

16. ARTHRITIS, OSTEOPOROSIS, AND CHRONIC BACK CONDITIONS

Arthritis

Number	Objective
1	Mean days without severe pain
2	Activity limitations
3	Personal care limitations
4	Help in coping
5	Labor force participation
6	Racial differences in total knee replacement rate
7	Failure to see a doctor for arthritis
8	Early diagnosis and treatment of systemic rheumatic diseases
9	Arthritis education among patients
10	Provision of arthritis education
11	Dietary practices and physical activity

Osteoporosis

Number	Objective
12	Prevalence
13	Counseling about prevention, 13 and over
14	Counseling about prevention, women 50 and over

Chronic Back Conditions

Number	Objective
15	Activity limitations

Arthritis, Osteoporosis, and Chronic Back Conditions

Goal

Reduce the impact of several major musculoskeletal conditions by reducing the occurrence, impairment, functional limitation, and limitation in social participation (i.e., disability) due to arthritis and other rheumatic conditions; reducing the prevalence of osteoporosis and resulting fractures by increasing calcium intake and counseling women and men about interventions to reduce the risk of disease; and reducing activity limitation due to chronic back conditions.

Terminology

(A listing of all acronyms used in this publication appears on page 27 of the Introduction.)

Musculoskeletal conditions affect the skeleton, joints, muscles, and connective tissues of the body.

Arthritis and other rheumatic conditions affect primarily the joints, tendons, bursa, ligaments, muscles, fascia, and other connective tissues of the body.

Osteoporosis and other metabolic bone disease. Osteoporosis is characterized by a reduction of bone mass and a deterioration of the microarchitecture of the bone leading to bone fragility. The formal definition of osteoporosis by the World Health Organization is based on the measurement of bone mineral density (BMD). Those with a BMD greater than 2.5 standard deviations below the referent BMD of young adults are said to have osteoporosis. Those with a BMD 1 to 2.5 standard deviations below the referent have osteopenia.¹

Chronic back conditions include low back pain and other conditions affecting only the back.

Disability is the reduction of a person's capacity to function in society.

Overview

The increasing number of older Americans has focused attention on preserving the quality of life, as well as the length of life. This has drawn attention to the prevention and treatment of conditions that are major causes of disability, although they do not usually cause death. The group of conditions that are the greatest causes of disability are musculoskeletal conditions. Among these, arthritis, osteoporosis, and chronic back conditions have the greatest public health impact. Demographic trends suggest that people will need to continue working at older ages (e.g., beyond age 65), making the higher rates of activity limitation and disability of older persons with these conditions an increasingly important adverse social and economic outcome. Effective public health interventions exist to reduce the burden of all three conditions.

Arthritis

Arthritis currently affects more than 15 percent of the U.S. population (over 40 million Americans) and more than 20 percent of the adult population, making it one of the most prevalent conditions in the United States.²⁻⁴

The large public health impact of arthritis is reflected in a variety of measures. First, it is the leading cause of disability.⁵ Arthritis limits the major activities of fully 2.8 percent of the entire U.S. population

1 (7 million persons) and of over 18 percent of those with arthritis.⁶⁻⁸ Arthritis trails only heart disease as a
2 cause of work disability.⁹ As a consequence, it limits the independence of affected persons and disrupts
3 the lives of family members and other caregivers. Second, health-related quality of life measures are
4 consistently worse for people with arthritis, whether the measure is healthy days in the past 30 days, days
5 without severe pain, “ability days” (i.e., days without activity limitations), or difficulty in performing
6 personal care activities.^{10,11} Third, arthritis has a large economic impact. It results in at least 39 million
7 physician visits/year and more than half a million hospitalizations.¹² Estimated medical care costs for
8 people with arthritis were \$15 billion and total costs (medical care and lost productivity) were \$65 billion
9 in 1992,¹³ which is 1.1 percent of the GNP and equivalent to a moderate recession. The latter finding may
10 surprise those who subscribe to the myth that arthritis is exclusively an old person’s disease. The reality
11 is that nearly 60 percent of people with arthritis are in the working age population¹⁴⁻¹⁶ and that they have a
12 low rate of labor force participation, defined as those who are employed and those who are unemployed
13 but looking for work.¹⁷ Fourth, arthritis has an important negative effect on one’s mental health,^{18,19} as do
14 all chronic pain conditions. Fifth, although death is not a frequent outcome of arthritis, people with
15 certain forms of arthritis do have higher mortality rates. For example, the 2 million people in the United
16 States with rheumatoid arthritis are at greater risk for premature death due to respiratory and infectious
17 diseases than the overall U.S. population.²⁰

18
19 A variety of demographic trends suggest the impact of arthritis will only increase.²¹ Given current
20 population projections, arthritis will affect 18.2 percent (nearly 60 million) of all Americans in the year
21 2020 and limit major activities of 3.6 percent (11.6 million).²²⁻²⁴ Direct and indirect costs will probably
22 rise proportionately. Many people will need to keep working at older ages (e.g., beyond age 65), making
23 the higher rates of activity limitation and disability of older persons with arthritis an increasingly
24 important adverse public health outcome. Addressing arthritis, the leading cause of disability, will be
25 important in accommodating this trend.

26
27 Arthritis is a leading health problem among all demographic groups, although considerable and
28 sometimes surprising disparities exist. Arthritis affects 50 percent of persons 65 and older. However,
29 most persons with arthritis are younger than age 65 and of working age.²⁵⁻²⁷ Arthritis is more common
30 among women, for whom it is the leading chronic condition and cause of activity limitation.²⁸⁻³⁰ Whites
31 and African Americans have similar rates of disease, but African Americans have greater rates of activity
32 limitation.³¹⁻³³ For African Americans, arthritis is the third most common condition and the leading cause
33 of activity limitation.³⁴ For Hispanics and American Indian/Alaska Natives, arthritis is the second most
34 common condition and the second leading cause of activity limitation.³⁵ For Asian/Pacific Islanders,
35 arthritis is the fourth most common condition and the second leading cause of activity limitation.³⁶
36 Arthritis prevalence and disability are more common among persons with lower education and lower
37 income.³⁷⁻³⁹ African Americans have lower rates of total joint replacement, a surgical procedure highly
38 successful in reducing the impact of arthritis in persons with severe pain or disability.⁴⁰ Certain
39 occupations, such as shipyard work, farming, and occupations requiring high knee-bending demands,
40 have increased risks for osteoarthritis.^{41,42}

Principal Determinants of Health

41
42
43
44 The importance of physical activity for bone and joint health was highlighted in a 1996 Surgeon
45 General’s report on physical activity and health.⁴³ Despite increasing evidence of potential behavioral
46 interventions, few resources have been invested in identifying these or other risk factors for the various
47 types of arthritis. Even so, it is now clear that recreational or occupational joint injury is a risk factor for
48 later osteoarthritis, and overweight is a risk factor for osteoarthritis of the knee and possibly the hip and
49 hand.⁴⁴ Overweight appears to be a risk factor for progression and severity of osteoarthritis.^{45,46} Genetic
50 research may soon identify persons at high risk for certain types of arthritis and thereby offer a better

1 target for interventions. As noted above, arthritis occurs more frequently among persons with low
2 education or low income.⁴⁷⁻⁴⁹

4 *Effective Interventions*

5
6 Current medical care offers considerable relief of pain and other symptoms for all types of arthritis.
7 Available interventions are often not used because of widespread popular belief that arthritis is part of
8 normal aging, that there is nothing one can do about it, and that it affects only old people. For example,
9 early diagnosis and more aggressive treatment of rheumatoid arthritis with disease-modifying drugs
10 appear to reduce symptoms and disability.⁵⁰⁻⁵⁵ Educational and behavioral interventions improve
11 symptoms and reduce disability. Interventions using telephone contacts with clinicians and several land-
12 based and water exercise programs have had beneficial outcomes.⁵⁶⁻⁵⁹ The Arthritis Self-Help Course, a
13 6-week, 2-hour/week educational intervention, has been shown to reduce pain up to 20 percent beyond
14 conventional medical care.⁶⁰ It has the additional benefit of being a cost-saving intervention by reducing
15 physician visits for arthritis.^{61,62} Effective interventions are currently underused, with some reaching less
16 than 1 percent of the target population.⁶³ Countering myths about arthritis and applying available
17 interventions can help reduce the impact of this health problem.

19 *Osteoporosis*

20
21 About 13 to 18 percent of women aged 50 and older have osteoporosis, and 37 to 50 percent have
22 osteopenia. Also 1 to 4 percent of men aged 50 and older have osteoporosis, and 28 to 47 percent have
23 osteopenia. This corresponds to 4 to 6 million women and 1 to 2 million men with osteoporosis.

24
25 The major health consequence of osteoporosis is increased risk of fractures. Approximately 1.5 million
26 fractures per year are attributed to osteoporosis.⁶⁴ One in three women and one in eight men aged 50 and
27 older will experience an osteoporotic-related fracture in their lifetime.⁶⁵ Health care costs for these
28 fractures are estimated at \$13.8 billion per year in 1996 dollars.⁶⁶

29
30 Even though the risk of any fracture is increased by the presence of osteoporosis, hip fractures represent
31 the most serious impact in terms of health care costs and consequences for the patient. In 1994, there
32 were 281,000 hospital discharges for hip fracture among persons aged 45 and older. Of these, 74,000 or
33 26 percent were men.⁶⁷ One out of 6 white women and 1 out of 17 white men will experience a hip
34 fracture by the time they reach 90 years of age.⁶⁸ While the hip fracture rate among women seems
35 relatively constant, the rate among men seems to be increasing over time.⁶⁹

36
37 An average of 24 percent of hip fracture patients aged 50 and over die from any cause in the year
38 following fracture, with higher mortality rates among men than among women.⁷⁰ Also, hip fracture was
39 more likely than other serious medical conditions, including heart attack, stroke, and cancer, to lead to
40 functional impairment.⁷¹ For example, 50 percent of hip fracture patients will be unable to walk without
41 assistance.⁷²

42
43 Interventions for osteoporosis and fractures can be designed to prevent the development of the disease,
44 reduce further bone loss after the occurrence of the disease, and lessen the risk of fractures. Opportunities
45 for primary prevention occur throughout the lifespan with programs to promote exercise, avoid smoking,
46 and improve nutrition, particularly calcium and vitamin D intake. These approaches can be important in
47 achieving a high peak bone mass during adolescence to delay the onset of osteoporosis as bone mass
48 declines with age. The approaches can also reduce the rate of bone loss later in life. Women need to be
49 particularly concerned about bone loss occurring at the time of menopause, when bone can be lost at the
50 rate of 2 to 4 percent per year. Women should be counseled on alternative methods to prevent this bone
51 loss as appropriate. There is evidence that older individuals, even those who have had a fracture, can

1 benefit from treatment to prevent further bone loss or restore some lost bone so that the risk of subsequent
2 fractures can be decreased.⁷³

3
4 Osteoporosis is more prevalent among women than men. Prevalences are higher among non-Hispanic
5 white Americans than among non-Hispanic blacks or Mexican-Americans.⁷⁴

6 7 ***Chronic Back Conditions***

8
9 Chronic back conditions are both common and debilitating. The annual incidence of low back pain is 5 to
10 14 percent, and the lifetime reported prevalence ranges from 60 to 90 percent.⁷⁵⁻⁷⁸ In 1983-85, the
11 prevalence of chronic back conditions was 77.5 per 1,000 people, 17 per 1,000 for intervertebral disk
12 disorders, 19.7 per 1,000 for curvature of the back or spine, and 40.8 per 1,000 for other impairments of
13 the back.⁷⁹

14
15 In 1983-85, chronic back conditions rivaled arthritis and heart disease as a major cause of activity
16 limitation. Intervertebral disk disorders accounted for 4.4 percent of all activity limitation, curvature of
17 the back or spine accounted for another 1.3 percent, and other impairments of the back accounted for 6.5
18 percent.⁸⁰ These translate into activity limitation rates due to chronic back conditions of 6.2 per 1,000 for
19 intervertebral disk disorders, 1.8 per 1,000 for curvature of the back or spine, and 9.2 per 1,000 for other
20 impairments of the back. Chronic back conditions are the most frequent cause of activity limitation in
21 people younger than age 45⁸¹⁻⁸³ and account for 23 percent of the activity limitation among people aged
22 18 through 44.⁸⁴ Low back pain disables 5.4 million Americans and costs at least \$16 billion each year.⁸⁵

23 24 **Progress Toward Year 2000 Objectives**

25
26 The national health objectives for the year 2000 included a few objectives for osteoporosis, one objective
27 for chronic back conditions, and no objectives for arthritis. National progress for the Healthy People
28 2000 objectives for osteoporosis and chronic back conditions are summarized below.

29
30 The objective of increasing to 90 percent the proportion of perimenopausal women who have been
31 counseled about estrogen replacement therapy for the prevention of osteoporosis (objective 17.18) had
32 baseline data determined in 1994. Rates were 76 percent among women aged 40 to 49 and 83 percent
33 among women aged 50 to 59. No subsequent data were available to chart progress toward the year 2000.

34
35 Annual hip fracture (objective 9.7) rates increased among persons aged 65 and older from 714 per
36 100,000 persons in 1988 to 818 fractures per 100,000 persons in 1995, although the rate declined slightly
37 among white females aged 85 and older.

38
39 Rates of activity limitation due to chronic back conditions (objective 17.5) increased from the 1986-88
40 baseline of 21.9 per 1,000 to 28.1 per 1,000 in 1994.

1 **Draft 2010 Objectives**

2
3 *Arthritis*

4
5 *Health-Related Quality of Life*

- 6
7 **1. Increase mean days without severe pain for U.S. adults with arthritis to more than 20 of the**
8 **past 30 days.** (Baseline: 16.0 days in 1995)

9
10 **Target Setting Method:** 25 percent increase.

11
12 **Data Source:** State-Based Behavioral Risk Factor Surveillance System (BRFSS), CDC, NCCDPHP.

- 13
14 **2. Reduce to no more than 15 percent the proportion of people with arthritis who experience a**
15 **limitation in activity due to arthritis.** (Baseline: 18.4 percent in 1990)

16
17 **Target Setting Method:** 18.5 percent improvement.

18
19 **Data Source:** National Health Interview Survey (NHIS), CDC, NCHS.

- 20
21 **3. (Developmental) Reduce the proportion of all people with arthritis who have difficulty in**
22 **performing two or more personal care activities thereby preserving independence.**

23
24 **Potential Data Source:** National Health Interview Survey (NHIS), CDC, NCHS.

25
26 Arthritis and other rheumatic conditions affect one's quality of life in many ways and are key items of
27 personal interest to those with these conditions.⁸⁶⁻⁹² From a public health perspective, validated measures
28 of health-related quality of life (HRQOL) are essential for monitoring the impact of clinical and public
29 health interventions. Validated measures of HRQOL (healthy days, ability days, days without pain) are
30 discussed in Goal 1.

31
32 Public health researchers measure days without severe pain (objective 1) by asking people the question,
33 "During the past 30 days, for about how many days did pain make it hard for you to do your usual
34 activities, such as self-care, work, or recreation?" Pain is the most important symptom among persons
35 with arthritis, resulting in the widespread use of conventional prescription and nonprescription
36 medications, surgical interventions, and alternative medical treatments. A pain-free days measure
37 provides a pertinent, understandable performance-based approach for tracking this key health-related
38 quality of life (HRQOL) determinant for persons with arthritis. A 25 percent increase in days without
39 severe pain is a feasible target, given more widespread use of available interventions (medical,
40 educational, exercise, nutritional) that are likely to affect this measure.

41
42 Healthy days, ability days, and days without severe pain all include a time perspective, an essential
43 concept for measuring HRQOL. All three measures have extensive population baseline data available.
44 Data for healthy days and recent ability days, collected in the State-Based Core Behavioral Risk Factor
45 Surveillance System (BRFSS) since January 1993, are available for States and many counties. More than
46 500,000 adults have reported their recent healthy days and ability days as of the end of 1997. Days
47 without severe pain, collected in the BRFSS HRQOL module since January 1995, are available for about
48 a dozen States and many counties. More than 20,000 adults have reported their recent pain days as of the
49 end of 1997. All three measures also have been found to have good construct validity in relation to other
50 health constructs measured in the BRFSS and have been acceptably cross-validated in a general

1 population adult sample with the Medical Outcomes Study Short-Form 36 (SF-36), a widely used clinical
2 HRQOL measure.

3
4 Activity limitation (objective 2) is an important functional limitation that can compromise one's
5 independence. Activity limitation is frequent among persons with arthritis, affecting 18.4 percent which
6 is far more than the national average. The activity limitations of arthritis also indirectly affect health and
7 independence by decreasing physical activity, increasing overweight, and placing persons at higher risk
8 for all the adverse outcomes of those risk factors. Therefore, it is an important outcome to target in this
9 large population.

10
11 As the leading cause of disability, arthritis is a leading cause of difficulty in performing personal care
12 activities (objective 3) and thereby a leading cause of loss of independence. Maintaining independence,
13 especially in personal care, is important for persons with arthritis and should be a specially targeted
14 outcome.

15
16 *Mental Health*

17
18 **4. (Developmental) Increase the proportion of people with arthritis aged 18 and older who seek
19 help in coping with personal and emotional problems.**

20
21 **Potential Data Sources:** National Health Interview Survey (NHIS), CDC, NCHS, and the State-
22 Based Behavioral Risk Factor Surveillance System (BRFSS), CDC, NCCDPHP, could be modified.

23
24 Difficulty coping, depression, anxiety, and low self-efficacy are recognized as major problems among
25 persons with arthritis.⁹³ Addressing these issues is especially important among persons with pain, and
26 arthritis is a leading cause of chronic pain.⁹⁴ Monitoring these mental health outcomes can help assess the
27 success of applied interventions.

28
29 *Labor Force Participation*

30
31 **5. Increase the proportion of the working age population with arthritis who desire to work (i.e.,
32 both those who are employed and those who are unemployed but looking for work, the labor
33 force participation rate) to 60 percent. (Baseline: 45 percent in 1994)**

34
35 **Target Setting Method:** 33 percent improvement.

36
37 **Data Source:** National Health Interview Survey (NHIS), CDC, NCHS.

38
39 Labor force participation rates for all working ages (i.e., 18 to 64 years) in 1994 were 86.9 percent for
40 men and 70.6 percent for women.⁹⁵ Rates for persons with arthritis are far below these numbers. A
41 portion of this low rate is likely to be preventable through early diagnosis and treatment and better self-
42 management. Raising this low rate will help create greater independence for the person affected and
43 reduce the demands on families and society. The latter is particularly important as demographic changes
44 lead to fewer workers for each nonworker. Also, labor force participation rates are different for men and
45 women, suggesting that they should be targeted separately.

1 *Joint Replacement*
2

3 **6. (Developmental) Reduce racial differences in the rate of total knee replacement for severe pain**
4 **and disability.**

5
6 **Potential Data Sources:** Medicare, health care provider data.
7

8 Studies have shown that African Americans have much lower rates of total knee replacement than whites,
9 even when adjusted for age, sex, and insurance coverage.⁹⁶ The reasons for this difference are not clear,
10 but the effect is that many persons are not getting needed interventions to reduce pain and disability. This
11 is one arthritis component of a more widespread problem of racial differences in medical care that cannot
12 be easily explained by financial or access-to-care issues. It will require research into the causes of these
13 differences and development of effective interventions.
14

15 *Health Care Access, Diagnosis, and Treatment*
16

17 **7. Decrease to 5 percent the proportion of individuals who report they have arthritis but have**
18 **never seen a doctor for it.** (Baseline: 16.4 percent in 1990)
19

20 **Target Setting Method:** 70 percent improvement.⁹⁷⁻⁹⁹
21

22 **Data Source:** National Health Interview Survey (NHIS), CDC, NCHS.
23

24 Appropriate medical management, education, better self-management, and exercise can reduce arthritis
25 pain and disability. Increasing the percent of persons who seek a diagnosis and treatment from a doctor
26 for their arthritis is an objective amenable to public awareness campaigns that counter the myths that
27 arthritis is normal aging and nothing can be done for it. This is especially important for the working age
28 population, the upper age limit of which is likely to rise as the overall population ages over the next 30
29 years.
30

31 **8. (Developmental) Increase the early diagnosis and appropriate treatment of individuals with**
32 **systemic rheumatic diseases.**
33

34 Early diagnosis and treatment have been shown to reduce pain, slow progression, and reduce disability of
35 rheumatoid arthritis.¹⁰⁰⁻¹⁰⁵ Yet studies suggest that the median time to diagnosis for rheumatoid arthritis is
36 8 months after symptom onset, and over one-third of patients are undiagnosed 1 year after symptom
37 onset.¹⁰⁶ An American College of Rheumatology consensus conference identified other systemic
38 rheumatic diseases, such as lupus nephritis, myositis, Kawasaki diseases, and giant cell arteritis, as
39 benefiting from early diagnosis and appropriate treatment.¹⁰⁷ An objective focused on these systemic
40 rheumatic diseases is likely to have incidental benefits on persons with other types of inflammatory
41 arthritis.
42

43 Analysis of surveys done between now and the year 2000 will provide a snapshot of current practice and
44 allow development of definitions of “early diagnosis” and “appropriate treatment.” Early diagnosis is
45 likely to mean diagnosis within 6 months of initial symptoms. Appropriate treatment is likely to mean at
46 least consultation with a rheumatologist to develop a plan of treatment (including use of disease
47 modifying drugs, patient education, physical activity, and maintaining ideal weight), even though the plan
48 may be executed by the person’s primary care provider.
49

1 *Arthritis Education*
2

- 3 **9. (Developmental) Increase the proportion of people with arthritis who have had effective,**
4 **evidence-based arthritis education (including information about community and self-help**
5 **resources) as an integral part of the management of their condition.**
6

7 **Potential Data Sources:** National Health Interview Survey (NHIS), CDC, NCHS, and Behavioral
8 Risk Factor Surveillance System (BRFSS) arthritis module, CDC, NCCDPHP, could be modified.
9

- 10 **10. (Developmental) Increase the proportion of hospitals, managed care organizations, and large**
11 **group practices that provide effective, evidence-based arthritis education (including**
12 **information about community and self-help resources) as an integral part of the management of**
13 **their condition.**
14

15 Existing effective evidence-based educational interventions, such as the Arthritis Self-Help Course, have
16 been shown to reduce arthritis pain and reduce physician visits for arthritis.¹⁰⁸ These beneficial
17 interventions, however, are estimated to reach less than 1 percent of the population with arthritis.¹⁰⁹
18 Disseminating the benefits of interventions currently available offers the opportunity of quickly
19 improving the health of all persons with arthritis and reducing their impact nationally.
20

21 *Physical Activity and Fitness*
22

23 For full discussion, see Physical Activity and Fitness Focus Area, objectives 1 and 2.
24

25 Physical activity is an important intervention for maintaining joint health among persons with arthritis,¹¹⁰
26 who compose 20 percent of the adult population. Their leisure-time physical activity profiles, however,
27 are far worse than the national average.¹¹¹ Further, in the past people with arthritis have been advised to
28 avoid physical activity. That recommendation has changed, but public health strategies are needed to
29 develop widespread public awareness of this new recommendation. Thus, achieving these objectives is
30 an extremely important public health approach to persons with arthritis, who also represent a large and
31 extra-difficult target group for achieving the national objectives of raising physical activity.
32

1 *Nutrition*

2
3 For full discussion, see Nutrition Focus Area, objectives 1 and 2.

4
5 **11. (Developmental) Increase the proportion of overweight people with arthritis who have adopted**
6 **some dietary practices combined with regular physical activity to attain an appropriate body**
7 **weight.**

8
9 **Statistical Note:** The National Health Interview Survey (NHIS), with input from the National
10 Arthritis Data Workgroup, changed its approach to arthritis in 1996. Instead of asking for self-reports
11 of arthritis diagnosis, which is difficult for many respondents who do not know their type of arthritis,
12 the NHIS now asks for self-reports of symptoms. The personal interview-based NHIS and the
13 telephone-based Behavioral Risk Factor Surveillance System optional arthritis module ask identical
14 questions about pain, aching, stiffness, or swelling in or around a joint that was present on most days
15 for at least 1 month in the past 12 months, which is the new self-report definition of arthritis and other
16 rheumatic conditions. Studies will soon be undertaken to validate this new definition. This objective
17 can be reframed using the new definition once analyses are completed using the new definition. Both
18 the NHIS and BRFSS also ask whether the person has seen a doctor for their arthritis. Thus, we have
19 the opportunity for nearly identical data at the national and State level to help measure and drive
20 progress toward these objectives. Studies currently underway will examine the ability of the State-
21 Based Behavioral Risk Factor Surveillance System to generate national estimates.

22
23 **Potential Data Sources:** National Health Interview Survey (NHIS) CDC, NCHS; State-Based
24 Behavioral Risk Factor Surveillance System (BRFSS), CDC, NCCDPHP.

25
26 Persons with arthritis have consistently higher body mass indices (BMIs) than age/sex/race matched
27 persons without arthritis.¹¹² Being overweight in middle age is a powerful risk factor for the development
28 and progression of knee osteoarthritis,¹¹³ one of the most common and disabling types of arthritis. Thus,
29 reducing overweight is one of the few recognized modifiable risk factors for an important cause of
30 arthritis disability.^{114,115} Further, the combination of dietary practices and regular physical activity is ideal
31 to help persons with arthritis maintain joint health and slow progression of disease.
32

1 **Osteoporosis**

2
3 *Prevalence of Osteoporosis*

4
5 **12. Reduce the prevalence of osteoporosis, as defined by low bone mineral density (BMD), to no**
6 **more than 8 percent among people aged 50 and over.** (Baseline: 10 percent had low total femur
7 BMD in 1988-94)
8

Select Populations	1988-94
African American, non-Hispanic female aged 50 and older	8%
American Indian/Alaska Native female aged 50 and older	Not available
Asian American female aged 50 and older	Not available
Hispanic female	Not available
Mexican American female aged 50 and older	12%
White, non-Hispanic female aged 50 and older	17%
Male	2%
Female	16%

9
10 **Target Setting Method:** 20 percent reduction of baseline

11
12 **Data Sources:** National Health and Nutrition Examination Survey (NHANES), CDC, NCHS.

13
14 Bone mineral density (BMD) has been identified as one of the primary predictive risk factors for
15 osteoporotic fracture.¹¹⁶⁻¹¹⁸ An expert panel of the World Health Organization (WHO) recently proposed
16 diagnostic criteria for osteoporosis in postmenopausal women based on bone density.^{119,120} Cutoff values
17 for osteoporosis are defined using BMD data from a young adult reference group. Specifically,
18 osteoporosis is defined as a BMD value that is more than 2.5 standard deviations below the young adult
19 reference mean.

20
21 Using the WHO approach, the prevalence of femoral osteoporosis was estimated in people aged 50 years
22 and older in 1988-94.¹²¹ Data from young white women were used to calculate the specific BMD cutoff
23 values to define osteoporosis. These criteria were applied to nonwhite women and to men of all races,
24 even though their applicability to groups other than white women is not certain. The prevalence of
25 osteoporosis in the total femur region of interest among adults aged 50 years and older was 10 percent (16
26 percent in older women and 2 percent in men). Estimates for specific race/ethnic groups in women were
27 17 percent in non-Hispanic whites, 8 percent in non-Hispanic blacks, and 12 percent in Mexican-
28 Americans. Osteoporosis occurs in men and minority women, although the rates of disease are not as
29 high as the rates found among white women. It is important to note that these prevalence estimates are
30 based on the total femur; estimates based on a different skeletal site (or combination of sites) may differ.
31 For example, Melton¹²² estimated that the prevalence of osteoporosis among white women in Olmsted
32 County, Minnesota, was approximately 16 to 17 percent at the femur, lumbar spine, or wrist when each
33 site was considered separately, but 30 percent when all three sites were considered together.

34
35 Baseline data on low femoral BMD is available from NHANES III, while baseline data on low total body
36 BMD will be available from NHANES IV by 2001. Both data sets can provide relevant baseline
37 information for monitoring progress towards this objective.
38

1 *Hip Fractures*

2
3 For more discussion, see Injury/Violence Prevention Focus Area, objective 23.

4
5 Hip fracture is the most serious consequence of osteoporosis. Over a quarter of a million hip fractures
6 occurred in the United States in 1994.¹²³ Approximately 1 in 6 white women and 1 in 17 men will
7 experience a hip fracture during his or her lifetime.¹²⁴ Hip fracture rates increase exponentially with
8 increasing age such that beginning at age 65, the rates double for men and women with each decade of
9 life.¹²⁵ With the aging of the population, there will be more people in the oldest age groups, which will
10 lead to a marked increase in the number of hip fractures.

11
12 The consequences of a hip fracture can be very devastating particularly in term of one's quality of life.
13 Virtually all people with a hip fracture are hospitalized for treatment. People with a hip fracture have an
14 elevated risk of dying as a result of the hip fracture and of comorbid conditions. Two thirds of people
15 who fracture a hip do not return to their prefracture level of functioning. After a year, 40 percent of the
16 patients could not walk without aid, and 60 percent could not independently perform all activities of daily
17 living (ADLs) such as bathing, dressing, transferring from a bed to a chair, and toileting. Hip fractures
18 were more likely to lead to functional impairments than other serious medical conditions, including heart
19 attack, stroke, and cancer.¹²⁶ Health care expenditures for hip fractures in 1995 have been estimated at
20 \$8.7 billion.¹²⁷

21
22 Osteoporosis is a major risk factor for hip fracture. It is estimated that osteoporosis contributes to 90
23 percent of hip fractures in women and 80 percent of hip fractures in men.¹²⁸ Increasing the bone mineral
24 density by 5 percent would decrease the risk of fractures by 25 percent.¹²⁹ Interventions that reduce the
25 rate of osteoporosis should have a marked impact on the rate of hip fractures.

26
27 Although osteoporosis increases the risk of fractures, most hip fractures result from falls.¹³⁰ Interventions
28 that reduce the risk of falling provide other approaches to reducing the rate of hip fractures among men
29 and women. Fall risk factors potentially amenable to interventions include impaired vision, use of long-
30 acting psychotropic drugs, physical inactivity, muscle weakness, and poor health.¹³¹ Also, the use of hip
31 protectors may reduce the likelihood of hip fractures among populations who are at high risk of falls.¹³²

32
33 *Nutrition*

34
35 For discussion of calcium, see Nutrition Focus Area, objective 9, and accompanying text.

36
37 *Counseling*

38
39 **13. (Developmental) Increase to __ percent the proportion of persons over the age of 13 who**
40 **receive counseling from their health care provider about osteoporosis prevention.**

41
42 **Target Setting Method:** Approximately doubling the current prevalence of counseling about diet
43 and physical activity.

44
45 **Potential Data Source:** National Ambulatory Medical Care Survey.

1 **14. (Developmental) Increase the proportion of women aged 50 and older, as well as other persons**
2 **at high risk for osteoporosis, who are counseled about prevention of osteoporosis as well as**
3 **about appropriate regimens for the treatment of osteoporosis.**
4

5 Osteoporosis is a largely preventable disease with known risk factors, many of which need to be
6 addressed by health care providers beginning in childhood and continuing throughout life. The 1995
7 *Guide to Clinical Preventive Services* suggests that postmenopausal women should receive counseling
8 regarding universal measures to reduce fracture risk, including the importance of adequate dietary
9 calcium and vitamin D intake, weight bearing exercise, and smoking cessation.¹³⁶ As an extension to
10 these guidelines, counseling about these behaviors may also be appropriate for men as well as young
11 adults and adolescents. While the prevalence of osteoporosis is higher in women, 1-4 percent of men
12 over the age of 50 also have osteoporosis.¹³⁷ In addition, low bone density in older adults may reflect the
13 failure to attain a peak bone density in adolescence and young adulthood. While data on the prevention of
14 osteoporosis in men and in young women is sparse, it is likely that nutrition, physical activity, and
15 smoking play a role in all population groups. Older persons should also receive counseling regarding
16 preventive measures to reduce the risk of falls and the severity of fall-related injuries.¹³⁸
17

18 As recommended in the 1995 *Guide to Clinical Preventive Services*, counseling should include both
19 education as well efforts to help the patient change behaviors. National estimates for the prevalence of
20 osteoporosis prevention counseling by health care providers do not currently exist. However, the
21 National Ambulatory Medical Care Survey does provide information on the prevalence of physician
22 counseling on diet, physical activity, and smoking, each of which should be included in osteoporosis
23 prevention counseling. Use of this data will provide a liberal estimate of the prevalence of counseling
24 related to specific osteoporotic risk factors.
25

26 Data from the 1995 National Ambulatory Medical Care Survey indicate that of all office visits for general
27 medical and gynecological examinations of adults aged 20 years and older, 19 percent included
28 counseling about physical activity, 23 percent included counseling about diet, and 64 percent included the
29 assessment of smoking status.¹³⁹ For similar office visits by adolescents aged 13 to 19 years old, 28
30 percent included counseling about physical activity, 29 percent included counseling about diet, and 83
31 percent included an assessment of smoking status (data not published).
32

33 Certain adults may be at high risk for osteoporosis because of their clinical profile. A Medicare law
34 effective July 1, 1998, compensates certain high-risk individuals for the cost of bone density
35 measurements. These individuals include: (1) postmenopausal women who are not using hormone
36 replacement therapy, (2) persons with hyperparathyroidism, (3) persons receiving long-term
37 glucocorticoid treatment, and (4) persons with vertebral abnormalities. In addition to being given
38 compensation for bone density measurements, these persons should also be counseled about the
39 prevention and treatment of osteoporosis. All counseling should include a discussion of the universal
40 measures to reduce fracture risk as described in the previous objective. In addition, this group of high-
41 risk individuals should be counseled about the benefits and risks of clinical interventions for the treatment
42 of osteoporosis. These clinical regimens might include estrogen replacement therapy, as well as drugs
43 approved by the FDA for the treatment of osteoporosis. National estimates for the prevalence of
44 counseling by health care providers about osteoporosis prevention and treatment in high-risk individuals
45 do not exist currently.
46

47 *Exercise*
48

49 For more discussion, see Physical Activity and Fitness Focus Area, objectives 1, 2, and 3.
50

1 **Chronic Back Conditions**
2

3 **15. Reduce activity limitation due to chronic back conditions to a prevalence of no more than 27.0**
4 **per 1,000 people.** (Baseline: 28.1 per 1,000 in 1992-94)
5

6 **Note:** Chronic back conditions include intervertebral disk disorders, curvature of the back or spine,
7 and other self-reported chronic back impairments such as permanent stiffness or deformity of the
8 back or repeated trouble with the back. Activity limitation refers to any self-reported limitation in
9 activity attributed to a chronic back condition.

10
11 **Target Setting Method:** 4 percent improvement.
12

13 **Data Source:** National Health Interview Survey (NHIS), CDC, NCHS.
14

15 People who are overweight and people who frequently bend over or lift heavy objects are more likely to
16 report low back injuries.¹⁴⁰ Occupations that require repetitive lifting, particularly in a forward bent and
17 twisted position, place employees at especially high risk. Other risk factors for low back injury include
18 exposure to vibration produced by vehicles or industrial machinery, prolonged vehicle driving, and
19 certain sports activities.¹⁴¹⁻¹⁴⁵ Also associated with an increased incidence of back pain are spinal
20 osteochondrosis, spondylolisthesis, and spinal stenosis.¹⁴⁶⁻¹⁴⁸ Other predictors of back problems may be
21 lumbar flexibility, trunk muscle strength, and hamstring elasticity.¹⁴⁹ Osteoporosis increases the risk of
22 vertebral compression, and this may account for the increase in reported low back pain symptoms in older
23 women.^{150,151} Increased age is associated with back pain.¹⁵² Finally, people who have experienced back
24 problems in the past are at increased risk for future injury.^{153,154}
25

26 Interventions to prevent low back injury typically involve education, physical conditioning, weight loss,
27 and/or task or environmental redesign. When feasible, redesigning the task or the environment is often
28 the most effective intervention, especially in the work setting (see objective 10.13 in Occupational Safety
29 and Health). The severity and frequency of low back injury among those at risk also may be reduced by
30 general improvement in physical fitness.¹⁵⁵ One program that combined health education with strength
31 and endurance training found that those who achieved the highest levels of physical fitness had much
32 lower back injury costs than did the least fit.¹⁵⁶ “Back school” programs that include education, lifestyle
33 analysis, and exercise are effective in reducing employment-related injuries and relieving chronic low
34 back pain.
35

36 Reductions in the incidence of back injuries of 49 percent and 68 percent have been reported.^{157,158}
37 Training in proper lifting techniques has been emphasized as an important preventive measure, but the
38 validity and practical utility of a single recommended lifting technique has been questioned. Greater
39 success in preventing injuries is usually achieved by redesigning the task or the environment.¹⁵⁹
40

41 Effective prevention of low back injury in the general population is more difficult than at the worksite
42 because tasks and environments vary greatly. Only a few specific activities such as repetitive lifting and
43 prolonged driving are relevant to large numbers of people. For the overall population, the emphasis
44 should be on physical activity and dietary measures to maintain ideal body weight. Individuals at
45 increased risk for low back injury because of past history, body configuration, or specific activity may
46 benefit from a program of selected conditioning exercises.
47

1 **Related Objectives From Other Focus Areas**

2
3 **Goal 1**

- 4 6 People with good, very good, or excellent health
5 7 Healthy days
6 8 Able to do usual activities
7 9 Years of healthy life
8 10 Years of healthy life, older adults
9

10 **Physical Activity and Fitness**

- 11 1 Leisure time physical activity
12 2 Sustained physical activity
13 3 Vigorous physical activity
14 4 Muscular strength and endurance
15 5 Flexibility
16 11 Inclusion of physical activity in health education
17 14 Clinician counseling about physical activity
18

19 **Nutrition**

- 20 1 Healthy weight
21 2 Obesity in adults
22 9 Calcium intake
23 14 Nutrition education, elementary schools
24 15 Nutrition education, middle/junior high schools
25 16 Nutrition education, senior high schools
26 17 Worksite nutrition education and weight management programs
27 18 Nutrition assessment and planning
28

29 **Tobacco Use**

- 30 1 Adult tobacco use
31 6 Smoking cessation
32 10 Advice to quit smoking
33 12 Providers advising smoking cessation
34 20 Adolescent perception of harm of tobacco use
35

36 **Educational and Community-Based Programs**

- 37 5 Worksite health promotion programs
38 6 Participation in employer-sponsored health promotion activities
39 9 Community disease prevention and health promotion activities
40 12 Elderly participation in community health promotion
41

42 **Injury/Violence Prevention**

- 43 23 Hip fractures
44

45 **Occupational Safety and Health**

- 46 2 Work-related injuries
47 3 Workplace injury and illness surveillance
48 4 Overexertion or repetitive motion
49

1 **Access to Quality Health Services**

2 A.3 Routine screening about lifestyle risk factors

3 A.5 Training to address health disparities

4 D.1 Functional assessments

5
6 **Cancer**

7 9 Provider counseling about preventive measures

8
9 **Disability and Secondary Conditions**

10 4 Healthy days among adults with activity limitations who need assistance

11
12 **References**

- 13
14 1. World Health Organization (WHO). *Assessment of Fracture Risk and Its Application to Screening for*
15 *Postmenopausal Osteoporosis*. Technical Report Series No. 843. Geneva Switzerland: WHO, 1994.
- 16 2. Centers for Disease Control and Prevention (CDC). Arthritis prevalence and activity limitations—United
17 States, 1990. *Morbidity and Mortality Weekly Report* 43:433-438, 1994.
- 18 3. Lawrence, R.C.; Helmick, C.G.; Arnett, F.C.; et al. Estimates of the prevalence of arthritis and selected
19 musculoskeletal disorders in the United States. *Arthritis and Rheumatism* 41(5): 778-799, 1998.
- 20 4. Helmick, C.G.; Lawrence, R.C.; Pollard, R.A.; et al. for the National Arthritis Data Workgroup. Arthritis and
21 other rheumatic conditions: Who is affected now, who will be affected later. *Arthritis Care and Research*
22 8:203-211, 1995.
- 23 5. CDC. Prevalence of disabilities and associated health conditions—United States, 1991-1992. *Morbidity and*
24 *Mortality Weekly Report* 43:730-739, 1994.
- 25 6. CDC, 1994, pp. 433-438, op. cit.
- 26 7. Lawrence, et al., op. cit.
- 27 8. Helmick, et al., op. cit.
- 28 9. LaPlante, M.P. *Data on Disability from the National Health Interview Survey, 1983-1985*. Washington, DC:
29 National Institute on Disability and Rehabilitation Research, U.S. Department of Education, 1991.
- 30 10. CDC. Health-related quality of life and activity limitation—8 states, 1995. *Morbidity and Mortality Weekly*
31 *Report* 47:134-140, 1998.
- 32 11. CDC. State differences in reported healthy days among adults—United States, 1993-1996. *Morbidity and*
33 *Mortality Weekly Report* 47:239-244, 1998.
- 34 12. CDC. *Targeting Arthritis: The Nation's Leading Cause of Disability*. At-a-Glance. Atlanta, GA: Technical
35 Information and Editorial Services Branch, National Center for Chronic Disease Prevention and Health
36 Promotion, Centers for Disease Control and Prevention, 1998.
- 37 13. Yelin, E. and Callahan, L.F. for the National Arthritis Data Workgroup. The economic cost and social and
38 psychological impact of musculoskeletal conditions. *Arthritis and Rheumatism* 38:1351-1362, 1995.
- 39 14. CDC, 1994, pp. 433-438, op. cit.
- 40 15. Lawrence, et al., op. cit.
- 41 16. Helmick, et al., op. cit.
- 42 17. Trupin, L.; Sebesta, D.; Yelin, E.; LaPlante, M. *Trends in Laborforce Participation Among Persons With*
43 *Disability, 1983-1994*. Disability Statistics Report 10. Washington, DC: U.S. Department of Education,
44 National Institute on Disability and Rehabilitation Research, 1997.
- 45 18. Frank, R.G. and Hagglund, K.J. Mood disorders. In: *Clinical Care in the Rheumatic Diseases*. Atlanta,
46 GA: American College of Rheumatology, 1996.
- 47 19. Bradley, L.A. Pain management interventions for patients with rheumatic diseases. In: Melvin, J. and
48 Jensen, G. eds. *Rheumatologic Rehabilitation: Assessment and Management*. Rockville, MD: American
49 Occupational Therapy Association, 1997.
- 50 20. CDC. *Targeting Arthritis*, 1998, op cit.
- 51 21. Boulton, C.; Altmann, M.; Gilbertson, D.; Yu, C.; Kane, R.L. Decreasing disability in the 21st century: The
52 future effects of controlling six fatal and non-fatal conditions. *American Journal of Public Health* 86:1388-
53 93, 1996.
- 54 22. CDC, 1994, pp. 433-438, op. cit.

Healthy People 2010 Objectives: Draft for Public Comment

- 1 23. Lawrence, et al., op. cit.
- 2 24. Helmick, et al., op. cit.
- 3 25. CDC, 1994, pp. 433-438, op. cit.
- 4 26. Lawrence, et al., op. cit.
- 5 27. Helmick, et al., op. cit.
- 6 28. CDC. Prevalence and impact of arthritis among women—United States, 1989-1991. *Morbidity and Mortality Weekly Report* 44:329-334, 517-518, 1995.
- 7
- 8 29. Callahan, L.F.; Rao J.; Boutaugh, M. Arthritis and women's health: Prevalence, impact, and prevention. *American Journal of Preventive Medicine* 12:401-409, 1996.
- 9
- 10 30. Manzi, S.; Meilahn, E.N.; Rairie, J.E.; et al. Age-specific incidence rates of myocardial infarction and angina in women with systemic lupus erythematosus: Comparison with the Framingham study. *American Journal of Epidemiology* 145:408-415, 1997.
- 11
- 12
- 13 31. CDC, 1994, pp. 433-438, op. cit.
- 14 32. Lawrence, et al., op. cit.
- 15 33. Helmick, et al., op. cit.
- 16 34. CDC. Prevalence and impact of arthritis by race and ethnicity—United States, 1989-1991. *Morbidity and Mortality Weekly Report* 45:373-378, 1996.
- 17
- 18 35. Ibid.
- 19 36. Ibid.
- 20 37. CDC, 1994, pp. 433-438, op. cit.
- 21 38. Lawrence, et al., op. cit.
- 22 39. Helmick, et al., op. cit.
- 23 40. Wilson, M.G.; May, D.S.; Kelly, J.J. Racial differences in the use of total knee arthroplasty for osteoarthritis among older Americans. *Ethnicity & Disability* 4:57-67, 1994.
- 24
- 25 41. Hochberg, J.C. Osteoarthritis. In: Silman, A.J. and Hochberg J.C., eds. *Epidemiology of the Rheumatic Diseases*. Oxford: Oxford University Press, 1993. pp. 257-288.
- 26
- 27 42. Felson, D.T. Epidemiology of hip and knee osteoarthritis. *Epidemiologic Reviews* 10:1-28, 1988.
- 28 43. U.S. Department of Health and Human Services. *Physical Activity and Health: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service, CDC, 1996.
- 29
- 30 44. Felson, D.T. and Zhang, Y. An update on the epidemiology of knee and hip osteoarthritis with a view to prevention. (Personal communication).
- 31
- 32 45. Ibid.
- 33 46. Felson, D.T.; Zhang, Y.; Anthony, J.M.; et al. Weight loss reduces the risk for symptomatic knee osteoarthritis in women. *Annals of Internal Medicine* 116:535-539, 1992.
- 34
- 35 47. CDC, 1994, pp. 433-438, op. cit.
- 36 48. Lawrence, et al., op. cit.
- 37 49. Helmick, et al., op. cit.
- 38 50. Weinblatt, M.E. Rheumatoid arthritis: Treat now, not later! (Editorial). *Annals of Internal Medicine* 124:773-774, 1996.
- 39
- 40 51. Van der Heide, A.; et al: The effectiveness of early treatment with "second-line" antirheumatic drugs. A randomized controlled trial. *Annals of Internal Medicine* 124:699-707, 1996.
- 41
- 42 52. Fries, J.F.; Williams, C.A.; Morrfield, D.; Singh, G.; Sibley, J.: Reducing long-term disability in patients with rheumatoid arthritis by disease-modifying antirheumatic drug-based treatment strategies. *Arthritis & Rheumatism* 39:616-622, 1996.
- 43
- 44
- 45 53. Egsmose, C.; et al: Patients with rheumatoid arthritis benefit from early 2nd line therapy: 5 year followup of a prospective double blind placebo controlled study. *Journal of Rheumatology* 22:2208-2213, 1995.
- 46
- 47 54. Kirwan, J.R. The Arthritis and Rheumatism Council, Low-Dose Glucocorticoid Study Group. The effect of glucocorticoids on joint destruction in rheumatoid arthritis. *New England Journal of Medicine* 333:142-146, 1995.
- 48
- 49
- 50 55. Emery, P. and Salmon, M. Early rheumatoid arthritis: Time to aim for remission? *Annals of Rheumatic Diseases* 54:944-947, 1995.
- 51
- 52 56. Maisiak, R.; Austin, J.; Heck, L. Health outcomes of two telephone interventions for patients with rheumatoid arthritis or osteoarthritis. *Arthritis & Rheumatism* 39:1391-1399, 1996.
- 53
- 54 57. Minor, M.A. Arthritis and exercise: The times they are a-changin' (Editorial). *Arthritis Care and Research* 9:9-81, 1996.
- 55
- 56 58. Minor, M.A. and Kay, D.R. Arthritis. In: *Exercise Management for Persons With Chronic Diseases and*

Healthy People 2010 Objectives: Draft for Public Comment

- 1 *Disabilities*. American College of Sports Medicine, 1997.
- 2 59. Puett, D.W. and Griffin, M.R. Published trials of nonmedicinal and noninvasive therapies for hip and knee
- 3 osteoarthritis. *Annals of Internal Medicine* 121:133-140, 1994.
- 4 60. Lorig, K.R.; Mazonson, P.D.; Holman, H.R. Evidence suggesting that health education for self-management
- 5 in patients with chronic arthritis has sustained health benefits while reducing health care costs. *Arthritis &*
- 6 *Rheumatism* 36:439-446, 1993.
- 7 61. Lorig, Mazonson, and Holman, op. cit.
- 8 62. Kruger, J.M.S.; Helmick, C.G.; Callahan, L.F.; Haddix, A.C. Cost-effectiveness of the Arthritis Self-Help
- 9 Course. *Archives of Internal Medicine*, 1998, in press.
- 10 63. Arthritis Foundation (personal communication).
- 11 64. Riggs, B.L. and Melton, L.J. The worldwide problem of osteoporosis: Insights afforded by epidemiology.
- 12 *Bone* 17:505S-511S, 1995.
- 13 65. Ibid.
- 14 66. Ray, N.F.; Chan, J.K.; Thamer, M.; Melton, L.J. Medical expenditures for the treatment of osteoporotic
- 15 fractures in the United States in 1995: Report from the National Osteoporosis Foundation. *Journal of Bone*
- 16 *and Mineral Research* 12:24-35, 1997.
- 17 67. Looker, A.C.; Orwoll, E.S.; Johnston, C.C.; et al. Prevalence of low femoral bone density in older U.S.
- 18 adults from NHANES III. *Journal of Bone and Mineral Research*. 12:1761-1768, 1997.
- 19 68. Melton L.J; Chrischilles, E.A.; Cooper, C.; et al. How many women have osteoporosis? *Journal of Bone and*
- 20 *Mineral Research*. 7:1005-1010, 1992.
- 21 69. Bacon, W.E. Secular trends in hip fracture occurrence and survival: Age and sex differences. *Journal of*
- 22 *Aging Health* 8:538-553, 1996.
- 23 70. U.S. Congress, Office of Technology Assessment. *Hip Fracture Outcomes in People Age 50 and Over—*
- 24 *Background Paper*. OTA-BP-H-120. Washington, DC: U.S. Government Printing Office, July 1994.
- 25 71. Ibid.
- 26 72. Riggs and Melton, op. cit.
- 27 73. Seeman, E. Introduction. *American Journal of Medicine* 103:1s-2s, 1997.
- 28 74. Looker, et al., op. cit.
- 29 75. Biering-Sorensen, F. Physical measurements as risk indicators for low-back trouble over a one year period.
- 30 *Spine* 9:106-119, 1984.
- 31 76. Frymoyer, J.W.; Pope, M.H.; Clements, J.H.; et al. Risk factors in low-back pain: An epidemiological
- 32 survey. *Journal of Bone and Joint Surgery* 65:213-218, 1983.
- 33 77. Frymoyer, J.W. Back pain and sciatica. *New England Journal of Medicine* 318:291-300, 1988.
- 34 78. Svensson, H.O. and Anderson, G.B.J. Low-back pain in 40- to 47-year old men: Work history and work
- 35 environment factors. *Spine* 8:272-276, 1983.
- 36 79. LaPlante, op cit.
- 37 80. Ibid.
- 38 81. Anderson, G.B. Epidemiological aspects of low back pain in industry. *Spine* 6:53-60, 1981.
- 39 82. Kelsey, J.L.; White, A.A.; Pastides, H.; et al. The impact of musculoskeletal disorders on the population of
- 40 the United States. *Journal of Bone and Joint Surgery* 61:959-964, 1979.
- 41 83. Parnianpour, M.; Bejjani, F.J.; Pavlidis, L. Worker training: The fallacy of single, correct lifting technique.
- 42 *Ergonomics* 30:331-334, 1987.
- 43 84. LaPlante, op. cit.
- 44 85. Frymoyer, op. cit.
- 45 86. CDC, *Morbidity and Mortality Weekly Report*, 1998, pp. 134-140, op. cit.
- 46 87. CDC, *Morbidity and Mortality Weekly Report*, 1998, pp. 239-244, op. cit..
- 47 88. Hennessy, C.H.; Moriarty, D.G.; Zack, M.M.; Scherr, P.A.; Brackbill, R. Measuring health-related quality of
- 48 life for public health surveillance. *Public Health Reports* 109:665-672, 1994.
- 49 89. CDC. Quality of life as a new public health measure—Behavioral Risk Factor Surveillance System, 1993.
- 50 *Morbidity and Mortality Weekly Report* 43:375-380, 1994.
- 51 90. CDC. Health-related quality-of-life measures—United States, 1993. *Morbidity and Mortality Weekly Report*
- 52 44:195-200, 1995.
- 53 91. Newschaffer, C.J. *Validation of BRFSS HRQOL Measures in a Statewide Sample*. Atlanta, GA: U.S.
- 54 Department of Health and Human Services, Public Health Service, Centers for Disease Control and
- 55 Prevention, National Center for Chronic Disease Prevention and Health Promotion, 1998.
- 56 92. Verbrugge, L.M.; Merrill, S.S.; Liu, X. *Measuring Disability With Parsimony*. Proceedings of the 1995

Healthy People 2010 Objectives: Draft for Public Comment

- 1 Public Health Conference on Records and Statistics. Hyattsville, MD: National Center for Health Statistics,
- 2 1995.
- 3 93. Frank and Hagglund, op. cit.
- 4 94. Bradley, op. cit.
- 5 95. Trupin, et al., op. cit.
- 6 96. Wilson, May, and Kelly, op. cit.
- 7 97. CDC, 1994, pp. 433-438, op. cit.
- 8 98. Lawrence, et al., op. cit.
- 9 99. Helmick, et al., op. cit.
- 10 100. Weinblatt, op. cit.
- 11 101. Van der Heide, et al., op. cit.
- 12 102. Fries, et al., op. cit.
- 13 103. Egsmose, et al, op. cit.
- 14 104. Kirwan, op. cit.
- 15 105. Emery and Salmon, op. cit.
- 16 106. Chan, K.A.; Felson, D.T.; Yood, R.A.; Walker A.M. The lag time between onset of symptoms and diagnosis
- 17 of rheumatoid arthritis. *Arthritis & Rheumatism* 37(4):814-820, 1994.
- 18 107. American College of Rheumatology (personal communication).
- 19 108. Lorig, Mazonson, and Holman, op. cit.
- 20 109. Arthritis Foundation, op. cit.
- 21 110. U.S. Department of Health and Human Services, op. cit.
- 22 111. CDC. Prevalence of leisure-time physical activity among persons with arthritis and other rheumatic
- 23 conditions—United States, 1990-1991. *Morbidity and Mortality Weekly Report* 465:389-393, 1997.
- 24 112. CDC. Factors associated with prevalence of self-reported arthritis and other rheumatic conditions—United
- 25 States, 1989-1991. *Morbidity and Mortality Weekly Report* 45:487-491, 1996.
- 26 113. Felson and Zhang, op. cit.
- 27 114. Ibid.
- 28 115. Felson, et al., op. cit.
- 29 116. Cummings, S.R.; Black, D.M.; Nevitt, M.C.; et al. for the Study of Osteoporotic Fracture Group. Bone
- 30 density at various sites for prediction of hip fractures. *Lancet* 341:72-75, 1993.
- 31 117. Melton, L.J. III; Atkinson, E.J.; O’Fallon, W.M.; Wahner, H.W.; Riggs, B.L. Long-term fracture prediction
- 32 by bone mineral assessed at different skeletal sites. *Journal of Bone and Mineral Research* 8:1227-1233,
- 33 1993.
- 34 118. Melton, L.J.; Thamer, M.; Ray, N.F.; et al. Fractures attributable to osteoporosis: Report from the National
- 35 Osteoporosis Foundation. *Journal of Bone and Mineral Research* 12:36-44, 1997.
- 36 119. Kanis, J.L.; Melton, L.J.; Christiansen, C.; Johnston, C.C.; Khaltsev, N. The diagnosis of osteoporosis.
- 37 *Journal of Bone and Mineral Research* 9:1137-1141, 1994.
- 38 120. World Health Organization, op. cit.
- 39 121. Looker, et al., op. cit.
- 40 122. Melton, L.J. How many women have osteoporosis now? *Journal of Bone and Mineral Research* 10:175-177,
- 41 1995.
- 42 123. Looker, et al., op. cit.
- 43 124. Melton, et al., 1992, op. cit.
- 44 125. Baron, J.A.; Karagas, M.; Barrett, J.; et al. Basic epidemiology of fractures of the upper and lower limb
- 45 among Americans over 65 years of Age. *Epidemiology* 7:612-618, 1996.
- 46 126. U.S. Congress, op. cit.
- 47 127. Ray, et al., op. cit.
- 48 128. Melton, L.J.; Thamer, M.; Ray, N.F.; et al. Fractures attributable to osteoporosis: Report from the National
- 49 Osteoporosis Foundation. *Journal of Bone and Mineral Research* 12:16-23, 1997.
- 50 129. Lips, P. Prevention of hip fractures: Drug therapy. *Bone* 18:159S-163S, 1996.
- 51 130. World Health Organization, op. cit.
- 52 131. Cummings, S.R. Treatable and untreatable risk factors for hip fracture. *Bone* 18:165S-167S, 1996.
- 53 132. Lauritzen, J.D.; Petersen, M.M.; Lund, B. Effect of external hip protectors on hip fractures. *Lancet*. 341:11-
- 54 13, 1993.
- 55 133. Reference deleted.
- 56 134. Reference deleted.

Healthy People 2010 Objectives: Draft for Public Comment

- 1 135. Reference deleted.
- 2 136. U.S. Preventive Services Task Force. *Guide to Clinical Preventive Services, 2nd Edition*. Baltimore:
3 Williams & Wilkins, 1996.
- 4 137. Looker, et al., op. cit.
- 5 138. U.S. Preventive Services Task Force, op. cit.
- 6 139. CDC. Missed opportunities in preventive counseling for cardiovascular diseases, United States 1995.
7 *Morbidity and Mortality Weekly Report* 47(5):91-95, 1998.
- 8 140. Schuchmann, J.A. Low back pain: A comprehensive approach. *Comprehensive Therapy* 14:14-18, 1988.
- 9 141. Frymoyer, et al., op. cit.
- 10 142. Frymoyer, op. cit.
- 11 143. Kelsey, J.L.; Githens, P.B.; White, A.A., III; et al. An epidemiologic study of lifting and twisting on the job
12 and risk for acute, prolapsed lumbar vertebral disc. *Journal of Orthopaedic Research* 2:61-66, 1984.
- 13 144. Kelsey, J.L.; Githens, P.B.; O'Conner, T.; et al. Acute prolapsed lumbar intervertebral disc: An
14 epidemiologic study with special reference to driving automobiles and cigarette smoking. *Spine* 9:608-613,
15 1984.
- 16 145. Svensson and Anderson, op. cit.
- 17 146. Anderson, D.J.; Adcock, D.F.; Chovil, A.C.; et al. Ultrasound lumbar canal measurement in hospital
18 employees with back pain. *British Journal of Industrial Medicine* 45:552-555, 1988.
- 19 147. MacDonald, E.B.; Porter, R.; Hibbert, C.; et al. The relationship between spinal canal diameter and back pain
20 in coal miners. *Journal of Occupational Medicine* 26:23-28, 1984.
- 21 148. Porter, R.W.; Hibbert, C.; Wellman, P. Backache and the lumbar spinal canal. *Spine* 5:99-105, 1980.
- 22 149. Parnianpour, Bejjani, and Pavlidis, op. cit.
- 23 150. Biering-Sorensen, op. cit.
- 24 151. Buchanan, J.R.; Myers, C.; Greer, R.B. III; et al. Assessment of the risk of vertebral fracture in menopausal
25 women. *Journal of Bone and Joint Surgery* 69:212-218, 1987.
- 26 152. Reisbord, L.A. and Greenland, S. Factors associated with self-reported back pain: A population-based study.
27 *Journal of Chronic Diseases* 38:691-702, 1985.
- 28 153. Chaffin, D.B. and Park, K.S. A longitudinal study of low back pain as associated with occupational weight
29 lifting factors. *American Industrial Hygiene Association Journal* 34:513-525, 1973.
- 30 154. Venning, P.J.; Walter, S.D.; Stitt, L.W. Personal and job-related factors as determinants of incidence of back
31 injuries among nursing personnel. *Journal of Occupational Medicine* 29:820-825, 1987.
- 32 155. Cady, L.D.; Thomas, P.C.; Karwasky, R.J. Program for increasing health and physical fitness of fire fighters.
33 *Journal of Occupational Medicine* 27:110, 1985.
- 34 156. Ibid.
- 35 157. Klaber-Moffett, J.A.; Chase, S.M.; Portek, B.S.; et al. A controlled, prospective study to evaluate the
36 effectiveness of a back school in the relief of chronic low back pain. *Spine* 11:120-122, 1986.
- 37 158. Lankhorst, G.J.; Van de Stadt, R.J.; Vogelaar, T.W.; et al. The effect of the Swedish Back School in chronic
38 idiopathic low back pain: A prospective controlled study. *Scandinavian Journal of Rehabilitation Medicine*
39 15:141-145, 1983.
- 40 159. Parnianpour, Bejjani, and Pavlidis, op. cit.