

Asthma and the Environment:

A Strategy to Protect Children



President's Task Force on Environmental Health
Risks and Safety Risks to Children

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ABOUT THE PRESIDENT'S TASK FORCE ON ENVIRONMENTAL HEALTH RISKS AND SAFETY RISKS TO CHILDREN

In recognition of the growing body of scientific information demonstrating that America's children suffer disproportionately from environmental health risks and safety risks, President Clinton issued Executive Order 13045 on April 21, 1997, directing each Federal Agency to make



it a high priority to identify, assess, and address those risks. In issuing this order, the President also created the Task Force on Environmental Health Risks and Safety Risks to Children, co-chaired by Donna Shalala, Secretary of the Department of Health and Human Services, and Carol M. Browner, Administrator of the Environmental Protection Agency. The Task Force was charged with recommending strategies for protecting children's environmental health and safety. Two

subcommittees were established in the Executive Order to carry out this directive: a subcommittee directed to review and foster public access to federal government sponsored research on environmental health and safety risks to children, and a subcommittee directed to identify priority public outreach activities related to protecting children's environmental health and safety.

In April 1998, the Task Force identified four priority areas for immediate attention: childhood asthma, unintentional injuries, developmental disorders, and childhood cancer. The Task Force created and charged the Asthma Priority Area Workgroup, co-chaired by EPA and DHHS, with reviewing current Federal efforts to address the many facets of the issue and, most importantly, to make appropriate recommendations for action by the Federal government. This strategy is the result of that effort.

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EXECUTIVE SUMMARY

An epidemic of asthma is occurring in the United States. While the epidemic affects people of all ages, children are particularly affected. Nearly 1 in 13 school-aged children has asthma, and the percentage of children with asthma (i.e., prevalence rate) is rising more rapidly in preschool-aged children than in any other age group.

There is no national system to collect data from states specifically on asthma, although several states are developing systems to collect such data. Although national data do not provide the resolution necessary to identify particular geographic areas hardest hit by the asthma epidemic, surveys undertaken in a number of large cities in the United States indicate that the prevalence and severity of asthma are greatest in the large, urban inner cities.

An epidemic of asthma is occurring in the United States.

Asthma is one of the leading causes of school absenteeism, accounting for over 10 million missed school days per year. Asthma also accounts for many nights of interrupted sleep, limitation of activity, and disruptions of family and care-giver routines. Asthma symptoms that are not severe enough to require a visit to an emergency room or to a physician can still be severe enough to prevent a child with asthma from living a fully active life.

In 1998, the cost of asthma to the U.S. economy was estimated to be \$11.3 billion, with the majority of the expense attributed to direct medical expenses. These estimates, which are not limited to the costs of childhood asthma, indicate that the direct medical costs of asthma account for approximately 1% of all health care expenditures in the United States.

Asthma is a particularly important disease to consider in the context of environmental hazards to which children are exposed. Children breathe more air, eat more food, and drink more liquid in proportion to their body weight than do adults, and their developing respiratory, immunological, and digestive systems may be more susceptible to environmental exposures than those of adults. In a typical day, children may be exposed to a wide array of environmental agents at home, in day care centers, schools and while playing outdoors. There is substantial evidence that environmental exposures, including viruses and allergens, play a major role in triggering asthma symptoms. Indoor airborne allergens include those from house dust mites, cockroaches, mold and animal dander. In addition, exposure to environmental tobacco smoke (ETS), also known as secondhand smoke, has been shown to be a major determinant of asthma symptoms. Elevated levels of outdoor air pollutants, particularly ozone and exposure to outdoor allergens (e.g. pollens, molds), are associated with increased symptoms and an increased risk of emergency department visits for asthma, as well.

In addition, environmental factors such as airborne allergens and environmental tobacco smoke may play a significant role in the onset of asthma. Other pollutants may also play a role, although the scientific data are inadequate to offer firm conclusions. Genetic predisposition is

the strongest known risk factor for developing asthma, but the rapidly rising number of cases of childhood asthma cannot be solely genetic because the genetic composition of the population changes slowly. Rather, some interaction between genetic predisposition and environmental exposures, and possibly other factors such as diet, increased body weight, or lack of exercise are likely to be responsible for the increase. Further work is essential to clarify how genetic susceptibility and environmental exposures interact to cause asthma.

Reducing exposures of children with asthma to airborne allergens and pollutants will reduce the health burden of asthma and significantly improve their quality of life. It is not yet certain, but it is possible that reducing the exposure of infants and young children at risk of developing asthma may prevent its onset. Environmental control methods and asthma treatments are available now that can help children and their families control asthma and lead healthy, active lives. Yet not all children have access to these measures. Too many children miss school, limit their physical activity, and are seriously ill because of asthma. A child ill with asthma also has an impact on the entire family.

This strategy, prepared by the Task Force, is aimed at developing a further understanding of the role of environmental factors associated with the:

- onset of asthma; and
- triggers of asthma attacks



The efforts of the Task Force resulted in four recommendations for Federal action for addressing childhood asthma, which are presented in this strategy. The strategy also sets forth guiding principles that were used to develop the four recommendations.

GUIDING PRINCIPLES

Federal agency actions can provide leadership and direction in reducing environmental risks to protect children who have asthma or are at risk of developing it. Recommendations for action put forward in this initiative are predicated on the principles that federal action must have:

- A focus on efforts to *eliminate the disproportionate impact of asthma in minority populations and those living in poverty.*
- An emphasis on *partnerships and community based programs.*
- A commitment to setting *measurable and consistent goals* for childhood asthma under the Healthy People 2010 program.
- *An investment in evaluation* to identify those strategies that are most effective in reducing the burden of asthma so that they may be replicated.

RECOMMENDATIONS

RESEARCH

Strengthen and accelerate focused research into the environmental factors that cause or worsen childhood asthma.

- ⇒ Strengthen and accelerate research into the environmental factors that may contribute to the onset of asthma in children.
- ⇒ Expand and accelerate research to develop and evaluate environmental strategies that will improve the quality of life of people with asthma.

PUBLIC HEALTH PROGRAMS

Implement public health programs that foster improved use of current scientific knowledge to reduce environmental exposures to prevent and reduce the severity of symptoms for those with asthma.

- ⇒ Promote clinician and patient implementation of national guidelines for reducing environmental risks that worsen asthma.
- ⇒ Expand support for state and local public health action.
- ⇒ Reduce children's exposure to environmental tobacco smoke and other indoor triggers in their homes.
- ⇒ Establish school based asthma programs that help reduce or eliminate allergens and irritants and that promote student's self management of asthma and full participation in school activities.
- ⇒ Continue to reduce outdoor air pollution.

SURVEILLANCE

Establish a coordinated, integrated, and systematic nationwide asthma surveillance system for collecting, analyzing, and disseminating health outcome and risk factor data at the state, regional and local levels.

DISPROPORTIONATE IMPACT ON THE POOR AND MINORITIES

Identify the reasons for and eliminate the disproportionate burden of asthma among different racial and ethnic groups and those living in poverty.

- ⇒ Improve asthma management for children within the medicaid program.

This initiative is about protecting children from environmental risks that either cause or worsen asthma...



INTRODUCTION

The Growing Problem of Asthma in Children

Asthma is a chronic inflammatory lung disease characterized by recurrent episodes of breathlessness, wheezing, coughing, and chest tightness; these episodes are also known as exacerbations or attacks. The severity of exacerbations can range from mild to life threatening. Both the frequency and severity of asthma symptoms can be reduced by the use of medications and by reducing exposure to the environmental triggers of asthma attacks.

For the past 15 years, an epidemic of asthma has occurred in the United States. By all indications, this epidemic is continuing. Although asthma has become a major public health problem affecting Americans of all ages, races and ethnic groups, children have been particularly severely affected.



National survey data indicate that the number of children with asthma in the United States has more than doubled in the past 15 years. In 1980, 2.3 million American children had asthma.¹ By 1995, the number of affected children had risen to 5.5 million.² Based on these trends, it is estimated that in 1998 more than 6 million children in the United States have asthma. Prevalence rates of asthma are highest in boys and are increasing in both boys and girls, and in all race and ethnic groups. The prevalence of asthma in children under age 18 is 7.3%. The most rapid increase has occurred in children under 5 years old, with rates increasing over 160% over the past 15 years.¹

The number of deaths attributed to asthma in children has also increased. In 1977, 84 deaths in children 18 and younger were recorded; the number of deaths has risen to 280 in 1995, a more than 3-fold increase.³ Although the death rate due to asthma has increased in all racial and ethnic groups, minority populations experience a disproportionately higher death rate from asthma. In 1995, the death rate from asthma in African-American children, 11.5 per million, was over four times the rate in white American children, 2.6 per million.³ The higher death rates among African-American children are especially troubling.

The number of hospitalizations and emergency room visits for asthma have increased in all population groups. Asthma accounts for one-third of all pediatric emergency room visits and is the fourth most common cause for physician office visits. The variation in the impact of asthma across racial and ethnic groups is significant. African-American children have an annual rate of hospitalization of 74 per 10,000, over 3 times that for white children, 21 per 10,000.⁴ In addition, African-American children are approximately 4 times more likely than white children to seek care at an emergency room.⁵ In short, African-American children have a slightly higher risk of getting asthma, but have a much higher risk of hospitalization or death due to the disease.

At the present time, surveillance for asthma in children is limited to analyses of ongoing surveys and data systems on health events such as mortality, hospitalization, and outpatient visits. Other than for African Americans, such information is extremely limited for most ethnic groups. There is no national system to collect data from states specifically on asthma, although several states are developing systems to collect such data. Although national data do not provide the resolution necessary to identify particular geographic areas hardest hit by the asthma epidemic, surveys undertaken in a number of large cities in the United States indicate that the prevalence and severity of asthma are greatest in the large, urban inner cities.^{6 7}

There is no national system to collect data from states specifically on asthma, although several states are developing systems to collect such data.

These measures, particularly for death, hospitalization, and emergency room visits, give an incomplete picture of the true burden of asthma in the United States. For example, one follow-up study of children with asthma in inner city areas found a nearly 10 times higher likelihood of a child suffering symptoms of asthma on a given day than visiting an emergency room.⁸ Asthma is one of the leading causes of school absenteeism, accounting for over 10 million missed school days per year.⁹ Asthma also accounts for many nights of interrupted sleep, limitation of activity, and disruptions of family and care-giver routines. Asthma symptoms that are not severe enough to require a visit to an emergency room or to a physician can still be severe enough to prevent a child with asthma from living a fully active life.

Estimating the costs of asthma is an indirect way to measure its health burden. In 1998, the cost of asthma to the U.S. economy was estimated to be \$11.3 billion,¹⁰ with the majority of the expense attributed to direct medical expenses. This estimate indicates that the direct medical costs of asthma for all ages account for about 1% of all health care expenditures in the United States.

What We Know About Childhood Asthma

Over the past 15 years, there have been major advances in the scientific understanding of asthma. Asthma is now known to be a disease of airway inflammation resulting from a complex interplay between environmental exposures and genetic and other factors. This has implications for the medical treatment and for the environmental management of asthma.

In contrast to the limited understanding of the relationship of environmental exposures to the onset of asthma, the environmental triggers of asthma attacks for children with asthma have become increasingly well characterized. House dust mites, cockroaches, mold and animal dander have been identified as the principal allergens that trigger asthma symptoms.^{11 12 13 14} Reducing exposure to these allergens has been shown not only to reduce asthma symptoms and the need for medication, but also to improve lung function.^{12 15} Environmental tobacco smoke is an important irritant that can trigger an asthma episode and possibly worsen the effects of allergens.¹⁶ Upper respiratory viral infections are also recognized as important triggers for asthma episodes.¹⁷

Children with asthma have long been recognized as particularly sensitive to outdoor air pollution. Many common air pollutants, such as ozone, sulfur dioxide, and particulate matter are respiratory irritants and can exacerbate asthma.¹⁸ Air pollution also might act synergistically with other environmental factors to worsen asthma. For example, some evidence suggests that exposure to ozone can enhance a person's responsiveness to inhaled allergens.¹⁹ Whether long term exposure to these pollutants can actually contribute to the development of asthma is not known. To date, little research has examined the role of other hazardous air pollutants (e.g., metals and volatile chemicals) in the development or exacerbation of asthma, although this is an issue of increasing public concern.²⁰

Children with asthma have long been recognized as particularly sensitive to outdoor air pollution.

In addition to improved understanding of appropriate environmental management of asthma, the medical management of asthma has changed significantly. Inhaled anti-inflammatory medications have become the mainstay of medical management to prevent asthma episodes and lessen chronic symptoms of asthma. In addition, improvements in monitoring techniques now permit objective measures of lung function that are easy for patients and physicians to use in assessing asthma severity and monitoring changes in the disease. In a disease like asthma that varies considerably over time and where changes in lung function can occur before symptoms develop, these objective measures are essential tools for making management decisions.

As a result of these advances, the medical and environmental management of asthma is better defined and the knowledge exists to manage asthma better than ever before. One especially important finding is that patient education has been documented to be cost effective.²¹ Teaching patients and their families specific management skills improves asthma management, reduces the use of emergency services, and improves quality of life. This is particularly important for asthma management, since the environmental management of asthma requires knowledge of asthma triggers and specific actions that can be undertaken to reduce exposure to these triggers. The treatment goal for almost all individuals with asthma should be for that person to lead a life unrestricted because of asthma.

Reducing exposure to environmental allergens and pollutants will reduce the frequency and severity of attacks for children with asthma, reduce their need for medicine, and improve their lung function. Children are exposed to many environmental agents that could trigger asthma attacks. For example, 25% of children in America live in areas that regularly exceed EPA limits for ozone.²² Approximately 29% of households still permit exposure of children to secondhand smoke in the home on a regular basis and exposure to environmental tobacco smoke is so widespread that approximately 88% of all children have some level of documented exposure.²³ A high proportion of children living in the inner city are exposed to high levels of cockroach antigen.²⁴

Why Has Asthma Reached Epidemic Proportions in Children?

The causes of the increasing rate of asthma over the past 15 years and the particular role that environmental exposures play are not known, but there are some clues. Atopy, the genetically inherited susceptibility to become allergic, is the most important predictor of a child developing asthma, and atopy is on the increase.²⁵ A substantial research effort is underway to identify the genes that are responsible for susceptibility to asthma. Because the genetic make-up of the population changes slowly, genetic susceptibility alone cannot be responsible for the epidemic of asthma that has occurred in the United States over the past 15 years. Further work is essential to clarify how genetic susceptibility and environmental exposures interact to cause asthma. Factors such as the intensity of environmental exposure and the age of the person being exposed are likely to be important.

Some studies suggest that exposure to allergens found indoors is a strong risk factor for developing asthma. Children are spending increasing amounts of time indoors, thus increasing their exposure to indoor allergens.^{23 26 27 28}

The causes of the increasing rate of asthma over the past 15 years and the particular role that environmental exposures play are not known

The environmental exposures most strongly suspected of causing asthma to develop include environmental tobacco smoke and allergens such as house dust mites, cockroaches, mold, and animal dander. Exposures that stimulate the immune system may also be significant, such as the pattern of respiratory infections early in life.²⁹ In addition, diet during the prenatal period and early infancy, and even decreasing rates of exercise have been suggested as risk factors for the development of asthma.^{30 31}

Scope of the Strategy

This strategy is about protecting children from the environmental risk factors that make their asthma worse. Environmental action may also help prevent asthma. To accomplish this goal, the environmental aspects of asthma must be considered in the context of other aspects of asthma prevention and management, such as access to quality medical care and efforts to understand the disproportionate health impact of asthma among minority populations. Childhood asthma is a multi-factorial disease, and efforts to improve its management and to prevent it will require multi-dimensional, multi-disciplinary efforts that must occur simultaneously. This Asthma and the Environment strategy focuses on improving the environment in which children with asthma live, learn, play and work. Environmental action, along with medical care, will help children with asthma live productive, active lives and may spare future generations of children from the disease altogether. The Task Force has prepared the following four goals to be accomplished in the next ten years, guided by the vision that in the 21st century, every child in America will live, learn, work, and play in environments that do not cause or worsen asthma.

GOALS OF THE ASTHMA AND THE ENVIRONMENT STRATEGY

BY THE YEAR 2005, THE NUMBER OF HOUSEHOLDS IN WHICH CHILDREN ARE REGULARLY EXPOSED TO SECONDHAND SMOKE WILL BE REDUCED TO 15%.¹

BY THE YEAR 2010, ASTHMA HOSPITALIZATION RATES IN CHILDREN WILL HAVE FALLEN TO NO MORE THAN 10 HOSPITALIZATIONS PER 10,000 PEOPLE.² (Healthy People 2010 DRAFT)

BY THE YEAR 2010, EMERGENCY DEPARTMENT VISITS WILL BE REDUCED TO NO MORE THAN 46 PER 10,000 PEOPLE.³
(Healthy People 2010 DRAFT)

BY THE YEAR 2010, NO MORE THAN 10% OF CHILDREN WITH ASTHMA WILL EXPERIENCE ACTIVITY LIMITATIONS.⁴
(Healthy People 2010 DRAFT)

¹ Baseline: 29% in 1994. Source: Biennial Radon and ETS Survey of the Conference of Radiation Control Program Directors and EPA.

² Baseline: Hospitalization rate per 10,000 population in 1993-94: 18 for total population; 50 for children 0-4 yrs of age and 18 for children 5-14 yrs. Source: Healthy People 2010 Draft

³ Baseline: Emergency room visits 71 per 10,000 population for total population in 1992-94; 121 for children 0-4 yrs of age and 81 for children 5-14 yrs. Source: Healthy People 2010 Draft

⁴ Baseline: Activity limitation for persons with asthma; 22 percent for overall population in 1992-94. No children-specific data available. Source: Healthy People 2010 Draft

VISION FOR THE 21ST CENTURY

Every child in America will
live, learn, work, and play
in environments that do
not cause or worsen
asthma.

GUIDING PRINCIPLES

Federal agency actions can provide leadership and direction in reducing environmental risks to protect children who have asthma or are at risk of developing it. Recommendations put forward in this strategy are predicated on the principles that federal action must have:

1. A focus on efforts to better understand and eliminate the disproportionate impact of asthma in minority populations and those living in poverty.

Poor and minority children are much more likely than white, non-Hispanic children to visit an emergency room, to be hospitalized, or to die from asthma, although the rising prevalence of asthma has affected all populations. The reasons for this disparity are not known, although environmental exposures and limited access to quality medical care may all play a role.

The focus on eliminating disparities across racial and ethnic groups has to be considered in all efforts to prevent asthma and its health impact; however, because of the importance of this issue the Task Force has included a specific recommendation in this strategy to examine, understand, and ultimately eliminate disparities.

2. An emphasis on partnerships and community based programs.

A successful effort to reduce childhood asthma will depend in part on the level of success achieved in enlisting all sectors of society in efforts to implement effective programs to prevent and manage the disease. Federal agencies have already forged effective partnerships with many health and professional organizations, corporations, and foundations to conduct training, educate health care providers and the public, and to implement a wide range of prevention activities at the national, state, and local levels.

Expanded partnerships both within government and between government and the private sector are needed. With increasing knowledge about the primary causes of asthma and triggers of asthma attacks, the challenge for the 21st century will be to integrate new research findings into effective environmental, medical and educational programs. Partnerships will be critical to implementing this broad vision of asthma control. In particular, community-based programs should integrate asthma control activities into existing systems such as schools, child care, youth programs, workplaces, primary health, and job training programs.

The challenge for the 21st century will be to integrate new research findings into effective environmental, medical and educational programs.

3. A commitment to setting measurable and consistent goals for childhood asthma under the Healthy People 2010 program.

Health objectives are now being developed for the year 2010 and represent a significant revision of the goals set for the year 2000. These objectives will set the nation's health agenda for increasing years of healthy life and reducing disparities among the entire American population. Draft objectives currently encompass an expanded set of asthma-related objectives for improved clinical management as well as a series of environmental objectives addressing known asthma triggers such as indoor allergens, secondhand smoke and outdoor air pollution. The goals embodied in the final Healthy People 2010 document will serve as the tools to measure progress towards control of asthma.

4. Investment in evaluation of programs to identify those strategies that are most effective in reducing the burden of asthma so that they may be replicated.

Asthma intervention programs and related activities need to be fully evaluated to determine those techniques which are successful and should be replicated. Evaluation should be incorporated in the planning of all programs and should include:

- identification of desired health outcomes of the program;
- measurement of effectiveness of the intervention activities and processes used to implement them;
- identification of unforeseen obstacles;
- assessment of the cost-effectiveness of the program;
- a prediction of long term sustainability of the program.

RECOMMENDATIONS

I. RESEARCH

Strengthen and accelerate focused research into the environmental factors that cause or worsen childhood asthma.

EXPAND RESEARCH INTO THE ENVIRONMENTAL FACTORS THAT CONTRIBUTE TO THE ONSET OF ASTHMA IN CHILDREN.

Though progress has been made in understanding what causes asthma, there is currently insufficient scientific information to establish specific guidelines and recommendations for public health practices to prevent the onset of asthma in children (i.e. primary prevention).

In order to establish primary prevention guidelines, the top priority for research is to determine the causes of asthma in children and particularly the role of the environment. To understand what causes asthma, research must identify the basic cellular and molecular mechanisms that cause airway inflammation and sensitization and, in particular, the interaction of environmental exposures and genetic susceptibility.³² In addition, clinical and epidemiologic studies are needed to examine the relationship between environmental exposures and the onset of asthma.



Because of promising preliminary work on the relationship of indoor allergens and asthma onset, as well as the much greater proportion of time that children spend indoors, greater emphasis on examining the relationship of indoor exposures to the development of asthma is warranted. Exposures to high levels of allergens in the indoor environment have been shown in some studies to be associated with the subsequent development of asthma.³³ However, few studies have examined the importance, by geography, of particular allergens. In studies evaluating the role of indoor allergens on exacerbations of asthma, different allergens, such as those associated with cockroaches, dust mites, and mold, have been implicated in different cities. This suggests that different allergens can exacerbate asthma, and that different allergens may be capable of inducing the new onset of asthma.

In one study,²⁶ avoiding exposure to dust mite and food allergens early in life was found to reduce the risk of developing asthma in the first year of life. However, this effect was not statistically significant at 2 to 4 years of age. Whether such allergen avoidance strategies are feasible and effective in reducing the development of asthma is not known.

The complex interactions between outdoor air pollutants and allergens and the development of asthma have not been adequately evaluated. Because adult-onset asthma is known to be associated with occupational and home based³⁴ exposures to volatile organic compounds (VOCs), including formaldehyde, ethylene oxide, and isocyanates, further work to assess the possible etiologic role of specific pollutants in childhood asthma is appropriate. VOCs are also known to exacerbate adult asthma.³⁵

EXPAND AND ACCELERATE RESEARCH TO DEVELOP AND EVALUATE ENVIRONMENTAL STRATEGIES THAT WILL IMPROVE THE QUALITY OF LIFE FOR CHILDREN WITH ASTHMA.

It is well established that inhaled allergens, irritants and outdoor pollutants provoke asthma symptoms. Research is needed to identify if other environmental exposures are significant. Further, the relative importance of various exposures is not well understood. Cost effective strategies for reducing exposures are not well developed.

Patient education strategies in certain populations have profound impacts on reducing the frequency and severity of exacerbations and improving the quality of life for children. But many of these programs are not responsive to the cultural, ethnic, and economic diversity of the American population. Innovative strategies are urgently needed for reaching a wide range of children and their families, for tailoring recommendations for reducing environmental exposures to their needs, and for providing support to follow the recommendations.

2. PROGRAMS TO IMPROVE PUBLIC HEALTH

Implement public health programs that improve use of scientific knowledge to prevent and reduce the severity of asthma symptoms by reducing environmental exposures.

PROMOTE CLINICIAN AND PATIENT IMPLEMENTATION OF NATIONAL GUIDELINES FOR REDUCING ENVIRONMENTAL RISKS THAT WORSEN ASTHMA.

Despite uncertainty about the causes of the increase in asthma prevalence rates, much can and should be done to prevent severe illness and death from asthma and improve the quality of life of persons with asthma. Experts convened by the National Asthma Education and Prevention Program (NAEPP) coordinated by the National Institutes of Health (NIH) have reviewed the scientific literature and produced guidelines for managing asthma. These include specific recommendations for controlling environmental factors that contribute to asthma severity.

While there is consensus that NAEPP guidelines define the best diagnosis and management practices for asthma, dissemination of the guidelines must be expanded and adoption improved. Many clinicians do not include advice about environmental control in their patient education. Among families who do receive recommendations, adherence is generally low. Asthma is highly variable, and families need help establishing priorities for environmental control measures that will be suitable for their individual child's asthma and their family circumstances. Effective public health programs can provide this education and support.

For children without access to quality health care, appropriate instruction on the environmental triggers of asthma is impossible or severely limited. Emergency rooms or urgent care facilities may serve as the only source of primary care for such children. These settings should be recruited to provide the kind of education and links to chronic disease management services that are essential to reducing the severity and frequency of asthma attacks.

EXPAND SUPPORT FOR STATE AND LOCAL PUBLIC HEALTH ACTION.

Recent advances in the treatment of asthma and in identifying the environmental triggers of asthma attacks make it possible to control and prevent symptoms at a level unheard of just ten years ago. But these gains have not been realized by many of our children. Public health agencies have a critical role in helping to reduce environmental factors affecting asthma and the human and financial toll of the disease. These programs should include the following components:

- (1) Education and training
- (2) Asthma surveillance
- (3) Coalitions for prevention



REDUCE CHILDREN'S EXPOSURE TO ENVIRONMENTAL TOBACCO SMOKE AND OTHER INDOOR TRIGGERS IN THEIR HOMES.

Secondhand tobacco smoke and indoor allergens are major contributors to the incidence of wheezing in young children and play a significant role in the number and severity of asthma attacks. Reducing smoking in homes with young children will improve the health status of the estimated 2 million children with asthma who are exposed to secondhand smoke. In addition, exposure to allergens such as cockroach, house dust mite, mold, and animal dander causes many attacks of asthma that are preventable.

ESTABLISH SCHOOL BASED ASTHMA PROGRAMS IN EVERY COMMUNITY.

The educational system is a critical component of effective efforts to reduce illness due to asthma in children. Programs will be implemented in schools



to assure a healthy physical environment at the school and to promote improved self-management of asthma through education.

CONTINUE TO REDUCE OUTDOOR AIR POLLUTION

The U.S. EPA set national ambient air quality standards (NAAQS) for six air pollutants in 1971, in part based on evidence of associations between air pollutants such as ozone, particulate matter, and sulfur dioxide and asthma. Since that time substantial new epidemiological evidence has been published supporting the association between levels of ozone and particulate matter and increased hospitalization for respiratory illnesses, such as childhood asthma. In 1997, NAAQS for both ozone and particulate matter were strengthened to improve the protection afforded by these standards and to help reduce the risk of ambient exposures that aggravate asthma in children.

Federal, State, local, and private sector efforts to implement the original NAAQS resulted in substantial improvements in air quality, yet notable problems remain. Following the 1990 Clean Air Act Amendments, efforts were expanded to improve nationwide air quality and reduce related health effects. In conjunction with the strengthening of the ozone and particulate matter NAAQS in 1997, EPA has taken steps to integrate implementation measures for these pollutants and to improve the effectiveness of control programs. EPA has also taken steps to inform the public about air pollution that may affect children.



3. SURVEILLANCE

Establish a coordinated nationwide asthma surveillance system for collecting, analyzing, and disseminating health outcome and risk factor data at the state, regional and local levels.

Current national surveillance permits tracking of asthma prevalence, asthma physician office visits, asthma emergency room visits, asthma hospitalizations and asthma mortality at a national level and in four geographic regions (i.e., Northeast, Midwest, South, and West) through surveys conducted by the National Center for Health Statistics. Surveillance information on asthma, with the exception of mortality data, are not available at the state or local level. This information is needed to identify high risk populations and environmental risk factors of relevance to particular communities and to design and implement interventions that will be most suitable for, and therefore most likely to succeed, in that community. State and local health agencies also need this information to evaluate the impact of local sources of air pollution on childhood asthma in specific communities. A significantly enhanced and expanded surveillance program will be essential to study issues related to race and gender differences in asthma morbidity and mortality

among children, identify gaps in providing comprehensive care, and monitor trends in asthma morbidity and mortality at the community level.

4. DISPROPORTIONATE IMPACTS ON THE POOR AND MINORITIES

Identify the reasons for and eliminate the disproportionate burden of asthma among different racial and ethnic groups and those living in poverty.

Poor and minority children are disproportionately affected by asthma, which has reached epidemic proportions in many American inner cities. Prevalence rates vary only by a few percentage points among different race and ethnic groups, yet emergency room use, hospitalization, and mortality rates vary 3- to 4-fold. Understanding the factors that contribute to the disproportionate impact of asthma on minority and lower income populations is the critical first step to reducing and eventually eliminating the disparities between rich and poor, minority and non-minority children. Such factors may include differing intensities of environmental exposures, such as exposure to cockroach antigen and access to and quality of care, among others.

Poor and minority children are disproportionately affected by asthma, which has reached epidemic proportions in many American inner cities.

IMPROVE ASTHMA MANAGEMENT FOR CHILDREN WITHIN THE MEDICAID PROGRAM.

Disease management combines prevention, intensive attention to treatment and patient compliance, and guidance for self-care. This concept has considerable promise for reducing the frequency and severity of asthma attacks. Integrating an asthma disease management initiative within the fee-for-service component of Medicaid would demonstrate the efficacy of this approach in improving children's health.

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