

# Prevalence and Impact of Disabling Chronic Conditions in Childhood

## ABSTRACT

**Objectives.** This study provides a current national profile of the prevalence and impact of chronic conditions causing childhood disability. Disability is defined as a long-term reduction in ability to conduct social role activities, such as school or play, because of a chronic physical or mental condition.

**Methods.** A cross-sectional descriptive analysis was performed on data from 99 513 children younger than 18 years who were included in the 1992–1994 National Health Interview Survey. The response rate exceeded 93% during each year.

**Results.** A significant proportion of children, estimated at 6.5% of all US children, experienced some degree of disability. The most common causes of childhood disability were respiratory diseases and mental impairments. Prevalence of disability was higher for older children, boys, and children from low-income and single-parent families. Childhood disability is estimated to result in 66 million restricted activity days annually, including 24 million days lost from school. Furthermore, disability in childhood results in an added 26 million physician contacts and 5 million hospital days annually.

**Conclusions.** Childhood disability has profound impacts on children, the education system, and the health care system. (*Am J Public Health.* 1998;88:610–617)

Paul W. Newacheck, DrPH, and Neal Halfon, MD, MPH

## Introduction

Although large numbers of children are afflicted by chronic conditions, only a small proportion of children are so severely affected that they experience limitations in their ability to engage in school or play activities.<sup>1</sup> Data from the 1992–1994 National Health Interview Survey (NHIS) indicate that an estimated 4.4 million children, or 6.5% of the noninstitutionalized population younger than age 18, were limited to some degree in their activities owing to chronic conditions.<sup>2–4</sup>

The impact of childhood disability can be measured by its effects on the individual child's health and functional status, as well as by the aggregate effects of disability on the educational system and the health care system. Adverse outcomes for child development and well-being have been demonstrated, as have long-term detrimental impacts on social and economic status in adulthood.<sup>5,6</sup> Moreover, childhood disability often results in added caretaking demands and lost income for parents.<sup>7</sup> Many disabled children either are restricted in their ability to participate in school activities for extended periods or require special classes or other forms of special education.<sup>8</sup> Children with disabilities are also subject to many more days of restricted activity, including missed school days, than other children.<sup>9</sup> Studies have also shown that disabled children use far more hospital care, physician services, and nonphysician services than their counterparts without disabilities.<sup>9,10</sup> Health care expenditures have been shown to be commensurately higher for children with disabilities.<sup>10–12</sup>

Given the substantial health and social impacts of childhood disability, we sought to provide a current profile of children with disabilities, including detailed estimates of

the prevalence and impact of chronic conditions causing disabilities. Although statistics on the overall prevalence of disability are routinely published by the National Center for Health Statistics (NCHS), prevalence estimates for individual conditions or groups of conditions causing disabilities are not generally available for children, nor are data routinely published on the health and social effects of childhood activity limitations. Combining results for nearly 100 000 children included in the 1992, 1993, and 1994 NHIS data sets, we derive average annual national prevalence estimates of disabling chronic conditions and assess the effects of disability on the child, the educational system, and the health care system.

## 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 by household interview by the US Bureau of the Census for the NCHS.<sup>2,9</sup>

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Paul W. Newacheck is with the Institute for Health Policy Studies and the Department of Pediatrics, School of Medicine, University of California, San Francisco. Neal Halfon is with the Department of Community Health Sciences, School of Public Health, and the Department of Pediatrics, School of Medicine, University of California, Los Angeles.

Requests for reprints should be sent to Paul W. Newacheck, DrPH, Institute for Health Policy Studies, 1388 Sutter Street, Suite 1100, San Francisco, CA 94109.

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*Note.* Data were provided by the National Center for Health Statistics. Analyses, interpretations, and conclusions are solely those of the authors.

During the period 1992 through 1994, the combined NHIS samples comprised approximately 145 205 households that included 99 513 children younger than 18 years. The response rate for all years exceeded 93%. The same sample design and survey questions were used each year.

The results presented in this paper are representative of the US civilian noninstitutionalized population. Persons residing in institutional settings, such as long-term care facilities, are excluded; thus the number and proportion of children with disabling chronic conditions would be higher than reported here were the population living in institutions included. However, the number of children residing in health-related institutional facilities is relatively small—estimated at 92 000 in 1990, or 0.14% of all children younger than 18 years.<sup>8</sup>

### Measuring Disability

In the NHIS, children are categorized as limited in their activities when their ability to perform the usual activities associated with the child's age group, such as school or play, are compromised by a chronic condition. The terms "limitation of activity," "activity limitation," and "disability" are used interchangeably in this paper.

A series of 8 questions is used in the NHIS to identify children who are limited in their activities.<sup>2</sup> For children younger than 17 years, the respondent is an adult member of the household, usually the mother; 17-year-olds are permitted to respond for themselves. After children are classified according to the 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 1 of 4 categories according to the degree to which their activities are limited as a result of chronic conditions: (1) children unable to conduct their major activity, (2) children limited in the amount or kind of major activity performed, (3) children not limited in major activity but otherwise limited, and (4) children not limited in activity.

If any level of activity limitation is reported, additional probes are used to identify the condition(s) responsible for the limitation. Only chronic conditions are considered to be causes of activity limitation. If an acute condition is reported as causing a temporary disability, the limitation questions are asked again. The NHIS classifies conditions as chronic only if the onset of the disease, injury, or impairment occurred more than 3 months prior to the week of the interview or if the condition reported is one of several

conditions always considered chronic regardless of date of onset (e.g., congenital anomalies, asthma, diabetes).<sup>13</sup> If more than 1 condition causing limitation of activity is reported, conditions are classified as either main or secondary causes on the basis of respondent's perceptions.

Chronic conditions reported as causing activity limitations are recorded by the interviewers and then recoded into individual diagnoses based on the *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* coding system by trained NCHS staff using an extensive coding procedure manual.<sup>13,14</sup> Conditions are then recoded into several more general categorizations developed by NCHS for public reporting purposes.

Because of the relatively small numbers of disabled children, prevalence estimates for conditions are presented here in broad condition groupings that generally follow the ICD-9-CM.<sup>14</sup> Prevalence estimates are presented for 8 impairment categories and 14 disease and injury categories. Injuries are included only if their onset occurred at least 3 months prior to the interview date. Impairments are defined here as chronic or permanent defects, usually static in nature.<sup>2,13</sup>

### Statistical Analysis

The NHIS uses a complex sample design and estimates are statistically weighted to obtain estimates for the US civilian noninstitutionalized population. Standard errors for prevalence and population characteristics were computed by standard methods that incorporate sample design considerations.<sup>15</sup>

## Results

### *Social and Demographic Correlates of Childhood Disability*

On average, approximately 446 000 (0.7%) children younger than age 18 were estimated to be unable to conduct their major activity each year during 1992 through 1994, approximately 2 726 000 (4.0%) were limited in the kind or amount of their major activity, and about 1 224 000 (1.8%) were limited in other activities. Thus, an annual average of 4 396 000 (6.5%) children experienced some degree of disability.

The prevalence of disability among children varies by demographic and socioeconomic characteristics (Table 1). For example, prevalence increases with age, rising particularly after age 5. However, the social role activity used to assess limitation

in the questionnaire changes from play to school for children reaching school age. The observed increase in prevalence may thus reflect the added social role demands placed on children as they enter school, rather than a change in underlying disease pathology. Disability was more prevalent among Blacks, boys, and children from families with incomes below the poverty level. Children living in single-parent families were also more likely to have disabling conditions. Prevalence rates varied only slightly by family size and region of the country.

Some of these demographic and socioeconomic differences in prevalence may be attributable to confounding. For example, the higher prevalence associated with 1-parent families may reflect the fact that single-parent families tend to have lower incomes than 2-parent families. We conducted a multivariate analysis to determine whether the variables shown in Table 1 were independently associated with prevalence of disability. The results, shown in the fourth column of Table 1, indicate that age, sex, family income, and family structure each exert an independent effect on the probability of disability. Hispanic and "other minority" children continue to demonstrate a lower likelihood of disability than White children; however, after we controlled for the other variables included in the logistic regression, there was no statistically significant difference between Black and White children.

### *Conditions Causing Disability*

Prevalence figures for individual diagnostic categories are presented in Table 2. The first column displays the average annual prevalence of chronic conditions reported as the main cause of disability, while the second column presents prevalence estimates for main and secondary causes combined. Conditions classified as chronic impairments were the main cause of about 39% of all childhood activity limitations, while those labeled as chronic diseases and injuries accounted for 61%. Overall, respiratory diseases (principally asthma) and impairments of speech, special sense, and intelligence (principally mental retardation) constituted the most common causes of disability. Each of these diagnostic categories accounted for a little more than one quarter of all cases of childhood disability. The third most prevalent diagnostic category, mental and nervous system disorders, accounted for about one sixth of disabilities. Most of the other conditions listed in Table 2 affected comparatively small numbers of children.

**TABLE 1—Prevalence of Activity Limitations Due to Chronic Conditions among Children Younger than 18 Years: United States, 1992 through 1994**

	Estimated No. of Cases	No. Cases per 1000	SE	Odds Ratio	95% Confidence Interval
<b>Degree of limitation</b>					
All	4 396 000	64.7	1.2	...	...
Unable to conduct major activity	446 000	6.6	0.3	...	...
Limited in amount or kind of major activity	2 726 000	40.1	1.0	...	...
Limited in other activities	1 224 000	18.0	0.5	...	...
<b>Age</b>					
< 6	794 000	33.2	1.2	1.00	...
6–11	1 794 000	79.3	2.0	2.56	2.35, 2.78
12–17	1 808 000	84.3	1.9	2.80	2.56, 3.07
<b>Race and ethnicity</b>					
White, non-Hispanic	2 912 000	64.3	1.4	1.00	...
Black, non-Hispanic	854 000	80.7	3.3	0.93	0.84, 1.03
Other, non-Hispanic	121 000	41.4	3.6	0.59	0.48, 0.72
Hispanic	510 000	55.5	2.8	0.71	0.63, 0.81
<b>Sex</b>					
Male	2 639 000	75.8	1.6	1.50	1.41, 1.59
Female	1 757 000	52.9	1.3	1.00	...
<b>Family income</b>					
Poor	1 210 000	96.2	3.4	1.80	1.64, 1.99
Nonpoor	2 859 000	57.3	1.2	1.00	...
<b>Family structure</b>					
1 parent	1 404 000	90.5	2.7	1.40	1.29, 1.52
2 parents	2 842 000	55.9	1.2	1.00	...
<b>Family size</b>					
<5 persons	2 642 000	65.9	1.4	1.06	0.98, 1.14
≥5 persons	1 754 000	62.8	1.7	1.00	...
<b>Region</b>					
Northeast	797 000	63.2	3.1	0.98	0.85, 1.12
Midwest	1 010 000	66.3	2.5	1.00	0.88, 1.12
South	1 549 000	67.8	2.1	0.98	0.88, 1.09
West	950 000	59.6	2.2	1.00	...

Source. Author's tabulations of data from the 1992–1994 National Health Interview Survey.

When secondary conditions are included, the distribution of conditions changes only modestly for the most part, suggesting that the distribution of secondary conditions was similar to that of main conditions. Comparison of the column totals in Table 2 reveals that children with disabilities were reported to have an average of about 1.2 underlying conditions.

#### *Impact of Disability on the Child*

Disability has pronounced effects on children's health and functional status, as indicated by counts of restricted activity days, the percentage of children who were unable to conduct their major activity (the most severe level of disability), and the percentage of children who were reported to be in only fair or poor health by the respondent (Table 3).

On average, children with disabilities were restricted in their daily activities for slightly more than 2 weeks per year. In total, conditions cited as the main cause of disabil-

ity resulted in 66 million restricted activity days annually. 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. Consequently, for those children who have permanently reduced their usual activities because of a disability (for example, a child who is completely paralyzed), no restricted activity days may be reported. Moreover, the counts shown in Table 3 include only those days of restricted activity that are caused by the condition reported as the main cause of disability. Children may have additional restricted activity days because of other acute and chronic conditions.

Although the sampling variances for some condition groups are quite high, it is apparent that the overall average figure of 15 days of restricted activity annually masks large differences by diagnostic category. For example, chronic disabling injuries, infectious and parasitic diseases, and neoplasms

resulted in an average of more than 6 weeks of restricted activity per year, while visual impairments and impairments related to speech, special sense, and intelligence all resulted in less than a day of restricted activity annually, on average. These results might be expected, since the former conditions are more likely to interfere with physical health while the latter have greater effects on cognitive functioning.

One tenth of all children with disabilities were completely unable to conduct their major activity (school or play). The conditions most likely to cause this severe level of disability included paralysis, defects and other physical abnormalities, and genitourinary disorders. Children with these conditions were 2 to 3 times more likely to be unable to perform their usual activities than children with other conditions. Conditions least likely to cause inability to conduct the child's major activity included sensory impairments (vision and hearing), intelligence-related impairments (mental retardation), and nonparalytic orthopedic impair-

**TABLE 2—Prevalence of Chronic Conditions Causing Activity Limitations among Children Younger than 18 Years: United States, 1992 through 1994**

	Main Causes of Disability		Main or Secondary Causes of Disability	
	No. Cases per 100 000	SE	No. Cases per 100 000	SE
<b>Impairments</b>				
Blindness, impairment of vision	59	8.2	108	10.9
Deafness, impairment of hearing	169	15.2	247	19.3
Impairment of speech, special sense, intelligence	1696	63.9	1942	71.9
Absence or loss of extremities, certain other sites	20	4.3	26	5.3
Paralysis, complete or partial	150	13.7	190	15.8
Specified deformity of limbs, trunk, back	155	12.4	198	14.8
Nonparalytic orthopedic impairment	192	13.5	239	16.2
Defect, abnormality, special impairment	71	9.1	103	10.7
<b>Diseases and injuries</b>				
Infectious, parasitic diseases	56	8.2	64	8.6
Neoplasms	55	7.6	62	8.1
Endocrine, nutritional, metabolic, blood disorders	142	12.9	177	14.8
Mental, nervous system disorders	1042	43.3	1262	51.0
Diseases of eye, ear	160	16.7	236	19.2
Diseases of circulatory system	96	11.9	143	14.1
Diseases of respiratory system	1729	66.5	1952	75.5
Diseases of digestive system	68	9.2	105	11.2
Genitourinary disorders, pregnancy, childbirth	37	6.9	55	8.2
Diseases of skin, subcutaneous tissue	74	10.2	108	12.2
Diseases of musculoskeletal system, connective tissue	93	10.0	110	10.9
Certain congenital anomalies, causes of perinatal morbidity	155	12.5	211	16.4
Certain symptoms, ill-defined conditions	214	16.3	295	21.5
Injuries	32	6.0	51	8.7
All activity-limiting conditions	6466	154.3	7884	195.4

Source. Author's tabulations of the data from the 1992–1994 National Health Interview Survey.

ments. Children with conditions in these categories were less than half as likely as other disabled children to be unable to conduct their usual activities.

The final column of Table 3 shows the percentage of children reported as being in only fair or poor health by survey respondents. On average, 18% of children with disabilities were reported to be in fair or poor health. This figure compares with only 2% for children without disabilities, indicative of a near 10-fold differential. Among children with disabilities, those with infectious and parasitic conditions and those with endocrine, nutritional, metabolic, and blood disorders were most likely to be reported in fair or poor health, while those with orthopedic impairments, absent extremities, and impairments of speech, special sense, and intelligence were least likely to be reported in fair or poor health.

#### *Impact of Disability on the Education System*

Childhood disability has substantial effects on the US educational system (Table 4). During 1992 through 1994, conditions cited as the main causes of disability resulted in an average of 6.2 school absence

days per child annually. These are in addition to school absences for other acute and chronic conditions. This represents an added burden of 27 million school absence days for children with disabilities.

There was wide variation in the number of school absence days reported for children in different diagnostic groups. Children with infectious and parasitic diseases, neoplasms, and injuries were reported to have missed an average of 6 weeks or more of school annually. In contrast, children with sensory impairments, impairments related to speech and intelligence, or skin diseases were reported to have missed an average of less than 1 school day annually.

In addition, an estimated 900 000 children, or 23% of those with disabling chronic conditions, were unable to attend school on a long-term basis. Conditions most likely to lead to long-term attendance problems included digestive conditions, infectious and parasitic diseases, and genitourinary disorders. Interestingly, sensory impairments and impairments of speech and intelligence were least likely to be associated with long-term school attendance difficulties.

#### *Impact of Disability on the Health Care System*

The presence of a childhood disability is associated with elevated use of health care services. Table 5 presents data on use of physician and hospital services. These estimates include utilization for all reasons and are not limited to encounters directly related to the child's disability. Consequently, the impact of disability must be assessed in an indirect fashion by comparing utilization rates for children with disabilities against rates for children without disabilities. On average, children with disabilities were reported to have 8.8 physician contacts annually, about 3 times the rate for children without disabilities (2.9 contacts). In total, 26 million physician contacts annually can be attributed to disabilities in children.

Children with neoplasms, paralysis, or injuries as the main cause of their disability were reported to have the greatest numbers of physician contacts—in each case averaging over 20 contacts annually. The lowest rates of physician use were found for children with absent extremities and impairments related to speech, special sense, and intelligence. Children with these conditions were reported to have physician use rates

**TABLE 3—Effect of Activity-Limiting Chronic Conditions on Children Younger than 18 Years: United States, 1992 through 1994**

	No. Restricted-Activity Days in Past Year Due to Limitation of Activity		Proportion of Children Unable to Conduct Major Activity		Proportion of Children in Fair or Poor Health	
	Mean	SE	%	SE	%	SE
<b>Impairments</b>						
Blindness, impairment of vision	...	...	3.6	2.0	17.3	6.1
Deafness, impairment of hearing	1.1	0.8	4.1	1.5	12.5	2.5
Impairment of speech, special sense, intelligence	0.7	0.3	3.7	0.5	8.8	0.7
Absence or loss of extremities, certain other sites	24.4	17.8	9.5	6.4	9.9	6.6
Paralysis, complete or partial	22.4	8.5	29.2	3.7	31.0	4.1
Specified deformity of limbs, trunk, back	19.8	6.5	12.2	2.7	14.7	2.8
Nonparalytic orthopedic impairment	25.7	6.3	4.0	1.5	10.0	2.5
Defect, abnormality, special impairment	21.4	10.9	30.0	6.9	22.1	6.1
<b>Diseases and injuries</b>						
Infectious, parasitic diseases	84.0	16.2	19.4	5.4	42.7	7.2
Neoplasms	61.6	17.6	21.2	5.7	36.1	7.4
Endocrine, nutritional, metabolic, blood disorders	35.1	6.6	16.2	3.5	40.8	4.8
Mental, nervous system disorders	11.7	2.0	9.4	1.1	15.9	1.3
Diseases of eye, ear	19.8	10.5	4.9	1.8	13.1	3.3
Diseases of circulatory system	24.3	8.4	13.5	3.4	33.5	6.2
Diseases of respiratory system	20.0	1.5	12.5	0.9	23.5	1.1
Diseases of digestive system	34.9	9.4	20.4	5.4	33.4	6.1
Genitourinary disorders, pregnancy, childbirth	13.8	9.7	24.8	9.0	19.1	6.9
Diseases of skin, subcutaneous tissue	8.0	5.1	13.4	4.2	26.1	6.2
Diseases of musculoskeletal system, connective tissue	35.6	10.4	10.8	3.5	22.6	4.7
Certain congenital anomalies, causes of perinatal morbidity	34.5	8.1	21.2	3.2	36.8	4.1
Certain symptoms, ill-defined conditions	14.9	3.6	13.3	2.7	19.1	2.9
Injuries	47.1	18.7	20.3	6.7	35.5	10.0
All activity-limiting conditions	15.0	0.8	10.2	0.5	18.5	0.6
Children without limitation of activity	...	...	...	...	1.9	0.1

Source. Author's tabulations of data from the 1992–1994 National Health Interview Survey.

similar to those of children without disabilities.

Children with disabilities were about 4 times as likely as children without disabilities to be hospitalized over the course of a year (11.4% vs 2.8%) and spent 8 times as many days in the hospital (1310 per thousand vs 160 per thousand). In total, we estimate that 5 million hospital days can be attributed to childhood disability. As with physician services, use of hospital care varied greatly by diagnostic category. High admission rates and lengths of stay are apparent for children with neoplasms and injuries. In contrast, children with impairments in speech, special sense, and intelligence were hospitalized much less frequently.

## Discussion

The results of this analysis provide a current national profile of the prevalence and impact of childhood disability. Because the results are based on aggregating multiple years of a large national probability sample, we were able to develop statistically reliable estimates of the prevalence of childhood disabilities in several diagnostic categories that would not be possible with

smaller samples. In addition, because the NHIS sampling plan is designed to be representative of the US noninstitutionalized population of households, the results presented here are more generalizable than the results of localized surveys.

The prevalence of disability was found to vary by demographic and socioeconomic characteristics of children. Older children, boys, children from poor families, and those from single-parent households all exhibited significantly higher prevalences of disability. For the most part, the differentials in prevalence reported here are consistent with patterns found in past reports.<sup>16–18</sup> However, the strong association of economic and social disadvantage with elevated prevalence of disability, even after multivariate analysis to adjust for potentially confounding factors, is of concern. Targeting prevention and rehabilitation efforts toward disadvantaged children and families may be an important way of ameliorating the impact of these conditions. Additional analysis is needed to elucidate how different social and demographic factors contribute to the prevalence and manifestation of chronic conditions in children; such information can be used to further refine prevention efforts.

Our results suggest that there is wide variation in the impact of disability on chil-

dren's health and social functioning. We found a high degree of variation in restricted activity and school loss days, severity of limitation, and use of medical services for different childhood chronic conditions. More than 10-fold differences were found among diagnostic categories for some of these outcome indicators. These results suggest that while a "noncategorical" or generic approach to studying childhood chronic illness has great appeal,<sup>19–21</sup> it remains important to consider the underlying condition when developing health and social policies targeted at improving outcomes for these children.

The effects of disability on children, their families, and the health and educational systems are profound. Childhood disability results in 66 million restricted activity days annually, including 27 million days lost from school. Since these estimates are limited to restricted activity resulting from the conditions cited as main causes of disability, the actual illness burden, if secondary conditions were considered, would be much greater. Moreover, our analysis did not consider the costs of special education services and grade repetition attributable to childhood disabilities.

The impact of childhood disability on the health care system is also substantial.

**TABLE 4—Effect of Activity-Limiting Chronic Conditions on the Educational System for Children Younger than 18 Years: United States, 1992 through 1994**

	No. School Absence Days in Past Year Due to Limitation of Activity <sup>a</sup>		Proportion of Children Limited in School Attendance or Unable to Attend <sup>a</sup>	
	Mean	SE	%	SE
<b>Impairments</b>				
Blindness, impairment of vision	...	...	6.5	3.8
Deafness, impairment of hearing	0.4	0.3	4.7	1.8
Impairment of speech, special sense, intelligence	0.5	0.2	2.5	0.4
Absence or loss of extremities, certain other sites	2.7	2.7	19.9	10.4
Paralysis, complete or partial	10.3	6.1	18.0	4.0
Specified deformity of limbs, trunk, back	10.7	4.6	19.9	3.9
Nonparalytic orthopedic impairment	4.3	1.5	13.7	2.3
Defect, abnormality, special impairment	6.6	3.9	35.8	8.3
<b>Diseases and injuries</b>				
Infectious, parasitic diseases	46.4	11.8	62.0	6.6
Neoplasms	35.1	12.9	41.8	7.2
Endocrine, nutritional, metabolic, blood disorders	20.4	5.1	53.9	4.7
Mental, nervous system disorders	5.3	1.0	15.8	1.2
Diseases of eye, ear	4.6	1.8	18.7	3.7
Diseases of circulatory system	7.1	3.5	18.4	5.2
Diseases of respiratory system	8.7	0.8	46.8	1.6
Diseases of digestive system	22.3	7.6	72.2	6.4
Genitourinary disorders, pregnancy, childbirth	4.4	2.4	54.8	9.7
Diseases of skin, subcutaneous tissue	0.5	0.4	42.5	6.7
Diseases of musculoskeletal system, connective tissue	8.2	3.7	27.3	5.1
Certain congenital anomalies, causes of perinatal morbidity	9.6	5.5	22.0	4.3
Certain symptoms, ill-defined conditions	7.9	2.4	25.0	3.7
Injuries	31.6	16.3	38.9	9.3
All activity-limiting conditions	6.2	0.4	23.0	0.8

Source. Author's tabulations of data from the 1992–1994 National Health Interview Survey.

<sup>a</sup>For children aged 5 to 17 years.

We estimate that childhood disability results in an additional 26 million physician contacts and 5 million hospital days annually over the level that would be expected if no children were disabled. Previous studies have demonstrated that disabled children also make disproportionate use of nonphysician medical professionals, prescription medications, and other health services and supplies.<sup>10,11</sup> Because we were able to assess only use of hospital and physician services, these are conservative estimates of the effect of childhood disability on the health care system.

This cross-sectional analysis demonstrates the impact of chronic conditions at one point in time and does not capture the longitudinal impact of disability. The impact of a disabling chronic condition in childhood is not only felt in childhood but can have lifelong consequences. A number of studies have documented the relationship between chronic childhood conditions and adult disability.<sup>22</sup>

Prevalence estimates based on household interviews such as the NHIS, however, are subject to biases created by respondent attitudes and awareness of health conditions.<sup>23</sup> Because these survey

reports are not corroborated by medical examinations or correlated with clinical findings, prevalence estimates may differ from those that would be derived by other diagnostic methods.<sup>24–26</sup> Studies using household interview surveys have shown that parental reports tend to result in condition prevalence estimates for children that range higher than those found in clinical examinations.<sup>27</sup> Such discrepancies in reporting may be attributable to the inclusion of mild conditions with limited clinical importance in validation studies. Higher levels of agreement are found when validation studies are restricted to conditions likely to cause disability. For example, agreement rates between parent respondents and physician records for presence of asthma over the course of a year exceeded 90% in one recent study.<sup>28</sup>

In previous prevalence studies using other data sources, prevalence estimates for childhood chronic conditions have ranged from less than 5% to more than 30%.<sup>1,2,16,17,27–30</sup> This degree of variation has been explained by studies' use of different approaches to defining chronic conditions, varying case ascertainment methods (e.g., self-report, parent report, teacher report, record abstract, or

clinical examination), and different settings and purposes for conducting the studies (e.g., school-based vs physician-based studies to estimate prevalence of learning disorders).<sup>27,31</sup> The higher estimates tend to include conditions that have modest effects on children's activities and use of medical care, while estimates at the lower end of the spectrum generally include only conditions causing some level of disability, as in the present study.

In summary, our analysis indicates that children with disabilities experience a substantial added burden of illness. There was, however, enormous variability across conditions in their impact on children, the educational system, and the health care system. With the goal of ameliorating adverse outcomes, additional study is needed to identify preventable causes and consequences of childhood chronic illness and disability. □

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**TABLE 5—Effect of Activity-Limiting Chronic Conditions on the Health Care System for Children Younger than 18 Years: United States, 1992 through 1994**

	No. Physician Contacts in Past Year		Proportion of Children Hospitalized in Past Year		Hospital Days per 100 in Past Year	
	Mean	SE	%	SE	No.	SE
<b>Impairments</b>						
Blindness, impairment of vision	6.0	1.3	14.7	5.2	622	318
Deafness, impairment of hearing	6.0	0.8	6.2	1.9	412	227
Impairment of speech, special sense, intelligence	4.7	0.5	4.6	0.5	246	42
Absence or loss of extremities, certain other sites	4.3	1.1	20.7	9.4	1341	1104
Paralysis, complete or partial	21.0	5.4	20.4	3.6	3015	848
Specified deformity of limbs, trunk, back	10.5	2.4	20.5	3.5	2352	759
Nonparalytic orthopedic impairment	7.8	1.0	12.9	2.5	780	230
Defect, abnormality, special impairment	16.5	2.8	22.0	4.7	2061	1120
<b>Diseases and injuries</b>						
Infectious, parasitic diseases	12.0	2.1	22.7	6.1	3235	1562
Neoplasms	25.3	6.5	40.2	6.4	11474	4474
Endocrine, nutritional, metabolic, blood disorders	12.0	1.7	36.3	4.3	3736	622
Mental, nervous system disorders	9.8	0.8	8.4	1.0	1400	340
Diseases of eye, ear	8.8	1.0	5.4	2.0	398	185
Diseases of circulatory system	7.7	1.4	13.2	3.9	2553	1158
Diseases of respiratory system	9.6	0.4	12.4	0.8	887	112
Diseases of digestive system	13.5	4.4	16.0	4.8	2494	1733
Genitourinary disorders, pregnancy, childbirth	8.7	2.2	25.6	8.6	2071	1036
Diseases of skin, subcutaneous tissue	10.9	2.3	9.3	4.0	491	249
Diseases of musculoskeletal system, connective tissue	10.3	1.8	8.9	3.0	562	231
Certain congenital anomalies, causes of perinatal morbidity	11.6	2.5	25.7	3.6	6304	1806
Certain symptoms, ill-defined conditions	9.8	1.2	15.5	2.9	2012	566
Injuries	20.7	3.7	45.8	8.3	12945	4620
All activity-limiting conditions	8.8	0.3	11.4	0.4	1310	104
Children without limitation of activity	2.9	<0.1	2.8	0.1	160	7

Source. Author's tabulations of data from the 1992–1994 National Health Interview Survey.

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## References

- Newacheck P, Taylor WR. Childhood chronic illness: prevalence, severity, and impact. *Am J Public Health*. 1992;82:364–371.
- Adams PF, Marano MA. Current estimates from the National Health Interview Survey, 1994. *Vital Health Stat 10*. 1995;No. 193.
- Benson V, Marano MA. Current estimates from the National Health Interview Survey, 1993. *Vital Health Stat 10*. 1994;No. 190.
- Benson V, Marano MA. Current estimates from the National Health Interview Survey, 1992. *Vital Health Stat 10*. 1994;No. 189.
- Gortmaker SL, Perrin JM, Weitzman M, Homer CJ. An unexpected success story: transition to adulthood of youth and chronic physical health conditions. *J Res Adolesc*. 1993; 3:317–336.
- Pless IB, Wadsworth MEJ. Long-term effects of chronic illness on young adults. In: Stein REK, ed. *Caring for Children with Chronic Illness*. New York, NY: Springer Publishing; 1989:147–158.
- Salkever DS. Parental opportunity costs and other economic costs of children's disabling conditions. In: Hobbs N, Perrin J, eds. *Issues in the Care of Children with Chronic Illness*. San Francisco, Calif.: Jossey-Bass Publishers; 1985:864–879.
- Aron LY, Loprest PJ, Steuerle CE. *Serving Children with Disabilities: A Systematic Look at the Programs*. Lanham, Md: Urban Institute Press; 1995.
- Health characteristics of persons with chronic activity limitation: United States, 1979. *Vital Health Stat 10*. 1981;No. 137.
- Newacheck P, McManus M. Financing health care for disabled children. *Pediatrics*. 1988;81:385–394.
- Trupin L, Rice DP, Max W. *Medical Expenditures for People with Disabilities in the United States, 1987*. Washington, DC: US Dept of Education, National Institute on Disability and Rehabilitation Research; 1995.
- Pope A, Tarlov A. *Disability in America: Toward a National Agenda for Prevention*. Washington, DC: National Academy Press; 1991.
- Public Use Data Tape Documentation, Part III: Medical Coding Manual and Short Index. National Health Interview Survey*. Hyattsville, Md. National Center for Health Statistics; November 1988.
- World Health Organization. *International Classification of Diseases, Ninth Revision, Clinical Modification*. Vol. 1. Ann Arbor, Mich: Edwin Brothers Inc; 1988.
- Shah BV, Barnwell BG, Hunt PN, et al. *Survey Data Analysis (SUDAAN) User's Manual*. Release 6.0. Research Triangle Park, NC: Research Triangle Institute; 1992.
- McNeil JM. *Americans with Disabilities: 1991–1992*. Washington, DC: US Dept of Commerce, Bureau of the Census; 1993. Current Population Reports. Publication 70-33.
- Haggerty RJ. Epidemiology of childhood disease. In: Mechanic D, ed. *Handbook of Health, Health Care and the Health Professions*. New York, NY: The Free Press; 1983.
- Pless IB, ed. *The Epidemiology of Childhood Disorders*. New York, NY: Oxford University Press; 1994.
- Perrin E, Newacheck P, Pless I, et al. Issues involved in the definition and classification of chronic health conditions. *Pediatrics*. 1993;91:787–793.
- Stein REK, Jessop DJ. What diagnosis does not tell: the case for a noncategorical approach to chronic illness in childhood. *Soc Sci Med*. 1989;29:769–778.
- Stein REK, Jessop DJ. A non-categorical approach to chronic childhood illness. *Public Health Rep*. 1982;97:355–359.
- Wadsworth M. Prediction of adult disease. In: Pless IB, ed. *The Epidemiology of Childhood Disorders*. New York, NY: Oxford University Press; 1994:498–517.
- Interviewing methods in the Health Interview Survey. *Vital Health Stat 2*. 1972;No. 48.
- Edwards WS, Winn DM, Kuriantzick V, et al. Evaluation of National Health Interview Survey diagnostic reporting. *Vital Health Stat 2*. 1994;No. 120.

25. Interview data on chronic conditions compared with information derived from medical records. *Vital Health Stat* 2. 1967;No. 23.
26. Jabine TB. Reporting chronic conditions in the National Health Interview Survey: a review of findings from evaluation studies and methodological tests. *Vital Health Stat* 2. 1987;No.105.
27. Walker DK, Gortmaker SL, Weitzman M. *Chronic Illness and Psychosocial Problems among Children in Genessee County*. Boston, Mass: Harvard School of Public Health; 1981.
28. Pless CE, Pless IB. How well they remember: the accuracy of parent reports. *Arch of Pediatr Adolesc Med*. 1995;149:553-558.
29. Sulz HA, Schlesinger ER, Mosher WE, Feldman JG. *Long-Term Childhood Illness*. Pittsburgh, Pa: University of Pittsburgh Press; 1972.
30. Weiland SK, Pless IB, Roghmann KJ. Chronic illness and mental health problems in pediatric practice: results from a survey of primary care providers. *Pediatrics*. 1992;89:445-449.
31. Jessop DJ, Stein RE. Consistent but not the same: effect of method on chronic condition rates. *Arch Pediatr Adolesc Med* 1995;149:1105-1110.

### ***Improved Treatment for STDs Critical to Health of Women and Children: New CDC Guidelines Address Urgent Health Need***

The majority of severe illnesses and deaths associated with sexually transmitted diseases (STDs) could be prevented with improved diagnosis and treatment, according to the Centers for Disease Control and Prevention (CDC). To address this need, the CDC has issued updated national guidelines designed to improve the prevention, detection, and treatment of STDs, especially among women and infants—the 2 groups that suffer the most severe consequences. The 1998 Guidelines for Treatment of Sexually Transmitted Diseases outlines the most effective treatment for STDs and includes recent advances that may greatly improve the health of women and infants and slow the spread of HIV.

The CDC guidelines stress the critical need to focus on preventing the further spread of STDs through multiple strategies.

These include efforts to reduce risk behaviors, wider use of vaccines for sexually transmitted forms of hepatitis, and early detection and treatment of STDs to stop further transmission. The CDC treatment guidelines were developed in consultation with representatives from public and private health care settings, including managed care organizations, where an increasing proportion of STDs are treated.

Health care providers can access the guidelines through the Internet at [www.cdc.gov/nchstp/dstdp.html](http://www.cdc.gov/nchstp/dstdp.html) or call 1-888-232-3228 (prompts, 2-5-1) to order copies. More information on STD prevention, screening, and treatment can be obtained by calling the CDC STD hotline at 1-800-227-8922.