Chapter 12: Key Messages

- Population-based interventions are targeted toward promoting the overall health status of the community by preventing disease, injury, disability, and premature death. A population-based health intervention should include the following: assessment, health promotion, disease prevention, monitoring of services, and evaluation. Some methods include public education programs, community projects, and media interventions.
- Bone health is particularly amenable to population- and community-based interventions, for several reasons.
  - ~ Bone loss and fractures affect a large portion of the population and can be prevented during all stages of life.
  - ~ There is a widespread lack of knowledge about prevention among providers and the public.
  - ~ State and local governments have an incentive to promote this approach, since the costs of caring for bone disease are frequently borne by government and the benefits from population-based interventions extend to other areas of health.
  - ~ Well-crafted population-based interventions have been shown to be effective in improving bone health and other aspects of health, including increases in physical activity and decreases in smoking within a target population.
- Communication is an essential tool in many population-based health interventions. Public sector (social marketing, mass media campaigns) and private sector (direct-to-consumer advertising) approaches can be used to reach target populations.
- This chapter includes seven case examples of successful and/or innovative interventions that can serve as building blocks for future population-based approaches to bone health:
  - ~ Any campaign should be based upon credible evidence and be evaluated on a continuing basis to ensure that objectives are being met and/or that corrective action can be taken.
  - ~ A number of evidence-based tools are available for developing interventions.
  - ~ Basic education about bone health is an important component.
  - ~ Building local partnerships is critical to success. Health care providers; education, environmental, and housing agencies; organizations serving the aged; churches, synagogues, and other religious organizations; and other groups can help to build a comprehensive strategy for maximizing the bone health of community residents.
  - ~ Useful prevention messages are available for every age group, although age should not be the only variable affecting the design of interventions.
  - ~ Health policy and environmental changes are important tools in health promotion.

Chapter 12

POPULATION-BASED APPROACHES TO PROMOTE BONE HEALTH

This chapter defines and provides examples of population-based interventions for promoting bone health that are tailored to different populations, addresses evidence regarding their effectiveness, and identifies some key aspects of successful programs.

Definition of Population-Based Interventions

In contrast to clinical services provided to individual patients in an effort to improve their health status, population-based interventions are targeted toward populations to promote the overall health status of the community by preventing disease, injury, disability, and premature death. A population-based health intervention should include the following: assessment, health promotion, disease prevention, monitoring of services, and evaluation. Some methods to accomplish these goals include public education programs, community projects, and media interventions. Some programs involve combinations of these approaches.

Most of these interventions are tailored to reach a subset of a population although some may be targeted towards the population at large. Populations and subsets may be defined by geography, culture, race and ethnicity, socioeconomic status, age, or other characteristics. Many of these characteristics relate to the health of the described population (Keller et al. 2002).

Bone health is a topic particularly amenable to population-based interventions, for a variety of reasons. Bone loss and fractures affect a large portion of the population, and they can be prevented during all stages of life. As discussed elsewhere in this report, there appears to be a widespread lack of knowledge about prevention approaches among both health providers and the general population. Finally, State and local governments have an incentive to promote population-based bone health interventions, for several reasons. First, the complications of osteoporosis are easily observed, and the costs of caring for these complications are frequently borne by these governments. Second, such interventions, including promoting exercise and appropriate diet, provide many other health benefits to community residents as well.

The most effective population-based approaches in bone health often involve a combination of individual- and population-level initiatives. The story of the Elder Floridian Foundation in the text box below highlights the interplay of individual- and population-level interventions and the importance of reaching beyond traditional health practices to produce positive changes in the population's health.

Personal Perspective of a Volunteer With the Elder Floridians Foundation

As a teenager, I watched my grandmother and her sisters get shorter. After my grandmother broke her hip, I spent many weekends cleaning for my grandparents while my mother prepared meals for the upcoming week. Grandmother never fully recovered from her fracture and died within a year. I was not able to name the primary reason for my grandmother's death until much later.

I learned about osteoporosis by researching the disease and writing press releases and background papers as a volunteer for the Elder Floridians Foundation. These materials were used for a media campaign to support proposed Florida legislation that would mandate the diagnosis and treatment of osteoporosis. Learning that it is possible to keep bones healthy and prevent fractures was an incredible discovery. Although I felt strongly that all older women should have this information, I did not feel that it applied to me. After all, I was in my mid-40s and healthy.

During the Governor's kick-off news conference event, which involved bone density (DXA) tests for reporters and elected officials, I got a big surprise. Results of my own DXA indicated low bone density of the hip.

I was alarmed that more than a million women in Florida might be in a similar situation, and it became my mission to educate them about their risk for this disabling disease. The media campaign was successful. Legislation was passed that mandated insurance coverage for medically necessary diagnosis and treatment of osteoporosis for high-risk individuals.

It also resulted, however, in an unfunded mandate to create an education and awareness program in Florida. To fill this gap, the Elder Floridians Foundation launched *Project Osteoporosis: Be Smart, Be Dense, Know the Difference* in September 1997.

The goal of *Project Osteoporosis* is to alert Florida's citizens through community-based education programs to the vital need to prevent, diagnose, and treat osteoporosis. These programs consist of a risk assessment survey, an educational slide presentation, a question and answer opportunity with health care professionals, and a peripheral bone density scan of the forearm (pDXA). Women's organizations, civic and faith groups, universities, and professional associations are among the Foundation's grassroots partners. They enthusiastically host *Project Osteoporosis* programs in local communities and at regional and State conventions.

Project Osteoporosis has traveled to 53 of Florida's 67 counties, providing hundreds of thousands of screenings to many grateful Floridians. The program has also shown that osteoporosis happens to people from all walks of life. Many of the people touched by this campaign have already suffered the consequences of osteoporotic fractures. Here is the story of one woman who was meaningfully affected by *Project Osteoporosis:*

Lucy was in her early 70s, had lost 5 inches in height and was no longer capable of growing new bone. Unfortunately, she suffered three compression fractures before a physician recommended a bone density test and prescribed treatment. By this time, Lucy's bones had become so brittle that she had two more compression fractures of the spine after beginning treatment. She said two things that still have a tremendous impact on the volunteers who work for *Project Osteoporosis*: "Be sure to tell people about the pain" and "I wish I had known."

Evidence of the Effectiveness of Population-Based Interventions

There is every reason to believe that well-crafted, population-based interventions can be highly effective in improving bone health and other aspects of health. For example, in 1993, it was estimated that while 10 percent of early deaths in the United States could be prevented through medical treatment, 70 percent could be prevented through programs that reduce health risks such as tobacco, drug, and alcohol use; sedentary lifestyle; poor nutrition; violence and environmental factors (McGinnis and Foege 1993). Over the past two decades, a variety of public health and health care professionals and organizations have developed methods for conducting standardized reviews of the effectiveness of interventions, including population-based interventions. These standardized assessments of an entire body of evidence for a specific intervention are known as "systematic reviews." Systematic reviews have contributed to methods for translating evidence into recommendations for practice (Canadian Task Force on the Periodic Health Examination 1994, Preventive Services Task Force [U.S.] 1996, Briss et al. 2000, Fiore et al. 2000). These "evidence-based recommendations" provide a method for linking the strength of a recommendation to the availability and quality of supporting evidence.

The Guide to Community Preventive Services (the Community Guide) provides systematic reviews on the effectiveness of various population-based interventions for a variety of public health topics, and then translates the evidence of effectiveness into evidence-based recommendations (Truman et al. 2000, Zaza et al. 2000). To date, the Task Force on Community Preventive Services has published reviews and recommendations on population-based interventions for nine public health topics (Guide to Community Preventive Services 2003).

The Community Guide includes completed reviews of interventions on two topics directly related to improving bone health: increasing physical activity (Task Force on Community Preventive Services 2002) and reducing tobacco use and exposure to environmental tobacco smoke (Task Force on Community Preventive Services 2001). These reviews and recommendations provide an initial set of population-based intervention options for communities and health care systems, and illustrate the range of settings and strategies to consider when developing population-based approaches to promote bone health.

Population-Based Interventions To Increase Physical Activity

Regular physical activity is associated with improved health and reduced risk of overall mortality (Lee et al. 1995, Paffenbarger et al. 1993). Physical activity and fitness have many bone health benefits, including reduced risk of osteoporosis and fractures (Bonaiuti et al. 2002, Karlsson 2004) and fall-related injuries (Carter et al. 2001, Robertson et al. 2002).

The Task Force on Community Preventive Services selected and reviewed 11 interventions related to physical activity. Recommendations were based primarily on the demonstration of changes in physical activity behaviors or aerobic capacity. As shown in Table 12-1, the task force found sufficient or strong evidence on the effectiveness of six interventions (Task Force on Community Preventive Services 2002), including community-wide, multi-component information campaigns; point-of-decision prompts to encourage stair use; school-based physical education; social support interventions in the community; health-behavior change programs

Table 12–1. Recommendations from the Task Force on Community Preventive Services, 2001– Use of Selected Interventions to Increase Physical Activity (PA) Behaviors and Improve Physical Fitness

Intervention	Number of Qualifying Studies	Task Force Recommendation
Informational approaches to increasing physical activity		
Community-wide campaigns (multi-component intervention)	10	**Recommended** (strong evidence on effectiveness)
Mass media campaigns	3	**Insufficient evidence**
Point-of-decision prompts to encourage stair use	6	**Recommended** (sufficient evidence on effectiveness)
Classroom-based health education focused on information provision	10	**Insufficient evidence**
Behavioral and social approaches to increasing physical activity		
Individually adapted health behavior change programs	18	**Recommended** (strong evidence on effectiveness)
School-based physical education (PE)	13	**Recommended** (strong evidence on effectiveness)
Classroom-based health education focusing on encouragement to turn off the television	3	**Insufficient evidence**
College-age physical education/health education	2	**Insufficient evidence**
Social support interventions in community contexts	9	**Recommended** (strong evidence on effectiveness)
Social support interventions in families	11	**Insufficient evidence**
Environmental and policy approaches to increasing physical activity (additional reviews in progress)		
Creation of or enhanced access to places for physical activity	10	**Recommended** (strong evidence on effectiveness)
Point-of-decision prompts to encourage stair use		See above under Informational approaches

Source: CDC 2001.

adapted for individual needs; and environmentally enhanced access to places for physical activity.

Evidence was insufficient to assess the effectiveness of five interventions selected for review, meaning that there is not enough information to conclude whether these strategies are effective. These five interventions include the following: classroom-based health education focused on information provision (due to inconsistent results); family-based social support (inconsistent results); mass media campaigns when implemented alone (insufficient number of studies); college-based physical and health education (insufficient number of studies); and classroom-based health education focused on reducing television viewing and video game playing (insufficient evidence of an increase in physical activity). For a more detailed explanation of the evidence for these interventions as well as others that were evaluated, see http://www.thecommunityguide.org/pa/pa.pdf. Conclusions from the task force document the strength of the available evidence and demonstrate that a variety of community-based interventions lead directly to increases in physical activity within the targeted population. These increases should ultimately lead to bone-health benefits, given the direct link between regular physical activity and stronger, healthier bones. The recommendations identify and support a range of effective, population-based options for schools, businesses, health care systems, and communities to increase physical activity. Programs, planners, and decision-makers can review the information, identify the efforts most appropriate for their local circumstances (setting, goals, target population, and resources), and translate the selected recommendations into specific, actionable interventions.

Population-Based Interventions To Reduce Tobacco Use

Smoking can be detrimental to bones, and therefore tobacco prevention and control efforts can have a positive impact on bone health. More broadly, these programs provide an excellent model for understanding how to assess, translate, and apply evidence on the effectiveness of population-based interventions.

The Community Guide reports strong evidence-based conclusions on the effectiveness of population-based interventions in tobacco control (Task Force on Community Preventive Services 2001). Table 12-2 lists task force recommendations developed from 14 population-based interventions. These recommendations illustrate several important points.

First, policies themselves are effective interventions. The concept of policies as interventions is firmly established in tobacco prevention and control programs. Laws and/or ordinances related to clean indoor air and excise taxes on tobacco products have proven to be effective population-based policy interventions. (See the Michigan case study later in this chapter for an example of the use of State polices to improve bone health.) Second, health care systems can be important settings for population-based interventions. Policies and programs implemented by health care systems, or by large employers or other entities that purchase health care for large groups of people, can target both patients and providers. Evidence of the effectiveness of clinical interventions that were documented in previous reviews (U.S. Preventive Services Task Force 1996, Fiore et al. 2000) enabled the Task Force on Community Preventive Services to focus on interventions designed to motivate patients and/or providers to make greater use of such interventions. (See Chapter 11 for addi-

Table 12–2. Recommendations From the Task Force on Community Preventive Services, 2000—Selected Population-Based Interventions To Reduce Tobacco Use and Exposure to Secondhand Tobacco Smoke

Intervention	Number of Qualifying Studies	Task Force Recommendation
Strategies to reduce exposure to secondhand tobacco smoke		
Smoking bans and restrictions	10	**Recommended** (strong evidence on effectiveness)
Community-wide education to reduce exposure in the home	1	**Insufficient evidence**
Strategies to reduce the initiation of tobacco use		
Increasing the unit price of tobacco products	8	**Recommended** (strong evidence on effectiveness)
Mass media education campaigns when combined with additional interventions	12	**Recommended** (strong evidence on effectiveness)
Strategies to increase tobacco-use cessation		
Increasing the unit price of tobacco products	17	**Recommended** (strong evidence on effectiveness)
Mass media education campaigns when combined with additional interventions	15	**Recommended** (strong evidence on effectiveness)
Mass media education-smoking cessation series	9	**Insufficient evidence**
Mass media education-smoking cessation contests	1	**Insufficient evidence**
Telephone cessation support when combined with additional interventions	32	**Recommended** (strong evidence on effectiveness)
Health care provider reminder systems when combined with provider education with or without patient education	31	**Recommended** (strong evidence on effectiveness)
Health care provider reminder systems when implemented alone	7	**Recommended** (sufficient evidence on effectiveness)
Reducing patient out-of-pocket costs for effective cessation therapies	4	**Recommended** (sufficient evidence on effectiveness)
Health care provider education when implemented alone	16	**Insufficient evidence**
Health care provider feedback	3	**Insufficient evidence**

Source: CDC 2000.

tional discussion of the role of health systems in population health.)

Third, interventions are often implemented and evaluated in combination. Four of the 14 interventions reviewed in Table 12-2 consist of multiple components. In many cases, the independent effects of the various components of the interventions cannot be determined based on the available body of evidence. The Michigan example described later in this chapter illustrates the use of a combination of interventions to improve bone health.

The concept of a comprehensive population-based approach to address a public health problem has become essential to tobacco prevention and control programs (Centers for Disease Control and Prevention 1999). Comprehensive multicomponent efforts acknowledge that reducing tobacco use requires a population-based change in attitudes as well as behaviors (National Cancer Institute 2000). Bone health advocates can benefit from examining the multifaceted programs used in community tobacco interventions.

Communication Tools for Population-Based Interventions

Communication is an essential tool in many population-based health interventions. Its role and effectiveness are described extensively in the Institute of Medicine report, "The Future of the Public's Health in the 21st Century" (Committee on Assuring the Health of the Public in the 21st Century 2003). Public sector (social marketing, mass media campaigns) and private sector (direct-to-consumer advertising) approaches can be used to communicate with target populations in order to improve health.

Social Marketing

Social marketing, which has been used since the 1970s, is based on the principles of commercial marketing. It involves the planning and implementation of an orchestrated marketing effort, usually involving multiple organizations and institutions, with the ultimate goal of generating behavior change. It is commonly described as being based on the "four Ps": product, price, place, and promotion. "Product" is the targeted behavior, which may be the initiation of a new behavior or the cessation of a current behavior. "Price" is the individual's perception of what may be lost or given up for the sake of behavior change. "Place" is where individuals have access to the products or services or where they engage in the desired behaviors. "Promotion" is communicating to target audiences about behavior change through a variety of ways, including media relations, personal selling, and special events (McKee 1992, Siegel and Donor 1998).

The development of effective social marketing campaigns requires extensive formative research, including qualitative and quantitative methods that are used throughout the process to understand the specific needs, desires, beliefs, and attitudes of the target audience (Andreason 1995). (For an example of formative research for social marketing purposes, see the description of the National Bone Health Campaign in this chapter.) Currently, the Robert Wood Johnson Foundation is sponsoring a Social Marketing Collaborative in its Turning Point program to develop social marketing resource guides for U.S. agencies and organizations (Social Marketing Collaborative 2002).

Direct-to-Consumer Advertising

Direct-to-consumer advertising (DTCA) has become a common way for pharmaceutical companies to market new products. In 1997, the Food and Drug Administration released guidelines on consumer-oriented drug marketing. Since then, DTCA has become a multibillion-dollar aspect

Learning From Other Campaigns: The National Cholesterol Education Program

Successful national educational campaigns for other diseases can serve as useful models for what might be achievable through coordinated efforts to improve bone health. One such model is the National Cholesterol Education Program (NCEP), launched in the fall of 1985 and modeled after another successful program—the National High Blood Pressure Education Program. NCEP was administered and coordinated by the NIH National Heart, Lung, and Blood Institute (NCEP 2003). More than 35 national medical, public health, and voluntary health organizations and Federal agencies served as active partners and members of the program's coordinating committee. The multidisciplinary partnership included researchers, clinicians, public health officials, and policy advocates at the national, State, and local levels. NCEP had a number of objectives. First, it attempted to keep health providers up to date on science-based clinical guidance. Second, it promoted awareness in the general population of the consequences of uncontrolled high blood cholesterol and urged individuals to "know your number" and what it means to you. The ultimate goal was to lower elevated cholesterol levels as a means of reducing heart attacks and heart attack deaths.

With input from its partners, the program developed television public service announcements, print ads and other media materials, public health information publications, and patient guides. It also produced physician kits and clinical guidelines.

In addition, the vast memberships and State chapters of its Coordinating Committee partners carried out many of their own initiatives via their far-reaching collective channels.

The impact has been significant. In 1983, only 35 percent of Americans said they had had their cholesterol checked. By 1995, that figure jumped to 75 percent. In other words, some 70–80 million Americans who were unaware of their blood cholesterol levels in 1983 took action to find out where they stood and what they needed to do to protect their hearts. Physicians became more aware of cholesterol detection and treatment as well, as core NCEP clinical guidelines are now firmly established in everyday practice. The average total cholesterol level of American adults has fallen significantly, and coronary heart disease mortality has continued to decline. These indicators show the considerable impact that cholesterol education has had (NCEP 2003).

Ten Lessons Learned From the National Cholesterol Education Program

The lessons learned from the NCEP are valuable for any national campaign being developed to improve health:

1. Establish a solid scientific base that can bring credibility and persuasion to effort.
2. Create a multidisciplinary and far-reaching partnership that includes interested organizations with State and local chapters.
3. Make sure partners and target audiences have input at the concept stage, not just the dissemination stage.

Ten Lessons Learned From the National Cholesterol Education Program (cont.)

4. Pursue collaboration with outside interests, such as industry, as appropriate opportunities arise.
5. Develop a comprehensive program plan that includes roles for all partners.
6. Reach a consensus on consistent key messages that can be repeated and reaffirmed by many partners through many channels and outlets.
7. To reach desired goals and objectives, make sure the effort has the type of long-term commitment in terms of leadership and funding from sponsoring organizations that is necessary to make it sustainable over the long term.
8. Both population and clinical approaches will be needed in order to change behavior at the personal, family, and community level, and choices between these two types of interventions should not be made.
9. Establish or acquire baseline data pertinent to established goals and objectives so progress, or lack thereof, can be measured and program direction can be altered as needed.
10. Build in a reassessment and renewal process to keep the effort vital and current.

Similarities Between Osteoporosis and Cholesterol

There are similarities in expression of the two risk factors, osteoporosis and elevated cholesterol, that suggest that a program comparable to the NCEP has the potential to be effective in improving bone health. These include:

1. The first symptom often can be a serious event (a fracture in one case, a heart attack in the other).
2. Osteoporosis is now and cholesterol was then underdetected, underdiagnosed, undertreated, and underappreciated.
3. Osteoporosis does and cholesterol did require a two-prong approach, e.g., lifestyle change and early detection and control.
4. The ability to assess, educate, and monitor each respective condition by knowing one's number, i.e. blood cholesterol level on one hand, T-score on the other.
5. There did exist with cholesterol and does exist with osteoporosis a tremendous need to increase awareness that these conditions are common with potentially serious consequences that can be prevented and/or treated.

of pharmaceutical marketing (Rosenthal et al. 2002). Theorists argue for and against its use, with debate usually centered on whether DTCA informs and empowers consumers or encourages them to seek inappropriate and expensive care. Several surveys have demonstrated that consumers are aware of DTCA and take action as a result of it (such as asking doctors about products) (Lyles 2002). Evidence of direct health benefits from DTCA, however, is limited (Weissman et al. 2003).

The mass media, including television programming, movies, radio, newspapers, and magazines, represents another communication

tool for the promotion of bone health. Health campaigns for other causes, including those aimed at reducing cholesterol levels, smoking rates, and the incidence of sexually transmitted diseases, have been successful in having their messages and/or desired behaviors portrayed in the mass media. Specialty and niche media can be used to reach racial and ethnic groups. One common approach for television and cinema is to suggest story lines and/or character portrayals that reinforce the intended message to the target audience. Similar efforts could be made in bone health. An example of a promising effort in social marketing is the *VERB*$_{TM.}$ *It's what you do.* campaign, a national, multicultural, social marketing campaign initiated in 2002 by the Centers for Disease Control and Prevention (CDC) to encourage young people between 9 and 13 years old to be physically active every day. Telephone surveys of youth and their parents conducted before the launch of the campaign and a year later indicate a 34 percent increase in the number of times each week that 9- and 10-year-olds engage in physical activity during their free time. There are 8.6 million children in the United States in this age group (Potter et al. 2004).

Population-Based Interventions: Conclusions

Despite challenges in mobilizing populations to improve health by addressing risk behaviors, a number of population-based interventions have been found to be effective. Evidence reviews provide a concise summary of the evidence on effectiveness and help decision-makers and program planners to weigh intervention options for local applications. Evidence reviews do not replace the important steps of conducting local assessments and enlisting community participation. Interventions should be well matched to local conditions (settings, needs, goals, target populations, and resources) and carefully implemented and evaluated.

As the evidence on different approaches continues to grow, several recurring themes and strategies emerge. While innovative application of new theories, strategies, and interventions will remain important to improving bone health, evidence-based reviews of what is already being done can play a significant role in supporting population-based program planning and decision-making.

Program Examples

Many of the following examples of population-based interventions in the area of bone health represent evidence-based interventions that draw upon research findings that have been presented in previous chapters of this report. In other cases, the examples illustrate innovative approaches where the evidence base is not yet fully developed. As a result, formal evaluation results are not available for some programs. In these cases, other evidence of the program's impact have been highlighted, including data related to "process" outcomes, such as number of Web site "hits," or proxy measures for bone health, such as the percentage of program participants who increased their calcium intake. Regardless of the evidence base for the programs, they were chosen for inclusion in this report because they each illustrate one or more key concepts in population-based interventions, which are summarized at the end of the chapter. However, this chapter is not intended to provide a comprehensive review of all successful population-based bone health interventions. The included examples are illustrative of the vast array of innovative programs that exist throughout the country.

Primary Prevention Messages for Young Girls:

The *National Bone Health Campaign*

The *National Bone Health Campaign* illustrates both the need and the ability to use population-based approaches early in life in an effort to reduce the chance of developing bone disease later. It also illustrates how a specific audience (in this case, girls age 9–12) can be the target of a prevention program.

Background

The *National Bone Health Campaign* (NBHC) is a multiyear national campaign created in 1998 by congressional mandate. Managed in partnership by the Centers for Disease Control and Prevention CDC, the Office on Women's Health (OWH) of U.S. Department of Health and Human Services, and the National Osteoporosis Foundation, this campaign uses a social marketing approach to educate preadolescent girls, their parents, and other adult influencers about behaviors that will help to prevent low bone density, thereby reducing the risk of osteoporosis later in life.

Before the campaign's materials were developed, formative research was conducted to get a better understanding of how information about calcium consumption and physical activity would be most effectively conveyed to this age group, a subject that was poorly understood. Racial- and ethnic-specific focus groups were the primary method for this research, along with a baseline survey of parents and daughters. The results indicated that bone health was neither well understood by, nor considered to be important to, girls and their parents.

The research also found that girls and their parents wanted messages that offer information, motivate them to act, provide action steps, and address the environments in which desired behaviors occur (USDHHS 2001). Girls also want messages provided in a context of fun, power, and social interaction.

The Intervention

The overall goal of the campaign is to educate and encourage girls to establish lifelong healthy habits—particularly increased calcium consumption and physical activity—that build and maintain strong bones. In the short term, the campaign is striving to increase girls' and parents' knowledge about how calcium intake and physical activity relate to bone health. Over the long term, the focus will shift to building on this increased knowledge in order to change behaviors.

To reach these goals, the campaign developed six main messages: 1) bone health is an important part of fitness, strength, and power; 2) calcium-rich foods and regular physical activity build strong bones; 3) calcium can be obtained from a variety of tasty and easily accessible foods; 4) there are a variety of easy and fun ways to get physical activity every day; 5) being more physically active is fun, and provides energy, fitness, health, and social interaction; 6) good nutrition helps you stay fit and active. All campaign materials are designed to convey easy ways to consume 1,300 mg of calcium and to participate in weight-bearing physical activity every day. To appeal to the girls' desire for inner strength, all six messages are held together by the campaign tag line: *Powerful Bones. Powerful Girls.*™

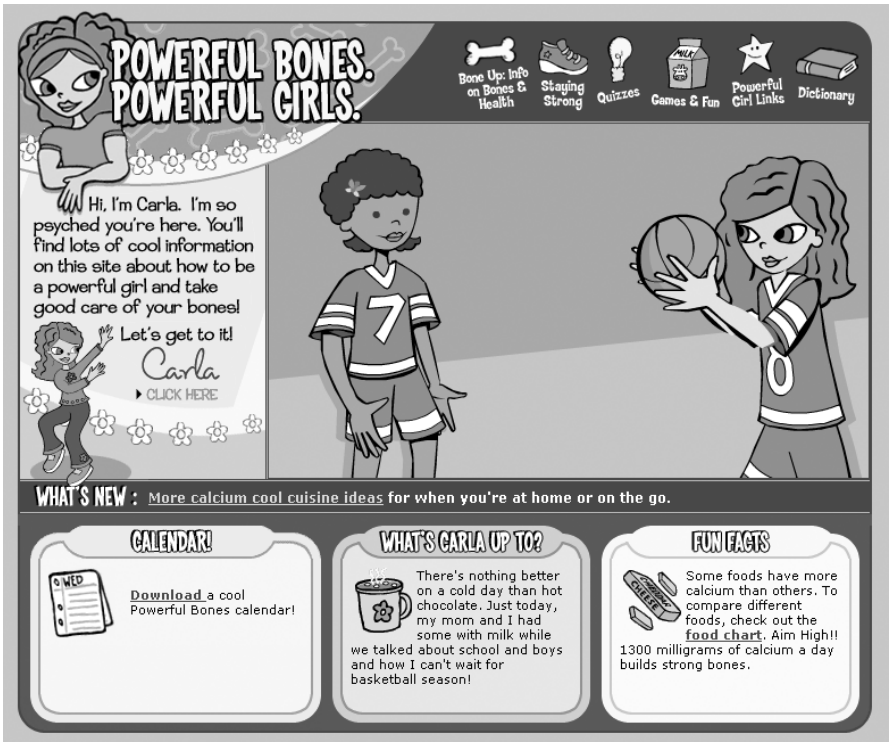
The cornerstone of the campaign is a Web site that helps girls understand how calcium and weight-bearing physical activity can be a fun, important part of everyday life. The site's spokes-character, Carla (Figure 12-1), emphasizes the basics of a bone-healthy lifestyle. The site also includes interactive games and quizzes, reci-

pes for tasty foods with calcium, and tips on ways to get weight-bearing physical activity (Centers for Disease Control and Prevention 2003).

The campaign also uses other channels to reach young girls, including paid advertisements in children and youth magazines (such as Nickelodeon, Sports Illustrated Kids, and Girls Life), radio advertisements (434 radio ads ran between July and December 2001), a radio media tour (which included 200 interviews), and print materials such as calendars with stickers, presentations, and fact sheets.

For parents, four main messages are consistently used in the campaign: 1) as part of your daughter's healthy development and future, it is vital to build strong bones early in her life; 2) foods with calcium are an essential part of a healthy, balanced diet; 3) your actions do make a difference, participating in your daughter's activities or sports programs actively or as an observer is a way to spend time with her and be part of her healthy lifestyle; and 4) creating an environment to facilitate your daughter's calcium consumption and physical activity is an easy way to ensure her health in the future. The four messages are distributed through tip sheets,

Figure 12–1. Powerful Bones. Powerful Girls. The National Bone Health Campaign



Note: The *National Bone Health Campaign* website educates preadolescent girls about adequate calcium intake and weight-bearing physical activity using interactive games and quizzes.

Source: CDC 2003.

shopping lists, and checklists that include specific action steps for parents. Paid print advertisements were placed in women's magazines such as Essence, Family Circle, and Ladies' Home Journal. A Web site (http://www.cdc.gov/powerfulbones/parents) has been launched to reinforce these key messages.

Partners

Several organizations that work directly with girls have tailored the NBHC materials to their needs. The Girl Scouts developed troop activity cards, a videotape, and a bone health patch, and Girls Inc. created activity guides and facilitator manuals. The National Association of School Nurses developed materials for use in schools. In addition, the NBHC partners with several local, State, and Federal agencies and nonprofit organizations.

Results, Evaluation, and Challenges

The focus of evaluation of the campaign to date has been on tracking "process measures" that gauge the extent to which people are being exposed to new materials and messages. As of spring 2004, the campaign had more than 122 million print media mentions and more than 3.1 million Web site visits. The plan going forward is to expand the target age of girls to 18 in order to reinforce messages initially introduced to younger girls.

Culture and Health:

Living Healthy: The Asian American Osteoporosis Education Initiative of the National Asian Women's Health Organization

This initiative illustrates the compelling need to understand each community's resources, leadership, and culture before designing and implementing a community-based health intervention.

Background

Most post-menopausal Asian women are at high risk for developing osteoporosis due to low calcium diets, low body weight, and small bones. Asian Americans often suffer from lactose intolerance, making it difficult to digest calcium-rich dairy foods. There are more than 30 distinct Asian-American ethnic groups with varying levels of English proficiency, cultural integration, and economic status. Many Asian Americans face economic and social hardships and require health intervention programs tailored to their linguistic and cultural needs. The lack of such programs, as well as language barriers, low literacy, financial constraints, and other concerns, leave Asian-American women with little incentive to seek health information and services (National Asian Women's Health Organization 1997).

The Intervention

The National Asian Women's Health Organization (NAWHO) has attempted to address these widespread, complex barriers to osteoporosis information through its community-driven education project *Living Healthy: The Asian American Osteoporosis Education Initiative.* NAWHO created a guide, "Living Healthy: The Asian American Women's Osteoporosis Education Implementation Kit," which offers a model program for health and social service agencies to plan, implement, and evaluate educational seminars on osteoporosis for Asian-American women.

NAWHO's program aims to raise awareness of osteoporosis among pre- and post-menopausal Asian-American women and to empower them to engage in positive lifestyle behaviors that promote bone health. The "Living Healthy" kit offers a mix of topics, exercises, cultural perspectives, and examples to enable organizations to tailor workshop agendas to the needs of ethni-

cally diverse Asian groups. The kit includes three major sections:

- *Section One: Osteoporosis Messages.* This section provides key messages in osteoporosis prevention for Asian-American women, combining scientific fact (using materials developed by the National Institutes of Health (NIH) Osteoporosis and Related Bone Diseases~ National Resource Center) with culturally specific content.
- *Section Two: Conveying the Message.* This section includes step-by-step instructions for planning and implementing the education seminar, such as partnership-building, agenda development, program promotion, participant recruitment, logistics preparation, use of Asian language interpreters, and evaluation and follow-up.
- *Section Three*: *Resources.* This section lists several resources, including contact information for obtaining more information on osteoporosis; a review of health and cultural beliefs shared by many Asian cultures as well as barriers to outreach, education, and screening; and guidelines for working with language interpreters.

Partners

NAWHO worked closely with the NIH Osteoporosis and Related Bone Diseases ~ National Resource Center in developing this campaign. NAWHO also collaborated with three community-based organizations—the Asian American Senior Citizens Service Center, the Lao Family Community of Stockton, and the Southeast Asian Community Center—to test the "Living Healthy" kit with Asian-American women in three California sites. Criteria for selecting community-based partners included knowledge of Asian-American health needs, access to post-menopausal Asian-American women, and adequate infrastructure and programmatic capacity in the local community.

Results, Evaluation, and Challenges

NAWHO has evaluated the impact of the forums and workshops through surveys and interviews of the participants. This evaluation suggests that use of the "Living Healthy" kit has had positive results. For example, the community forums have increased overall knowledge about osteoporosis (i.e., understanding what the disease is), enhanced specific knowledge about the disease (such as screening and exercise as prevention strategies), and strengthened behavioral intentions (such as talking to the doctor and increasing calcium intake).

The evaluation also highlighted specific challenges and barriers for Asian-American women, many of which are being addressed by the "Living Healthy" program:

- *Illiteracy among target population.* Many participants had limited reading and writing capabilities in their native language, which created challenges in completing evaluation forms. To resolve this barrier, evaluations were structured as simple true/false questions that could be read out loud to the participants. In addition, outreach efforts were extended to younger women who were educated to teach their mothers and other elderly relatives about osteoporosis.
- *Duration of presentation and audience.* Feedback suggested that the seminars should be shorter for older participants (those over age 75). Based on this feedback, an abbreviated 90-minute presentation was developed for this audience, rather than the normal 4-hour format.

- *Importance of delivery.* Delivery style can make a difference in terms of how well information is understood. For example, many participants failed to understand the key messages when they were delivered by a well-known doctor who couched his remarks in difficult-to-grasp medical terms.
- *Lactose intolerance among Asian Americans.* To address this issue, the "Living Healthy" kit provides information on alternative high-calcium foods that Asian-American women can include in their diets, such as tofu, bok choy, sea weed, and soybeans.

State Policies and Health Promotion:

Michigan Department of Community Health Osteoporosis Program

This example illustrates the importance of partnerships across multiple community sectors in implementing comprehensive health interventions and demonstrates how a State health department can promote bone health.

Background

The Michigan Osteoporosis Strategic Plan, released in 1999, included 18 recommendations that were part of a detailed plan to reduce the human and economic burden of osteoporosis; the plan called for a variety of activities to be directed at improving the bone health of Michigan residents of all ages (Michigan Department of Community Health 1999). As a result of the strategic planning process, the Michigan Legislature dedicated State funds in 1999 to create the Michigan Osteoporosis Program. The program was launched under the leadership of the Department of Community Health and the guidance of the Michigan Osteoporosis Strategic Plan Advisory Committee. The importance of this program is underscored by a 2000 economic assessment that found that Michigan citizens suffered 38,614 osteoporosis-related fractures that year, with total related medical care costs being $410 million (Burge et al. 2000).

Intervention

The Michigan Public Health Institute, a nonprofit organization under contract with the Michigan Department of Community Health, manages the program's initiatives, which are focused on reducing the prevalence of osteoporosis and osteoporosis-related fractures through consumer awareness and education programs, environmental interventions, and provider support, including education and tools. The initiative also includes assessment and evaluation components. Examples of specific interventions are described below.

In-School Education: A key recommendation in the Strategic Plan was to incorporate lessons about bone health into the existing Michigan Model for Comprehensive School Health Education Curriculum. Initiatives were designed to help youth achieve peak bone mass and lay the groundwork for continuing healthy behaviors into adulthood. Educational lessons for children in grades two and three were developed in 2000 and pilot-tested in 2001. A parent component was created to complement the information presented to students.

Community Screening: Michigan established a community screening initiative that combines a written risk assessment, individualized education, and a bone mineral density (BMD) screening test for those at risk for osteoporosis. Those individuals identified as having low bone mass are referred for further medical evaluation, and follow-up telephone calls are placed to check on the outcome from these referrals. Over 3,000

individuals completed a risk assessment and received education between 2000 and 2002. Almost two-thirds of them were identified as being at risk for osteoporosis and therefore received a BMD screening test and follow-up referrals if indicated.

Fall Prevention Program: Through a 3-year grant from the CDC, the Injury Prevention Section of the Department of Community Health is developing, implementing, and evaluating hospital-based geriatric fall prevention clinics at two Michigan hospitals. Patients who come to the emergency departments of these hospitals because of a fall or fall injury will be screened using a validated fall risk assessment tool. Eligible patients will be referred to the clinics, which will provide a comprehensive set of interventions to reduce the risk of future falls. These interventions include counseling and education of patients and families; provision of a fall-related home hazard assessment; a review of medications; lessons in Tai Chi; and referrals to other Medicare-reimbursable hospital services, including vision testing, physical therapy (for gait, balance, and muscle strengthening), treatment of chronic and acute conditions that can lead to falls, and BMD testing. A final component of the project is the development of training courses for providers (nurses, physicians, physical therapists, and occupational therapists) on how to improve their skills in identifying and managing adults over age 65 with fall injuries.

Health Department Education: In October 2001, Michigan began integrating osteoporosis education and risk-reduction initiatives into existing health department programs, such as the Breast and Cervical Cancer Control Program, WIC, and Senior Screening.

Partners

Partnerships became critical in late 2002 when State funding for the osteoporosis program was eliminated due to a budget crisis. Fortunately, by that time the program had alternative sources of funding that allowed several smaller initiatives to move forward, including the development of the fall prevention program and State quality assurance standards for bone densitometry providers.

Another project that was done in partnership with other organizations was the Partnership for Better Bones Project, a two-pronged initiative that includes both professional training and community education designed to make health care professionals and the general public more aware of osteoporosis and its risk factors. Educators from existing networks are trained and receive program materials to implement a standardized osteoporosis education program, "Better Bones, Brighter Futures."

Results, Evaluation, and Challenges

From the beginning, the program included an extensive evaluation component. Baseline data were collected to determine where education, prevention, and treatment efforts should be targeted. In 2000 and 2001, a statewide random telephone survey of 1,108 adults (age 18 and older) and 1,101 women (age 50 and older) was conducted using a survey instrument that included questions on osteoporosis knowledge and attitudes, risk factors, functional limitations, and self-reported prevalence. The survey was repeated in 2003 and will be regularly repeated in the future in an effort to allow evaluation of the overall program's efficacy.

The effectiveness of individual components of the overall initiative is also being evaluated. For example, the school health program, which

included pilot lessons in three school districts, used intervention and control groups to assess the educational impact. Each group took a pre- and post-education test, the results of which suggest that the education had a meaningful impact. A post-lesson survey with parents indicated students had made behavior changes related to eating foods high in calcium and increasing weight-bearing physical activity. The impact of the fall prevention program will be tested through a controlled group study. Patients who meet the eligibility criteria for referral to the fall prevention clinic will be randomly assigned to intervention and control groups. Both groups will be followed for 1 year, with an assessment of risk factors and documentation of subsequent falls and fall injuries taking place at 6 months and 12 months after entry into the study. The evaluation will also assess quality-of-life issues for older adults and their caregivers, along with changes in health professionals' knowledge and behavior regarding fall risk assessment and management.

Perhaps the biggest challenge facing the Michigan Osteoporosis Program came when the State government, faced with budgetary problems, decided to eliminate funding for the initiative. Thanks to strong partnerships, the program has been able to continue even in the absence of financial support from the State.

Health Messages for Older Adults:

Project Healthy Bones
New Jersey Department of Health and Senior Services

The program demonstrates opportunities for health promotion messages and activities among older citizens, as well as the use of peer leaders as advocates for bone health.

Background

The New Jersey Department of Health and Senior Services (NJDHSS) began osteoporosis prevention activities in 1991 under a grant from the CDC. These efforts continue to this day, as the State still suffers tremendously from the impact of osteoporosis. There were over 36,000 osteoporosis-related fractures in New Jersey in 2000, leading to total medical expenses of $469 million and total nursing home costs of $137 million (Burge and Worley 2001).

NJDHSS's initial efforts focused on educational programs throughout the State, but it quickly became apparent that education alone was not enough. Based on scientific research showing that osteoporosis and osteoporosis-related disability can be prevented or slowed by balance and strength training exercises, diet, appropriate medications, and a safe environment, *Project Healthy Bones* was developed This project was directed toward older women and men who are at risk for or have osteoporosis.

Intervention

The objectives of *Project Healthy Bones* are to:

- Train peer advocates as leaders for *Project Healthy Bones*;
- Educate older adults on the importance of exercise, nutrition, safety, drug therapy, and lifestyle factors relating to osteoporosis; and
- Improve strength, balance, and flexibility in older adults, using weight-training exercises (Figure 12-2).

Project Healthy Bones includes both education and exercise components. The 24-week curriculum provides information on exercise, nutrition, safety, drug therapy, and lifestyle factors related to osteoporosis. Classes are interactive, with

peer leaders facilitating information exchange.

The peer leaders are older adults who guide and support group participants as they exercise and learn. Peer leaders understand the beliefs, limitations, and concerns of the participants and work in pairs to provide both class instruction and individualized assistance. *Project Healthy Bones* includes exercises that target the body's larger muscle groups to improve strength, balance, and flexibility. Participants receive weight cuffs with 1-pound pellets that allow for individualized progression.

More than 1,700 older New Jerseyans currently participate in the program as either a peer leader or class member in 125 sites throughout the State. Waiting lists exist in most counties, as classes often elect to continue to meet after completing the 24-week cycle.

Partners

Project Healthy Bones is a partnership of NJDHSS, the New Jersey Association of Retired and Senior Volunteer Program Directors, Inc. (RSVP), and the Saint Barnabas Health Care System. NJDHSS administers *Project Healthy Bones*, acting as liaison among the three partners, developing policies for program operation and managing program funds. NJDHSS also develops and distributes peer leader and participant manuals and other educational materials.

RSVP's primary focus is local project administration, including recruiting volunteer peer leaders, linking at-risk older adults with classes in or near their communities, securing sponsors and sites for classes, and ensuring that classes operate smoothly on a daily basis.

The third partner in Project Healthy Bones includes two departments of the Saint Barnabas Health Care System. The Saint Barnabas Osteoporosis and Metabolic Bone Disease Center (OMBDC) functions as the program's technical advisor, maintaining and updating educational materials. OMBDC staff educate peer leaders about osteoporosis and Project Healthy Bones curriculum. The Saint Barnabas Center for Health and Wellness provides exercise training to peer leaders. Trainers are certified exercise

Strength Training for Older Adults

New Jersey's *Project Healthy Bones* was developed based on research at Tufts University investigating the use of strength training exercises to improve bone density in older adults. This and other research resulted in several educational programs for enhancing strength training. One example is "Growing Stronger: Strength Training for Older Adults" (Seguin et al. 2002). This self-instructional workbook on strength training includes exercise instructions, a progression logbook, safety advice, and information on additional resources.

Another example is the "Strong Women Tool Kit: A National Fitness Program for Women" (Nelson and Seguin 2002). This tool kit for program leaders of strength training programs for women includes recommendations on physical space and equipment for classes, screening of participants, tracking participants' progress, and use of leadership techniques to encourage class members. Like the "Growing Stronger" book, the material is evidence-based.

Additional information regarding strength training is available on the CDC Web site. "Growing Stronger: Strength Training for Older Adults" can be found at http://www.cdc.gov/nccdphp/dnpa/physical/growing_stronger.

Figure 12–2. Weight Training Exercises Can Improve Strength, Balance, and Flexibility in Older Adults

Note: Community exercise programs for older adults are based on evidence that osteoporosis and related disability can be prevented or slowed by balance and strength training exercises, diet, appropriate medications, and a safe environment.

Source: NJDHSS 2000.

physiologists who possess extensive experience with older adults.

Results, Evaluation, and Challenges

The impact of *Project Healthy Bones* is being evaluated through exercise tracking forms. Preliminary data suggest that the programs are making a difference. In 2001, a program review based on 217 forms revealed that 90 percent of the participants who completed at least 12 weeks of the program increased the amount of weight lifted, and 68 percent increased their calcium intake (NJDHSS 2000). Looking ahead, a more rigorous evaluation that examines the program's impact on strength, balance, and individual behavior change is warranted. Such information can be used as feedback to guide program revision and development.

Building Community Capacity and Group Support in Bone Health:

North Carolina

North Carolina was one of the first States to develop a program oriented at osteoporosis. While the State is involved in a variety of initiatives, two are profiled below. The first is a "train-the-trainer" model to build community capacity to address osteoporosis, and the second is a support-group program that helps individuals cope with the effects of osteoporosis.

Background

Low bone density and osteoporosis pose a threat to at least 1,300,000 North Carolinians age 50 and over. Each year more than 13,000 residents are hospitalized for osteoporosis-related fractures, resulting in over $145 million in direct medical costs from hip fractures alone. In addition, there are costs associated with the non-hospital treatment of fractures (wrist and spine being the most prevalent) and other health problems caused by osteoporosis. By 2020, it is projected that the number of North Carolinians with osteoporosis will exceed 400,000, while an additional million individuals will have low bone density (Borisov et al. 2002).

The Osteoporosis Coalition of North Carolina was established in 1996 to promote education and support for prevention, diagnosis, and treatment of osteoporosis; to reduce its prevalence, severity, and economic consequences; and to advocate for public and private support to achieve these goals. In 1997, the State legislature created the Osteoporosis Task Force to assess surveillance, create awareness, and develop a State plan.

Interventions and Partners

Train-the-Trainer Program: The Bone Health/Body Health (BH/BH) Initiative seeks to teach community leaders how to train others about bone health. More specifically, goals for the program include:

- Identify and train community leaders, both volunteer and professional, in techniques for communicating information about osteoporosis prevention, diagnosis, and treatment;
- Train community leaders in how to motivate and teach others the same skills; and
- Provide all training materials and educational support necessary for the community leaders to conduct their efforts effectively.

The BH/BH project targeted health professionals, administrators, and other community leaders in seven counties. The curriculum emphasized workshops on osteoporosis and health communication, with participants completing assignments between workshops. In addition, participants received a training manual, "Carrying Bone Health/Body Health to Your Community" (NCDPH 2001), "Making Health Communication Programs Work" (NCI 1989), a National Cancer Institute document, and a collection of excerpts drawn from the 2000 edition of TST Associates' "Media Relations and Promotion Training Handbook" (TST 2002).

The BH/BH program was conducted as a partnership with the North Carolina Division of Public Health, Osteoporosis Program, and the Regional Area Agency on Aging, Health Promotion and Disease Prevention Program. In addition, multiple community groups and individuals provided training, educational resources, and local venues for educating the communities.

Support Group Program: Public health staff developed a support group curriculum and a support group leader's handbook in 1997 (Condelli 2000). This effort led to the establishment of support groups in a wide variety of geographical settings by a diverse group of leaders.

During 2000–2001, there were 17 active osteoporosis support groups throughout the State, with groups holding meetings every 2 or 3 months. Groups are most active in urban areas, as limited State funding has largely prevented the establishment of groups in more rural areas. Topics for the meetings have included fall prevention, stress management, long-term care, diet, emergency preparedness, exercise, and self-esteem. Group leaders receive up-to-date information through the NOF's quarterly publication, "The Osteoporosis Report" (NOF 2002). In each session, participants are encouraged to share their thoughts and experiences in coping

with the effects of osteoporosis. In addition, pharmacists, exercise physiologists, physicians, nurses, nutritionists, wellness coordinators, physical therapists, and others give informational presentations and answer questions from participants.

Results, Evaluation, and Challenges

While no formal evaluation of the programs has been conducted, process measures have been used to track the number of participants in group presentations and free bone density screenings, the number of exhibits displayed at churches, hospitals, and senior centers, and the kinds of media used for advertising programs. In addition, the support group participants have written about their own perceptions of osteoporosis. These vignettes will be compiled in a storybook and used as a resource for future programs. Future plans also include establishing support groups in new counties, providing technical assistance to established groups, and developing an organizational structure that allows groups to receive updated information on osteoporosis and to communicate with "sister" support groups.

Evaluating Community Health Programs:

Missouri *Take Our Trail* Physical Activity Program

This example illustrates the importance of developing a well-planned evaluation of the effectiveness of an intervention program and of establishing linkages with local community groups, both of which are critical to the success of community bone health programs.

Background

In 1997, Missouri State survey data showed that 65 percent of the State's population did not engage in adequate levels of physical activity to meet public health recommendations. To address this health problem, the State health department helped to fund the construction of walking trails in two communities through the Department of Transportation (DOT) (Brownson et al. 1996). A year later, in response to requests from other communities to build trails, the State asked for evidence to determine if further investment would be worthwhile.

Although there had not been a formal evaluation of trail use, anecdotal reports indicated that the trails were underutilized because of safety concerns and lack of amenities such as playground equipment and clean restrooms. The State provided funds to the health department to conduct the *Take Our Trail* campaign, which was designed to enhance trail activities and to conduct an awareness campaign in one of the communities with a year-old trail. If community members were not more physically active after this awareness effort, the State indicated that it would probably not fund additional trails.

Intervention

The *Take Our Trail* campaign was conducted for 3 months and led by the health department and a community health coalition. A variety of initiatives were aimed at increasing awareness of the trail and of the value of physical activity. The campaign kicked off with a 3-mile Family Fun Walk. For the duration of the campaign, signs were placed in busy areas throughout the community to promote the trail. A brochure was developed and provided to all programs in the local health department for distribution to clients, clinics, physician offices, church leaders, and the coalition. The brochure included information on walking and physical activity, safety, the trail, and contact names for walking clubs.

The local television station created a public service announcement to promote the trail and the importance of regular physical activity. The

public transportation system placed signs inside buses, encouraging riders to "Take Our Trail." The community coalition helped develop walking clubs in work sites, churches, and social organizations. To address concerns about safety issues, local law enforcement officials patrolled the trail, and local business, city government, and churches raised money to add lights, along with other amenities such as benches, mile markers, painted lanes, and a water fountain.

Partners

The *Take Our Trail* campaign and its evaluation included multiple stakeholders. Participating government agencies included the local public health department, the city government, the Department of Transportation, Department of Parks and Recreation, and the Department of Education. Several local businesses and nonprofit organizations supported the campaign through donated goods, services, and publicity. Many volunteers also helped to build and support use of the trail, including walking, jogging, and cycling clubs; nearby employers; and community members who donated land, money, or other resources.

Results, Evaluation, and Challenges

Since the outcomes of the awareness campaign would directly influence future State budget policy, an extensive campaign evaluation was planned, including process measures that could help to replicate the campaign in the future, along with short- and long-term "outcomes" measures to gauge whether behaviors or intended behaviors changed.

Four primary evaluation questions were identified: 1) What activities were actually conducted as part of the *Take Our Trail* campaign? 2) Did trail use increase as a result of the *Take Our Trail* campaign? 3) Who used the trail, both before and after the campaign? 4) To what extent do trails increase physical activity levels of community members?

Since there were two communities with trails in place, the evaluation was designed as a quasi-experimental trial. Conducting the *Take Our Trail* campaign in one community but not the other allowed an assessment of whether trail use appeared to increase due to the campaign. A third geographically distinct community with similar sociodemographics and no walking trail or campaign was used as an additional comparison group. Data collection included electronic counter monitoring of trail usage; interviews with trail users and other key stakeholders in the community; event logs to capture activities at the trail such as formation of walking clubs, trail enhancements, and related events; media review to identify campaign announcements and news coverage; and community surveys immediately before and a year after the campaign.

The 3-month walking trail counter results indicated increased trail usage in the *Take Our Trail* community. The *Take Our Trail* community had a 35 percent increase in trail use between a month before and a month after the campaign, compared with a 10 percent increase experienced by the community without the campaign. Interviews revealed that individuals in the campaign community felt safer while walking than did those in the community with a trail and no campaign.

More than 60 percent of trail users in both communities indicated an increase in walking since the building of the trail. All types of people used the trail. Those who walked were more likely to be women, older adults, athletes recovering from injuries, and individuals with medical conditions that require a low-impact activity. Many of these groups are people at high risk for osteoporosis. The 1-year follow-up phone survey indicated a 5 percent increase in the number of individuals meeting the physical activity

recommendations in the *Take Our Trail* community, compared to a 2 percent increase in the other community with a trail and a 1 percent decrease in the community without a trail. While this level of increase may seem small, it could result in meaningful changes if similar increases were to occur for the next few years.

There have been some challenges for the program. Some organizations and community leaders felt "left out of the loop" despite efforts to achieve broad community support. In addition, evaluation efforts also proved to be challenging, particularly labor-intensive surveying of busy community leaders. In the future, the use of focus groups might be a more efficient way to collect similar information.

Despite these challenges, based on this evaluation and other evidence, the Task Force on Community Preventive Services strongly recommends that communities invest in increasing access to places for physical activity, combined with informational outreach activities to promote use of such places. This approach is advocated as an effective way for communities to increase physical activity levels among the population at large (USDHHS 2002) (see Table 12-1).

Using a Multimedia Approach in a National Campaign:

Milk Matters Campaign

The National Institute of Child Health and Human Development

This example illustrates the use of multiple communication channels to communicate health messages in a national campaign.

Background

Based on 1) strong scientific evidence showing that adequate calcium intake during childhood is necessary for healthy bones throughout a lifetime, 2) consensus among scientific and public health communities on optimal calcium intake, and 3) data indicating that young people were not consuming sufficient amounts of calcium, the National Institute of Child Health and Human Development (NICHD) began the *Milk Matters* public health campaign in 1997. The campaign was directed toward all segments of the population and particularly young people.

Intervention

The long-range goal of the *Milk Matters* campaign is to encourage consumption of recommended daily amounts of calcium, with an emphasis on the importance of lowfat milk and dairy products as good sources of calcium. The more immediate goal is to increase awareness about the importance of calcium in the diets of young children and adolescents, which is seen as a critical step in the process of behavior change.

The campaign used multiple approaches to increase public awareness. Examples include:

- "A Crash Course on Calcium" is an in-school program, which included a video, featuring Olympic Gold medalists Amy Van Dyken and Kristi Yamaguchi, along with a teacher's guide, poster, and brochure. The course was designed to teach teens about bone health, calcium, and how getting enough calcium can help prevent injury now and osteoporosis later in life.
- "Milk Matters with Buddy Brush" is a coloring book for children age 4–8 that teaches the importance of milk for building strong teeth and bones. More than 1.7 million copies were distributed to dentists and health educators around the country.
- "Milk Matters for Your Child's Healthy Mouth" is a booklet about milk and calcium for parents. Its goal is to let parents know that calcium is important for a

healthy mouth and to suggest ways to include calcium-rich foods such as milk and dairy products in their child's diet. The booklet is distributed to parents through WIC and Head Start programs, to State dental directors, and at meetings for health care professionals.

- "Bone Up on Bone Loss!" is a one-page brochure for health care professionals to distribute to parents and children that emphasizes the importance of weight-bearing exercise and calcium on building strong bones.
- Two other brochures were developed for parents, along with a brochure for health professionals. Available in both English and Spanish, these three resources have been distributed to health professionals at a number of meetings.

The *Milk Matters* Web site is designed to be an interactive, comprehensive resource for the public that can be viewed in English or Spanish (http://www.nichd.nih.gov/milk). Users can read *Milk Matters* publications online or order them online at no charge. Among other things, the Web site provides in-depth information about foods that are good sources of calcium, facts on lactose intolerance, and scientific abstracts on calcium research. The latest addition to the Web site is the "Kids and Teens" page, which includes puzzles and coloring pages for younger audiences and video games for older children.

Partners

Early in the campaign, NICHD established partnerships with several organizations that could help the campaign reach its primary audience. The campaign also collaborated with several of these organizations in developing its educational resources, including the American Academy of Orthopedic Surgeons (AAOS), the Milk Processor Education Program (MilkPEP), the National Dairy Council (NDC), and the National Institute of Dental and Craniofacial Research (NIDCR).

Results, Evaluation, and Challenges

Evaluation of the *Milk Matters* campaign has focused primarily on collecting information to improve the program, not on assessing its impact with respect to increasing awareness and consumption of calcium. Bounce-back card enclosures are included with outgoing orders for campaign materials. Recipients use these cards to indicate, for example, which materials they requested, how they used the materials, how they learned about the campaign, and if they are a health professional, parent, or teacher. Analysis of this information has influenced *Milk Matters* in several ways. For example, it pointed out the need to reach a Spanish-speaking audience and the need for publications that are easy to read. This feedback led to the development of several new publications, including a coloring book for children.

The *Milk Matters* campaign posed new marketing challenges to NICHD, and these challenges increased the importance of reaching out to new partners. As noted, NICHD worked closely with commercial partners to develop educational materials. At the same time NIHCD also partnered with other non-commercial organizations, such as professional societies, in order to avoid the perception that it was endorsing these commercial entities.

Building on Success

The case examples included in this chapter provide critical observations that can serve as building blocks for population-based interventions:

- Since scientific evidence is an important

aspect of effective decision-making (Eisenberg 2002), it is critical that any population-based campaign be based upon credible evidence suggesting that the proposed approach is likely to be effective in meeting its stated goals. In addition, ongoing, rigorous evaluation activities should test whether the interventions succeed in meeting these objectives.

- Basic education about bone health is an important aspect of population-based interventions. Almost every example cited in this chapter noted that most people do not know that calcium and physical activity are critical to protecting bone health, that fragile bones are not an inevitable aspect of aging, and that the peak time to build bone mass is during childhood and adolescence. Unlike the situation for some other health risk factors, such as smoking or driving under the influence of alcohol, most people remain unaware of the factors that increase or decrease the risks of poor bone health.
- Including health care providers as partners in population-based interventions accomplishes several useful functions, as illustrated in the Elder Floridian Foundation activities and the Michigan Osteoporosis Program. Health providers themselves need education on bone health and its assessment, as well as on population approaches to prevention. Health providers are recipients of referrals from community screening programs, so they need to understand and support these programs. Their support enhances the credibility of these interventions.
- Useful prevention messages on bone health are available for every age group. Examples include drinking milk for preschoolers (*Milk Matters* campaign), building powerful bones for preadolescent girls (*National Bone Health Campaign*), or weight-lifting for older adults (*Project Healthy Bones*). Opportunities abound for tailoring bone health messages to populations at greatest risk.
- Age is not the only variable affecting the design of population interventions. The *Living Healthy: The Asian American Women's Osteoporosis Education Initiative* illustrates the need to address cultural and community concerns. It is significant that a national Asian-American health organization was not satisfied to take its own knowledge of Asian culture into the field. Instead, NAWHO partnered with Asian-American community-based organizations that were even better informed about local Asian ethnic groups and cultures.
- A number of evidence-based tools can be used in building population interventions for bone health. As noted previously, effective interventions exist for addressing specific bone health risk factors, such as tobacco use or lack of physical activity (the *Take Our Trail* campaign). Strategies such as social marketing have also proved to be useful across multiple health topics and are likely to work in addressing bone health as well.
- Health policy and environmental changes are important tools in health promotion, as illustrated in the section on tobacco prevention and in the Michigan Osteoporosis Program and the *Take Our Trail* program.
- Building partnerships is usually essential

to intervention success. The right partners provide credibility and resources, access to networks and communities, collaboration with other health campaigns and programs, advocacy for health policies, staffing for special projects, and multiple other advantages. For bone health, building strong partnerships, especially at the community level, may be as critical as determining the best population interventions.

- Local culture and circumstances are also part of the decision-making process. Policy may be influenced by a community's choice of interventions, efficiency in using limited resources, and equity in health status, especially with respect to disadvantaged populations.

There are additional factors to consider in developing and implementing population-based bone health interventions. While some evidence-based interventions exist, many more are needed. As new interventions are developed, it will be necessary to design evaluation plans, or even a formal research design, to assess their effectiveness. Since the ultimate outcome of these interventions may not occur for a long period of time (e.g., especially for interventions among younger adults and children), it will be necessary to develop and validate proxy measures to assess effectiveness. For older citizens, however, measuring reductions in osteoporotic fragility fractures can allow for the direct assessment of health outcomes.

Another concern relates to financial support, both for assessing new interventions and for conducting new interventions at a population level. Several of the examples cited in this chapter highlight the difficulty of maintaining financial support for these programs. An economic analysis of the benefits of preventing bone disease may help make the case for support.

Despite these concerns, there is reason for hope. Education and public awareness campaigns may be the most easily understood aspect of population-based interventions and thus may provide the best opportunities for success. While education is essential, it usually cannot change the behavior of the population on its own. Thus, there is also a need for a change in cultural attitudes and in formal policies to support positive behavior changes. Social marketing can assist in creating these types of changes. The good news is that because the essential components of prevention in bone health—good nutrition and physical activity—are also important to many other aspects of health, there is an opportunity for the development of synergistic public health programs to address multiple diseases including not only osteoporosis, but also obesity, diabetes, and heart disease. This multipronged emphasis on cultural changes has proven effective in restricting smoking in public settings, increasing use of seat belts in moving vehicles, and making use of designated drivers an accepted social practice.

Though much remains to be learned, enough is known about bone health to move forward with population-based interventions, so that bone disease can become a rare event rather than an everyday occurrence.

National Bone Disease Organizations as Partners in Population-Based Interventions

The national bone disease organizations can be important partners in population-based interventions to promote bone health. As national nonprofit organizations, they play key roles in educating the public and health care professionals about the prevention and treatment of bone diseases and can serve as resources for many of the public and private organizations working at the community and State levels toward improving bone health. There are four leading national bone disease organizations, each with distinct missions, but all working collaboratively to promote bone health. The American Society for Bone and Mineral Research promotes excellence in bone and mineral research and the translation of basic science to clinical practice. The three other organizations—the National Osteoporosis Foundation, the Osteogenesis Imperfecta Foundation, and the Paget Foundation for Paget's Disease of Bone and Related Disorders—promote education, awareness, research, and support for patients and health care professionals related to their specific diseases.

In addition to promoting public and professional awareness, the national bone disease organizations are powerful advocates for research funding and public policy through the Federal government to improve the prevention and treatment of bone diseases. They coordinate their advocacy efforts through their participation in the National Coalition for Osteoporosis and Related Bone Diseases, also known as the Bone Coalition. The Bone Coalition's accomplishments in improving bone health have been in the areas of research, policy, legislation, funding, and national guidelines and standards.

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The National Institutes of Health Osteoporosis and Related Bone Diseases~National Resource Center:

A Resource for Population-Based Interventions

A valuable resource for population-based interventions is the National Institutes of Health Osteoporosis and Related Bone Diseases~National Resource Center (NIH ORBD~NRC). The National Resource Center was established in 1994 to provide patients, health professionals, and the public with an important link to resources and information on metabolic bone diseases, including osteoporosis, Paget's disease of the bone, osteogenesis imperfecta, and hyperparathyroidism. The National Resource Center is operated by the National Osteoporosis Foundation, in collaboration with The Paget Foundation and the Osteogenesis Imperfecta Foundation. It is supported by the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) of the National Institutes of Health, with contributions from other Federal offices.

The National Resource Center offers a range of services to provide links to resources and information on metabolic bone diseases that are geared to both professionals and the public. An in-house database contains references to print materials, organizations, and programs. A cumulative index of metabolic bone diseases literature contains the latest clinical research and studies, and customized bibliographies can be developed from this index. New materials have been developed to fill important gaps in information for specific populations, including those who do not speak English, low literacy populations, and the visually impaired.

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Key Questions for Future Research

While many population-based interventions have been found to be effective in promoting specific healthy behaviors, such as smoking cessation and promoting physical activity, relatively little is known about how best to tailor these approaches to promoting bone health. Key, unanswered research questions appear below:

- What population-based bone health interventions are most effective in reducing the long-term incidence and burden of osteoporosis and other bone diseases?
- What combinations of health messages are most effective for a bone health campaign, including those messages that have been used in other health campaigns?
- Given the long-term nature of population-based bone health interventions, what are valid "proxy" measures that can be used to assess them when targeted at younger adults and children?
- What are the most effective means of educating the public and providers about the importance of bone health and about basic preventive measures?
- What are the best methods for encouraging providers to take a more active role in promoting bone health with their patients?

- What are the most effective population-based interventions in schools, businesses, health care systems, and communities to increase physical activity to recommended levels throughout the lifespan?
- What are the most effective population-based interventions to increase calcium and vitamin D consumption to recommended levels throughout the lifespan?
- What population-based interventions are most effective for improving bone health in racial and ethnic minorities?
- What are the most effective social marketing interventions to promote bone health?
- What are the best measures of bone health to be used for surveillance?
- What environmental modifications are most effective in preventing fractures?

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