less self-esteem, a more negative body image, and more feelings of inadequacy, self doubt, anxiety, depression, moodiness, and social dysfunction. The prevalence of eating disorders among high school students may be as high or even higher than among college students (18).

Long-Term Health Outcomes

In the United States, diseases that result from nutritional deficiencies have been replaced largely by diseases that result from dietary excess and imbalance—behaviors that may begin during adolescence. Coronary heart disease, atherosclerosis, cancer, stroke, and diabetes account for more than two-thirds of all deaths in the United States (4). Each of these chronic conditions

is associated with dietary factors, particularly the excessive consumption of foods high in fat (1,2). Dietary excesses and imbalances also contribute to osteoporosis, dental diseases, and obesity. Together, these diet-related conditions touch the lives of most Americans and generate substantial health care costs (1,2).

The three major modifiable risk factors for cardiovascular disease and atherosclerosis are cigarette smoking, high blood pressure, and high blood levels of cholesterol. Numerous studies have found a strong relationship between high blood cholesterol levels and increased risk for cardiovascular disease (1,2). Although cardiovascular disease still accounts for more deaths than any other disease, the age-adjusted death rate for cardiovascular disease dropped by more than 42 percent from 1964 to 1985 (1). There are many determinants of blood cholesterol levels, but no modifiable factor influences blood cholesterol levels more profoundly than diet, particularly the excessive consumption of saturated fat and cholesterol (1,2).

In the United States in 1991, an estimated 514,000 people died of cancer and an estimated 1.1 million additional new cases were diagnosed (19). The proportion of cancer deaths at least partly attributable to diet has been estimated to be about 35 percent overall (20). Cancers of the lung, colon-rectum, breast, prostate, and pancreas account for most cancer deaths in the United States, and all are thought to be associated with dietary factors. Excessive consumption of fat and calories and insufficient consumption of fiber and anti-oxident micronutrients may be the most important dietary risk factors for cancer (1,2).

Two million Americans suffer from stroke-related disabilities (1). Diets associated with high blood pressure may increase the likelihood of stroke. Thus, excessive consumption of fat, calories, sodium, and alcohol may increase risk for stroke (21).

About 36,000 deaths are attributed directly to diabetes mellitus annually, and an additional 95,000 deaths are associated with resultant complications (22). Type II diabetes accounts for approximately 90 percent of all cases and affects at least 10 million Americans (1). Obesity is strongly associated with the onset and severity of Type II diabetes. At least 80 percent of persons with Type II diabetes are more than 15 percent above their desirable body weight at the time of diagnosis. New cases of diabetes could be reduced by nearly half by preventing obesity in middle-aged adults (23).

In 1983, approximately 15-20 million Americans were affected by osteoporosis (24). Dietary factors, including consumption of calcium, phosphate, vitamin D, protein, sodium, and alcohol, may affect peak bone mass during young adulthood and subsequently affect risk for osteoporosis (1,2).

Though rarely life-threatening, dental caries and periodontal disease affect a large proportion of American adults and children. A strong link exists between dietary sugar, particularly sucrose, and dental caries. Diet also may influence periodontal disease by lowering the resistance of gums to harmful bacteria (1,2).

Obesity, which affects approximately 34 million adults ages 20 to 74 (1), is a health issue of particular concern in the United States. One-fourth of American adults are overweight, and nearly one-tenth are severely overweight (25). Although poor health is not an inevitable consequence, obese people are more likely than normal weight people to have elevated blood cholesterol and triglyceride levels, reduced HDL-cholesterol levels, high blood pressure, and adult-onset diabetes mellitus (1,2). Obese people also are more likely to develop coronary heart disease independently of other risk factors (3). Obesity increases risk for gallbladder disease and some types of cancer and has been implicated in the development of osteoarthritis of the weight-bearing joints, particularly the knee (1,2). Obese people also may suffer adverse social and psychological consequences (8).

National Health Objectives

The national health objectives measured by the YRBSS are given in Appendix III, page 67. Nine of the national health objectives for the year 2000, presented in Healthy People 2000 (4) are relevant to dietary behaviors among adolescents. These objectives helped guide our selection of priority health outcomes and behaviors.

Among the risk reduction objectives that concern nutrition, Objective 2.5 calls for reducing the consumption of foods high in fat among people ages 2 and older to reduce fat intake from 36 percent of total calories to 30 percent or less, and Objective 2.6 calls for increasing the consumption of complex carbohydrates and fiber from 2.5 to 5 servings per day. Both objectives are consistent with recommendations from the 1988 Surgeon General's Report on Nutrition and Health (1), the 1989 National Research Council's Diet and Health: Implications for Reducing Chronic Disease Risk (2) and the 1990 Report of the Expert Panel on Population Strategies for Blood Cholesterol Reduction (3). Dietary patterns demonstrating higher intake of vegetables, fruits, and grains are associated with a variety of health benefits, including lower rates of diverticulosis and decreased risk for some types of cancer (1,2,26). Although Objective 2.6 specifies a goal only for adults, the inclusion of fruits, vegetables, and grains in the diet also is advised for everyone older than age 2 (4).

Objectives 1.7 and 2.7 recommend physical activity and balanced dietary intake as sound practices to achieve appropriate body weight without impairing growth and

development among overweight youth. Additional risk reduction objectives call for increasing adequate calcium intake among young adults ages 12 through 24 (Objective 2.8) and decreasing salt and sodium intake among all age groups (Objective 2.9).

Services and protection objectives that concern nutrition recommend that school lunch and breakfast services be consistent with the nutrition principles outlined in the Dietary Guidelines for Americans (26) (Objective 2.17) and that nutrition education be provided from preschool through twelfth grade, preferably as a part of quality school health education (Objective 2.19).

One health status objective that concerns nutrition calls for reducing the prevalence of obesity (Objective 2.3). Adolescents ages 12 through 19 are singled out as a special target population for this objective (4). Another health status objective (Objective 13.1) calls for reducing dental caries among children ages 6 through 8 and adolescents age 15.

Priority Health Outcomes and Behaviors

To focus our development of questions related to dietary behaviors for the YRBSS, we selected, by priority, the following health outcomes: obesity, elevated blood cholesterol levels, undernutrition, decreased peak bone mass, dental caries and periodontal disease, and foodborne infection. We based our decisions on the prevalence, severity of morbidity, and intervention potential for each health outcome.

We then selected the two major dietary behaviors contributing to these health outcomes — weight loss practices and dietary choices. Both behaviors had a strong relationship to the priority health outcomes, both contributed to multiple disease outcomes, and both could be measured through responses to the eleven questions developed for the YRBSS questionnaire.

YRBSS Questions

We developed three questions to measure weight-loss practices (see Appendix II, YRBSS questionnaire for the specific questions). One question (No. 58) asks whether adolescents are trying to lose, gain, or maintain their current weight. The other two questions (Nos. 59 and 60) address appropriate and inappropriate weight-loss or maintenance practices, including dieting, exercising for weight loss, intentional vomiting, and taking diet pills. These two questions are relevant to Objectives 1.7 and 2.7. To provide a current measure of these practices, we selected “seven days” as the recall period.

An additional question (No. 57) addresses body weight perception, which, though not a behavior, can influence strongly the decision to initiate weight loss, even among

‘Many American youth experience problems related to obesity, including psychological dysfunction, orthopedic problems, abnormal glucose tolerance, hypertension, and elevated cholesterol and triglyceride levels that persist into adulthood.’

teenagers who are not obese. Respondents thus are asked to characterize themselves on a five-point scale ranging from very underweight to very overweight.

We developed seven questions to measure dietary choices. Since only a limited number of dietary behavior questions could be included in the YRBSS questionnaire, the use of more traditional dietary measures, such as extensive listings of foods and open-ended questions, could not be used. Instead, specific foods were selected as “markers” of fruit, vegetable, and fatty food choices. This approach was consistent with findings from laboratory and field tests conducted by the National Center for Health Statistics, Centers for Disease Control and Prevention (CDC), which indicated that adolescents had difficulty describing the contents of different food groups.

The four questions that measure fruit and vegetable choices focus on fruit (No. 61), fruit juice (No. 62), green salad (No. 63), and cooked vegetables (No. 64). These foods may be good sources of vitamins and generally are low in fat. The latter three generally are good sources of complex carbohydrates and dietary fiber. These questions are relevant to Objective 2.6, even though a goal is established only for adults.

The three questions that measure fatty food choices focus on hamburger, hot dogs, or sausage (No. 65); french fries or potato chips (No. 66); and cookies, doughnuts, pie, or cake (No. 67). These foods are not inherently unhealthy, but when eaten frequently, in large quantities, or in place of foods with lower fat content, they may contribute excessive fat and cholesterol to the diet. These questions are relevant to Objective 2.5, although they will not provide sufficient information to quantify fat intake.

“Yesterday” was selected as the recall period for all seven questions about dietary choices, because laboratory and field tests demonstrated that adolescents had difficulty reporting dietary behaviors over longer periods of time. Because these tests also revealed that adolescents had difficulty identifying the quantity (that is, serving size) of food eaten, the seven questions ask only how many times (none, once, or two or more times) each food group or group of foods was consumed the preceding day.

'By promoting the desirability of eating for good health, these messages must try to offset the pressures exerted against adolescents by often unrealistic social norms for body weight.'

Since only a limited number of questions on dietary behaviors could be included in the YRBSS questionnaire, we could not quantitatively assess fat intake, nor could we measure other dietary behaviors related to obesity and undernutrition, such as overeating, especially bingeing behavior; inappropriate meal patterns, including eating snacks and skipping meals; and emotion-related eating. Similarly, dietary behaviors related to other priority health outcomes are not measured, including consumption of calcium, starchy and sugary foods, and carbonated beverages; poor oral hygiene; poor food handling; and poor food storage.

Levels of physical activity—often a factor in determining body weight—are measured within another categorical area of the YRBSS questionnaire (see article by Heath et al. on page 42).

Because the YRBSS was designed to focus primarily on behaviors, we did not include questions to measure nutrition-related knowledge, availability of dental care, availability of food in the home, and food practices of parents or caregivers.

Discussion

Information on weight-loss practices prevalent among adolescents should provide insight into their perceptions of appropriate ways to reduce weight. A major challenge to nutrition education is to deliver effective messages to adolescents about body weight. By promoting the desirability of eating for good health, these messages must try to offset the pressures exerted against adolescents by often unrealistic social norms for body weight.

Similarly, information on adolescent dietary choices can help provide focus for nutrition education programs in the United States. Nutrition education, with the broad recommendation to eat from a wide range of healthy foods, often is included as a content area in high school courses such as health education, home economics, and science. However, family practices, food advertising, and social activities with peers are among other strong influences on dietary choices among adolescents. Results from the YRBSS should provide a basis for State-specific monitoring of broad trends in food choices among adolescents.

Analyses of differences in dietary choices and weight-loss practices among age, sex, and race-ethnicity groups also will be valuable in targeting nutrition education programs for youth. Although the nutrition questions in the YRBSS will provide only a descriptive analysis of certain dietary behaviors, the results may be linked with other areas of adolescent behavior measured by the questionnaire.

The key strategies identified to achieve nutrition-related national health objectives for the year 2000 (4) include improved access to nutrition information and education and the maintenance and improvement of a strong national program of nutrition research. Information collected through the YRBSS should provide a point of reference for planning and developing effective education programs and identifying research priorities related to dietary behaviors among youth in the United States.

References.....

1. Public Health Service: The Surgeon General's Report on Nutrition and Health. DHHS publication no. (PHS) 88-50210. U.S. Government Printing Office, Washington, DC, 1988.
2. National Research Council: Diet and health: Implications for reducing chronic disease risk. National Academy Press, Washington, DC, 1989.
3. National Cholesterol Education Program: Report of the Expert Panel on Population Strategies for Blood Cholesterol Reduction. DHHS publication no. (NIH) 90-3047. U.S. Government Printing Office, Washington, DC, 1990.
4. Public Health Service: Healthy People 2000: National Health Promotion and Disease Prevention Objectives, full report with commentary. DHHS publication no. (PHS) 91-50212. U.S. Government Printing Office, Washington, DC, 1991.
5. Dietz, W. H., Jr.: Prevention of childhood obesity. *Pediatr Clin North Am* 33: 823-833 (1986).
6. Freedman, D. S., et al.: Relationship of changes in obesity to serum lipid and lipoprotein changes in childhood and adolescence. *JAMA* 254: 515-520, July 26, 1985.
7. Gortmaker, S. L., Dietz, W. H., Sobol, A. M., and Wehler, C. A.: Increasing pediatric obesity in the United States. *Am J Dis Child* 141: 535-540 (1987).
8. Bronwell, K. D.: The psychology and physiology of obesity. *J Am Diet Assoc* 84: 406-416 (1984).
9. Coates, T. J., and Thorensen, C. D.: Treating obesity in children and adolescents: a review. *Am J Public Health* 68: 143-151 (1978).
10. Stein, R. F.: Comparison of self-concept of nonobese and obese university junior female nursing students. *Adolescence* 22: 77-90 (1987).
11. Killen, J., et al.: Self-induced vomiting and laxative and diuretic use among teenagers. *JAMA* 255: 1447-1449, Mar. 21, 1986.
12. Feldman, W., McGrath, P., and O'Shaughnessy, M.: Adolescents' pursuit of thinness. *Am J Dis Child* 140: 294 (1986).
13. Grunewald, K. K.: Weight control in young college women: who are the dieters? *J Am Diet Assoc* 85: 1445-1550 (1985).
14. Mellin, L. M.: Responding to disordered eating in children and adolescents. *Nutr News* 51: 5-7 (1988).
15. Herzog, D., and Copeland, P.: Eating disorders. *N Engl J Med* 313: 295-303, Aug. 1, 1985.
16. Mitchell, J., and Eckert, E.: Scope and significance of eating disorders. *J Consult Clin Psychol* 55: 628-634 (1987).
17. Diagnostic and Statistical Manual of Mental Disorders. Ed. 4. American Psychiatric Association, Washington, DC, 1994.

- can Psychiatric Association, Washington, DC, 1987.
18. Shisslak, C. M., Crago, M., and Neal, M. E.: Prevention of eating disorders among adolescents. *Am J Health Promotion* 5: 100-106 (1990).
 19. Cancer Facts and Figures — 1991. American Cancer Society, Atlanta, GA, 1991.
 20. Doll, R., and Peto, R.: The causes of cancer: quantitative estimates of avoidable risks of cancer in the United States today. *J Natl Cancer Inst* 66: 1191-308 (1981).
 21. The 1988 report of the Joint National Committee on detection, evaluation, and treatment of high blood pressure. *Arch Intern Med* 148: 36-39 (1988).
 22. Kovar, M. G., Harris, M. I., and Hadden, W. C.: The scope of diabetes in the United States population. *Am J Public Health* 77: 1549-1550 (1987).
 23. Wood, F. C., and Bierman, E. L.: Is diet the cornerstone in management of diabetes? *N Engl J Med* 315: 1224-1227, Nov. 6, 1986.
 24. Consensus Conference: Osteoporosis. *JAMA* 252: 799-802, Aug. 10, 1984.
 25. Public Health Service: Anthropometric reference data and prevalence of overweight, United States 1976-1980. National Health Interview Survey, series 11, No. 238. DHHS publication no. (PHS) 87-1688. U.S. Government Printing Office, Washington, DC, 1987.
 26. Department of Agriculture and Department of Health and Human Services: Dietary guidelines for Americans. Washington, DC, 1985.