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Incidence and Impact of Selected Infectious Diseases in Childhood

Series 10:
Data from the National Health Interview Survey
No. 180

This report provides estimates of the lifetime and annual incidence of selected infectious diseases for children in various demographic groups. The social and health care impact of these diseases in terms of limitation in activity, bed days, school days lost, physician contacts, hospitalizations, surgery, and use of medication is also presented. The data are from the 1988 National Health Interview Survey on Child Health.

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Cooperation of the U.S. Bureau of the Census

Under the legislation establishing the National Health Interview Survey, the Public Health Service is authorized to use, insofar as possible, the services or facilities of other Federal, State, or private agencies.

In accordance with specifications established by the National Center for Health Statistics, the U.S. Bureau of the Census, under a contractual arrangement, participated in planning the survey and collecting the data.

Contents

Symbols

- - -	Data not available
. . .	Category not applicable
-	Quantity zero
0.0	Quantity more than zero but less than 0.05
Z	Quantity more than zero but less than 500 where numbers are rounded to thousands
*	Figure does not meet standard of reliability or precision

Incidence and Impact of Selected Infectious Diseases in Childhood

by Ann M. Hardy, Dr.P.H., Division of Health Interview Statistics

Introduction

Infectious diseases are an important health problem for children; excluding routine infant and child health examinations, the five leading diagnoses made during office visits to pediatricians are infectious diseases (1). These visits account for about 40 percent of all office visits for illness for all children and for about half of the doctor visits for pre-school-aged children (1).

In addition to being important causes of morbidity, infectious diseases are also important causes of infant and childhood mortality. Infectious diseases are listed as the underlying cause of death for about 4 percent of infant deaths but are estimated to contribute to 12.5 percent of deaths (2). For children 1–4 years of age, infections are the underlying cause of 10 percent of deaths; for those 5–14 years, the figure is 5 percent (3). Infections are also important contributors to other causes of childhood mortality, such as cancer.

The purpose of this report is to provide in one document recent national estimates of the occurrence of some of the more common childhood infectious diseases. Various demographic characteristics associated with these diseases and their impact on health care utilization and limitation of activity are also examined. This information may be useful for surveillance and disease control efforts as well as for health care planning. The estimates are based on data collected in the 1988 National Health Interview Survey on Child Health (NHIS–CH) which included children from birth through 17 years. Information is presented on eight specific diseases: Repeated tonsillitis or enlargement of the tonsils or adenoids, frequent or repeated ear infections, mononucleosis, hepatitis, meningitis, bladder or urinary tract infection, rheumatic fever, and pneumonia. Another disease, frequent or repeated diarrhea or colitis, was also included. While there may be noninfectious causes for this disease, some episodes are likely to be infectious in origin. Also, children, particularly infants, with diarrhea, regardless of the cause, may represent a source of infection for others with whom they have contact. All of the estimates presented for these diseases are based on parental reporting.

It should be noted that there are other sources of data on the incidence of infectious diseases in children. However, comparisons with the information in this report are difficult because of methodological differences. One alternate source is the Centers for Disease Control (CDC) notifiable disease surveillance system which provides summary data on a weekly basis (4). For most of the diseases in this reporting system, surveillance is passive, and underreporting may occur. Also, because the system is etiologic agent specific and because some diseases, such as mononucleosis, are not reportable, the data are not directly comparable with that presented in this report.

Reports in the medical literature on prospective studies of children also provide incidence information. Generally these studies are not population based but limited to selected groups in one medical practice (5,6). The few population-based studies that have been reported on have, in general, been limited geographically (7,8).

The National Health and Nutrition Examination Survey (NHANES I) conducted by the National Center for Health Statistics (NCHS) in 1976–80 did collect data on a past history of ear infections and urinary tract infections for children over 6 months of age. Because of differences in wording compared with the NHIS–CH, the data from the two surveys are not directly comparable.

Two other data systems maintained by NCHS provide information on health care utilization for specific diseases. The National Ambulatory Care Survey (NAMCS) has published information on office visits to pediatricians. However, this survey focuses on visits and not on patients. The National Hospital Discharge Survey collects information on a sample of hospital discharges and is useful for examining hospital utilization for specific diseases. This data set may be less useful for looking at childhood infectious diseases as many of the latter are managed on an outpatient basis.

The 1981 Child Health Supplement to the National Health Interview Survey included questions about many of the same diseases described in this report (9). By comparing estimates from the two surveys, trends in infectious diseases could be studied, but such an analysis is beyond the scope of this report.

Highlights

The following highlights summarize information described in detail in the text and tables that follow.

- Thirty-eight percent of children were reported to have ever had at least one of the nine infectious diseases examined (repeated ear infection, repeated tonsillitis or enlarged adenoids, pneumonia, frequent diarrhea or colitis, bladder or urinary tract infection, mononucleosis, hepatitis, meningitis, and rheumatic fever); 11 percent were reported to have had two or more of these diseases.
- The most common of these conditions was repeated ear infection, affecting one-quarter of all children at some time in their lives and 9 percent in the previous year.
- Among infants (under 1 year of age), 10 percent were reported to have had repeated ear infection, 3 percent had had frequent diarrhea or colitis, and 3 percent had had pneumonia.
- Among teenagers, 13–17 years of age, repeated tonsillitis was the most common disease, affecting 5 percent in the past year.
- In general, most of these diseases were reported more frequently among white non-Hispanic children than black non-Hispanic or Hispanic children.
- The most striking difference in disease incidence by sex was for bladder urinary tract infections; girls were more than five times as likely to have had this condition as boys.
- The six most common of these infectious diseases (repeated ear infection, repeated tonsillitis, pneumonia, frequent diarrhea or colitis, bladder or urinary tract infection, and mononucleosis) had a variety of impacts on children:
  - Between 29 and 82 percent of affected children were reported to have been limited in their usual activities in the past year as a result of these conditions.
  - Children with these conditions had from 1.2 to 7.6 bed days per year as a result.
  - These six conditions resulted in about 2 million days of school lost and over 40 million physician contacts per year.
  - While hospitalization and surgery were relatively uncommon for these conditions, physician contacts and medication use were very common. The number of physician contacts per child per year for children with these conditions ranged from 2.0–4.2; 46–93 percent of children with these diseases took medication prescribed or recommended by a physician for the condition.

Sources and limitations of data

The estimates presented in this report were based on information collected by the 1988 National Health Interview Survey on Child Health (NHIS–CH). This supplement was developed jointly by the National Center for Health Statistics (NCHS), the National Institute of Child Health and Human Development (NICHD), and the Bureau of Maternal and Child Health of the Health Resources and Services Administration (HRSA). Child Trends Incorporated, a private research company, was also involved in survey development and design.

The NHIS is an ongoing, cross-sectional survey of the U.S. civilian noninstitutionalized population conducted annually by NCHS. Each week a national probability sample of households is contacted. Household members are interviewed in person by U.S. Bureau of the Census personnel to obtain information about their health status and sociodemographic characteristics.

The NHIS has two main parts: A basic health and demographic questionnaire which is used every year, and one or more special health topic questionnaires which change annually. In 1988, the special topics included AIDS (acquired immunodeficiency syndrome) knowledge and attitudes, medical device implants, occupational health, alcohol, and child health. These data sets can be linked for analytic purposes.

For the NHIS–CH, one sample child under 18 years of age was randomly selected from each family with children in that age range. The questionnaire was administered in person to the adult family member who knew the most about the sample child's health; for 80 percent the respondent was the mother. In 1988, the total interviewed sample for the basic health questionnaire consisted of 47,485 households containing 122,310 persons. The total response rate was 95 percent. The NHIS–CH collected data on 17,100 children, about 95 percent of those eligible. Thus the combined overall response rate for the NHIS–CH was 90 percent, the product of the response rates for the basic and the child health questionnaires. Item nonresponse for the variables used in this report was low, generally less than 5 percent.

The estimates presented in this report are for noninstitutionalized persons under 18 years of age. Details of the survey design, the methods used in estimation, and the general qualifications of the data obtained with the survey can be found in appendix I. Because the estimates are based on a sample, they are subject to sampling variability. Formulas for computing sampling errors are also described in appendix I. In general, the standard errors associated with the estimates are low. However, when the estimated number in the numerator or denominator of a rate or percent is quite small, the standard errors may be large.

Definitions for many of the terms used in this report can be found in appendix II. The entire NHIS–CH questionnaire is contained in the 1988 edition of the NHIS annual report entitled "Current Estimates From the National Health Interview Survey, 1988" (10).

Respondents to the NHIS–CH were asked if the sample child had ever had any on a list of specific health conditions including each of the diseases discussed in this report. Those who indicated the sample child had ever had a condition were asked if the child had had the condition in the past year. Questions were also asked about limitation in activity and health care utilization resulting from these diseases during the past year. For both time periods (ever and past year), the occurrence of disease was based on reports by the respondents. Therefore, the respondents had to recall that the child had had the disease and had to be willing to report this information. Some underreporting may have resulted from this, with the less serious forms of certain diseases being less likely to have been reported.

All the differences noted in this report are statistically significant at the 0.05 level. The t test with a critical value of 1.96 was used to test all comparisons. The terms "similar" and "not different" in this report indicate that no statistical difference was found between the measures being compared. Lack of comment regarding differences between two estimates does not imply that the difference was tested and found not to be statistically significant.

Results

Lifetime incidence of selected infectious diseases

Overall, an estimated 38 percent of children had ever had at least one of the nine infectious diseases examined in this report, and 11 percent had had two or more of these diseases. Frequent or repeated ear infection was the most commonly reported of the nine infectious conditions examined, affecting almost one-quarter of all children (table 1). This was followed by repeated tonsillitis or enlargement of tonsils or adenoids (12.8 percent) and pneumonia (6.6 percent). Rheumatic fever was the least common disease, affecting only 0.2 percent of children.

For most of the diseases, lifetime incidence increased with age. The two exceptions were repeated ear infection and frequent diarrhea or colitis, which were highest in children ages 1–4 years and decreased in older children. This may be due to respondents for the older children not recalling these diseases, which tend to occur in pre-school-aged children, or to the diseases being more common now than when the older children were younger.

Males were more likely than females to have ever had repeated ear infection, frequent diarrhea or colitis, and pneumonia (table 1). Females were more likely than males to have had bladder or urinary tract infection. This was most striking in the age group 5–11 years, where females were 6.4 times more likely to have had these infections than males.

In general, these nine infectious diseases were more commonly reported in white non-Hispanic children than in either black non-Hispanic or Hispanic children (table 2). Table A shows the relative risk for five of these diseases for white non-Hispanic children compared with black non-Hispanic and Hispanic children. The relative risks for white children compared with black children ranged from 2.3 for repeated ear infection to 1.0 for frequent diarrhea or colitis. For white non-Hispanic children compared with Hispanic children, the relative risks were slightly lower, ranging from 2.5 for bladder or urinary tract infection to 1.0 for frequent diarrhea or colitis.

Three of the diseases, repeated ear infections, repeated tonsillitis, and mononucleosis, increased in lifetime incidence with income (table 3). No consistent trend by income was seen for the other diseases. Children with a usual source of routine health care were more likely to have had repeated ear infection than children without such care. Children with health insurance were more likely to have this disease and repeated tonsillitis than those without health insurance. This is probably because these diseases may go undiagnosed without an examination by a health care provider; children with a source of routine care and with health insurance probably are more likely to access medical care for less serious illness, and thus have more opportunity to have ear infections and tonsillitis diagnosed.

Table A. Relative risk of ever having had selected infectious diseases, by race and Hispanic origin: United States, 1988

Disease	*Black non-Hispanic*[1]	*White non-Hispanic*	*Hispanic*[1]	*White non-Hispanic*
Repeated ear infection	1.0	2.3	1.0	1.5
Repeated tonsillitis	1.0	1.7	1.0	1.4
Pneumonia	1.0	1.6	1.0	2.0
Bladder or urinary tract infection	1.0	2.1	1.0	2.5
Frequent diarrhea or colitis	1.0	1.0	1.0	1.0

[1]Reference group.

Slight differences in lifetime incidence were also noted by geographic region (table 4). For three of the diseases (repeated ear infection, repeated tonsillitis, and pneumonia), rates were highest among children in the Midwest and lowest among those in the Northeast.

Annual incidence of selected infectious diseases

For three of the diseases, hepatitis, meningitis, and rheumatic fever, the reported incidence in the past year was too small to make reliable estimates. The remainder of this report will focus on the other six diseases.

Repeated ear infection was the most common disease, with an annual incidence rate of 9.0 per 100 children up to 17 years, followed by repeated tonsillitis (4.7) and pneumonia (1.7) (table 5). In the age group 0–4 years, the rate for repeated ear infections was quite high, 16.0 per 100 children in this age group, more than five times the incidence rate for the next most common diseases, repeated tonsillitis and pneumonia. For those aged 5–11 years, bladder or urinary tract infections were as common as pneumonia. For teenagers, repeated tonsillitis was the most common disease. Mononucleosis was also much

Table B. Relative risk of having had selected infectious diseases in the past year, by race and Hispanic origin: United States, 1988

Disease	Black non-Hispanic[1]	White non-Hispanic	Hispanic[1]	White non-Hispanic
Repeated ear infection	1.0	1.8	1.0	1.4
Repeated tonsillitis	1.0	1.8	1.0	1.2
Pneumonia	1.0	1.7	1.0	*2.5
Bladder or urinary tract infection	1.0	1.8	1.0	*2.0
Frequent diarrhea or colitis	1.0	1.1	1.0	1.0

[1]Reference group.

more common in this age group than in younger children. Females had higher incidence rates of repeated tonsillitis and bladder and urinary tract infections than males.

For most of the diseases, white non-Hispanic children had higher rates than black non-Hispanic children (table 6). Mononucleosis was reported almost exclusively among white children. As seen in table B, the relative risks for white children compared with black children ranged from 1.8 for repeated tonsillitis and repeated ear infection to 1.1 for frequent diarrhea or colitis. For white children compared with Hispanic children, the relative risk was increased only for repeated ear infection and repeated tonsillitis.

When rates for these six diseases were examined by income level, rates for three diseases, repeated tonsillitis, frequent diarrhea or colitis, and pneumonia, were higher among those in the lower income categories than those with higher incomes (table 7). The other diseases showed no consistent pattern of incidence by income. Only one disease, repeated ear infection, showed a difference in incidence rate related to whether the child had a usual source of routine health care (9.7 per 100 children who did versus 3.8 per 100 children who did not). This difference is likely due to children with a usual source of routine health care having more opportunity for ear infections to be diagnosed than do children without a usual source of routine care. This condition was also slightly more common among those children with health insurance coverage.

Regional variations in disease rates were also seen (table 8). Rates for repeated ear infections were lower among children in the West than in the Midwest and Northeast. Repeated tonsillitis was more common in the Midwest and South than in the Northeast and West. Bladder or urinary tract infections were reported less frequently for those from the Northeast than from the other regions.

Social impact and health care consequences of selected infectious diseases

For the six infectious diseases discussed in the preceding section, information on the social and health care impact on children with these conditions in the previous year was also examined. Impact included limitation in activity, bed days, school-loss days, physician contacts, hospitalization, need for surgery, and use of medication. This type of information supplements the information presented on rates of disease and helps quantify the financial, social, and health care burden they create.

Limitation in activity—All six diseases were associated with limitation in usual childhood activities in at least some of the children affected (table 9). Pneumonia and mononucleosis resulted in limitation in the highest percent of affected children (82 and 79 percent, respectively). Frequent diarrhea or colitis resulted in limitation in only 29 percent of children with this condition. For most of the diseases, those aged 4 years and younger were less likely to be limited than older children. Males and females were similar in the proportion limited in activity for these conditions. White non-Hispanic children were reported to have been limited more often than black non-Hispanic children.

Bed days—Bed days ranged from 7.6 days per year per child with mononucleosis to 1.2 days per year per child with frequent diarrhea or colitis (table 10). For pneumonia, those aged 12–17 years had more bed days than younger children with this condition. For mononucleosis and frequent diarrhea or colitis, children aged 5–11 years had more bed days than other children. Females with mononucleosis had more bed days than males with this condition; for other conditions the number of bed days was similar for males and females. Hispanic children with pneumonia and with repeated ear infections had more bed days than white and black non-Hispanic children.

School-loss days—Children with mononucleosis and pneumonia had more school-loss days than children with the other infectious diseases (table 11). Those with frequent diarrhea or colitis and bladder or urinary tract infections had the least (2.0 days for each). Females had slightly more school-loss days for frequent diarrhea or colitis than males with this condition. Hispanic children had substantially more school-loss days than non-Hispanic children for pneumonia and slightly more for bladder or urinary tract infections. White children had about 1 more school day lost for repeated tonsillitis than did either black or Hispanic children. In total, these six conditions resulted in an annual loss of about 28 million days of school.

Hospitalization—With the exception of pneumonia, hospitalization for these infectious diseases was fairly rare. Approximately one-quarter of the children with pneumonia were hospitalized; for repeated tonsillitis and repeated ear infection, less than 7 percent of affected children were hospitalized (table C). For children aged 0–4 years with pneumonia, 36.2 percent were hospitalized, more than twice the proportion for those over age 4 years with this disease. Because of low incidence of hospitalization, reliable estimates cannot be made for the other three diseases.

Surgery—Surgery was also rare for these particular diseases, and reliable estimates could be made only for

Table C. Percent of children with selected infectious diseases in the past year who required hospitalization, by age, sex, race, and Hispanic origin: United States, 1988

Disease	Age				Sex		Race and Hispanic origin		
	All ages	0–4 years	5–11 years	12–17 years	Male	Female	White non-Hispanic	Black non-Hispanic	Hispanic
Pneumonia	2.2	*2.4	*1.9	*2.6	*2.4	*2.0	2.2	*4.3	*0.4
Repeated tonsillitis	6.7	*6.6	9.1	*3.6	8.9	*4.9	6.6	*5.8	*7.7
Repeated ear infection	25 9	36.2	*18.8	*12.6	30.0	*20.0	22.7	*41.9	*49.0

Table D. Percent of children with repeated tonsillitis or repeated ear infections in the past year who required surgery, by age, sex, race, and Hispanic origin: United States, 1988

Disease	Age				Sex		Race and Hispanic origin		
	All ages	0–4 years	5–11 years	12–17 years	Male	Female	White non-Hispanic	Black non-Hispanic	Hispanic
Repeated ear infection	7.0	7.6	6.7	*5.4	7.8	6.1	8.9	*1.0	*1.1
Repeated tonsillitis	10 9	*10.6	14.4	*6.3	14.3	8.0	12.0	*4.3	*7.6

repeated tonsillitis and repeated ear infection. Eleven percent of children with repeated tonsillitis and 7 percent of children with repeated ear infection required surgery for their conditions (table D). For repeated tonsillitis, the percent needing surgery was highest in the age group 5–11 years and higher for males than for females.

Physician contacts—While hospitalization and surgery were relatively uncommon for most of the infectious conditions examined, a large proportion of children with these disorders had outpatient contact with a health care provider. The proportion who had had at least one physician contact during the past year for these conditions was highest for repeated ear infections and mononucleosis (92.4 and 91.9 percent, respectively) and lowest for frequent diarrhea or colitis (61.4 percent) (table 12). For three of the diseases (repeated ear infection, repeated tonsillitis, and frequent diarrhea or colitis), younger children were more likely to have had physician visits than older children with the same disease. There were no significant differences in proportion with a physician contact by sex or race and ethnicity.

Children with these six infectious diseases in the past year had over 40 million physician contacts as a result. Those children with repeated ear infections had the most (4.2 per affected child) (table 13). The number of visits for the other disorders ranged from 2.0 visits per year per child with frequent diarrhea or colitis to 2.9 per child with repeated tonsillitis and mononucleosis. For most of these diseases, younger children had more visits than older children and white non-Hispanic children had more visits than black non-Hispanic children.

Use of medication—Use of doctor-prescribed or -recommended medication in the past 12 months by children with specific conditions was also assessed. More than 90 percent of children with pneumonia and repeated ear infections reported taking medication (93.4 and 92.8 percent, respectively) (table 14). Only 45.5 percent of those with frequent diarrhea or colitis took medication. For repeated tonsillitis and repeated ear infection, younger children were more likely than older children to have used medication. In general, patterns of medication use were similar within the three racial–ethnic groups, with medication for pneumonia and repeated ear infections used by more than 80 percent of affected children and medication for frequent diarrhea or colitis less common (used by less than 50 percent).

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List of detailed tables

Table 1. Percent of children who had ever had selected infectious diseases, by age and sex: United States, 1988

Sex and disease	Age				
	All ages	0–1 year	1–4 years	5–11 years	12–17 years
Both sexes					
Repeated ear infection	24.5	10.3	29.4	28.0	19.6
Repeated tonsillitis	12.8	*0.9	5.3	13.9	19.1
Pneumonia	6.6	2.8	5.3	7.2	7.6
Bladder or urinary tract infection	3.8	*0.5	2.0	4.7	4.5
Frequent diarrhea or colitis	3.1	2.9	5.3	2.7	2.0
Mononucleosis	1.3	–	*0.2	0.8	2.8
Meningitis	0.7	*0.1	0.7	0.8	0.6
Hepatitis	0.3	*0.1	*0.1	*0.3	*0.3
Rheumatic fever	0.2	–	–	*0.1	*0.3
Male					
Repeated ear infection	25.8	11.1	32.3	29.7	19.5
Repeated tonsillitis	12.0	*1.2	6.0	13.6	16.4
Pneumonia	7.3	*4.4	6.0	8.0	8.0
Bladder or urinary tract infection	1.2	*0.6	*1.0	1.3	1.5
Frequent diarrhea or colitis	3.7	*3.9	6.3	3.1	2.4
Mononucleosis	1.1	–	*0.3	*0.6	2.4
Meningitis	0.8	*0.2	*0.8	1.0	*0.8
Hepatitis	*0.2	–	*0.1	*0.4	*0.2
Rheumatic fever	*0.2	–	–	*0.2	*0.4
Female					
Repeated ear infection	23.2	9.4	26.4	26.3	19.6
Repeated tonsillitis	13.6	*0.5	4.5	14.1	22.0
Pneumonia	6.0	*1.0	4.6	6.5	7.2
Bladder or urinary tract infection	6.4	*0.4	3.0	8.3	7.7
Frequent diarrhea or colitis	2.5	*1.8	4.2	2.2	1.7
Mononucleosis	1.4	–	*0.1	1.0	3.1
Meningitis	0.5	–	*0.5	*0.5	*0.5
Hepatitis	*0.3	*0.2	*0.1	*0.3	*0.5
Rheumatic fever	*0.1	–	–	*0.1	*0.3

Table 2. Percent of children who had ever had selected infectious diseases, by age, race, and Hispanic origin: United States, 1988

Race, Hispanic origin, and disease	Age			
	All ages	0–4 years	5–11 years	12–17 years
White non-Hispanic				
Repeated ear infection	27.6	28.2	31.5	22.4
Repeated tonsillitis	14.9	4.8	16.5	21.9
Pneumonia	7.7	5.5	8.2	8.9
Bladder or urinary tract infection	4.5	2.5	5.7	5.4
Frequent diarrhea or colitis	3.1	4.7	2.9	2.0
Mononucleosis	1.6	*0.3	0.9	3.5
Meningitis	0.7	*0.5	0.8	0.6
Hepatitis	0.3	*0.1	*0.4	*0.4
Rheumatic fever	*0.1	*0.0	*0.1	*0.3
Black non-Hispanic				
Repeated ear infection	16.1	17.8	18.6	11.8
Repeated tonsillitis	6.5	*2.8	5.5	10.9
Pneumonia	4.8	3.9	5.8	4.4
Bladder or urinary tract infection	2.1	*1.2	*2.2	*2.9
Frequent diarrhea or colitis	2.9	6.5	*1.9	*1.2
Mononucleosis	*0.5	*0.0	*0.3	*1.0
Meningitis	*0.5	*0.1	*0.3	*0.9
Hepatitis	*0.1	*0.3	–	–
Rheumatic fever	*0.1	–	*0.1	0.1
Hispanic				
Repeated ear infection	19.9	21.8	22.8	14.2
Repeated tonsillitis	10.2	4.4	11.2	14.8
Pneumonia	3.9	*2.9	3.4	5.4
Bladder or urinary tract infection	1.8	*1.3	*2.3	*1.5
Frequent diarrhea or colitis	3.0	*3.2	*2.4	*3.5
Mononucleosis	*0.6	–	*1.0	*0.8
Meningitis	*1.0	*1.4	*1.2	*0.3
Hepatitis	*0.2	–	*0.2	*0.4
Rheumatic fever	*0.3	–	–	*0.9

Table 3. Percent of children who had ever had selected infectious diseases, by family income, usual source of routine health care, and health insurance coverage: United States, 1988

Disease	Family income				Usual source of routine health care		Health insurance coverage	
	Less than $10,000	$10,000–$19,999	$20,000–$34,999	$35,000 or more	Yes	No	Yes	No
Repeated ear infection	21.5	21.9	25.1	28.8	25.8	17.4	26.6	20.1
Repeated tonsillitis	11.2	12.7	13 4	13.8	13.0	13.6	14.0	10.0
Pneumonia	6.9	6 1	7.2	6.9	7.0	5.5	7.0	6.1
Bladder or urinary tract infection	3.6	3 3	4.5	3.9	4.0	2.5	4.1	3.0
Frequent diarrhea or colitis	4.0	3.6	3.0	3.1	3.2	3.2	3.1	3.3
Mononucleosis	*0.2	1.1	1.3	1.9	1.3	*1.0	1.6	*0.5
Meningitis	*0 8	*0.5	0.7	0.7	0.7	*0.6	0.6	0.8
Hepatitis	*0.6	*0 3	*0.2	*0.2	0.2	*0.6	0.2	*0.5
Rheumatic fever	*0.1	*0.2	*0.2	*0.1	*0.2	*0.2	*0.1	*0.3

Table 4. Percent of children who had ever had selected infectious diseases, by geographic region: United States, 1988

Disease	Geographic region			
	Northeast	Midwest	South	West
Repeated ear infection	23.1	26.0	24.3	24.3
Repeated tonsillitis	10.0	14.4	13.5	11.9
Pneumonia	5.5	7.6	7.0	6.0
Bladder or urinary tract infection	2.8	4.5	4.2	3.1
Frequent diarrhea or colitis	2.3	2.9	3.4	3.5
Mononucleosis	1.0	1.6	1.1	1.3
Meningitis	*0.5	0.8	0.7	*0.7
Hepatitis	*0.3	*0.3	*0.3	*0.2
Rheumatic fever	*0.2	*0.1	*0.2	*0.2

Table 5. Annual incidence rate per 100 children for selected infectious diseases, by age and sex: United States, 1988

Sex and disease	Age			
	All ages	0–4 years	5–11 years	12–17 years
Both sexes				
Repeated ear infection	9.0	16.0	8.5	3.4
Repeated tonsillitis	4.7	2.8	5.7	5.1
Pneumonia	1.7	2.8	1.4	1.1
Bladder or urinary tract infection	1.5	1.3	1.7	1.5
Frequent diarrhea or colitis	1.4	3.1	0.7	0.6
Mononucleosis	0.5	*0.1	*0.2	1.1
Male				
Repeated ear infection	9.4	17.5	8.8	2.9
Repeated tonsillitis	4.1	3.1	5.5	3.5
Pneumonia	2.0	3.6	1.5	1.0
Bladder or urinary tract infection	0.5	*0.7	*0.4	*0.4
Frequent diarrhea or colitis	1.6	3.5	0.8	*0.8
Mononucleosis	0.5	*0.2	*0.2	1.1
Female				
Repeated ear infection	8.6	14.5	8.2	3.9
Repeated tonsillitis	5.2	2.6	6.0	6.8
Pneumonia	1.5	2.0	1.3	1.2
Bladder or urinary tract infection	2.6	2.0	3.1	2.6
Frequent diarrhea or colitis	1.1	2.6	0.6	*0.4
Mononucleosis	0.5	*0.1	*0.3	1.1

Table 6. Annual incidence rate per 100 children for selected infectious diseases, by race and Hispanic origin: United States, 1988

Disease	Race and Hispanic origin		
	White non-Hispanic	Black non-Hispanic	Hispanic
Repeated ear infection	10.2	5.8	7.3
Repeated tonsillitis	5.3	2.4	4.3
Pneumonia	2.0	1.2	*0.8
Bladder or urinary tract infection	1.8	1.0	*0.6
Frequent diarrhea or colitis	1.4	1.3	1.4
Mononucleosis	0.6	–	*0.1

Table 7. Annual incidence rate per 100 children for selected infectious diseases, by family income, usual source of routine health care, and health insurance coverage: United States, 1988

Disease	Family income				Usual source of routine health care		Health insurance coverage	
	Less than $10,000	$10,000–$14,999	$20,000–$34,999	$35,000 or more	Yes	No	Yes	No
Repeated ear infection	9.0	8.9	9.6	9.6	9.7	3.8	9.6	8.0
Repeated tonsillitis	5.2	5.1	4.5	4.6	4.8	4.5	5.0	4.1
Pneumonia	2.6	1.3	2.1	1.4	1.8	*1.0	1.7	2.0
Bladder or urinary tract infection	1.6	1.8	1.7	1.4	1.7	*0.6	1.6	1.5
Frequent diarrhea or colitis	2.0	1.8	1.4	1.1	1.4	*1.4	1.3	1.6
Mononucleosis	*0.0	*0.6	*0.5	*0.6	0.5	*0.3	0.6	*0.1

Table 8. Annual incidence rate per 100 children for selected infectious diseases, by geographic region: United States, 1988

Disease	Geographic region			
	Northeast	Midwest	South	West
Repeated ear infection	9.9	9.6	9.0	7.5
Repeated tonsillitis	4.2	5.1	5.1	4.0
Pneumonia	1.4	2.0	1.8	1.6
Bladder or urinary tract infection	0.9	1.8	1.9	1.2
Frequent diarrhea or colitis	1.0	1.2	1.6	1.4
Mononucleosis	*0.4	0.6	0.4	*0.4

Table 9. Percent of children with selected infectious diseases in the past year who had resulting activity limitation, by age, sex, race, and Hispanic origin: United States, 1988

Disease	Age				Sex		Race and Hispanic origin		
	All ages	0–4 years	5–11 years	12–17 years	Male	Female	White non-Hispanic	Black non-Hispanic	Hispanic
Repeated ear infection	49.6	41.9	52.1	49.9	45.3	48.1	48.4	41.6	37.7
Repeated tonsillitis	58.0	58.0	59.8	55.9	60.0	56.5	59.2	54.2	51.0
Pneumonia	81.5	77.2	87.1	82.6	81.4	77.3	80.3	88.9	*85.6
Bladder orurinary tract infection	79.4	*82.0	*71.7	81.3	79.3	79.6	81.3	–	*42.5
Frequent diarrhea or colitis	37.3	*24.1	38.2	47.1	*30.1	38.5	38.2	*42.7	*18.1
Mononucleosis	29.3	20.7	47.2	45.3	28.7	30.3	30.0	*18.5	*48.2

Table 10. Average annual number of bed days per child with selected infectious diseases, by age, sex, race and Hispanic origin: United States, 1988

Disease	Age				Sex		Race and Hispanic origin		
	All ages	0–4 years	5–11 years	12–17 years	Male	Female	White non-Hispanic	Black non-hispanic	Hispanic
Repeated ear infection	1.7	1.9	1.4	1.8	1.8	1.6	1.5	1.2	3.7
Repeated tonsillitis	2.8	2.5	2.6	3.1	2.4	3.0	2.9	2.2	2.4
Pneumona	4.9	4.0	4.4	7.1	4.9	4.6	4.4	4.6	10.1
Bladder or urinary tract infection	1.5	1.3	1.0	2.3	1.6	1.5	1.6	1.1	*0.6
Frequent diarrhea or colitis	1.2	0.8	2.3	0.9	1.4	0.8	1.1	0.8	2.1
Mononucleosis	7.6	*1.6	13.8	6.1	5.4	9.6	7.9	–	*3.1

Table 11. Average annual number of school-loss days per child with selected infectious diseases, by age, sex, race, and Hispanic origin: United States, 1988

Disease	Age				Sex		Race and Hispanic origin		
	All ages	0–4 years	5–11 years	12–17 years	Male	Female	White non-Hispanic	Black non-Hispanic	Hispanic
Repeated ear infection	2.8	3.1	2.9	2.2	2.7	2.9	2.8	2.1	2.9
Repeated tonsillitis	4.7	4.8	5.2	4.1	4.3	5.1	5.0	3.7	3.7
Pneumonia	5.5	3.0	5.0	7.6	5.3	5.7	5.0	5.0	16.3
Bladder or urinary tract infection	2.0	2.0	1.6	2.6	2.1	2.0	1.9	1.5	4.8
Frequent diarrhea or colitis	2.0	1.5	2.0	2.3	1.5	2.9	1.9	2.7	*1.6
Mononucleosis	6.5	*2.1	8.4	6.2	5.7	7.3	6.6	–	*6.0

NOTE: Includes only children attending school.

Table 12. Percent of children with selected infectious diseases in the past year who had physician contact, by age, sex, race, and Hispanic origin: United States, 1988

Disease	Age				Sex		Race and Hispanic origin		
	All ages	0–4 years	5–11 years	12–17 years	Male	Female	White non-Hispanic	Black non-Hispanic	Hispanic
Repeated ear infection	92.4	96.4	91.1	79.1	92.7	92.1	93.0	90.6	88.6
Repeated tonsillitis	85.0	95.2	88.5	75.0	85.3	84.7	86.7	*81.2	*79.5
Pneumonia	88.8	92.2	84.8	86.9	91.0	85.6	92.2	*72.1	*67.5
Bladder or urinary tract infection	88.5	87.8	89.6	87.5	86.2	88.9	87.9	*98.5	*84.8
Frequent diarrhea or colitis	61.4	70.9	*45.4	*38.9	54.6	71.4	67.7	*44.4	*58.9
Mononucleosis	91.9	*100.0	*80.7	94.2	90.3	93.5	91.4	–	*100.0

NOTE: Does not include physicians seen while hospitalized overnight.

Table 13. Average annual number of physician contacts per child with selected infectious diseases, by age, sex, race, and Hispanic origin: United States, 1988

Disease	Age				Sex		Race and Hispanic origin		
	All ages	0–4 years	5–11 years	12–17 years	Male	Female	White non-Hispanic	Black non-Hispanic	Hispanic
Repeated ear infection	4.2	5.4	3.3	1.9	4.2	4.2	4.5	2.8	3.5
Repeated tonsillitis	2.9	4.3	3.1	1.8	3.0	2.8	3.1	1.7	2.4
Pneumonia	2.3	2.5	2.4	2.0	2.2	2.5	2.4	1.5	2.9
Bladder or urinary tract infection	2.3	2.4	2.2	2.3	3.0	2.2	2.4	2.0	*1.7
Frequent diarrhea or colitis	2.0	2.6	1.1	*0.7	1.8	2.4	2.2	*0.7	3.0
Mononucleosis	2.9	*3.0	3.1	2.7	2.5	3.1	2.8	–	*1.6

NOTE: Does not include physicians seen while hospitalized overnight.

Table 14. Percent of children with selected infectious diseases in the past year who required medication, by age, sex, race, and Hispanic origin: United States, 1988

Disease	Age				Sex		Race and Hispanic origin		
	All ages	0–4 years	5–11 years	12–17 years	Male	Female	White non-Hispanic	Black non-Hispanic	Hispanic
Repeated ear infection	92.8	96.1	91.5	82.6	93.4	92.0	94.1	89.0	84.6
Repeated tonsillitis	79.7	92.0	80.2	72.9	81.8	78.0	81.1	68.4	80.7
Pneumonia	93.4	97.1	92.6	86.1	97.1	88.3	95.3	86.6	*91.2
Bladder or urinary tract infection	88.4	89.0	85.6	91.9	87.0	88.7	89.1	91.4	*63.9
Frequent diarrhea or colitis	45.5	46.3	35.9	55.6	41.4	51.5	47.9	*37.5	*48.7
Mononucleosis	64.3	*74.9	*62.3	63.8	77.1	*51.7	66.4	–	*21.5

Appendixes

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Appendix I
Technical notes on methods

Background

This report is one of a series of statistical reports published by the staff of the National Center for Health Statistics (NCHS). It is based on information collected from a nationwide sample of households included in the National Health Interview Survey (NHIS). Data are obtained on the sociodemographic and health characteristics of all family members and unrelated individuals living in these households.

Field operations for the survey are conducted by the U.S. Bureau of the Census under specifications established by NCHS. The U.S. Bureau of the Census participates in the survey planning, selects the sample, and conducts the interviews. The data are then transmitted to NCHS for preparation, processing, and analysis.

Summary reports and reports on special topics for each year's data are prepared by the staff of the Division of Health Interview Statistics for publication in *Vital and Health Statistics*, Series 10 publications of NCHS. Data also are tabulated for other reports published by NCHS staff and for use by other organizations and by researchers within and outside the Government. Since 1969, public use data tapes have been prepared for each year of data collection.

The health characteristics described by NHIS estimates pertain only to the resident, civilian noninstitutionalized population of the United States living at the time of the interview. The sample does not include persons residing in nursing homes, members of the Armed Forces, institutionalized persons, or U.S. nationals living abroad.

Statistical design of the NHIS

General design

The NHIS has been conducted continuously since 1957. The sample design of the survey has undergone changes following each decennial census. This periodic redesign of the NHIS sample allows the incorporation of the latest population information and statistical methodology into the survey design. The data presented in this report were collected using an NHIS sample design first implemented in 1985. It is anticipated that this design will be used until 1995. A detailed description of the sample design is contained in the publication entitled "Design and Estimation for the National Health Interview Survey, 1985–94" (11).

The sampling scheme of the NHIS follows a multistage probability design that permits continuous sampling of the civilian noninstitutionalized population residing in the United States. The survey is designed in such a way that the sample scheduled for each week is representative of the target population and the weekly samples are additive over time. This design permits estimates for frequent events or for large population groups to be produced from data collected over a short period of time. Estimates for less frequent events or for smaller population subgroups can be obtained from data collected over a longer period of time. The annual sample is so designed that tabulations can be provided for each of the four major geographic regions. Because interviewing is done throughout the year, there is no seasonal bias for annual estimates. The continuous data collection also has administrative and operational advantages because fieldwork can be handled on a continuing basis with an experienced, stable staff.

Sample selection

The target population for the NHIS is the civilian noninstitutionalized population residing in the United States. For the first stage of the sample design, the United States is considered to be a universe composed of approximately 1,900 geographically defined primary sampling units (PSU's). A PSU consists of a county, a small group of contiguous counties, or a metropolitan statistical area (MSA). The PSU's collectively cover the 50 States and District of Columbia. The 52 largest PSU's in the universe are referred to as self-representing PSU's. The other PSU's in the universe are clustered into 73 strata, and 2 sample PSU's are chosen from each stratum with probability proportional to population size. The selection of two PSU's per stratum allows more efficient variance estimation than was possible under the pre-1985 NHIS design in which only one PSU was selected per stratum. The current procedure yields a total of 198 PSU's selected in the second stage.

Within a PSU, two types of second stage units, referred to as segments, are used: Area segments and permit area segments. Area segments are defined geographically and contain an expected eight households. Permit area

segments cover geographic areas containing housing units built after the 1980 census. The permit area segments are defined using updated lists of building permits issued in the PSU since 1980 and contain an expected four households.

Within each segment, all occupied households are targeted for interview. On occasion, a sample segment may contain a large number of households. In this situation, the households are subsampled to provide a manageable interviewer workload.

To increase the precision of estimates for black persons, differential sampling rates are applied in PSU's containing a population consisting of between 5 and 50 percent black persons. Within those PSU's, sampling rates for selection of segments are increased in areas known to have the highest concentration of black persons; segment sampling rates are decreased in other areas within those PSU's to ensure that the total sample is the same size as it would have been without oversampling black persons.

The sample was so designed that a typical NHIS full sample for the data collection years 1985 to 1995 will consist of approximately 7,500 segments containing about 59,000 assigned households. Of these households, an expected 10,000 will be vacant, demolished, or occupied by persons not in the target population of the survey. The expected sample of 49,000 occupied households will yield a probability sample of about 127,000 persons.

The NHIS sample is so designed that it can serve as a sample frame for other NCHS population-based surveys. Four national subdesigns, or panels, constitute the full NHIS sample design. Each panel contains a representative sample of the U.S. civilian noninstitutionalized population. All four panels have identical sampling properties, and any combination of panels defines a national design. Panels were constructed to facilitate the linkage of the NHIS to other surveys and also to efficiently make large reductions in the size of the sample by eliminating panels from the survey when budgetary constraints make this necessary.

In 1988, the NHIS sample consisted of 8,435 segments containing 62,106 assigned households. Of the 50,061 households eligible for interview, 47,485 households actually were interviewed, resulting in a sample of 122,310 persons. The total noninterview rate was 5.1 percent; 3.0 percent was the result of respondent refusal, and the remainder was primarily the result of failure to locate an eligible respondent at home after repeated calls.

Collection and processing of data

The NHIS questionnaire contains two major parts: The first, the basic health and demographic component, consists of topics that remain relatively unchanged from year to year. Among these topics are the incidence of acute conditions, the prevalence of chronic conditions, persons limited in activity due to impairment or health problems, and utilization of health care services involving physician care and short-stay hospitalization. The second part, a special topics component, consists of additional topics that change from year to year.

Careful procedures are followed to ensure the quality of data collected in the NHIS interview. Most households in the sample are contacted by mail before the interviewer arrives. Potential respondents are informed of the importance of the survey and assured that all information obtained in the interview will be held in strict confidence. Interviewers make repeated trips to a household when a respondent is not found on the first visit. The success of these procedures is indicated by the response rate for the survey, which has been between 95 and 98 percent over the years.

When contact is made, the interviewer attempts to have all family members of the household aged 19 years and over present during the interview. When this is not possible, proxy responses for absent family members are accepted. In most situations, proxy respondents are used for persons under 19 years of age. Persons 17 and 18 years of age may respond for themselves, however.

Interviewers undergo extensive training and retraining. The quality of their work is checked by means of periodic observation and by reinterview. Their work also is evaluated by statistical studies of the data they obtain in their interviews. A field edit is performed on all completed interviews so that if there are any problems with the information on the questionnaire, respondents may be recontacted to solve the problem.

Completed questionnaires are sent from the U.S. Bureau of the Census field offices to NCHS for coding and editing. To ensure the accuracy of coding, a 5-percent sample of all questionnaires is recoded and keyed by other coders. A 100-percent verification procedure is used if certain error tolerances are exceeded. Staff of the Division of Health Interview Statistics then edit files to remove impossible and inconsistent codes.

Estimation procedures

The complex, multistage probability sample utilized by the NHIS must be reflected in the derivation of survey-based estimates. For this report, 1988 NHIS–CH (National Health Interview Survey on Child Health) sample person counts were weighted to produce national estimates. The weight for each sample child was derived from his or her final annual weight on the core NHIS. This weight is the product of up to four components:

1. *Probability of selection.* The basic weight for each NHIS respondent is obtained by multiplying the reciprocals of the probabilities of selection at each step of the design: PSU, segment, and household.
2. *Household nonresponse adjustment within segment.* Because of household nonresponse on the basic NHIS health and demographic questionnaire, a weighting adjustment is required. The nonresponse adjustment weight is a ratio with the number of households in a

sample segment as the numerator and the number of households actually interviewed in that segment as the denominator. This adjustment reduces bias in an estimate to the extent that persons in the noninterviewed households have the same characteristics as persons in interviewed households in the same segment.

3. *First-stage ratio adjustment.* The weight for persons in the non-self-representing PSU's is ratio adjusted to the 1980 population within four race-residence classes of the non-self-representing strata within each geographic region.

4. *Poststratification by age-race-sex.* Within each of the 16 age-race-sex cells (table I), a weight is constructed each quarter to adjust the first-stage population estimates based on the NHIS to an independent estimate of the population of each cell. These independent estimates are prepared by the U.S. Bureau of the Census and are updated quarterly.

Table I. Age-race-sex poststratification cells for the 1988 National Health Interview Survey on Child Health

Race and sex	Age in years			
	0–4	5–9	10–14	15–17
Black				
Male	X	X	X	X
Female	X	X	X	X
All other				
Male	X	X	X	X
Female	X	X	X	X

The main effect of the ratio-adjustment process (3 above) is to make the sample more closely representative of the target population by age, sex, race, and residence. The poststratification adjustment helps to reduce the component of bias resulting from sampling frame undercoverage; furthermore, this adjustment frequently reduces sampling variance.

In some households responding to the basic health and demographic component of the NHIS, there is nonresponse to the special topic questionnaire. Although the NHIS estimation procedures include no separate adjustment factor to reduce the bias due to this type of nonresponse, the poststratification by age-race-sex also serves to reduce the nonresponse bias in estimates derived from the special topics sections, to the extent that nonrespondents to the special topics questionnaire are similar to respondents in each poststratification adjustment cell.

Reliability of estimates

Because NHIS estimates are based on a sample, they may differ somewhat from the figures that would have been obtained if a complete census had been taken using the same survey and processing procedures. There are two types of errors possible in an estimate based on a sample survey: Sampling and nonsampling errors. To the extent possible, these types of errors are kept to a minimum by methods built into the survey procedures described earlier (11). Although it is very difficult to measure the extent of bias in the NHIS, several studies have been conducted to examine this problem (12–16).

Nonsampling errors

Interviewing process—Information, such as the number of days of restricted activity caused by a condition, can be obtained more accurately from household members than from any other source because only the persons concerned are in a position to report this information. However, there are limitations to the accuracy of the diagnostic and other information collected in household interviews. For example, for diagnostic information, the household respondent can usually pass on to the interviewer only the information the physician has given to the family. For conditions not medically attended, diagnostic information is often no more than a description of symptoms. Further, a respondent may not answer a question in the intended manner because he or she has not properly understood the question, has forgotten the event, does not know, or does not wish to divulge the answer. Regardless of the type of measure, all NHIS data are estimates of known reported morbidity, disability, and so forth.

Reference period bias—NHIS estimates do not represent a complete measure of any given topic during the specified calendar period because data are not collected in the interview for persons who died or became institutionalized during the reference period. For many types of statistics collected in the survey, the reference period is the 2 weeks prior to the interview week. For such a short period, the contribution by decedents to a total inventory of conditions or services should be very small. However, the contribution by decedents during a long reference period (such as 1 year) might be significant, especially within older age groups.

Population estimate—Some of the published tables include population figures for specified categories. Except for overall totals for the 16 age, sex, and race groups, which are adjusted to independent estimates, these figures are based on the sample of households in NHIS. They are given primarily to provide denominators for rate computation and for this purpose they are more appropriate for use with the accompanying measures of health characteristics than other population data that may be available. With the exception of the overall totals by age, sex, and race mentioned above, the population figures may differ from figures (which are derived from different sources) published in reports of the U.S. Bureau of the Census. Official population estimates are presented in the U.S. Bureau of the Census reports in Series P–20, P–25, and P–60.

Rounding of numbers—In published tables, the figures are rounded to the nearest thousand, although they are not necessarily accurate to that detail. Derived statistics, such as rates and percent distribution, are computed after

the estimates on which they are based have been rounded to the nearest thousand.

Sampling errors

The standard error is the primary measure of sampling errors, that is, the variation that might occur by chance because only a sample of a population is surveyed. The chances are about 68 in 100 that an estimate based on a sample would differ from that obtained from a complete census by less than 1 standard error. The chances are about 95 in 100 that the difference between a sample-based and a census estimate would differ by less than twice the standard error of the estimate and about 99 in 100 that it would differ by less than a factor of 2.5.

Individual standard errors were not computed for each estimate in this report. Instead, standard errors were computed for a broad spectrum of estimates. Regression techniques were then applied to produce equations from which a standard error for any estimate can be approximated. Rules explaining their use are presented in the section below.

The reader is cautioned that this procedure will give an approximate standard error of an estimate rather than the precise standard error. The reader is further cautioned that particular care should be exercised when the denominator is small.

General rules for determining standard errors

To produce approximate standard errors for NHIS estimates in this report, the reader must first determine the type of estimate for which the standard error is needed. For each percent p included in this report, the standard error can be estimated as

$$SE(p) = \sqrt{\frac{(8{,}307p)\ (100 - p)}{y}}$$

where y is the estimated base of the percent. The bases of the percents are shown in tables II and III. For the estimated rates in this report, approximate standard errors are determined using the formula

Table III. Number of children 17 years of age and under, by selected characteristics: United States, 1988

Characteristic	Number in thousands
Family income	
Less than $10,000	7,924
$10,000–$19,999	10,911
$20,000–$34,999	17,022
$35,000 or more	20,582
Child has usual source of routine health care	
Yes	55,970
No	5,119
Health insurance coverage	
Yes	46,620
No	15,205
Geographic region	
Northeast	11,621
Midwest	16,574
South	22,149
West	13,225

$$SE(p) = p\sqrt{\frac{SE(x)^2}{x^2} + \frac{SE(y)^2}{y^2}}$$

where p is the estimated rate expressed as the ratio of two estimates, $p = x/y$ (inflated by 100 when appropriate). SE(x) and SE(y) are computed from the following formulas

$$SE(x) = \sqrt{0.000075598x^2 + 8{,}307x}$$

and

$$SE(y) = \sqrt{0.000075598y^2 + 8{,}307y}$$

and x and y are obtained from tables IV–VIII.

The approximate standard error of the difference between two statistics (rate or percent) is given by the formula

$$SE(x_1 - x_2) = \sqrt{SE(x_1)^2 + SE(x_2)^2}$$

where x_1 and x_2 are the two estimates being compared, $x_1 - x_2$ is the difference between them, and $SE(x_1)$ and $SE(x_2)$ are the standard errors for the two estimates.

Table II. Number of children 17 years of age and under, by age, sex, race, and Hispanic origin: United States, 1988

Sex, race and Hispanic origin	All ages, 17 years and under	0–4 years	Under 1 year	1–4 years	5–11 years	12–17 years
			Number in thousands			
All children	63,569	18,424	3,858	14,566	24,649	20,495
Sex						
Male	32,526	9,439	2,041	7,398	12,445	10,642
Female	31,043	8,986	1,818	7,168	12,204	9,854
Race and Hispanic origin						
White non-Hispanic	44,645	12,836	2,562	10,274	17,325	14,485
Black non-Hispanic	9,540	2,687	619	2,068	3,708	3,145
Hispanic	7,329	2,193	502	1,691	2,863	2,182

Table IV. Number of children 17 years of age and under with selected infectious diseases in the past year, by selected characteristics: United States, 1988

Characteristic	Disease					
	Repeated ear infection	Repeated tonsillitis	Pneumonia	Bladder or urinary tract infection	Frequent diarrhea or colitis	Mono-nucleosis
	Number in thousands					
All children	5,735	2,975	1,090	974	863	304
Age						
0–4 years	2,951	521	521	245	571	*23
5–11 years	2,093	1,411	348	429	172	*61
12–17 years	692	1,043	221	299	119	220
Sex and age						
Male	3,055	1,347	638	156	515	151
0–4 years	1,648	288	341	*64	333	*16
5–11 years	1,097	684	192	*53	100	*22
12–17 years	310	375	105	*39	*82	114
Female	2,680	1,628	453	817	348	153
0–4 years	1,303	233	179	181	238	*7
5–11 years	995	727	157	376	*73	*40
12–17 years	382	668	116	260	*38	106
Race and Hispanic origin						
White non-Hispanic	4,566	2,372	893	814	603	286
Black non-Hispanic	557	234	118	93	123	–
Hispanic	527	314	*61	*45	99	*10
Family income						
Less than $10,000	710	410	204	130	159	*2
$10,000–$19,999	974	560	145	192	192	*62
$20,000–$34,999	1,630	760	354	290	234	*88
$35,000 or more	1,985	951	293	289	232	132
Child has usual source of routine health care						
Yes	5,437	2,656	1,030	992	776	288
No	195	230	*48	*30	*73	*14
Health insurance coverage						
Yes	4,464	2,332	790	731	605	282
No	1,222	617	300	233	244	*21
Geographic region						
Northeast	1,155	492	158	105	114	*50
Midwest	1,589	830	324	291	202	99
South	1,995	1,120	401	418	359	98
West	997	525	206	160	189	*56

Table V. Number of bed days in the past year for children with selected infectious diseases, by age, sex, race, and Hispanic origin: United States, 1988

Characteristic	Disease					
	Repeated ear infection	Repeated tonsillitis	Pneumonia	Bladder or urinary tract infection	Frequent diarrhea or colitis	Mono-nucleosis
	Number in thousands					
All children	9,711	8,194	5,198	1,428	975	2,148
Age						
0–4 years	5,545	1,308	2,103	316	465	*35
5–11 years	2,932	3,700	1,524	435	400	789
12–17 years	1,234	3,187	1,570	677	110	1,323
Sex						
Male	5,395	3,292	3,110	243	697	741
Female	4,316	4,902	2,088	1,185	278	1,407
Race and Hispanic origin						
White non-Hispanic	6,981	6,808	3,945	1,280	666	2,087
Black non-Hispanic	676	510	537	101	98	–
Hispanic	1,940	744	617	*29	208	*30

Table VI. Number of children with selected infectious diseases in the past year who attended school, by age, sex, race, and Hispanic origin: United States, 1988

Characteristic	Disease					
	Repeated ear infection	*Repeated tonsillitis*	*Pneumonia*	*Bladder or urinary tract infection*	*Frequent diarrhea or colitis*	*Mono-nucleosis*
	Number in thousands					
All children	3,213	2,522	624	730	325	276
Age						
0–4 years	605	194	103	*59	*71	*12
5–11 years	1,994	1,322	304	393	151	*61
12–17 years	6,741	1,007	217	277	103	203
Sex						
Male	1,690	1,114	334	107	212	135
Female	1,523	1,408	290	623	113	142
Race and Hispanic origin						
White non-Hispanic	2,625	2,048	521	638	250	259
Black non-Hispanic	278	183	*71	*65	*39	–
Hispanic	253	245	*24	*23	*35	*10

NOTE: Includes children in preschools and nursery schools.

Table VII. Number of school-loss days in the past year for children with selected infectious diseases, by age, sex, race, and Hispanic origin: United States, 1988

Characteristic	Disease					
	Repeated ear infection	*Repeated tonsillitis*	*Pneumonia*	*Bladder or urinary tract infection*	*Frequent diarrhea or colitis*	*Mono-nucleosis*
	Number in thousands					
All children	8,912	11,943	3,431	1,447	648	1,804
Age						
0–4 years	1,858	931	305	119	104	*25
5–11 years	5,590	6,866	1,487	614	306	514
12–17 years	1,464	4,146	1,640	714	237	1,265
Sex						
Male	4,490	4,825	1,774	228	323	767
Female	4,422	7,117	1,657	1,219	324	1,037
Race and Hispanic origin						
White non-Hispanic	7,409	10,191	2,632	1,221	487	1,715
Black non-Hispanic	585	686	352	98	103	–
Hispanic	746	903	391	110	*56	*58

NOTE: Includes children in preschools and nursery schools.

Table VIII. Number of physician contacts in the past year for children with selected infectious diseases, by age, sex, race, and Hispanic origin: United States, 1988

Characteristic	Disease					
	Repeated ear infection	*Repeated tonsillitis*	*Pneumonia*	*Bladder or urinary tract infection*	*Frequent diarrhea or colitis*	*Mono-nucleosis*
	Number in thousands					
All children	24,119	8,515	2,544	2,235	1,758	846
Age						
0–4 years	15,839	2,263	1,286	590	1,481	*69
5–11 years	6,952	4,390	818	965	192	191
12–17 years	1,328	1,862	440	680	*85	586
Sex						
Male	12,760	3,974	1,396	473	921	371
Female	11,359	4,541	1,148	1,762	838	474
Race and Hispanic origin						
White non-Hispanic	20,383	7,253	2,159	1,952	1,355	813
Black non-Hispanic	1,551	399	177	187	*92	–
Hispanic	1,857	755	177	*76	293	*16

NOTE: Excludes physicians seen while hospitalized overnight.

Appendix II
Definitions of certain terms used in this report

Age—The age recorded for each child is his or her age at last birthday. Age was recorded in single years (in months, if under 1 year) and grouped for presentation in the tables. For almost 5 percent of the National Health Interview Survey on Child Health (NHIS–CH) sample children, the age reported on the NHIS–CH questionnaire differed to some degree (not always by a full year) from the age that was recorded on the basic health and demographic questionnaire. In all discrepant cases, the age used in analysis is that recorded on the NHIS–CH.

Race—The population is divided into three racial groups—"white," "black," and "all other." The last includes Aleut, Eskimo, or American Indian; Asian or Pacific Islander; and any other races. Characterization of the NHIS–CH sample child's race is based on the basic NHIS household respondent's characterization of the child's racial background.

Hispanic origin—Characterization of Hispanic origin is based on the household respondent's description of the sample child's ancestry. Children classified as Hispanic include those whose ancestry was defined as Puerto Rican, Cuban, Mexican/Mexicano, Chicano, or other Hispanic.

Family income—Each sample child is classified according to the total income of his or her family as recorded on the NHIS basic health and demographic questionnaire. The income recorded is the total of all income received by family members in the 12-month period preceding the week of interview. Income from all sources is included, for example, wages, salaries, rents from property, pension, and help from relatives.

Geographic region—For the purpose of classifying the population by geographic area, the States are grouped into four regions. These regions, which correspond to those used by the U.S. Bureau of the Census, are as follows:

Region	*States included*
Northeast	Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania
Midwest	Michigan, Ohio, Illinois, Indiana, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas
South	Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas
West	Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Hawaii, and Alaska

Usual source of routine care—Sample children are classified as having a usual source of routine health care if the respondent indicated that there was a particular clinic, health center, hospital, doctor's office, or other place that the child usually went for routine health care. Children who reportedly had never received routine health care were excluded from this classification.

Health insurance coverage—Sample children are classified as being covered by health insurance if the respondent indicated that the child was currently covered by a health insurance plan which pays any part of a hospital, doctor's, or surgeon's bill.

Limitation in activity because of selected infectious diseases—A reduction in the child's ability to perform usual childhood activities, such as playing with other children or participating in games or sports.

Bed day—A day during which the child stayed in bed more than half a day because of illness. All hospital days for inpatients are considered bed days.

School-loss day—A day on which a student missed all or part of a day from school in which he or she was currently enrolled. For the NHIS–CH, this included children enrolled in nursery schools or preschools.

Physician contact—A physician contact is defined as consultation with a physician, in person or by telephone, for examination, diagnosis, treatment, or advice. (Physician contacts with hospital inpatients are not included.) The contact is considered to be a physician contact if the service is provided directly by the physician or by a nurse

or other person acting under a physician's supervision. For the purpose of this definition, "physician" includes doctors of medicine and osteopathic physicians. The term "doctor" is used in the interview rather than "physician" because of popular usage.

Hospital—For the NHIS in general, a hospital is defined as any institution either (a) named in the listing of hospitals in the current *American Hospital Association Guide to the Health Care Field* or (b) found on the Master Facility List maintained by the National Center for Health Statistics. For this report, children were classified as hospitalized if they spent at least 1 night in a hospital.

Medication—For this report, medication included medicine, other than vitamins, prescribed or recommended by a doctor.

Relative risk—The ratio of the incidence rate of a disease in one group to the rate for that disease in another group.

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Centers for Disease Control
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6525 Belcrest Road
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