

Trends in Activity-limiting Chronic Conditions among Children

PAUL W. NEWACHECK, MPP, PETER P. BUDETTI, MD, JD, AND NEAL HALFON, MD

Abstract: Data from the National Health Interview Survey indicate that the prevalence of activity-limiting chronic conditions among children under age 17 years doubled between 1960 and 1981, from 1.8 to 3.8 per cent. Approximately 40 per cent of the overall rise in prevalence occurred before 1970. Most of the increase in prevalence during this early period can be attributed to changes in questionnaire design and aging of the child population following the "baby boom" years. The factors responsible for increases in reported cases of activity limitation following 1970 are more difficult

to specify and evaluate. During this later period, the increase in prevalence was restricted to less severe levels of limitations. While prevalence levels rose for a variety of conditions during this period, respiratory conditions and mental and nervous system disorders demonstrated the largest changes. It appears that much of the increase in reported cases of activity limitations during the 1970s can be attributed to shifting perceptions on the part of parents, educators, and physicians. (*Am J Public Health* 1986; 76:178-184.)

Introduction

In this century, improvements in infectious disease control, sanitation, housing, and medical care services have had major beneficial effects on the health of children. For children ages 1-14, mortality rates have fallen dramatically from 870 per 100,000 children in 1900 to 38 in 1981.¹ While this trend demonstrates progressive reduction of childhood mortality, the problem of childhood chronic illness persists. Annual reports from the National Center for Health Statistics (NCHS) indicate that both the number and proportion of children with activity-limiting chronic health conditions have been increasing for many years.^{2,3}

Data from the NCHS National Health Interview Survey (NHIS) show that over two million children under age 17 now suffer some degree of limitation in their school, play, or other recreational activities because of chronic conditions. Although the numbers remain small when compared to estimates for adults, the percentage of children with reported limitation of activity has risen from approximately 2 per cent in the early 1960s to nearly 4 per cent in 1981 (Figure 1). Thus it appears that there has been a doubling in the proportion of children with activity limitations.

Because these estimates are based on household interviews rather than clinical tests or examinations, the trend data should be viewed with a degree of caution. There may, in fact, have been a doubling in the prevalence of disabled children. However, some portion of this increase may be explained by: 1) changes in perceptions of what constitutes a functional disability in a chronically ill child; 2) improved access to health care services; 3) expanded screening programs in schools; or 4) an artifact of this particular survey. Each explanation clearly has different implications for public health policy. The primary purpose of this study was to examine these and other explanations for the rise in reported cases of childhood activity limitations.

Previous investigations have helped to clarify some of these explanations, in particular aging of the child population and changes in survey procedures.^{2,4,5} Since the prevalence of disability increases with age, overall prevalence levels

should rise as the baby-boom generation matured. Analysis of age-specific results for the 1960 to 1980 period indicates that the mean age of the population under 17 years has increased approximately one year; this age shift explains approximately 10 per cent of the increase in prevalence from 1960 to 1980.²

Changes in survey procedures are well documented and appear to explain a substantial portion of the trend, particularly during the early years of the survey. When the survey was initiated in 1957, checklists of chronic conditions were used to screen respondents into two groups: those who would be asked a series of probes on presence and degree of activity limitations, and those not asked the probes. Eventually, these checklists were expanded to include more conditions, thereby increasing the likelihood that a given respondent would be asked about a limitation of activity.⁶ Later, the entire procedure was changed so that all persons were asked the questions regarding activity limitations, whether or not they had previously reported a chronic condition.⁷ In 1969, a catch-all question, designed to pick-up additional cases of activity limitation, was added to the standard probes.⁷ With the exception of a temporary change in survey procedures during 1977,⁸ no changes were made in the survey between 1969 and 1981. The cumulative effect of these changes in survey procedures appears to explain a substantial part of the rise in prevalence of activity limitation during the 1960s.²

Other factors suggested as contributing to this trend include the increased survival of sick newborns as well as other children with severe chronic illnesses. However, the available evidence suggests neither has played a major role. Although the number of low birthweight survivors has increased significantly since 1960, a review of several studies suggests improved survivorship of low birthweight babies has resulted in, at most, very small increases in the number of moderately or severely disabled children.^{9,10} Gortmaker and Sappenfield have shown that increases in longevity for children with selected chronic conditions, including spina bifida, cystic fibrosis, acute lymphocytic leukemia, certain congenital heart defects, and renal failure have resulted in increased prevalence of these conditions over the last two decades.¹¹ However, these severe conditions are relatively rare so even large increases in longevity would have only modest effects on the overall trend in reported activity limitations.

Because institutionalized children are excluded from the scope of the NHIS, it has been postulated that deinstitutionalization efforts could result in increased numbers of disabled children counted by the NHIS.⁵ Earlier examination of data

From the Institute for Health Policy Studies, School of Medicine, University of California, San Francisco. Address reprint requests to Paul W. Newacheck, MPP, Institute for Health Policy Studies, University of California School of Medicine, 1326 Third Avenue, San Francisco, CA 94143. Dr. Budetti is currently a member of the professional staff of the Subcommittee on Health and the Environment, Committee on Energy and Commerce, US House of Representatives. This paper, submitted to the *Journal* April 29, 1985, was revised and accepted for publication August 14, 1985.

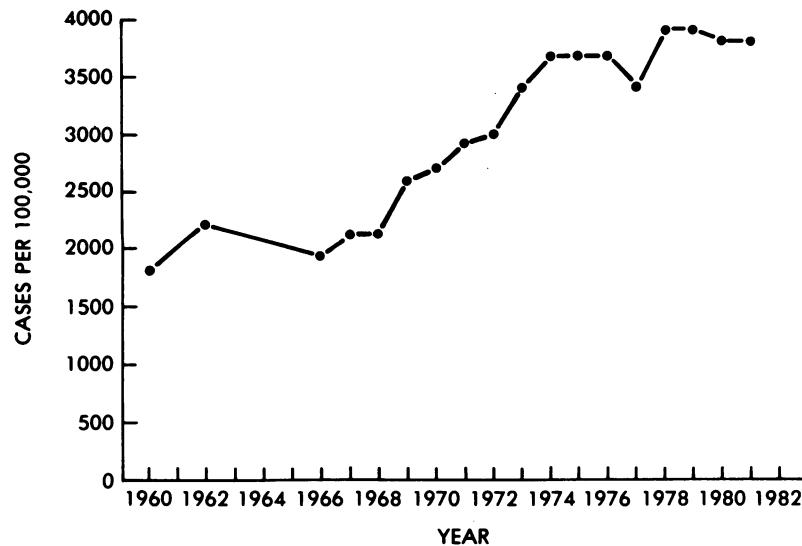


FIGURE 1—Prevalence of Activity Limitations for Children under 17 Years of Age

from the 1960 and 1970 Census indicated no change in the proportion of children institutionalized for health reasons.² More recent data from the 1980 Census indicate the institutionalized population has decreased since 1970,¹² but only by approximately 30,000 children—a relatively small number when compared to the estimated one million-plus increase in children with reported activity limitations since 1960.

Finally, during the mid-1960s through the early 1970s great strides were made in the provision of medical services to previously underserved low-income children. If additional physician contacts resulted in identifying children with previously undiagnosed activity-limiting chronic illnesses, an increase in reported prevalence should have occurred. Comparison of trends in activity limitations by income class revealed that this has not been the case; rates of increase in reported cases for low-income children were nearly identical to those for higher-income children between 1964 and 1978.²

To summarize, changes in survey methods combined with aging explain most of the rise in reporting of activity limitations occurring during the 1960s, but these and the other factors leave unexplained most of the rise in prevalence occurring after 1969. Hence, over half of the overall increase in prevalence of activity limitations remains unexplained.

This report focuses on the portion of the trend beginning after 1969 that remains unexplained. We attempt to discern whether the increases in reported cases of activity limitation are attributable to shifts in perceptions or awareness or to a real increase in underlying disease and disability.

Methods

The primary data source for the results reported here is the National Health Interview Survey, a continuing cross-sectional survey of some 40,000 households annually including some 30,000 to 40,000 children conducted by the Census Bureau for the National Center for Health Statistics. The NHIS classifies children into four categories of activity limitation based on parental responses: 1) children unable to carry on 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 activities (Appendix). For preschool children (under age 6), major activity refers to ordinary play with other

children; for school age children (ages 6–16) major activity refers to school attendance. Category 3, persons not limited in major activity but otherwise limited, is not defined for preschool age children.

The number of children with reported activity limitations is relatively small—approximately 1,000 children are represented in the sample each year. For that reason we have combined years of survey data to yield more precise estimates. In addition, because rapid increases appeared during the early 1970s followed by much more modest increases in the late 1970s and early 1980s (Figure 1), results are presented separately for two time periods: 1969–70 to 1974–75, and 1974–75 to 1979–81. To compensate for the declining child population following the maturation of the baby boom generation in the mid and late 1970s, three years of data were combined for the endpoint of the time series.

Because of small sample sizes, chronic conditions cited as the main causes of activity limitation are grouped into general categories using a classification system developed by the National Center for Health Statistics for the NHIS. (Reported conditions are coded according to the NCHS Recode Number 1, a list of 353 categories of diseases, injuries and impairments grouped into 22 larger categories. These 22 larger categories are used in this report. A general description of the classification method is included in all Vital and Health Statistics Series 10 reports. A list of specific International Classification of Diseases categories included in each general category is available from the Interview and Examination Statistics Program of NCHS, or from the authors.) These groupings provide statistical reliability and minimize biases resulting from changes in coding methodologies. This classification scheme includes eight impairment categories and 14 disease and injury categories. The categories are designed to group together impairments and diseases according to body systems.

Given that activity limitation is a subjective concept influenced by parental perceptions, changes in reporting levels for a subset of conditions determined by us to be less subjective in the nature of their impacts on a child's functional capacity are also examined. This group of conditions included malignant neoplasms, epilepsy, rheumatic fever and rheumatic heart disease, blindness in both eyes, deafness in

both ears, Down syndrome, absence of extremities, paraplegia, quadriplegia, cerebral palsy, spina bifida, and cleft palate. The more obvious or severe nature of these conditions should make them less subject to attitudinal reporting biases. Therefore, if prevalence of activity limitations for this group of conditions rose at a rate similar to that for overall activity limitations, it would add support to the hypothesis that the overall trend was attributable to an increase in underlying disease rather than to changes in awareness or attitude.

Data from other independent surveys of utilization, such as the National Hospital Discharge Survey,¹³ are also used to corroborate findings on trends in prevalence of specific chronic conditions. The assumption here is that if there has been a true increase in the prevalence of a particular activity limiting condition (e.g., asthma), there should be a concomitant rise in use of medical services for that condition.

Where available, prevalence data from other sources are also used to corroborate the NHIS results. Unfortunately, most published prevalence estimates are based on cross-sectional studies; they do not permit direct comparisons over time, are based on select local samples which may not be generalizable, and focus on the presence or absence of disease, per se, rather than on disability. This last point is particularly important because it is possible for prevalence of conditions to remain level or to decline while prevalence of activity limitations increases (or vice versa). This problem limits the usefulness of other national surveys such as the National Health and Nutrition Examination Survey (NHANES) as a cross-check on NHIS results.¹⁴

Because the data are based on a sample rather than a census, differences in rates over time could be the result of sampling variability. Standard errors of differences were used in testing differences reported here.¹⁵ Unless otherwise noted, all prevalence differences reported in the text have a probability of occurring by chance of less than 5 per cent. Other differences with higher probabilities of occurring by chance are reported where they might be useful in interpreting the data but are labeled "suggestive". (Detailed data are available on request to authors.)

Results

Between 1969-70 and 1979-81, prevalence of activity-limiting chronic conditions increased a substantial 44 per cent, from 2,680 to 3,848 per 100,000. As shown in Table 1, almost all of this increase occurred between 1969-70 and 1974-75. The increment in reported cases of limitation of activity between 1969-70 and 1974-75 was almost entirely restricted to the less serious categories: children limited in the amount or kind of their major activities, and children limited in other than their major activity. The rates of increase in these less serious groups are nearly identical between 1969-70 and 1974-75. Prevalence for children unable to perform their major activity rose, but only suggestively, during the early 1970s and receded in the late 1970s.

For children ages 6-16, the rate in 1974-75 was 39 per cent higher than the rate in 1969-70, compared with a 27 per cent increase for younger children. Prevalence of limitation of activity for both age groups leveled off during the late 1970s.

Changes in Prevalence of Activity-Limiting Chronic Conditions, 1969-70 to 1974-75

What is striking about the 1969-70 to 1974-75 period is the diversity of conditions which show increases in preva-

TABLE 1—Prevalence of Activity Limitations for Children under 17 Years of Age by Severity and Age

	Prevalence per 100,000		
	1969-70	1974-75	1979-81
All Activity-Limiting Chronic Conditions	2680	3673	3848
Severity			
Unable to conduct major activity	173	193	161
Limited in amount or kind of major activity	1259	1700	1878
Limited in other activities	1249	1780	1810
Age (years)			
0 to 5	1840	2332	2297
6 to 16	3090	4289	4614

SOURCE: Unpublished tabulations from the National Health Interview Survey.

TABLE 2—Prevalence of Chronic Conditions Causing Activity Limitations among Children under 17 Years of Age

Condition Groups	Prevalence per 100,000		
	1969-70	1974-75	1979-81
Impairments			
Blindness, Impairment of Vision	71	93	75
Deafness, Impairment of Hearing	113	186	171
Impairment of Speech, Special Sense, Intelligence	385	417	567
Absence, Loss, Extremities, Certain Other Sites	23	36	28
Paralysis, Complete or Partial Specified Deformity of Limbs, Trunk, Back	190	187	205
Non-Paralytic Orthopedic Impairment Defect, Abnormality, Special Impairment	130	227	209
83	90	66	
Diseases and Injuries			
Infective, Parasitic Diseases	26	20	18
Neoplasms	33	40	23
Endocrine, Nutritional, Metabolic, Blood Disorders	79	109	142
Mental, Nervous System Disorders	178	320	382
Diseases of Eye, Ear	92	202	235
Diseases of Circulatory System	150	126	112
Diseases of Respiratory System	641	945	979
Diseases of Digestive System	39	54	49
Genito-Urinary Disorders, Pregnancy, Childbirth	47	47	47
Diseases of Skin, Subcutaneous Tissue	33	76	72
Diseases of Musculoskeletal System, Connective Tissue	59	124	121
Certain Congenital Anomalies, Causes of Perinatal Morbidity	82	154	123
Certain Symptoms, Ill-Defined Conditions	72	77	83
Injuries	26	27	24
All Activity-Limiting Conditions	2680	3672	3847

SOURCE: Micro Data Tapes from the National Health Interview Survey.

lence (Table 2). Large increases in reporting occurred for conditions as different as respiratory diseases, mental and nervous disorders, and orthopedic impairments. It seems unlikely that this pattern of change is attributable to increased exposure or decreased host-resistance to a single or even several risk factors related to the physical environment. On the other hand, shifts in social perceptions of disability, heightened awareness of illness, or deterioration in the social

TABLE 3—Leading Chronic Condition Groups, 1969–70 to 1974–75: Children under 17 Years of Age

Condition Groups	Prevalence per 100,000		Per Cent Change in Prevalence	Cumulative Per Cent of Net Overall Change in Prevalence of Activity Limitations Explained
	1969–70	1974–75		
All Respiratory Conditions	641	945	47	31
Asthma, with or without Hay Fever (493)	431	710	65	—
Hay Fever (507)	50	102	104	—
All Mental, Nervous System Disorders	178	320	80	45
Personality and other nonpsychotic mental disorders (301, 302, 304, 305.0, 305.3, 305.5, 305.6, 308, 309)	19	91	379	—
All Eye, Ear Diseases	92	202	120	56
Inflammatory diseases of the ear and other ear diseases (380–384, 385–387 (745.0–745.3, 781.3))	37	98	165	—
All Orthopedic Impairments	130	227	75	66
Impairments of the knee and leg	53	113	113	—
All Hearing Impairments	113	186	65	73
Hearing loss in both ears without deafness	35	80	129	—
All Activity-Limiting Conditions	2680	3672	37	100

NOTE: Eighth Revision International Classification of Diseases codes in parentheses.
SOURCE: Micro Data Tapes from the National Health Interview Survey.

environment of the child could result in the generalized pattern of increase shown in Table 2.

To help clarify this question, condition categories contributing most to the 37 per cent increase in reported activity limitations between 1969–70 and 1974–75 were examined in greater depth. In order of contribution, these were respiratory diseases, mental and nervous system disorders, eye and ear diseases, orthopedic impairments, and hearing impairments. Together, conditions in these categories accounted for 73 per cent of the net increase in prevalence of activity limitations.

Respiratory Conditions—Almost one-third of the entire increase in reported activity limitations during this period can be attributed to respiratory diseases (Table 3). Prevalence for this group of diseases increased some 47 per cent. Increases in the prevalence of asthma (65 per cent) account for almost the entire net change in prevalence of activity-limiting respiratory diseases. Such a large increase is surprising in light of the increased availability of bronchodilator medications during this period. By permitting asthmatic children to engage in a greater variety of physical activities, such medications should result in reductions in prevalence of limitations. With the exception of activity-limiting hay fever, which also increased significantly, prevalence for most other respiratory diseases was stable or declined slightly.

Because several studies have demonstrated a link between asthma and hay fever, the parallel increases in these conditions are not surprising.^{16,17} However, no other national studies have attempted to assess the prevalence of functionally disabling asthma or hay fever. The National Health and Nutrition Examination Survey (NHANES) and its predecessor National Health Examination Surveys (NHES) did obtain spirometry data that might be used to document the HIS results. Unfortunately, these data were collected to establish body norms and, as a consequence, asthmatic children were less likely than others to participate in spirometric tests (Personal communication to author from Terry Drizd, NCHS).

One other data source that might help to validate the increased reporting of activity-limiting asthma is the National Hospital Discharge Survey (NHDS). If the prevalence of severe cases of asthma is increasing, increased hospital discharges for asthma might be expected. Data from the 1971

and 1975 NHDS do show an increase of 98 per cent in discharges for asthma among children under age 15 years.^{18,19} However, these data are not consistent over time. Hospital utilization for asthma increased at an even higher rate between 1975 and 1980, while prevalence of activity limiting asthma was stable.^{19,20}

Mental and Nervous System Disorders—Prevalence of mental and nervous system disorders increased by 80 per cent over the 1969–70 to 1974–75 period, accounting for 14 per cent of the overall net increase in reported activity limitations. Personality and other nonpsychotic mental disorders (including behavioral disorders, drug abuse, and hyperactivity) rose by over 300 per cent, accounting for half of the total change in prevalence for this condition category. Other individual mental and nervous system conditions demonstrating suggestive increases in prevalence included psychoses, nervousness and depression, epilepsy, and migraine.

Hospital discharges for mental and nervous conditions showed only suggestive increases between 1971 and 1975 according to the NHDS.^{18,19} Surveys of inpatient and outpatient mental health facilities conducted for the National Institute for Mental Health indicate patient care episodes increased from 638 per 100,000 in 1971 to 989 in 1975 for children under 18 years old.^{21,22} While inpatient admissions were relatively stable, the largest increases occurred for hospital outpatient services (up 48 per cent) and services provided at Community Mental Health Centers (up 98 per cent). Over 80 per cent of children treated on an outpatient basis during 1975 for this condition category were diagnosed with adjustment reactions, behavioral problems, and other unspecified mental disorders. Nearly 75 per cent of children treated on an outpatient basis had no previous psychiatric care, suggesting that many of these children may have been receiving treatment for newly diagnosed conditions.

Diseases of the Eye and Ear—The third largest category contributing to the overall increase in prevalence was eye and ear diseases. Prevalence of these activity-limiting conditions grew by 120 per cent, accounting for 11 per cent of the overall net increase in activity limitations reported between 1969–70 and 1974–75. Prevalence of activity limiting ear diseases increased 165 per cent, which was 56 per cent of the overall

TABLE 4—Leading Chronic Condition Groups, 1974–75 to 1979–81: Children under 17 Years of Age

Condition Groups	Prevalence per 100,000		Per Cent Change in Prevalence	Cumulative Per Cent of Net Overall Change in Prevalence of Activity Limitations Explained
	1974–75	1979–81		
Impairments of Speech, Special Senses, Intelligence	417	567	36	86
Learning Disabilities	38	111	192	—
All Activity-Limiting Conditions	3672	3847	5	100

SOURCE: Micro Data Tapes from National Health Interview Survey.

change in this condition category. Prevalence of eye diseases also increased slightly.

Hearing loss in children is a common morbid complication of inflammatory diseases of the ear (otitis media), and was measured at the national level by the NHES and NHANES. During 1963–65, over 7,000 children aged 6 to 11 years were interviewed and examined.²³ Parents reported 4.2 per cent of all children had some level of hearing impairment. Audiograms performed on all children confirmed approximately 25 per cent of the parentally reported cases. Children with histories of past earaches and physician-diagnosed abnormalities of the eardrum were more likely to have abnormal audiograms. Although similar data were collected during the 1970s, they have yet to be analyzed or published.

Hospital discharges for disorders of the ear and Eustachian tube increased 45 per cent between 1971 and 1975, according to the National Hospital Discharge Survey.^{18,19} Hospital discharges and prevalence of activity-limiting ear diseases continued to increase in a parallel fashion between 1975 and 1980, although at lower rates of increase.^{19,20} No significant change was found for hospital discharges for eye disorders between 1971 and 1975.^{18,19}

Orthopedic Impairments—Ten per cent of the increase in reported activity limitations during this period was due to increased prevalence of orthopedic impairments, principally those associated with the knee and leg. Reporting of orthopedic impairments rose by 75 per cent. Increases in the prevalence of impairments of the back, spine or vertebra, and the shoulder and arms, as well as ill-defined sites were only suggestive, as were the declines reported for impairments of the hips and/or pelvis, ankle, and foot.

No data from other sources were found to confirm or refute the overall trend in orthopedic impairments. Nevertheless, it should be noted that the prevalence for knee and leg impairments, the subgroup of impairments showing the largest increase in prevalence during 1969–70 to 1974–75, receded to almost the 1969–70 level by 1979–81.

Hearing Impairments—The fifth largest contributor to rising prevalence of activity limitation between 1969–70 and 1974–75 was hearing impairments. Reporting of these impairments increased 65 per cent. The leading individual condition in this group was hearing loss in both ears without deafness, which increased 129 per cent over the period. Prevalence of activity limitation for more severe hearing impairments, such as deafness in both ears, showed no significant change.

Chronic otitis media is one of the most common causes of non-congenital hearing loss in children.²⁴ While the NHIS data do not permit examination of the etiology of reported hearing impairments, it seems likely that increased reporting of hearing loss could be associated with the rise in prevalence of inflammatory ear disease and other ear diseases noted above. This

question can be addressed once the NHANES audiometry data for the early 1970s are analyzed and reported.

Effect of Perceptions

Unlike some other conditions that have clear effects on a child's functioning, the degree of limitation caused by the leading diseases and impairments discussed above is often ambiguous and thus easily influenced by changing perceptions. For example, whether asthma is limiting is based only partly on the pathology of the condition. Depending on physician and parental attitudes as well as how much a child desires to engage in strenuous physical pursuits, an asthmatic child may or may not be considered limited. This is also likely the case for partial hearing loss and orthopedic impairments where the presence of a limitation is related at least partly to the types of activities children are expected to engage in (e.g., physical education, sports, dance, etc.). Whether personality disorders, especially those related to social behavior, are limiting is also likely to be influenced by parental and educator attitudes.

Comparison of total prevalence levels for the group of less subjective conditions described in the methods section revealed that rather than increasing, annual prevalence for these conditions as a group showed a suggestive decline from 366 to 363 per 100,000 between 1969–70 and 1974–75. Prevalence of mild and moderate limitations for this group of selected conditions rose suggestively from 316 to 323 per 100,000 between 1969–70 and 1974–75.

Changes in Prevalence of Activity Limiting Chronic Conditions, 1974–75 to 1979–81

Overall prevalence of activity limitations demonstrated only a suggestive increase between 1974–75 and 1979–81. This period is marked by scattered small changes within the Table 2 condition categories. While many conditions exhibited slight increases in prevalence, other conditions exhibited decreases of nearly equal size. Prevalence for only one category of conditions—speech, special sense, and intelligence-related impairments—showed a significant upward movement.

Prevalence of impairments of speech, special senses, and intelligence climbed 36 per cent between 1974–75 and 1979–81 as shown in Table 4. Although a variety of conditions are included in this group of impairments, prevalence rose in a strikingly large fashion for only one individual condition: learning disabilities rose 192 per cent.

The reported prevalence for learning disabilities was quite stable during the 1969–70 to 1974–75 period. This apparent stability, however, may reflect changes in how parents and others label children with learning or other educational disorders. During the early 1970s, a large in-

crease in the general category of activity-limiting personality and other nonpsychotic mental disorders occurred, and many of the conditions in that category, such as hyperactivity and hyperkinesis, are now often labeled as learning disabilities. Hence, the recent increase in learning disabilities may actually be a continuation of a trend that began in the late 1960s or early 1970s but was reported under a different heading.

An increase in the number of children attending special classes for learning disabilities is apparent from other data collected by the US Department of Education's Office of Special Education and Rehabilitative Services. These data show that between 1976 and 1982 the number of children classified as speech-impaired, hearing-impaired, mentally retarded, orthopedically handicapped, or visually handicapped declined, while those with specific learning disabilities increased 119 per cent. Children with learning disabilities accounted for 22 per cent of the special education population in 1976-77, and 41 per cent in 1982. The former leading category—speech impairments—declined from 35 to 27 per cent of this population, and mental retardation dropped from 26 to 18 per cent of the special education population. The only other category to demonstrate an increase was the severely emotionally disturbed.²⁵

The National Association of State Directors of Special Education suggests that some of these changes were due to a greater public awareness about learning disabilities, wider availability of evaluation techniques, liberalization of eligibility criteria, cutbacks in remedial programs, and the perception that the learning disabled categorization had become less stigmatized over time.²⁵

Discussion

Between 1969 and 1981, prevalence of activity-limiting chronic conditions increased by 44 per cent. This period is marked by two distinct trends: a sharp rise in the early 1970s, and a leveling off in the late 1970s. The increase in reported activity limitations was restricted to the less severe categories of limitation.

The 37 per cent increase in overall prevalence of activity limitations that occurred between 1969-70 and 1974-75 was characterized by growth in almost all condition categories. There is little firm evidence available from other sources to confirm or refute the NHIS results. Comparison of prevalence levels for conditions assumed to be less subject to an attitudinal component showed virtually no change in reporting levels over this period. While this comparison is by no means conclusive, it is consistent with the hypothesis that the increased reporting of childhood activity limitations between 1969-70 and 1974-75 is attributable, at least in part, to better ascertainment and increased concern of parents, educators, and physicians.

On the other hand, the data available on hospital discharges by diagnosis from the NHDS suggest increased prevalence of activity limitations between 1969-70 and 1974-75 was associated with increased hospitalizations for at least some of the same conditions. These data are compatible with the alternate hypothesis that during this period genuine increases in underlying disease occurred. However, increased hospitalizations could also be attributed to changing practice patterns on the part of the medical community or to some other trend unrelated to the trend in activity limitations (e.g., improved insurance coverage).

The results for the 1974-75 to 1979-81 period suggest educationally related impairments were primarily responsible for the small rise in activity limitations reported. During

this period, increased concern was voiced among health professionals and educators regarding learning and other educational handicaps. Implementation of the Education for All Handicapped Children Act of 1975 (PL 94-142) and renewed efforts at mainstreaming disabled children sharpened the focus on these children. In fact, while Census data from 1970 and 1980 show little change in the number of children residing in institutions for physical disabilities, there were reductions in the numbers of children residing in institutions for mental disabilities. Hence, it appears that the recent increase in prevalence of learning disabilities among noninstitutionalized children may be explained by increased detection efforts and heightened awareness of educational problems as well as efforts to deinstitutionalize and provide mainstream education to mentally handicapped children. Heightened awareness of learning disabilities should increase reporting of mild limitations among school age children, while efforts at mainstreaming severely disabled children should decrease the number of children counted as unable to conduct their major activity. The 1974-75 to 1979-81 trend data (Table 1) indicate such a pattern of shifts in prevalence may have occurred during the late 1970s.

Many of the conditions responsible for the overall rise in reported limitations between 1969 and 1981 are related to what has been termed the "new morbidity." Although a somewhat general term, new morbidity reflects the changing nature of pediatric practice as it shifts away from traditional medical illnesses towards those with a greater psychosocial component. As Haggerty, Roghmann, and Pless have stated: "The current major health problems of children, as seen by the community, are those that would have barely been mentioned a generation ago. Learning difficulties and school problems, behavioral disturbances, allergies, speech difficulties, visual problems, and the problems of adolescents in coping and adjusting are today the most common concerns about children."²⁶ Some of these problems are actually old problems that always existed but were ignored as more pressing needs took priority.²⁶ Increased concern over such problems may be partly attributable to a shrinking child population that occurred simultaneously with an expansion in the number of practicing pediatricians during the early 1970s.^{27,28} With more pediatricians and fewer children, more time and energy could be focused on less tractable and previously undertreated problems.

The trend toward increased reporting of activity limitations, particularly those with greater psychosocial components, may also be partly attributable to the changing character of the American family over the last 15 years. Since the late 1960s an enormous increase in the number of children residing in single parent families has occurred.²⁹ The stress created by family dissolution and the manifestation of that stress on children's emotional and behavioral well-being is well documented.³⁰ Similarly, the rapid increase in the proportion of mothers who work outside the home, without offsetting increases in the number of fathers staying at home, has resulted in reduced parental-child interaction. A separate multivariate analysis revealed that children in households where only one parent was present had a higher probability of being limited in activity. Reduced caretaking time may contribute to a particularly stressful environment when maternal employment becomes necessary and more common as a result of divorce or separation.

APPENDIX

*National Health Interview Survey Questionnaire Probes for Determining Presence of Activity Limitations***Age under 1 year**

- Is _____ limited in any way because of his health?

Age 1-5 years

- Is _____ able to take part at all in ordinary play with other children?
- Is he limited in the kind of play he can do because of his health?
- Is he limited in the amount of play because of his health?

Age 6-16 years

- Does (would) _____ have to go to a certain type of school because of his health?
 - Is he (would he be) limited in school attendance because of his health?
 - Is he limited in the kind or amount of other activities because of his health?

All ages responding NO to the above probes

- Is _____ limited in ANY WAY because of a disability or health?

SOURCE: National Health Interview Survey questionnaire 1980.

ACKNOWLEDGMENTS

This research was supported by the National Center for Health Services Research Grant HS 04339. Data were provided by the National Center for Health Statistics. Analyses, interpretation, and conclusions are solely those of the authors and do not necessarily reflect the views of the funding agency or the data collection agency. The authors appreciate the very helpful comments of Lew Butler, John Butler, Helen Gonzales, Nick Jewel, Peggy McManus, Tom Newman, and Jon Showstack. We are also appreciative of the time and resources donated by staff at the National Center for Health Statistics, particularly Susan Jack.

REFERENCES

1. Data from the Division of Vital Statistics, National Center for Health Statistics, Hyattsville, Maryland. (Unpublished)
2. Newacheck PW, Budetti PP, McManus P: Trends in childhood disability. *Am J Public Health* 1984; 74:232-236.
3. National Center for Health Statistics: Current Estimates from the Health Interview Survey: United States, 1981. Vital and Health Statistics, Series 10, Number 141. DHEW Pub. No.(PHS) 82-1569. Hyattsville, MD: NCHS, 1982.
4. Colvez A, Blanchet M: Disability trends in the United States population, 1966-76: analyses of reported causes. *Am J Public Health* 1981; 71:464-471.
5. Wilson RW, Drury TF: Factors affecting the use of limitation of activity as a health status measure *In*: National Center for Health Statistics: Silver Anniversary of the National Health Survey Act. Hyattsville, MD: NCHS, 1981.
6. National Center for Health Statistics: Limitation of Activity and Mobility due to Chronic Conditions: July 1965-June 1966. Vital and Health Statistics, Series 10, Number 45. Washington, DC: NCHS, 1968.
7. National Center for Health Statistics: Interviewing Methods in the Health Interview Survey. Vital and Health Statistics, Series 2, Number 48. DHEW Pub. No.(HSM) 72-1048. Rockville, MD: NCHS, 1972.
8. National Center for Health Statistics: Current Estimates from the Health Interview Survey: United States, 1977. Vital and Health Statistics, Series 10, Number 126. DHEW Pub. No.(PHS) 78-1554. Hyattsville, MD: NCHS, 1978.
9. Budetti PP, *et al*: Case study #10: The Costs and Effectiveness of Neonatal Intensive Care. Washington, DC: US Congress: Office of Technology Assessment, August 1981.
10. Newacheck PW, Budetti PP, McManus P: (letter) Response from Newacheck, *et al*. *Am J Public Health* 1984; 74:1168.
11. Gortmaker SL, Sappenfield W: Chronic childhood disorders: prevalence and impact. *Pediatr Clin North Am* 1984; 31:3-18.
12. US Census Bureau: Persons in Institutions and Other Group Quarters 1980: PC80-2-40. Washington, DC: Census Bureau, 1984.
13. National Center for Health Statistics: Development of the Design of the NCHS Hospital Discharge Survey. Vital and Health Statistics, Series 2, Number 39. PHS No. 1000. Washington, DC: Govt Printing Office, 1970.
14. National Center for Health Statistics: Plan and Operation of the Second National Health and Nutrition Examination Survey, 1976-1980. Vital and Health Statistics, Series 1, Number 15. DHEW Pub. No.(PHS) 81-1317. Health Research Statistics and Technology. Washington, DC: Govt Printing Office, 1981.
15. National Center for Health Statistics: Estimate and Sampling Variance in the Health Interview Survey. Vital and Health Statistics, Series 2, Number 38. DHEW Pub. No.(HRA) 74-1288. Rockville, MD: NCHS, 1974.
16. McNichol KN, Williams HE: Spectrum of asthma in children: II. allergic components. *Br Med J* 1973; 4:12-16.
17. Kuzemko JA: Natural history of childhood asthma. *J Pediatr* 1980; 97:886-892.
18. Ranofsky AL: Inpatient Utilization of Short-stay Hospitals, by Diagnosis, United States, 1971. National Center for Health Statistics, Series 13, No. 16, DHEW Pub. No. (HRA) 75-1767. Washington, DC: Govt Printing Office, 1974.
19. Glickman L: Inpatient Utilization of Short-stay Hospitals, by Diagnosis, United States, 1975. National Center for Health Statistics, Series 13, No. 35, DHEW Pub. No. (PHS) 78-1786. Washington, DC: Govt Printing Office, 1978.
20. Haupt BJ: Utilization of Short-stay Hospitals: Annual Summary for the United States, 1980. National Center for Health Statistics, Series 13, No. 64, DHHS Pub. No. (PHS) 82-1725. Washington, DC: Govt Printing Office, 1982.
21. Regier D: Trends in admissions under 18 years of age to selected mental services, US 1971 and 1975. Memorandum #37. Rockville, MD: National Institute of Mental Health, April 7, 1978.
22. Sowdor BJ, Burt MR, Rosenstein MS, Milazzo-Sayre LJ: Use of Psychiatric Facilities by Children and Youth, United States, 1975. National Institute of Mental Health, Series CN, No. 6. DHHS Pub. No.(ADM) 81-1142. Washington, DC: Govt Printing Office, 1981.
23. National Center for Health Statistics: Hearing Sensitivity and Related Medical Findings among Children. Vital and Health Statistics, Series 11, Number 114. DHEW Pub. No.(HSM) 72-1046. Washington, DC: Govt Printing Office, 1972.
24. Bluestone CD, *et al*: Workshop on effects of otitis media on the child. *Pediatrics* 1983; 71:639-652.
25. Zill N: The school-age handicapped: a statistical profile of special education students in elementary and secondary schools in the United States. Report prepared for National Center for Education Statistics. Washington, DC: Child Trends Inc., October 1984.
26. Haggerty RJ, Roghmann KJ, Pless IB: *Child Health and the Community*. New York: John Wiley, 1975.
27. Wright FH: Survey of pediatricians certified by the American Board of Pediatrics up to 1975. *J Pediatr* 1980; 97:1021.
28. Burnett RD, Bell LS: Projecting pediatric practice patterns. *Pediatrics* 1978; 62(suppl):625-680.
29. Preston SH: Children and the elderly in the US. *Sci Am* 1984; 251:44-49.
30. Furstenburg FF, Nord CW, Peterson JL, Zill N: The life course of children of divorce. *Am Sociol Rev* 1983; 48:656-668.