Asthma is a growing problem among all children, but it is greatest among minority children. The second National Health and Nutrition Examination Survey (NHANES II) of the National Center for Health Statistics found that asthma prevalence rates are significantly higher for black than for white children and for boys than for girls, regardless of whether the definition is (1) ever having asthma diagnosed by a physician, (2) currently having asthma diagnosed by a physician, (3) wheezing within the past 12 months, (4) ever having been diagnosed with asthma plus wheezing, or (5) currently diagnosed with asthma plus wheezing.

Fewer data are available for Hispanic than for black subjects, partly because Hispanics have traditionally been included in the white population. The NIAID National Cooperative Inner-City Asthma Study in progress should provide a better measure of the problem in Hispanic children, but we have reason to believe that asthma is also a greater problem for Hispanic than for white persons.

Hospital discharge rates and mortality data indicate that minority children are also experiencing more severe asthma. For example, in 1985, the discharge rate for asthma among children up to 14 years old was 48 per 100,000 population. By 1988, discharge rates had escalated to 66 per 100,000, and rates for nonwhite children were approximately twice the rates for white children.

At Children's Memorial Hospital in Chicago, hospitalizations for childhood asthma have increased by 6% per year since 1985. On average, the hospital admits at least 5 children per day for asthma; the asthma admission rate is greater than that for any other common medical condition. Over one half of the asthma admissions are black and Hispanic children, and the proportion of these minorities is increasing, while that for white subjects is declining. Black and Hispanic children are about evenly represented, but more boys are admitted than girls.

Age-specific death rates for asthma in children are about the same for boys and girls, but the death rate is 0.7 per 100,000 population in black 5- to 14-year-old children, while it is only 0.1 in white children in the same age group. The death rate for asthmatic children in Chicago and Cook County is among the highest in the nation. Between 1982 and 1985, Cook County had an average annual mortality of 6.6 deaths per 100,000 population compared to the national average of 3.5 deaths per 100,000 population. Other areas of excess mortality include New York City, Maricopa County, Arizona, and Fresno County, California.

Childhood asthma is a serious health issue in major cities and other areas with large minority populations. As yet, research has not determined the exact relationship between generally known risk factors and the present increase in asthma-related morbidity and mortality among minority children, but there is evidence that sociologic, psychologic, and environmental—as well as medical—factors are involved.

Poverty

Poverty and all its ramifications undoubtedly impact upon the health of our inner-city populations. In fact, even early studies noted that the disproportionate number of black subjects hospitalized for asthma might be due, at least in part, to poverty and not race. At 2 Washington, D.C.-area hospitals serving low-income populations, black children admitted for asthma were overrepresented compared to their numbers in the population. However, at a third hospital, which served a more prosperous area, the ratio of black to white admissions was similar to the ratio of blacks to whites in the population.

More recently, Wissow and co-workers investigated hospital discharges for asthma in Maryland for children aged 1 to 19 years. The discharge rate was 3.75 per 1,000 for black children compared to 1.25 per 1,000 for white children. Both black and white Medicaid-enrolled children had increased discharge rates for asthma compared to those using other forms of payment. In the poorest black areas, the discharge rate was more than 10 times that of the most affluent white areas.

When discharge rates for pneumonia, gastroenteritis, tonsilllectomy, and inguinal hernia repair were compared with those for asthma, asthma was the only condition for which the discharge rate was higher among black patients. Asthma also had the strongest association between poverty and discharge rates. After adjustment for poverty, black and white children had almost equal asthma discharge rates.

Other studies have shown that poverty is associated with an increased prevalence of chronic illness and increased childhood mortality. Definitive evidence is lacking to link poverty and asthma prevalence, but poverty has been associated with underdiagnosis and reduced use of preventive care for asthma. Failure to use preventive care may be at least partially related to a lack of means to pay for it. Estimates of the cost of asthma to the family range from 2.1% to 30.1% of family income. Twenty years ago, paying the average cost of severe asthma took about 18% of a family's yearly income. Given the tremendous rise in medical costs, this percentage is likely to be much higher today, especially for those who have neither insurance nor Medicaid eligibility.
ENVIRONMENTAL RISK FACTORS

There are many differences in the living conditions of low-income and high-income families. Environmental risk factors that may place inner-city children at increased risk for asthma include smoking, air pollution, overcrowding, poorly vented heating and cooking gases, presence of house-dust mites and vermin, and presence of pets. Of these, all but pets are probably greater problems among the poor than among the more affluent. However, even pets have a different status in an environment of poverty. For example, a large dog often provides an element of safety that a family may be loath to give up. In the same way, cats are used to keep down the vermin population. So giving away a pet may introduce new problems for inner-city families.

Smoking

The evidence is mounting that passive smoking has harmful effects. While cigarette smoking is declining overall in the United States, it remains a serious problem among those with lower educational and socioeconomic status.

Smoking is decreasing at a lower rate among women. In fact, until recently, the rate of smoking was increasing among women in the least-educated population. Females are also beginning to smoke at a younger age. In 1987, 26% of women aged 18 to 24 smoked as did 31% of those aged 25 to 44. In these age groups, approximately twice as many women with less than a high-school education smoked than did college graduates.

In a report released in June of 1991, HHS Secretary Louis W. Sullivan, M.D., said that the risk of fair or poor health is almost twice as great for children who live in households with current smokers as it is for children who are never exposed to cigarette smoke. About one half of all children 5 years old or younger in the United States have been exposed to cigarette smoke, and more than a quarter of all young children have been exposed to passive smoke both before and after birth. Children in families with incomes under $10,000 are about twice as likely to have been exposed to smoking than children whose family income is $40,000 or more. Children from lower-income families are also more likely to have fair or poor health.

In the HHS report, race was a factor in the degree of exposure. Black children were most likely to have ever been exposed to environmental smoke. In this study, being of Hispanic origin lessened the risk as compared to either being black or white non-Hispanic, and children of Mexican-American derivation were least likely to have been exposed. It remains to be seen whether other studies will support these findings, particularly in regard to the lower exposure of Hispanic subjects. If it is true that Mexican-Americans have the lowest rate of exposure, then we might look for the reasons in the cultural practices among this population.

In a recent study of asthmatic children from low-income families, David Evans and colleagues found that passive smoking was positively associated with the frequency of Emergency Room visits but not with hospitalization or abnormalities in pulmonary function. The annual percentage of increase in emergency room visits was 63% greater in smoking than in nonsmoking households. Such an increase has a considerable impact upon the use of emergency room facilities and certainly upon health care costs. Evans et al. estimated that the annual health care cost for emergency asthma care of children attributable to smoking is $92 per family with 1 or more smokers. Projected over the number of children requiring excess ER visits, this adds up to a substantial expenditure of scarce healthcare dollars.

Air Pollution

Exposure to other outdoor and indoor air pollutants may be greater for minority children. These children often live near expressways and factories where concentrations of pollutants from cars and smokestacks are high. Indoor pollution results from use of supplementary kerosene space heaters, inadequate venting of heating and cooking gases, and use of homemade cleaning products that often combine several caustic chemicals with irritating fumes.

In New York City, Bhat and co-workers found that 80% of the homes of clinic patients were exposed to air pollution from factories, highways, or garbage disposal sites. In contrast, only 46% of private patients lived in homes with such exposure. Furthermore, only 15% of clinic patients had air conditioning to help filter out pollutants, whereas 76% of private patients had it. Nearly one fourth of clinic patients also had inadequate heat and/or hot water. Only 8% of clinic patients lived in private homes vs 60% of private patients. Most (62%) clinic patients lived in rented apartments or housing projects (27%). Only 24% of private patients lived in rented apartments, and none lived in housing projects.

Mites and Other Vermin

Infestation with pests such as roaches, mites, bed bugs, rodents, and mosquitoes are greater problems among the poor than among the more affluent. Bhat and colleagues found that pests were a problem for only 12% of private patients, while 46% of clinic patients lived in homes with pest infestations.

PSYCHOSOCIAL RISK FACTORS

Stresses of inner-city living are likely to increase psychosocial risk factors for asthma. Most inner-city neighborhoods where poor people live are dangerous, crime-ridden places. Drug-dealing is rampant, and gangs are often in control. Almost every day in any major city, there are reports of innocent bystanders being hit by stray bullets during gang shootouts. Many parents find it difficult to cope with these and other poverty-related stresses, and some turn to alcohol and drug abuse to escape their problems. Often family and community support structures are lacking. In such an environment, many already unskilled parents become punitive or disengaged. Pressures of daily living may leave them with little time or inclination to see that children comply with medical treatment.

Ignorance of asthma and its treatment is likely to be more common among lesser educated and younger parents. Also, cultural practices may interfere with parents seeking medical care or complying with treatment. Some families may turn to folk remedies or "healers" for example.

Stresses of inner-city living are not confined to parents. Many children have symptoms of anxiety, aggression, and depression. In the teen years, peer pressure to deal drugs or join gangs can be enormous. At least 1 study has found that aggression, anxiety, and depression are risk-factors for...
asthma mortality.17

INADEQUATE ACCESS TO HEALTHCARE

Another important factor often cited for greater risk of severe asthma in the inner city is lack of access to health care. The emergency department at a nearby hospital commonly serves in lieu of a primary care physician for minority families, but many inner-city hospitals have closed in recent years. Even when health care facilities are available, minority parents often have troubling accessing services. In order to reach a hospital or clinic, inner-city mothers must often take all their children (not just the asthmatic one) on public transportation, perhaps changing buses several times, and then wait for hours for service in an overcrowded, overworked facility. If she works, the mother may find the clinic isn't open at all during the hours when she is free to take the child. If there is a language problem, there may be no one to translate instructions at the clinic.

Most problems with inadequate access to health care are related to money. Neither the provider services nor the inner-city family has enough of it. In these circumstances, we need to make the most efficient use of the health care dollars we do have. In many cases, this means reducing the need for clinic or ER services through better parent/patient education, aggressive treatment protocols, and improved patient compliance.

COMPLIANCE

Several studies have found that the principal factor related to compliance is the simplicity of the medication regimen.18,19 However, if compliance with treatment is viewed as simply one aspect of coping with the disease, compliance might also be related to family function, education and characteristics, and the child's personality and self-concept. One study demonstrated that children with 8 or more years of formal education are more compliant with asthma therapy than those with fewer years of formal education.20 The same study found a positive correlation between perceived severity of illness in asthmatic children and compliance with the drug regimen.

Family characteristics that have been studied include the presence of 1 or 2 parents, number of children in the family, position of the patient in the family, the occurrence of illness in siblings, the educational level of parents, communication problems, ethnic background, and socioeconomic status.18 Findings have sometimes been contradictory, but compliance seems to be reduced when multiple caretakers are responsible for administering drugs,41 but when parents work or are otherwise absent, the task of administering medication is often left to the child himself, to older siblings, or to day-care workers. Increased compliance is also related to the presence of parents in the home18 and parents accompanying children to clinic.42 Other than having more flexible clinic hours, there is little that healthcare workers can do about these circumstances. However, the practitioner can try to make parents and patients understand the severity of the illness, take time to answer questions, provide simplified instructions for taking medications, and schedule follow-up care.

Christiaansen and co-workers43 evaluated 38 chronically asthmatic children on 3 measures of psychosocial and family adjustment. Most of the children were from disadvantaged backgrounds. The study found that a combination of psychologic adjustment, degree of family conflict vs cohesiveness, and the interaction of these 2 variables were predictive of compliance as measured by mean theophylline levels. Neither race nor age was related to any of the psychosocial variables, but nonintact families had higher indices of family conflict. Socioeconomic status was inversely related to the number of behavior problems that the child had.

CASE MANAGEMENT

The prospects for the minority asthmatic child may appear to be bleak, given the lack of resources for ameliorating problems confronting these children and their families. However, there has been some promising research. Several studies have developed models of improved care that might reduce costs associated with use of acute-care facilities. For example, Wissow and co-workers21 found that when they used case management and quality assurance for the care of 88 asthmatic children, use of acute care dropped 50% compared with a control period.

When interviewed before the study, 10% of parents said they had no medication in the home. Sixty-three percent said the only way they could get medication refilled was to go to the medical-care site to pick up a prescription, and 47% had to rely on a borrowed car or public transportation to get there. All but 1 parent could name at least 1 stimulus that triggered their child's asthma, but 45% thought that wheezing attacks could not be prevented. In 75% of the households, there was at least 1 smoker.

Most families who had no medications in the house at the initial interview did, in fact, have prescriptions, but in 2 cases, no medications had been prescribed. Overall, the Wissow et al study20 found 56 prescribing errors. Most commonly, prescription deficiencies involved failure to plan for acute episodes of wheezing; 61% of patients who received continuous medication had no additional prescription for acute use. Some patients receiving as-needed medications had been given only long-half-life theophylline medications. The delayed absorption of these preparations makes them less useful once wheezing has started. Other patients were prescribed theophylline doses that were either too low or too high. One possible reason for the prevalence of under-prescribing is that practitioners may be reluctant to provide aggressive therapy for inner-city patients because they fear that medications will be overused.

If sufficient medication is prescribed, case management has the potential to conserve scarce healthcare dollars by reducing utilization of acute-care facilities. However, the cost of the program has to be kept relatively low in order to realize savings.

PATIENT/PARENT EDUCATION

Expanded patient/parent education is another comparatively low-cost method of improving compliance and quality of life for asthmatic inner-city children. In particular, practitioners should be aggressive about promoting smoking abstinence. In addition to exacerbating asthma itself, smoking is related to a more frequent occurrence of several acute respiratory diseases, including pneumonia, bronchitis, and respiratory syncytial viral infection.22,23
Approaches that might be effective in inducing parents to quit smoking include providing verbal or written information on the effects of passive smoking, showing educational videos in the office, dispensing information on available smoking-cessation programs, and prescribing nicotine chewing gum or patches. A mother's pregnancy is an opportune time to promote smoking cessation. If smokers will not quit, they should be counseled to at least avoid smoking around children, especially in confined spaces like automobiles and closed rooms.

Clark and co-workers studied the impact of teaching home management on the frequency of use and cost of health care in a population of low-income asthmatic children. When cases and control subjects were compared without regard to previous hospitalizations, cases did not have significantly reduced health care use, but when the comparison was restricted to children who had been hospitalized during the preceding year, the experimental group had significantly reduced use of the emergency room compared to control subjects. The experimental group also had a significantly greater reduction in the mean number of hospitalizations during the follow-up year. For children with 1 or more hospitalizations, the program provided a savings of $11.22 for every $1.00 spent to deliver health education.

Case management and better patient/parent education may play larger roles in the future management of asthma in minority children, but reversing the upward spiral in morbidity and mortality will not be easy, especially in the present climate of cost-containment. Findings from the current NIAID National Cooperative Inner-City Asthma Study and other research efforts may provide guidelines for the wisest expenditure of scarce health care dollars. Our goal should be to give minority asthmatic children the same opportunity to live normal lives as we have been able to provide for most of their more affluent counterparts.

REFERENCES