

Prevalence, Impact, and Trends in Childhood Disability Due to Asthma

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Background: Although not widely recognized as such, asthma is the single most prevalent cause of childhood disability and has contributed to a substantial rise in the overall prevalence of disability among children during the past 25 years.

Objective: To provide a national profile of the prevalence, impact, and trends in childhood disability due to asthma. (Disability is a 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.)

Methods: We derived our primary findings from a cross-sectional, descriptive analysis of 62 171 children younger than 18 years who were included in the 1994-1995 National Health Interview Survey.

Main Outcome Measures: Outcome measures include the presence of disability, degree of disability, restricted activity days, school absence days, and use of hospital and physician services. We also used data from the 1969-1970, 1979-1981, and 1994-1995 National Health Interview Surveys to assess trends in the prevalence of disability due to asthma.

Results: A small, but significant, proportion of children, estimated at 1.4% of all US children, experienced some degree of disability due to asthma in 1994-1995. Prevalence of disability due to asthma was higher for adolescents (odds ratio [OR], 1.64), black children (OR, 1.66), males (OR, 1.23), and children from low income (OR, 1.46) and single-parent families (OR, 1.37). Disabling asthma resulted in an annual average of 20 restricted activity days, including 10 days lost from school—almost twice the level of illness burden as experienced by children with disabilities due to other types of chronic conditions. Finally, prevalence of disabling asthma, as reported in the National Health Interview Survey, has increased 232% since 1969, the first year that electronic data are available from the survey. In contrast, prevalence of disability due to all other childhood chronic conditions increased by 113% over the same period.

Conclusions: Disabling asthma has profound effects on children. The social costs of asthma are likely to rise in the future if current trends in the prevalence of disabling asthma continue.

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Editor's Note: Now we need to figure out why the prevalence of disabling asthma has been rising so markedly; too many bad air days?

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CHILDHOOD disability has increased dramatically over the past 4 decades. According to the National Health Interview Survey (NHIS), the prevalence of disability, as indicated by the presence of a limitation in usual childhood activities due to a chronic condition, has increased from 2.6% of noninstitutionalized children younger than 18 years in 1969 to 6.3% in

1995.^{1,2} Researchers have identified several possible explanations for the increase in reported disability.³⁻⁵ A portion of this increase has been attributed to changes in data collection procedures for the NHIS.^{2,3} However, most of the increase is due to other factors. These include changes in awareness and ascertainment of disability, and shifts in the distribution of underlying risk factors. A portion of this increase may also be due to changes in host resistance and disease severity.²⁻⁵

Asthma is the single most prevalent cause of childhood disability and has accounted for much of the recent rise in disability among children. However, little has been written about the contribution of asthma to the upward trend in childhood disability.³⁻⁵ Moreover, although statis-

MATERIALS AND METHODS

DATA SOURCE AND SAMPLE DESIGN

The information presented in this article is based on data from the NHIS, a continuing nationwide cross-sectional survey conducted through household interviews by the US Bureau of the Census for the National Center for Health Statistics.^{1,6} Because the NHIS sampling plan is designed to be representative of the US noninstitutionalized population of households, the results presented here are potentially more generalizable than localized survey results. Our principal findings are drawn from analyses of combined NHIS samples for 1994-1995, which comprised 87 529 households composed of 218 646 individuals. All children younger than 18 years (N = 62 171) were incorporated in this analysis, including 939 children with limitations in their activities due to asthma and 3119 children with limitations in their activities due to other chronic conditions. We use the 1969-1970, 1979-1981, and 1994-1995 NHIS data sets to describe trends in the prevalence of disabling asthma. The NHIS response rate exceeded 90% in every survey year used in this analysis.

Results presented in this article are representative of the US civilian, noninstitutionalized population. Persons residing in institutional settings, such as long-term care facilities are excluded; thus, the reported number and proportion of children with disability due to asthma might have been higher had we included the population living in institutions. However, the number of children residing in health-related institutional facilities is small—estimated at 92 000 in 1990, or 0.14% of all children younger than 18 years. Moreover, almost all these children are housed in facilities for the mentally disabled.⁷

MEASURING DISABILITY DUE TO ASTHMA

The NHIS categorizes children as limited in their activities in the NHIS when the ability to perform the usual activities associated with their age group, such as attending school or engaging in play, is compromised by a chronic condition. The terms “limitation of activity,” “activity limitation,” and “disability” are used interchangeably in this article.

The segment of the questionnaire used during 1994-1995 to identify children whose activities are limited is shown in **Figure 1**. For all sample children younger than 17 years, the respondent is an adult member of the household, usually the mother. After classifying children according to major activities appropriate for their age—those relevant to preschool-aged children (play) and school-aged children (school)—a series of interview questions is used to classify children into 4 groups according to the degree of limitation on their activities imposed by chronic conditions, ranging from complete inability to carry out their activities to no limitation of activity, as shown in **Table 1**.

If any level of activity limitation is reported, additional probes are used to identify the condition(s) responsible for the limitation. Conditions that limit activity are then classified as either primary or secondary causes (based on respondent perceptions) if more than one is reported. Children were classified as disabled due to asthma only when asthma was cited as the main cause of an activity limitation.⁶

MEASURING THE EFFECTS OF DISABILITY DUE TO ASTHMA

We use several indicators collected in the NHIS to describe the severity and impact of disability on affected children, the educational system, and their use of the health care system. Two measures are used to characterize the impact of disability on affected children: First, we assess the degree to which disability limits participation in age-specific social roles over the long-term. That is, whether the child is reported to be unable to engage in school or play; is limited in school or play activities; or is limited in other activities. Second, we assess the average annual number of restricted activity days caused by disabling conditions. These are days when a child curtails his or her usual activities; they can include bed days, school absence days, and other days when usual activities are restricted by illness.

Two measures are given to describe the impact of disability on the educational system: First, we estimate the proportion of children who were reported to be either unable to attend school or limited in school attendance over the long term because of their disability. Second, we assess the average annual number of school absence days attributable to disabling conditions.

We also give 2 measures of the impact of disability on children's use of the health care system: annual volume of physician contacts, and percentage of children with a hospitalization in the past year. The NHIS questionnaire is structured to record utilization of these services for all reasons rather than being limited to encounters directly related to the child's disabling condition. Consequently, we assess the impact of disability indirectly by comparing utilization rates for children with a disability due to asthma with rates for children with disability due to other conditions and to children with no disabilities.

STATISTICAL ANALYSIS

The NHIS uses a complex sample design, and estimates are statistically weighted to obtain estimates for the US civilian, noninstitutionalized population.^{1,6} We used standard methods that incorporate sample design considerations, including weighting and household clustering, to compute SEs for prevalence and population characteristics.⁸ Unless otherwise specified, all comparisons given in the text were statistically significant at the .05 level or higher.

tics on the prevalence and impact of disability from all causes combined are routinely published from the NHIS,¹ data are not generally available for individual conditions that cause disability for children, like asthma. Consequently, little is known about the etiol-

ogy of disabling asthma or its impact on health and social well-being of affected children.

We address these issues by providing a current profile of children with disability due to asthma. Combining results for several NHIS electronic data sets span-

Under 5 years:

Is _____ able to take part AT ALL in the usual kinds of play activities done by most children _____ age?

Is he limited in the kind of amount of play activities _____ can do because of any impairment or health problem?

Age 5-17 years:

Does any impairment or health problem NOW keep _____ from attending school?

Does _____ attend a special school or special classes because of any impairment or health problem?

Does _____ need to attend a special school or special classes because of any impairment or health problem?

Is _____ limited in school attendance because of _____ health?

All ages responding NO to the above probes:

Is _____ limited in ANY WAY in any activities because of an impairment or health problem?

Figure 1. Extraction of questions asked on the National Health Interview Survey. From the National Health Interview Survey questionnaire 1994-1995.¹

ning more than 25 years, we describe trends in the prevalence of disabling asthma nationally and assess the impact of asthma-related disability on children, the educational system, and the health care system. Throughout, we compare children with disabilities due to asthma to children with disabilities due to other chronic conditions.

RESULTS

SOCIAL AND DEMOGRAPHIC CORRELATES OF DISABLING ASTHMA

According to the NHIS, 1.4% of US children younger than 18 years, or 996 000 children nationally, experienced some degree of disability due to asthma in 1994-1995 (**Table 2**). The degree of disability ranged from children who were unable to engage in school or play activities (0.2% of all children), to those who were limited in the amount or kind of school or play (0.5% of all children), and those who were able to engage in their main activity but limited in other activities such as after school sports (0.7% of all children). Another 5.0% of children, or about 3.5 million children nationally, were limited in their activities due to chronic conditions other than asthma. The most prevalent conditions in the group without asthma included mental retardation, mental and nervous system disorders, orthopedic impairments, and hearing and vision impairments.

Prevalence of disabling asthma increases with age, particularly after age 5 years (Table 2). However, the social role activity used to assess limitation in the questionnaire changes from play to school for children reaching school age (Figure 1). Hence, the observed increase in prevalence of disabling asthma at age 5 years may reflect the added demands placed on asthmatic children as they enter school, rather than an age-related progression in the severity of asthma. Disabling asthma was also more prevalent among boys, black children, chil-

Table 1. Classification of Children According to Degree of Disability

Children unable to conduct their major activity
Preschool aged: Unable to take part in ordinary play
School aged: Unable to attend school
Children limited in the amount or kind of major activity performed
Preschool aged: Limited in amount or kind of play with other children; eg, need special rest periods, cannot play strenuous games, or cannot play for long periods
School aged: Limited to certain types of schools and classes or in school attendance; eg, need special schools or special classes or cannot go to school full time, or for long periods
Children not limited in major activity but are otherwise limited
Preschool aged: Not limited in play activities but limited in other activities
School aged: Not limited in school activities but limited in other activities
Children not limited in activity
All ages: May or may not have chronic conditions but are not limited in any of the ways described above

dren in single-parent families, and children in families with incomes below the federal poverty level. Prevalence of disabling asthma did not vary significantly by family size or by region.

Some of these demographic and socioeconomic differences in prevalence of disabling asthma may be the result of the confounding effects of one variable on another. For example, the higher prevalence found for single-parent families may reflect the fact that single-parent families tend to have lower incomes than 2-parent families. We conducted a multiple logistic regression analysis to identify those socioeconomic and demographic variables that were independently associated with prevalence of disabling asthma. The results, given in Table 2, indicate that age, sex, family income, and family structure each independently predict disability due to asthma. Black children also continue to demonstrate a higher likelihood of disability due to asthma than white children after adjustment for the potentially confounding effects of these other sociodemographic variables.

COMPARISON OF CORRELATES FOR DISABILITY DUE TO ASTHMA AND OTHER CONDITIONS

A comparison of the adjusted odds ratios given in Table 2 indicates the social and demographic correlates of disability due to asthma are similar to those for disability due to other chronic conditions. In both cases, age, race, sex, family income, and family structure are associated with an elevated risk of disability, while family size and region are not. However, there are some important distinctions. First, the effects of age, sex, family income, and family structure on risk of disability appear more pronounced for children with disability due to other chronic conditions. For example, there is a more pronounced age effect for disability due to conditions other than asthma. Second, there is a striking difference in the association of race with risk of disability; black children are at greater risk of disabling asthma, while white children are at greater risk of disability due to other conditions. More gener-

Table 2. Prevalence of Disability Due to Asthma and Other Chronic Conditions Among US Children Younger Than 18 Years, 1994-1995*

Characteristic	Prevalence of Asthma†				Prevalence of Other Chronic Conditions			
	Cases per 1000	SE	Adjusted OR‡	95% CI	Cases per 1000	SE	Adjusted OR‡	95% CI
Degree of limitation								
All	14.2	0.6	NA§	NA	49.6	1.1	NA	NA
Unable to conduct major activity	1.7	0.2	NA	NA	5.1	0.3	NA	NA
Limited in amount or kind of major activity	5.4	0.4	NA	NA	34.0	0.9	NA	NA
Limited in other activities	7.1	0.6	NA	NA	10.6	0.5	NA	NA
Age, y								
<6	10.4	0.8	1.00	NA	22.2	1.1	1.00	NA
6-11	16.0	1.0	1.56	1.28-1.90	60.4	1.9	2.84	2.51-3.22
12-17	16.3	0.9	1.64	1.34-2.01	68.3	2.1	3.23	2.84-3.68
Race and ethnicity								
White, non-Hispanic	12.0	0.6	1.00	...	50.7	1.3	1.00	...
Black, non-Hispanic	23.7	2.0	1.66	1.33-2.07	57.8	3.1	0.83	0.72-0.95
Other, non-Hispanic	9.1	2.0	0.74	0.48-1.17	28.8	3.8	0.53	0.40-0.71
Hispanic	15.3	1.4	1.17	0.92-1.48	42.5	2.7	0.71	0.61-0.83
Sex								
Males	15.7	0.8	1.23	1.06-1.44	60.6	1.6	1.67	1.54-1.82
Females	12.5	0.8	1.00	...	38.2	1.2	1.00	...
Family income								
Poor	22.0	1.5	1.46	1.20-1.76	74.1	2.9	1.77	1.58-1.99
Nonpoor	12.4	0.6	1.00	...	43.8	1.1	1.00	...
Family structure								
1 Parent	21.2	1.3	1.37	1.13-1.66	70.5	2.5	1.49	1.34-1.65
2 Parents	11.7	0.6	1.00	...	42.5	1.1	1.00	...
Family size								
<5	14.9	0.7	1.18	1.00-1.39	49.9	1.3	1.02	0.93-1.12
≥5	13.1	0.8	1.00	...	49.3	1.7	1.00	...
Region								
Northeast	15.2	1.4	0.99	0.79-1.26	48.2	2.5	1.03	0.89-1.19
Midwest	14.1	1.2	0.94	0.73-1.21	52.6	2.0	1.06	0.93-1.21
South	13.6	0.9	0.80	0.64-1.00	51.5	2.0	1.04	0.91-1.18
West	14.3	1.1	1.00	...	44.9	2.0	1.00	...

*Source: National Health Interview Survey tabulations for 1994-1995.

†Restricted to cases where asthma was cited as the main cause of limitation.

‡Odds ratios (ORs) for each independent variable are adjusted for all remaining independent variables in the table.

§NA indicates does not apply; ellipses, reference category.

ally, membership in a racial or ethnic minority group seems to confer a protective effect against disability due to chronic conditions other than asthma.

IMPACT OF DISABILITY DUE TO ASTHMA ON THE CHILD

Disabling asthma has pronounced effects on children's health status (**Table 3**). On average, children with disabilities caused by asthma were restricted in their daily activities slightly less than 3 weeks per year. Restricted activity days reflect a reduction of activity below a child's normal capacity and include days spent ill in bed or hospitalized and other days when a child must cut down on usual activities for most or all of the day. This estimate includes only those days of restricted activity that are caused by asthma. Children may have additional restricted activity days as a result of other acute and chronic conditions. Severity of disability, as indicated by degree of limitation, is also given in Table 3. Approximately 1 in 8 children with disabling asthma was so severely disabled as to be unable to conduct age appropriate school or play activities.

IMPACT OF DISABILITY DUE TO ASTHMA ON THE EDUCATIONAL SYSTEM

Disabling asthma has substantial effects the US educational system (Table 3). The impact of disabling asthma is expressed here by rates of health-related school absences and long-term attendance problems due to asthma. During 1994-1995, disabling asthma caused an average of 9.7 school absence days annually. Because these are in addition to school absences for other acute and chronic conditions, they represent the added burden caused by disabling asthma. Furthermore, an estimated 40% of children with disabling asthma were reported as being either unable or limited in their ability to engage in school activities.

IMPACT OF DISABILITY DUE TO ASTHMA ON CHILDREN'S USE OF THE HEALTH CARE SYSTEM

Disabling asthma is associated with substantial use of physician and hospital services (Table 3). On average, children with disabling asthma were reported to have 9.2 physician contacts annually. One (13.6%) in 7 chil-

Table 3. Effects of Disability Due to Asthma and Other Conditions Among US Children Younger Than 18 Years, 1994-1995*

Effect	Children					
	With Disability Asthma (n = 939)		With Other Disability Conditions (n = 3119)		Without Disability Conditions (n = 58 113)	
	Estimate	SE	Estimate	SE	Estimate	SE
On the child						
Restricted activity days in past year due to disability	19.9	2.3	11.8†	1.0	NA	NA
Percentage unable to conduct major activity	12.1	1.0	10.2	0.6	NA	NA
On the education system						
School absence days in past year due to disability	9.7	1.5	5.3†	0.6	NA	NA
Percentage limited in school attendance or unable to attend	40.0	2.0	15.9†	0.8	NA	NA
On the health care system in the past year						
Physician contacts	9.2	0.7	8.3	0.4	2.8†	<0.1
Percentage hospitalized	13.6	1.2	9.3†	0.6	2.5†	0.1

*Source: National Health Interview Survey tabulations for 1994-1995. NA indicates not applicable; measure applies only to children with disabilities.

†Estimate is significantly different from children with disabling asthma at the .01 level.

dren with disabling asthma were hospitalized at least once over the course of a year. Because we were only able to assess use of hospital and physician services and not other specialized services or prescription medications, these estimates provide a conservative assessment of the effects of disabling asthma on the health care system.

COMPARISON OF THE IMPACT OF DISABILITIES DUE TO ASTHMA AND OTHER CONDITIONS

Children with disabling asthma experience more substantial consequences than children with disabilities due to other chronic conditions. This is especially true for restricted activity days (19.9 vs 11.8 days), school absence days (9.7 vs 5.3 days), and the percentage of children limited in school attendance (40.0% vs 15.9%). The pattern of differences for the other indicators in Table 3 is consistent with the notion that disability due to asthma has greater impact on the child, the educational system, and the health care system than disability due to other causes.

TRENDS IN THE PREVALENCE OF DISABILITY DUE TO ASTHMA

Electronic data from the NHIS needed to estimate the prevalence of disability due to asthma first became available beginning with calendar year 1969 and continuing through 1995. Over this 26-year period, the prevalence of disability due to asthma increased 232%, from 431 per 100 000 to 1433 per 100 000, as shown in **Figure 2**. During this same period, the prevalence of disability due to causes other than asthma increased from 2249 per 100 000 to 4800 per 100 000, an increase of 113%. Hence, prevalence of disability due to asthma has grown at a much higher rate than prevalence of disability due to other childhood chronic conditions.

COMMENT

Although only 1.4% of US children experienced disabling asthma in 1994-1995, the analysis revealed that

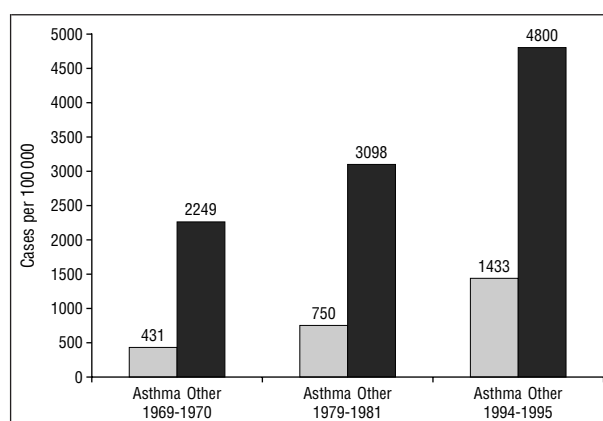


Figure 2. Trends in prevalence of disability due to asthma and other conditions among US children younger than 17 years. Prevalence data are annualized. From the National Health Interview Survey.

prevalence varies substantially according to the demographic and socioeconomic characteristics of children. In particular, older children, boys, black children, children from impoverished families, and children living in single-parent households all exhibited a significantly higher prevalence of asthma-caused disability. Excluding race, a similar pattern was observed for disability caused by conditions other than asthma, suggesting that age, sex, and the economic and social environment of children may be universally related to the occurrence of disability.

This finding of a strong association of socioeconomic disadvantage with disability due to asthma, even after using multivariate analysis to adjust for confounding, is consistent with results from previous studies. For example, recent studies of the association between childhood asthma and socioeconomic status in industrialized countries have concluded that although an association between childhood asthma and socioeconomic status cannot be clearly documented when all levels of severity are combined, strong gradients exist between severe asthma and socioeconomic status.^{9,10}

These findings, suggesting that socioeconomic status is a critical determinant of disabling asthma, have important implications for prevention and treatment policy. The higher prevalence of disability due to asthma among children from low-income, black, and single-parent households indicates that targeting these families for secondary prevention and rehabilitation may represent an important approach to ameliorating the adverse impact of asthma. This may be especially important given historic disparities in access to comprehensive care.^{11,12}

OUR FINDINGS indicate prevalence of disability due to asthma has increased more than 3-fold over the past quarter century. Moreover, prevalence of asthma-related disability is increasing at a much faster rate than disability due to other causes. The rise in prevalence found in this study is consistent with findings of a variety of independent studies of asthma prevalence trends conducted in the United States and other industrialized countries.¹³⁻¹⁸ However, because the trend data reported here are based on household surveys without clinical verification, the extent to which the results reflect a genuine increase in prevalence must be carefully evaluated. Some part of this trend may be explained by changes in survey methods, changes in parental perceptions of asthma and disability, changes in diagnostic criteria and in the willingness of physicians to label a child with asthma, or changes in the distribution of underlying social and environmental risk factors for asthma. The potential contribution of these factors in explaining the upward trend is discussed briefly below.

Changes in survey procedures seem to account for a small part of the overall increase in prevalence. During the 25-year study period, the survey design and administration have remained remarkably constant, except for one important change. In 1982, the questionnaire items on limitation of activity were repositioned in the NHIS instrument and some of the survey questions were reworded. No published data are available on prevalence of disability due to asthma immediately before and after the changes were made. However, prevalence of disability from all causes for children increased from 3.8% in 1981 to 5.1% in 1983. Assuming that all of this change in prevalence was attributable to adaptations in survey procedures and that prevalence of disability due to asthma followed the pattern for disability from all causes, we estimate that the shifting and rewording of questionnaire items could explain no more than one fourth of the 3-fold increase in prevalence of disability due to asthma observed from 1969 to 1995.

Assessing the impact of changes in respondent perceptions of asthma and disability is more difficult. Prevalence estimates based on household interviews like those contained in the NHIS are, in fact, subject to biases created by respondent attitudes and awareness of health conditions.¹⁹⁻²² Because these survey reports are not corroborated by medical examinations, prevalence estimates may differ from those that would be produced by other diagnostic methods. Although validation studies have been undertaken by the National Center for Health Statistics,

to our knowledge, none has focused on children or disability due to asthma. Studies using other household interview surveys have shown high levels of agreement when validation studies are restricted to conditions likely to cause disability. For example, one study found that agreement rates between parent reports and physician records for the presence of asthma over the course of a year exceeded 90%.²³

Together, the available evidence suggests that parents may be reliable reporters of asthma, particularly for asthma severe enough to cause disability. However, changes in the accuracy of parental reports over time could affect prevalence estimates from the NHIS. No data are available to indicate whether the reliability of reporting by parents and other household respondents has in fact changed over time. Nevertheless, there is no compelling reason to expect that parental reporting accuracy would have changed over the study period.

Another factor that may have contributed to increased reporting of asthma-related disability is change in diagnostic criteria used by physicians. Over the past 25 years, there have been many important changes in the diagnosis and identification of childhood asthma. For example, children formerly labeled with wheezy bronchitis are now more likely to be diagnosed as having asthma. However, we would speculate that such changes in labeling are more likely to occur for milder respiratory conditions and less likely to affect reporting of respiratory conditions severe enough to result in disability.

Shifts in the distribution of known risk factors for asthma disability may also contribute to its increasing prevalence. For example, the analysis of risk factors presented in this article indicates that asthma disability is closely associated with certain demographic and socioeconomic characteristics of the child, as indicated by higher relative risks for older children, boys, black children, children living in impoverished families, and children living in single-parent families.

Although the prevalence and distribution of most of these characteristics have changed little during the 25-year trend analysis period, family composition is a notable exception. The proportion of children living in single-parent families has increased dramatically as a result of higher rates of divorce and out-of-wedlock births. For example, in 1970, 85% of the children younger than 18 years lived in 2-parent households. By 1994, this figure had dropped to 69%.²⁴ Assuming that family structure is causally related to prevalence of disabling asthma and that the strength of such an association did not change during the study period, it could be argued that the increased proportion of children living in single-parent households has contributed to the upward trend in asthma disability.

However, an explanatory mechanism for this association is required. Single parenthood is associated with a variety of difficulties, including fewer resources, lower educational attainment, and other factors that, in turn, may be associated with diminished levels of care. Single parenthood may also be a marker for divorce, family disruption, and other relationship issues that by creating a stressful environment may exacerbate asthma severity. However, these explanations are speculative; further analysis is needed before definitive conclusions can be drawn.

Finally, there is the question of whether declines in host resistance could contribute to increased prevalence of disabling asthma. Here, the evidence is controversial and incomplete but nevertheless intriguing. For example, there are some data suggesting that increased rates of infant immunizations could promote allergic sensitization and thus lead to increased prevalence of asthma.^{25,26} However, not all studies support such a conclusion.^{27,28} It has also been suggested that increased use of antibiotics could have a deleterious effect on host-immune response,²⁹ but a direct link to increased incidence or severity of childhood asthma has not been established. Further research is needed in this area as well.

In summary, the upward trend in prevalence of disabling asthma is likely to be attributable to several factors, including changes in data collection methods, changes in the prevalence and distribution of underlying risk factors, and perhaps changes in host resistance. Further study is needed to quantify the specific contribution of each of these factors and to uncover other possible explanations for the rapid growth of child disability due to asthma.

CONCLUSIONS

Data from the NHIS presented here provide a new perspective on the population of children most severely affected by asthma. Disabling asthma was found to have profound effects on children, the educational system, and the health care system. The social costs of asthma are likely to rise in the future if past trends in the prevalence of disabling asthma continue.

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