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ASTHMA

THE STATES'

An increasingly organized and privatized health care system, dominated by large managed care organizations, obscures the role of state public health agencies in preventing clinically important diseases. What makes a disease a matter of public health importance and therefore of concern to health departments?

A disease first becomes a public health issue when an unexpected number of cases are found. After a decade of decline, both the morbidity and mortality associated with asthma are increasing in the United States; more than 14 million people are affected today.[1] (See Figures 1 and 2.) At the national level, this has led to an increased awareness of asthma as a public health concern.

Public health agencies traditionally conduct surveillance in response to the unexpected—to learn whether an apparent increase in disease is real and to find the causes. In the case of asthma, are the states aware of the extent of the problem? Have they undertaken surveillance activities?

When a disease has an environmental cause, public health agencies have a second important role: to control or eliminate causal environmental exposures. Asthma is triggered by a variety of environmental allergens and irritants; thus state health agencies have an important role to play in the detection and prevention of asthma.

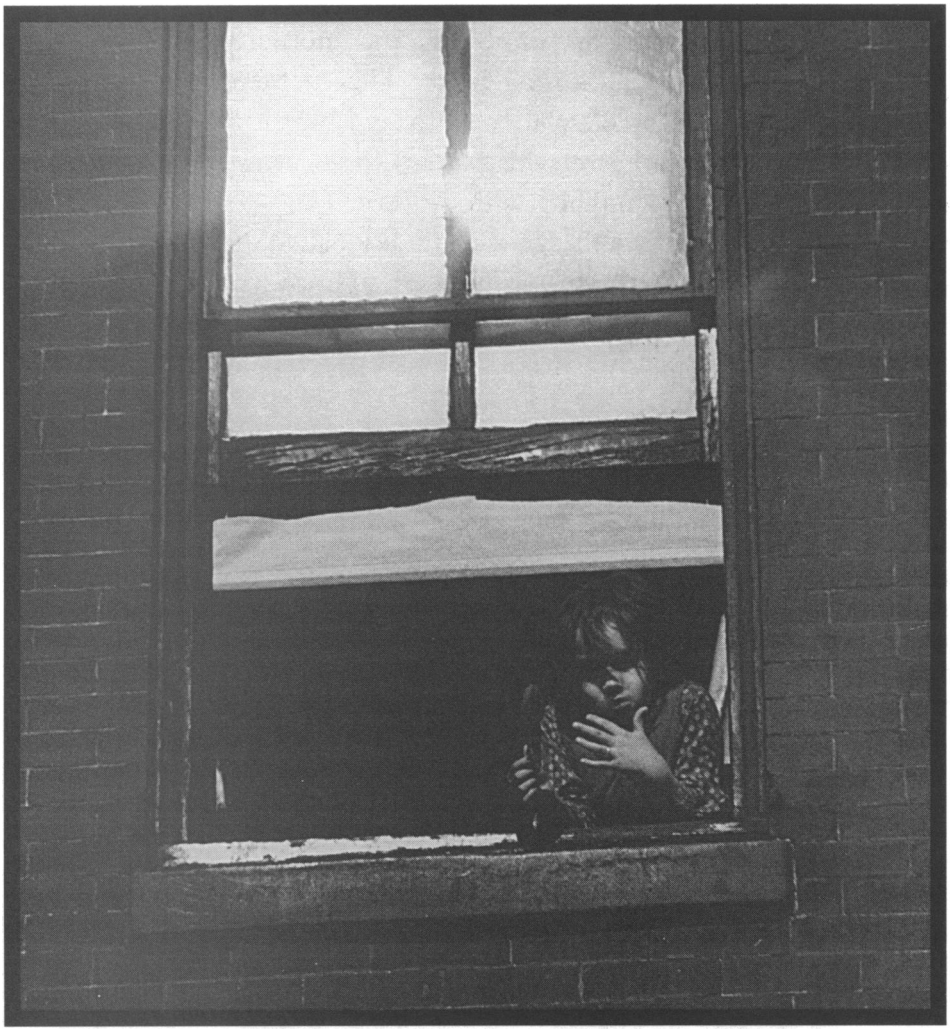
SYNOPSIS

AT THE NATIONAL LEVEL, asthma is increasingly being recognized as an important public health problem. Because of the significant role of environmental exposure in asthma morbidity, public health agencies have a critical role to play in the surveillance and prevention of the disease. In April 1996, the Council of State and Territorial Epidemiologists, with assistance from the Centers for Disease Control and Prevention, surveyed state and territorial public health departments to determine the status of their asthma surveillance and intervention programs. Of the 51 health departments that responded, only eight reported that they had implemented an asthma control program within the previous 10 years. Reasons cited for not having programs included lack of funds, shortage of personnel, and asthma not being a priority.

Most states were unable to assess the burden of asthma because they lack data or face barriers to using existing data. Removing barriers to the use of data is a first step toward defining the scope of the asthma problem.

CHALLENGE

In 1996, the Council of State and Territorial Epidemiologists (CSTE), in conjunction with the Centers for Disease Control and Prevention (CDC), conducted a survey of asthma surveillance and control efforts. We found that most states and territories lack coordinated asthma programs and few have implemented programs to achieve the health goals related to asthma in *Healthy People* 2000[2] (for a list of these goals, see page 204), which, among other things, called for the establishment of 35 state-based asthma surveillance programs. These programs would allow states to identify high risk communities for targeted intervention and allow them to monitor progress in reducing the burden of disease.[3]



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Who Gets Asthma?

Asthma is a chronic inflammatory disorder of the airways characterized by intermittent, recurrent episodes of wheezing, breathlessness, chest tightness, and cough, particularly at night or in the early morning or both.[4] In the United States asthma is the most common chronic disease of childhood,[5] affecting almost five million children below the age of 18, and has become the fourth leading cause of disability among children less than 18 years old.[6] Inner-city children have the highest prevalence of asthma and the highest asthma-associated hospitalization rates.[7,8] Studies have shown that asthma mortality is higher among inner-city children than other children,[7,8] higher among poor children than other children,[9] and higher among African Americans than other groups.[5,10] A recent CDC analysis of mortality data from its multiple-cause-of-death files found that between 1980 and 1993 African Americans ages 15 to 24 years consistently had the highest asthma-associated death rates.[1]

The association between poverty and adverse asthma outcomes seen among children in the United States is not evident in Great Britain or Canada.[11] This may be due at least in part to differences in health care systems.[11] Lack of access to care and reliance on emergency departments for primary care are associated with poor health outcomes in rural and inner-city poverty areas.[9,12] Maternal smoking during pregnancy[13] and exposure to dust mites[14] and cockroaches[14] are associated with asthma in inner-city children. Exposure to indoor allergens appears to be more common in these populations.[15]

Why Is Asthma on the Increase?

Many scientists are puzzled by the recent apparent increase in asthma morbidity and mortality. Bronchial airway hyper-reactivity in asthma is the respiratory manifestation of sensitization to allergens and irritants in the environment. The major role of genetics in predisposition to airway hyper-reactivity in people with asthma is supported by twin and genetic linkage studies. However, since changes in the genetic make-up of individuals occurs over generations, the rapid increase in the prevalence of asthma during the past decade suggests that changes at the genetic level are unlikely to be the cause.

Some of this increase in the prevalence of asthma may be due to increased recognition and diagnosis of the disease given greater awareness on the part of physicians of the pathophysiology of asthma and the clinical signs and symptoms associated with the disease and given the recent publication of asthma management guidelines by, for example, the National Heart, Lung, and Blood Institute.[4] However, these factors are also unlikely to account for all of the increase in prevalence.

Monitoring of environmental exposures related to asthma is usually restricted to epidemiologic or clinical studies, including the investigation of acute clusters of asthma symptoms or occupational exposures. There are few biomarkers to indicate exposure (especially acute exposure) to environmental factors. We are therefore unable to determine whether the increase in asthma is due to an increase in airborne levels of indoor or outdoor allergens and irritants.

By building more energy-efficient homes and by using more carpeting, we may be collecting more dust and concentrating pollutants in the dust.

One theory is that urbanization has increased our exposure to environmental allergens and irritants. By building more energy-efficient homes and by using more carpeting, it may be that we are providing the opportunity to collect more dust and to concentrate pollutants in the dust. Psychosocial factors that cause us to spend more time indoors and overcrowding in certain neighborhoods and in the home may lead to increased exposure to indoor pollutants. Overcrowding may also predispose to increases in the number of pests such as cockroaches and rodents. Socioeconomic factors related to lack of access to health care and to specialist services may also be related to an increase in asthma attacks.

Although there has been an overall decline in the proportion of people that are exposed to environmental tobacco smoke, the rate of smoking has increased in some populations, including young women. If these women are exposing their children to environmental tobacco smoke, especially during the perinatal period, this could be associated with an increase in the prevalence of asthma.

In summary, the increased prevalence of asthma seems to be related to a variety of factors, including increased diagnosis of the disease, increased exposure to environmental allergens and irritants, increased exposure of children to mothers' tobacco smoke, and psychosocial and socioeconomic factors.

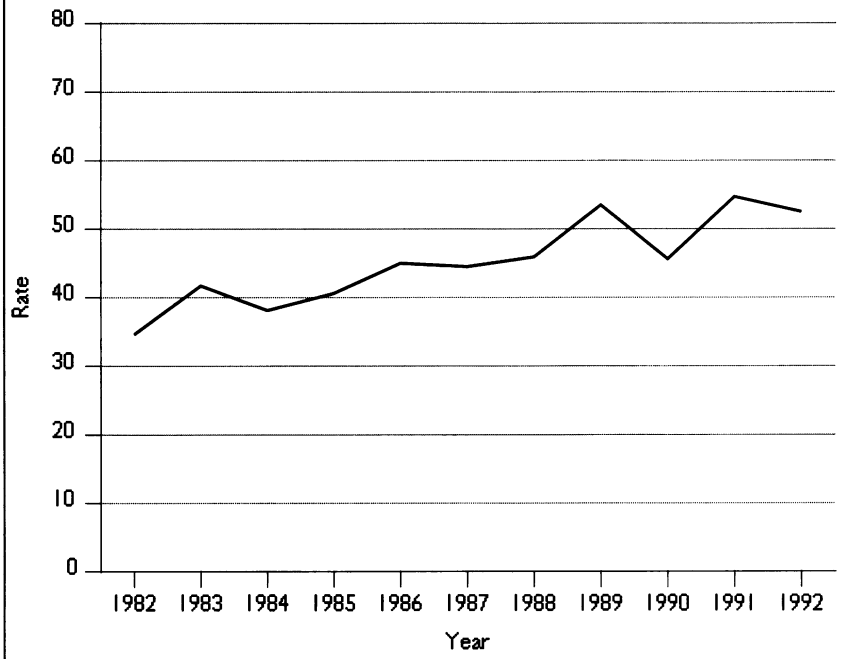
Treatment and Prevention

Asthma is generally treated in ambulatory settings. Between 1965 and 1992 the estimated annual number of visits to physicians by people with asthma in this country approximately doubled, rising to an estimated annual average of 15 million visits.[16] Today, fewer visits for asthma are made to general practitioners and more to specialists.[16]

While the total number of prescriptions filled annually in the United States rose by approximately 23% between 1988 and 1994, the number of asthma prescriptions filled during the same period increased by 48%, due primarily to increased use of anti-inflammatory drugs—inhaled corticosteroids and inhaled beta$_2$-agonists. At the same time, the number of prescriptions for bronchodilators—xanthines—decreased significantly.[17] The use of anti-inflammatory drugs reflects the current view of asthma as a chronic inflammatory disorder of the airways. Yet despite an improved understanding of the pathophysiology of the disorder and advances in treatment, the prevalence of asthma and asthma-related morbidity and mortality continue to rise.

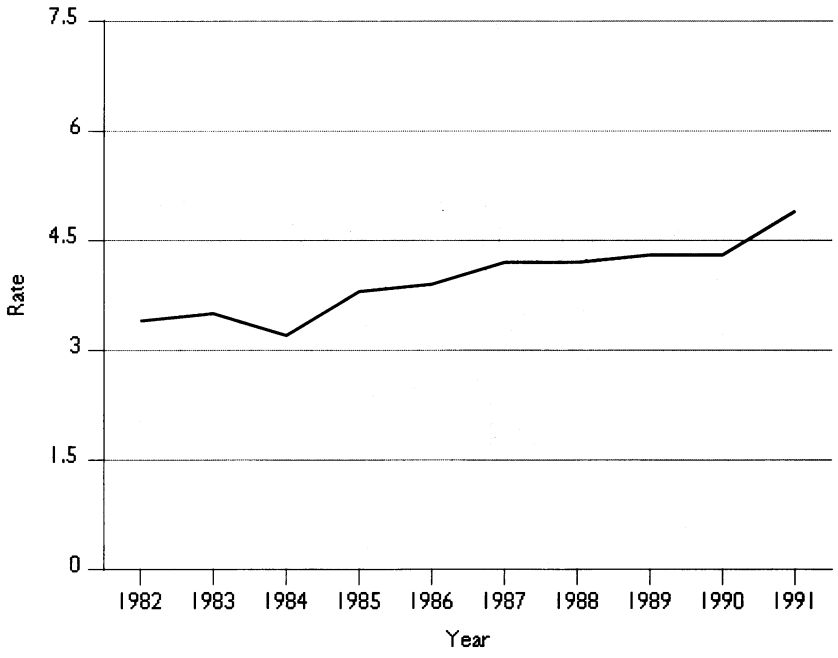
Education of patients and parents can play an important

Figure 1. Age-adjusted prevalence per 1000 population of self-reported asthma in people ages 5–34 years, by year—United States, 1982–1992



NOTE: Standardized to 1980 U.S. population.
SOURCE: Reference 7.

Figure 2. Age-adjusted death rate per one million population for asthma as the underlying cause of death in people ages 5–34 years, by year—United States, 1982–1991



NOTE: Standardized to the 1980 U.S. population.
SOURCE: Reference 7.

State-Based Asthma Activities

We surveyed asthma surveillance and intervention programs in public health departments in the United States and asked about barriers to establishing such programs. CSTE/CDC sent questionnaires to 50 state and four territorial epidemiologists affiliated with CSTE, asking that the person most knowledgeable about asthma prevention and control programs in the state complete the questionnaire. Responses were received from 48 states and three territories.

State-level asthma control programs. In responding to the survey, only eight of the health departments reported that they had implemented any type of asthma control project within the previous 10 years. The two most important reasons given for not having an asthma control program were lack of funds and shortage of staff; however, 10 of the responding health departments indicated that they did not regard asthma as a public health priority.

role in reducing the prevalence and severity of asthma. While the exact etiology of asthma is unknown, we know that a variety of environmental allergens and irritants trigger the bronchial hyper-responsiveness and airway obstruction that characterize the disease. These exposures can be avoided or reduced. Indoor air pollutants show the strongest association with exacerbations of asthma symptoms. Exposure to allergens from house dust mites[18] and cockroaches[14,15,19] and environmental tobacco smoke[20] usually contribute more than outdoor air pollutants.[21,22] Studies have shown that the environmental control of allergens,[23,24] including avoidance of environmental tobacco smoke, is effective in preventing attacks. Increasing parental knowledge of the effects of "secondhand smoke,"[25] and patient and provider education programs[26,27] also reduce the severity of the disease and frequency of hospitalizations.

The management of the person with asthma should ideally incorporate both clinical treatment and preventive approaches that mobilize the family and the community to learn about asthma management. State and local health departments are essential to an effective effort; they have important roles to play in measuring the burden of disease in their areas and in identifying high risk populations and the pollutants associated with asthma. These departments should lead the development of targeted interventions to reduce the burden of disease. Unfortunately, the CSTE/CDC survey found that most states lacked the necessary funding and personnel.

Availability of data. In order for state health departments to understand the scope of problem, they need to evaluate local data. All state health departments have access to mortality data; 82% (42) of the respondents reported that hospital discharge data were available, and 31% (16) reported that data on emergency department visits were available. Only 20% (10) reported being able to evaluate the use of public or private health care services for asthma care, with 8% (4) being able to identify first-time users of such services. Four responding health departments (8%) reported having data on the quality of life of people with asthma.

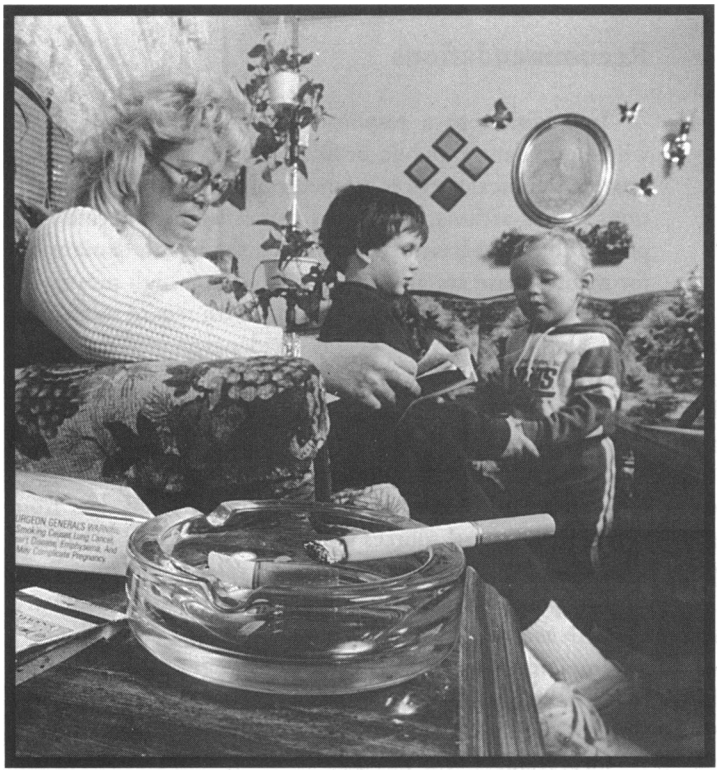
Use of data. Simply having data available does not mean that those data are used. For example, although 82% of respondents reported having access to hospital discharge data, only 34% of the respondents having those data had used them. In addition to legal constraints and technological barriers, states reported that ownership and cost issues made it difficult to obtain information, especially from private sources such as firms conducting health care analyses under contract with providers.

Most of the 10 health departments reporting that asthma was not a priority had not evaluated the asthma data for their jurisdictions. None of the 10 had ever done a survey to determine the prevalence of asthma, and although hospital discharge data were available to nine of the 10, only three used them to study asthma. None of the 10 health departments had data available to them on emergency

department visits, the use of public or private ambulatory care services for asthma, or the quality of life of people with asthma. None had a surveillance system in place to monitor trends in asthma.

Using national data sources. In written comments, survey respondents suggested additional sources of data on asthma—for example, adding state- and territory-specific questions about asthma to the Behavioral Risk Factor Survey (BRFSS), a monthly telephone survey of adults, which uses standard protocols and standard interviewing methods to inquire about behavioral risk factors. Our survey respondents also recognized the utility of using Medicaid data and of making diagnosis of asthma a performance measure in the Health Plan and Employer Data, an information set produced and used by the nation's managed care plans.

We agree that exploring the use of such national data sources could be beneficial and result in savings of both time and money. BRFSS data could be used to estimate the prevalence of asthma and its effects, and HEDIS or Medicaid data monitored over time could form the basis of a surveillance system by providing estimates of services used by asthmatics. Our findings suggest that state public health officials need to explore ways of removing barriers to the use of existing data in order to develop asthma surveillance systems and novel intervention programs.



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State-based surveys and surveillance. A survey to determine the local burden of asthma and the environmental exposures related to asthma in specific geographic areas is a good first step toward an asthma program. An ongoing surveillance system is needed to monitor trends in the disease and the effectiveness of interventions. Only 20% of respondents (10) reported that they had ever done a survey to determine the prevalence of asthma. Prevalence data would allow a department to target intervention at populations with the greatest need. Only one health department reported having a surveillance system in place to monitor trends in asthma.

While the exact etiology of asthma is unknown, we know that a variety of environmental allergens and irritants trigger the bronchial hyperresponsiveness and airway obstruction that characterize the disease.

Intervention programs. About half of the responding health departments reported involvement in intervention programs to control asthma in communities within their jurisdiction at some point during the previous 10 years. In addition to state-level programs sponsored by the health departments, these included activities initiated or sponsored by other agencies or groups.

Twenty-six health departments indicated that they had implemented or helped implement limited asthma intervention programs in communities within their jurisdictions. Only three health departments told us they were currently involved in an intervention program. Unfortunately, only one state has an ongoing asthma surveillance systems that would allow it to monitor the impact of these interventions.

Of the 25 asthma intervention programs reported by the health departments surveyed, 56% (14) involved public education, 56% (14) involved patient education, 48% (12) involved the education of health care providers, and 20% (5) involved legislation. Only 8 of the 22 environmental control programs included *active* intervention measures such as efforts to reduce dust and allergens in dust or financial incentives to enroll in smoking cessation programs. The remaining 14 were passive programs, which provided people with information but did not offer concrete support.

Plans for future programs. Of 48 responding departments not involved in an asthma intervention or control program at the time of the survey, seven indicated that

Healthy People 2000 Asthma Goals

Health goals related to asthma in *Healthy People 2000: National Health Promotion and Disease Prevention Objectives* (11.1, 17.4, 17.14b, 11.16).[2]

- Reduce hospitalizations from 188 per 100,000 to 160 per 100,000.
- Reduce from 19% to 10% the proportion of people with asthma whose activities are limited by the disease.
- Increase the proportion of people with asthma who get formal patient education from 9% to 50%.
- Establish and monitor 35 state-based plans to define and track sentinel respiratory diseases triggered by environmental factors.

they planned to develop a program in the near future. Of the remaining 41 states and territories, 34 said they would be interested in starting a program. Of the seven states not interested in starting an asthma control program, five reported that asthma was not considered a public health priority.

We asked respondents to tell us where an asthma intervention or control program might be located within their organizations. About half (23/43) of the health departments that had not been involved with an asthma control program in the last 10 years indicated that a future asthma control program would probably be located within existing chronic disease programs, while 26% (11/43) suggested the program would probably be shared among two or more program areas. Asthma programs at the CDC are in the Center for Environmental Health, which focuses on the environmental exposures; thus to attack clinical and health education issues, CDC will need to draw on resources from other centers and coordinate efforts.

Implementing New Asthma Surveillance and Control Programs

Starting and maintaining asthma programs may seem costly, yet asthma itself—measured in terms of both direct and indirect costs—represents a large economic burden. The estimated medical costs associated with asthma were nearly 1% of total U.S. health care costs in 1985, increasing from $4.5 billion to $6.2 billion between 1985 and 1990.[28] Programs to limit the exposure for people with asthma to allergens and irritants and thus reduce exacerbations of symptoms could potentially result in great savings to society.

We asked for estimates of the start-up cost of an asthma surveillance system. Thirty-eight percent (17/45) of those answering the question indicated a cost between $100,000 and $250,000, and 44% (20/45) between $50,000 and $100,000. For an asthma intervention program, 54% (22/41) of those answering the question estimated start-up costs at between $100,000 and $250,000, and 29% (12/41) between $50,000 and $100,000.

Using the upper bounds of these estimates, we calculate the total start-up cost for state-based asthma surveillance systems across the United States at approximately $9 million and the cost of starting asthma intervention programs at approximately $10 million. Because costs would differ depending on the nature and scope of the program, the size of the population, and the prevalence of asthma, it might be prudent to start with demonstration intervention and surveillance programs in a few states. Evaluating the *prevention effectiveness* ("the systematic assessment of the impact of public health policies, programs, and practices on health outcomes"[29] of these demonstration projects would produce an estimate of the direct and indirect medical costs saved. These demonstration projects could serve as models for other states and territories.

Clinical guidelines. The National Asthma Education Program of the National Heart, Lung, and Blood Institute (NHLBI) has developed guidelines for the diagnosis and management of asthma.[4,30] Of the health departments in our survey, 57% knew about the NHLBI guidelines. Seventy-eight percent reported being unsure if their public health clinics used the guidelines, while 12% stated that their clinics did not use the NHLBI guidelines. (It should be kept in mind that not all health departments offer clinical services.) Cooperation between CDC, NHLBI, and state and territorial health departments could assure distribution of the guidelines to providers serving populations with the greatest need for clinical services.

Recommendations

In addition to a responsibility for the health of the whole population, public health agencies have traditionally provided clinical services to medically underserved populations.[31] For asthma, these jobs come together because the populations that have often relied on the health department for medical care are also the groups with a high prevalence of asthma. Thus we recommend that with regard to asthma, state and territorial public health departments should be able to:

- Access and interpret existing asthma-related data on hospital discharges and emergency department visits;
- Access and interpret existing asthma-related data from non-traditional sources such as Medicaid and HEDIS;
- Conduct surveys to assess the prevalence of asthma and the prevalence of environmental exposures associated with asthma
- Implement targeted intervention programs for high risk populations based on local data; and
- Develop novel asthma surveillance system to monitor local trends in the disease.

We believe that collaboration is essential to the design and implementation of comprehensive community-based asthma prevention programs. Providers, payers, and patient representatives as well as academic centers and community and citizen groups must work with state and local health departments, which in turn must work with CDC and other Federal agencies. Surveillance systems are needed from the start to help us understand asthma, to direct interventions, and for accurate evaluation of our progress against the disease.

A national strategy is needed too, to assure that every person with asthma has access to state-of-the-art case management and appropriate care and to assure that every state and local public health department and the programs they coordinate can abate the air pollutants that put people with asthma at risk. With a coordinated approach we anticipate decreasing the burden of asthma on people with the condition, on their families, and on the health care system.

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