

## Physical Activity and Fitness

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## 1. Physical Activity and Fitness

### Introduction

Evidence of the multiple health benefits of regular physical activity continues to mount. Regular physical activity can help to prevent and manage coronary heart disease, hypertension, noninsulin-dependent diabetes mellitus, osteoporosis, obesity, and mental health problems (e.g., depression, anxiety).<sup>16</sup> Regular physical activity has also been associated with lower rates of colon cancer<sup>31</sup> and stroke<sup>34</sup> and may be linked to reduced back injury.<sup>7</sup> On average, physically active people outlive those who are inactive.<sup>27</sup> Regular physical activity can also help to maintain the functional independence of older adults and enhance the quality of life for people of all ages.<sup>18</sup>

Because coronary heart disease is the leading cause of death and disability in the United States, the potential role of physical activity in preventing coronary heart disease is of particular importance. Physically inactive people are almost twice as likely to develop coronary heart disease as people who engage in regular physical activity.<sup>32</sup> This is only slightly less than the relative risk for such well-known risk factors as cigarette smoking, high blood pressure, and high blood cholesterol. Furthermore, more people are at risk for coronary heart disease due to physical inactivity than for any other single risk factor, and those with other risk factors for coronary heart disease, such as obesity and hypertension, may particularly benefit from physical activity.

Increasing evidence suggests that light to moderate physical activity, below the level recommended for cardiorespiratory fitness, can have significant health benefits, including a decreased risk of coronary heart disease.<sup>21,33</sup> For the inactive, even relatively small increases in activity are associated with measurable health benefits. In addition, light to moderate physical activity is more readily adopted and maintained than vigorous physical activity. Therefore, compared to the 1990 objectives, the year 2000 objectives place greater emphasis on reducing inactivity and increasing light to moderate physical activity.

The relationships between physical activity and health are numerous and complex.<sup>8</sup> Many different physiologic and physical effects are associated with the many different

types of physical activities that a person can choose to do. While it is unclear what exact types and amounts of physical activity are required for precise health benefits, several health-related dimensions of physical activity are thought to be most important in producing selected health effects.<sup>8</sup> The year 2000 objectives are proposed to ensure that health-related dimensions of physical activity that encompass key physiologic and physical mechanisms become part of regular behavioral patterns.

For example, Objective 1.3 addresses the dimension of physical activity associated with energy or caloric expenditure which results in energy utilization, thereby enhancing weight loss or control. Pursuing activities that result in energy expenditure may also produce physiologic changes that favorably affect blood pressure, platelet aggregation and fibrinolysis, and glucose tolerance, thereby helping to prevent or manage coronary heart disease and diabetes mellitus.<sup>20</sup> Objective 1.4 addresses aerobic intensity which increases the ability of the cardiorespiratory and other systems to do physical work, but may also have an additional beneficial influence on preventing cardiovascular disease. Objective 1.6 addresses muscular strength, muscular endurance, and flexibility which are important because they may protect against disability and, therefore, may serve to ensure regular physical activity participation. As research continues to elucidate the links between physical activity and selected health outcomes, individuals will be able to increasingly select physical activity patterns optimally suited to individual health risks and physiologic benefits as well as to individual preferences.

Unfortunately, few Americans engage in regular physical activity despite the potential benefits. Less than 10 percent of the U.S. adult population exercises at the level recommended by the 1990 objectives: "exercise which involves large muscle groups in dynamic movement for periods of 20 minutes or longer, 3 or more days per week, and which is performed at an intensity of 60 percent or greater of an individual's cardiorespiratory capacity."<sup>9</sup> Less than half the adult population exercises 3 or more days per week for 20 minutes or longer regardless of intensity of dynamic movement of large muscle groups. The prevalence of physical inactivity increases with advancing age especially during adolescence and early adulthood.

Note: Except as otherwise noted, all rates in the following objectives are annual. Where the baseline

rate is age adjusted, it is age adjusted to the 1940 U.S. population, and the target is age adjusted also. If a rate is age adjusted, the crude baseline rate may be found in Appendix D.

## Health Status Objectives

- 1.1\* Reduce coronary heart disease deaths to no more than 100 per 100,000 people. (Age adjusted baseline: 135 per 100,000 in 1987)

	Special Population Target	
Coronary Deaths (per 100,000)	1987 Baseline	2000 Target % Decrease
1.1a Blacks	163	115

**Baseline data source: National Vital Statistics System (special analysis), CDC.**<sup>35,36</sup>

\*For commentary, see Objective 15.1 in Heart Disease and Stroke. This objective also appears as Objective 2.1 in Nutrition and as Objective 3.1 in Tobacco.

- 1.2\* **Reduce overweight to a prevalence of no more than 20 percent among people aged 20 and older and no more than 15 percent among adolescents aged 12 through 19. (Baseline: 26 percent for people aged 20 through 74 in 1976-80, 24 percent for men and 27 percent for women; 15 percent for adolescents aged 12 through 19 in 1976-80)**

	Special Population Targets	
Overweight Prevalence	1976-80 Baseline	2000 Target % Decrease
1.2a Low income women aged 20 and older	37%	25%
1.2b Black women aged 20 and older	44%	30%
1.2c Hispanic women aged 20 and older		
Mexican-American	39%	
Cuban women	34%	
Puerto Rican women	37%	
1.2d American Indians/		

	Alaska Natives	29-75%	30%
1.2e	People with disabilities	36%	25%
1.2f	Women with high blood pressure	50%	41%
1.2g	Men with high blood pressure	39%	35%

Note: For people aged 20 and older, overweight is defined as body mass index (BMI) equal to or greater than 27.8 for men and 27.3 for women. For adolescents, overweight is defined as BMI equal to or greater than 23.0 for males aged 12 through 14, 24.3 for males aged 15 through 17, 25.8 for males aged 18 through 19, 23.4 for females aged 12 through 14, 24.8 for females aged 15 through 17, and 25.7 for females aged 18 through 19. The values for adolescents are the age and gender-specific 85th percentile values of the 1976-80 National Health and Nutrition Examination Survey (NHANES II), corrected for sample variation.<sup>39</sup> BMI is calculated by dividing weight in kilograms by the square of height in meters. The cut points used to define overweight approximate the 120 percent of desirable body weight definition used in the 1990 objectives.

**Baseline data sources:** National Health and Nutrition Examination Survey (NHANES), CDC; Hispanic Health and Nutrition Examination Survey, CDC; Indian Health Service; for people with disabilities, National Health Interview Survey, CDC.

\*For commentary, see Objective 2.3 in Nutrition. This objective also appears as Objective 15.10 in Heart Disease and Stroke and as Objective 17.12 in Diabetes and Chronic Disabling Conditions.

## Risk Reduction Objectives

- 1.3\* Increase to at least 30 percent the proportion of people aged 6 and older who engage regularly, preferably daily, in light to moderate physical activity for at least 30 minutes per day. (Baseline: 22 percent of people aged 18 and older were active for at least 30 minutes 5 or more times per week and 12 percent were active 7 or more times per week in 1985)

Note: Light to moderate physical activity requires sustained, muscular movements, is at least equivalent to sustained walking, and is performed at less than 60 percent of maximum heart rate for age. Maximum heart rate equals roughly 220 beats per minute minus age. Examples may include walking, swimming, cycling, dancing, gardening and yardwork, various domestic and occupational activities, and games and other childhood pursuits.

**Baseline data source:** Behavioral Risk Factor Surveillance System, CDC.

Physical activity is defined as any bodily movement produced by skeletal muscles that results in caloric expenditure.<sup>11</sup> Caloric expenditure utilizes energy. Energy utilization enhances weight loss or control and is important in preventing and managing obesity, coronary heart disease, and diabetes mellitus. Engaging regularly in light to moderate physical activity for at least 30 minutes per day will help to ensure that calories are expended and confer health benefits.<sup>21,33</sup> For example, daily physical activity equivalent to a sustained walk for 30 minutes per day would result in an energy expenditure of about 1050 calories per week (1.5 miles X 100 kcal per mile x 7 days per week = 1050 kcal per week). If caloric intake remains constant, this would translate into a weight loss of roughly one-third pound per week. Furthermore, epidemiologic studies suggest that a weekly expenditure of 1000 calories could have significant individual and public health benefit for coronary heart disease prevention, especially for those who are originally sedentary.<sup>20</sup>

A minimum level of intensity for light to moderate physical activity is set by the example of a sustained walk. This level of activity is feasible for most people. Those willing and able can perform even more vigorous types of physical activity for the purpose of improving and/or maintaining cardiorespiratory fitness (see Objective 1.4). However, light to moderate activities confer considerable

health benefit, are more likely to be adopted and maintained than intense activities, and are less likely to result in injury.<sup>30</sup>

Although light to moderate physical activity for a sustained period of at least 30 minutes is preferable, intermittent physical activity also increases caloric expenditure and may be important for those who cannot fit 30 minutes of sustained activity into their schedules. The point is to encourage physical activity as part of a daily routine. People engaging in light to moderate physical activity less often than daily also receive health benefits, but if the frequency falls below three days per week, they may be less likely to maintain a regular pattern of activity over time.<sup>3</sup>

Most Americans engage in less physical activity than is proposed by this objective. Currently only 22 percent of people aged 18 and older engage in at least 30 minutes of activity 5 or more times per week and only 12 percent report that they are this active 7 or more times per week. Similar rates prevail for older adults and low-income individuals.

Increasing public awareness about the many benefits of light to moderate physical activity could help to attain this objective. For example, Americans need to recognize the importance of daily physical activity to weight management, to know that walking is a form of exercise most people can do, and to understand that one needs to remain active throughout life. It is also important for people to realize that starting out slowly, and gradually increasing the frequency and duration of their physical activity over time is the key to successful behavior change.<sup>2</sup> In the case of walking, the message becomes "if you are not used to daily walking, then walk slowly and take short, frequent walks, gradually increasing distance and speed." Educational messages should be appropriately tailored to reach older adults, people with disabilities, and racial and ethnic minorities.

For young children, attaining this objective will require public awareness messages targeted to parents. Parents should be encouraged to exercise with their children (e.g., daily family walks), to advocate for daily school physical education (see Objective 1.8), and to involve their children in the physical activity programs of community organizations.

\*This objective also appears as Objective 15.11 in Heart Disease and Stroke and as Objective 17.13 in Diabetes and Chronic Disabling Conditions.

- 1.4 Increase to at least 20 percent the proportion of people aged 18 and older and to at least 75 percent the proportion of children and adolescents aged 6 through 17 who engage in vigorous physical activity that promotes the development and maintenance of cardiorespiratory fitness 3 or more days per week for 20 or more minutes per occasion. (Baseline: 12 percent for people aged 18 and older in 1985; 66 percent for youth aged 10 through 17 in 1984)

**Special Population Target**

Vigorous Physical Activity	1985 Baseline	2000 Target Percent
<b>Increase</b>		
1.4a Lower income people aged 18 and older (annual family income \$20,000	7%	12%

**Note:** Vigorous physical activities are rhythmic, repetitive physical activities that use large muscle groups at 60 percent or more of maximum heart rate for age. An exercise heart rate of 60 percent of maximum heart rate for age is about 50 percent of maximal cardiorespiratory capacity and is sufficient for cardiorespiratory conditioning. Maximum heart rate equals roughly 220 beats per minute minus age.

**Baseline data source:** For people aged 18 and older, the National Health Interview Survey, CDC; for youth aged 10 through 17, the National Children and Youth Fitness Study I, ODPHP.

Regular vigorous physical activity helps achieve and maintain higher levels of cardiorespiratory fitness than light to moderate physical activity. Cardiorespiratory fitness or aerobic capacity describes the body's ability to perform high intensity activity for a prolonged period of time without undue stress or fatigue. Having higher levels of cardiorespiratory fitness helps enable people to carry out their daily occupational tasks and leisure pursuits more easily.

The vigorous physical activities that help to achieve and maintain cardiorespiratory fitness can also contribute substantially to caloric expenditure, and probably provide additional protection against coronary heart disease over less vigorous forms of regular physical activity.<sup>5,28</sup> Vigorous physical activities include brisk walking,

jogging/running, lap swimming, cycling, dancing, skating, rowing, jumping rope, cross-country skiing, hiking/backpacking, racquet sports, and competitive group sports (soccer, basketball, volleyball). Activities such as stair climbing; strenuous housework, yardwork, and occupational tasks; and children's games (tag, kickball) and other childhood pursuits may also qualify as vigorous activities if they are sustained and elevate the heart rate to at least 60 percent of the maximum heart rate for age.

Higher levels of cardiorespiratory fitness can be achieved by increasing the frequency, duration, or intensity of activity over that suggested in this objective (i.e., more than three times per week or more than 20 minutes per session or at a higher intensity), but the relationship is not linear. Progressively larger increases in frequency, duration, or intensity are needed to induce a steady increase in cardiorespiratory fitness. The frequency of musculoskeletal injury also rises with more frequent, prolonged, and intense activity.<sup>30</sup>

This objective is designed to encourage vigorous physical participation for at least three times per week. Unfortunately, those that meet the minimal frequency and duration proposed in this objective may secure a strong cardiorespiratory system, but they may not achieve the weight control or physiologic benefits secured by daily activity (see Objective 1.3). On the other hand, daily vigorous physical activity performed for 30 minutes per day will surely provide daily energy expenditure, but there is also an increased injury risk.<sup>30</sup> Therefore, vigorous physical activity should be incorporated into the daily activity pattern proposed in Objective 1.3 in a manner that will not result in injury.

Monitoring progress toward this objective must take into account the decline in maximal cardiorespiratory capacity with age.<sup>6</sup> A method for this has been developed and used in surveys that obtain information about physical activities performed without measuring pulse rates.<sup>10</sup>

- 1.5 Reduce to no more than 15 percent the proportion of people aged 6 and older who engage in no leisure-time physical activity. (Baseline: 24 percent for people aged 18 and older in 1985)

**Baseline data source:** National Health Interview Survey, CDC.

Although the protective effect of a more active lifestyle is seen for both occupational and leisure-time physical activity, the amount of physical activity at work and in the home has declined steadily. For most people, the greatest opportunity for physical activity is during leisure. Unfortunately, 24 percent of men and women aged 18 and older report no leisure-time physical activity. The prevalence of leisure-time sedentarism increases with advancing age--33 percent of people aged 45 through 64 and 43 percent of those aged 65 and older engage in no leisure-time physical activity.<sup>9</sup> People with disabilities and lower-income individuals are also more likely to be sedentary at leisure.

It is important for those who are sedentary during their leisure-time to take the first step towards developing a pattern of regular physical activity. Public education efforts need to address the specific barriers that inhibit the adoption of physical activity by different population groups. Older adults, for example, need information about safe walking routes, appropriate foot care and footwear for those with foot problems, appropriate levels of activity for those with coronary heart disease and other chronic conditions, and the availability of group activities in the community.

**1.6 Increase to at least 40 percent the proportion of people aged 6 and older who regularly perform physical activities that enhance and maintain muscular strength, muscular endurance, and flexibility. (Baseline data available in 1991)**

Muscular strength, muscular endurance, and joint flexibility are expected components of health-related fitness although the type, frequency, duration, and intensity of activities necessary for specific age and gender groups remains to be determined. Regular participation in home maintenance, yardwork, gardening, and selected occupational activities may satisfy this objective in adults. Participation in games and other active childhood pursuits may satisfy this objective in children. Satisfying this objective may require combinations of activities as not all activities will both increase muscular strength and endurance and enhance flexibility.

Muscular strength and endurance describe the ability of skeletal muscles to perform hard and/or prolonged work. Strength and endurance greatly affect the ability to perform the tasks of daily living without undue physical stress and fatigue. Regular use of skeletal muscles helps to improve and maintain strength and endurance.<sup>14,47</sup> Engaging in regular physical activity and engaging in a variety of physical activities can help to satisfy this objective. Although weight training (exercising with free weights or weight machines) can increase muscle strength and endurance, weight training is not necessary to meet this objective and may not be appropriate for all age groups and individuals.<sup>46</sup>

Flexibility describes the range of motion in a joint or sequence of joints. Those with greater flexibility may have a lower risk of future back injury.<sup>7</sup> Older adults with better joint flexibility may be able to drive an automobile more safely.<sup>45</sup> Joint movement through the full range of motion helps to improve and maintain flexibility. Stretching exercises and engaging regularly in a variety of physical activities may help to satisfy this objective.

Physical activities that improve muscular strength, muscular endurance, and flexibility also improve the ability to perform tasks of daily living. The performance of routine daily activities is particularly important to maintaining functional independence and social integration in older adults. Increasing the public's awareness of all of these potential benefits may help to encourage the pursuit of activities that will promote muscular strength, muscular endurance, and flexibility.

- 1.7\* Increase to at least 50 percent the proportion of overweight people aged 12 and older who have adopted sound dietary practices combined with regular physical activity to attain an appropriate body weight.  
(Baseline: 30 percent of overweight women and 25 percent of overweight men for people aged 18 and older in 1985)

**Baseline data source:** National Health Interview Survey, CDC.

Overweight occurs when too few calories are expended and too many consumed for individual metabolic requirements.<sup>29</sup> The results of weight loss programs focused on dietary restrictions alone have not been encouraging. Physical activity burns calories, increases the proportion of lean to fat body mass, and raises the metabolic rate.<sup>48</sup> Therefore, a combination of both caloric control and increased physical activity is important for attaining a healthy body weight.<sup>13</sup>

Neither frequent fluctuations in body weight nor extreme restrictions in food intake are desirable. Overweight people should increase their physical activity and should avoid calorie-dense foods, especially those high in fat. Diets that are lower in fat and higher in vegetables, fruits, and grains can facilitate weight reduction. Extremely low-calorie diets, cyclic weight reduction, and fad weight-loss regimes of unscientific merit should be avoided. Practices should be adopted that are safe and that lead to long-term maintenance of appropriate weight. Extreme behaviors as exhibited in bulimia or anorexia nervosa should be medically treated.

Self-help groups and programs that apply the principles of behavior modification (e.g., goal setting, self-monitoring, stimulus control, reinforcement) may help overweight individuals to sustain the physical activity and dietary practices needed to reach an appropriate body weight.

The target for this objective is very ambitious, but given the potential health benefits of weight loss in the overweight person, this objective deserves special priority. Attaining this objective will help to reduce the prevalence of overweight in the total population (see Objective 1.2). The prevention of overweight among those not yet overweight is also vitally important. Objectives 1.3, 1.4, and 1.5 in this priority area and Objectives 2.5 and 2.6 in Nutrition address the primary prevention of obesity.

\*This objective also appears as Objective 2.7 in Nutrition.

## **Services and Protection Objectives**

- 1.8 Increase to at least 50 percent the proportion of children and adolescents in 1st through 12th grade who participate in daily school physical education. (Baseline: 36 percent in 1984-86)**

**Baseline data sources:** For students in 5th through 12th grade, the National Children and Youth Fitness Study I, ODPHP; for students in 1st through 4th grade, the National Children and Youth Fitness Study II, ODPHP.

Participation in school physical education assures a minimum amount of physical activity by children and continued physical activity into adulthood. Findings from the National Children and Youth Fitness Studies I and II suggest that the quantity, and in particular the quality, of school physical education programs have a significant positive effect on the health-related fitness of children and youth.<sup>40,41</sup> In addition, recent reports suggest that physical education programs in early childhood not only promote health and well-being, but also contribute to academic achievement.<sup>4</sup>

Concern about the amount and quality of youth physical activity and school physical education has been expressed by several groups, including the American Academy of Pediatrics and the American College of Sports Medicine. In 1987, both houses of Congress passed a resolution (H. Con. Res. 97) encouraging state and local educational agencies to provide high quality daily physical education programs for all children in kindergarten through 12th grade. Only one state, Illinois, currently requires daily physical education as part of the curriculum in kindergarten through 12th grade.

Although a quantity is not synonymous with quality (see Objective 1.9), the proportion of students receiving daily physical education in school is one measure of the frequency of participation in physical activity and the frequency of exposure to information about how and why to partake in activity. Because time spent engaged in regular, vigorous, and prolonged physical activity outside of school physical education falls off sharply during the fall and winter months, daily school physical education programs can play an important role in helping children and youth maintain a high level of physical activity year-round.

In 1974-75, it was estimated that roughly one-third of

students in 5th through 12th grade received physical education daily. As of 1984, the situation had changed little, with only 36 percent of students in 5th through 12th grade receiving physical education daily.<sup>40</sup> In 1986, only 36 percent of students in 1st through 4th grade received daily physical education.<sup>41</sup>

Most children in the lower grades are enrolled in school physical education but many receive it fewer than 5 days per week. In the upper grades, fewer children are enrolled but those who are more often participate in daily physical education classes. Therefore, to achieve this objective, physical education needs to be more frequent for children in the lower grades, whereas enrollment needs to be increased for children in the upper grades.

To achieve this objective equitably for all of America's children, daily adaptive physical education programs should be available for children with special needs. School physical education requirements are also recommended for students in preschool and post secondary programs.

**1.9 Increase to at least 50 percent the proportion of school physical education class time that students spend being physically active, preferably engaged in lifetime physical activities. (Baseline: Students spent an estimated 27 percent of class time being physically active in 1983)**

Note: Lifetime activities are activities that may be readily carried into adulthood because they generally need only one or two people. Examples include swimming, bicycling, jogging, and racquet sports. Also counted as lifetime activities are vigorous social activities such as dancing. Competitive group sports and activities typically played only to young children such as group games are excluded.

**Baseline data source:** Siedentop 1983.

Results from the National Children and Youth Fitness Studies I and II revealed that although enrollment in physical education positively affects fitness, the nature of the program is of even greater importance.<sup>40,41</sup> The intent of this objective is to encourage the implementation of high quality physical education programs that will enhance the fitness of children and youth and encourage life-long physical activity.

Although school physical education can help to assure a minimum amount of physical activity for children and youth, studies indicate that only 27 percent of class time is spent in actual physical activity; 26 percent of time is spent in instruction, 22 percent is spent in administrative tasks, and 25 percent is spent waiting.<sup>38</sup> The target of 50 percent is attainable if waiting time is trimmed to less than 5 percent of class time.

Many physical educators stress the importance of dedicating a major portion of the physical education curriculum to lifetime physical activities, especially as the student approaches adulthood. Despite the acknowledged importance of lifetime physical activities outside the physical education class (60 percent) than within it.<sup>40</sup> The portion of the physical education curriculum devoted to lifetime fitness in 5th through 12th grade is only 48 percent, 45 percent for boys and 50 percent for girls. The average student is exposed to 5.6 different lifetime activities over a year's time. To a large extent, relays and informal games for younger students and competitive sports for older students are still the mainstay of the physical education program. More class time should be spent engaged in lifetime activities and more

emphasis given to developing the knowledge, attitudes, cognitive skills, and physical skills students need to remain physically active throughout life.

**1.10 Increase the proportion of worksites offering employer-sponsored physical activity and fitness programs as follows:**

Worksite Size	1985 Baseline	2000 Target
50-99 employees	14%	20%
100-249 employees	23%	35%
250-749 employees	32%	50%
750 employees	54%	80%

**Baseline data source:** National Survey of Worksite Health Promotion Activities, ODPHP.

Worksite physical activity and fitness programs provide a mechanism for reaching large numbers of adults. Examples of such programs include onsite exercise facilities and exercise classes, reimbursable membership fees in health clubs and Ys, informal walking clubs, formal fitness challenges and campaigns, and flexible health benefits that include exercise-related activities. Employer-sponsored programs can be offered on site or in conjunction with community organizations. Smaller worksites may prefer to align themselves with a community recreation facility in order to meet this objective.

Although varied, worksite fitness programs can increase the physical activity and fitness of program participants and improve employee health.<sup>17</sup> Evidence that worksite programs are cost-effective is also growing. Such programs may even reduce employer costs for insurance premiums, disability benefits, and medical expenses.<sup>37</sup> Additional benefits for employers include increased productivity, reduced absenteeism, reduced employee turnover, improved morale, enhanced company image, and enhanced recruitment. Benefits to employers and the community can be further increased by including family members and retirees in worksite programs.

High levels of participation can be achieved by offering a variety of physical activities, maximizing convenience, permitting employees to exercise on company time, or giving employees flexible time for use of the facilities. A promotion and education campaign can aid in recruitment. Incentives and awards for regular participation or achievement can help motivate people to continue. Employee involvement in planning and managing the program may also be

important to program success. Special effort should be made to target sedentary and high-risk employees. Optimally, efforts to promote physical activity and fitness at the worksite should be part of a comprehensive health promotion program (see Objective 10.12 in Occupational Safety and Health and Objectives 8.6 and 8.7 in Educational and Community-Based Programs).

In 1985, a national survey of worksites found that activities to promote physical activity and fitness were present at 22 percent of worksites with 50 or more employees.<sup>26</sup> Of these, the majority offered information (65 percent) or group classes or workshops (59 percent). Far fewer offered equipment or facilities (22 percent), special events or competition (26 percent), or subsidized memberships (27 percent). Of worksites offering exercise equipment or facilities, 89 percent set aside an area specifically for fitness activities, 76 percent had a locker room with showers, 74 percent had stationary bicycles or other aerobic exercise equipment, 62 percent had weight training equipment, 53 percent reported other major exercise facilities or equipment (e.g., swimming pools, running tracks, or racquetball, tennis, or squash courts), and 22 percent had a fitness course.

As purchasers of group health and life insurance plans, employers can also design employee benefit packages that include coverage for fitness club membership fees and community-based fitness classes or reduced insurance premiums and rebates for employees who participate regularly in worksite fitness programs or who can document regular physical activity.

**1.11 Increase community availability and accessibility of physical activity and fitness facilities as follows:**

Facility	1986 Baseline	2000 Target
Hiking, biking, and fitness trail miles	1 per 71,000 people	1 per 10,000 people
Public swimming pools	1 per 53,000 people	1 per 25,000 people
Acres of park and recreation open space	1.8 per 1,000 people (553 people per managed acre)	4 per 1,000 people (250 people per managed acre)

**Baseline data source:** McDonald and Cordell 1988.

Participation in regular physical activity depends in part on the availability and proximity of community facilities and conducive environments. As facility distance from residence increases, use generally decreases. People are unlikely to use community resources located more than a few miles away by car or more than a few minutes away by bike or on foot. In a recent national survey, 51 percent of adults agreed that greater availability of exercise facilities would help them become more involved in regular exercise.<sup>15</sup>

The National Recreation and Park Association (NRPA) has established recreation, park, and open space standards and guidelines that recommend, at a minimum, 6.25 to 10.5 acres of developed open space per 1,000 people (or 1 managed acre for every 95 to 160 people).<sup>19</sup> A 1986 survey of municipal and county park and recreation departments found that the average number of citizens per managed acre was 553, well over the standard of 95 to 160.<sup>25</sup> The average for small, medium, and large communities were 345, 1,147, and 312 citizens per acre, respectively. (Small communities were defined as fewer than 25,000 people, medium as 25,000 to 100,000 people, and large as more than 100,000 people.)

Trails in particular are unavailable in most communities. Only 46 percent of municipal and county park and recreation departments provide fitness trails, 29 percent provide hiking trails, 21 percent provide bicycle trails, and 15 percent provide snow trails. For departments with trails, the average number of miles for all trail types combined is 23, but the median is only 6 miles. Where trails are provided, the average number of citizens per trail mile ranges from 17,107 for hiking trails to 19,129 for biking trails to 28,941 for fitness trails. Including areas without trails yields national estimates of roughly 1 hiking trail mile per 59,000 citizens, 1 biking trail mile per 91,000 citizens, and 1 fitness trail mile per 63,000 citizens.

Additional miles of convenient and accessible trails for biking, jogging, hiking, and cross-country skiing are very much needed.

The NRPA standard recommends 1 community swimming pool per 20,000 people within a service radius of 15 to 30 minutes travel time. Only 56 percent of municipal and county park and recreation departments provide one or more community swimming pools. The median number of pools per department is one. For small, medium, and large communities, the medians are 1, 2, and 4 pools, respectively. For departments providing pools, the number of citizens per pool averages 29,850. Including areas served by departments that do not provide pools yields a national estimate of roughly 1 public pool per 53,000 people.

Other facilities conducive to physical activity are also in inadequate supply. For example, the median number of tennis courts per park and recreation department is only 8. For small, medium, and large communities, the medians are 5, 12, and 32 courts, respectively. For departments providing tennis courts, the number of citizens per court averages 6,817. Nationally, the number of citizens per court is estimated to be about 8,000. In contrast, the recommended standard for tennis courts is 1 court per 2,000 people within a service radius of 0.25 to 0.5 miles. Similarly, four is the median number of basketball courts per park and recreation department. For small, medium, and large communities, the medians are 2, 5, and 14, respectively. For departments providing basketball courts, the number of citizens per court averages 12,551. Nationally, the estimate is about 15,500. The recommended standard for basketball courts, however, is 1 court per 5,000 people within a service radius of 0.25 to 0.5 miles. Numerous other facilities including sport playing fields, community recreation centers, and community golf courses also fall short of recommended standards.

**1.12 Increase to at least 50 percent the proportion of primary care providers who routinely assess and counsel their patients regarding the frequency, duration, type, and intensity of each patient's physical activity practices. (Baseline: Physicians provided exercise counseling for about 30 percent of sedentary patients in 1988)**

**Baseline data sources:** American College of Physicians (in press); Lewis 1988.

Physicians and other health care providers are viewed as respected sources of information about preventive as well as curative medicine. An estimated 80 percent of the population sees a physician at least once during a given year, and 54 percent of all encounters are with primary care physicians (e.g., general practitioners, family physicians, internists, pediatricians, obstetrician/gynecologists).<sup>43</sup> Other primary care providers with whom patients have frequent contact include physician assistants, nurse practitioners, and nurses.

Most patients seen by primary care providers could benefit from encouragement and advice on physical activity, and 85 percent of adults say that a doctor's recommendation would help them get more involved in regular exercise.<sup>15</sup> However, physical activity assessment and counseling is not yet routine practice for most primary care providers. In 1983, less than half of primary care physicians were found to "routinely" inquire about their patients' exercise habits.<sup>44</sup> A more recent national survey of internists found that although 66 percent routinely obtained and recorded the patterns of exercise for patients new to their practice, exercise counseling was provided to fewer than one-third of all sedentary patients.<sup>1</sup> Furthermore, when exercise was discussed with patients, less than three minutes typically was spent on the subject. A meta-analysis of 7 physician surveys (including 2 national surveys of family practitioners), 1 chart audit study, and 2 consumer surveys also estimated that physicians provide exercise counseling for roughly 30 percent of sedentary patients.<sup>22</sup>

Though few studies have evaluated the effectiveness of physical activity counseling by primary care physicians or other providers, 36 percent of the patients at one intervention site where physicians were trained to counsel had begun a program of regular physical activity compared to 28 percent at a control site.<sup>24</sup> Additional support for the effectiveness of physical activity counseling in clinical settings comes from cardiac rehabilitation programs where exercise compliance rates of 50 percent at 6 months are typically observed.<sup>12</sup> Because of the potential benefit, the U.S. Preventive Services Task Force recommended that clinicians counsel all patients to engage in a

program of regular physical activity tailored to their health status and personal lifestyle.<sup>42</sup> Clinicians who are unable to design an effective program should refer patients to a preventive medicine specialist, a certified exercise specialist, or an accredited fitness center.

Surveys suggest that many physicians are uncomfortable about their ability to properly counsel and advise patients about physical activity. A standardized set of questions, prescriptions, and counseling protocols would facilitate attainment of this objective as would training in physical activity assessment and counseling through professional preparation curricula and continuing education programs. Efforts to involve primary care providers personally in physical activity may also be effective in increasing counseling by providers. Several studies have shown that the activity levels of physicians are associated with their physical activity counseling practices.<sup>23</sup> Primary care providers may further extend their influence by serving as visible role models and, as community leaders, can encourage schools to provide daily school physical education (see Objectives 1.8 and 1.9).

### **Personnel Needs**

Priorities for ensuring an adequate supply of personnel to achieve the physical activity and fitness objectives over the next decade include the following:

- . Establish the number and types of health professionals, including allied/associated public health fields, who are needed to accomplish the practice, educational, and research aspects of the physical activity and fitness objectives.
- . Provide sufficient, appropriate curricular content in physical activity and fitness in all schools and programs preparing students for careers in the health, education, and recreation professions, including allied/associated public health fields, and ensure that all graduates of such schools and programs can demonstrate knowledge of these subjects.
- . Increase the provision of continuing education on physical activity and fitness by national professional associations whose members have roles in promoting physical activity and fitness.

## **Surveillance and Data Needs**

### **Availability of Future Data**

Annual data from existing surveys are available to tract Objective 1.1.

Periodic surveys and/or supplements to existing surveys can help to tract Objective 1.2, 1.3, 1.4, 1.5, 1.6, and 1.7.

New surveillance systems are needed to tract Objectives 1.8, 1.9, 1.10, 1.11, and 1.12.

### **High Priority Needs**

Expanded surveillance of physical activity is needed to provide periodic information on the activity patterns of children and youth, racial and ethnic minorities, and people with disabilities.

Information is needed about the health-related physical fitness levels of able-bodied and disabled populations aged 6 and older according to age, gender, race, and ethnicity. Periodic assessment of national fitness levels is important because fitness levels reflect changes in physical activity patterns. Although a single national estimate of the health-related physical fitness levels of children aged 6 through 17 was provided by the National Children and Youth Fitness Studies I and II, no national estimates of the health-related fitness of U.S. adults are available.

Information about the availability and use of community physical activity programs, facilities, and special events is also very much needed.

State and local surveillance systems are needed to provide state and local estimates for all of the above.

## **Research Needs**

Research is needed, especially for population subgroups, to further define the relationships between physical activity, physical fitness, and:

The incidence of cardiovascular disease;

The incidence of colon cancer;

The incidence of osteoporosis and osteoporosis-related hip fractures;

The incidence of and disability from osteoarthritis;

The incidence of low back pain, injury, and disability;

The incidence of injuries;

The incidence of obesity and selected types of body fat patterns;

Nutritional patterns;

The adoption of healthy behavior patterns;

The prevention and cessation of cigarette smoking;

The treatment of alcohol and drug abuse;

The incidence of depressive episodes among depressed people;

Improved mental well-being;

The cognitive and functional ability of older adults;  
and

Quality of life.

Research on the determinants of regular physical activity is also needed to identify the knowledge, attitudes, and behavior and social skills associated with a high probability of adopting and maintaining a regular exercise program.

## **Related Objectives From Other Priority Areas**

### **Nutrition**

2.20 Worksite nutrition/weight management programs

## **Alcohol and Other Drugs**

4.11 Anabolic steroid use

## **Mental Health and Mental Disorders**

6.3 Mental disorders among children and adolescents

6.4 Mental disorders among adults

6.5 Adverse health effects from stress

6.9 Taking steps to control stress

6.11 Worksite stress management programs

## **Educational and Community-Based Programs**

8.4 Quality school health education

8.6 Worksite health promotion activities

8.8 Health promotion programs for older adults

8.10 Community health promotion programs

## **Unintentional Injuries**

9.4 Fall-related deaths

9.7 Hip fractures among older adults

9.19 Protective equipment in sporting and recreation events

## **Occupational Safety and Health**

10.12 Worksite health and safety programs

10.13 Worksite back injury prevention and rehabilitation programs

## **Heart Disease and Stroke**

15.2 Stroke

15.4 Controlled high blood pressure

15.6 Mean serum cholesterol level

15.7 High blood cholesterol prevalence

- 15.8 Taking action to reduce blood cholesterol
- 15.16 Worksite blood pressure/cholesterol education

### **Cancer**

- 16.5 Colorectal cancer

### **Diabetes and Chronic Disabling Conditions**

- 17.1 Years of healthy life
- 17.2 Disability due to chronic conditions
- 17.3 Preserving function in older adults
- 17.5 Activity limitation due to chronic back conditions
- 17.9 Diabetes-related deaths

### **Baseline Data Source References**

American College of Physicians, Results of the American College of Physicians Membership Survey of Prevention Practices in Adult Medicine, to be published in Annals of Internal Medicine.

Behavioral Risk Factor Surveillance System, Centers for Disease Control, Public Health Service, U.S. Department of Health and Human Services, Atlanta, GA.

Hispanic Health and Nutrition Examination Survey, National Center for Health Statistics, Centers for Disease Control, Public Health Service, U.S. Department of Health and Human Services, Hyattsville, MD.

Indian Health Service, Public Health Service, U.S. Department of Health and Human Services, Rockville, MD.

Lewis, C.E. Disease prevention and health promotion practices of primary care physicians in the United States. American Journal of Preventive Medicine 4(4) Suppl:9-16, 1988.

McDonald, B.L. and Cordell, H.K. Local Opportunities for Americans: Final Report of the Municipal and County Park and Recreation Study, Alexandria, VA: National Recreation and Park Association, 1988.

National Health Interview Survey, National Center for Health Statistics, Centers for Disease Control, Public Health Service,

U.S. Department of Health and Human Services, Hyattsville, MD.

National Health and Nutrition Examination Survey (NHANES) II, National Center for Health Statistics, Centers for Disease Control, Public Health Service, U.S. Department of Health and Human Services, Hyattsville, MD.

National Survey of Worksite Health Promotion Activities, Office of Disease Prevention and Health Promotion, Public Health Service, U.S. Department of Health and Human Services, Washington, D.C.

National Vital Statistics System, National Center for Health Statistics, Centers for Disease Control, Public Health Service, U.S. Department of Health and Human Services, Hyattsville, MD.

Siedentop, D. Developing Teaching Skills in Physical Education. 2nd edition. Palo Alto, CA: Mayfield, 1983. p.61.

U.S. Department of Health and Human Services. National children and youth fitness study. Journal of Physical Education, Recreation, and Dance 56:44-90, 1985.

U.S. Department of Health and Human Services. National children and youth fitness study II. Journal of Physical Education, Recreation, and Dance 58:50-96, 1987.

## **References**

<sup>1</sup>American College of Physicians. Results of the American College of Physicians membership survey of prevention practices in adult medicine. Annals of Internal Medicine, in press.

<sup>2</sup>American College of Sports Medicine. Guidelines of Exercise Testing and Exercise Prescription. Philadelphia, PA: Lea and Febiger, 1988.

<sup>3</sup>American College of Sport Medicine. American College of Sports Medicine position stand: The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness in healthy adults. Medicine and Science in Sports and Exercise 22:265-274, 1989.

<sup>4</sup>Bennett, W.J. First Lessons: A Report on Elementary Education in America. Washington, D.C: U.S. Department of Education, 1986.

<sup>5</sup>Blair, S.N.; Kohl, H.W.; Paffenbarger, R.S.; Clark, D.G.; Cooper, K.H.; and Gibbons, L.W. Physical fitness and all-cause mortality: A prospective study of healthy men and women. Journal of the American Medical Association 262:2395-2401, 1989.

- <sup>6</sup>Buskirk, E.R. and Hodgson, J.L. Age and aerobic power: The rate of change in men and women. Federal Proceedings 46:1824-1829, 1987.
- <sup>7</sup>Cady, L.D.; Bischoff, D.P.; O'Connell, E.R.; Thomas, P.C.; and Allan, J.H. Strength and fitness and subsequent back injuries in firefighters. Journal of Occupational Medicine 21:269-272, 1979.
- <sup>8</sup>Caspersen, C.J. Physical activity epidemiology: Concepts, methods, and applications to exercise science. Exercise and Sport Sciences Reviews 17:423-473, 1989.
- <sup>9</sup>Caspersen, C.J.; Christenson, G.M.; and Pollard, R.A. Status of the 1990 physical fitness and exercise objectives--Evidence from NHIS-1985. Public Health Reports 101:587-592, 1986.
- <sup>10</sup>Caspersen, C.J.; Pollard, R.A.; and Pratt, S.O. Scoring physical activity data with special consideration for elderly populations. In: Data for an Aging Population, pp.30-34. DHHS Pub. No. (PHS) 88-1214. Washington, DC: U.S. Department of Health and Human Services, 1987.
- <sup>11</sup>Caspersen, C.J.; Powell, K.E.; and Christenson, G.M. Physical activity, exercise and physical fitness: Definitions and distinctions for health-related research. Public Health Reports 101:126-131, 1986.
- <sup>12</sup>Dishman, R.K. Compliance/adherence in health-related exercise. Health psychology 1:237-267, 1982.
- <sup>13</sup>Epstein, L.H. and Wing, R.R. Aerobic exercise and weight. Addictive Behavior 3:371-388, 1980.
- <sup>14</sup>Gettman, L.R.; Ayres, J.J.; Pollock, M.L.; and Jackson, A. The effect of circuit weight training on strength, cardiorespiratory function, and body composition of adult men. Medicine and Science in Sports and Exercise 10:171-176, 1978.
- <sup>15</sup>Harris, L. and Associates, Inc. The Prevention Index '89: Summary Report. Emmaus, PA: Rodale Press, 1989.
- <sup>16</sup>Harris, S.S.; Caspersen, C.J.; DeFries, G.H.; and Estes, E.H. Physical activity counseling for healthy adults as a primary preventive intervention in the clinical setting. Journal of the American Medical Association 261:3590-3598, 1989.
- <sup>17</sup>Iverson, D.C.; Fielding, J.E.; Crow, R.S.; and Christenson, G.M. The promotion of physical activity in the United States population: The status of programs in medical, worksite, school, and community setting. Public Health Reports 100:212-224, 1985.

- <sup>18</sup>Katz, S.; Branch, L.G.; Branson, M.H.; Papsidero, J.A.; Beck, J.C.; and Greer, D.S. Active life expectancy. New England Journal of Medicine 309:1218-1224, 1983.
- <sup>19</sup>Lancaster, R.A., ed. Recreation, Park and Open Space Standards and Guidelines. Alexandria, VA: National Recreation and Park Association, 1983.
- <sup>20</sup>Leon, A.S. Effects of physical activity and fitness on health. In: National Center for Health Statistics. Assessing Physical Fitness and Physical Activity in Population-Based Surveys. DHHS Pub. No. (PHS)89-1253. Hyattsville, MD: U.S. Department of Health and Human Services, 1989.
- <sup>21</sup>Leon, A.S.; Connette, J.; Jacobs, D.R.; and Raurama, R. Leisure-time physical activity levels and risk of coronary heart disease and death: The multiple risk factor intervention trial. Journal of the American Medical Association 258:2388-2395, 1987.
- <sup>22</sup>Lewis, C.E. Disease prevention and health promotion practices of primary care physicians in the United States. American Journal of Preventive Medicine 4(4) Suppl.:9-16, 1988.
- <sup>23</sup>Lewis, C.E. and Wells, K.B. A model for predicting the counseling practices of physicians. Journal of General Internal Medicine 1:14-19, 1985.
- <sup>24</sup>Logsdon, D.N.; Lazaro, C.M.; and Meier, R.V. The feasibility of behavioral risk reduction in primary medical care. American Journal of Preventive Medicine 5:249-256, 1989.
- <sup>25</sup>McDonald, B.L. and Cordell, H.K. Local Opportunities for Americans: Final Report of the Municipal and County Park and Recreation Study. Alexandria, VA: National Recreation and Park Association, 1983.
- <sup>26</sup>Office of Disease Prevention and Health Promotion. National Survey of Worksite Health Promotion Activities: A Summary. Washington, DC: U.S. Department of Health and Human Services, 1987.
- <sup>27</sup>Paffenbarger, R.S.; Hyde, R.T.; Wing, A.L.; and Hsieh, C.C. Physical activity, all-cause mortality, and longevity of college alumni. New England Journal of Medicine 314:605-613, 1986.
- <sup>28</sup>Paffenbarger, R.S.; Wing, A.L.; and Hyde, R.T. Physical activity as an index of heart attack risk in college alumni. American Journal of Epidemiology 108:161-175, 1978.
- <sup>29</sup>Passmore, R. The regulation of body weight in man.

Proceedings of the Nutrition Society 30:122-127, 1971.

<sup>30</sup>Pollock, M.L.; Gettman, L.R.; Milesis, C.A.; Bah, M.D.; Durstine, J.L.; and Johnson, R.B. Effects of frequency and duration of training on attrition and the incidence of injury. Medicine and Science in Sports and Exercise 9:31-36, 1977.

<sup>31</sup>Powell, K.E.; Caspersen, C.J.; Koplan, J.P.; and Ford, E.S. Physical activity and chronic disease. American Journal of Clinical Nutrition 49:999-1006, 1989.

<sup>32</sup>Powell, K.E.; Thompson, P.D.; Caspersen, C.J.; and Kendrick, J.S. Physical activity and the incidence of coronary heart disease. Annual Review of Public Health 8:253-287, 1987.

<sup>33</sup>Sallis, J.F.; Haskell, W.L.; Fortmann, S.P.; Wood, P.D.; and Vranizan, K.M. Moderate-intensity physical activity and cardiovascular risk factors: The Stanford five-city project. Preventive Medicine 15:561-568, 1986.

<sup>34</sup>Salonen, J.T.; Puska, P.; and Tuomilehto, J. Physical activity and risk of myocardial infarction, cerebral stroke and death: A longitudinal study in Eastern Finland. American Journal of Epidemiology 115:526-537, 1982.

<sup>35</sup>Sempos, C. Personal Communication. National Center for Health Statistics, 1990.

<sup>36</sup>Sempos, C.; Cooper, R.; Kovar, M.G.; and McMillen, M. Divergence of the recent trends in coronary mortality for the four major race-sex groups in the United States. American Journal of Public Health 78(11):1422-1477, 1988.

<sup>37</sup>Shephard, R.J. Employee health and fitness-state of the art. Preventive Medicine 12:644-653, 1983.

<sup>38</sup>Siedentop, D. Developing Teaching Skills in Physical Education. Palo Alto, CA: Mayfield, 1983.

<sup>39</sup>Sullivan, K. Personal communication. National Center for Health Statistics, 1990.

<sup>40</sup>U.S. Department of Health and Human Services. National children and youth fitness study. Journal of Physical Education, Recreation, and Dance 56:44-90, 1985.

<sup>41</sup>U.S. Department of Health and Human Services. National children and youth fitness study II. Journal of Physical Education, Recreation, and Dance 58:50-96, 1987.

<sup>42</sup>U.S. Preventive Services Task Force. Guide to Clinical Preventive Services: An Assessment of the Effectiveness of 169 Interventions. Report of the U.S. Preventive Services Task Force. Baltimore, MD: Williams and Wilkins, 1989.

<sup>43</sup>Weaver, F.J.; Herrick, K.L.; Ramirez, A.G.; and Deatrck D.A. Establishing a community base for a cardiovascular health education program. Health Values 2:249-256, 1978.

<sup>44</sup>Wechsler, J.; Levine, S.; Idelson, R.K.; Rohman, M.; Taylor, J.O. The physician's role in health promotion: A survey of primary care practitioners. New England Journal of Medicine 308:97-100, 1983.

<sup>45</sup>West Virginia University, Department of Safety and Health Studies and Department of Sports and Exercise Studies. Physical Fitness and the Aging Driver: Phase I. AAA Foundation of Traffic Safety, Washington, DC, 1988.

<sup>46</sup>Wilmore, J.H. Training for Sport and Activity. 2nd edition. Boston, MA: Allyn and Bacon, 1982.

<sup>47</sup>Wilmore, J.H.; Parr, R.B.; Girandola, R.N.; Ward, P.; Vodak, P.A.; Barstow, T.J.; Pipes, T.V.; Romero, G.T.; and Leslie, P. Physiological alterations consequent to circuit weight training. Medicine and Science in Sports and Exercise 10:79-84, 1978.

<sup>48</sup>Wood, P.D.; Stefanick, M.L.; Dreon, D.M.; Frey-Hewitt, D.; Garay, B.C.; Williams, P.T.; Superko, H.R.; Fortman, S.P.; Albers, J.J.; Vranizan, K.M.; Ellsworth, N.M.; Terry, R.B.; and Haskell, W.L. Changes in plasma lipids and lipoprotein in overweight men during weight loss through dieting as compared with exercise. New England Journal of Medicine 319:1173-1179, 1988.