



Healthy Generations

Maternal & Child Health Program
School of Public Health

Childhood
Asthma

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The Epidemiology of Asthma Among Children in the U.S.

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Asthma, the most common chronic disease among children, has increased at epidemic rates since the early 1980s. Based on data from the National Health Interview Survey (NHIS), the number of children ages 0 to 17 whose parents reported that their child had asthma during the past 12 months increased from 37 of every 1000 children in 1980, to 69 per 1000 children in 1995 (see Figure 1).¹ Due to a change in the NHIS questionnaire in 1997, it is not possible to track the trend in point prevalence of asthma beyond 1996. In 1997, NHIS asked different questions: "Has a doctor or other health professional ever told you that your child had asthma?" and "How many asthma attacks did you have in the last 12 months?" Based on responses to the latter question, 55 of every 1000 children in the U.S. had one or more asthma attacks in the past year. Responses to the latter question from 1997 to 2000 indicate that the number of children experiencing an asthma attack in the last 12 months remained relatively stable (see Figure 1).¹

In 2002, NHIS revised the survey again and asked



three questions about asthma: lifetime diagnosis of asthma, current asthma, and asthma attack prevalence. When the 2002 data are released, comparisons to the 1980-1996 trend in asthma prevalence will be possible, as will the trend in asthma attack prevalence since 1997.²

When examined by age, asthma prevalence increased across all age groups from 1980 to 1995. From 1997 to 2000, asthma attack prevalence remained fairly level across age groups. Among children 0-17 years, males are more likely to have asthma or experience an asthma attack. In 1998 for example, asthma attacks were experienced by 59 per 1,000 males versus 41 per 1,000 females.³

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Disparities

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The epidemic of asthma among children in the U.S. is drawing increasing attention from public health leaders around the country. The reasons for this dramatic increase are not fully understood, as the articles in this issue of *Healthy Generations* point out. What is known, however, is that the burden of asthma is significant. It reduces quality of life and increases the risk for early death among affected children. It creates ongoing challenges for their families. The health-related costs for managing asthma are escalating. Furthermore, this burden disproportionately affects children and families of color and those who live with economic challenges.

In *Healthy People 2010*, eight national objectives focus on this burden: reducing asthma deaths, hospitalizations, emergency department visits, activity limitations, and school days missed; as well as increasing the proportion of persons who receive patient/family education, referral to community resources, and asthma care according to national guidelines. There is also a call for states to develop surveillance systems for tracking asthma deaths, illness, disability, the impact of occupational and environmental factors on asthma, access to medical care, and asthma management. [Additional information on *HP 2010* objectives can be found at http://www.healthypeople.gov/document/html/volume2/24respiratory.htm#_Toc489704825.]

Although we lack full understanding about how environmental and genetic factors interact and affect the onset and course of asthma, there have been tremendous advances in clinical knowledge about how to effectively manage asthma. Learning about and following these clinical guidelines enable children with asthma to lead healthy, active lives.

In Minnesota, several initiatives are underway that address the national asthma objectives. The authors of the articles in this issue are providing leadership for many of these initiatives. We want to acknowledge their expertise, thank them for sharing their insights in the articles in this issue, and most especially thank them for their commitment to improving the health and well-being of the many children living with asthma.

- Joän M. Patterson, PhD & Erica L. Fishman, MSW, MPH



The Epidemiology of Asthma Among Children in the U.S.

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There are significant disparities in asthma prevalence by race/ethnicity (see Figure 2). The gap between black and white non-Hispanic children widened during the period, from 15% higher prevalence in black non-Hispanic children in 1980-81 to 26% higher in 1995-96.¹ The rate of asthma attack prevalence was 44% higher for black non-Hispanic children in 2000. From 1985-86 to 1995-96, the prevalence of asthma

Definition of Asthma

Asthma is a chronic inflammatory disease of the lungs in which the airways are constricted from inflammation and hyper-responsiveness to asthma "triggers." There are many potential triggers, including allergens, infections, exercise, abrupt changes in the weather, and exposure to airway irritants, such as tobacco smoke. Recurrent asthma episodes, called *exacerbations*, range in severity from inconvenient to life threatening, and involve shortness of breath, coughing, wheezing, chest pain or tightness, or a combination of these symptoms.³ Severity is rated according to the following symptoms:

Mild Intermittent

- Symptoms <1/week
- Nighttime symptoms <2/month
- Symptoms with exercise following a viral illness or allergy exposure

Mild Persistent

- Symptoms >2/week, but not daily
- Nighttime symptoms >2/month
- Symptoms with exercise; affects daily activities
- Has periods of time when needs to use bronchodilator every day

Moderate Persistent

- Symptoms daily
- Nighttime symptoms daily
- Attacks ≥ 2/week that may last for days
- Needs to use bronchodilator every day or at night

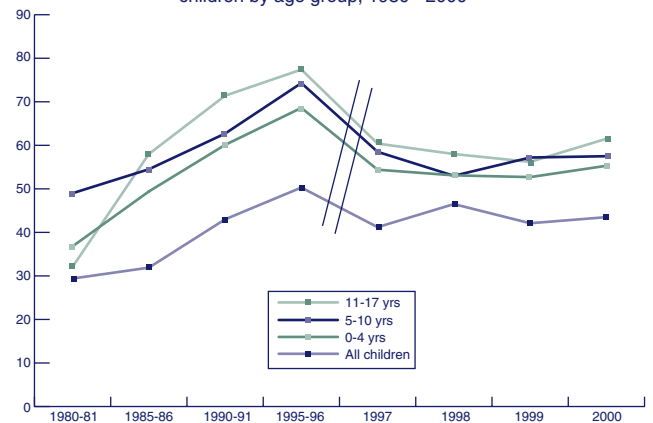
Severe Persistent

- Continuous symptoms
- Major lifestyle limitations due to symptoms; limited activity
- Generally needs daily or every other day oral steroids

among Hispanic children more than doubled, from 31.5 to 76.1 per 1000 children. However, using asthma attack prevalence data from 1997 to 2000, the rate for Hispanic children actually declined, and it was lower than for both black and white children.

Etiology. It is generally believed that asthma results from the interaction of environmental and genetic factors. Atopy, the genetically inherited susceptibility to become allergic, is an important predictor of a person developing asthma.⁴ However, genetics alone cannot account for the recent epidemic. While outdoor air pollution might appear to be an obvious cause, outdoor air is actually cleaner today than it was 20 years ago.⁵ However, this does not preclude the potential introduction of some yet unknown substance that could be a factor, nor does it preclude differential exposure to poor outdoor air quality by geographic area, which may account for some of the disparities in asthma prevalence. Indoor air contaminants, on the other hand, may be a contributing factor due to more tightly sealed living spaces and because children spend increasingly more time indoors.⁶

Figure 1. Asthma prevalence and asthma attack prevalence in U.S. children by age group, 1980 - 2000



Source: MMWR²
// = trend break due to change in survey design from measuring asthma prevalence to measuring asthma attack prevalence for 1997 and after

In a 2000 report, the Institute of Medicine (IOM) examined scientific evidence related to 27 environmental exposures as potential factors in either the *development* (onset) of asthma or in causing *exacerbations* of existing asthma (see side bar).⁵ It is important to note, however, that while evidence of environmental exposures contribute to an understanding of asthma as a disease, they do not explain why the prevalence of asthma has increased.

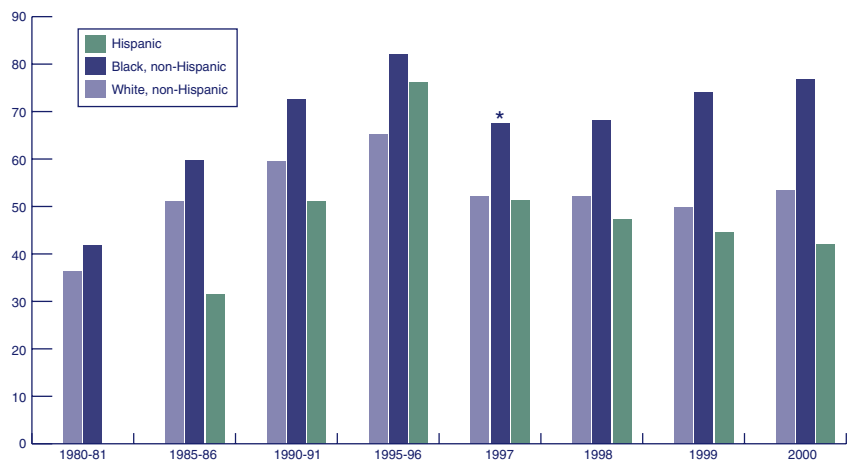
Burden of Asthma

The burden of asthma manifests itself in multiple ways, including (a) an increased risk for early death, (b) its impact on a child's quality of life and that of his/her family, and (c) increased utilization of health care and the costs associated with that utilization. In *Healthy People 2010*, five of the eight objectives related to asthma, focus on reducing this burden.

Mortality. Death rates due to asthma increased from 1.8 per 1,000,000 children in 1980 to 3.3 per 1,000,000 children in 1998 – an increase of about 3.4% a year (see Figure 3).¹ Death rates due to asthma are dramatically higher for black non-Hispanic children, and these rates have also increased more rapidly. Death rates for older children were nearly twice as high as those for younger children.

Quality of life. Asthma is the most prevalent cause of childhood

Figure 2. Childhood asthma prevalence and asthma attack prevalence by race / ethnicity, 1980-2000



Source: MMWR²
* Change in survey design from measuring asthma prevalence to measuring asthma attack prevalence for 1997 and after. White and black estimates for 1980-81 include Hispanic ethnicity.

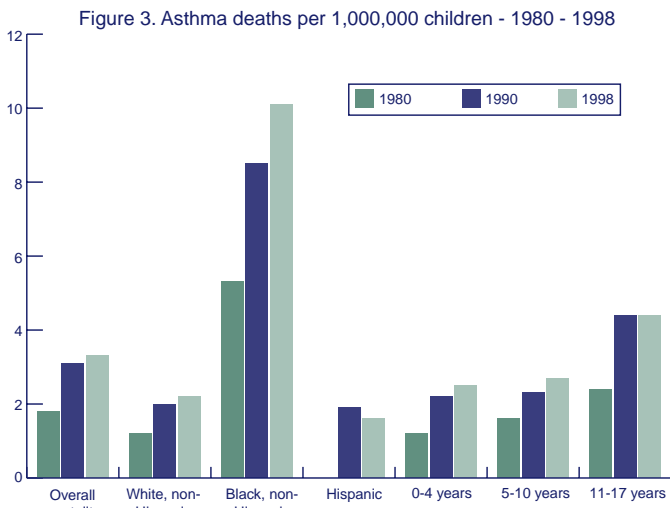
⊙ = Sufficient (strong) evidence
○ = Suggestive (limited) evidence

Development (onset) of asthma

- ⊙ House dust mites
- ⊙ Environmental tobacco smoke
- Cockroaches
- Respiratory syncytial infections
- Indoor home dampness
- Certain non-residential environments

Exacerbation of existing asthma

- ⊙ House dust mites
- ⊙ Environmental tobacco smoke
- ⊙ Cockroaches
- ⊙ Rodents
- ⊙ Cats, Fungi
- ⊙ Rhinovirus infections
- ⊙ Higher levels of ozone
- Dogs
- Birds
- Respiratory syncytial infections
- Chlamydia infections
- Mycoplasma infections
- Formaldehyde
- Fragrances
- Particulate matter
- Indoor home dampness
- Certain non-residential environments



Source: National Vital Statistics System, NCHS, CDC

disability (defined as long-term reduction in the ability to participate in children's usual activities, such as attending school or engaging in play due to a chronic condition).⁸ Using data from the 1994-95 NHIS, 1.4% of all U.S. children under 18 years experienced some degree of disability due to asthma. This is 21% of all the children with asthma in that year. Socioeconomic disadvantage (as a result of being poor, black or living with a single parent) was associated with twice the rate of asthma-related disability.⁸ Asthma-related disability manifests in school absences (an average of 9.7 days/year per child just due to asthma) and inability or limited ability to engage in school activities.⁸ Children with moderate to severe asthma experience higher rates of social isolation and social and emotional problems compared to their peers.^{4,9}

Healthcare cost and utilization. For all individuals in the U.S., the cost of asthma in 1998 was estimated to be \$11.3 billion, with \$7.5 billion accounted for by direct costs, and \$3.8 billion in indirect costs, such as lost work days by parents and lifetime earnings lost due to mortality from asthma.¹⁰ Hospitalizations account for the biggest portion of the direct costs. In addition to hospitalizations, emergency room and doctors' office visits add to the direct costs of care (see Figure 4). Among some sub-groups with asthma, there is heavier utilization of costly hospital-related emergency care for asthma exacerbations, many of which could be minimized by ongoing care in a doctor's office, coupled with good follow through on adherence to a written asthma action plan.

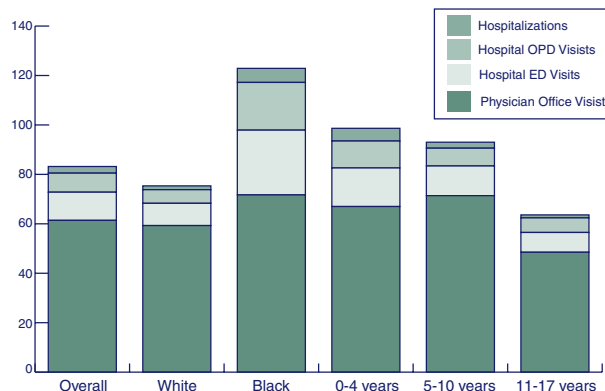
Overall, the epidemic increase in asthma over the past 20 years has created a significant public health problem, for which we still have major gaps in knowledge and data for effective primary and secondary prevention. However, scientific breakthroughs have led to increasingly more effective treatments. When children and their families are educated by culturally competent, family-

centered providers about environmental controls, symptom monitoring, and medication use, and when families are able to follow through with recommended treatment guidelines, most children and youth with asthma can lead active, full lives. That outcome should be our goal.

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Figure 4. Average annual ambulatory visits & hospitalizations for asthma among children < 18 years, 1998



Source: National Ambulatory Medical Care Survey, National Hospital Ambulatory Medical Care Survey, National Hospital Discharge Survey, National Center for Health Statistics - CDC



Risk and Protective Factors for Childhood Asthma

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Even though asthma is the most common chronic illness among children, understanding of its development is still incomplete. Asthma is not a single disease but a syndrome of recurrent coughing, wheezing and breathlessness. There are several asthma sub-types, each with a different clinical appearance and prognosis. Furthermore, there is no single risk factor associated with the onset of asthma; rather, genetics and environmental triggers interact and lead to its development. Inflammation of the bronchial airways, which is present in all who have asthma, can be caused by allergies, respiratory infections, and/or airborne irritants.¹ In the sections below, risk and protective factors are briefly described for the onset of asthma and for exacerbations of existing asthma. In addition, a third group of factors is described for which the evidence is less clear and often must be qualified as to when the factor is a risk or when it may be protective.

Risk Factors

Genetics. Having a biological parent or family member with asthma and/or allergies remains the foremost risk factor for the development of asthma in children. Stronger associations have been reported for maternal asthma compared to paternal asthma. If both parents have asthma, the risk is even greater. Recently, an asthma-associated gene has been identified (ADAM-33 on chromosome #20).²

Perinatal factors. Prematurity and serious infant lung disease have been associated with childhood asthma.³ Fetal exposure to maternal smoking during pregnancy has been linked to childhood asthma. In addition to its association with low birth weight, maternal smoking during pregnancy may compromise development of the fetal immune system, which begins in utero.

Allergens. Approximately 75-80% of children with asthma have significant allergies. Certain materials that are ordinarily harmless can

trigger an allergic reaction in some children. These allergens include (1) common indoor inhalants (such as house dust mites, cockroach droppings, feathers, molds, pets, etc.); (2) outdoor inhalants (such as, molds and pollens); or (3) ingested foods (such as, milk, soy, egg, etc.).¹ Generally, foods are a much less frequent cause of allergic reactions. Among the indoor allergens, dust mite exposure is a greater risk among mid to high socioeconomic (SES) families and cockroach allergen is a greater risk among low SES families.⁴

Environmental tobacco smoke (ETS) is the most significant form of airborne irritants associated with risk for both the onset and exacerbation of asthma. Even when household members smoke in rooms not frequented by children, they are still exposed to some level of passive smoke. Recent studies indicate that even parents who smoke outside bring in particles on their clothing that can trigger a child's asthma.⁵

Other airborne irritants that can trigger asthma in some children include aerosol sprays, paint fumes, strong odors, and air pollution.

Viral respiratory infections, such as respiratory syncytial virus (RSV) and parainfluenza, are risk factors for the development of asthma. Dysregulation in the immune system response to these infections appears to be a mechanism contributing to airway inflammation.⁶ Some bacterial infections, such as mycoplasma and chlamydial illnesses lead to exacerbations in people with asthma. When such respiratory infections are recurrent, severe, or occur early in life, they may cause long-term airway changes and the development of asthma.

Obesity has been associated with increasing asthma and more frequent asthma episodes,⁷ especially in young females.⁸

Other factors. In addition to the above environmental triggers that have been associated with both the onset and exacerbations of asthma, there are other triggers for those with asthma. These include (1) exercise, which can trigger an episode in over 80% of children with asthma if bronchodilator medications have not been used before exercise; (2) weather conditions, such as cold air or winds scattering more pollen or rainy weather increasing mold concentrations; and (3) emotional stress leading to anxiety attacks or anger.¹ This does not mean that emotional

stress causes asthma or that asthma is "just in your head," but rather that deep rapid breathing often associated with strong emotional reactions, can trigger an asthma episode. In addition, because an asthma episode set off by an environmental trigger can produce feelings of panic and suffocation, it is important to remain calm and administer appropriate medications to prevent a vicious cycle driven by emotional reactivity.

Psychosocial factors. Although not linked with the onset of asthma per se, certain psychosocial factors have been associated with increased asthma morbidity. These include parenting difficulties,⁹ maternal depression,¹⁰ and lower family socioeconomic status.¹¹

Protective Factors

Diet. Consumption of fruits and vegetables high in antioxidants, particularly vitamin C and, to a lesser extent, vitamin E, appear to promote higher lung function and have been associated with a lower prevalence of asthma symptoms in children.¹²



Consumption of fish (omega-3 fatty acid) has been related to lower airway hyperreactivity among children and hence protective against asthma symptoms.¹²

Microbial exposures, such as bacteria found around farm and barnyard animals, may protect from asthma and account for lower rates of asthma among children living on farms.¹³ This observation is consistent with the “hygiene hypothesis” defined below.

Probiotics are cultures of potentially beneficial bacteria of the healthy gut microflora, which are believed to stimulate healthy maturation of the immune system. In a randomized, placebo-controlled trial, perinatal administration of probiotics to mothers with a family history of atopic disease reduced by half atopic eczema (an early sign of atopic disease often leading to asthma) in their children at 2 years of age.¹⁴

Ambiguous Factors

Pets are risky for wheezy children if parents and family members are pet allergic. Otherwise pet exposure may actually protect against asthma. In a recent study, exposure to cats early in life was protective for children at-risk for asthma by virtue of a family history of allergic diseases, except for one group – those whose mothers also had asthma; the latter group were three times more likely to wheeze by 5 years of age if exposed to cats.¹⁵

Daycare. The use of out-of-home daycare has been implicated as a risk factor in some studies and as a protective factor in other studies. On the risk side, the correlation between the increase in asthma incidence and the increase in daycare use during the same time period has been noted. Early exposure to respiratory infections is viewed as the mediating mechanism increasing sensitivity to allergens, thereby predisposing to the development of asthma.¹⁶

On the other hand, other studies have suggested that daycare may serve a protective function in that microbial exposure to potentially beneficial bacteria (infections) early in life may help the immune system develop properly. In a similar way, having siblings at home (as another potential source of early modest exposure) has been shown to be protective against asthma. These findings are linked to the *hygiene hypothesis*, which suggests that the epidemic increase in allergic reactions may be the result of developed countries’ emphasis on a “sanitized, ultra-clean industrial world.” It is hypothesized that children have been shielded from developing their immune systems because they have not had “practice” in fighting off common bacteria. In the absence of modest exposure and immune response “practice,” later pathogen exposure leads to an overly aggressive immune response where the body attacks both the invader and its own tissues – leading to inflammation indicative of allergy.¹⁷

Breastfeeding. Controversy surrounds the issue of whether breastfeeding is protective against asthma. Breastfeeding has been reported to decrease the incidence of acute respiratory infections in early life, in particular those due to respiratory syncytial virus,¹⁸ and thereby protect against RSV-induced asthma.¹⁹ Other studies have reported that atopic children with asthmatic mothers are more likely to have asthma if they were exclusively breastfed in early life.²⁰ Two recently published



studies further extend the conflict. In a cohort study of 2602 children, exclusive breastfeeding was protective, even for children whose mothers had a history of asthma – but only if the breastfeeding exceeded four months.²¹ However, in a longitudinal cohort study, infants who were breastfed at least 4 weeks, were more than twice as likely to have asthma at 9 years than those who were not breastfed, irrespective of whether the mother had asthma or the length of breastfeeding.²² These discrepancies may relate to the type of asthma (e.g., viral-associated versus allergic asthma), but it is still impossible to recommend breastfeeding as a way to prevent asthma.

Summary

The greatest risk for the development of asthma remains genetic, with allergic children who wheeze especially prone to adult asthma. The interaction between genetic and environmental factors is complex and available evidence suggests that the programming of aberrant patterns of immunological memory specific for inhaled allergens, and inflammatory damage to lung and airway tissue occurring during critical phases of early growth in children, have long-term consequences for lung and airway function. Exposure to environmental tobacco smoke is to be avoided. Animal exposure may be protective in children who are not pet allergic. Other risk factors are still being defined. Along with today’s effective controller and reliever medications, risk factor modification may be our best means of future asthma control.

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Children with Asthma and Welfare Reform

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In 1996, Congress passed the Personal Responsibility Work Opportunity and Reconciliation Act (commonly known as welfare reform). The Act replaced the 65-year-old federal program, Aid to Families with Dependent Children, with the Temporary Assistance to Needy Families (TANF) block grant to the states. The law also decoupled cash assistance from other benefits such as medical assistance. To receive cash assistance, parents (most of whom are mothers) are required to work. In addition, families are limited to no more than five years of TANF assistance, unless they meet specific circumstances set by federal and state policies. Minnesota's new welfare program is known as the Minnesota Family Investment Program (MFIP).

By setting expectations for work, welfare reform prodded planners and administrators in the welfare system to learn more about the families who turn to welfare for assistance. What has been learned has implications for other disciplines, including health care. The high incidence of asthma in families on welfare is one such topic, where health care goals and welfare reform goals intersect.

Having a child with a chronic health condition such as asthma has emerged as a critical factor making it difficult for some families to move off the welfare system in the five-year time frame. In a national study, Heymann et al.¹ reported that 41% of working mothers who had been on welfare had at least one child with a chronic health condition. In Ramsey County, 2200 of the approximately 8000 families on MFIP (about 25%) have a family member disabled enough to receive payments from the federal Supplemental Security Income (SSI) program for disabled individuals.



Asthma and Families Receiving TANF Assistance

Only a small number of studies have focused specifically on asthma and families receiving TANF assistance, but all conclude that families on TANF have higher rates of asthma than the general population. Results of a study using administrative data in California showed that 20-25% of families on welfare had a family member with a disability. About 45% of those disabilities were respiratory diseases, most commonly, asthma.² In a study using data from the National Longitudinal Survey of Youth, it was reported that 14% of working mothers who had received welfare for more than two years had a child with asthma compared to 7% of mothers who had never been on welfare.¹ In a study of very low income working families in Denver, Milwaukee and Boston, 23% of the 187 children living at home with their mothers had been diagnosed with asthma.³

The combination of welfare reform requirements and being a parent of a child with asthma has at least two major implications:

First, the realities of life for families receiving TANF assistance probably shape how their child's asthma is managed. Parents leaving welfare are less likely to be in jobs that offer benefits such as health insurance, sick leave or flexibility in scheduling and hours. Heymann et al. reported that mothers on welfare were more likely to be caring for at least one child with a chronic condition, yet were less likely to have sick leave.⁴ Parents on welfare also tend to use informal, unlicensed and ever changing arrangements for child care.

Second, the child's asthma is probably a factor in the mother's ability to meet work requirements and time limits under the new policies of welfare reform. Parents of children with asthma are more likely to miss work and therefore more likely to lose jobs. In addition, parents with a chronically ill child may experience more difficulties finding appropriate child care.

Asthma and Ramsey County TANF Recipients

Anecdotal information from front-line job counselors indicates similar high levels of asthma in the children of families on MFIP in Ramsey County, Minnesota. Families in Ramsey County on MFIP fall into one of three categories, each of which has implications if the family also has a child with asthma.

Group 1. More than 16,000 children live in families who use welfare for a short period of time (3 years or less) and then move into jobs, usually with low wages. These are the families who need health insurance coverage, sick leave policies and successful strategies for managing their child's chronic health conditions (such as asthma) to all work together so that the parents can stay in the workforce and off welfare.

Group 2. More than 5,000 children live in families where the parent reaches the five-year time limit. Parents in this group most often have multiple and complex challenges, including mental illness, active domestic violence, learning impairments, and/or major health problems. Of the 682 Ramsey County families who reached time limits by October 2002, 599 received extensions, primarily for the following state-approved reasons: serious illness in a parent or other family member (100 families), parent's severe mental illness (86 families), parent's low IQ (269 families), or parents were working, but with earnings so low, they continued to qualify for MFIP assistance (102 families). For families in this group, their multiple, complex problems and limited personal resources make it nearly impossible to both sustain employment and fulfill parenting responsibilities, especially if a child has a chronic illness like asthma.

Group 3. In 1,311 families, only the child is on MFIP because the parent is disabled or no longer has custody. Many of these parental disabilities can be assumed to be as significant or more significant than those of families reaching time limits (group 2). There is, however, no set

of support services – medical, social service or otherwise – developed to support these parents with disabilities in caring for their children. If a child has asthma, the caregiving needs are even more complex.

Summary

Children in families receiving TANF assistance are more likely than other children in the community to have asthma. Because of welfare reform, more information is available about the families who turn to welfare. That information should inform not only the welfare system and the policies being debated in reauthorizing the federal block grant, but should also inform and shape other disciplines. Families living with chronic conditions like asthma need adequate support from the welfare system, workplace policies, health care coverage reforms and the health care system itself in order to develop their capacity to move out of poverty, maintain paid work and meet their families' needs.

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News from MDH

Implementation of the Asthma State Plan

Aided by a new grant from the Centers for Disease Control and Prevention - amounting to \$700,000 per year for five years - the Minnesota Department of Health will be implementing the "Strategic Plan for Addressing Asthma in Minnesota". This plan is the result of the Commissioner of Health's Asthma Advisory workgroup which met between October 2001 and May 2002 and was comprised of physicians, nurses, pharmacists, representatives from health plans, community based organizations, and non-profit associations. This comprehensive plan contains an overview of the diagnosis and treatment of asthma, information on the epidemiology of asthma in Minnesota, recommendations to improve the lives of individuals with asthma and their families, and a listing of asthma programs and resources in Minnesota. Overarching recommendations include:

- The public, individuals with asthma, their families, caregivers, health systems, health care providers, schools, employers, childcare providers, community groups and others must work together in a coordinated approach.
- Communities must be aware and empowered to control asthma through public action to decrease allergens and irritants inside and outside home, workplaces, school and businesses.
- Individuals with asthma must have the resources to manage their disease.

- Education for individuals with asthma and their families should begin at the time of diagnosis and be integrated into every step of care.
- Health care providers must obtain the skills necessary to accurately diagnose and treat this complex disease and partner with their patients to provide them with the education and tools they need to manage their condition.

The report also contains a comprehensive set of strategies needed to make significant strides in the above areas. They are to be carried out by a wide range of partners including caregivers, health care providers, schools, employers, and community groups. Strategies include gathering better data about the prevalence of asthma, creating greater public awareness of asthma, providing asthma education to health professionals, and developing public policies to reduce exposure to environmental triggers of asthma.

The implementation grant will use the above strategies over the next five years with the intent of reducing the human and economic burden of asthma in Minnesota. The hope is to reduce hospitalizations and emergency room visits due to asthma and improve the lives of those who live with asthma every day.

For more information about this report, please contact Janet Keysser at the Minnesota Department of Health at 612.676.5691 or janet.keysser@health.state.mn.us

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Asthma is the most common chronic illness in children in the United States.¹ Nationwide, an estimated 5 million children have asthma, and as with most chronic conditions, the impact of childhood asthma is felt throughout our communities. As previously discussed, between 1980 and 1994, the number of asthma cases has increased more than 160 percent among children under age 5, and 74 percent among children ages 5 to 14.²

Nationwide, the economic burden of asthma in 1994 was in the range of \$10.7 billion.³ With the progressive increase in asthma prevalence in Minnesota and elsewhere, these costs continue to rise. An estimated 11.8 million school absences annually, are due to asthma⁴ with an estimated \$957 million in time lost from work for parents and caretakers.⁵ In fact, asthma results in almost twice the level of illness burden through lost school days and restricted activity days than experienced by children with other disabling chronic conditions.⁶ This impact has been confirmed by local observations and local surveys in Minnesota;⁷ including a parent/guardian survey in the Minneapolis Public Schools.⁸

Current therapies for asthma are effective, and when used properly, allow children with asthma to maintain a normal, active life. Yet many children and their families suffer needlessly with frequent symptoms, often resulting in urgent medical treatment and hospitalization. Through effective health policies, we can decrease the morbidity and mortality associated with this chronic illness in children.

A Need To Identify and Educate Children with Asthma

There is evidence that asthma is under-diagnosed in children and therefore under-treated.⁹ To improve health care delivery to children with asthma, a standardized system for identifying children who have asthma symptoms is needed. A dual policy strategy would facilitate implementation of such a system. First, mandatory asthma screening, as a part of routine well child checkups, in schools or in day care settings may assist in the early identification of children with asthma. Second, the establishment of a centralized tracking system for high-risk patients (i.e.

children hospitalized for asthma episodes or frequent Emergency Department users) can help find the children with the greatest needs. These children and their families could then be referred for case management services, which would provide intensive educational interventions, social service support, and medical care.

Children with asthma and their families must receive education about effective disease management. Successful asthma management requires instruction about medication use and asthma symptoms by anyone providing care for the child with asthma. These educational programs need to be age, language, and culturally appropriate and delivered throughout the community in different settings. To ensure sustainability, healthcare providers or other organizations providing asthma education need to have ongoing financial support for these programs. One strategy to support the systematic delivery of this education would be to give providers the ability to bill a child's insurer for the educational services delivered.

Asthma medications and instructions for their use must be available at school, day care and at after-school activities. These settings need to be certified as being "asthma friendly" after staff receives formal training about asthma care and proper inhaler use. The asthma care and education provided in these institutions needs to be facilitated and financially supported so ongoing expertise and certification can be sustained.

Indoor Environment and Pediatric Asthma

Asthma symptoms and severity are affected by environmental factors such as exposure to second-hand tobacco smoke as well as exposure to potential allergens. Indoor environments have an enormous impact on asthma, especially for children who have allergies to dust mites, cockroaches and molds. While Minnesota has some of the strongest building codes in the nation to protect occupant health, more can be done to make indoor environments safer for children with asthma and other respiratory diseases. Smoking legislation and housing policy, especially as it relates to low-income housing, need to be focused on promoting asthma-safe environments.

The Role of Healthcare Providers and Health Plans

It can be difficult to diagnose children with asthma, especially those under age 4. However, it is the responsibility of healthcare providers to make the diagnosis of asthma and assess the severity before proper therapies are prescribed. Primary care providers need to have focused professional education about asthma diagnosis and management, and performance criteria in asthma care should be developed and monitored.

It is essential to establish standard health benefits for children with asthma based on the National, Heart, Lung and Blood Institute (NHLBI) guidelines¹⁰ and guarantee continuous coverage. These benefits would include payments for age-appropriate spacers that hold aerosol medications to be dispensed with the inhalers, as well as asthma education. Extra medications and spacers for school and/or day care also should be covered.

The Need for a Coordinated Approach

As described above, multiple sectors need to be engaged and coordinated to produce a sustainable improvement in asthma outcomes for affected children in Minnesota. Though the scope of this problem seems overwhelming, work has been done at the national level to summarize the key issues and corresponding resources for pediatric asthma. A summary of a

The American Lung Association of Minnesota is offering a preparatory course for asthma educator certification. The certification is sponsored by the National Asthma Education Certification Board, an organization dedicated to increasing asthma awareness and advocating for third-party reimbursement for asthma education. Credentialed professionals that have experience working with patients with asthma, such as nurses, pharmacists, respiratory therapists, and other health care providers will be eligible to be certified as asthma educators. It is anticipated that as asthma education becomes standardized, through this process of national certification, third party reimbursement for asthma education will become available.

For more information, you may go to: <http://www.alamn.org/profed/default.asp>

comprehensive RAND Health study on improving childhood asthma outcomes in the United States was published in May 2002.¹¹ The committee preparing the report identified 11 policy recommendations in two broad categories: (a) improving health care delivery and financing and (b) strengthening the public health infrastructure as the foci of strategies to improve pediatric asthma.

Initiating Change in Minnesota

Several initiatives in Minnesota have focused on improving pediatric asthma through laws and policies; yet there have been only two state laws passed that directly affect children with asthma. In May 2001, the Minnesota Asthma Inhaler Law was enacted. This legislation allows public school students to carry and use their inhalers at school, with certain stipulations. Prior to this law, it was up to each individual school district to make decisions regarding student self medication and the right to carry an inhaler at school. Also, legislation regarding limiting bus idling in front of schools and re-routing bus parking zones away from air-intake vents (or, if necessary, re-locating the air vents) has been passed, but this law has been difficult to interpret and enforce.

Asthma care in schools and day care settings will only happen if there is improved written communication with children's health care providers. As evidenced by the dramatic increase in childhood immunizations through the Minneapolis Public Schools' Healthy Learners Board initiative, "No Shots, No School,"¹² a policy of "No Written Asthma Action Plan, No School (or Day care)" may be as effective in improving written communication between schools, parents, and healthcare providers.

The American Lung Association of Minnesota and the Minnesota Department of Health currently have funding from the Centers for Disease Control and Prevention to begin implementation of projects to improve the quality of life of children in Minnesota with asthma. This includes the implementation through the Minnesota Asthma Coalition, of the statewide plan, developed by Minnesota Commissioner of Health Jan Malcolm's asthma advisory group. The strategic planning process has brought together representatives from multiple sectors to facilitate the creation of linkages and communication strategies needed to develop and maintain an asthma-friendly community. This Coalition will further identify areas where specific policy changes are needed.

As described above, sustainable improvements in asthma outcomes will only be attained through a coordinated, community-wide approach with the overarching policy objective to promote the development and maintenance of asthma-friendly communities. Ultimately, we are working to decrease health disparities and enhance the quality of life of children with asthma in Minnesota.

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Minnesota Targets Inner-City Asthma

Several major studies have shown that asthma rates are higher in inner-city populations. The Minnesota Department of Health, working with the American Lung Association of Minnesota, is taking action to reduce the incidence and severity of chronic respiratory disease among this at-risk population. The two programs described below are funded by grants from the Centers for Disease Control and Prevention. In addition, the Twin Cities **Asthma Intervention for Inner City Children** project receives funds from the Alliance of Community Health Plans, a national group of nonprofit health plans that provide health coverage for approximately 11 million Americans.

- **The Twin Cities Asthma Intervention for Inner City Children** is a four-year program designed to teach inner-city children and their families techniques to help control their asthma. Led by the American Lung Association of Minnesota, a consortium of clinics in Minneapolis and St. Paul will serve 80 children, ages 5 through 11, with moderate to severe asthma. A key part of the program is a masters-level social worker, who teaches families how to better communicate with their doctor and with other family members about asthma. The program will implement the National Cooperative Inner-City Asthma Study protocol (based on a randomized clinical study conducted from 1994-1996) through a single intervention unit. Contact: Janelle O'Brien, (651) 268-7616.
- The American Lung Association of Minnesota in collaboration with the Healthy Learner's Board, a public/private partnership of health care organizations, the Minneapolis Department of Health and Family Support, and the Minneapolis Public Schools, have formed a new coalition called **Controlling Asthma in American Cities**, to develop comprehensive, population-based, pediatric asthma care in Minneapolis and St. Paul. The coalition seeks to expand and refine successful local initiatives targeting childhood asthma. The focus of planning is in the following areas: schools, child care, children with asthma and family education, emergency departments, clinical settings, indoor and outdoor environment, and healthcare provider education. Contact: Jill Heins Nesvold, 651.223.9578.



Working Together: Schools, Clinics and Families Help Control Kids' Asthma

Stephanie Bisson Belseth, RN, MAN, LSN, CPNP
Coordinator, Healthy Learners Asthma Initiative,
Minneapolis Public Schools
Pediatric Nurse Practitioner, Children's Hospitals and
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Among students in Minnesota who attend the Minneapolis Public Schools, (MPS), asthma is the most common chronic health condition. Approximately 12% of MPS students have asthma compared to 7.5% nationally. Some Minneapolis schools have an asthma prevalence over 25%. Asthma is a leading cause of school absenteeism due to chronic illness, and for a child's parents, a major cause of missed work days. However, these consequences can be minimized and children with asthma can lead healthy, active lives if they receive good medical care, take asthma medications as prescribed, and control asthma triggers in their environment.

Healthy Learners Board Asthma Initiative

In 2000-2001, the Healthy Learners Board (HLB)* launched its Asthma Initiative, a pilot program designed to combat health and school problems for students with asthma. Eight pilot schools and seven medical clinics participated in this innovative, comprehensive, community-based model of care to improve asthma control through asthma monitoring at school, school use of individualized written Asthma Action Plans (AAP), and improved education and communication between students, parents,

school staff, primary providers, and/or asthma specialists.

An evaluation of the program revealed that these cooperative efforts improved asthma management and were successful in reducing asthma attacks and absenteeism for students who received enhanced asthma care from the school health office. It also found that students who were poor and also had asthma were at a more significant disadvantage in terms of attendance. *"This program evaluation verifies what we already knew—that asthma adds another barrier to attendance and achievement for students,"* said HLB Co-Chair and MPS Superintendent Carol Johnson. *"The fact that we were able to improve the attendance for students with severe asthma is important because school attendance is linked to academic success. The study clearly demonstrates that working collaboratively with clinics and parents/guardians, we're able to succeed in reducing asthma as a barrier to learning."*

Medical clinic involvement. A key component of the program was assuring that each child had an up-to-date written AAP, which is the standard recommended by the National Institutes of Health, National Asthma Education and Prevention Program.¹ It is completed by the child's primary care provider and includes an individualized emergency protocol and emergency contact information, medications plan, peak flow monitoring ranges, as well as information on environmental triggers. In this pilot project, parental and provider consent was included on the AAP to allow clinics to routinely send/fax the AAP to the schools and to authorize school administration of asthma medication. At the seven participating clinics, use and sharing of students' written AAPs increased

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What is the MCH Program? It is a training program for MPH students who are interested in promoting and preserving the health of families, including women, children and adolescents. The Program is in the Division of Epidemiology in the School of Public Health at the University of Minnesota.

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Who should apply? People who care about vulnerable populations and want careers in program planning and development, evaluation, surveillance, assessment, teaching or research. The program offers a special emphasis on MCH epidemiology for interested students. Clinical professionals, and others with advanced degrees who are interested in administering MCH-related health programs or conducting research projects are also encouraged to apply. Individuals with advanced degrees may have the option of completing the two-year MPH Program in one year.

For further information about the MCH Program. Call 612.626.8802 or 800.774.8636; email gradstudies@epi.umn.edu; or visit <http://www.epi.umn.edu/mch> and <http://www1.umn.edu/twincities/>.

Services Provided through the HLB Asthma Initiative

- Asthma screening through an Annual Health Information Form completed by parent/guardians
- Symptom and peak flow monitoring in the school health office
- Administration of asthma medication at school if needed (quick-relief medication and/or long-term control medicine), as well as support for older students who have the consent and skills to carry and self-administer their asthma medication
- Asthma care according to a Pathway for Acute Asthma Care in the School Setting (consistent with NIH asthma guidelines)
- Communication with parents or guardians and health care providers regarding students' asthma status and needs, in order to best manage students' asthma
- Asthma education
- Development of written individual Asthma Action Plan (done at partnering students' clinics) and use at school
- Family referral to asthma education and environmental assessment in the home by area home visiting/home care agencies
- Referral to asthma camp, community education classes and other community resources and programs
- Referral to resources for health insurance
- Referral to appropriate asthma medical care

tenfold from before to after the pilot. Additionally, there was a 50% increase in availability of written AAPs in the pilot schools compared to control schools. The increase in personalized asthma plans is an important reflection of communication between schools, families, and clinics; and an important way for families, schools and health care providers to be consistent regarding asthma care.

“Health staff are more knowledgeable about best practices for providing asthma care. They know that if a child is coughing, wheezing, or complaining of nighttime symptoms more than twice a week, they are not in good control and need to see their health care provider to adjust their asthma plan. Through the initiative, so many students have gotten the care they need, and as a result are now healthier, happier, able to play sports, and are more likely to be in school learning.”

- Stephanie Bisson Belseth CPNP

School involvement. MPS health staff in the pilot schools received intensive in-service training, skills validation, and ongoing mentoring in state-of-the-art asthma management. Physical education teachers, coaches, principals and teaching staff also received asthma education. The program evaluation showed improvement in the schools' ability to serve children. Furthermore, asthma-related visits to the school health office

changed from acute care visits for asthma attacks to more preventive care visits for education, symptom monitoring and lung peak flow readings. More students took preventive asthma controller medications, and asthma medications were available at school for more students in the intervention schools than the control schools. In fact, all asthma visits to the health office were significantly lower in the intervention schools compared to control schools, indicating students were learning to control their own asthma.

Based on findings from the pilot project, the HLB Asthma Initiative was expanded to all elementary and middle schools in the MPS in 2001-2002. Currently, the program is being modified for use/expansion to the high schools, as well to the MPS before-and after-school childcare program, *Minneapolis Kids*.

As a result of the HLB Asthma Initiative, clinics and schools have a heightened awareness of the importance of good asthma management and of the importance of a strong partnership between schools, clinics, families and children/youth. Because the vast majority of children and teens with asthma are in school and thus accessible, a school-based initiative can serve as a unique safety net for children who have asthma. Working together, schools, health care providers and parents/guardians can make significant differences for the quality of life of children and teens with asthma.

*The Healthy Learners Board is a partnership of the Minneapolis Public Schools and 28 public and private health care providers and community organizations, which was established in 1997 to improve academic achievement of students by improving their health.

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HLB Asthma Initiative in Action

Amy is 12 years old and has asthma. As a result of coordinated efforts of the HLB Asthma Initiative, Amy's mother receives a phone call and/or an *Asthma Visit Notification* form any time Amy is in the school health office with asthma symptoms. At the same time, Amy's primary care provider or specialist receives a phone call and/or *Asthma Medical Request* form (from the school nurse) to notify them that Amy is having consistent and worrisome asthma symptoms at school and/or that an updated Asthma Action Plan may be needed.

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