

# Progress in Dietary Behavior Change

Karen Glanz

## SYNOPSIS

Nutrition has important influences on health and mortality. Public response to current dietary guidance is indicated by positive movement on some indicators, notably reductions in calories from fat and in blood cholesterol levels. Downstream case finding and intensive educational and behavioral interventions are often effective for high risk and motivated subjects and for persons with diet-related disease. Midstream environmental changes (e.g., in grocery stores, schools) proffer improved nutritional choices and supports. Individualized dietary counseling has yet to become the norm. Despite recent upstream success in developing broad dietary guidance and improving nutrition labeling policies, numerous avenues remain open for aggressive national policy developments. Emerging studies and continuing improvement in intervention methods, measurement, and research design will help realize the preventive effects of healthful diets.

## OVERVIEW AND POPULATION TRENDS

Five of the 10 leading causes of death for Americans relate to dietary practices: heart disease, some cancers, stroke, diabetes, and atherosclerosis.<sup>1,2</sup> Guidelines for healthy eating developed by government, health, and scientific organizations share common themes but vary in their disease and nutrient emphases and the degree of quantification in recommendations.<sup>3,4</sup> The scientific consensus has broad public health implications: cutting fat and cholesterol, maintaining optimal weight, increasing complex carbohydrates and fiber, and moderating alcohol intake.<sup>5,6</sup> Strategies for following these guidelines include, among other things, eating more fruits and vegetables and less red meat and consuming fewer full-fat dairy products.<sup>2,3</sup>

---

*Karen Glanz, PhD, MPH, is a Professor in the Prevention and Control Program, Cancer Research Center of Hawaii, University of Hawaii, Honolulu, Hawaii.*

Send reprint requests to Karen Glanz, PhD, MPH, Cancer Research Center of Hawaii, University of Hawaii, 1236 Lauhala Street, Suite 406, Honolulu, HI 96813.

*This manuscript was received January 20, 1999; revisions were requested May 4, 1999; the manuscript was accepted for publication September 27, 1999.*

*Am J Health Promot 1999;14(2):112-117.  
Copyright © 1999 by American Journal of Health Promotion, Inc.  
0890-1171/99/\$5.00 + 0*

Controversies remain regarding diet-disease links, the magnitude of benefits expected with changing habits, and optimal quantitative advice. But the potential public health benefit from improved eating patterns, coupled with the low risk of adopting present guidelines, provides a stronger foundation than ever before to understand and encourage good nutrition.<sup>2,7,8</sup>

Positive movement has occurred for several dietary intake and risk factor markers during the past decade, as well as in the context and environment of eating. Population trends in sentinel Healthy People 2000 diet indicators show: decreases in percentage of calories from fat (36% to 34%), saturated fat (13% to 12%), and mean population blood cholesterol level (213 to 203 mg/dl) as well as improved blood pressure control among people with hypertension (11% to 29%).<sup>9,10</sup> Awareness of risks associated with high cholesterol is at an all-time high, concern about dietary fat has increased dramatically, more processed foods bear nutrition labels, a greater proportion of restaurants offer low-fat and low-calorie selections, and more worksites offer nutrition education and weight management programs.<sup>9</sup> Further, the food and restaurant industry has developed products that better meet national recommendations for healthful eating.<sup>11</sup>

In contrast, considerable challenges remain. Fifty percent of adults have blood cholesterol levels above the ideal. The prevalence of overweight persons has increased among teens (15% to 21%) and adults (26% to 34%).<sup>9,10</sup> Intake of fruits, vegetables, grains, and dietary fiber remains well below recommendations.<sup>12</sup> Few population-wide data on eating patterns of children and youth are available.<sup>9</sup>

Upstream interventions have focused on increasing the availability of consumer nutrition information but otherwise have been limited. Motivating more people to change will require more aggressive upstream strategies and wider dissemination of effective downstream and midstream interventions. Table 1 outlines a spectrum of possible intervention approaches by stream level, while Table 2 provides additional detail on illustrative studies.

## DOWNSTREAM INTERVENTIONS

Behavioral research on dietary change has become more rigorous in the past decade. Clear evidence exists from controlled clinical trials that intensive educational and behavioral interventions are effective in promoting sustained reductions in dietary fat intake among motivat-

**Table 1**  
**Current and Prospective Interventions: Dietary Change**

Downstream	Case finding, counseling, and monitoring for individuals with elevated blood cholesterol Behavioral interventions (group instruction + individual counseling) to reduce dietary fat intake Chronic disease management via therapeutic diets (e.g., for persons with diabetes, cardiovascular disease, etc.) Minimal contact and self-help interventions to promote healthy eating
Midstream	Point-of-choice nutrition information programs (e.g., grocery stores, restaurants) Worksite nutrition programs Interventions in primary health care settings School-based programs including classroom instruction and food service changes
Upstream	Dietary guidance policy Federal nutrition information policy and strategies (e.g., ingredient and nutrient labeling requirements) Increased access to healthy foods in geographic regions (e.g., growing more fresh fruits and vegetables) Nutrition services in health care (e.g., reimbursement for nutrition counseling, more emphasis in medical education) Economic strategies (e.g., insurance risk rating, pricing policies, monetary incentives/disincentives for healthy eating through taxation)

ed subjects (Table 2).<sup>13-16</sup> Interventions that include case finding (cholesterol screening), counseling, group education, and mediated strategies are effective in high risk persons.<sup>17</sup> However, preexperimental research designs and the use of measures with unknown validity often make it difficult to conclude that observed effects can be attributed to these interventions. Similarly, intensive behavioral programs promote dietary change among persons with diet-related disease (e.g., post-myocardial infarction [MI] patients, diabetics, and cancer),<sup>15,18</sup> although much less research has been done in secondary and tertiary prevention.<sup>7</sup> A limitation of the available research is that it does not address the question of what percentage of participants usually benefits significantly from these interventions.

Accumulating data support the efficacy of self-help and minimal-contact interventions, including print guides, tailored messages, and supportive telephone counseling.<sup>19-21</sup> These can help expand the reach of downstream interventions, as can approaches tailored to low-literacy, low socioeconomic status (SES) persons (Table 2).<sup>22</sup> These interventions may produce small effects relative to those achieved with more intensive behavioral interventions, but the net public health effects may be equal to or greater than those with small, highly selected audiences. Stage of change is a stronger predictor of treatment outcome than demographic variables.<sup>23</sup>

### MIDSTREAM INTERVENTIONS

Although evidence for change is mixed for nutrition interventions, promising findings exist for point-of-choice information (e.g., in restaurants, grocery stores), risk reduction for coronary heart disease in medical settings, and worksites (Table 2).<sup>16,24-27</sup> School-based instructional and food service programs, aiming at fat and sodium reduction and increasing complex carbohydrate intake, generally show positive but inconsistent results. Programs focusing on younger children and involving parents have been most successful.<sup>28</sup> Dietary behavior change can be

enhanced by modifying institutional food service offerings, as demonstrated in the ongoing CATCH (Child and Adolescent Trial for Cardiovascular Health) trial and other studies (Table 2).<sup>29-31</sup>

Despite consensus among physicians and allied health professionals that diet can promote health and reduce risks of chronic disease, substantial discrepancies are apparent between support stated in national surveys and actual counseling practices documented in patient charts. While 67% of primary care physicians nationally report that they personally provide nutrition counseling (especially advice to lower fat and dietary cholesterol) and rely on non-physician providers (e.g., nurses, dietitians, nutritionists) for backup,<sup>32</sup> few use dietary assessments required for personalized diet counseling. Cholesterol screening has become increasingly common, but frequently, it is not followed with clinical treatment for elevated levels. Although such screening is recommended by the U.S. Preventive Services Task Force, barriers to nutrition counseling remain, including physicians' lack of confidence in their own counseling skills plus lack of training, time, staff, payment, or insurance coverage.<sup>32-35</sup>

Encouraging new directions for reducing provider burden and improving individualization include computer-based interactive video programs with diet messages tailoring advice to patient diet goals, barriers, motives, and stage of change. Positive findings have been reported among healthy populations as well as those with diet-related disease (e.g., diabetes).<sup>19,36</sup> To date, no research is available on how feedback about genetic susceptibility (for hypercholesterolemia, colon cancer, breast cancer) might affect dietary change and adherence. Use of combined nutrition, exercise, and pharmacologic interventions makes it difficult to judge the effectiveness, and cost-effectiveness, of nutrition intervention alone.

### UPSTREAM INTERVENTIONS

Nutrition policy and environmental interventions include dietary guidance, nutrition information, and regula-

Table 2, continued

Study	Objective of Evaluation	Research Design	Participants and Controls	Evaluation Period	Interventions	Outcome Measures	Key Findings
Midstream Sorensen et al. <sup>27</sup> Treatwell Program (1992)	Test the efficacy of a worksite nutrition intervention program designed to promote dietary changes associated with reduction of cancer risk.	Randomized controlled trial, randomization by worksite	Of 16 worksites in Massachusetts and Rhode Island, 13 completed study. Total of 3076 employees from insurance, computer, health care, and manufacturing companies; respondent cohort of 2258; 74% response at baseline and 75% of baseline at follow-up	15-mo intervention period, with surveys at baseline and end of intervention	Multicomponent: employee advisory boards, nutrition education, classes, materials, food demonstrations, environmental programs, control = no intervention	Dietary intake of fat, fiber, nutrient intakes, and servings of foods	In the experimental sites: <ul style="list-style-type: none"> <li>• greater reduction in fat intake (1.1% of total calories)</li> <li>• increased intake of vegetables and decrease in ground and processed meats</li> <li>• no difference in fiber intake compared with control sites</li> </ul>
Levy et al. <sup>25</sup> Diet Alert Program (1985)	Test the efficacy of brand-specific, point-of-choice nutrition information for foods to meet special diet needs.	Randomized controlled trial, randomization by supermarket	Inapplicable; main outcomes based on product sales in 20 supermarkets, not individuals' reports	24 mo	Brand-specific shelf markers and information booklets re: available products for special diet needs (low calorie, low/reduced sodium, low cholesterol)	Food purchase of shelf-marked products	Purchase of shelf-marked products increased 4% to 8% more in experimental stores
Jeffery et al. <sup>30</sup> Cafeteria Fruit and Salad Study (1994)	Determine whether increasing the variety of offerings and reducing prices would increase consumption of fruit and salad in a worksite cafeteria setting	Withdrawal design; three 3-wk phases: baseline period, intervention, return to baseline	One cafeteria in a physically isolated office building, 320-430 customers per day; worksite with 700 employees	9 wk (three 3-wk periods)	Doubled the number of fruit choices, increased salad ingredient selections, and reduced price of both fruit and salad by 50%	Daily sales of fruit and salad, as assessed by cash register receipts	Fruit and salad purchases increased threefold during intervention period compared to nonintervention periods
Upstream None available							

- compliance in the Women's Health Trial Vanguard Study. *Prev Med* 1990;19:115-33.
15. Glanz K. Reducing breast cancer risk through changes in diet and alcohol intake: from clinic to community. *Ann Behav Med* 1994;16:334-46.
  16. Glanz K, Sorensen G, Farmer A. The impact of worksite nutrition and cholesterol intervention programs. *Am J Health Promot* 1996;10:453-70.
  17. Glanz K, Gilboy MB. Psychosocial impact of cholesterol screening and management. In: Croyle RT, editor. *Psychosocial Effects of Screening for Disease Prevention and Detection*. New York: Oxford University Press, 1995.
  18. Glanz K. Nutrition education for risk factor reduction and patient education: a review. *Prev Med* 1985;14:721-52.
  19. Campbell MK, DeVellis BM, Strecher VJ, et al. Improving dietary behavior: the effectiveness of tailored messages in primary care settings. *Am J Public Health* 1994;84:783-7.
  20. Beresford SA, Curry SJ, Kristal AR, et al. A dietary intervention in primary care practice: the Eating Patterns Study. *Am J Public Health* 1997;87:610-6.
  21. Barratt A, Reznik R, Irwig L, et al. Work-site cholesterol screening and dietary intervention: the Staff Healthy Heart Project. Steering Committee. *Am J Public Health* 1994;84:779-82.
  22. Howard-Pitney B, Winkleby MA, Albright CL, et al. The Stanford Nutrition Action Program: a dietary fat intervention for low-literacy adults. *Am J Public Health* 1997;87:1971-6.
  23. Glanz K, Patterson RE, Kristal AR, et al. Impact of work site health promotion on stages of dietary change: the Working Well Trial. *Health Educ Behav* 1998;25:448-63.
  24. Glanz K, Hewitt A, Rudd J. Consumer behavior and nutrition education: an integrative review. *J Nutr Educ* 1992;24:267-77.
  25. Levy A, Mathews O, Stephenson M, et al. The impact of a nutrition information program on food purchases. *J Public Policy Marketing* 1985;4:1-13.
  26. Sorensen G, Thompson B, Glanz K, et al. Work site-based cancer prevention: primary results from the Working Well Trials. *Am J Public Health* 1996;86:939-47.
  27. Sorensen G, Morris DM, Hunt MK, et al. Work-site nutrition intervention and employees' dietary habits: the Treatwell Program. *Am J Public Health* 1992;82:877-80.
  28. Contento IR, Manning AD, Shannon B. Research perspective on school-based nutrition education. *J Nutr Educ* 1992;24:247-60.
  29. Ellison RC, Goldberg RJ, Witschi JC, et al. Use of fat-modified food products to change dietary fat intake of young people. *Am J Public Health* 1990;80:1374-6.
  30. Jeffery RW, French SA, Raether C, et al. An environmental intervention to increase fruit and salad purchases in a cafeteria. *Prev Med* 1994;23:788-92.
  31. Luepker RV, Perry CL, McKinlay SM, et al. Outcomes of a field trial to improve children's dietary patterns and physical activity. The Child and Adolescent Trial for Cardiovascular Health. CATCH Collaborative Group. *JAMA* 1996;275:768-76.
  32. Glanz K, Tziraki C, Albright CL, et al. Nutrition assessment and counseling practices: attitudes and interests of primary care physicians. *J Gen Intern Med* 1995;10:89-92.
  33. [USDHHS] US Department of Health and Human Services. Guide to Clinical Preventive Services. 2nd ed. Report of the US Preventive Services Task Force. Washington, DC: US Government Printing Office, 1997.
  34. Truswell AS, editor. Nutritional attitudes and practices of primary care physicians. *Am J Clin Nutr* 1997;65:6S.
  35. Glanz K. Review of nutritional attitudes and counseling practices of primary care physicians. *Am J Clin Nutr* 1997;65(Suppl. 6):2016S-9S.
  36. Glasgow RE, Toobert DJ, Hampson SE. Effects of a brief office-based intervention to facilitate diabetes self-management. *Diabetes Care* 1996;19:835-42.
  37. Glanz K, Lankenau B, Foerster S, et al. Environmental and policy approaches to cardiovascular disease prevention through nutrition: opportunities for state and local action. *Health Educ Q* 1995;22:512-27.
  38. Orleans CT, Gruman J, Ulmer C, et al. Rating our progress in population health promotion: report card on six behaviors. *Am J Health Promot* 1999;14:000-000.
  39. Klem ML, Wing RR, McGuire MT, et al. A descriptive study of individuals successful at long-term maintenance of substantial weight loss. *Am J Clin Nutr* 1997;66:239-46.
  40. Brunner E, White I, Thorogood M, et al. Can dietary interventions change diet and cardiovascular risk factors? A meta-analysis of randomized controlled trials. *Am J Public Health* 1997;87:1415-22.