
5 A Day for Better Health—Nine Community Research Projects To Increase Fruit and Vegetable Consumption

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Synopsis

One of the national objectives in "Healthy People 2000" is for members of the public to increase their consumption of fruits and vegetables to five or more servings daily. The National Cancer Institute (NCI) began a nationwide campaign to achieve this objective in 1991. As part of this campaign, the NCI funded nine research studies in 1993. These projects are implementing and evaluating community-based programs designed to increase fruit and vegetable consumption among different segments of the population in Alabama, Arizona, Georgia, Louisiana, Maryland, Massachusetts, Minnesota, North Carolina, and Washington.

The settings for these projects include the Special Supplement Food Program for Women, Infants, and Children (WIC Programs), churches, worksites, and schools. The projects are led by multidisciplinary teams and entail extensive collaboration among academic, governmental, private sector, and voluntary agencies within each State. The projects represent a model public health paradigm for conducting this type of research.

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CANCER ACCOUNTS FOR 23 percent of all deaths in the United States (1). Doll and Peto estimate that 35 percent or more of cancer deaths may be attributable to unhealthful diets (2). More cancer deaths are attributable to unhealthful diets than to any other cause. Dietary factors associated with an increased risk of cancer include excess fat, calories, and alcohol, as well as smoked, salted, and pickled foods; those associated with a decreased risk of cancer include increased intake of fruits, vegetables, and fiber (3).

Of all the dietary factors postulated to cause cancer, the epidemiologic evidence is strongest for an association between low fruit and vegetable consumption and an increased risk of developing cancer. Both case-control and cohort studies have shown an association between higher levels of fruit and

vegetable intake and reduced risk from a variety of cancers, including those of the pharynx, esophagus, oral cavity, stomach, pancreas, colon, rectum, larynx, lung, bladder, endometrium, cervix, and ovary (4-10).

The evidence is particularly strong for epithelial cancers of the digestive and respiratory systems. A recent review of 156 studies of dietary influences on such cancers revealed that 128 had shown a statistically significant protective effect of fruit and vegetable consumption (4). Most of these studies controlled for possible confounding factors, such as fat, calories, smoking, and alcohol. For lung cancer, 24 of 25 studies showed a protective effect, as did 15 of 16 for esophageal cancer, 17 of 19 for stomach cancer, 20 of 27 for colorectal cancers, and 9 of 9 for oral cancers.

These studies were conducted in 17 countries with

very diverse populations, such as the Netherlands, China, India, and the United States. The vast majority of the studies reported a dose-response relationship. Those persons with a lower consumption of fruits and vegetables generally have a cancer risk at least twice as high as those with a higher consumption level. In the 156 studies previously noted, relative risks ranged from 0.5 to 7.0 (4). In these studies, the intake in the lower ranges was less than 1 to 1.3 servings of fruits and vegetables per day; in the upper range, the intake was from 3 to 5 servings.

These studies indicated that a variety of fruits and vegetables are associated with a reduced risk of cancer. These included dark green, yellow, and orange fruits and vegetables, cruciferous vegetables, dried fruits, berries, beans, tomatoes, and carrots.

There are plausible biochemical mechanisms for the protective effects of fruits and vegetables. Fruits and vegetables are sources of vitamins A, C, E, and folate, carotenoids and other antioxidants, fiber, and non-nutritive substances such as dithiolthiones, flavonoids, glucosinolates, indoles, isothiocyanates, phenols, d-limonene, and allium compounds (6). Each of these substances may play a role in reducing the risk of developing cancer. More likely, it is a combination of these and other, unknown factors that confer protection.

Five a Day Projects

The Department of Agriculture, the Department of Health and Human Services, and the National Academy of Sciences have recommended that Americans consume five or more servings of fruits and vegetables daily (11-14). Several national surveys conducted over the past 15 years indicate that most Americans fall short of this goal. The 1976-78 NHANES II survey, using a single 24-hour recall, indicated that adults in the bottom quintile of fruit and vegetable consumption averaged one serving per day; adults in the top quintile averaged five servings per day (personal communication with B. Patterson, National Cancer Institute [NCI], April 1993).

The 1989 Continuing Survey of Food Intakes by Individuals (CSFII), which used one 24-hour recall, indicated that adults in the bottom quartile are consuming 2.1 servings, while those in the highest quartile are consuming 4.8 servings or more (personal communication with S. Krebs, NCI, January 1994). A national telephone survey sponsored by the NCI in 1991 showed that only 23 percent of the adult population was consuming the recommended level; average consumption ranged from 2.5 to 3.4 servings per day (15).

The strength of the scientific data concerning the relationship between fruit and vegetable consumption and the incidence of various cancers, coupled with the low consumption rates just cited, led the NCI to initiate the national "5 A Day for Better Health" Program in the fall of 1991. The program encourages Americans to eat five or more servings of fruits and vegetables every day, addressing one of the nation's health promotion and disease prevention objectives (11). It is a partnership between the NCI and the Produce for Better Health Foundation (PBH), a nonprofit consumer education foundation representing the fruit and vegetable industry. Industry participants include supermarkets, independent grocery stores, merchandisers, suppliers, commodity groups, marketers, and foodservice operations.

The national 5 A Day for Better Health Program had its origins in a public health capacity-building grant from the NCI to the California Department of Health Services in 1986. The California program established the simple, positive 5 A Day dietary message, developed and trademarked the program logo, established a public-private partnership between State agencies and the fruit and vegetable industry, and implemented social marketing strategies using the mass media and supermarkets. The national program replicated and expanded the design of the California statewide 5 A Day Program.

The national 5 A Day Program also uses this simple, positive nutrition message to capture the public's attention. This strategy is based on social marketing theory (16) and provides a new model for nutrition education. It attempts to demonstrate that culturally sensitive, adequately tailored, reasonably simple nutrition messages are effective when conveyed through appropriate channels. It takes into account the short attention span of many consumers, for whom nutrition messages in the past may often have been too complex.

The national 5 A Day Program includes retail, media, community, and research components. Retailers advertise the program in the local media and provide consumers with brochures, recipes, and interactive events such as food demonstrations. The NCI and PBH are working together to develop a comprehensive media campaign to obtain ongoing coverage of the 5 A Day Program.

The design of the national 5 A Day Program reflects results of previous research on the effectiveness of media, public-private collaborations, and community-based health promotion interventions for disease prevention. Studies have shown that the media plays an important role in increasing consumers' awareness of health issues and, in some

National Cancer Institute-Funded 5 A Day Projects

Name. Maryland WIC 5 A Day Promotion Program

Principal investigator. Stephen Havas, MD

Institution. University of Maryland at Baltimore

Target population. Pregnant, post-partum, and breast feeding WIC participants and the mothers of children in WIC

Collaborating agencies. University of Maryland at College Park, Cooperative Extension Service, American Cancer Society, Maryland Department of Health and Mental Hygiene, local health departments and WIC Programs, and Maryland Department of Agriculture

Interventions. Nutrition education: at certification by WIC staff; at voucher pickup by Cooperative Extension Services staff; at WIC and in the community by peer counselors.

Visual reminders: posters, magnets; calendars, calendar reminders; targeted nutrition mailings

Community-based and environmental: enhanced Farmers' Market Coupon Program; solicitation of recipes; super-market programs

Name. Black Churches United for Better Health

Principal investigator. J. Dale Simmons, MD

Institution. North Carolina Department of Environment, Health and Natural Resources

Target population. Rural black adults, 18 years and older

Collaborating agencies. University of North Carolina, Chapel Hill, School of Public Health; Duke Comprehensive Cancer Center Program of Cancer Prevention, Detection, and Clinical Research; North Carolina Cooperative Extension Service

Interventions. Computer tailored nutrition messages; media campaign; food cooperatives; educational sessions.

Activities: fruit and vegetables at food functions; recipe contest; food demonstrations; taste testing; cookbook; planting victory gardens and fruit trees; fruit baskets

Name. The Seattle 5 A Day Worksite Project

Principal investigator. Shirley A. A. Beresford, PhD

Institution. Fred Hutchinson Cancer Research Center

Target population. Employees in worksites with a cafeteria

Collaborating agencies. University of Washington, Washington State Department of Health, Washington Apple Commission, Washington State Potato Commission

Interventions. Environmental and individual strategies.

Cafeteria changes: personnel training, food labeling, food discounts, food changes

Activities: Employee Advisory Board, nutrition resource center, kick-off event, self-assessment materials, self-help materials, skill-building tips, taste tips, contests, flyers, posters, pay-stuffers

Name. Treatwell: 5 A Day

Principal investigator. Glorian Sorensen, PhD

Institution. Dana-Farber Cancer Institute

Target population. Employees at 24 Massachusetts Community Health Centers

Collaborating agencies. Massachusetts Department of Public Health; University of Massachusetts Cooperative Extension Service; University of Massachusetts School of Public Health; Harvard School of Public Health

Interventions. Worksite group: nutrition education mini-series, vending machine programs, catering guidelines, Employee Advisory Board-initiated activities

versus

Worksite plus family group: worksite activities listed previously, home-based program, family festivals, family newsletter

Name. 5 A Day: Healthier Eating for the Overlooked Worker

Principal investigator. David Buller, PhD

Institution. University of Arizona

Target population. Adults employed in public sector worksites in labor or trade job classifications that have lower salaries, require less education, and less English literacy. In Arizona, this target population is largely Hispanic.

Collaborating agencies. Arizona Department of Health Services, American Cancer Society, Western Growers Association, Arizona Vegetable Growers Association, Growing Connection, public sector worksites in Tucson and Phoenix

Interventions. Worksite Wellness Program: speakers, newsletter articles, posters, cafeteria promotion

versus

Worksite Wellness Enhanced Program: program as preceding; workers trained as peer health educators to motivate employees and act as change agents

Name. 5 A Day Power Plus

Principal investigator. Donald Bishop, PhD

Institution. Minnesota Department of Health

Target population. Fourth and fifth grade students in urban schools

Collaborating agencies. University of Minnesota, St. Paul Public Schools, Minnesota Department of Education

Interventions. Curriculum: series of 15 to 30 minute sessions

Family involvement: homework assignments; share "snack packs" with parents

Environmental: train school cafeteria staff in preparation and presentation of fruits and vegetables served; taste testing; point-of-purchase promotion; incentives for consumption

Industry-media support: student field trips; donation of fruits and vegetables for taste testing

Name. "Gimme 5": A Fresh Nutrition Concept for Students

Principal investigator. Theresa A. Nicklas, DrPH
Institution. Tulane School of Public Health and Tropical Medicine

Target population. High school students
Collaborating agencies. American Cancer Society—Louisiana Chapter, State health department, local culinary chefs, local universities
Interventions. Curriculum: 6 student workshops, complementary subject matter activities

Parental involvement ("Raisin' Teens"): cookbook with monthly inserts, calendars, promotions at sports events, Parent Teacher Organization and Student Council

Environmental ("Fresh Choices"): cafeteria menu planning, food purchasing, recipe development, availability of fruits and vegetables at concession stands

School Media and Marketing Campaign

Name. Gimme 5 Fruits and Vegetables for Fun and Health

Principal investigator. Tom Baranowski, PhD
Institution. Emory University School of Public Health
Target population. Fourth and fifth grade students in suburban and urban schools and their families

Collaborating agencies. Gwinnett County Board of Education (12 schools), an urban school system (4 schools)
Interventions. Curriculum: fourth grade—vegetables, fifth grade—fruits

Parent involvement: newsletters, homework, videotapes
Environmental: point-of-purchase education

Name. High-5-Alabama

Principal investigator. Kim Reynolds, PhD
Institution. University of Alabama at Birmingham School of Public Health (UAB)

Target population. Students in fourth grade and their parents
Collaborating agencies. Bessemer School District, Hoover City Schools, Jefferson County Board of Education, American Cancer Society—Alabama affiliate, UAB Comprehensive Cancer Center, Healthy Alabama 2000 Nutrition Coalition, Alabama Department of Public Health
Interventions. Curriculum: 15 initial sessions, additional booster

Parent intervention: newsletters, tipsheets, education sessions, interactive homework with students
Environmental: train food service workers, posters and displays at school

instances, changing their behavior (17–19). Public confidence in messages from a health agency such as the NCI can also affect consumer buying patterns (20). Credible health messages promoted by industry through the media have been shown to influence consumers (18).

Although use of the media alone can produce behavior change, the effect is increased when use of the media is supplemented by other community-based educational efforts (21–23). The Stanford Three-Community Study, the North Karelia Project in Finland, and the Stanford Five-City Project have all been successful in reducing cardiovascular risk factors through community-based interventions using mass media and other community education strategies (21, 23–26).

The NCI has been working with State health departments throughout the United States to foster the development of community programs aimed at promoting the 5 A Day message. As of June 1994, the NCI had licensed 48 State health agencies to coordinate State efforts to reach consumers through community channels.

For the research component of the national program, the NCI in 1992 issued a Request for Applications (RFA) to develop, implement, and evaluate community-based interventions to increase

the consumption of fruits and vegetables, using the 5 A Day message. The NCI funded 9 of the 73 applications in response to the RFA. The studies were funded in May 1993. They will be completed in May 1997.

Each 5 A Day project has chosen a specific channel and target population for intervention and has randomized its units to either intervention or control conditions. All project interventions are based on a specific model of behavior change (16). These interventions must have adequate intensity and penetration to measurably exceed the national trends, created partly by the other components of the 5 A Day Program. The outcomes of these nine studies will provide valuable information on dietary behavior change in a variety of populations, and if successful, reproducible intervention strategies for four different community channels.

The nine projects are summarized in the box. They are described subsequently, categorized by channel: one project based in WIC sites, one in churches, three in worksites, and four in schools. Following this, the relevance and importance of this research to public health practitioners is discussed.

"Maryland WIC 5 A Day Promotion Program." This project will implement and evaluate a multi-

dimensional program aimed at increasing fruit and vegetable consumption among women in 16 WIC (Special Supplemental Food Program for Women, Infants, and Children) sites in Baltimore City and seven Maryland counties. The Maryland WIC 5 A Day Promotion Program will target pregnant, breastfeeding, and post-partum WIC participants and the mothers of WIC children. The 16 sites selected vary in number of clients served (range 500 to 2,500).

Overall, the target population is 69 percent black, 30 percent white, and 1 percent Hispanic. However, there is considerable variation among the WIC clients served in the targeted areas. For example, the Baltimore City sites serve a predominantly black, urban population, and the Cecil County site, a predominantly white, rural population. All WIC participants meet the program requirement of having an income level of less than 185 percent of poverty and either a medical or nutritional risk, or both.

The 16 sites will be randomized to either intervention or control status for 6 months. The project will enroll an average of 135 clients per site. The intervention and control status of the sites will then be reversed and a second wave of intervention programs will be conducted. All participants in intervention sites will be exposed to all intervention components.

The intervention will consist of three components: nutritional counseling and education, written materials and visual reminders, and environmental enhancements. There will be two types of nutritional counseling and education: (a) messages provided by the WIC paraprofessional staff at the time of certification and (b) lay counseling provided by trained peer group discussion leaders. Education will take place at WIC certification and during the bimonthly voucher distribution periods.

Written materials will include brochures, recipes, and tip sheets. Visual reminders will include posters, calendars, and refrigerator magnets. Environmental enhancements will include a campaign to increase the use of farmers' markets and to display point-of-purchase information in supermarkets.

The project is led by researchers at the University of Maryland at Baltimore, working in collaboration with numerous partners. Faculty in the Departments of Health Education and Communications at the University of Maryland at College Park provide additional leadership in program development, implementation, and evaluation. The Cooperative Extension Services staff is assisting in development of program materials and in training the lay counselors. WIC staff at the Maryland Department of Health and Mental Hygiene ensure that planning and implemen-

tation efforts at the local level flow smoothly. Implementation of these interventions includes the input and cooperation offered by the WIC programs in participating local health departments. The Maryland Department of Agriculture is enthusiastically participating in the development of the farmers' market component of the program. The American Cancer Society provides input into the program and serves as a co-sponsor of the project.

North Carolina: "Black Churches United for Better Health." This project will develop a dietary behavior change program to increase fruit and vegetable consumption among rural black adults via five churches in each of 10 counties in eastern North Carolina. The counties have a high incidence of cancer and a population which is at least 20 percent black. Half of the counties will be randomized to intervention initially and the other half will receive intervention later. The 500 participants represent varied socioeconomic and educational levels.

The project will use lay health advisors to implement activities, encourage increased consumption of fruits and vegetables, and develop social support for dietary change among church members. Intervention activities will include providing individually tailored computer-generated nutrition messages to all study participants in the intervention churches in rural North Carolina. These messages will be specifically tailored to the nutritional intake, demographic characteristics, and literacy level of the individual participant.

A county-wide media campaign will be implemented, using church members and leaders to promote increased consumption of fruits and vegetables. Other activities will include conducting nutrition education sessions, serving fruits and vegetables at church functions, holding recipe contests and food demonstrations, compiling a cookbook, planting fruit trees and vegetable gardens, and providing fruit baskets to the homebound, the indigent, seniors, and those who are ill.

Many agencies are collaborating in the North Carolina project. The Division of Adult Health Promotion of the North Carolina Department of Environment, Health, and Natural Resources is responsible for the implementation of the nutrition interventions. This includes providing consultation and technical assistance to local health departments and churches and ensuring that sound nutrition-based interventions are implemented. The University of North Carolina School of Public Health is responsible for the data collection and evaluation of the project.

The North Carolina Cooperative Extension Service

is responsible for the airing of the ALMANAC show, a half hour television show that will feature demonstrations of fruit and vegetable preparation techniques, methods for canning and freezing fruits and vegetables, and gardening tips. The Duke Comprehensive Cancer Center Program of Cancer Detection, Prevention, and Control Research and the North Carolina Department of Agriculture are developing print materials which will coincide and enhance the project as well as interface with local grocery stores, farmers' markets, and fruit and vegetable producers in intervention counties. Duke will also disseminate other materials through intervention churches and will promote the Cancer Information Services of the Carolinas as a resource.

Washington: "The Seattle 5 A Day Worksite Project." This project targets worksites with cafeterias in the Greater Seattle area that serve between 250 and 5,000 employees. Worksites are being recruited in two waves. Eligible worksites in the first wave include banks, government agencies, newspapers, radio-television stations, law offices, medical centers, and educational institutions. The ratio of blue to white collar employees varies, with about one-third being predominantly blue collar work forces and two-thirds being predominantly white collar work forces. This factor will be matched prior to randomization, as will size of work force, percent female employees, and response rate to the baseline survey of the sites.

Twenty-eight worksites will be randomized to the intervention program or a comparison program. The primary outcome of interest is change in the consumption of fruits and vegetables, with dietary fat intake and readiness to change as secondary interests. The principal evaluation of the program will be based upon results from cross-sectional surveys of the worksites conducted at baseline and 24 months.

The program's conceptual framework combines environmental level and individual level interventions to effect movement through stages of change. The environmental interventions will promote worksite involvement in dietary change by establishing employee advisory boards. These boards will represent employees' interests while assisting staff interventionists in program implementation. Other environmental interventions include training cafeteria workers to promote, label, and serve fruits and vegetables, establishing company catering policies, altering selections in vending machines, and providing a permanent nutrition resource kiosk.

The individual level interventions are aimed at raising consciousness about healthful eating through posters, napkins, and a self-evaluation brochure. They

are intended to build skills through both self-help materials and worksite-wide events such as cooking demonstrations and taste testings. Contests and incentives will reinforce healthful behaviors by recognizing persons who have increased their consumption of fruits and vegetables.

The Seattle project is a collaboration between researchers at the Fred Hutchinson Cancer Research Center's Cancer Prevention Research Program and the University of Washington School of Public Health that have worked together on other dietary intervention studies and worksite intervention studies. In addition, the State of Washington Department of Health is collaborating with the Seattle 5 A Day project by providing a liaison member of the research team; this collaboration facilitates the planning of related departmental activities, including the state-wide partnership in the national program. Less formal collaboration is also occurring with the produce industry. Both the Washington Apple Commission and the Washington State Potato Commission have agreed to donate apples or potatoes for kick-off events in the intervention worksites. Supermarket chains and other grocers have agreed to participate in various ways at the kick-off, at taste tests, and at other worksite-wide events.

Massachusetts: "Treatwell 5 A Day." The Treatwell 5 A Day study will test the efficacy of a worksite model for promoting the 5 A Day for Better Health message. This worksite program will also carefully evaluate the role of the family in determining and promoting change in employees' eating habits. The target population in the Massachusetts project consists of employees at community health centers (CHCs).

CHCs were selected as sites for the Massachusetts project because of the access they provide to diverse ethnic and cultural groups, including both workers and patients. They were also chosen because they represent a type of small, nonprofit worksite which is underrepresented in health promotion efforts. Twenty-four CHCs have been recruited as the sites for this study.

Preliminary data about the participating CHCs indicate that the size of these CHCs varies: about half of them employ 100 or fewer workers (mean = 49) with the remainder employing more than 100 workers (mean = 254). CHC's staff represent a broad range of professionals and paraprofessionals, for example, physicians, nurses, nutritionists, social workers, outreach workers, nursing assistants, and case managers. The mean CHC staff turnover rate is 6.5 percent. Eighty-two percent of employees are women (range of

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60 to 95 percent). Fifty-three percent of employees are white (range of 1 to 100 percent), 18 percent Hispanic, 22 percent black, and 5 percent Asian. The CHCs are located in inner-city and suburban medically underserved communities throughout the State. CHCs try to hire staff from the community with cultural, ethnic, and linguistic backgrounds similar to their clients.

The 24 CHCs will be randomly assigned to one of three groups: (a) a minimal intervention control group, (b) a worksite intervention group in which worker dietary change is promoted through worksite-based interventions, and (c) a worksite plus family intervention group in which worker dietary change is promoted through both worksite and family focused interventions. By working with staff at CHCs, the project also hopes that these workers will diffuse the 5 A Day message to patients.

At the start of the program and after 2 years of intervention, individual worker and worksite consumption patterns will be assessed through surveys. Examples of interventions to be undertaken include the establishment of employee advisory boards to work with the project's staff in tailoring the intervention to the needs of the site, worksite campaigns, a nutrition education miniseries, a vending machine program, catering guidelines, a home-based educational program, family festivals, and a family newsletter.

The Massachusetts 5 A Day project is a collaboration among the Dana-Farber Cancer Institute, Harvard School of Public Health, University of Massachusetts Cooperative Extension Service and School of Public Health, Massachusetts Department of Public Health, and 24 CHCs. Collaborators from the institutions participate in a steering committee and subcommittees addressing intervention and evaluation activities.

Researchers at the Dana-Farber Cancer Institute lead the project.

The evaluation instruments are being designed by researchers from the Dana-Farber Cancer Institute and the two schools of public health. The Massachusetts Cooperative Extension Service is collaborating in the design of the family intervention program. Collaboration with the Massachusetts Department of Public Health assures that project and statewide 5 A Day activities mesh smoothly.

Arizona: "5 A Day: Healthier Eating for the Overlooked Worker." This project targets workers often overlooked by traditional worksite wellness programs: nonmanagerial and blue collar workers, shift workers, employees who work off site, public sector employees, and minorities. The targeted employees are in low-level job classifications at 10 of Arizona's largest employers: Arizona State University, City of Phoenix, Mesa Public Schools, Maricopa Community College, Maricopa County, University of Arizona, City of Tucson, Pima County, Pima Community College, and Tucson Unified School District. The target population is predominantly Hispanic and male, working in custodial services, grounds keeping, sanitation, food service, heavy equipment operation, and physical maintenance.

This project will compare the impact of a peer health educator program designed to influence dietary attitudes and behavior through interpersonal networks to a traditional worksite wellness program using impersonal communication channels, such as posters and brochures. For 18 months, all worksites will receive the 5 A Day Worksite Wellness Program, with cafeteria promotions, speakers, and wellness activities rotated every 6 months. After 9 months of this program, a Health Peers Program will be randomized to 40 matched pairs of interpersonal social networks in the worksites, which will run along with the 5 A Day Worksite Wellness Program for another 9 months.

One worker from each of the 40 intervention networks, who is well integrated into the social network, will be recruited and trained to act as a peer health educator. These educators will make informal contacts with coworkers to provide dietary information, promote wellness activities, assess barriers to change, and motivate coworkers to increase their consumption of fruits and vegetables. Evaluations will assess immediate and persisting dietary changes resulting from the Health Peers Program and the 5 A Day Worksite Wellness Program.

The Arizona project is a collaborative effort of several organizations. The lead organization is the

University of Arizona Cancer Center, which works closely with the State of Arizona Department of Health Services' Office of Nutrition. The Office of Nutrition helps coordinate 5 A Day project activities with local agencies, participates in the development of intervention materials designed for lower socioeconomic status and Hispanic populations, and helps facilitate intervention activities.

The American Cancer Society, Western Growers Association, the Arizona Vegetable Growers Association, and the Retail Growers Association also provide support. Growing Connections, a nonprofit agency providing nutrition education to low-income and minority public school students through home-gardening curriculums, is developing training for the peer health educators on gardening and providing equipment, materials, and advice on demonstration gardens at two project worksites.

Minnesota: "5 A Day Power Plus Program." This study is a randomized intervention trial in 34 elementary schools in the St. Paul metropolitan area assigned to either an intervention or control condition. The target population is the 1994–95 cohort of fourth grade students, who will be followed through the fifth grade. This population of students is racially diverse—55 percent white, 22 percent Asian, 17 percent black, 6 percent Hispanic, and 1 percent Native American. The Asian population is largely Hmong, the children of immigrants resettled after the Vietnam War. All schools are co-educational. The overall student population is 49 percent female. The demographic characteristics of this population are representative of many other urban settings.

The intervention for the 5 A Day Power Plus Program consists of four school-based activities: changes in the food service environment, classroom curriculums, family involvement, and support from industry and the media. The food service component will encourage selection and consumption of fruits and vegetables in school lunch, breakfast, and snack programs. Specific strategies include training of food service staff in food preparation and presentation techniques to enhance the attractiveness of fruits and vegetables served to the students, point-of-purchase promotion of fruits and vegetables, and incentives for consumption such as a stamped card that can be turned in as a "lottery" ticket after 10 servings of fruits and vegetables.

The classroom curriculum will encourage consumption of fruits and vegetables at lunch and as snacks. These will be accomplished through a series of 15 to 30 minute sessions each year over the 2 years of intervention. Classroom discussion of fruits and

vegetables will be structured around taste testings of fruits and vegetables prepared by the students and the school's weekly food service menu.

The family involvement component will encourage fruit and vegetable consumption at home. In addition, homework assignments will require parental participation in joint activities such as labeling fruits and vegetables in the cupboards or refrigerator as "Snack Power." Students will also bring home "snack packs" they have prepared at school to share with parents as models of snacks.

This project is led by the Minnesota Department of Health and the University of Minnesota in collaboration with the St. Paul Public Schools and the Minnesota Department of Education. The health department provides leadership in the development of food service environmental changes and support from industry and the media. The health department is also responsible for program coordination in the schools and data management. The university has primary responsibility for development of the classroom curriculums and family involvement components. The St. Paul Public Schools and Minnesota Department of Education are represented on key planning and implementation committees. The Minnesota Department of Education is assuring that the program's design is readily transferable to elementary schools statewide and complementary to existing school-based nutrition programs in the State.

Louisiana: "Gimme 5: A Fresh Nutrition Concept for Students." This program is designed to increase the consumption of fruits and vegetables by high school students close to the New Orleans metropolitan area by use of the 5 A Day message. Nineteen high schools in the Archdiocese of New Orleans have agreed to participate in the Gimme 5 Program. A matched-pair design, based on race, sex, and location, was used to identify 12 schools (6 pairs) for the actual research. Six schools will participate in the intervention and evaluation, and only six schools will be evaluated. Two of the selected schools have a co-ed student body, six have only girls, and four have only boys; each school has a biracial mixture.

The targeted cohort are 9th grade students enrolled in the 1993–94 school year who will be followed each year until they complete the 12th grade. It is anticipated that there will be a 93 percent student retention rate from 9th to 10th grade and from 10th to 11th grade, and a 96 percent retention rate from 11th to 12th grade. Current enrollment of ninth graders at these schools ranges from 100 to 340 students. Another seven schools in the Archdiocese will serve as demonstration schools, assisting with the

pilot testing of intervention and evaluation materials.

The intervention will consist of four components: workshops and complementary activities, school meal and snack modification (“Fresh Choices”), a school media and marketing campaign, and involvement of parents (“Raisin Teens”). Coaches, health education teachers, or counselors will deliver six workshops over 4 years to the intervention school cohorts. Activities in other classes will complement each workshop, for example, in French class students will learn the French words for fruits and vegetables. “Fresh Choices” will focus on increasing the fruit and vegetable choices in school cafeterias and snack outlets, with strategies aimed at promoting increased consumption. The school media and marketing campaign will reinforce other components through the use of brochures, videotapes, posters, public service announcements, games, rap-songs, drama skits, marketing stations, and other similar communication channels.

“Raisin Teens” will focus on activities and materials for the parents of the intervention school cohorts aimed at increasing the availability, variety, and taste of fruits and vegetables in the students’ homes. Refrigerator tip sheets, cookbooks with monthly inserts, cooking demonstrations from local chefs, and promotions at school sports events are examples of these activities.

The Gimme 5 Program is a collaboration among the Tulane University School of Public Health and Tropical Medicine, local universities, culinary chefs, American Cancer Society, and the Louisiana State Health Department. Other networking avenues include commodity groups licensed to participate in the 5 A Day Program. Gimme 5 investigators plan to modify existing materials developed by these groups and discuss the development of new materials to target high school students. Video tapes developed by the Louisiana Chapter of the American Cancer Society will complement the workshops introduced in the Gimme 5 Program. These video tapes will convey the 5 A Day message as it relates to physical activity, appearance, snacking, dining out, and other relevant topics.

Personnel from the Louisiana State Health Department will participate in the development and implementation of Gimme 5 activities and in ensuring their adaptability to the statewide campaign; projects of particular interest include those at sporting events and other family-oriented activities. Other partners include local media stations, large chain grocery stores, and sports teams. The culinary department at a local college will assist in the development of a 5 A Day fruit and vegetable recipe file for preparation of large

quantities of foods and in presenting cooking demonstrations for both students and their families.

Georgia: “Gimme 5 Fruits and Vegetables for Fun and Health.” This project targets families with fourth and fifth grade children in Gwinnett County and in a major urban area in Georgia. Previous research by the Georgia investigators revealed that their school curriculum intervention resulted in changing fruit and vegetable consumption only at school (27). Therefore in this project, the investigators decided to expand the intervention to include families. Gwinnett County is a middle-class suburban community, where about 9 percent of the students qualify for free or reduced-price lunches. In contrast, 69 percent of students qualify in the major urban area.

The “Gimme 5” curriculum will be implemented sequentially in the fourth and fifth grades in eight schools. Eight control schools have been selected, matched on size, socioeconomic status (SES), and ethnic composition. The “Gimme 5” school nutrition education curriculum will seek to increase the availability of fruits and vegetables in the home, to increase preference for fruits and vegetables, to enhance children’s ability to prepare fruit and vegetable dishes by providing FaSST (fast, safe, simple, tasty) recipes, and to use behavior modification techniques to increase consumption (for example, self-monitoring, goal setting, and self-reward). The curriculum includes fun activities such as a fruit and vegetable rap and games.

In addition to the curriculum, the project will send to the students’ homes newsletters to encourage family participation and videotapes to model desired dietary practices. Point-of-purchase taste testing and education will be conducted to reach families in grocery stores near participating schools.

The project will assess changes in the consumption of fruits and vegetables, in availability of fruits and vegetables at home, in self-efficacy and preferences for consuming more fruits and vegetables, and in movements in stages of change. Process evaluation measures for implementation of the curriculum will also be collected.

This project is led by researchers at the Emory School of Public Health. Collaborating partners include the Gwinnett County Public School System, another major urban school system, and produce retailers in the respective areas. The Gwinnett County schools and another major urban school system provide access to the target population of fourth and fifth grade students and their families. The teachers will deliver the Gimme 5 nutrition education

curriculum, and distribute newsletters and videotapes to the children to be taken home to parents. Local produce retailers will conduct taste testings of fruits and vegetables, distribute 5 A Day educational materials and copies of FaSST recipes, and perform other educational activities.

Alabama: "High-5-Alabama." The High-5-Alabama project will develop and evaluate a multicomponent program to increase the consumption of fruits and vegetables by fourth-grade students and their families in three school districts in the greater Birmingham area. The participating school districts include the Bessemer City Schools, the Hoover City Schools, and the Jefferson County Board of Education. Twenty-four schools from these districts will participate in the program. The schools range in size and have a median number of 5 fourth grade classes per school. Participating schools are drawn from rural as well as suburban areas and vary in the ethnic distribution of their student population. The children in each school are primarily black or white, with the ratio varying by school. The economic makeup of the schools' populations also varies; they range from families with predominantly low incomes to those with predominately high incomes.

Twelve elementary schools will serve as intervention sites, and 12 will serve as controls. The three project components are a classroom curriculum, a parent intervention, and an environmental intervention. A 15-session curriculum will be delivered by the teachers in each school assisted by nutritionists employed by High-5-Alabama. Special events, such as taste testings and a food fair held by the children for their parents, will be used to reinforce the classroom component. The parent intervention will include newsletters, tip sheets, and educational sessions. Interactive homework, aimed at altering parental behavior and coordinated with the classroom interventions, will also be completed with the child.

The environmental intervention component will consist primarily of teaching food service workers to increase foods served that correspond to 5 A Day guidelines. The food service personnel will be asked to label fruits and vegetables in the cafeteria, to assist in taste testings, and to help conduct demonstrations, and set up displays that will support the other intervention activities.

Several agencies are collaborating with the School of Public Health at the University of Alabama at Birmingham (UAB) in this project. The three participating school districts are active partners in the development and evaluation of the High-5 intervention. Elementary schools within these three districts

'Each 5 A Day project has chosen a specific channel and target population for intervention and has randomized its units to either intervention or control conditions.'

will serve as the program sites; key school personnel will serve on the steering committee for the project. Other agencies collaborating with UAB include the Healthy Alabama 2000, American Cancer Society, UAB Comprehensive Cancer Center, and Alabama Department of Public Health.

The Healthy Alabama 2000 is a statewide coalition comprised of various groups committed to improving the nutritional intake of Alabama citizens and focusing its activities on increasing the intake of fruits and vegetables. The Alabama division of the American Cancer Society will provide some educational products for use by High-5 Alabama. The UAB Comprehensive Cancer Center serves as a resource by providing expertise through its scientific faculty and community outreach activities. In collaboration with the UAB Cancer Center, the Alabama Department of Public Health is leading the effort to license supermarket retailers in the State; this will provide High-5-Alabama access to retailers. High-5-Alabama will serve as a resource to the State by delivering education to children, by sharing effective educational approaches, and eventually by disseminating effective materials throughout Alabama.

Discussion

These multicenter research projects, which are being implemented in a variety of settings that can facilitate health promotion activities, are addressing numerous issues important to public health practitioners. These projects will assess how the proposed interventions should be modified based on age, sex, race, and ethnicity of the target population. They will also assess how these interventions should be tailored, based on the type of site where the interventions will occur. Each channel represents an important potential avenue for public health interventions.

For example, the WIC Program provides nutritional risk assessments, nutrition education, health and social service referrals, and specified nutritious foods to pregnant, post-partum, and breastfeeding women, and to infants and children up to age 5 years. The

'They will also assess how these interventions should be tailored, based on the type of site where the interventions will occur.'

program is funded and administered nationally by the Department of Agriculture, working through State departments of health. County and city departments of health receive funding through the State to provide WIC services locally. WIC participants represent an important, low SES population, all having low income and many having less than a high school education. A large proportion are members of racial minorities. Study results may provide insights for other low SES populations.

Black churches often play a central role in the lives of their congregations, acting as advocate, encourager, and enabler of improved health in other areas. Implementing interventions there may be particularly effective because of the central role the church plays in the lives of many blacks. Members of such churches invest a great deal of trust in their pastors, lay leaders, and fellow members. This channel may provide an excellent source of motivation for improving the diets of its members. Nutrition interventions can easily be incorporated into many existing activities in a familiar setting which is comfortable to the congregants.

Worksite health promotion programs can be an effective public health channel for reaching private and public sector employees. More than 60 percent of adults between the ages of 18 and 65 are employed (28). Most employees eat at least one meal at the worksite (29). The worksite has the potential for providing a supportive environment for health programs. The stability of the work force facilitates continuous education. Coworkers can be key sources of health-related information and models for attitudes and behavior.

CHCs are important intervention sites because they employ health-conscious workers who are likely to diffuse health messages to both their families and their patients. CHCs address the health care needs of high-risk, low-income, minority, and non-English speaking populations and have a strong commitment to the provision of primary health care, preventive services, and health promotion activities. CHCs use a multidisciplinary team approach to provide direct health education, injury prevention, outreach, and case management. Federal, State, and local govern-

ments fund primary care services for the medically underserved through CHCs.

Schools offer many potential benefits as intervention sites. With 95 percent of U.S. children enrolled in school and with more than 24 million children participating in the National School Lunch Program, a unique opportunity to modify dietary behavior and promote healthful eating patterns is available. Furthermore, it may be easier to establish healthful dietary habits during childhood than later in life. Dietary habits, food preferences, and positive attitudes toward healthful food developed in childhood may help in maintaining healthful eating behavior throughout adulthood.

Health promotion programs for high school students are limited. These youths are nutritionally vulnerable, being at an age when they are exercising their freedom to make personal decisions in all aspects of life. Problems ranging from obesity to diabetes to eating disorders make this age group a particular challenge to reach.

Each of the NCI-funded 5 A Day projects is led by a multidisciplinary team of researchers. Investigators with expertise in public health, preventive medicine, nutrition, health education, communications, community organization, epidemiology, biostatistics, and social psychology play prominent roles in these projects.

The collaborative aspects of these projects are exceedingly strong. As shown in the box, each lead institution is working with numerous partners. These include State and local health departments, State education departments, State agriculture departments, universities, Cooperative Extension Services, local chapters of the American Cancer Society, and either schools, worksites, community health centers, WIC sites, or churches.

Extensive cooperation and enthusiastic collaboration also are occurring among the investigators of the nine projects. Collaborative activities include

1. sharing evaluation instruments, materials, approaches, and ideas,
2. designing common evaluation tools, and
3. preparing scientific manuscripts.

While the results from the NCI research projects are being awaited, there are many opportunities for others to work in the national 5 A Day program. State health agencies can serve as a forum for the cooperative efforts of health, educational, agricultural, and voluntary agencies and the private sector in promoting the 5 A Day message. Many State or local public health agencies are developing coalitions

to engage consumers in awareness and skills development activities that will help increase their fruit and vegetable consumption. Local health departments, Cooperative Extension Services, State departments of education and agriculture, voluntary agencies, and representatives of the food industry can contribute to the 5 A Day Program by working with their State health agency on such a coalition.

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