

# The Power of Prevention

Chronic disease . . . the  
public health challenge  
of the 21<sup>st</sup> century

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NATIONAL CENTER FOR CHRONIC DISEASE PREVENTION  
AND HEALTH PROMOTION



# THE POWER OF PREVENTION

## CHRONIC DISEASE . . . THE PUBLIC HEALTH CHALLENGE OF THE 21<sup>ST</sup> CENTURY

The United States spends significantly more on health care than any other nation. In 2006, our health care expenditure was over \$7,000 per person,<sup>1</sup> more than twice the average of 29 other developed countries.<sup>2</sup> We also have one of the fastest growth rates in health spending, tripling our expenditures since 1990.<sup>1</sup> Yet the average life expectancy in the United States is far below many other nations that spend less on health care each year.

As a nation, more than 75% of our health care spending is on people with chronic conditions.<sup>3</sup> These persistent conditions—the nation’s leading causes of death and disability—leave in their wake deaths that could have been prevented, lifelong disability, compromised quality of life, and burgeoning health care costs. The facts are arresting:

- 7 out of 10 deaths among Americans each year are from chronic diseases.<sup>4</sup>
- In 2005, 133 million Americans—almost 1 out of every 2 adults—had at least one chronic illness.<sup>5</sup>
- About one-fourth of people with chronic conditions have one or more daily activity limitations.<sup>3</sup>
- Health disparities in chronic disease incidence and mortality are widespread among members of racial and ethnic minority populations. For example, heart disease death rates are higher among African Americans than whites,<sup>4</sup> and diabetes rates are substantially higher among American Indians and Alaska Natives than whites.<sup>6</sup>
- Mental illnesses and chronic diseases are closely related. Chronic diseases can exacerbate symptoms of depression, and depressive disorders can themselves lead to chronic diseases.<sup>7</sup>



The scope and severity of the chronic disease problem has not escaped the public’s attention. More than two-thirds of all adults believe that the U.S. health care system should place more emphasis on chronic disease preventive care, and more than 4 in 5 Americans (84%) favor public funding for such prevention programs.<sup>8</sup>





## WHAT ARE THESE CHRONIC CONDITIONS?

Tackling chronic disease requires a closer look at the major conditions that affect our nation—namely, heart disease and stroke, cancer, diabetes, arthritis, obesity, respiratory diseases, and oral conditions.

### ***Heart disease and stroke***

The good news is that since 1999, death rates for coronary heart disease and stroke have declined 20.8% and 24.4%, respectively.<sup>4</sup> In addition, the percentage of adults with high cholesterol, a major risk factor for heart disease, has been cut by almost half since the early 1960s.<sup>6</sup>

YET . . .

- Heart disease and stroke remain the first and third leading causes of death, accounting for more than 30% of all mortality,<sup>4</sup> and are among the leading causes of disability.<sup>9</sup>
- 1 million Americans are disabled from strokes; many can no longer perform daily tasks, such as walking or bathing, without help.<sup>9</sup>
- In 2003, approximately 37% of adults reported having two or more of the major risk factors for heart disease and stroke (high blood pressure, high cholesterol, diabetes, current smoking, physical inactivity, and obesity).<sup>10</sup>
- Many disparities persist—for example, age-adjusted stroke death rates for 2005 were 31% higher for African Americans than for whites, and heart disease death rates were 23% higher.<sup>4</sup>

### ***Cancer***

During the past two decades, tremendous progress has been made in developing and using effective cancer prevention strategies, early detection interventions, and cancer treatments. Largely through public health efforts targeting screening, breast cancer deaths among women decreased by 2% per year from 1998 to 2005, and deaths from colorectal cancer decreased among both men and women by 4% per year from 1995 to 2005.<sup>11</sup>

YET . . .

- Cancer continues to claim more than half a million lives each year and remains the nation's second leading cause of death.<sup>4</sup>
- Cancer does not affect all races equally in the United States. African Americans are more likely to die of cancer than people of any other racial or ethnic group.<sup>11</sup>
- The total number of Americans living with a previous diagnosis of cancer, currently estimated at 11 million, is on the rise.<sup>11</sup> The most commonly diagnosed cancers are prostate, female breast, lung and bronchus, and colorectal cancers.<sup>12</sup>
- Lung cancer remains the leading cause of cancer death in both men and women.<sup>12</sup> More than 80% of lung cancers are due to smoking or exposure to secondhand smoke.<sup>13</sup>

## **Diabetes**

Tremendous progress has been made in managing diabetes and its complications. Because of public health efforts, higher percentages of people with diabetes are monitoring their blood sugar daily and receiving, through health professionals, annual foot exams, eye exams, and influenza and pneumococcal vaccinations. The incidence of treatment for diabetes-related end-stage renal disease declined 21% from 1997 to 2002, and the prevalence of visual impairment among people with diabetes decreased as well, from 24% in 1997 to 18% in 2005.\*

YET . . .

- Nearly 24 million Americans have diabetes. An estimated 57 million American adults have prediabetes, placing them at increased risk for developing type 2 diabetes.<sup>14</sup>
- Diabetes is becoming more common every day. If current trends continue, 1 in 3 Americans born in 2000 will develop diabetes during their lifetime.<sup>15</sup>
- Diabetes continues to be the leading cause of kidney failure, nontraumatic lower-extremity amputations, and blindness among adults aged 20–74.<sup>14</sup>
- American Indian and Alaska Native adults are twice as likely as white adults to have diabetes.<sup>6</sup>



## **Arthritis**

Arthritis is the nation's most common cause of disability, affecting 1 of every 5 adults.<sup>16</sup> As the U.S. population ages, the number of adults with doctor-diagnosed arthritis is projected to increase from 46 million to 67 million by 2030, and 25 million of these individuals will have limited activity as a result.<sup>17</sup> Considerable progress has been made in raising awareness and understanding of effective, evidence-based messages and interventions (such as physical activity) to decrease disability and increase quality of life among those with arthritis.

YET . . .

- Having arthritis presents special barriers to engaging in physical activity, which in turn impedes medical and self-management efforts for arthritis and other chronic conditions.
- 19 million U.S. adults report being limited in their usual activities because of arthritis.<sup>16</sup>
- The disabling effects of arthritis are disproportionately prevalent in racial and ethnic minority populations. For example, compared with whites, a higher proportion of African Americans reported severe pain as well as activity and work limitations attributable to arthritis.<sup>18</sup>

\* Source: CDC, unpublished analysis of 2002 and 2005 Behavioral Risk Factor Surveillance System data, 2008.

## **Obesity**

Obesity has emerged as a priority in chronic disease prevention and has been linked to increased risk for heart disease, high blood pressure, type 2 diabetes, arthritis-related disability, and some cancers. After a quarter-century of increasing rates, obesity prevalence among children and adults appears to be leveling.<sup>19, 20</sup>

YET . . .

- 1 in every 3 adults is obese.<sup>19</sup>
- Almost 1 in 5 youth between the ages of 6 and 19 is obese (BMI  $\geq$  95<sup>th</sup> percentile of the CDC growth chart).<sup>20</sup>
- 61% of obese children aged 5–10 years have one or more risk factors for heart disease, and 27% have two or more.<sup>21</sup>
- Among 12- to 19-year-old boys, the prevalence of obesity is higher among adolescent non-Hispanic African Americans (19%) and Mexican Americans (22%) than among non-Hispanic whites (17%).<sup>20</sup> Among girls in this age group, non-Hispanic African Americans have the highest prevalence of obesity (28%); the prevalence is 20% among Mexican Americans and 15% among non-Hispanic whites.<sup>20</sup>

## **Respiratory diseases**

Smoking is the primary risk factor for chronic respiratory diseases, such as emphysema and chronic bronchitis, both of which are major conditions of chronic obstructive pulmonary disease (COPD).<sup>13</sup> COPD, as well as lung cancer, could become relatively uncommon in future generations if smoking rates were substantially reduced.<sup>13,22</sup>

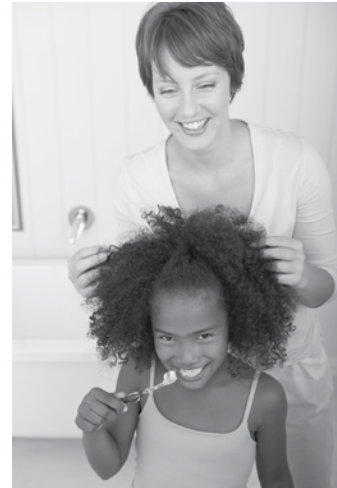


YET . . .

- COPD remains the third leading cause of smoking-related deaths, killing about 93,000 adults annually.<sup>23</sup>
- From 1980 to 2000, the nation's COPD death rates increased from 20.1 to 56.7 per 100,000 women and from 73.0 to 82.6 per 100,000 men.<sup>24</sup>
- Almost 60% of children—or 22 million children aged 3 to 11 years old—are exposed to secondhand smoke, which slows lung growth and increases risk for acute respiratory diseases and for more severe asthma.<sup>25</sup>

## Oral conditions

Mouth and throat diseases—such as tooth decay, periodontal (gum) disease, and oral cancers—cause pain and disability for millions of Americans each year. The good news is that remarkable progress has been made in oral health over the past few decades. The baby boomer generation will be the first in which the majority will maintain their natural teeth over their entire lifetime, having benefited from water fluoridation and fluoride toothpastes.<sup>26</sup> In addition, the use of dental sealants over the past several decades has significantly improved the oral health of children.



YET . . .

- More than 90% of adults aged 20–64 have experienced tooth decay.<sup>27</sup>
- Tooth decay is one of the most common diseases of childhood—5 times as common as asthma, and 7 times as common as hay fever.<sup>26</sup>
- Approximately 1 in 3 children aged 6–8 has had at least one cavity or filling, and 2 in 3 adolescents aged 16–19 have experienced tooth decay.<sup>27</sup>
- Children and adolescents living in poverty suffer more tooth decay than their more affluent peers.<sup>26</sup> They are less likely to receive preventive treatments like dental sealants, and their dental disease is more than twice as likely to go untreated.

## WHAT ARE THE CAUSES?

Four modifiable health risk behaviors—lack of physical activity, poor nutrition, tobacco use, and excessive alcohol consumption—are responsible for much of the illness, suffering, and early death related to chronic diseases.

### Lack of physical activity

Regular physical activity is one of the most important things a person can do to stay healthy. Not only will physical activity increase one's chances of living longer—it can also help control weight; reduce risks for cardiovascular disease, type 2 diabetes, metabolic syndrome, and some cancers; strengthen bones and muscles; improve mental health and mood; and improve ability to do daily activities and prevent falls among older adults.<sup>28</sup>

YET . . .

- More than one-third of all adults do not meet recommendations for aerobic physical activity based on the *2008 Physical Activity Guidelines for Americans*, and 23% report no leisure-time physical activity at all in the preceding month.<sup>29</sup>
- A 2007 national survey found that 25% of adolescents did not participate in 60 or more minutes of physical activity on any day.<sup>30</sup> In

The World Health Organization has estimated that if the major risk factors for chronic disease were eliminated, at least 80% of all heart disease, stroke, and type 2 diabetes would be prevented, and more than 40% of cancer cases would be prevented.<sup>31</sup>

addition, daily participation in high school physical education classes declined from 42% in 1991 to 30% in 2007.<sup>30</sup>

- One-quarter of high school students reported prolonged computer use (3 hours or more per day) in 2007, and 35% reported watching television for 3 or more hours per day.<sup>30</sup>

### **Poor nutrition**

Good nutrition can help lower risk for many chronic diseases, including heart disease, stroke, some cancers, diabetes, and osteoporosis. Increased consumption of fruits and vegetables helps reduce the risk for heart disease and certain cancers as well. Managing weight is all about balance—balancing the number of calories consumed with the number of calories the body uses or “burns off.”



YET . . .

- In 2007, only 24% of U.S. adults ate 5 or more servings of fruits and vegetables per day.<sup>32</sup>
- Less than 22% of high school students report eating fruits and vegetables 5 or more times daily.<sup>30</sup>
- More than 60% of U.S. children and adolescents consume more than the *Dietary Guidelines for Americans* recommends for saturated fat.<sup>33</sup>

### **Tobacco use**

Since 1964, an ongoing series of Surgeon General’s reports on smoking and health has concluded that tobacco use is the single most avoidable cause of disease, disability, and death in the United States. The tobacco use epidemic can be stopped. Evidence-based, statewide tobacco control programs that are comprehensive, sustained, and accountable have been shown to reduce smoking rates, tobacco-related deaths, and disease caused by smoking.<sup>34</sup>

YET . . .

- More than 43 million American adults (approximately 1 in 5) still smoke.<sup>6</sup>
- Every year, an estimated 443,000 people die prematurely from smoking or exposure to secondhand smoke.<sup>23</sup>
- After a dramatic decline from 1997 to 2003, smoking rates among high school students remained unimproved from 2003 to 2007.<sup>35</sup>
- Although 70% of U.S. smokers want to quit, and nearly 40% try to quit each year, most of these attempts are unaided and unsuccessful.<sup>36</sup>

**Excessive alcohol consumption**

Excessive alcohol use is the nation’s third leading lifestyle-related cause of death, and is associated with a wide range of health and social problems, including acute myocardial infarction, unintended pregnancy, and interpersonal violence.<sup>37</sup> The current *Dietary Guidelines for Americans* recommends that people who choose to drink alcoholic beverages do so sensibly and in moderation, defined as up to 1 drink per day for women and up to 2 drinks per day for men.<sup>38</sup> These guidelines also specify that some people should not drink alcoholic beverages at all, including underage youth.

YET . . .

- About 30% of adult current drinkers report binge drinking (consuming 4 or more drinks on an occasion for women, 5 or more drinks on an occasion for men) in the past 30 days.<sup>39</sup>
- Adult binge drinkers report an average of 4 episodes of binge drinking per month and consume an average of 8 drinks per binge.<sup>40</sup>
- Nearly 45% of high school students report consuming alcohol in the past 30 days, and over 60% of those who drink report binge drinking (consuming 5 or more drinks on an occasion) within the past 30 days.<sup>41</sup>
- Evidence-based strategies for preventing binge drinking (e.g., increasing alcohol excise taxes) are available but are underused.<sup>42</sup>

**AT WHAT COST?**

Chronic diseases and their major risk factors place huge economic demands on our nation. For example, from 1987 through 2001, increases in obesity prevalence alone accounted for 12% of the growth in health spending.<sup>43</sup> Without concerted interventions, these and other costs can be expected to increase in the years ahead.

Americans are living longer than ever before. In 30 years, the number of Americans aged 65 years or older is expected to double,<sup>44</sup> generating a 25% increase in health care spending before taking inflation or new technologies into account.<sup>45</sup>

Complementing this trend is the expected growth in demand for family and professional caregivers, now present in 1 of every 5 households.<sup>46</sup> The toll on caregivers’ health and well-being is tremendous, and it accounts for significant costs to families, employers, and communities.

**The Chronic Disease Price Tag—  
Estimated Annual Direct Medical Expenditures\***

<b>Cardiovascular disease and stroke**</b>	\$313.8 billion in 2009 <sup>47</sup>
<b>Cancer</b>	\$89.0 billion in 2007 <sup>48</sup>
<b>Smoking</b>	\$96 billion in 2004*** <sup>23</sup>
<b>Diabetes</b>	\$116 billion in 2007 <sup>49</sup>
<b>Arthritis</b>	\$80.8 billion in 2003 <sup>50</sup>
<b>Obesity</b>	\$61 billion in 2000 <sup>51</sup>

\* Different methodologies were used in calculating costs.  
 \*\* Includes heart diseases, coronary heart disease, stroke, hypertensive disease, and heart failure combined.  
 \*\*\* Average annual expenditure, 2001–2004.

*Without concerted strategic intervention, chronic diseases and their risk factors can be expected to cause more harm—and be more costly to society. We cannot effectively address escalating health care costs without addressing the problem of chronic diseases.*





## THE POWER OF PREVENTION

Although chronic diseases are among the most common and costly of all health problems, they are also among the most preventable. Chronic disease prevention, to be most effective, must occur in multiple sectors and across individuals' entire life spans. Prevention encompasses **health promotion** activities that encourage healthy living and limit the initial onset of chronic diseases. Prevention also embraces **early detection efforts**, such as screening at-risk populations, as well as strategies for appropriate **management** of existing diseases and related complications. The following examples show what targeted investments in prevention can achieve.

- ☑ The health benefits of **quitting smoking** are numerous, and many are experienced rapidly. Within 2 weeks to 3 months after quitting, heart attack risk begins to drop and lung function begins to improve.<sup>52</sup> One year after quitting, excess risk for heart disease is reduced by half, and 10 years after quitting, the lung cancer death rate is about half that of a current smoker. Fifteen years after quitting, an ex-smoker's risk for heart disease is about the same as that of a lifelong nonsmoker.
- ☑ Lifestyle changes in **diet and exercise**, including a 5%–7% maintained weight loss and at least 150 minutes per week in physical activity, can prevent or delay the onset of type 2 diabetes for Americans at high risk for the disease.<sup>53</sup> Participants in a major clinical trial group exercised at moderate intensity, usually by walking an average of 30 minutes a day, 5 days a week, and lowered their intake of fat and calories. Their efforts resulted in a sustained weight loss of about 10 to 15 pounds, reducing their risk of getting diabetes by 58%.



- ☑ An adult with **healthy blood pressure and healthy blood cholesterol levels** has a greatly reduced risk for cardiovascular disease. A 12- to 13-point reduction in systolic blood pressure can reduce cardiovascular disease deaths by 25%,<sup>54</sup> and a 10% decrease in total cholesterol levels reduces the risk for coronary heart disease by 30%.<sup>55</sup>

- ✓ Instilling **healthy behaviors and practices during youth**, particularly in school settings, is far more cost-effective than waiting until unhealthy behaviors are entrenched. A study of the Toward No Tobacco program, which was designed to prevent cigarette use among middle and high school students, found that for every dollar invested in school tobacco prevention programs, almost \$20 in future medical care costs would be saved.<sup>56</sup>



- ✓ **Community water fluoridation** results in fewer cavities among community members. In one study of communities with at least 20,000 residents, every \$1 invested in community water fluoridation yielded about \$38 in savings from fewer cavities treated.<sup>57</sup>
- ✓ **Regular screening for colorectal cancer** can reduce the number of people who die from this disease.<sup>58</sup> When colorectal cancer is found early and treated, the 5-year relative survival rate is 90%.<sup>11</sup>
- ✓ For women aged 40 years or older, **mammograms** every 12–33 months significantly reduce mortality from breast cancer.<sup>58</sup> For women who have been sexually active and have a cervix, screening with a **Pap test** reduces incidence of, and mortality from, cervical cancer. Females aged 11–26 years can help prevent cervical, vaginal, and vulvar cancers by getting the **HPV vaccine**.
- ✓ **Improved glycemic control** benefits people with either type 1 or type 2 diabetes. In general, every percentage point drop in A1c blood test results (e.g., from 8.0% to 7.0%) can reduce the risk of microvascular complications (eye, kidney, and nerve diseases) by 40%.<sup>59,60</sup> Among people with diabetes, **annual eye and foot exams** can reduce vision loss and lower-extremity amputations. Detecting and treating diabetic eye disease with laser therapy can reduce the development of severe vision loss by an estimated 50% to 60%.<sup>14</sup> Comprehensive foot care programs can reduce amputation rates by 45% to 85%.<sup>61,62</sup>
- ✓ **Early diagnosis and appropriate management of arthritis**, including self-management activities, can help people with arthritis decrease pain, improve function, and stay productive.<sup>63</sup>



## A VISION FOR PREVENTION

We have indisputable evidence of the power of prevention. Researchers and practitioners at national, state, and local levels have designed, tested, and implemented effective programs and policies for chronic disease prevention and control, many at very little cost.

For example, Trust for America's Health estimates that an investment of \$10 per person per year in community-based programs tackling physical inactivity, poor nutrition, and smoking could yield more than \$16 billion in medical cost savings annually within 5 years.<sup>64</sup> This savings represents a remarkable return of \$5.60 for every dollar spent, without considering the additional gains in worker productivity, reduced absenteeism at work and school, and enhanced quality of life.<sup>64</sup>

Despite this evidence, our health care system has primarily focused on discovering treatments and cures for disease—not on preventing disease. In short, our health care system is not designed to prevent chronic illnesses. At the heart of our system is the traditional physician-patient interaction. As effective as these interactions are, they are generally infrequent and brief. Whether healthy or ill, a person spends far more time outside the physician's office than inside it. Of special concern are the 46 million uninsured Americans under the age of 65 who have limited coverage for health care services.<sup>65</sup>

To reduce chronic disease across the nation, we must rethink our health care system. It is essential to have a coordinated, strategic prevention approach that promotes healthy behaviors, expands early detection and diagnosis of disease, supports people of every age, and eliminates health disparities. With community-based public health efforts that embrace prevention as a priority, we *can* become a healthier nation.

*The function of protecting and developing health must rank even above that of restoring it when it is impaired.*

—Hippocrates

## THE CALL TO ACTION

Just a few years into the 21<sup>st</sup> century, America is at a critical crossroads in the fight against chronic disease. Significant progress has been made, but much hard work remains. As the nation's premier public health agency, CDC is at the forefront of efforts to prevent and control chronic disease. CDC's National Center for Chronic Disease Prevention and Health Promotion envisions a nation in which all people live healthy lives free from the devastation of chronic diseases. To realize this vision, the nation must harness the collective capacity and energy of communities, health care professionals, voluntary and professional organizations, the private sector, governmental agencies, and academic institutions to take tangible action in the following key areas: well-being, policy promotion, health equity, research translation, and workforce development.

## **Well-being**

Evidence indicates that with education, social support, and healthy policies and environments, people can and will take charge of their health. Strategies are needed to facilitate and support individual responsibility and behavior change at schools and workplaces and in faith-, community-, and medical-based settings, such as:

- School-based strategies that foster environments and instruction that promote healthy eating, daily physical activity, sun protection, and the avoidance of tobacco, alcohol, and illicit drugs.
- Smoking cessation strategies, such as improved access to quitlines, improved insurance coverage of smoking cessation services, and greater involvement of health providers and health care systems in the routine delivery of cessation advice and services to patients who want to quit smoking.
- Outreach strategies and coordination to ensure that older adults have access to programs with documented, science-based measures to prevent disease and functional decline.
- Better training and education of health care professionals to close the gap in time between discovering effective prevention tools and strategies and applying those tools in medical practice.
- More population-based case management systems to which doctors can refer patients once a condition has been detected (e.g., community-based lifestyle programs to prevent type 2 diabetes, cancer survivorship programs, hypertension management programs, tobacco quitlines).


## **Policy promotion**

Policy and environmental changes can affect large segments of the population simultaneously. Adopting healthy behaviors is much easier if we establish supportive community norms and adopt a philosophy that embraces health in all policies and settings. We must promote proven social, environmental, policy, and systems approaches that support healthy living for individuals, families, and communities, such as:

- Urban design and land-use strategies that lead to increased physical activity, as well as changes to transportation and travel policy and infrastructure that reduce dependence on motorized transport and increase physical activity.
- Low-fat and high-fruit-and-vegetable menu selections in restaurants, schools, and employee cafeterias.
- Requirements for daily physical education classes in schools.
- 100% smoke-free policies in workplaces, restaurants, schools, and other public places.
- Universal availability of 911 emergency services for stroke and heart attack care.
- Continued and extended fluoridation of community drinking water.

## **Health equity**

Health equity is achieved when every person has the opportunity to “attain his or her full health potential” and no one is “disadvantaged from achieving this potential because of social position or other socially determined circumstances.”<sup>66</sup> Health inequities are reflected in differences in



length of life; quality of life; rates of disease, disability, and death; severity of disease; and access to treatment. To ensure health equity, we must:

- Increase health promotion efforts targeting social determinants of health, such as increased access to affordable healthy food options in underserved communities through the development of community gardens, as well as taxing and zoning policies that encourage the development of full-service grocery stores in neighborhoods where they are lacking.
- Create equitable access to effective screening and diagnostic tools for breast, cervical, and colorectal cancers, diabetes, high blood pressure, and high cholesterol.
- Implement programs that foster healthy living across life stages among disadvantaged groups. Examples include early childhood education, work-study programs that improve graduation rates and access to secure employment with livable wages, and employer-sponsored health promotion programs for blue-collar and low-wage workers.
- Fully cover all recommended tobacco-dependence treatments, eliminate restrictions and barriers to using treatments, and promote treatment use among all tobacco users.

### ***Research translation***

Promising research findings are relevant only when they reach the people they are designed to serve. Key scientific advances must be applied and evaluated, reflected in state and local health policies, and widely adopted as community practices across the country. We must:

- Support community-based prevention research to identify the causes of health inequities and the best ways to provide resources needed for health and access to high-quality preventive care and clinical services.
- Accelerate the translation of scientific findings into community and school practices to protect the health of people where they live, work, learn, and play.
- Apply scientific approaches to social marketing, health education, and consumer research in the design of effective communication strategies to inform and influence individual and community decisions on health.

### ***Workforce development***


A skilled, diverse, and dynamic public health workforce and network of partners is crucial to promote health and prevent chronic disease at the national, state, and local levels. We must work toward the day when:

- Every state has a strong, adequately funded chronic disease prevention program.
- CDC and other national agencies can provide essential technical assistance and scientific underpinnings to support state and local programs.
- Communities have the capacity to deliver prevention and self-management programs through public health professionals and trained peers/lay workers.
- Partnering agencies are working collaboratively to focus their respective strengths on strategic priorities.

***CDC can help lead the nation to a day when chronic disease prevention is another success story in public health history.***


## REFERENCES

- <sup>1</sup> National health expenditures aggregate, per capita amounts, percent distribution, and average annual percent growth, by source of funds: selected calendar years 1960–2007 [Internet]. Baltimore, MD: Centers for Medicare and Medicaid Services; 2008. Available from: <http://www.cms.hhs.gov/National-HealthExpendData/downloads/tables.pdf>.
- <sup>2</sup> OECD health data 2008: statistics and indicators for 30 countries [Internet]. Paris: Organisation for Economic Co-operation and Development; 2008. Available from: <http://www.oecd.org/dataoecd/46/2/38980580.pdf>
- <sup>3</sup> Anderson G. Chronic conditions: making the case for ongoing care. Baltimore, MD: John Hopkins University; 2004.
- <sup>4</sup> Kung HC, Hoyert DL, Xu JQ, Murphy SL. Deaths: final data for 2005. *National Vital Statistics Reports* 2008;56(10). Available from: [http://www.cdc.gov/nchs/data/nvsr/nvsr56/nvsr56\\_10.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr56/nvsr56_10.pdf)
- <sup>5</sup> Wu SY, Green A. Projection of chronic illness prevalence and cost inflation. Santa Monica, CA: RAND Health; 2000.
- <sup>6</sup> National Center for Health Statistics. Health, United States, 2007. With chartbook on trends in the health of Americans. Hyattsville, MD: National Center for Health Statistics; 2007. Available from: <http://www.cdc.gov/nchs/data/hus/hus07.pdf>
- <sup>7</sup> Chapman DP, Perry GS, Strine TW. The vital link between chronic disease and depressive disorders. *Preventing Chronic Disease* 2005;2(1):A14. Available from: [http://www.cdc.gov/pcd/issues/2005/jan/04\\_0066.htm](http://www.cdc.gov/pcd/issues/2005/jan/04_0066.htm)
- <sup>8</sup> Two-thirds of adult Americans believe more money needs to be spent on chronic disease prevention programs, and they're willing to pay higher taxes to fund them, survey finds [press release]. Atlanta, GA: National Association of Chronic Disease Directors; September 3, 2008. Available from: [http://www.chronicdisease.org/files/public/PressRelease\\_NACDD\\_PublicHealthSurvey\\_August2008.pdf](http://www.chronicdisease.org/files/public/PressRelease_NACDD_PublicHealthSurvey_August2008.pdf)
- <sup>9</sup> Centers for Disease Control and Prevention. Prevalence of disabilities and associated health conditions among adults—United States, 1999. *MMWR* 2001;50:120–125. Available from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5007a3.htm>
- <sup>10</sup> Centers for Disease Control and Prevention. Racial/ethnic and socioeconomic disparities in multiple risk factors for heart disease and stroke—United States, 2003. *MMWR* 2005;54:113–117. Available from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5405a1.htm>
- <sup>11</sup> Ries LAG, Melbert D, Krapcho M, Stinchcomb DG, Howlader N, Horner MJ, et al., editors. SEER cancer statistics review, 1975–2005 [Internet]. Bethesda, MD: National Cancer Institute; 2008. Available from: [http://seer.cancer.gov/csr/1975\\_2005/index.html](http://seer.cancer.gov/csr/1975_2005/index.html)
- <sup>12</sup> Cancer facts & figures 2008 [Internet]. Atlanta, GA: American Cancer Society; 2008. Available from: [http://www.cancer.org/docroot/stt/content/stt\\_1x\\_cancer\\_facts\\_and\\_figures\\_2008.asp](http://www.cancer.org/docroot/stt/content/stt_1x_cancer_facts_and_figures_2008.asp)
- <sup>13</sup> Centers for Disease Control and Prevention. The health consequences of smoking: a report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services; 2004. Available from: [http://www.cdc.gov/tobacco/data\\_statistics/sgr/sgr\\_2004/index.htm](http://www.cdc.gov/tobacco/data_statistics/sgr/sgr_2004/index.htm)
- <sup>14</sup> Centers for Disease Control and Prevention. National diabetes fact sheet, 2007. Atlanta, GA: U.S. Department of Health and Human Services; 2008. Available from: <http://www.cdc.gov/Diabetes/pubs/fact-sheet07.htm>
- <sup>15</sup> Venkat Narayan KM, Boyle JP, Thompson TJ, Sorensen SW, Williamson DF. Lifetime risk for developing diabetes mellitus. *JAMA* 2003;290:1884–1890.

- 
- <sup>16</sup> Centers for Disease Control and Prevention. Prevalence of doctor-diagnosed arthritis and arthritis-attributable activity limitation—United States, 2003–2005. *MMWR* 2006;55:1089–1092. Available from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5540a2.htm>
- <sup>17</sup> Hootman JM, Helmick CG. Projections of U.S. prevalence of arthritis and associated activity limitations. *Arthritis and Rheumatism* 2006;54:266–229.
- <sup>18</sup> Centers for Disease Control and Prevention. Racial/ethnic differences in the prevalence and impact of doctor-diagnosed arthritis—United States, 2002. *MMWR* 2005;54:119–123. Available from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5405a3.htm>
- <sup>19</sup> Ogden CL, Carroll MD, McDowell MA, Flegal KM. Obesity among adults in the United States—no change since 2003–2004. NCHS data brief no 1. Hyattsville, MD: National Center for Health Statistics; 2007. Available from: <http://www.cdc.gov/nchs/data/databriefs/db01.pdf>
- <sup>20</sup> Ogden CL, Carroll MD, Flegal KM. High body mass index for age among US children and adolescents, 2003–2006. *JAMA* 2008;299:2401–2405.
- <sup>21</sup> Freedman DS, Dietz, WH, Srinivasan SR, Berenson GS. The relation of overweight to cardiovascular risk factors among children and adolescents: the Bogalusa Heart Study. *Pediatrics* 1999;103:1175–1182.
- <sup>22</sup> Institute of Medicine. Ending the tobacco problem: a blueprint for the nation. Washington, DC: National Academies Press; 2007.
- <sup>23</sup> Centers for Disease Control and Prevention. Smoking-attributable mortality, years of potential life lost, and productivity losses—United States, 2000–2004. *MMWR* 2008;57:1226–1228. Available from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5745a3.htm>
- <sup>24</sup> Mannino DM, Homa DM, Akinbami LJ, Ford ES, Redd SC. Chronic obstructive pulmonary disease surveillance—United States, 1971–2000. *Respiratory Care* 2002;47:1184–1199.
- <sup>25</sup> Centers for Disease Control and Prevention. The health consequences of involuntary exposure to tobacco smoke: a report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services; 2006. Available from: [http://www.cdc.gov/tobacco/data\\_statistics/sgr/sgr\\_2006/index.htm](http://www.cdc.gov/tobacco/data_statistics/sgr/sgr_2006/index.htm)
- <sup>26</sup> National Institutes of Health. Oral health in America: a report of the Surgeon General. Rockville, MD: U.S. Department of Health and Human Services; 2000. Available from: <http://www.surgeongeneral.gov/library/oralhealth/>
- <sup>27</sup> Dye BA, Tan S, Smith V, Lewis BG, Barker LK, Thornton-Evans G, et al. Trends in oral health status: United States, 1988–1994 and 1999–2004. *Vital and Health Statistics* 2007;11(248). Available from: [http://www.cdc.gov/nchs/data/series/sr\\_11/sr11\\_248.pdf](http://www.cdc.gov/nchs/data/series/sr_11/sr11_248.pdf)
- <sup>28</sup> Physical activity for everyone [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; 2008. Available from: <http://www.cdc.gov/physicalactivity/everyone/health/index.html>
- <sup>29</sup> Centers for Disease Control and Prevention. Prevalence of self-reported physically active adults—United States, 2007. *MMWR* 2008;57:1297–1300. Available from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5748a1.htm>
- <sup>30</sup> Centers for Disease Control and Prevention. Youth risk behavior surveillance—United States, 2007. *MMWR* 2008;57(SS-04):1–131. Available from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5704a1.htm>
- <sup>31</sup> World Health Organization. Preventing chronic diseases: a vital investment. Geneva: World Health Organization; 2005. Available from: [http://www.who.int/chp/chronic\\_disease\\_report/full\\_report.pdf](http://www.who.int/chp/chronic_disease_report/full_report.pdf)
- <sup>32</sup> BRFSS prevalence and trends data [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; 2008. Available from: <http://apps.nccd.cdc.gov/brfss/page.asp?cat=AC&yr=2007&state=US#AC>

- <sup>33</sup> U.S. Department of Agriculture. Continuing survey of food intakes by individuals 1994–96, 1998 [CD-ROM]. Beltsville, MD: U.S. Department of Agriculture; 2000.
- <sup>34</sup> Centers for Disease Control and Prevention. Best practices for comprehensive tobacco control programs—2007. Atlanta: U.S. Department of Health and Human Services; 2007. Available from: [http://www.cdc.gov/tobacco/tobacco\\_control\\_programs/stateandcommunity/best\\_practices/](http://www.cdc.gov/tobacco/tobacco_control_programs/stateandcommunity/best_practices/)
- <sup>35</sup> Centers for Disease Control and Prevention. Cigarette use among high school students—United States, 1991–2007. *MMWR* 2008;57:689–691. Available from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5725a3.htm>
- <sup>36</sup> Fiore MC, Jaen CR, Baker TB, Bailey WC, Benowitz NL, Curry SJ, et al. Treating tobacco use and dependence: 2008 update. Rockville, MD: U.S. Department of Health and Human Services; 2008. Available from: <http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=hstat2.chapter.28163>
- <sup>37</sup> Naimi TS, Brewer RD, Mokdad A, Denny C, Serdula MK, Marks JS. Binge Drinking Among US Adults. *JAMA* 2003;289:70–75.
- <sup>38</sup> Dietary guidelines for Americans, 2005 [Internet]. Washington, DC: U.S. Department of Health and Human Services and U.S. Department of Agriculture; 2005. Available from: <http://www.health.gov/DietaryGuidelines/dga2005/document/default.htm>
- <sup>39</sup> Naimi TS, Brewer RD, Miller JW, Okoro C, Mehrotra C. What do binge drinkers drink? Implications for alcohol control policy. *American Journal of Preventive Medicine* 2007;33:188–193.
- <sup>40</sup> Centers for Disease Control and Prevention. Sociodemographic differences in binge drinking among adults—14 States, 2004. *MMWR* 2009;58:301–304. Available from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5812a1.htm>
- <sup>41</sup> Miller JW, Naimi TS, Brewer RD, Everett Jones S. Binge drinking and associated health risk behaviors among high school students. *Pediatrics* 2007;119:76–85.
- <sup>42</sup> Brewer RD, Swahn MH. Binge drinking and violence. *JAMA* 2005;294:616–618.
- <sup>43</sup> Thorpe KE, Florence CS, Howard DS, Joski P. The impact of obesity on rising medical spending. *Health Affairs* 2004; 20 October:W-480–W-486. Available from: [http://content.healthaffairs.org/cgi-reprint/hlthaff.w4.480v1](http://content.healthaffairs.org/cgi/reprint/hlthaff.w4.480v1)
- <sup>44</sup> U.S. population projections [Internet]. Suitland, MD: U.S. Census Bureau; 2008. Available from: <http://www.census.gov/population/www/projections/natproj.html>
- <sup>45</sup> CDC and the Merck Company Foundation. The state of aging and health in America 2007. Whitehouse Station, NJ: The Merck Company Foundation; 2007. Available from: [http://www.cdc.gov/aging/pdf/saha\\_2007.pdf](http://www.cdc.gov/aging/pdf/saha_2007.pdf)
- <sup>46</sup> Caregiving in the U.S. [Internet]. Bethesda, MD, and Washington, DC: National Alliance for Caregiving and AARP; 2004. Available from: <http://www.caregiving.org/data/04finalreport.pdf>
- <sup>47</sup> Lloyd-Jones D, Adams R, Carnethon M, De Simone G, Ferguson TB, Flegal K, et al. Heart disease and stroke statistics 2009 update. *Circulation* 2009;119:e21–e181.
- <sup>48</sup> Costs of cancer [Internet]. Atlanta, GA: American Cancer Society; 2008. Available from: [http://www.cancer.org/docroot/MIT/content/MIT\\_3\\_2X\\_Costs\\_of\\_Cancer.asp](http://www.cancer.org/docroot/MIT/content/MIT_3_2X_Costs_of_Cancer.asp)
- <sup>49</sup> American Diabetes Association. Economic costs of diabetes in the U.S. in 2007. *Diabetes Care* 2008;31:596–615.
- <sup>50</sup> Centers for Disease Control and Prevention. National and state medical expenditures and lost earnings attributable to arthritis and other rheumatic conditions—United States, 2003. *MMWR* 2007;56:4–7. Available from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5601a2.htm>



- 
- <sup>51</sup> U.S. Department of Health and Human Services. The Surgeon General's call to action to prevent and decrease overweight and obesity. Rockville, MD: U.S. Department of Health and Human Services; 2001. Available from: <http://www.surgeongeneral.gov/topics/obesity/calltoaction/CalltoAction.pdf>
- <sup>52</sup> Centers for Disease Control. The health benefits of smoking cessation: a report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services; 1990.
- <sup>53</sup> Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle interventions or metformin. *New England Journal of Medicine* 2002;346:393–403.
- <sup>54</sup> He J, Whelton PK. Elevated systolic blood pressure and risk of cardiovascular and renal disease: overview of evidence from observational epidemiologic studies and randomized controlled trials. *American Heart Journal* 1999;138(3 Pt 2):211–219.
- <sup>55</sup> Cohen JD. A population-based approach to cholesterol control. *American Journal of Medicine* 1997;102:23–25.
- <sup>56</sup> Wang LY, Crosssett LS, Lowery R, Sussman S, Dent CW. Cost-effectiveness of a school-based tobacco-use prevention program. *Archives of Pediatrics and Adolescent Medicine* 2001;155:1043–1050.
- <sup>57</sup> Public Health Service. Review of fluoride benefits and risks report of the Ad Hoc Subcommittee on Fluoride of the Committee to Coordinate Environmental Health and Related Programs. Washington, D.C.: U.S. Department of Health and Human Services; 1991.
- <sup>58</sup> U.S. Preventive Services Task Force. Guide to clinical preventive services [Internet]. Rockville, MD: Agency for Healthcare Research and Quality; 2008. Available from: <http://www.ahrq.gov/clinic/uspstfix.htm>
- <sup>59</sup> Stratton IM, Adler AI, Neil HA, Matthews DR, Manley SE, Cull CA, et al. Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study. *BMJ* 2000;321:405–412.
- <sup>60</sup> The Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *New England Journal of Medicine* 1993;329:977–986.
- <sup>61</sup> Bild DE, Selby JV, Sinnock P, Browner WS, Braveman P, Showstack JA. Lower-extremity amputation in people with diabetes. Epidemiology and prevention. *Diabetes Care* 1989;12:24–31.
- <sup>62</sup> Litzelman DK, Slemenda CW, Langefeld CD, Hays LM, Welch MA, Bild DE, et al. Reduction of lower extremity clinical abnormalities in patients with non-insulin-dependent diabetes mellitus. A randomized, controlled trial. *Annals of Internal Medicine* 1993;119:36–41.
- <sup>63</sup> Goepfinger J, Barnwell S, Ensley D. Effectiveness of disease self-management education for African Americans with arthritis. Paper presented at: 2005 Annual Meeting of the American College of Rheumatology and the Association of Rheumatology Health Professionals; 2005 Nov 13–17; San Diego, CA
- <sup>64</sup> Prevention for a healthier America: investments in disease prevention yield significant savings, stronger communities [Internet]. Washington, D.C.: Trust for America's Health; 2008. Available from: <http://healthyamericans.org/reports/prevention08/>
- <sup>65</sup> DeNavas-Walt C, Proctor BD, Smith JC. Income, poverty, and health insurance coverage in the United States: 2007. Current Population Reports, P60-235. Washington, DC: U.S. Census Bureau; 2008. Available from: <http://www.census.gov/prod/2008pubs/p60-235.pdf>.
- <sup>66</sup> Whitehead M, Dahlgren G. Concepts and principles for tackling social inequalities in health: levelling up part 1. Copenhagen: WHO Regional Office for Europe; 2006. Available from: <http://www.euro.who.int/document/e89383.pdf>

