

# A National Asthma Public Policy Agenda



AMERICAN LUNG ASSOCIATION

# A National Asthma Public Policy Agenda

---

© 2009

American Lung Association  
1301 Pennsylvania Avenue NW • Suite 800  
Washington DC 20004-1725  
Phone 202.785.3355 • LungUSA.org

# Table of Contents

Introduction	1
Objective and Approach	3
Framing the issue	3
The Consensus Process	5
Expert Guidance	5
Literature Search	6
Organization of Existing Policies	6
Online Survey of Participants	7
Consensus Conference	8
Peer Review of Recommended Policies	9
National Asthma Public Policy Agenda	11
Public Health Infrastructure and Surveillance	12
Outdoor Air	17
Health-care Systems and Financing	23
Homes	30
Schools	35
Workplaces	43
Conclusions and Call to Action	48
Appendix A: Project Participants	52
Appendix B: References	56



## Introduction

**A**sthma remains one of the most prevalent lung diseases, afflicting nearly 23 million Americans, including approximately 6.8 million children.<sup>1</sup> In the decade or so since asthma was first recognized as a pressing public health concern, efforts to reduce morbidity and mortality rates have concentrated on the medical care model: Improve therapies; improve disease management; and improve education of patients, health-care providers and others. Communities have mobilized through asthma coalitions to achieve widespread use of these measures with some successes. However, the history of public health demonstrates that to sustain and expand the impact on the health of millions, including those who are most underserved by current medical care systems, requires intervening at the community, institutional and societal levels.

Successful intervention at these broader levels requires tools in addition to those used in the medical care of a disease. These interventions require policy changes, embodied in laws, standards, systems, guidelines or procedures. Just as with the medical interventions, these tools must demonstrate that they can be implemented and can impact the disease. The evidence must show that they work.

Researchers are still struggling to determine how to prevent asthma. So far, the greatest success lies in occupational asthma, where steps to identify, substitute or control workplace agents can prevent the disease. Meanwhile, evidence mounts that changes in public policy can directly reduce the burden of asthma. In just one example, policy changes that reduced outdoor ozone air pollution during the 1996 Olympics in Atlanta, GA, were associated with up to a 42 percent reduction in pediatric asthma events, especially for poor children.<sup>2</sup>

Clearly, changing public policies has the potential to improve the health and quality of life of asthma patients and their families.

Many communities have begun to address the need for asthma-related policy change. For example, 47 states have recently adopted laws or policies permitting children to carry their inhalers in school.<sup>3</sup> But because asthma public policy issues are still relatively young, there has been a lack of consensus among stakeholders on what policies are needed – or what specific provisions or funding should be included to achieve those policies. When RAND Health published *Improving Childhood Asthma Outcomes in the United States* in 2001, it based its recommendations on the judgment of an expert panel, citing a “paucity of evidence on the potential impact of policies in key areas....” For example, while data show 47 states have “inhaler carry” policies, evidence is lacking for us to know which of those policies are effective.

The American Lung Association believed that establishing a national consensus on asthma policies among a wide range of stakeholders is the essential next step. The

The Lung Association sought an evidence-based compendium of measures that can reduce asthma morbidity and mortality.

Lung Association’s interest in developing a public policy agenda for asthma had its genesis in the organization’s experience in tobacco control, where many years of work on public policy change have generated a very clear evidence-based consensus on what interventions are the most effective in reducing smoking prevalence. In particular, the 1999 publication of *Best Practices for Comprehensive Tobacco-Control Programs* by the U.S. Centers for Disease Control and Prevention (CDC) Office of

Smoking or Health gave tobacco-control agencies and advocates a blueprint for policy action, and set a national standard for success.<sup>4</sup> The Lung Association sought to develop a similar consensus for asthma policy, to provide an evidence-based compendium of measures that can achieve the goals of reducing asthma morbidity and mortality.

In 2007, the Lung Association received a contract from the CDC’s National Center for Environmental Health to undertake an initiative to assess the existing evidence for effective asthma policy interventions, convene an interdisciplinary group of asthma experts and build consensus for a comprehensive, actionable national public policy agenda for asthma.

NOTE: Neither the results of this American Lung Association initiative nor the recommendations contained in this report in any way represent an official CDC position. They do, however, represent broad agreement from multi-disciplinary stakeholders interested in reducing asthma morbidity and mortality.

## Objective and Approach

The initiative sought one objective: To develop a public policy agenda to reduce asthma morbidity and mortality that can be embraced and pursued by the American Lung Association and other stakeholder organizations nationwide.

The Lung Association recognized the significant amount of research that had been done by various organizations on targeted aspects of asthma, such as vulnerable populations and specific environmental factors. The approach taken in this new initiative involved reviewing and discussing the body of independent work done to date and reaching consensus among stakeholders on a set of public policy priorities that, if implemented, could have the greatest impact on asthma morbidity and mortality. The Lung Association sought to incorporate the recommendations of previous policy considerations into one document that could both reflect the diversity of the recommendations and unite them into a shared agenda.

The approach used to achieve this initiative included:

- A broad literature search to gather existing policy recommendations addressing asthma;
- An online survey to obtain input on the feasibility and impact of these existing policy recommendations;
- A multi-disciplinary conference of stakeholders to review, discuss and, ultimately, reach consensus on policies that could likely be implemented and would have the greatest impact on the disease; and
- A vetting of the proposed policy agenda by a broad representation of stakeholders, including leaders and experts in the legal, professional association, health-care, government, academic and public health fields, among others.

Tools used to reach consensus at the conference included nominal group processing, brainstorming, facilitated discussion, and small and large group deliberation.

## Framing the Issue

Asthma is a complex, highly prevalent disease that cannot be cured. Appropriate intervention reduces the suffering and death that asthma can inflict, as well as prevent workplace-induced asthma. Currently, 22.9 million Americans have asthma, including 6.8 million children.<sup>5</sup> In 2005, 3,884 people died of asthma, a disease that should not kill anyone.<sup>6</sup> Children with asthma missed 12.8 million school days in 2003.<sup>7</sup> The estimate of the economic impact of asthma in the United States is \$19.7 billion (2007) in direct and indirect costs.<sup>8</sup> Although significant work has been done to address this growing concern, most effort has occurred in the areas of patient and provider education, and improving treatment options. Typically, policy work in asthma has focused on specific populations. Examples include RAND's *Improving Childhood Asthma Outcomes in the U.S.: A Blueprint for Policy Action*<sup>9</sup> and the American College of Chest Physician's *Eliminating Asthma Disparities: A National Workshop*



*To Set a Working Agenda.*<sup>10</sup> Other policy work has focused on specific environments such as indoor and outdoor air pollution, multi-tenant housing and others.

Previous policy work has been instrumental in the adoption of a limited number of effective interventions. However, the American Lung Association believes that a comprehensive approach could have a significantly greater impact and that sufficient evidence-based research now exists to begin to move asthma policy to the next level. Prior to this initiative, no comprehensive literature review had been done to identify policy interventions that could likely be implemented and most effectively reduce asthma morbidity and mortality. Further, cross-disciplinary consensus had not been reached on a national asthma public policy agenda on which regulators and advocates could take action.

# The Consensus Process

## Expert Guidance

**T**he American Lung Association sought advice from a range of experts to develop the plan and identify conferees who could provide expert review and participate in developing the consensus agenda. Six people formed the Planning Committee and met by phone three times to advise the Lung Association staff. Members of the Planning Committee included individuals who had participated in the development of asthma policies and other public policies at the state and national levels. The members of the Planning Committee are noted on the list of participants (see Appendix). The Planning Committee provided advice on the overall process as well as identifying potential conference participants.

Fundamental to the success of this project was the inclusion of a wide range of perspectives and expertise. The Lung Association sought to identify and invite individuals to participate in the conference who had expertise not only in asthma, public health, medicine and health-care systems, but in air quality, policy advocacy, schools, housing and occupational health. Twenty-nine people accepted invitations to attend a consensus-development conference in January 2008. In July 2008, conference participants, as well as those not able to attend the conference, were invited to submit comments as part of the review of the draft document for this report. Ultimately, 37 individuals participated in the review. A complete list of participants and reviewers is included in the Appendix.

Fundamental to the success of this project was the inclusion of a wide range of perspectives and expertise.

## Literature Search

The Lung Association conducted a broad literature search to gather information on existing asthma-related policies. Sources included national and state public health organizations; public and private coalitions; local, state and national government agencies; health-care organizations; professional associations; individual and collaborative research initiatives; and academic institutions.

Highest priority for inclusion went to meta-analyses or reviews published in peer-reviewed journals or comparable documents, such as publications by the CDC, the Institute of Medicine (IOM) or the U. S. Environmental Protection Agency (EPA). Other peer-reviewed research, including workshop proceedings, also was collected. The literature search included evidence of the harm from the sources of asthma morbidity or mortality as well as evidence on the effectiveness of policies to resolve those problems, provide interventions or protect against harmful exposures.

Some policies came from reviews that explored the direct link between a policy and its results on health. Where possible, those were included. However, many reviews had a mixture of direct and extrapolated evidence. For example, direct evidence that housing code enforcement improves asthma control is not found in peer-reviewed literature. However, recent reviews provided abundant evidence that building-related indoor air pollutants are a prime source of asthma triggers in homes. Published analyses of case studies documented the feasibility of using housing codes to reduce those triggers, especially some that could not be addressed without the use of codes. No attempt was made to characterize the status of the quantity or quality of evidence for all the policy statements.

From that search, the Lung Association identified 49 existing “policy statements” based in the recommendations of prior studies and reviews. Policy statements summarized the specific, recommended, policy change and identified, wherever possible, the agent that would make the change (e.g., “All school systems [*the agent*] should adopt and implement an environmental management plan [*the policy change*]”). Deliberately excluded were measures that spelled out medical treatment or individual patient guidance; these policy statements were to be actions that targeted *systems* for change, not individuals.

## Organization of Existing Policies

The Planning Committee organized the existing policy statements into five distinct categories to facilitate discussion. Those categories were:

1. Public health infrastructure and surveillance,
2. Outdoor air pollution,
3. Health-care systems and financing,
4. Homes and
5. Schools and workplaces.

In addition, staff prepared brief background summaries for existing policy statements, touching on current implementation, feasibility, strength of research/historical evidence and impact.

## Online Survey of Participants

Prior to attending the conference, participants were asked to complete an online survey to review the existing policy statements across these five categories and to rate each statement either “high” or “low” based on two measures – impact and feasibility (see Figure 1). Participants were provided an opportunity to submit additional comments on any policy statement or category and to suggest additional policies or policy areas that should be considered but were not on the list. Twenty-four of the 29 participants responded to the online survey.

Data obtained through the online survey were combined and analyzed to ascertain the overall initial perceptions and areas of agreement of the participants around existing policy statements. The survey data were not used to determine priorities, but rather to provide a baseline for initiating discussions on a national asthma public policy agenda.

Each participant received definitions of key terms for the discussion (Figure 1).

**Definitions**

**Policy** – “A definite course or method of action selected (as by a government, institution, group or individual) from among alternatives and in the light of given conditions to guide and usually determine present and future decisions.” (*Merriam-Webster Unabridged Online Dictionary*. 2007.)

**Impact** – The ability of a policy to produce or compel change. *Impact* answers the question “How many people will benefit if this happens?” or “How significant of an impact – in terms of reduced health-care costs, reduced suffering and/or decreased number of deaths – will result from implementing this policy?”

**Feasibility** – The capability of the action to be completed or executed. *Feasibility* answers the questions: “Can this really be done?” “Is it realistically possible to put in place?” For purposes of this exercise, participants were instructed not to consider funding-related assumptions.

Figure 1

## Consensus Conference

In January 2008, the American Lung Association convened a two-day conference of 29 policy leaders and asthma experts:

- To review the evidence from existing policy work on asthma and
- To identify a set of policies to recommend as a national asthma public policy agenda.

The primary objective of the consensus conference was to develop a list of critical policy statements. To ensure a shared understanding of that objective, the attendees began by reviewing the “Challenge Statement” shown in Figure 2.

### Challenge Statement

Identify the most critical policy statements (i.e., those that are supportable and could result in evidence-based impact) that, if implemented at the local, state and federal levels, would measurably impact and/or reduce suffering and death from asthma.

Figure 2

These policy statements would form the basis of a national asthma public policy agenda. If time permitted, a secondary outcome of the conference was to solicit suggestions on implementation and potential impact of specific public policy recommendations. As it turned out, there was little time available for the secondary discussion, although some occurred.

### Review of Background Information and Survey Results

At the conference, participants were given an opportunity to review the background information on existing policy statements and the survey results. Questions and areas needing clarification were addressed through facilitated discussion. During their review, participants individually noted key existing policy statements and areas for potential new policy statements they felt should be included in the public policy agenda.

Through facilitated discussion, policy statements put forth in the survey were broadened and/or combined for clarification and succinctness. Some policy statements became strategies under a broader policy recommendation. A few that were deemed of limited feasibility and/or impact were eliminated.

## Reaching Consensus on Policy Statements

The group followed a systematic process (Figure 3) to review and reach consensus on specific, actionable policy recommendations for each of the five initial categories.

The group also agreed to define *consensus* as “an individual may not agree with the decision of the majority completely, but can live with it and will support it when the conference ends.”

### Consensus Development Process

- Review and discuss proposed policy statements [facilitated discussion]
- Identify potential new policy statements [brainstorming]
- Discuss, modify and/or combine statements for clarity and conciseness [facilitated discussion]; and
- Evaluate and reach consensus on policy statements to move forward [individual voting, vote tallying, facilitated discussion].

Figure 3

During the review, the participants determined that certain “Guiding Principles” should be included with the policy recommendations. These were underlying concepts or values the participants recommended as core components for the policies, principles that provided additional context and guidance for future implementation.

## Recommendations on Policy Implementation

After revising the list of policy statements, the group moved to suggest steps to implement those policies. Participants divided into small groups, each focused on a specific policy category. The charge to each group was to determine how each policy recommendation could be implemented by addressing the following questions:

- Which public segment(s) would need to implement the policy?
- What would likely change if the policy were implemented?
- Who would need to drive the implementation?
- Where there other considerations to recognize?

Given the available time, this exercise served primarily as a feasibility check, to ensure that identified policy statements were clear and specific enough to be actionable.

## Peer Review of Recommended Policies

Following the conference, the policy recommendations and data on implementation and impact were shaped and refined further into a proposed National Asthma Public Policy Agenda. Based on the recommendations obtained at the conference, policy recommendations for schools were separated from those relating to workplaces, resulting in six rather than five policy categories. The proposed National Asthma Public Policy Agenda was distributed to conference participants for review and

feedback. Substantive comments, around which there was some consensus or supportive evidence in the literature, were incorporated into the policy agenda.

The proposed National Asthma Public Policy Agenda was then shared with additional experts and leaders who had not participated in the conference but whose work touches on the prevention, treatment and/or regulation of asthma and its interventions. Again, this step was incorporated to ensure broad deliberation and consensus across disciplines and among stakeholders. Overall, external reviewers corroborated the work of the conference and provided additional information for inclusion in the supporting text.

## National Asthma Public Policy Agenda

The consensus process resulted in 19 public policy recommendations grouped in the six major categories. The six categories came from the five original ones with workplaces split from schools to provide more specific attention to that arena. The policies are listed by category in tables each section. Possible implementation strategies identified in the process are included in the tables.

Each policy category begins with a list of “Guiding Principles.” The participants at the January 2008 conference felt strongly that such over-arching statements were needed for each area. For the most part, these statements are as

### Public Policy Categories

- Public Health Infrastructure and Surveillance
- Outdoor Air
- Health Care Systems and Financing
- Homes
- Schools
- Workplaces

they were developed at that meeting. A very brief discussion derived from the current literature is included for each policy category. That summary includes an overview of the importance of the category, feasibility of implementation of policy recommendations, strength of existing research, and evidence-based or anticipated impact of interventions. These summaries are not intended as a comprehensive review of the issue but provide context for including policies within the category in the National Asthma Public Policy Agenda.



# Public Health Infrastructure and Surveillance

## Guiding Principles

A strong public health infrastructure is essential to ensure adequate capacity and training for community-based asthma strategies. An adequate public health infrastructure should:

- Recognize that asthma is both a chronic and an environmental disease;
- Enable the identification and surveillance of trends over long periods of time;
- Provide funding for specific asthma services that fall outside the insurance system;
- Coordinate with the health-care financing and provision sector;
- Address disparities and identify cross-cutting risk factors and interventions;
- Leverage impact among common interventions by combining funding across typical categories;
- Address asthma management in homes, workplaces, schools and childcare facilities; and
- Address asthma management in underserved and at-risk populations.

## Overview

In each state, multiple groups, agencies and individuals are tackling asthma. Their expertise and interests range widely from pediatricians and pulmonologists to school administrators, health departments, air pollution agencies and nonprofit organizations. Although all of these entities work to reduce the burden of asthma, too often their efforts are uncoordinated, leading to missed opportunities and scattered resources. To better coordinate these separate endeavors, CDC provides funds 31 states, Puerto Rico and the District of Columbia to work with their partners to develop state asthma plans. As

**State asthma plans, programs and surveillance are the core public health components of a state infrastructure for asthma.**

defined by the CDC, state asthma plans involve the commitment of multiple partners who provide resources and carry out activities to achieve desired objectives.<sup>11</sup> Through the development and implementation of a state's asthma plan, governmental, medical, public health, business and nonprofit partners can coordinate their work while identifying gaps and developing priorities for future work.

In its *Guide for State Health Agencies in the Development of Asthma Programs* issued in December 2003, the CDC distinguished state *programs* for asthma from state *plans* for asthma. State asthma programs are vehicles for implementing state plans; specifically, the guide describes these programs as “proven components” that CDC

## A NATIONAL ASTHMA PUBLIC POLICY AGENDA

asthma grantees have used to implement their asthma plans. For FY 2008, Congress appropriated \$31.34 million for the CDC's National Asthma Control Program, representing a continual decline in real spending from the program's peak of \$36.9 million in FY 2003. The most current summary report shows that in FY 2006 the National Asthma Control Program funded grantees in 33 states, the District of Columbia and Puerto Rico, as well as three national organizations and others.

According to the CDC, asthma surveillance is the "ongoing, systematic collection, analysis, interpretation and dissemination of data" about asthma "for use in public health action to reduce morbidity and mortality and to improve health." Surveillance data establish the basis for public health planning, evaluation and response.<sup>12</sup>

There are currently two major data surveys for asthma surveillance -- the National Health Interview Survey (NHIS) and the Behavioral Risk Factor Surveillance Survey (BRFSS). The BRFSS provides asthma prevalence data for every state. In addition, the Asthma Call-Back Survey, now implemented in 35 states as part of the BRFSS, provides data on children. A number of national-level data sources supplement these core elements, including National Vital Statistics for deaths, National Ambulatory Medical Care survey for physician office visits, National Hospital Ambulatory Care survey for hospital outpatient and emergency department visits, and National Hospital Discharge Survey for hospitalizations. However, all of these data collection mechanisms have serious limitations due to their limited scopes and lack of valid data relating to specific populations. Although there is strong support in the literature for a national asthma surveillance system, a nationwide system has not yet been established.

**A nationwide asthma surveillance system has not yet been established.**

In 2001, the BRFSS began using the first national uniform definition of asthma, with questions based on the definition recommended by the Council of State and Territorial Epidemiologists. However, although it collects data annually from all states, the District of Columbia and three territories, it cannot be considered a comprehensive national system because it does not cover the entire population, in particular omitting children.<sup>13</sup>

In 2000, the Pew Environmental Health Commission called for a coordinated, national system to track asthma. In 2001, the Trust for America's Health (TFAH)<sup>14</sup> and the RAND Report<sup>15</sup> called on the CDC to work in collaboration with the states to identify national standards for asthma surveillance and for funding to carry out these activities. The Trust for America's Health report in particular noted the gaps in state-specific information, a problem that grows with smaller political subdivisions.<sup>16</sup>

In a 2005 publication, *CDC's Strategy for the National Environmental Health Tracking Program*, the CDC cited the "urgent need" for "tracking data," a term used as a synonym for "public health surveillance."<sup>17</sup> As the CDC noted, the public health infrastructure currently focuses primarily on infectious diseases. The report listed the standard asthma surveillance tools and noted that this system has led to "a patchwork of health effect measures" and concluded that "reliance on these data demonstrates the need for standardization for most disease surveillance."<sup>18</sup> The CDC *Strategy* envisions

a “more comprehensive, national approach to the collection and analysis of noninfectious disease data.”<sup>19</sup>

Optimally, a national surveillance system could provide data that are comparable and comprehensive. National data should enable comparisons between all states and between smaller political or geographic subdivisions (such as counties, zip codes or census tracts). Comprehensive surveillance systems would allow not only nationwide coverage but provide data that allow the full range of public health, medical, policy and research functions. The CDC provided such a list of uses for these data in its *Strategy* report<sup>20</sup>:

- Quantify the magnitude of a problem,
- Detect unusual trends and occurrences,
- Document the distribution and spread of a hazard or health event and identify populations at risk,
- Plan and evaluate protective and preventive measures,
- Facilitate research,
- Develop information that can inform clinical care providers and stimulate individual-health action and
- Detect changes in health practice.

Although many of these objectives are possible using surveillance tools already available on a broad, national scale, they are seriously limited by the need for more localized, comprehensive data, as well as data for occupational asthma, school asthma or other broadly recognized arena of concern.

## Policy Recommendations

### Public Health Infrastructure & Surveillance Policy Agenda

- Every state should have an adopted and adequately funded comprehensive state plan to reduce asthma morbidity and mortality.
- Every state should have an adequately funded statewide asthma program.

*Strategies:*

- *CDC should provide estimates, by state, of what would constitute adequate funding.*

- The United States should institute a comprehensive, nationwide asthma surveillance system.

*Strategies:*

- *The surveillance system should track asthma incidence, prevalence, morbidity and mortality, and coordinate with other disease tracking efforts.*
- *The surveillance system should collect and report nationally consistent data on health-care access and use (not just hospital discharge data) by patients' race, ethnicity, occupation, socioeconomic status and primary language.*

## Feasibility

Funding is a critical factor in ensuring that every state has a comprehensive state asthma plan in place. In addition, partnerships are essential for plan development, coordination and implementation. CDC has funded development of state plans using portions of annual appropriations for National Asthma Control Programs. The American Lung Association and others have recommended to Congress that funding for these activities be increased from \$31.48 million to at least \$70 million annually.

The 2001 RAND Report<sup>21</sup> recommended that the CDC – in collaboration with state agencies, providers and payers – establish and refine national standards for asthma surveillance. The report recommended the appropriation of federal and state matching funds to create and operate state and local surveillance units, using existing systems as a possible beginning for expanded ones. In the 2001, Trust for America's Health<sup>22</sup> recommended three steps: 1) Establish demonstration projects funded by the CDC to develop the national health tracking network to monitor these data, 2) provide a chronic disease investigator in every state and 3) fund tracking networks in all states that would follow baseline standards for collecting consistent data.

CDC has developed a plan that would establish a network for tracking asthma and other chronic disease data by the end of FY 2010. In its vision of that system, CDC states that the system would be compliant with the Health Insurance Portability and Accountability Act or HIPAA, and with the architecture and data/messaging standards of the Public Health Information Network, as well as other applicable laws.<sup>23</sup> The specifics of the data to be collected are not outlined in the published materials.

## Evidence of Effectiveness

Some evidence supports the value of involving community partners in planning for asthma activities, stemming largely from the work of the Allies Against Asthma and other coalitions that have involved smaller geographic areas. Friedman, et al. 2006 and Peterson, et al. 2006 both reported on the need for community participation for

planning as well as implementing asthma plans.<sup>24</sup> The Asthma in Michigan (AIM) coalitions published *Asthma in Michigan: A Blueprint for Action* in 2000, listing 24 recommendations for achieving its state plan. When AIM updated the plan in 2005, it summarized a wide range of accomplishments from the previous plan, including funding and staffing for a statewide program, a state surveillance system and expansion of local coalitions.<sup>25</sup>

CDC recognized the surveillance of diseases as an Essential Public Health Service in its National Public Health Performance Standards Program.<sup>26</sup> In a *Journal of Asthma* article, Boss, et al. 2001 cited specific data that could be found in a nationwide surveillance system, including: prevalence of asthma in the general population (age, sex, race, lifetime and/or current prevalence); prevalence of asthma in selected schools; incidence of asthma episodes; number of asthma deaths by age, sex and race; and frequency and duration of hospitalization.<sup>27</sup>

## Potential Impact

States and coalitions have found success by involving their partners in developing asthma plans and seeking their help in executing those plans. The AIM update provides an example of how a state's asthma program can be successfully expanded and improved through local partnerships. With 31 or more state plans in place, the opportunity now exists to expand programs and improve outreach and systems in those states. Additional funding can make it possible for all 50 states, Puerto Rico and the District of Columbia to develop plans and enable states with existing structures to expand their work.

The impact of surveillance may be easier to see in examining the limitations of the current data systems. Both the RAND and TFAH reports describe many limitations that could be addressed by improved national surveillance. For example, only mortality data are reported at the state, county, city and census tract levels, making it much harder for health authorities to develop adequate strategies to prevent, treat or manage asthma. Lack of consistent data across governmental lines makes it impossible to adequately assess differences among counties or cities. Even more critical is the lack of statistical power to address the burden of asthma among ethnic groups, such as Hispanic subgroups and American Indians.

## Outdoor Air

### Guiding Principles

The following principles should be considered in implementing asthma policy recommendations relating to outdoor air:

- Protection from breathing outdoor air pollution should exist for people with asthma throughout the country.
- Measures to clean up outdoor air pollution should include energy efficiency and conservation.
- Many people face higher exposure to pollution because of pollution sources located near their residence or community. Stronger and/or targeted measures will be needed to reduce their exposure.

### Overview

For decades, researchers studying outdoor air pollutants have reported asthma exacerbations as one of the most frequently identified health effects. Through the Clean Air Act, Congress established a system to force a reduction in outdoor air pollution based on established national ambient air quality standards. Congress required that these standards be set at levels that would protect public health “with an adequate margin of safety,” and provided for five-year review cycles to ensure that the standards reflect the current scientific understanding of the harm from these pollutants.

The EPA sets the national standards for six outdoor air pollutants: ozone, particulate matter, sulfur dioxide, nitrogen oxide, lead and carbon monoxide. Widespread monitoring of pollution levels and emission sources identifies areas that suffer from unhealthy levels of these pollutants. States and local governments are required to meet these standards by reducing emissions on state, regional and local sources. Such action may range from requiring large local factories to install new equipment to providing incentives for people to drive less. In addition, federal regulations force reductions in pollution from industry, utilities and transportation sources to push pollution levels into compliance with the adopted standards.

Even with these standards in place, millions of people still live in U.S. communities that have poor air quality. For example, roughly 132 million people live in 293 counties that the EPA officially recognizes as failing to meet its 1997 national standards for ozone.<sup>28</sup> Many communities face higher exposure to outdoor air pollution because of their proximity to pollution sources, such as coal-fired power plants and high-traffic areas for diesel-fueled vehicles such as trucks and buses. Wind and air currents blow pollution across state and international boundaries so that many communities suffer from the additional burden of transported pollution.

Heavily trafficked freeway routes may place asthma sufferers and children at greater risk.

Heavily trafficked freeway routes may place asthma sufferers and children at greater risk. One study found that children who lived closer to freeways were 89 percent more likely to have a history of asthma than children who lived further away.<sup>29</sup> Environmental justice requires stronger and/or targeted measures in those communities to reduce exposure equitably. Although states are required to take steps to meet the air quality standards, they have been given varying amounts of time to do so, based on the severity of the pollution.

A nationwide network of monitoring devices is the backbone of air quality measurement and enforcement. Currently, only 800 to 900 out of 3,066 U.S. counties have monitors established by state or federal regulation. Data from the monitors are quality reviewed and posted to the EPA Air Quality System database.<sup>30</sup> The number and placement of monitors have become a politically charged issue. Some communities resist having monitors out of concern that local businesses will have to take steps to reduce emissions that could put them at an economic disadvantage compared to neighboring communities. Budget reductions also are forcing hard decisions about the scope of the monitoring network. Absent adequate funding, monitoring of widespread and dangerous air pollutants will decline.

One major source of emissions throughout the nation is diesel exhaust. In 2000, the EPA adopted regulations requiring that diesel fuel and new diesel trucks and buses be cleaner beginning in 2006. The post-2006 fuel emits 95 percent less sulfur dioxide. Beginning with model year 2007, new heavy-duty trucks, buses and construction equipment (tractors, bulldozers, etc.) also became much less polluting. However, the existing, dirtier diesel fleet of heavy trucks, buses and equipment still has hundreds of thousands of miles to run before the fleet turns over. Many of these existing “dirty diesel” vehicles, such as school buses and garbage trucks, are owned or contracted by governments.

Among the biggest industrial polluters, especially in the eastern half of the United States, are old, coal-fired power plants. The toll of premature death, disease and environmental harm caused by coal-fired power plant pollution continues to mount.

Research estimates over 550,000 asthma attacks are caused annually by power plant pollution.

An analysis released in 2004 attributed 24,000 premature deaths *each year* to power plant pollution. In addition, the research estimates over 550,000 asthma attacks, 38,000 heart attacks and 12,000 hospital admissions are caused annually by power plant pollution.<sup>31</sup> Regulations put in place in the 1990s have required some plants to install equipment to reduce emissions. However, many plants have complied with regulations through emissions

“trading” or purchasing the right to pollute – called “credits” – from other plants that have cleaned up more than was required. The EPA instituted emissions trading to encourage reductions of regional pollutants for its Acid Rain program. However, trading results in some plants continuing to emit larger quantities of pollution at the local level than would have been allowed if they had not purchased the regional pollution credits.

## A NATIONAL ASTHMA PUBLIC POLICY AGENDA

In 2005, the EPA issued regulations, called the Clean Air Interstate Rule or CAIR, for reducing emissions from coal-fired power plants that would have made significant cuts in sulfur dioxide and nitrogen oxide emissions, although allowing utilities until 2020 to implement all measures and permitting emissions to remain much higher than necessary to meet the air quality standards for ozone and small particulate matter. Several states and electric utilities challenged the rule in court and, in July 2008, the U.S. District Court of Appeals for the District of Columbia vacated the rule. The EPA is currently considering its options. In the interim, electric utilities are expected to install only the equipment that was scheduled for 2008, pending future regulatory or legislative action.

Other emissions sources contribute to unhealthful levels of air pollution in specific areas. Included are agricultural practices such as field burning, wood smoke and outdoor hydronic heaters, also called outdoor wood boilers.

### Policy Recommendations

#### Outdoor Air Policy Agenda

- The U.S. EPA should adopt the most health protective national ambient air quality standards in accordance with Clean Air Act requirements.
- Every county in every state should attain the national ambient air quality standards as expeditiously as possible.
- Monitoring of air pollutants should cover all populations at risk and sources of concern, in every state.  
*Strategies:*
  - *Expand the nationwide ambient air quality monitoring system.*
  - *Increase monitoring of air quality from traffic-generated and point-source (hot spot) sources.*
  - *Ensure exposures in at-risk populations are measured and addressed.*
- Federal, state and local measures to reduce emissions of outdoor air pollutants should be expanded, especially in communities with the highest exposure.  
*Strategies:*
  - *Reduce diesel emissions from on-road and non-road sources, including school buses and home heating oil.*
  - *Reduce emissions of pollutants from coal-fired power plants, especially sulfur dioxide and nitrogen oxide emissions.*
  - *Ban or restrict outdoor wood boilers (outdoor hydronic heaters)*



*and require cleanup of existing units.*

- *Reduce agricultural sources of emissions, such as agricultural burning.*
- *Reduce emissions from motor vehicles and transportation sources by:*
  - *Adopting policies that reduce the use of motor vehicles, promote more compact and walkable community development, and encourage transit use, bicycling and walking; and*
  - *Adopting or expanding mass transit systems that reduce emissions from motor vehicles.*
- *Eliminate emissions trading for all air pollutants and require facility-specific reductions in emissions.*
- *Reduce broadcast applications of toxic pesticides.*

## Feasibility

A complex implementation system exists to monitor and regulate air quality standards. Funding and resources continue to be needed for a) setting new standards, as continued research exposes additional risk; b) monitoring pollution levels; and c) implementing measures to reduce, prevent and monitor pollutants. Research into new technologies and approaches to clean up pollution sources continues and is often driven by requirements for tighter standards. Many pollutant reduction measures are being implemented by individual states and even organizations such as school systems. Proactive measures such as energy efficiency and conservation provide even more opportunities for improving air quality.

Some communities have taken steps to reduce emissions from transportation and goods movement. Some revise their city plans and development agendas to discourage driving and promote walking. Others have expanded transit and ridesharing opportunities. Reducing diesel emissions is also a priority in many communities. In addition to speeding up replacements with cleaner vehicles and equipment, the technology currently exists to “retrofit” older vehicles to reduce the pollution they produce by adding sophisticated filtration systems. Many localities have adopted policies that prohibit or limit idling, especially near schools.

Other measures effective for reducing specific emissions include prohibiting burning as waste disposal or for polluting agricultural processes. Some states are moving to regulate outdoor hydronic heaters<sup>32</sup>. The EPA has adopted voluntary guidelines for manufacturers to reduce emissions from outdoor hydronic heaters, but representative from states in the Northeast and West have asked EPA to begin to develop regulatory guidelines.<sup>33</sup>

## Evidence of Effectiveness

As part of its requirements under the Clean Air Act, the EPA has conducted extensive reviews of the scientific evidence on the health effects of six of the historically most widespread outdoor air pollutants. These reviews have repeatedly documented the impact of air pollution on asthma exacerbations, resulting in increased physician visits, increased medication use and decreased peak-flow measurements. There is strong evidence, particularly for ozone and particulate matter, linking reduced levels of pollutants to reduced harm to individuals with asthma.<sup>34</sup>

Cleaning up power plants has proven to reduce ozone and particulate air pollution. Reductions required under the Acid Rain program, beginning in 1995, and the “NOx SIP Call,” beginning in 1998,<sup>35</sup> greatly reduced the tons of nitrogen oxides emitted by power plants and industries. EPA examined ozone levels through 2006 in a study that controlled for weather, which can influence the formation of pollution. EPA found that between 1997 and 2006, ozone levels dropped seven percent, which it attributed in large part to the reductions from measures required under the NOx SIP Call that were put in place during that period.<sup>36</sup> The importance of the controls on power plants is reflected in the location of the largest declines in ozone. In the eastern United States where controls are in place, ozone levels dropped on average 10 percent, while dropping only 1 percent on average in the rest of the country.<sup>37</sup>

Other studies have shown the link between diesel emissions, emissions from coal-fired power plants and other outdoor air pollution sources to well-established triggers for asthma exacerbation, including fine particulates, nitrogen oxides and volatile organic compounds. Proximity to high-traffic areas increases the risk of asthma triggers and is especially harmful to children residing near major highways and in urban areas, as well as those exposed to school bus exhaust.

## Potential Impact

According to EPA calculations, health benefits from reduced pollutants between 1970 and 1990 included:

- Prevention of 200,000 premature deaths,
- Reduction of annual hospital admissions from air pollution-induced respiratory causes by 89,000,
- Reduction of air pollution-induced asthma attacks by 850,000 incidents each year and
- Avoidance of many other adverse health and environmental effects.

In monetary terms, the reductions saved more than \$22 trillion.<sup>38</sup> The American Lung Association and many other groups have called for at least 50 percent reductions in sulfur dioxide emissions and nitrogen oxide emissions from power plants by 2020. This action would reduce annual air pollution-induced asthma emergency room visits by over 15,000 annually by 2020. Premature deaths from power plant pollution would fall by more than 16,000 deaths each year by 2020.<sup>39</sup>

In March 2008, the EPA adopted new, tighter standards for ozone. Measures to reduce ozone resulting from the new standards will go into effect starting in 2013. The EPA projects that having these standards in place will reduce annual emergency department visits for asthma by 1,200 and school absences by 610,000 in 2020.<sup>40</sup>

The White House Office of Management and Budget places the net costs to society for the implementation of air pollution rules from 1996 to 2006 at \$19 million to \$22 million.<sup>41</sup> The benefits of these same measures are calculated at \$59 million to \$411 million, based in large part on value of lives saved by reducing deaths from cardiovascular disease, although the cost estimates do include savings from reductions in asthma morbidity.

# Health-care Systems and Financing

## Guiding Principles

The following principles should be considered in implementing asthma policy recommendations relating to health-care systems and financing:

- The health-care system alone cannot fully address the burden of asthma on patients, families and communities. It needs to be viewed in the context of a broader public health approach.
- Access to quality care should be available and affordable for patients, families and the health care system.
- All health-care systems should collect standardized, self-reported race and ethnicity data to better enable efforts to recognize and address health disparities.
- Health-care delivery should provide culturally competent patient- and family-centered care.

## Overview

Many children and adults with asthma do not receive the health care needed to adequately control their disease. The Institute of Medicine (IOM), in its *Crossing the Quality Chasm* report, defined the optimal health-care system as one in which care is safe, effective, patient-centered, efficient, timely and equitable.<sup>42</sup> What constitutes quality health care for asthma is well established, and clinical practice guidelines from the National Asthma Education and Prevention Program (NAEPP) have been around for nearly two decades. The recently released NAEPP *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma* (NAEPP EPR-3) clearly provides an evidence-based treatment regimen.<sup>43</sup> However, there continues to be a gap between what is known to be best practice and what is actually being covered by insurers, required by purchasers and implemented by providers. The reasons for this gap are complex, with multiple possible approaches to the solution. Broadly speaking, the problems can be categorized as issues of either *access* or *quality*.

The Institute of Medicine defined the optimal health-care system as one in which care is safe, effective, patient-centered, efficient, timely and equitable.

According to the NAEPP Guidelines, the four components of good asthma management are: 1) assessment and monitoring, 2) patient education, 3) environmental control and 4) medication. Access to all four of these components within health-care services is of paramount importance to patients with asthma and is essential to optimal disease management. Asthma is not a "one-size-fits-all" disease. Not all medicines are effective for all patients; some patients require more intensive services than others.

Unfortunately, in this era of managed care and cost-containment initiatives, concern has been growing that the rules and policies used by payers to deliver “efficient and cost-effective care” have reduced access to the treatment, services and medications proven to reduce the burden of disease and improve quality of life.

Problems in standard asthma care include restrictive formularies and burdensome co-pays, as well as lack of access to specialists and case-management services. Self-

Self-management education and support is on the "must have" list for patient-centered asthma-related quality-improvement initiatives.

management education and support is on the "must have" list for patient-centered asthma-related quality-improvement initiatives.<sup>44</sup> Yet, even though self-management education is called for in multiple clinical practice guidelines, health-care providers report that given the limited time they have with their asthma patients, they do not feel it is a top priority. Providers who

are willing to deliver asthma education are often discouraged by the difficulty in getting reimbursed.<sup>45</sup>

The *Crossing the Quality Chasm* report estimated that 40 percent of the health-care dollars spent in the United States is wasted on system inefficiencies. Since that report was published in 2001, a number of foundations, government agencies and health plans have developed and tested innovative approaches to improve the quality of health care, including asthma management. Key components of these emerging models that have shown promising results include: Standardized performance measures; coordination of care, including data sharing; and financial incentives for delivery of evidence-based care.

The backbone of improving quality is measuring performance. Since the 1990s, performance of managed-care health plans has been assessed against measures updated and used by the National Committee for Quality Assurance (NCQA). The NCQA’s Health-care Effectiveness Data and Information Set (HEDIS) is a well-established tool for measuring health plan performance on dimensions of care and service for a range of health conditions. The assessment of individual practitioners has less of a track record than assessment of hospitals and health plans. However, according to the NCQA, provider-level measures are being introduced and adopted at an accelerating pace.<sup>46</sup>

Managed-care organizations have practiced care coordination for some time. But there is no standard definition of the term and practices vary widely. In June 2007, the Agency for Healthcare Research and Quality (AHRQ) published an evidence review of care coordination programs. It identified over 40 definitions of care coordination, which were synthesized into the following:

*Care coordination is the deliberate organization of patient care activities between two or more participants (including the patient) involved in a patient’s care to facilitate the appropriate delivery of health-care services. Organizing care involves the marshalling of personnel and other resources*

*needed to carry out all required patient care activities, and is often managed by the exchange of information among participants responsible for different aspects of care.*<sup>47</sup>

Information technology should be inextricably linked to coordination of care. All providers interacting with a patient need to have a platform for exchanging patient information. A great deal of attention has been paid in recent years to the concept of the electronic health record, but it is still far from reality in practice in the United States, especially in a form that is shareable. There are many competing, incompatible software products in the marketplace. The Veterans Administration health system has been a leader in the use of information technology, and has made its software available publicly for adoption by other hospitals and health-care networks.

Despite mixed past experience, most experts believe that a well-designed incentive program for providers can improve care. In a recent review, the Institute of Medicine found that incentive programs can result in rapid, feasible performance improvement, support for innovative change and promotion of better outcomes of care.<sup>48</sup> Many private and public health plans now have pay-for-performance programs in place. A 2005 study found that just over one-quarter of primary care physicians are in group practices that include quality-based incentives in the compensation arrangements. While the number appears to be growing, there is no systematic tracking effort and evidence of effectiveness remains limited.<sup>49</sup>

## Policy Recommendations

### Health-Care Systems & Financing Policy Agenda

- All health-care systems, including public and private providers, purchasers and payers, should provide access to services and medications consistent with NAEPP guidelines.

#### *Strategies:*

- *Provide self-management education using evidence-based interventions by trained health professionals as a standard of care.*
- *Develop and use asthma action plans for all patients.*
- *Ensure that pharmacy formularies include a full range of medication options for quick-relief and long-term control of asthma.*
- *Provide case management, including home-based environmental assessment and remediation, for high-risk patients and those whose asthma is not under good control.*
- *Provide tobacco dependence treatment and pharmacological therapy to smokers who have asthma or who have family members with asthma.*

- Standardized national performance measures should be adopted for monitoring and evaluating asthma quality of care.

*Strategies:*

- *Revise/expand/develop HEDIS and other national measures aligned with national standards to better measure performance.*
- *Ensure consistency and alignment of process and outcomes measures across all levels of the health-care system.*

- Promote quality improvement activities and develop and disseminate tools that support achievement of performance goals.

*Strategies:*

- *Facilitate the use of health-care system data for surveillance of asthma care.*
- *Require comprehensive reporting of health-care system data.*
- *Ensure competency and collaboration of health-care workers across settings of care.*
- *Provide well-designed incentive programs for the delivery of evidence-based care.*

## Feasibility

Conventional wisdom holds that providing optimal care to patients with chronic conditions like asthma would carry an enormous price tag. Products and services authorized by insurers would need to be based on treatments recommended by clinical practice guidelines rather than cost. However, there are health-care systems that are successfully implementing a wide range of improvements in a cost-effective manner. In 2006, the Center for Health Care Strategies published *Improving Asthma Care for Children: Best Practices in Medicaid Managed Care*, a compilation of successful strategies adopted by Medicaid health plans around the country. Notably, many of these success stories involved collaboration among "competing" health plans, along with the close involvement of state agencies, providers and advocacy organizations.<sup>50</sup>

Unfortunately, these success stories come for the most part from experimental or small-scale pilot programs. According to a June 2008 report from the Center for Studying Health System Change, existing payment systems, primarily fee-for-service, are a major barrier to delivery of appropriate care for patients with chronic conditions. Broad payment reform efforts have been virtually nonexistent.<sup>51</sup> Until proven-effective interventions like self-management education, home-based environmental assessment and case management are fully reimbursable; their integration into the core of health-care delivery will continue to be delayed.

One of the ways that health-care purchasers and payers can drive quality improvement is to set standards of care and performance that participating providers must meet. Some states already have developed and are using performance measures, usually in collaboration with a network of public and private health plans and providers.<sup>52</sup> As

calls for performance measurement have increased and measures have proliferated from a variety of sources, the National Quality Forum, a public/private sector collaboration, has taken on the task of developing consensus on and recommending adoption of proposed measures. Its aim is to bring consistency and uniformity to quality measures. In September 2007, U.S. Department of Health and Human Services Secretary Leavitt announced a plan to use Medicare data to generate physician quality performance measurement results available at the community level in an effort to create a comprehensive, unified and effective approach to physician quality measurement.<sup>53</sup>

Care coordination programs that are modest in scope, focus only on the highest users of health care and limit the shareability of patient records are entirely feasible. They have been put in place in a number of state Medicaid programs. Moving beyond these limited programs to more standardized models creates many challenges. The biggest hurdle is the lack of agreement about what care coordination means and what it should encompass. Roles need to be carefully delineated and lines of accountability made clear. Confidentiality requirements are a problem, especially when the care network includes community-based services. Existing electronic health records are not set up to incorporate population-based care.

Moving beyond these limited programs to more standardized models creates many challenges.

Pay-for-performance initiatives are well underway in many systems. A 2006 survey reports that 28 states have adopted some type of pay-for-performance initiative in their Medicaid program.<sup>54</sup> Widespread adoption of financial incentives for provider performance requires agreed-upon measures, and a way to track and report on structural and process changes. The slow pace of adoption of electronic health records in the United States could be a significant barrier to tracking measures of quality. Thus, both pay-for-performance and adoption of electronic health records may need to be addressed at the same time. The Robert Wood Johnson Synthesis Project report recommends that the Centers for Medicare and Medicare Services (CMS) and other payers establish pay-for-performance demonstration projects that systematically vary the design features of the programs, which could provide direction on the type of measures used and the optimum nature and size of rewards.

## Evidence of Effectiveness

The NAEPP EPR-3 Guidelines rank recommendations according to the level of supporting evidence found in the scientific literature. Evidence Category A is the gold standard, supported by a rich body of data from numerous randomized controlled trials. Evidence Category B is also from randomized controlled trials, but with a more limited body of data. There are also Categories C and D, which are supported by weaker evidence. Strong evidence of effectiveness exists for all of the core components of asthma management detailed in the policy recommendations offered by this American Lung Association report.



According to the NAEPP guidelines, “Asthma self-management education is essential to providing patients with the skills necessary to control asthma and improve outcomes.” This statement is backed up by a large number of formal research studies and is ranked as Evidence Category A. Evidence suggests that education delivered in clinical settings has the highest efficacy, but provision of services in pharmacies, emergency departments and schools also is recommended. Case management by trained health professionals for patients who have poorly controlled asthma and have recurrent visits to the emergency department or hospital is ranked as Evidence Category B.

At least for health plans, measuring and reporting on performance has been demonstrated to improve the quality of care. Currently, there is only one HEDIS measure for asthma – the appropriate prescription of controller medication for patients age five and older with persistent asthma. According to *The State of Health-Care Quality 2007* report published by NCQA, the percentage of enrolled members who were prescribed the appropriate medications increased steadily from 1998 to 2006, and is now at 91.6 percent for commercial health plans and 87.1 percent for Medicaid.<sup>55</sup>

At least for health plans, measuring and reporting on performance has been demonstrated to improve the quality of care.

The AHRQ analysis of care coordination found a positive effect on health outcomes studied regardless of clinical topic although, as stated above, the care coordination approaches studied represented a wide range of practices. A concurrent review of children with special health-care needs found that the results for patients with asthma were not sufficient to draw firm conclusions.<sup>56</sup> There is also little evidence to date on the effectiveness of electronic health records as reported by the IOM in its 2004 *Crossing the Quality Chasm* report.<sup>57</sup>

Evidence on the effectiveness of incentive programs in improving quality of care has been decidedly mixed. A 2004 study by Rosenthal et al. revealed that existing incentive programs encompass a wide variety of features and very little is known about how each affects the potential outcomes of the program.<sup>58</sup> The researchers found that what they call “sponsor leverage” increases the responsiveness of providers. Incentive programs offered by large payors, or by coalitions of payors, were more likely to make a difference. Only one of the studies in the Robert Wood Johnson Synthesis Report looked specifically at asthma care and found no significant improvements with the use of an incentive program.

## Potential Impact

It is well established that access to guidelines-based care can significantly reduce asthma morbidity and mortality. Effective asthma education programs targeted to high-risk patients also have been shown to result in health-care cost savings, as well as gains in productivity through improved quality of life and decreased absenteeism.<sup>59</sup> Because it can be delivered by a wide range of providers and educators and is readily

## A NATIONAL ASTHMA PUBLIC POLICY AGENDA

tailored to suit community and individual needs, self-management education is also an especially effective approach to reducing disparities in underserved populations.

Case management is a strategy targeted to patients with the greatest difficulty managing their asthma. Although it serves a smaller number of people, it has the potential to have a high impact on hospitalization rates and perhaps even mortality. It also may be a particularly effective strategy for improving outcomes in the underserved – at least for those who are insured. Studies indicate that combining case management with intensive self-management education seems particularly effective. Greineder et al. found a 39 percent decrease in emergency department visits in the study group that received education alone, but a 73 percent decrease in emergency department visits for education combined with case management.<sup>60</sup>

Potential positive outcomes from the provision of financial incentives for physician performance include improved health, better care, better record-keeping, improved patient satisfaction and reduction of health-care costs. There are also some possible unintended consequences, such as exclusion of high-risk patients from care, that must be carefully considered in the design of effective pay-for-performance programs. This would be of particular concern if providers were rewarded for health outcomes. The Rosenthal et al. study found, however, that this was very uncommon.

# Homes

## Guiding Principles

The following principles should be considered in implementing asthma policy recommendations relating to homes:

- Homes include single and multi-unit housing, group homes, shelters, institutionalized settings, etc.
- Housing codes are public health tools that can and should be used to reduce the burden of indoor air pollution in homes of residents who have asthma.
- Exposure to secondhand smoke is a critical indoor air pollutant that should be eliminated.
- “Green building” guidelines do not necessarily provide adequate protection from asthma health concerns.

## Overview

The home may be the most critical environment for managing asthma. Homes often contain known triggers for asthma exacerbations, including secondhand smoke, dampness and mold, cockroaches and dust mites. Measures recommended to reduce asthma triggers in the home include cleaning and maintaining property, maintaining water-tight premises, eliminating cockroaches and dust mites, and eliminating smoking from the home. However, more tools are frequently needed to successfully control those triggers, particularly in multi-family or tenant housing.

Housing codes provide an existing, but often underemployed, tool to improve indoor environments to require owners and occupants to maintain housing to standards that protect public health and reduce indoor allergens, irritants and other pollutants. Many states and local governments have housing codes; however, they vary considerably in their requirements, ranging from codes that incorporate very nonspecific language to providing specific descriptions of substandard conditions and requirements for repair. Many local codes are based on model codes such as the 1975 American Public Health Association-CDC model code.

The federal government’s public housing and Section 8 housing programs also include minimum standards that must be maintained in public or subsidized housing. Those requirements must be met in addition to any state or local code requirements, and specifically require protection against health hazards, such as poor air quality and ventilation, mold and infestation.

The Environmental Law Institute (ELI) notes that the role of the local health department can heavily impact the effectiveness of codes to address indoor air problems, particularly where asthma or other health problems are present.<sup>61</sup> Although the availability of funds and staffing are critical factors driving the involvement of the health department, so is the recognition of indoor air as a priority issue. Cities such as Stamford, CT, and Marion County, IN, offer examples that integrating health and

housing concerns enhances the effective use of housing codes to reduce exposure to asthma triggers in homes.

One-third of housing units in the United States are occupied by renters; 25 percent of all housing units are in multi-unit buildings.<sup>62</sup> In a 2003 report on indoor air quality in rental property, the ELI described the legal basis for federal, state and local governments to establish minimal housing conditions for rental property. State and local laws can require landlords and tenants to maintain the premises, to restrict or eliminate nuisances and/or to protect public health. Housing and health departments conduct routine housing inspections or follow up on complaints from tenants. Enforcement measures may result in resolving the immediate problem but fail to prevent its recurrence.

Measures prohibiting smoking in public indoor places have grown markedly since 2000. Currently, 23 states and the District of Columbia have comprehensive smokefree laws in place, as do many cities. Many communities now are looking to protect the health of those living in multi-family housing. With the decline in smoking, building owners see the market expanding for smokefree apartments. They also are recognizing the money they can save in terms of not having to repair the damage smoking can cause to apartment units. Such repairs have been reported to run as much as \$6,000 per unit.<sup>63</sup> As landlords gain understanding of the opportunity to protect their property and public health, they are moving to ban smoking in multi-family housing.

## Policy Recommendations

### Homes Policy Agenda

- Housing code ordinances should protect people with asthma against indoor air problems.  
*Strategies:*
  - *Develop guidelines for state/local health departments on best practices/regulations and codes that best protect indoor air.*
  - *Adopt model indoor air quality codes.*
  - *Require use of integrated pest management in multi-unit housing.*
  - *Improve federal regulations to address indoor air quality conditions in subsidized and public housing.*
- Housing code enforcement should be strengthened to reduce prevalence of indoor air quality problems.  
*Strategies:*
  - *Provide training for housing code enforcement officials on applying codes to address indoor air quality problems.*

- *Provide authority and capacity for the local health department to take legal action to enforce indoor air quality-related codes and laws (including nuisance laws).*
- *Provide capacity within state and local housing inspection agencies to offer specialized services to identify and remedy indoor air quality problems where families with asthma reside.*
- *Improve legal and other recourse for tenants to enforce local laws (including judicial education, increasing legal services, tenant education).*
- *Provide capacity for state and local health departments to offer guidance to property owners on identifying and remediating indoor air quality problems including information on smokefree policies.*
- Multi-unit housing should be smokefree.  
*Strategies:*
  - *Pass ordinances to require smokefree, multi-unit housing.*
  - *Encourage owners of public housing to make multi-unit housing smokefree.*
  - *Establish policy within the U.S. Department of Housing and Urban Development (HUD) to require all federally funded public housing to be smokefree.*
- New and remodeled housing, including public housing, should be built to promote healthful indoor air quality.  
*Strategies:*
  - *Establish policy within the HUD to require new construction, rehabilitation, repair and remodeling in federally funded public housing to follow guidelines for healthier indoor air quality.*

## Feasibility

The ELI report offered specific examples from five local jurisdictions (San Francisco, Boston, Seattle, Marion County, IN, and Stamford, CT) using housing codes to improve indoor air quality and, by extension, to reduce the presence of indoor allergens, triggers and other pollutants that can exacerbate asthma. The report estimates that many, if not most, jurisdictions have some general or specific authority to address these issues under housing and nuisance laws. Many of these issues are not clearly spelled out so that important concerns are not explicitly covered. In addition, enforcement officials are often building inspectors who may not be aware of health concerns of people with asthma.

Reducing indoor exposures to asthma triggers requires a multi-pronged approach, which includes education, financial assistance and personal commitment, as well as other factors. Local and state housing codes offer opportunities to reduce triggers, for example, through provisions that target weather-tightness and pest control. Although

## A NATIONAL ASTHMA PUBLIC POLICY AGENDA

smoking is not usually specifically addressed in housing codes, some codes may be logically interpreted to include secondhand smoke under the category of nuisance. In the ELI study, most codes officials believed that making the language of codes more explicit, particularly for mold and other indoor air problems, would improve their ability to enforce these measures.

The ELI report notes that the lack of affordable, decent housing is one of the biggest challenges, as tenants may not be in a position to seek enforcement of housing codes. Additional state and local resources are needed to address these problems, particularly in rental housing. The report recommends coupling enforcement with education to enforce codes to remedy the problem, but also to use enforcement as an intervention to reach out to the owners and tenants to introduce practices that can prevent such problems from recurring. The report further suggests establishing a working group to coordinate resources and to include medical institutions and community organizations.

Most states recognize the legal responsibility of the landlord to ensure that the housing is habitable. Depending on the law, tenants can take a variety of steps to respond to a landlord's failure to maintain the property, including moving, court action to have rent held in escrow and having the rent abated. In one of the stronger examples, Massachusetts provides broad legal tools for tenants to force corrections to substandard housing. However, even in Massachusetts, tenants lack legal assistance and face other obstacles to using landlord/tenant laws to remedy problems.<sup>64</sup> Some localities have pursued stronger laws to protect the rights of tenants who seek repairs. For example, New York City adopted its latest such law in March 2008.<sup>65</sup>

Owners, too, need additional resources and information to know how to fix the problems. State and local health and housing agencies could provide owners with specific guidance in as much detail as possible in each enforcement action. Boston, for example, has a separate enforcement initiative in its housing inspection agency that focuses on cases where a resident has severe asthma. Called Breathe Easy at Home, this program sorts out and tracks such cases, and includes education as well as remediation. The health department also has enforcement authority in Boston. The ELI report suggests that housing authorities should consider establishing a specialized enforcement initiative to address indoor air and/or asthma cases. To put an effective program in place would require additional funding, as well as regulations or formal guidance for making the repairs, and improved access to the courts. One example is in Marion County, IN where the health department established a separate program for codes enforcement to focus on indoor air quality problems.<sup>66</sup>

A report from the Smoke-free Environments Law Project (SFELP) states that many multi-unit development and management companies are making subsidized and affordable housing units smokefree. These units include those financed by Section 8 subsidies, as well as tax incentives and other state or local measures. SFELP reports that these initiatives have expanded to include more than 30 states and Canada.<sup>67</sup> Often policies are phased in gradually. Public spaces are made smokefree first, followed by changes to leases for new tenants that incorporate smokefree housing policies.

## Evidence of Effectiveness

Reviews of measures implemented in the home to reduce asthma exacerbations have noted the importance of controlling asthma allergens and triggers, especially bioaerosols with allergenic proteins.<sup>68</sup> The IOM found evidence of a causal relationship between asthma exacerbations and exposure of sensitized individuals to allergens from cats, cockroaches and house dust mites.<sup>69</sup> In a separate review, the IOM also found that asthma symptoms in sensitized persons were associated with damp indoor environments and mold.<sup>70</sup> The IOM recommended reducing the presence of cockroaches and dust mites through a combination of control measures, including cleaning and extermination. To reduce dampness and mold, the IOM included modification of “regulations, building codes and building-related contracts” and “enforcement of existing rules” among its recommendations. Also included were recommendations to develop guidelines for preventing dampness-related problems and establishing economic incentives to reward actions that prevent or reduce building dampness. The IOM also recognized the need to continue research to determine the effectiveness of these measures in reducing asthma morbidity.

The effects of secondhand smoke on asthma exacerbations are well documented, most recently in the 2006 U.S. Surgeon General’s report. That report recognized the home as the leading place for exposure to secondhand smoke for children and, along with workplaces, for nonsmoking adults.<sup>71</sup> Secondhand smoke is the indoor pollutant most closely linked with asthma morbidity; some research has also linked it to increased prevalence.<sup>72</sup> A recent meta-regression of studies conducted from 1970 and 2005 found that the duration of exposure to secondhand smoke, such as in the home, may be a stronger factor in the induction of asthma in children than previously recognized.<sup>73</sup>

## Potential Impact

Housing codes appear to offer an established tool that can be used to reduce asthma triggers in homes, especially in rental housing. Some states and local governments have found that through strategic enhancements of the codes themselves, as well as their enforcement practices, they can improve the indoor air for asthma sufferers.

Governments have greater abilities to enforce these measures than do tenants. Although the legal responsibilities of landlord-tenant relationships are enforceable, tenants often lack the legal assistance to challenge their landlords. Further, the lack of affordable housing makes this option even more challenging to tenants, closing off the option of “just leaving” that is also available in the law.

Exposure to secondhand smoke in the United States has declined, as has smoking prevalence. However, one in five people in this nation still smokes, a figure that may be higher in some populations.<sup>74</sup> Some studies of inner-city asthma have found that inner-city families have higher exposure to smoking. For example, the National Cooperative Inner-City Asthma Study found that 59 percent of families studied included at least one smoker.<sup>75</sup> A more recent study in Baltimore found a 55.7 percent smoking prevalence in inner-city homes where the children or caregivers had asthma.<sup>76</sup> Smokefree housing policies in place in multi-family and public housing could reduce the exposure of many people with asthma to the well-documented dangers from secondhand smoke.

## Schools

### Guiding Principles

The following principles should be considered in implementing asthma policy recommendations relating to schools:

- Closer coordination between schools and the health-care system is critical to improve health outcomes for children with asthma.
- Provision of adequate health services may require creative solutions including private/public partnerships, use of health technicians, etc. Links between schools and other community services should be aggressively pursued and used.
- Although these policy recommendations focus on schools, children with asthma in all institutional settings, including childcare and residential programs, should receive similar protections.

### Overview

Asthma is the most common cause of school absenteeism due to chronic disease. In 2003, children aged 5 to 17 years and reporting at least one asthma attack missed 12.8 million school days due to the disease.<sup>77</sup> School populations face a host of issues directly related to asthma – potential asthma emergencies, absenteeism, student and teacher productivity, health office visits and access to life-saving medications, to name a few. In many cases, schools are not prepared to manage these issues, resulting in a school environment that may actually exacerbate asthma and inhibit a student's learning.

Since 2002, when the CDC published *Strategies for Addressing Asthma Within a Coordinated School Health Program*,<sup>78</sup> a number of stakeholder organizations, including the American Lung Association, the American Association of School Administrators and the National Association of State Boards of Education, have advocated for a comprehensive approach to asthma management in schools. They all recommend essentially the same components:

- Community involvement and support,
- Appropriate school health services,
- Asthma education for students and staff,
- A healthy school environment and
- Safe and enjoyable physical activity for students with asthma.

Schools are responsible for ensuring the health of all students while in school. Students with asthma may experience serious or life-threatening episodes at school, so schools need to know which students have the disease and what staff can do to prevent asthma episodes or provide a quick intervention. Even after a decade of attention to the problem of asthma in schools, studies find that school personnel underestimate the



nature of the problem, both the number of children who have asthma and the extent to which the disease can impact students' ability to attend school and learn.

Gathering information on which students have asthma is a critical first step in creating a protective, "asthma-friendly" school. School health services policies should ensure that the school nurse, health aide or school secretary (for schools without adequate coverage by school nurses) have a list of students with asthma; that there is a mechanism in place to get Asthma Action Plans on file; and that a record is kept of each student's visits to the health room and administration of medications. "Need-to-know" information about a child's asthma can then be shared with teachers, coaches, bus drivers, kitchen staff, playground volunteers and others who may be in a position to intervene if the student has an asthma episode. Students whose asthma is not well controlled can be provided or referred for more intensive case management services.<sup>79</sup>

School nurses play a pivotal role in the health and well-being of children with asthma. The school nurse is responsible for many critical components, including ensuring that quick-relief medication is at school for each student with asthma, implementing a student's Asthma Action Plan, administering or supervising the administration of medications, monitoring the student's condition and often providing asthma education to the rest of the school staff. School nurses are uniquely able to identify students whose asthma is not well controlled and to work with the family and the student's asthma care clinician to identify and implement the right control measures.

The CDC, the NAEPP, the National Association of School Nurses, the American Academy of Pediatrics, the American Lung Association, the Allergy and Asthma Network Mothers of Asthmatics and others all have called for schools to ensure that

There should be at least one full-time registered nurse in every school, every day.

there is at least one full-time registered nurse in every school, every day. But the reality is far from the ideal. According to the 2006 School Health Policies and Programs survey, only 5.8 percent of states and 19.5 percent of school districts have a policy stating that each school will have at least one full-time school

nurse. Fortunately, schools are doing better than policies dictate. Nationwide, 86.3 percent of schools had a part-time or full-time school nurse who provided standard health services. However, only 31.5 percent of all schools had a full-time registered nurse. Among schools with a part-time registered nurse, that nurse was present in the school for only an average of 10 hours a week.<sup>80</sup>

Regardless of the availability of a school nurse, immediate access by students with asthma to all asthma medications approved by health-care providers and parents is critical. The NAEPP adopted a "Resolution on Asthma Management at School" calling for a written medication policy that allows safe, reliable and immediate access to medications. The NAEPP specifically encouraged policies "that allow students to carry and self-administer quick-relief medication whenever possible."<sup>81</sup> To ensure quick-relief medication is available where the student does not have an inhaler at hand, or the asthma is previously undiagnosed, the NAEPP School Subcommittee recommends that schools keep personal back-up inhalers or use a standing order

signed by the school or public health physician and a stock albuterol inhaler to ensure immediate treatment is available.<sup>82</sup>

School environments can expose both children and staff to indoor and outdoor air pollution. The effects of indoor air quality (IAQ) and outdoor air pollutants on health, including asthma, are well established. Children are particularly vulnerable whether or not they have asthma. Through the EPA's *Indoor Air Quality Tools for Schools* program, tremendous strides have been made in the level of awareness and action in the schools community over the past decade. According to a recent report from EPA, nearly 25 percent of public, private, charter and tribal schools in the United States are taking effective action to safeguard IAQ.<sup>83</sup> But indoor air is not the only source of pollution in a school setting. Children playing outside on high pollution days can be exposed to unhealthy levels of outdoor air pollution, which is an established asthma trigger. School buses are the safest transportation to school for children, but diesel exhaust from those buses has been found to concentrate into the bus cabin. Idling school buses also increases the exposure to children and the exhaust can infiltrate the school building itself.<sup>84</sup> Just over one-third (35 percent) of school districts reported having implemented an anti-idling program.<sup>85</sup>

## Policy Recommendations

### Schools Policy Agenda

- All school systems should adopt and implement a comprehensive plan for the management of asthma that is based on current research and best practices.  
*Strategies:*
  - *Identify and track all students with a diagnosis of asthma.*
  - *Obtain and ensure the use of an Asthma Action Plan for all students with asthma.*
  - *Establish standard emergency protocols.*
  - *Educate all school personnel (especially health personnel, physical educators and coaches) about asthma, including how to respond to an emergency.*
  - *Provide a full-time registered nurse in every school, every day, all day.*
  - *Ensure students with asthma have immediate access to quick-relief medications.*
  - *Ensure that students whose asthma is not well controlled are provided self-management education and case management.*
- All school systems should adopt and implement an environmental assessment and management plan.

*Strategies:*

- *Develop and implement indoor air quality management plans that address dampness problems, mold contamination, maintenance and repairs, cleaning, integrated pest management and other factors as detailed in EPA's Indoor Air Quality Tools for Schools.*
- *Require schools, grounds, facilities, vehicles and sponsored events to be 100 percent tobacco-free.*
- *Establish a protocol to minimize students' exposure to outdoor air pollutants on days with unhealthy levels of air pollution.*

## Feasibility

Making change in the schools is complicated by the many overlapping jurisdictions with authority at the federal, state and local levels. However, that challenge also offers many venues for creating change, with some options best suited for implementation at each level. There are a variety of national, state and local stakeholder organizations working on the issue, and a number of model laws and policies available, both for a comprehensive approach and for stand-alone strategies.

States and/or school districts should adopt policies requiring the identification and tracking of students with diagnosed asthma, preferably as part of a more comprehensive school health plan or school asthma management plan, such as the sample developed by the National Association of State Boards of Education.<sup>86</sup> Many community-based asthma coalitions and programs have worked with schools to develop identification and tracking forms that meet local needs, so there are a lot of examples that have been tested and made available to others.

States and/or individual school districts can enact policies that require the collection of Asthma Action Plans for students with a diagnosis of asthma. Standard state or regional Asthma Action Plans can facilitate their use. Actually collecting those plans,

Policies can require the collection of Asthma Action Plans. Actually collecting those plans, however, often requires removing hidden barriers.

however, often requires removing hidden barriers. For example, a study conducted by the Massachusetts School Nurse Research Network found that one barrier to physicians completing Asthma Action Plans was that they felt they had neither the time or the training to calculate the patient's "personal best" peak-flow reading. When the school nurses were able to provide peak-flow readings for their students to the

providers, the number of plans they got back increased dramatically.<sup>87</sup> In its Asthma Friendly Schools Initiative pilot project, the American Lung Association found that providing families and physicians with basic education about asthma management in schools, and the need for Asthma Action Plans, made a difference. One school administrator reported a 30 percent increase in the number of plans on file.<sup>88</sup>

## A NATIONAL ASTHMA PUBLIC POLICY AGENDA

There are large discrepancies in the availability of school nursing services across the states; additional funding is needed in many areas. Nationally, funding comes from a patchwork of sources, including general state and local revenue; categorical funds such as Title One and Special Education; federal programs such as Medicaid and the State Children's Health Insurance Program (SCHIP); and third-party payers, partnerships and grants.<sup>89</sup> Engaging school administrators and state leaders in a comprehensive asthma-management program, including a thorough needs assessment, can raise awareness and increase the sense of urgency needed to invest in solutions. Additional funding will require the help of champions in the national, state and local executive and legislative branches to increase the appropriations for school nurses.

State legislative efforts to ensure that students have the right to carry and self-administer their inhalers at school have been one of the more striking successes for asthma control in the policy arena. Allergy & Asthma Network/Mothers of Asthmatics and other stakeholders worked with Congress to pass federal legislation encouraging states to create laws protecting students' rights to carry and self-administer asthma and/or anaphylaxis medications during the school day. As of June 2007, 47 states had laws protecting children's right to carry and self-administer prescribed asthma medications at school, although some of these laws allow school staff to "revoke" the student's right. Despite this progress, there are still barriers to full access that need to be addressed, including lack awareness of state laws and school policies allowing students to carry and use inhalers, inability of very young children to self-administer, and lack of back-up medication for students who forget or unexpectedly run out of their medicine.

State-level policies can establish a framework that requires, facilitates and encourages local action to improve IAQ in schools. A 2002 survey report by the Environmental Law Institute identified four distinct policy mechanisms in use:<sup>90</sup>

1. Traditional regulatory mechanisms, such as requiring plans or mandatory school inspection programs;
2. Information and training programs for school district personnel to increase their capacity to recognize and address IAQ issues;
3. Funding and financial incentives to make it easier for cash-strapped school systems to take on needed major improvements; and
4. Public right-to-know requirements that have been almost exclusively focused on pesticide use notification.

Challenges to setting and implementing school IAQ policies include cost and fear of liability for identified, but uncorrected IAQ problems. Nevertheless, an increasing number of schools and school systems nationwide are recognizing the importance of assessing and monitoring IAQ and are successfully implementing *IAQ Tools for Schools*. In addition, new tools and resources continue to be developed. For example, the EPA has released the HealthySEAT software tool (available at [www.epa.gov/schools/healthyseat/index.html](http://www.epa.gov/schools/healthyseat/index.html)) that school districts can use to evaluate and manage school facilities for key environmental, safety and health issues, including IAQ.<sup>91</sup> A more comprehensive approach to the school environment should increase the level of interest in these programs.

Many school systems have reduced emissions from diesel school buses, often replacing the oldest and dirtiest vehicles with ones that meet new, more stringent federal emissions standards for diesel engines. Some states have adopted requirements that retire buses after 12 years of use. Buses that are less than 12 years old can be retrofitted with diesel filter technology. The EPA has found some of these technologies can cut up to 90 percent of particulate matter emissions.<sup>92</sup> California has committed \$140 million per year for diesel engine replacement and retrofit. The EPA can provide federal grants for diesel fleet retrofit programs pursuant to the Diesel Emission Reduction Act of 2005. Idling buses parked at or near schools can contribute unnecessarily to local air pollution build up. Many areas are adopting anti-idling requirements that restrict idling to such operation needed to meet safety and comfort needs.

## Evidence of Effectiveness

Evidence of the effectiveness of comprehensive school asthma-management programs is beginning to emerge. However, other than evaluation data, like pre- and post-tests for training sessions, it does not seem likely that studies will tease out the effect of asthma education for school personnel as separate from other strategies. Individualized Asthma Action Plans are an important component of a larger asthma-management program in schools. They provide school personnel, and the students themselves, with the information they need to appropriately monitor symptoms, reduce exposure to triggers and manage symptoms – all are key to reducing exacerbations and keeping children with asthma healthy, in school and ready to learn.

Extensive evidence shows that the use of individualized Asthma Action Plans, in conjunction with self-management education, improves health outcomes for patients with asthma. Studies that have attempted to look at the use of written plans alone have yielded more mixed results. Still, based upon the results from a limited number of nonrandomized and observational studies, the NAEPP EPR-3 Guidelines recommend that clinicians provide a completed Asthma Action Plan to a child’s school or childcare setting.<sup>93</sup>

There has been extensive literature on screening programs for pediatric asthma, which is summarized by Wheeler and Gerald in their reviews.<sup>94,95</sup> Well-trained school nurses can reduce episodic “sick” school health office visits and increase the percentage of

students with quick-relief medication at school.<sup>96,97</sup> When the ratio of students to school nurses is low and school nurses receive appropriate training and support, they provide more services, including intensive case management for students with poorly controlled

Full-time school nurses can improve student attendance.

asthma.<sup>98,99,100</sup> Full-time school nurses can reduce the number of students leaving school early due to medical reasons and increase the numbers with health insurance coverage.<sup>101</sup> Full-time school nurses can improve student attendance. Students with asthma who were poor or African American and in schools with full-time nurses missed significantly fewer days (three days or 23 percent fewer missed days) than did their counterparts with asthma in schools with part-time nurses.<sup>102</sup> Students who

## A NATIONAL ASTHMA PUBLIC POLICY AGENDA

received case management from school nurses were absent less and less than students in control schools (mean 4.38 vs. 8.18 days).<sup>103,104</sup> In contrast, school-based asthma programs without a strong school nursing component are often unable to improve the health status of students.<sup>105,106</sup>

Research has shown that students with asthma benefit from unobstructed access to their medications. Restrictions on the use of inhalers may ultimately compromise medication adherence, increase the risk of a severe asthma episode. They also cause unnecessary suffering, the need for emergency treatment, asthma-related school absences and even death.<sup>107</sup>

Evidence of the link between indoor air contaminants and health is very strong.<sup>108</sup> There is also evidence that indoor air quality in schools has a direct impact on student performance.<sup>109</sup> The effects of secondhand smoke on asthma exacerbations are well documented, most recently in the Surgeon General's report in 2006.<sup>110</sup> Secondhand smoke is the indoor air pollutant most closely linked with asthma morbidity; some research also has linked it to increased asthma prevalence.<sup>111</sup>

### Potential Impact

The primary objective of identifying students with asthma is to ensure they receive the care and attention they need to stay healthy and in school. Community asthma programs like the American Lung Association's Asthma-Friendly Schools Initiative have repeatedly found that documenting, tracking and reporting on the burden of asthma on schools has raised awareness of the problem and galvanized support for policies and programs.<sup>112</sup>

The availability of Asthma Action Plans in schools has been demonstrated to increase the confidence of school nurses to manage asthma in the students in their care.<sup>113</sup> It also has been shown to improve health outcomes for children. Among elementary-age students in Western New York, the use of Asthma Action Plans was found to significantly reduce the number of asthma exacerbations.<sup>114</sup>

Ensuring that children can take their asthma medications when needed as prescribed reduces asthma morbidity and mortality, reduces health-care costs and saves lives. School nurses play an important role in medication adherence and in advocating for effective, comprehensive school health services for all children.

Fortunately, the number of children who die from asthma is small. But, tragically, it does happen, sometimes while a child is in school. In a survey of asthma deaths in schools, CDC investigators found that 42 percent occurred while the child was participating in physical activity and 31 percent died while waiting for medical assistance.<sup>115</sup> It is impossible to know if asthma training for the staffs in those schools might have made a difference. But because asthma can be a life or death situation, it is in the best interest of schools to ensure that they have done what they can to prepare their staffs to handle asthma emergencies. Educating school personnel about asthma also increases the "buy-in" for a more comprehensive asthma-management program within the school.

Proactively managing IAQ will help ensure that children with asthma stay healthy and in school. Reducing exposure of people with asthma to environmental contaminants, such as mold, dust mites and tobacco smoke will reduce asthma episodes, reduce health-care utilization and costs, and decrease absenteeism. There is also evidence of long-term cost savings for school maintenance and repair budgets.

# Workplaces

## Guiding Principles

Workplaces should reduce or eliminate conditions that cause or exacerbate asthma. Many people work in situations that make them more vulnerable to workplace asthma, but also may be discouraged from seeking assistance. Policies to identify and manage workplace asthma should recognize that critical issues must be addressed, including:

- Workers' rights,
- Job loss,
- Access to workers' compensation,
- Lack or loss of health insurance and
- Undocumented workers.

## Overview

The American Thoracic Society defines *occupational asthma* as asthma that is caused by workplace exposure. The term *work-related asthma* is broader, encompassing both occupational asthma and existing asthma that is aggravated by work or the work environment.<sup>116</sup> Workplace exposures are estimated to be responsible for 15 percent of all asthma cases among adults in the United States,<sup>117</sup> although more recent research has estimated workplace asthma as high as 29 percent.<sup>118</sup> In addition to causing asthma, workplace exposures also can worsen existing asthma symptoms, even in those people whose asthma does not originate from occupational exposures.<sup>119</sup>

Many workplaces contain substances that can cause asthma or asthma-like syndromes. Examples include animal and bird parts, bedding and waste products; seafood and fish; insects, such as cockroaches; wood and grain dusts; flour and gums; detergents and dough additives; coatings and paints; metal dusts; diisocyanates; and others. In addition, exposures to irritants such as cleaning agents, chlorine, sulfur dioxide and many other chemicals may cause or make asthma worse. Nonindustrial workplaces also can contain these irritants and other indoor air pollutants that, as noted elsewhere in this report, can cause or worsen asthma. These circumstances result in asthma or allergic reactions reported in a wide range of occupations and settings.<sup>120</sup>

Many workplaces contain substances that can cause asthma or asthma-like syndromes.

Appropriate surveillance or epidemiological data can play an important role in recognizing associations between asthma and occupation or industry. For example, a California analysis found the highest asthma rates in three industries in that state: Local and interurban passenger transportation; lumber and wood product manufacturing; and electric, gas and sanitary services. The study also found that correctional officers, firefighters and welfare eligibility clerks were the three highest



occupations for asthma, again demonstrating the diversity of workplace asthmagens.<sup>121</sup>

In the United States, two regulatory agencies within the Department of Labor have the primary responsibility for developing and enforcing regulations limiting workplace exposures. The Occupational Health and Safety Administration (OSHA) establishes Permissible Exposure Limits (PELs) to control exposures in general industry; while the Mining Safety and Health Administration has similar responsibility for the mining industry. The National Institute for Occupational Safety and Health (NIOSH) is located within the Department of Health and Human Services, Centers for Disease Control and Prevention. NIOSH has primary responsibility for conducting research and making recommendations to improve occupational safety and health. NIOSH sets Recommended Exposure Limits, which do not have regulatory authority and are often lower than PELs. Another key source of workplace evaluation is the American Conference of Governmental Industrial Hygienists (ACGIH), which, despite its name, is a nongovernmental organization. ACGIH sets Threshold Limit Values for workplace exposures. Most employers in the private sector are legally required to meet the OSHA standards, although they often consider limits other than PELs in protecting their employees.<sup>122</sup>

PELs do not exist for most workplace asthmagens. Even when they do, the American Thoracic Society warned that meeting the standards does not provide sufficient protection from workplace asthmagens. Even exposures at or below regulated levels can cause exacerbations in workers who already have asthma, allergies or other risk factors. Nor do regulations adequately address the impact of these substances in all real world settings, such as in combination with other substances, with the environment or with medications that workers may be taking.<sup>123</sup>

Meeting the OSHA exposure limit standards does not provide sufficient protection from workplace asthmagens.

One work-related trigger for asthma is secondhand smoke. Acceptance of measures prohibiting smoking in public places has grown markedly since 2000, when only California had prohibited smoking indoors statewide. Currently, some 23 states and the District of Columbia have comprehensive smokefree laws in place, as do many cities. Other states have less comprehensive regulations, but the momentum toward completely smokefree workplaces clearly has begun. Employees in private workplaces clearly do not have equal protection under state law – only 20 states and the District of Columbia have laws eliminating smoking in all private workplaces, which would include all restaurants and bars. Eleven states have no restrictions at all on smoking in private workplaces. The other 19 have some restrictions, which may mean that there are dedicated smoking areas, ventilation requirements or exemptions for employers with very small staffs.<sup>124</sup> It is important to note that in some states with weaker laws, a number of counties, cities and towns have developed their own strong ordinances that protect large numbers of workers.

Asthma is a potentially life-threatening illness that can strike without much warning, and most asthma deaths occur in adults. Even so, workplace protocols for asthma emergencies have received less attention in the mainstream asthma-control literature. Workplace policies can lay a valuable foundation for an appropriate response to a medical emergency. The Asthma Foundation in Australia has developed guidelines for the Asthma Friendly Workplace that include training staff to respond to asthma emergencies.<sup>125</sup>

## Policy Recommendations

### Workplaces Policy Agenda

- All workplaces should be 100 percent tobacco-free.
- Surveillance mechanisms should be established and implemented to document levels of work-related asthma and follow trends.  
*Strategies:*
  - *Include coding for occupation and industry in current asthma surveillance systems.*
  - *Improve surveillance through use of innovative approaches, such as electronic medical records.*
  - *Promote interventions that investigate and intervene to reduce exposure.*
- National guidelines should be developed for management of work-related asthma, including primary and secondary prevention, as well as education of health-care providers, employers and employees.
- Workplaces should follow national guidelines for management of work-related asthma, including primary and secondary prevention, as well as education of employers and employees.

## Feasibility

The American Lung Association has issued its Smokefree Air 2010 Challenge, calling for all states and communities to enact laws that protect everyone no later than 2010. In 2007, seven states significantly strengthened their smokefree air laws. In addition to the remaining 27 states where comprehensive laws are still needed, ample opportunities exist to enact and enforce policies that protect workers by working directly with school districts, large employers and municipalities. A robust and experienced network of tobacco-control advocates nationwide is very interested in collaborating with those working on the management of asthma and other chronic

diseases. Further, many state and local asthma stakeholders, including asthma coalitions, are poised to collaborate on the development of policies that suit local needs.

A variety of potential sources can provide data on work-related asthma, including physicians' reports, hospital discharge records and worker compensation claims. States use a mix of approaches, yet it is generally accepted that the prevalence of work-related asthma is under-reported. Once cases are identified, there is usually a follow-up procedure, such as a telephone interview, to collect more detailed information about occupational and nonoccupational exposures.<sup>126</sup>

Some states, including California and New Jersey, require health-care providers to report individuals diagnosed with work-related asthma. California, Massachusetts, Michigan and New Jersey are the only states funded by NIOSH to collect data and develop prevention strategies as part of the Sentinel Event Notification Systems for Occupational Risks (SENSOR) program. Follow-up includes investigation of problem areas, as well as programs and materials to educate health-care providers, employers and employees about work-related asthma and the report requirements.

Asthma management in the workplace includes managing existing asthma properly, preventing exposure to asthmagens and responding to an asthma emergency. The American Thoracic Society and others<sup>127</sup> have recommended four components of asthma risk reduction in the workplace:

1. Elimination or reduction of known asthmagens, such as using powder-free or low-latex gloves in medical settings.
2. Detection and management of previously undiagnosed patients, through questionnaires and medical testing. In one key step, clinicians would ask about occupation and workplace for every adult patient who has asthma.<sup>128</sup> British Guidelines call for clinicians to suspect occupational asthma in any adult with obstructed airflow and to “positively [search] for [it] in those with high-risk occupations.”<sup>129</sup> Unfortunately, studies show that patients with adult-onset asthma rarely get asked about workplace exposure.<sup>130</sup>
3. Prevention of asthma exacerbation through appropriate disease management steps, including eliminating asthma triggers. For example, spray paints made without isocyanates can be substituted in the workplace of someone with isocyanate-induced asthma. Workplaces should be 100 percent smokefree.
4. Adoption of protocols to handle asthma emergencies, including among visitors and customers.

## Evidence of Effectiveness

In its *Guidelines for Assessing and Managing Asthma Risk at Work, School and Recreation*, the American Thoracic Society concluded that the prevention of exposure and preventative pharmacotherapy are the most effective approaches to reducing the health burden of asthma.<sup>131</sup>

The effects of secondhand smoke on asthma exacerbations are well documented, most recently in the Surgeon General's report in 2006.<sup>132</sup> Secondhand smoke is the indoor air pollutant most closely linked with asthma morbidity. Some research has linked it to increased prevalence as well.<sup>133</sup>

## Potential Impact

Surveillance of work-related asthma has two important functions. It can identify clusters of asthma cases in particular workplaces or segments of industry, which can lead to actions to reduce potentially harmful exposure for all workers. It also can reduce the risk of morbidity in individuals. Identifying cases of work-related asthma promptly is critical to stopping exposure, which significantly improves a patient's chances for recovery.

A surveillance program can prevent work-related asthma through the reporting of index patients. According to a report published jointly by the Michigan State University and the Michigan Department of Labor and Economic Growth, "The reporting of the index patient is regarded as a sentinel health event that may lead to the identification of other employees from the same facility who are at risk of developing asthma or who have developed similar breathing problems."<sup>134</sup>

Exposure to secondhand smoke in the United States has declined as has smoking prevalence. However, although more people are protected today, these policies still do not apply uniformly. Restaurant employees, who are often minorities and low income, are far less likely than other workers to be protected by smokefree workplace policies, more likely than other workers to have these policies violated where they do exist and are more likely to be exposed to high levels of secondhand smoke on the job.<sup>135</sup> Requiring all workplaces to be 100 percent smokefree would provide protection for these workers.

Chapter

4

## Conclusions and Call to Action

Changing policies can improve the health of people with asthma. The evidence, summarized in the previous pages, demonstrates that tools as old as disease surveillance and as new as smokefree multi-family housing can help reduce the burden of asthma. A very broad, multi-disciplinary group of leaders and experts have reached consensus on a set of public policy priorities that, if implemented, could have the greatest impact on asthma morbidity and mortality. This project establishes a blueprint for national asthma policy on which lawmakers, administrators, regulators and advocates can take action.

Clearly, implementation of the recommendations set forth in this document will require the effort of multiple individuals, as well as public and private stakeholder groups at the national, state and local levels. Policy recommendations are grouped below by the arenas in which the change needs to occur. Note that some recommended changes will be most successful if addressed by multiple stakeholder groups and levels.

### Policy Recommendations by Arena of Implementation

#### National Initiatives

- The United States should institute a comprehensive, nationwide

asthma surveillance system.

- The EPA should adopt the most health protective national ambient air quality standards in accordance with Clean Air Act requirements.
- Federal, state and local measures to reduce emissions of outdoor air pollutants should be expanded, especially in communities with the highest exposure.
- Standardized national performance measures should be adopted for monitoring and evaluating asthma quality of care.
- Surveillance mechanisms should be established and implemented to document levels of work-related asthma.
- National guidelines should be developed for management of work-related asthma, including primary and secondary prevention, as well as education of health-care providers, employers and employees.

## State Initiatives

- Every state should have an adopted and adequately funded comprehensive state plan to reduce asthma morbidity and mortality.
- Every state should have an adequately funded statewide asthma program.
- Every county in every state should attain the national air quality standards as expeditiously as possible.
- Monitoring of air pollutants should cover all populations at risk and sources of concern in every state.
- Federal, state and local measures to reduce emissions of outdoor air pollutants should be expanded, especially in communities with the highest exposure.
- All health-care systems, including public and private providers, purchasers and payers, should deliver services and medications consistent with NAEPP guidelines.
- Surveillance mechanisms should be established and implemented to document levels of work-related asthma.
- All workplaces should be 100 percent tobacco-free.

## Local Initiatives

- Every county in every state should attain the national ambient air quality standards as expeditiously as possible.
- Federal, state and local measures to reduce emissions of outdoor air pollutants should be expanded, especially in communities with the highest exposure.

- Multi-unit housing should be smokefree.
- All workplaces should be 100 percent tobacco-free.

## Health-care Systems

- All health-care systems, including public and private providers, purchasers and payers, should deliver services and medications consistent with NAEPP guidelines.
- Promote quality improvement activities, and develop and disseminate tools that support achievement of performance goals.

## Housing Authorities

- Housing code ordinances should protect people with asthma against indoor air problems.
- Housing code enforcement should be strengthened to reduce prevalence of indoor air quality problems.
- Multi-unit housing should be smokefree.
- New and remodeled housing, including public housing, should be built to promote indoor air quality.

## School Districts

- All school systems should adopt and implement a comprehensive plan for the management of asthma based on current research and best practices.
- All school systems should adopt and implement an environmental management plan.

## Workplaces

- All health-care systems, including public and private providers, purchasers and payers, should deliver services and medications consistent with NAEPP guidelines.
- All workplaces should be 100 percent tobacco-free.
- Surveillance mechanisms should be established and implemented to document levels of work-related asthma.
- Workplaces should follow national guidelines for management of work-related asthma, including primary and secondary prevention, as well as education of employers and employees.

## A NATIONAL ASTHMA PUBLIC POLICY AGENDA

Thousands of people are working diligently daily on the issues tracked in this document. Wise, experienced leaders have come together repeatedly to analyze and report on changes that so clearly need to be made to reduce the burden of asthma and to eliminate deaths from this disease. Asked one participant in the consensus conference early on, “What will be different this time?” Excellent question.

This process builds on the work that already has been done. The work knits together the distinct strands of asthma today, in the hope of gaining strength and new insights from the combined yarns. However, this document is unique in that it recommends specific policies that can be implemented – policies that have, in fact, worked in certain arenas. These recommendations create an agenda for the American Lung Association and its partners. All stakeholders in the fight against asthma must work together to guarantee success.

Much more remains to be done. The American Lung Association is committed to making the changes outlined in this report and will partner with others at the national, state and local levels to collect and develop tools, including model policy language and plans, and then widely communicate these concepts.

The American Lung Association wishes to thank all of the participants, especially the Planning Team, and the reviewers who assisted in improving the final version of *A National Asthma Public Policy Agenda*.

December 2008



# Appendix A: Asthma Policy Consensus Project Participants

This list includes members of the Planning Committee, conference participants and external reviewers, all of whom made invaluable contributions to the project. Individuals with (P) by their names served on the planning committee. Individuals with (R) by their names participated only after the conference as external reviewers. The participation of an individual does not imply the support of the individual or their institution, organization or agency for the policy recommendations as stated in this report, nor should such support be inferred.

Sharon Adams-Taylor  
Associate Executive Director  
American Association of School Administrators

Tobie Bernstein  
Senior Attorney  
Environmental Law Institute

Paul G. Billings  
Vice President, National Policy and Advocacy  
American Lung Association

Mary Cooley RN, BSN, CCM, MS  
Manager, Case and Disease Management  
Priority Health

Adam Davis  
Director, Asthma and COPD Programs  
American Lung Association of California

Norman Edelman, MD (R)  
Chief Medical Officer  
American Lung Association

Ben Francisco  
Research Assistant Professor, Child Health Pulmonary  
Medicine and Allergy  
University of Missouri School of Medicine

Paul Garbe, DVM, MPH (P)  
Chief, Air Pollution and Respiratory Health Branch  
National Center for Environmental Health  
Centers for Disease Control and Prevention

Diane R. Gold, MD, MPH  
American Thoracic Society  
Associate Professor of Medicine  
Harvard University Medical School

Dianne Hasselman, MSPH  
Associate Vice President  
Center for Health Care Strategies

Elizabeth Herman, MD, MPH  
Air Pollution and Respiratory Health Branch  
National Center for Environmental Health  
Centers for Disease Control and Prevention

Marcia Griffith (P)  
Air Pollution and Respiratory Health Branch  
National Center for Environmental Health  
Centers for Disease Control and Prevention

Lori Kondas  
Vice President of Mission Services  
American Lung Association of Midland States

Marielena Lara, MD, MPH  
Natural Scientist  
RAND Corporation

Janet G. McCabe (R)  
Executive Director  
Improving Kids' Environment, Inc.

Sarah Merkle, MPH  
Health Scientist  
Division of Adolescent and School Health  
Centers for Disease Control and Prevention

Amy Friedman Milanovich, MPH (P)  
Head of Training and Dissemination  
Center for Managing Chronic Disease  
University of Michigan

Ed Miller (P)  
Senior Vice-President for Public Policy  
American Lung Association of New England

Tracey Mitchell, RRT, RPFT, AE-C (P)  
Indoor Environments Division  
U.S. Environmental Protection Agency

Janice E. Nolen (P)  
Assistant Vice President, National Policy and Advocacy  
American Lung Association

David Núñez, MD, MPH  
Chief, California Asthma Public Health Initiative  
California Department of Health Services

Sydney Parker, PhD  
Vice President  
American College of Chest Physicians

Elise Pechter, MPH, CIH  
Industrial Hygienist  
Occupational Health Surveillance Program  
Massachusetts Department of Public Health

Katherine Pruitt (P)  
Assistant Vice President, Program Services  
American Lung Association

Julie Osgood, MS  
Program Director, Clinical Integration  
MaineHealth

Susan J. Rappaport, MPH (R)  
Vice President, Research and Program Services  
American Lung Association

Margaret Reid, RN  
Director, Asthma and Diabetes Prevention and Control Program  
Boston Public Health Commission

Albert Rizzo, MD (R)  
Speaker, American Lung Association National Assembly  
Pulmonary Physician  
Pulmonary Associates

Diana Schmidt  
Coordinator  
National Asthma Education and Prevention Program  
National Heart, Lung and Blood Institute

Shana Scott, MPH  
Air Pollution and Respiratory Health Branch  
National Center for Environmental Health  
Centers for Disease Control and Prevention

Laurie Stillman  
Executive Director  
Asthma Regional Council of New England

Jim Stout, MD, MPH (R)  
Professor, Department of Pediatrics  
University of Washington

Kathryn Sunnarborg  
Air Pollution and Respiratory Health Branch  
National Center for Environmental Health  
Centers for Disease Control and Prevention

Eleanor Thornton  
Merck Community Asthma Network

Louise Vetter  
Chief Executive Officer  
American Lung Association of the City of New York

Sandra Fusco Walker  
Director of Advocacy  
Allergy and Asthma Network/ Mothers of Asthmatics

Patricia A. Weinewski, RN, MS (P)  
Asthma Coordinator  
New York State Department of Health

David Weissman, MD  
Director, Division of Respiratory Disease Studies  
National Institute of Occupational Safety and Health

Lani Wheeler, MD (R)  
Senior Policy Analyst  
EPA/IED/Center for Asthma and Schools

Jean Zotter  
Executive Director  
Boston Urban Asthma Coalition

## Appendix B: References

- 
- <sup>1</sup> Centers for Disease Control and Prevention (CDC). National Center for Health Statistics. *National Health Interview Survey Raw Data, 2006*. Analysis by the American Lung Association Research and Program Services Division using SPSS and SUDAAN software.
- <sup>2</sup> Friedman MS, Powell KE, Hutwagner L, Graham LM, Teague WG. Impact of Changes in Transportation and Commuting Behaviors During the 1996 Summer Olympic Games in Atlanta on Air Quality and Childhood Asthma. *Journal of the American Medical Association*. February 21, 2001; 285(7):897-905.
- <sup>3</sup> Allergy & Asthma Network/Mothers of Asthmatics. Accessed at [www.breatherville.org/cityhall/ch\\_childrights.htm](http://www.breatherville.org/cityhall/ch_childrights.htm)
- <sup>4</sup> CDC. Office on Smoking and Health. *Best Practices for Tobacco Control Programs—2007*. [http://www.cdc.gov/tobacco/tobacco\\_control\\_programs/stateandcommunity/best\\_practices/](http://www.cdc.gov/tobacco/tobacco_control_programs/stateandcommunity/best_practices/).
- <sup>5</sup> CDC. National Center for Health Statistics. *National Health Interview Survey Raw Data, 2006*. Analysis by the American Lung Association Research and Program Services Division using SPSS and SUDAAN software.
- <sup>6</sup> CDC. National Center for Health Statistics. *Final Vital Statistics Report*. Deaths: Final Data for 2005. April 24, 2008; 56(10).
- <sup>7</sup> CDC. National Center for Health Statistics. *Asthma Prevalence, Health-Care Use and Mortality: United States, 2003-05*. January 2007. Available at <http://www.cdc.gov/nchs/products/pubs/pubd/hestats/asthma03-05/asthma03-05.htm>. Accessed on July 10, 2008.
- <sup>8</sup> National Institutes of Health. National Heart, Lung and Blood Institute. *Chartbook on Cardiovascular, Lung and Blood Diseases*. 2007.
- <sup>9</sup> Lara M, Nicholas W, Morton S, Vaiana M, Genovese B, Rachelefsky G. *Improving Childhood Asthma Outcomes in the United States: A Blueprint for Policy Action*. RAND MR-1330-RWJ. 2001.
- <sup>10</sup> Eliminating Asthma Disparities: A National Workshop To Set a Working Agenda. *Chest*. 2007;132(Supplement).
- <sup>11</sup> CDC. *Guide for State Health Agencies in the Development of Asthma Programs*. December 2003. Available at [http://www.cdc.gov/asthma\\_NACP.htm](http://www.cdc.gov/asthma_NACP.htm).
- <sup>12</sup> CDC. Guidelines Working Group. Updated Guidelines for Evaluation of Public Health Surveillance Systems: Recommendations from the Guidelines Working Group. *MMWR Recommendations and Reports*. 2001;50:RR-13.
- <sup>13</sup> Trust for America's Health. *Short of Breath: Our Lack of Response to the Growing Asthma Epidemic and the Need for Nationwide Tracking*. July 2001. Posted at <http://healthyamericans.org/reports/files/shortofbreath.pdf>.
- <sup>14</sup> Pew Environmental Health Commission. *Attack Asthma: Why America Needs a Public Health Defense System To Battle Environmental Threats*. 2000. <http://healthyamericans.org/reports/files/asthma.pdf>; *Short of Breath*.
- <sup>15</sup> Lara M, et al. *Improving Childhood Asthma Outcomes in the United States: A Blueprint for Policy Action*. The RAND Report. 2001.
- <sup>16</sup> Trust for America's Health. July 2001;4-5.
- <sup>17</sup> CDC. *CDC's Strategy for the National Environmental Public Health Tracking Program: Fiscal Years 2005-2010*. 2005:2. Accessed at [www.cdc.gov/nceh/tracking](http://www.cdc.gov/nceh/tracking).
- <sup>18</sup> CDC. *CDC's Strategy*. 2005:3.
-

- 
- <sup>19</sup> CDC. *CDC's Strategy*. 2005:3.
- <sup>20</sup> CDC. *CDC's Strategy*. 2005:2. (The report draws this list from Thacker SB. Historical development. In: Teutsch SM, Churchill RE, eds. *Principles and Practice of Public Health Surveillance*. New York: Oxford University Press, 2000.)
- <sup>21</sup> Lara M, et al. *Improving Childhood Asthma Outcomes in the United States: A Blueprint for Policy Action*. The RAND Report. 2001.
- <sup>22</sup> Trust for America's Health. *Short of Breath: Our Lack of Response to the Growing Asthma Epidemic and the Need for Nationwide Tracking*. July 2001. Posted at <http://healthyamericans.org/reports/files/shortofbreath.pdf>.
- <sup>23</sup> CDC. *Environmental Public Health Tracking Network: Vision*. Version 1.0. October 20, 2004.
- <sup>24</sup> Friedman AR, Wicklund K. Allies Against Asthma: A Midstream Comment on Sustainability. *Health Promotion Practice*. April 2006;7(2 supplement):140S-148S; Peterson JW, Lachance LL, Butterfoss FD, Houle CR, Nicholas EA, Gilmore LA, Lara M, Friedman AR. Engaging the Community in Coalition Efforts To Address Childhood Asthma. *Health Promotion Practice*. April 2006;7(2 supplement):56S-65S.
- <sup>25</sup> Asthma in Michigan. *Asthma in Michigan 2010: A Blueprint for Action*. 2005.
- <sup>26</sup> CDC. National Public Health Performance Standards Program. *The Essential Public Health Services*. <http://www.cdc.gov/od/ocphp/nphsp/EssentialPHServices.htm>.
- <sup>27</sup> *Short of Breath*. Adapted from Boss LP, Kreutzer RA, Luttinger D, et al. The Public Health Surveillance of Asthma. *Journal of Asthma*. 2001;38(1):83-9.
- <sup>28</sup> U.S. Environmental Protection Agency (EPA). *Green Book*. 8-Hour Ozone Nonattainment Designations. Effective as of June 2, 2008. Accessed at <http://www.epa.gov/air/oaqps/greenbk/gntc.html>.
- <sup>29</sup> Gauderman WJ, Avol E, Laurmann F, Kuenzli N, Gilliland F, Peters J, McConnell R. Childhood Asthma and Exposure to Traffic and Nitrogen Dioxide. *Epidemiology*. 2005.
- <sup>30</sup> EPA. *Air Quality System*. Accessible at <http://www.epa.gov/air/data/index.html>.
- <sup>31</sup> Abt Associates. *Power Plant Emissions: Particulate Matter-related Health Damages and the Benefits of Alternative Reduction Scenarios*. Prepared for the Clean Air Task Force. 2004.
- <sup>32</sup> Northeast States for Coordinated Air Quality Management (NESCAUM). *Outdoor Hydronic Heaters Model Regulation*. January 29, 2007. Accessed at <http://www.nescaum.org/topics/outdoor-hydronic-heaters>.
- <sup>33</sup> Letter to Steve Page, EPA, from Arthur Marin, NESCAUM, and Dan Johnson, Western States Air Resources Council. April 29, 2008. Available at <http://www.nescaum.org/items-of-interest>. Downloaded August 29, 2008.
- <sup>34</sup> American Lung Association (ALA). 2001. EPA. *Air Quality Criteria for Particulate Matter, 2004*; EPA. *Air Quality Criteria for Ozone and Related Photochemical Oxidants, 2006*.
- <sup>35</sup> The NO<sub>x</sub> SIP Call rule was a requirement for the Eastern states to reduce the emissions of nitrogen oxides. The controls were in place by 2003-2004 and primarily reduced emissions from coal-fired power plants.
- <sup>36</sup> EPA. *Latest Findings on National Air Quality: Status and Trends Through 2006*. January 2008.
- <sup>37</sup> EPA. *Latest Findings on National Air Quality: Status and Trends Through 2006*. January 2008.
- <sup>38</sup> EPA. *Final Report to Congress on Benefits and Costs of the Clean Air Act, 1970 to 1990*. October 1997; EPA 410-R-97-002.
- <sup>39</sup> Abt Associates. *Power Plant Emissions: Particulate Matter-related Health Damages and the Benefits of Alternative Emissions Reductions Scenarios*. June 2004. Available at [www.catf.us](http://www.catf.us).

- 
- <sup>40</sup> EPA. *Regulatory Impact Assessment – Draft (DATE)*.
- <sup>41</sup> White House Office of Management and Budget. *Draft 2007 Report to Congress on the Costs and Benefits of Federal Regulations*. March 2007. Posted at [http://www.whitehouse.gov/omb/inforeg/2007\\_cb/2007\\_draft\\_cb\\_report.pdf](http://www.whitehouse.gov/omb/inforeg/2007_cb/2007_draft_cb_report.pdf).
- <sup>42</sup> Institute of Medicine (IOM). Committee on the Quality of Health Care in America. *Crossing the Quality Chasm: A New Health-Care System for the 21<sup>st</sup> Century*. 2001.
- <sup>43</sup> National Institutes of Health. National Heart, Lung and Blood Institute. National Asthma Education and Prevention Program. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma*. 2007.
- <sup>44</sup> Bodenheimer T, Wagner EH, Grumbach K. Improving Primary Care for Patients with Chronic Disease: The Chronic Care Model, Part 2. *Journal of the American Medical Association*. 2002;288(15):1909-14.
- <sup>45</sup> [http://asthma.umich.edu/Asthma\\_Health\\_Outcomes\\_Project/overview.html](http://asthma.umich.edu/Asthma_Health_Outcomes_Project/overview.html).
- <sup>46</sup> National Committee for Quality Assurance. *The Basics: Performance Measurement*. Accessed at <http://web.ncqa.org/tabid/441/Default.aspx>.
- <sup>47</sup> McDonald KM, et al., eds. *Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies, Volume 7, Care Coordination*. AHRQ Publication. 4(07)-0051-7. Agency for Healthcare Research and Quality. June 2007.
- <sup>48</sup> IOM. *Rewarding Provider Performance: Aligning Incentives in Medicare*. Washington DC: National Academy Press. 2006.
- <sup>49</sup> Christianson JB, et al. *Paying for Quality: Understanding and Assessing Physician Pay-for-Performance Initiatives*. Research Synthesis Report No. 13. Robert Wood Johnson Foundation.. December 2007.
- <sup>50</sup> Center for Health Care Strategies, Inc. *Improving Asthma Care for Children: Best Practices in Medicaid Managed Care*. 2006. Available at [www.chcs.org](http://www.chcs.org).
- <sup>51</sup> Tynan A, Draper D. *Getting What We Pay For: Innovations Lacking in Provider Payment Reform for Chronic Disease Care*. Research Brief No. 6. Center for Studying Health System Change. June 2008.
- <sup>52</sup> Lyon-Callo SK, et al. A Review of Potential State and Local Policies To Reduce Asthma Disparities. *Chest*. 2007; 132(5):840S-52S.
- <sup>53</sup> U.S. Department of Health and Human Services (HHS) Fact Sheet. September 28, 2007. Accessed at [www.hhs.gov/news/facts/physician\\_performance.html](http://www.hhs.gov/news/facts/physician_performance.html).
- <sup>54</sup> Kuhmerker K, Hartman T. *Pay-for-Performance in State Medicaid Programs: A Survey of State Medicaid Directors and Programs*. Commonwealth Fund Publication #1018. New York, NY. The Commonwealth Funds. 2007.
- <sup>55</sup> National Committee for Quality Assurance. *The State of Health-Care Quality 2007*. 2007. Accessed at <http://web.ncqa.org/tabid/543/Default.aspx>.
- <sup>56</sup> Wise PH, et al. *A Critical Analysis of Care Coordination Strategies for Children with Special Health-Care Needs*. AHRQ Publication No. 07-0054. Agency for Healthcare Research and Quality. June 2007.
- <sup>57</sup> Adams K, Greiner AC, Corrigan JM, eds. *Crossing the Quality Chasm Summit: A Focus on Communities*. Institute of Medicine. 2004.
- <sup>58</sup> Rosenthal MB, et al. Paying for Quality: Providers' Incentives for Quality Improvement. *Health Affairs*. 2004; 23(2):127-41.
- <sup>59</sup> Hoppin P, Jacobs M. *Investing in Best Practices for Asthma: A Business Case for Education and Environmental Interventions*. New England Asthma Regional Council. April 2007.
- <sup>60</sup> Greineder DK, Loane KC, Parks P. A Randomized Control Trial of a Pediatric Asthma Outreach Program. *Journal of Allergy and Clinical Immunology*. 1999;103(3 Pt 1):436-40.

- 
- <sup>61</sup> Environmental Law Institute (ELI). *Improving Indoor Air Quality in Rental Units: A Review of Policies in Five U.S. Localities*. 2003. Available at [www.elisotre.org](http://www.elisotre.org).
- <sup>62</sup> U.S. Census Bureau. *Housing-Physical Characteristics: Occupancy Characteristics & Occupied Housing Units*. 2006.
- <sup>63</sup> Smoke-Free Environments Law Project. Fact Sheet. Many Affordable Housing Providers in Michigan Offer Non-smoking Policies Fact Sheet. Available at <http://www.tcsg.org/sfelp/AffordMISFHsg.pdf>.
- <sup>64</sup> ELI.
- <sup>65</sup> Fernandez M. "New Law Lets Tenants Sue over Harassment." *New York Times*. March 14, 2008.
- <sup>66</sup> ELI.
- <sup>67</sup> Smoke-Free Environments Law Project. "Smoke-Free Multi-Unit Housing Came of Age in 2007." Press release. December 21, 2007. Available at [www.tcsg.org/sfelp/home.htm](http://www.tcsg.org/sfelp/home.htm).
- <sup>68</sup> Eggleston PA. The Environment and Asthma in U.S. Inner Cities. *Chest*. 2007;132:782S-8S. Also, California Air Resources Board. *Report to the California Legislature: Indoor Air Pollution in California*. July 2005.
- <sup>69</sup> IOM. *Clearing the Air: Asthma and Indoor Air Exposures*. 2000.
- <sup>70</sup> IOM. *Damp Indoor Spaces and Health*. 2004.
- <sup>71</sup> HHS. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. 2006.
- <sup>72</sup> Eggleston PA. The Environment and Asthma in U.S. Inner Cities. *Chest*. 2007;132:782S-8S.
- <sup>73</sup> Vork KL, Broadwin RL, Blaisdell RJ. Developing Asthma in Childhood from Exposure to Secondhand Tobacco Smoke – Insights from a Meta-Regression. *Environmental Health Perspective*. 2007;115:1394-400.
- <sup>74</sup> CDC. Cigarette Smoking Among Adults—United States, 2006. *Mortality and Morbidity Weekly Report*. November 9, 2007;56:44.
- <sup>75</sup> Kattan M, Mitchell H, Eggleston P, et al. Characteristics of Inner-city Children with Asthma: The National Cooperative Inner-City Asthma Study. *Pediatric Pulmonology*. 1997;24:253-62; in Eggleston, 2007.
- <sup>76</sup> Deitte GB, Hansel NN, Buckley TJ, et al. Home Indoor Pollutant Exposures Among Inner-City Children with or without Asthma. *Environmental Health Perspective*. 2007;115:1665-9.
- <sup>77</sup> CDC. National Center for Health Statistics. *Asthma Prevalence, Health-Care Use and Mortality: United States, 2003-05*. January 2007. Available at <http://www.cdc.gov/nchs/products/pubs/pubd/hestats/ashtma03-05/asthma03-05.htm>.
- <sup>78</sup> CDC. *Strategies for Addressing Asthma Within a Coordinated School Health Program*. 2002. Accessed at [www.cdc.gov/healthyyouth/healthtopics/asthma](http://www.cdc.gov/healthyyouth/healthtopics/asthma).
- <sup>79</sup> Wheeler L, et al. School-based Approaches to Identifying Students with Asthma. *Journal of School Health*. 2004; 74(9).
- <sup>80</sup> Brener ND, et al. Health Services: Results from the School Health Policies and Programs Study 2006. *Journal of School Health*. 2007;77:464-85.
- <sup>81</sup> National Asthma Education and Prevention Program. *NAEPP Resolution on Asthma Management at School*. November 2005. Accessed at [www.nhlbi.nih.gov/health/public/lung/asthma/resolut.htm](http://www.nhlbi.nih.gov/health/public/lung/asthma/resolut.htm).
- <sup>82</sup> National Heart, Lung and Blood Institute. Accessed at [www.nhlbi.nih.gov/health/prof/lung/asthma/sch-emer-protocol.htm](http://www.nhlbi.nih.gov/health/prof/lung/asthma/sch-emer-protocol.htm).
- <sup>83</sup> EPA. *Envisioning Excellence: Lessons from Effective Indoor Air Quality (IAQ) Program*. Accessed January 2008 at [www.epa.gov/schools](http://www.epa.gov/schools).



- 
- <sup>84</sup> California Air Resources Board. *Children's School Bus Exposure Study*. October 2003; and Behrentz E, Sabin LD, Winer AM, Fitz DR, Pankratz DV, Colome SD, Fruin SA. Relative Importance of School Bus-related Microenvironments to Children's Pollutant Exposure. *Journal of Air and Waste Management Association*. October 2005;55(10):1418-30.
- <sup>85</sup> CDC. SHPPS. 2006.
- <sup>86</sup> Wilson TK, Bogden JF. *Fit, Healthy and Ready To Learn: A School Health Policy Guide*. National Association of State Boards of Education. 2005.
- <sup>87</sup> Pulcini J, et al. An Intervention To Increase the Use of Asthma Action Plans in Schools: An MASNRN study. *Journal of School Nursing*. June 2007;23(3):170-6.
- <sup>88</sup> ALA. *Asthma-Friendly Schools Initiative Toolkit*. 2007. Accessed at [www.lungusa.org/afsi](http://www.lungusa.org/afsi).
- <sup>89</sup> Costante CC. School Health Nursing: Framework for the Future, Part 1. *Journal of School Nursing*. 2001;17:3-11.
- <sup>90</sup> ELI. *Healthier Schools: A Review of State Policies For Improving Indoor Air Quality*. January 2002. Accessed at [www.elistore.org/reports\\_detail.asp?ID=56](http://www.elistore.org/reports_detail.asp?ID=56).
- <sup>91</sup> Jones SE, et al. Healthy and Safe Environment, Part II, Physical Schools Environment: Results from the School Health Policies and Programs Study 2006. *Journal of School Health*. 2007;77(8):544-56.
- <sup>92</sup> EPA. Accessed at <http://www.epa.gov/otaq/retrofit/retroverifiedlist.htm>.
- <sup>93</sup> National Asthma Education and Prevention Program. *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma*. National Institutes of Health. National Heart, Lung and Blood Institute. 2007.
- <sup>94</sup> Wheeler L, et al. School-based Approaches to Identifying Students with Asthma. *Journal of School Health*. 2004; 74(9).
- <sup>95</sup> Gerald LB, et al. An official ATS Workshop report: Issues in Screening for Asthma in Children. *Proceedings of the American Thoracic Society*. 2007;4:133-41.
- <sup>96</sup> Erickson CD, Splett PL, Mullett SS, Jensen C, Belseth SB. The Healthy Learner Model for Student Chronic Condition Management-Part II: The Asthma Initiative. *Journal of School Nursing*. December 2006;22(6):319-29.
- <sup>97</sup> Splett PL, Erickson CD, Belseth SB, Jensen C. Evaluation and Sustainability of the Healthy Learners Asthma Initiative. *Journal of School Health*. 2006;76(6):276-82.
- <sup>98</sup> Guttu M, Engelke MK, Swanson M. Does the School Nurse-to-Student Ratio Make a Difference? *Journal of School Health*. 2004;74(1):6-9.
- <sup>99</sup> Taras H, Wright S, Brennan J, Campana J, Lofgren R. Impact of School Nurse Case Management on Students with Asthma. *Journal of School Health*. 2004;74(6):213-9.
- <sup>100</sup> Perry C, Toole K. Impact of School Nurse Case Management on Asthma Control in School-aged Children. *Journal of School Health*. 2000;70(7):303-4.
- <sup>101</sup> Allen G. The Impact of Elementary School Nurses on Student Attendance. *Journal of School Nursing*. 2003;19(4):225-31.
- <sup>102</sup> Telljohann S, Dake J, Price J. Effect of Full-time Versus Part-time School Nurses on Attendance of Elementary Students with Asthma. *Journal of School Nursing*. 2004;20(6):331-4.
- <sup>103</sup> Tinkelman D, Schwartz A. School-based Asthma Disease Management. *Journal of Asthma*. 2004;41(4):455-62.
- <sup>104</sup> Levy M, Beeman G, Heffner B, Stewart T. The Efficacy of Asthma Case Management in an Urban School District in Reducing School Absences and Hospitalizations. *Journal of School Health*. 2006;76(6):320-4.
-

- 
- <sup>105</sup> Bruzzese JM, Evans D, Wiesemann S, et al. Using School Staff To Establish a Preventive Network of Care To Improve Elementary School Students' Control of Asthma. *Journal of School Health*. 2006;76(6):307-12.
- <sup>106</sup> Gerald LB, Redden D, Wittich AR, et al. Outcomes for a Comprehensive School-based Asthma Management Program. *Journal of School Health*. 2006;76(6):291-6.
- <sup>107</sup> Jones SE, Wheeler L. Asthma Inhalers in Schools: Rights of Students with Asthma to a Free Appropriate Education, *American Journal of Public Health*. 2004;94(7):1102-8
- <sup>108</sup> IOM. *Clearing the Air: Asthma and Indoor Air Exposures*. 2000.
- <sup>109</sup> EPA. *Indoor Air Quality and Student Performance*. August 2003. Accessed at [www.epa.gov/schools](http://www.epa.gov/schools).
- <sup>110</sup> HHS. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. 2006.
- <sup>111</sup> Eggleston PA. The Environment and Asthma in U.S. Inner Cities. *Chest*. 2007;132:782S-8S.
- <sup>112</sup> ALA. *Asthma-Friendly Schools Initiative Toolkit*. 2007. Accessed at [www.lungusa.org/afsi](http://www.lungusa.org/afsi).
- <sup>113</sup> Borgemeyer A, et al. The School Nurse Role in Asthma Management: Can an Action Plan Help? *Journal of School Nursing*. 21(1):23-30. 2005.
- <sup>114</sup> Millard M, et al. A Randomized Control Trial Using the School for Anti-inflammatory Therapy in Asthma. *Journal of Asthma*. 2003;40(7):769.
- <sup>115</sup> Greiling AK, et al. A Preliminary Investigation of Asthma Mortality in Schools. *Journal of School Health*. 2005; 75(8):286-90.
- <sup>116</sup> American Thoracic Society (ATS). Guidelines for Assessing and Managing Asthma Risk at Work, School and Recreation. *American Journal of Respiratory and Critical Care Medicine*. 2004;169:873-81.
- <sup>117</sup> ATS. Occupational Contribution to the Burden of Airway Disease. *American Journal of Respiratory and Critical Care Medicine*. 2003;167:787-97.
- <sup>118</sup> Sama SR, Milton DK, Hunt PR, Houseman EA, Henneberger PK, Rosiello RA. Case-by-case Assessment of Adult-onset Asthma Attributable to Occupational Exposures Among Members of a Health Maintenance Organization. *Journal of Occupational and Environmental Medicine*. 2006;48(4):400-7.
- <sup>119</sup> ATS. 2004.
- <sup>120</sup> ATS. 2004.
- <sup>121</sup> California Department of Health Services. *California Asthma Facts*. August 2004. Accessed at [www.ehib.org/cma/papers/California\\_Asthma\\_Facts\\_WRA.pdf](http://www.ehib.org/cma/papers/California_Asthma_Facts_WRA.pdf).
- <sup>122</sup> ATS. 2004
- <sup>123</sup> ATS. 2004
- <sup>124</sup> ALA. *State Legislated Actions on Tobacco Issues*. Available at <http://slati.lungusa.org/>. Database accessed September 10, 2008.
- <sup>125</sup> [www.asthmaqld.org.au/content/indes.cfm?id=60&printable=1](http://www.asthmaqld.org.au/content/indes.cfm?id=60&printable=1).
- <sup>126</sup> California Department of Health Services (DHS). *California Asthma Facts*. August 2004. Accessed at [www.ehib.org/cma/papers/California\\_Asthma\\_Facts\\_WRA.pdf](http://www.ehib.org/cma/papers/California_Asthma_Facts_WRA.pdf).
- <sup>127</sup> California DHS. 2004.
- <sup>128</sup> ATS . 2003.
- <sup>129</sup> British Guideline on the Management of Asthma. *Thorax*. 2003;58(Supplement1):1-94.

- 
- <sup>130</sup> Sama SR, Hunt PR, Cirillo CIH P, MA, Rosiello RA, Henneberger PK, Milton DK. A Longitudinal Study of Adult-onset Asthma Incidence Among HMO Members. *Environmental Health*. 2003;2:10.
- <sup>131</sup> ATS. 2004
- <sup>132</sup> HHS. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. 2006.
- <sup>133</sup> Eggleston PA. The Environment and Asthma in U.S. Inner Cities. *Chest*. 2007;132:782S-8S.
- <sup>134</sup> Rosenman KD, et al. *2004 Annual Report on Work-related Asthma in Michigan*. Accessed at [www.oem.msu.edu/asthma/04AsthmaAnnRpt\\_all.pdf](http://www.oem.msu.edu/asthma/04AsthmaAnnRpt_all.pdf).
- <sup>135</sup> CDC. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. 2006.