



# Respiratory Diseases

U.S. Department of Health & Human Services • Public Health Service

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## PROGRESS REVIEW



In the 21st session in the second series of assessments of *Healthy People 2010*, Deputy Assistant Secretary for Health (Science and Medicine) Anand Parekh chaired a Progress Review on Respiratory Diseases. He was assisted by staff of the co-lead Agencies for this *Healthy People 2010* focus area, the National Institutes of Health (NIH) and the Centers for Disease Control and Prevention (CDC). Also participating in the review were representatives from other Agencies and offices within the U.S. Department of Health and Human Services (HHS) and from the U.S. Environmental Protection Agency (EPA). In opening the meeting, Dr. Parekh acknowledged the tremendous societal impact of respiratory diseases in all their forms, both in terms of morbidity and mortality. He emphasized the importance of prevention—primary, secondary, and tertiary—in devising strategies to control these persistent threats to the well-being of the Nation. What we particularly need, he said, is to find better ways to diagnose and treat chronic respiratory diseases in their earliest stages when they are largely asymptomatic.

The complete November 2000 text for the Respiratory Diseases focus area of *Healthy People 2010* is available online at [www.healthypeople.gov/document/html/volume2/24respiratory.htm](http://www.healthypeople.gov/document/html/volume2/24respiratory.htm). Revisions to the focus area chapter that were made after the January 2005 Midcourse Review are available at [www.healthypeople.gov/data/midcourse/html/focusareas/fa24toc.htm](http://www.healthypeople.gov/data/midcourse/html/focusareas/fa24toc.htm). For comparison with the current state of the focus area, the report on the first-round Progress Review (held on June 29, 2004) is archived at [www.healthypeople.gov/data/2010prog/focus24/2004fa24.htm](http://www.healthypeople.gov/data/2010prog/focus24/2004fa24.htm). The meeting agenda, tabulated data for all focus area objectives, charts, and other materials used in the Progress Review can be found at a companion site maintained by the CDC National Center for Health Statistics (NCHS): [www.cdc.gov/nchs/about/otheract/hpdata2010/focusareas/fa24-rd2.htm](http://www.cdc.gov/nchs/about/otheract/hpdata2010/focusareas/fa24-rd2.htm). That site has a link to [wonder.cdc.gov/data2010](http://wonder.cdc.gov/data2010), which provides access to detailed definitions for the objectives in all 28 *Healthy People 2010* focus areas and periodic updates to their data.

### Data Trends

In his overview of data applicable to the United States that relate to the Respiratory Diseases focus area, NCHS Director Edward Sondik noted that, in 2006, asthma prevalence extended to approximately 9.4 percent of children and 7.3 percent of adults. In 2005, asthma was responsible for around 1,770,000 emergency department visits, 489,000 hospitalizations, and 3,884 deaths.

In 2006, chronic obstructive pulmonary disease (COPD)—which is widely under-diagnosed—had a diagnosed prevalence among about 12 million adults and was the cause of about 1,998,000 emergency department visits and 661,000 hospitalizations. In 2004, COPD caused about 122,000 deaths and ranks as the fourth leading cause of death. Of the 26 objectives and subobjectives remaining in the focus area after

the *Healthy People 2010* Midcourse Review, 1 has met its target, 9 showed improvement, 9 showed little or no change, 1 is getting worse, and 6 either have only baseline data or are without data. Dr. Sondik then provided a more detailed examination of selected objectives in the focus area.

**(Obj. 24-1e):** The death rate from asthma in adults aged 65 years and older decreased from 69.5 per million in 1999 to 52.3 per million in 2005. In that age group, the 2005 death rates per million by racial and ethnic group for whom data were available were as follows: Hispanic, 46.0; non-Hispanic white, 48.4; Asian or Pacific Islander, 71.0; and non-Hispanic black, 86.7. All of these population groups showed improvement in the asthma death rate between 1999 and 2005. The 2010 target is 47.0 per million for all population groups in the age range.

**(Obj. 24-2a):** Hospitalizations for asthma among children under 5 years of age decreased from a rate of 45.6 per 10,000 in 1998 to 43.3 per 10,000 in 2006. By racial group for whom data were available and by gender, the asthma hospitalization rates per 10,000 in 2006 for children under 5 were as follows: black, 78.2; white, 28.0; male, 55.3; and female, 30.6. The target for all groups is 25.0 per 10,000.

**(Obj. 24-2c):** Age-adjusted hospitalization rates for asthma among adults aged 65 years and older increased from 17.7 per 10,000 in 1998 to 23.7 per 10,000 in 2006. By racial group for whom data were available, the age-adjusted asthma hospitalization rates per 10,000 in 2006 for adults aged 65 and older were as follows: black, 35.1; white, 17.5; and by gender: male, 14.9; female, 30.3. The target for all groups is 11.0 per 10,000.

**(Obj. 24-3b):** Hospital emergency department visits for asthma among children and adults aged 5 to 64 years decreased from 71.1 per 10,000 in 1995–1997 to 57.4 per 10,000 in 2004–2006. By racial group for whom data were available, hospital emergency

department visits for asthma per 10,000 in 2004–2006 were as follows: black, 181.3; white, 40.4; and by gender: male, 48.0; and female, 66.7. The target for all groups is 50.0 per 10,000.

**(Obj. 24-6):** The age-adjusted proportion of persons with asthma aged 18 years or more who responded positively to the question, “Have you ever taken a course or class on how to manage your asthma yourself?” increased from 8.4 percent in 1998 to 12.4 percent in 2003. By family income level, the proportions responding positively in 2003 were as follows: poor (i.e., below the Federal poverty level (FPL)), 7.9 percent; near poor (100–199 percent of FPL), 13.7 percent; and middle/high income (200 percent or more of FPL), 13.4 percent. The target for all groups is 30.0 percent.

**(Objs. 24-7a-f):** In 2003, the proportions of persons with asthma who received appropriate asthma care by category were as follows: written asthma plans from healthcare provider (age-adjusted), 35 percent (target: 38 percent); proper-use instructions with prescribed inhalers, 96.0 percent (target: 98.8 percent); education on early signs, symptoms, and responses to asthma episodes, 68 percent (target: 71 percent); medication regimens that prevent the need for more than 1 beta agonist inhalation canister per month, 80 percent (target: 92 percent); long-term management care after any hospitalization due to asthma, 76 percent (target: 87 percent); and assistance in reducing exposure to environmental risk factors (age-adjusted), 49 percent (target: 50 percent). With respect to receiving assistance in reducing exposure, the target was met or exceeded by non-Hispanic whites, females, and people with high income. The poor (at 46 percent), males (at 44 percent), and Hispanics (at 40 percent) were farthest from reaching the target.

**(Obj. 24-10):** The age-adjusted rate of deaths from COPD (asthma excluded) among adults aged 45 years or older decreased from 123.9 per 100,000 in 1999 to

118.8 per 100,000 in 2005. Over the same period, the COPD mortality rate per 100,000 among males in this age group decreased from 163.1 to 142.9, but among females the rate increased from 100.8 to 103.4. Among racial and ethnic groups for whom data were available, the COPD mortality rates per 100,000 aged 45 years or older in 2005 were as follows: Asian or Pacific Islander,

38.2; Hispanic, 51.8; American Indian or Alaska Native, 78.8; non-Hispanic black, 79.1; and non-Hispanic white, 130.9. The target for all groups is 62.3 per 100,000. To a limited degree, the recent moderate decrease in COPD mortality rates parallels the general historical decrease in cigarette smoking rates.

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## Key Challenges and Current Strategies

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Representatives from CDC and NIH made presentations on the principal themes of the Progress Review. They included Susan Shurin, Deputy Director of NIH's National Heart, Lung, and Blood Institute (NHLBI); Sheila Newton, Director of the Office of Policy, Planning, and Evaluation of NIH's National Institute of Environmental Health Sciences (NIEHS); Matthew Fenton, Chief of the Asthma, Allergy and Inflammation Branch of NIH's National Institute of Allergy and Infectious Diseases (NIAID); and Paul Garbe, Chief of the Air Pollution and Respiratory Health Branch of CDC's National Center for Environmental Health (NCEH). Their statements, the discussion that ensued, and Progress Review briefing materials prepared by an interagency workgroup identified a number of barriers to achieving the objectives, as well as activities under way to meet these challenges, including the following.

### Barriers

- After chronic rhinitis, asthma is the most common cause of chronic illness in children and is the leading cause for their hospitalization. EPA reports that, in 2002, children 5 to 17 years of age missed 14.7 million school days due to asthma.
- Many patients are unaware of what provokes their asthma attacks and many physicians underdiagnose the severity of asthma or underestimate the level of asthma control a patient experiences. This leads to missed opportunities to improve asthma control.
- Viral respiratory infections, exposure to allergens, exercise, irritants such as tobacco smoke and air

pollutants, and abrupt changes in the weather can cause asthma attacks in people who are sensitive to these factors. The difficulty of measuring the amount of exposure to different environmental triggers also impedes efforts to conduct research on possible links between environment and respiratory disease.

- In 2007, the direct and indirect costs of asthma to the U.S. economy were about \$14.7 billion dollars, approximately \$9.7 billion of which was directly associated with medical care costs and \$5 billion with lost productivity.
- Trends measured on the basis of certain *Healthy People 2010* objectives may not present sufficient information for directing future programs. For example, asthma hospitalization rates are increasing in general, but asthma mortality rates are decreasing, perhaps because increasing hospitalizations had the effect of preventing a significant number of deaths. It is also possible that improvements in diagnosing a disease can give rise to a misleading increase in the number of cases of illness.
- COPD is a slowly progressive disease of the lungs in adults that involves airway obstruction and gradual loss of lung function and that cannot be fully reversed by bronchodilator drugs. The symptoms can range from chronic cough and sputum production to severe, disabling shortness of breath. Many patients with COPD have symptoms of chronic

bronchitis and/or radiographic evidence of lung emphysema.

- Although COPD is common, it is a relatively unknown disease to most of the U.S. population, including those at greatest risk. Because COPD typically develops slowly over a period of decades, many people make accommodations for their symptoms, rather than reporting them and the condition goes undiagnosed and untreated.
- Smoking is the major cause of COPD, so COPD diagnosis and treatment are subject to issues of social acceptability and stigmatization not present with other common chronic diseases. COPD can become symptomatic years after smoking has ceased, so millions of ex-smokers may not realize they continue to be at risk. COPD did not decrease during the dramatic decline in cigarette smoking during the 1970s and 1980s. Slow onset of the disease likely contributed to this discordance.
- Sleep disordered breathing (SDB) is characterized by intermittent periods of partial or complete ventilatory arrest lasting 10 seconds or more. Breathing problems during sleep occur when the upper airway is obstructed, the airway collapses, or there is no effort to breath. Symptoms of SDB include restless sleep, loud snoring, periods of silence without breathing sounds, gasping for breath during sleep, morning headache, excessive daytime sleepiness, trouble concentrating, mood or behavior changes, and evidence of drowsy driving.
- Untreated SDB is associated with an increased risk for heart failure, heart attack, diabetes, stroke, and mortality. The estimated prevalence of SDB in people 30 to 60 years of age ranges from 9 to 24 percent for men and 4 to 9 percent for women. Among elderly men and women, the estimated range is from 20 to 30 percent. SDB is associated with increased healthcare utilization and decreased workplace performance. Also, patients with SDB are 3 to 7 times more likely to be involved in motor

vehicle crashes. An increase in SDB is expected in coming years because of the obesity epidemic and the aging of the population.

### **Activities and Outcomes**

- In August 2007, NHLBI's National Asthma Education and Prevention Program released the most recent, comprehensive update of the guidelines for diagnosing and managing asthma. Among other advances, the guidelines introduce new approaches for monitoring asthma, provide an expanded section on childhood asthma, give new guidance on medications, and offer new advice for controlling environmental factors that can cause asthma symptoms.
- A significant portion of NIH-supported research on asthma is devoted to identifying and examining the underlying pathogenesis and basic mechanisms of the disease to better understand what initiates, directs, and perpetuates the development of airway inflammation. Recently launched genome-wide association studies and several pharmacogenetics projects are examining the genetic determinants of asthma and individual response to asthma therapy. Through the Genes, Environment, and Health Initiative, NIH is also exploring new ways to measure an individual's exposure to environmental pollutants and other agents that could be causing the disease.
- For more than 35 years, NIAID has supported Asthma and Allergic Diseases Cooperative Research Centers, the aim of which is to integrate basic and clinical research on the immunological basis of these diseases. Currently, the Institute is funding 15 Centers across the United States, all of which perform clinical studies or trials. Among their recent areas of interest have been the role of environmental pollutants, for example, diesel fumes, on immune responses and the role of respiratory infections (viruses, bacteria, fungi) on asthma development and exacerbations.

- The CDC/NCEH National Asthma Control Program was created in 1999 to support the goals and objectives of *Healthy People 2010*. In 2007, CDC funded 35 asthma surveillance projects and 35 State and Territorial asthma partnership and intervention projects. Under the program, CDC also funds the Controlling Asthma in American Cities Project, a locally developed initiative in seven cities aimed at reducing the burden of asthma in inner-city communities suffering a disparate burden of disease.
- Data collection through the 2005–2006 NCHS National Health and Nutrition Examination Survey (NHANES) will address the nationwide prevalence of indoor allergen and endotoxin exposures and associations between these environmental exposures and asthma. These NHANES components are principally funded by NIEHS and NIAID. Data on immunoglobulin E are expected to be released in June 2008.
- In January 2007, NHLBI and more than 20 partnering organizations launched the Learn More, Breathe Better campaign to increase awareness of the signs and symptoms of COPD among those who have the disease or are at risk and to improve understanding of COPD diagnosis and treatment among healthcare providers. As part of the campaign, a mobile education and screening trailer traveled to health fairs and expos in 12 cities in 2007 and administered an average of 650 screenings in each location.
- To address the disproportionate impact of asthma on minority populations, particularly black and Hispanic children residing in inner cities, NIAID established the National Cooperative Inner-City Asthma Study in 1991, also supported by NIEHS, which first identified the cockroach as a major allergen in the inner city that is associated with asthma morbidity. The program subsequently provided evidence for the effectiveness of an environmental intervention in asthma management.
- Since 1998, NIEHS, in partnership with EPA, has supported nearly a dozen Centers for Children's Environmental Health and Disease Prevention in conducting research on the effects of environmental exposures on children's health, including pulmonary health. Studies undertaken by the Centers examine the effects of exposure and genetic susceptibility to ambient air pollution, inhaled particulates, allergens, and environmental tobacco smoke. The Centers communicate their findings to clinical and public health professionals and policymakers to alleviate the burden of environmentally induced diseases in children.
- The latest iteration of NIAID's programs focused on the inner city is the Inner-City Asthma Consortium (ICAC), which was established in 2002 to study the incidence, pathogenesis, and treatment of asthma among low-income inner-city children and adolescents, the population most at risk for uncontrolled asthma. The ICAC recently demonstrated the effectiveness of guidelines-based asthma management in this population. The program will be recompleted in fiscal year 2009.
- NHLBI's National Center for Sleep Disorders Research (NCSDR) serves as the coordinating body for sleep-related research and education activities across NIH, as well as with other Federal agencies, such as the National Highway Traffic Safety Administration (NHTSA). To reach adolescents, a group at high risk for drowsy driving, NCSDR developed an insert, "Awake at the Wheel," that was disseminated to most high schools across the country to raise awareness about sleep deprivation and driving.

## **Approaches for Consideration**

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Participants in the Progress Review made the following suggestions for public health professionals and policymakers to consider as steps to enable further progress toward achieving the objectives for Respiratory Diseases:

- Encourage the establishment of additional asthma management programs in schools and at worksites.
- Enhance collaboration and integration of programs across HHS agencies and with non-HHS agencies, such as EPA and NHTSA.
- To better identify population groups that should be given particular attention in asthma interventions, seek to establish a more comprehensive surveillance that would cover asthma prevalence, behaviors practiced by patients and healthcare providers in preventing and controlling asthma, adverse events resulting from poor management, and the demographic and geographic distribution of these indicators and their trends over time.
- Increase educational activities to encourage primary care physicians to seize opportunities for addressing COPD, including the use of spirometry for diagnosis and medications and pulmonary rehabilitation for relieving symptoms and improving quality of life.
- Target additional research to identify the pathogenetic mechanisms that are critical to COPD development and progression.
- Intensify efforts to arrest and reverse the remodeling and destruction of lung tissue that occur with COPD.
- Seek to understand why only a small fraction of cigarette smokers develops significant lung disease

and why different COPD patients can present with very different clinical phenotypes.

- Place greater emphasis on understanding the role of gender and sex hormones as modulators of lung structure, development, and maturation and on the importance these factors have for respiratory health in later life.
- Collect population-based data to benchmark the prevalence of chronic sleep loss, excessive sleepiness, snoring, and the presence of a diagnosed sleep disorder, including treatment outcomes.

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