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Foreword

The purpose of the *CDC Surveillance Summaries* is to make available the most current information on conditions of public health interest for which CDC has major responsibility. The *CDC Surveillance Summaries* are published quarterly and provide detailed analysis of the most current available data obtained for CDC surveillance programs. These reports complement other data published by CDC in the *Morbidity and Mortality Weekly Report (MMWR),* the *MMWR Annual Summary,* and various disease-surveillance reports. This volume contains epidemiologic information derived from surveillance forms, special investigations, and other sources of information collected at the state and national levels.

History of CDC Surveillance Activities

CDC has been actively involved in disease-surveillance activities since the formation of the Communicable Disease Center in 1946. The original scope of the National Surveillance Program included the study of malaria, murine typhus, smallpox, psittacosis, diphtheria, leprosy, and sylvatic plague. In 1954, a surveillance section was established within the Epidemiology Branch of CDC, primarily concerned with planning and conducting continuing surveillance and making periodic reports. National emergencies such as the Asian influenza pandemic and the discovery of Legionnaires' disease have prompted the involvement of CDC in new surveillance activities. Over the years the surveillance activities of CDC have expanded to include not only new areas in infectious disease but also programs in human reproduction, environmental health, chronic disease, risk reduction, and occupational safety and health. Ongoing evaluation of these programs has led to new methods of data collection and analysis and has prompted examination of how data are disseminated to the public health community.

In 1980 and 1981, a survey of CDC staff and state epidemiologists suggested that improved coordination of surveillance reports with the *MMWR* and the *MMWR Annual Summary* would facilitate timely publication; provide greater uniformity in the acquisition, evaluation, and reporting of surveillance data; and encourage use of these data. Several approaches to the development of a systematic process of disseminating disease-specific surveillance reports were considered. On the basis of considerations of timeliness, cost advantages, and editorial uniformity, a report published on a quarterly basis was recommended.

The *CDC Surveillance Summaries* contain information more reflective of the detailed surveillance reports of the past. CDC hopes that the *Surveillance Summaries* will disseminate surveillance data on a regular schedule, improve the clarity of community public health information, and also realize a cost savings. Although the *CDC Surveillance Summaries* are published quarterly, they will not be limited to quarterly data; annual data will probably be more typical. The *MMWR Annual Summary* will complement rather than serve as the cumulative summary of the quarterly publications.

Data Sources

Data on the reported occurrence of notifiable diseases are derived from reports supplied by the state and territorial departments of health and CDC program activities, routinely published in the *MMWR,* and compiled in final form in the *MMWR Annual Summary.*

CDC also maintains national surveillance programs for selected diseases with the cooperation of state and local health departments as well as other federal agencies, and publishes detailed epidemiologic analyses periodically. Data appearing in the *CDC Surveillance Summaries* or in a surveillance report may not agree exactly with reports published in the *MMWR* because of differences in timing of reports or because of refinements in case definition. It should be noted that data collected for the *MMWR* and the more detailed data published by individual CDC programs are collected independently.

These data should be interpreted with caution. Some diseases that cause severe clinical illness and are associated with serious consequences are probably reported quite accurately. However, diseases that are clinically mild and infrequently associated with serious consequences are less likely to be reported. Additionally, subclinical cases are seldom detected except in the course of epidemic investigations or special studies. The degree of completeness of reporting is also influenced by the diagnostic facilities available, the control measures in effect, and the interests and priorities of state and local officials responsible for disease control and surveillance. Finally, factors such as the introduction of new diagnostic tests and the discovery of new disease entities may cause changes in disease reporting independent of the true incidence of disease. Despite these limitations the data in these reports have proven to be useful in the analysis of trends.

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Surveillance Programs
Centers for Disease Control

Surveillance program	Responsible branch	Most recent report/summary*
Abortion	Pregnancy Epidemiology Branch Division of Reproductive Health Center for Health Promotion and Education	1984, (SS 33/3) (1981 data)
Behavioral risk factors	Division of Nutrition Center for Health Promotion and Education	1984, (SS 33/1) (data from 1981-1983)
Berylliosis cohorts: registry of disease and exposure	Surveillance Branch Division of Surveillance, Hazard Evaluations, and Field Studies National Inst. for Occup. Safety & Hlth.	March 1983 (data from 1951-1980)
Biologics	Data Management Branch Division of Immunization Center for Prevention Services	Dec 1982 (1982 data)
Botulism	Enteric Diseases Branch Division of Bacterial Diseases Center for Infectious Diseases	May 1979 (data from 1899-1977)
Brucellosis	Bacterial Zoonoses Activity Division of Bacterial Diseases Center for Infectious Diseases	June 1979 (1978 data)
Coal workers' pneumoconiosis	Epidemiological Investigations Branch Division of Respiratory Disease Studies National Inst. for Occup. Safety & Hlth.	1985, (SS 34/1) (data from 1970-1981)
Congenital malformations	Birth Defects Branch Chronic Diseases Division Center for Environmental Health	Feb 1983 (SS 32/1) (data from 1970-1980)
Dengue	Dengue Branch Division of Vector-Borne Viral Diseases Center for Infectious Diseases	1984, (SS 33/1) (1982 data)
Diabetes	Division of Diabetes Control Center for Prevention Services	June 1979 (1978 data)
Diphtheria	Surveillance, Investigations and Research Branch Division of Immunization Center for Prevention Services	July 1978 (data from 1971-1975)

*Publications denoted by "SS" appeared in issues of *CDC Surveillance Summaries*. Other reports listed can be obtained by contacting the responsible administrative unit listed.

Surveillance Programs
Centers for Disease Control

Surveillance program	Responsible branch	Most recent report/summary*
Ectopic pregnancy	Pregnancy Epidemiology Branch Division of Reproductive Health Center for Health Promotion and Education	1984, (SS 33/2) (data from 1979-1980)
Encephalitis	Arbovirus Reference Branch Division of Vector-Borne Viral Diseases Center for Infectious Diseases	May 1981 (1978 data)
Enterovirus	Respiratory and Enterovirus Branch Division of Viral Diseases Center for Infectious Diseases	Nov 1981 (data from 1970-1979)
Fifteen leading causes of death in the U.S., 1978	Health Analysis and Planning for Preventive Services Center for Prevention Services	Sept 1982 (1978 data)
Food-borne disease	Enteric Diseases Branch Division of Bacterial Diseases Center for Infectious Diseases	June 1983 (1981 data)
Gonorrhea	Division of Sexually Transmitted Diseases Center for Prevention Services	1984, (SS 33/4) (data from 1983-1984)
Hepatitis	Hepatitis Branch Division of Viral Diseases Center for Infectious Diseases	1985, (SS 34/1) (data from 1982-1983)
Homicide	Violence Epidemiology Branch Office of the Director Center for Health Promotion and Education	May 1983 (SS 32/2) (data from 1970-1978)
Hysterectomy	Epidemiologic Studies Branch Division of Reproductive Health Center for Health Promotion and Education	Aug 1983 (SS 32/3) (data from 1979-1980)
Influenza	Influenza Branch Division of Viral Diseases Center for Infectious Diseases	July 1984 (data from 1983-1984)
Lead poisoning in workers	Surveillance Branch Division of Surveillance, Hazard Evaluations, and Field Studies National Inst. for Occup. Safety & Hlth.	April 1983 (data from 1976-1980)
Leprosy	Respiratory and Special Pathogens Branch Division of Bacterial Diseases Center for Infectious Diseases	April 1976 (data from 1971-1973)

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Surveillance Programs
Centers for Disease Control

Surveillance program	Responsible branch	Most recent report/summary*
Leptospirosis	Bacterial Zoonoses Activity Division of Bacterial Diseases Center for Infectious Diseases	Aug 1979 (1978 data)
Malaria	Malaria Branch Division of Parasitic Diseases Center for Infectious Diseases	Oct 1984 (1983 data)
Maternal mortality	Division of Reproductive Health Center for Health Promotion and Education	1984, (SS 33/1) (data from 1974-1978)
Measles	Surveillance, Investigations and Research Branch Division of Immunization Center for Prevention Services	Sept 1982 (data from 1977-1981)
Mumps	Surveillance, Investigations and Research Branch Division of Immunization Center for Prevention Services	July 1978 (data from 1974-1976)
National electronic injury surveillance system	Safety Surveillance Branch Division of Safety Research National Inst. for Occup. Safety & Hlth.	May 1983 (SS 32/2) (1982 data)
National Occupational Hazard Survey (NOHS)	Surveillance Branch Division of Surveillance, Hazard Evaluations, and Field Studies National Inst. for Occup. Safety & Hlth.	NIOSH Technical Report DHHS (NIOSH) Pub. No. 83-117
Nosocomial infections	National Nosocomial Infections Study Hospital Infections Program Center for Infectious Diseases	1984, (SS 33/2) (1983 data)
Nutrition	Division of Nutrition Center for Health Promotion and Education	Nov 1982 (1980 data)
Occupational characteristics of disabled workers	Surveillance Branch Division of Surveillance, Hazard Evaluations, and Field Studies National Inst. for Occup. Safety & Hlth.	July 1980 (data from 1969-1978)
Occupational injuries among loggers	Safety Surveillance Branch Division of Safety Research National Inst. for Occup. Safety & Hlth.	Aug 1983 (SS 32/3) (data from 1969-1974)
Occupational injuries in the meatpacking industry	Safety Surveillance Branch Division of Safety Research National Inst. for Occup. Safety & Hlth.	1985, (SS 34/1) (data from 1976-1981)

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Surveillance Programs
Centers for Disease Control

Surveillance program	Responsible branch	Most recent report/summary*
Occupational mortality in Washington State	Surveillance Branch Division of Surveillance, Hazard Evaluations, and Field Studies National Inst. for Occup. Safety & Hlth.	DHHS (NIOSH) Pub. No. 83-116 (data from 1950-1979)
Pediatric nutrition	Division of Nutrition Center for Health Promotion and Education	1983, (SS 32/4) (1982 data)
Pelvic inflammatory disease	Division of Sexually Transmitted Disease Center for Prevention Services	1983, (SS 32/4) (data from 1965-1982)
Plague	Plague Branch Division of Vector-Borne Viral Diseases Center for Infectious Diseases	1984, (SS 33/1) (1983 data)
Poliomyelitis	Surveillance, Investigations and Research Branch Division of Immunization Center for Prevention Services	Dec 1982 (data from 1980-1981)
Psittacosis	Bacterial Zoonoses Activity Division of Bacterial Diseases Center for Infectious Diseases	Feb 1983 (SS 32/1) (1979 data)
Rabies	Viral and Rickettsial Zoonoses Branch Division of Viral Diseases Center for Infectious Diseases	1985, (SS 34/1) (1983 data)
Reye syndrome	Epidemiology Office Division of Viral Diseases Center for Infectious Diseases	1984, (SS 33/3) (1983 data)
Rickettsial disease (RMSF, murine typhus, Q fever)	Viral and Rickettsial Zoonoses Branch Division of Viral Diseases Center for Infectious Diseases	May 1981 (1979 data)
Rocky mountain spotted fever	Viral and Rickettsial Zoonoses Branch Division of Viral Diseases Center for Infectious Diseases	1984, (SS 33/3) (data from 1981-1983)
Rubella	Surveillance, Investigations and Research Branch Division of Immunization Center for Prevention Services	1984, (SS 33/4) (1983 data)

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Surveillance Programs
Centers for Disease Control

Surveillance program	Responsible branch	Most recent report/summary*
Salmonella	Enteric Diseases Branch Division of Bacterial Diseases Center for Infectious Diseases	Dec 1982 (1980 data)
Sentinel health event (occupational) (SHE)	Surveillance Branch Division of Surveillance, Hazard Evaluations, and Field Studies National Inst. for Occup. Safety & Hlth.	Sept 1983
Summer mortality	Special Studies Branch Chronic Diseases Division Center for Environmental Health	Feb 1983 (SS 32/1) (data from 1979-1981)
Surgical sterilization	Epidemiologic Studies Branch Division of Reproductive Health Center for Health Promotion and Education	Aug 1983 (SS 32/3) (data from 1979-1980)
Toxic-shock syndrome	Respiratory and Special Pathogens Branch Division of Bacterial Diseases Center for Infectious Diseases	1984, (SS 33/3) (data from 1960-1984)
Trichinosis	Helminthic Diseases Branch Division of Parasitic Diseases Center for Infectious Diseases	1984, (SS 33/4) (1983 data)
Tuberculosis	Division of Tuberculosis Control Center for Prevention Services	March 1985 (1983 data) TB Statistics: States & Cities Nov 1983 (1980 data) TB in the United States
U.S. immunization survey	Surveillance, Investigations and Research Branch Division of Immunization Center for Prevention Services	April 1983 (data from 1979-1982)
Venereal disease	Division of Sexually Transmitted Disease Center for Prevention Services	(1980 data) Sexually Transmitted Diseases Statistical Letter-No. 130 (data from 1978-1979) STD Fact Sheet-Edition 35
Water-related disease outbreaks	Enteric Diseases Branch Division of Bacterial Diseases Center for Infectious Diseases	Sept 1984 (1983 data)

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Hepatitis Surveillance, 1982-1983

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Introduction

The various types of viral hepatitis have a major impact on the public health of this nation. The objective of national surveillance of viral hepatitis is to provide serologic, demographic, and epidemiologic information that will aid in formulating policies for the prevention and control of these diseases. The purpose of the hepatitis surveillance report is to interpret and disseminate this information, as well as to present new developments and clarify issues related to viral hepatitis.

Information on hepatitis is obtained by two surveillance systems. The CDC National Morbidity Reporting System collects incidence data on cases reported by each state and territory. These data, which include numbers of cases of each type of hepatitis classified by age of patient and date reported, appear in the Morbidity and Mortality Weekly Report (MMWR) and the MMWR Annual Summary, and are summarized in this report as well. Serologic and epidemiologic data pertaining to risk factors of disease acquisition are obtained from the Viral Hepatitis Surveillance Program (VHSP), a separate, voluntary reporting system operated by the Hepatitis Branch (formerly Division of Hepatitis and Viral Enteritis, Phoenix, AZ), Division of Viral Diseases, Center for Infectious Diseases, Centers for Disease Control, Atlanta, GA. The VHSP obtains its information from the viral hepatitis case records (CDC form 53.1). These forms can be obtained from the Hepatitis Branch.

Since 1980, the VHSP has received reports on approximately half the cases reported in the MMWR. CDC's ability to accurately analyze and interpret nationwide trends and patterns, identify high-risk groups, and determine mechanisms of transmission for each type of hepatitis depends on two factors: 1) local medical communities' utilization of appropriate serologic tests to distinguish between the different types of hepatitis and 2) the voluntary cooperation of the state and local health departments in completing and submitting the VHSP forms. Non-A, non-B hepatitis is now a separate reportable disease category, and since this type of viral hepatitis remains a diagnosis of exclusion, serotesting is even more important. Differentiation of any of the types of viral hepatitis based on clinical or epidemiologic characteristics alone is no longer acceptable since there is considerable overlap of the different types of hepatitis with respect to these characteristics.

Underreporting and inaccurate diagnosis impede CDC's ability to develop guidelines for preventing and controlling hepatitis and to assess the impact of prevention strategies.

Morbidity Trends Based on MMWR-Reported Cases

Incidence Reported in the United States. Table 1 shows the changes in incidence of reported cases of hepatitis, by type, since 1966. In 1983, the reported incidence of hepatitis B surpassed that of hepatitis A for the first time. Of the 56,469 cases of viral hepatitis reported in 1983, 38% were reported as hepatitis A, 43% as hepatitis B, only 6% as hepatitis non-A, non-B, and 13% as unspecified hepatitis. Although the rates of hepatitis A and unspecified hepatitis have declined, the increase in the rate of hepatitis B and the institution of reporting of hepatitis non-A, non-B have resulted in a nearly constant overall rate of viral hepatitis. In part, these trends may be artifacts due to increased utilization of specific tests for both hepatitis A and hepatitis B and increased awareness of hepatitis non-A, non-B.

Incidence Reported by State and Region. The reported rates for hepatitis A and hepatitis B by state for both 1982 and 1983 are shown in Figures 1-4. In 1983, states in the west and southwest regions continued to report high rates of hepatitis A. However, several states from other regions reported the highest disease rates; these states had either foodborne or community-wide outbreaks. The states with the highest rates of hepatitis B were clustered primarily on the east and west coasts, as in previous years. Hepatitis non-A, non-B has been a separate reportable disease in the MMWR only since 1982. The low reported rates for this disease are believed to be due to incomplete serologic testing and underreporting. At this time, these rates are not thought accurate enough to be presented by state or region.

By 1983 the rate of hepatitis B had equalled or surpassed that of hepatitis A in six of the nine regions in the United States (Figure 5). Since 1980, the total rate of hepatitis reported has remained fairly constant in most of the regions. However, in the East-South Central, West-South Central, Mountain, and Pacific regions, the total rate of hepatitis continues to fluctuate as a result of fluctuations in the rate of hepatitis A.

Incidence Reported by Age. Persons in the 20- to 29-year age group continue to have the highest rates of both hepatitis A and hepatitis B (Figure 6). The risk of acquiring hepatitis A appears to have declined in persons of all age groups except those less than 15 years of age. Day care centers are well recognized as high-risk areas for the transmission of hepatitis A (*1-3*), not only for day care attendees and workers but also for their household contacts. In addition, more complete testing, including serologic markers for acute hepatitis A and hepatitis B, may have resulted in reclassification of the type of hepatitis in older persons. Although

TABLE 1. Reported cases of viral hepatitis by type and year, United States, 1966-1983

	Types of hepatitis									
	Hepatitis A		Hepatitis B		Non-A, non-B†		Unspecified§		Total	
Year	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
1966	32,859	16.77	1,497	0.79	—	—	—	—	34,356	17.56
1967	38,909	19.67	2,458	1.28	—	—	—	—	41,367	20.95
1968	45,893	22.96	4,829	2.49	—	—	—	—	50,722	25.45
1969	48,416	23.98	5,909	3.02	—	—	—	—	54,325	27.00
1970	56,797	27.87	8,310	4.08	—	—	—	—	65,107	31.95
1971	59,606	28.90	9,556	4.74	—	—	—	—	69,162	33.64
1972	54,074	25.97	9,402	4.52	—	—	—	—	63,476	30.49
1973	50,749	24.18	8,451	4.03	—	—	—	—	59,200	28.21
1974	40,358	19.54	10,631	5.15	—	—	8,351	3.95	59,340	28.07
1975	35,855	16.82	13,121	6.30	—	—	7,158	3.44	56,134	26.34
1976	33,288	15.51	14,973	7.14	—	—	7,488	3.57	55,749	25.97
1977	31,153	14.40	16,831	7.78	—	—	8,639	3.99	56,623	26.17
1978	29,500	13.53	15,016	6.89	—	—	8,776	4.02	53,292	24.44
1979	30,407	13.82	15,452	7.02	—	—	10,524	4.79	56,393	25.62
1980	29,087	12.84	19,015	8.39	—	—	11,894	5.25	59,996	26.49
1981	25,802	11.25	21,152	9.22	—	—	10,975	4.79	57,929	25.26
1982	23,403	10.11	22,177	9.58	2,629	1.14	8,564	3.40	56,773	24.52
1983	21,532	9.20	24,318	10.39	3,470	1.48	7,149	3.05	56,469	24.12

*Rate/100,000 population.

†Not reported until 1982.

§Not reported until 1974.

Source: MMWR

persons under 15 years of age still experience low rates of hepatitis B infection, the risk of acquiring this disease has increased for all other age groups. Persons in the 15- to 39-year age groups, particularly, tend to be in the high-risk categories associated with hepatitis B, such as health care workers, parenteral drug abusers, and homosexual men.

Epidemiologic and Clinical Characteristics—Cases Reported to VHSP

Case Definition. The purpose of collecting epidemiologic data on reported cases of viral hepatitis is to define the different groups at risk of acquiring acute hepatitis infection and to assess trends in the frequencies with which these groups acquire disease. Reporting of asymptomatic carriers and/or persons with chronic hepatitis (B or non-A, non-B) may obscure the trends associated with new disease acquisition. Therefore, the VHSP requires that reported cases meet certain criteria as outlined below, and encourages persons reporting to use these criteria before cases are reported.

The case definition for acute viral hepatitis in the VHSP includes 1) an illness with discrete date of onset and 2) jaundice and/or elevated serum aminotransferase levels greater than 2½ times upper limit of normal. Serologic criteria used to distinguish the different types of hepatitis are as follows: hepatitis A is defined as IgM anti-HAV-positive (regardless of HBsAg status), hepatitis B as HBsAg-positive with IgM anti-HAV negative or not done, and hepatitis non-A, non-B as HBsAg-negative and IgM anti-HAV-negative. In 1982, although 82% of all the cases reported to VHSP were tested for at least one serologic marker, only 71% had sufficient serologic testing to designate a specific type. In 1983, 85% were tested for at least one serologic marker, but only 79% had sufficient serologic testing to designate a specific type of hepatitis. Only those cases with a specific serologic diagnosis are included in the following analyses.

FIGURE 1. Reported cases of hepatitis A per 100,000 population, by state, United States, 1982

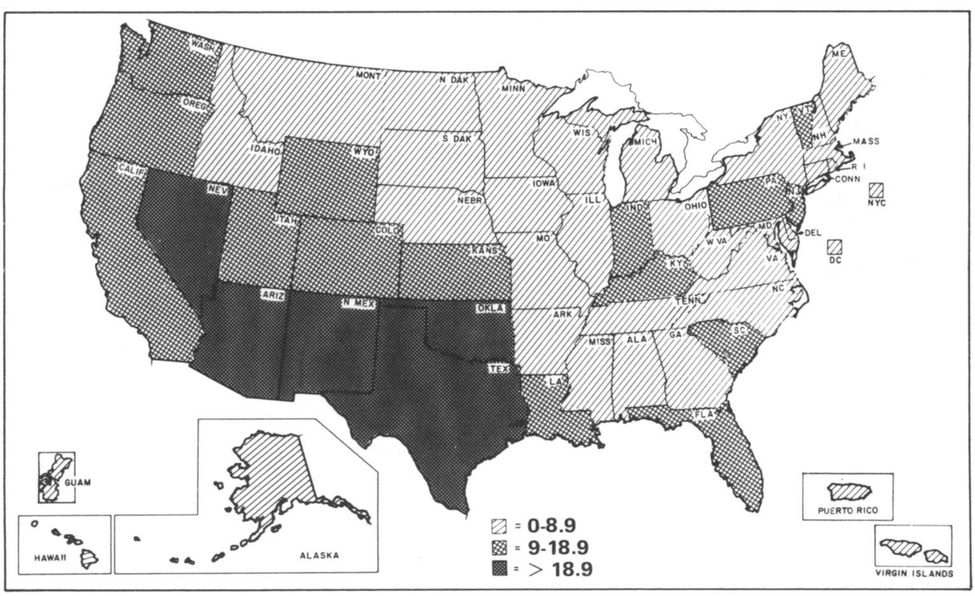


FIGURE 2. Reported cases of hepatitis A per 100,000 population, by state, United States, 1983

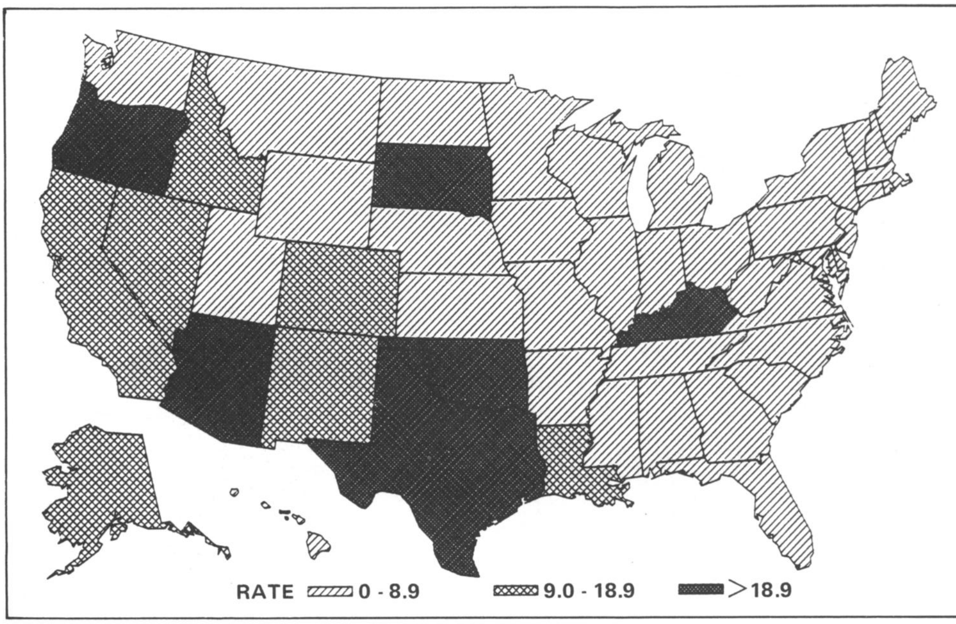


FIGURE 3. Reported cases of hepatitis B per 100,000 population, by state, United States, 1982

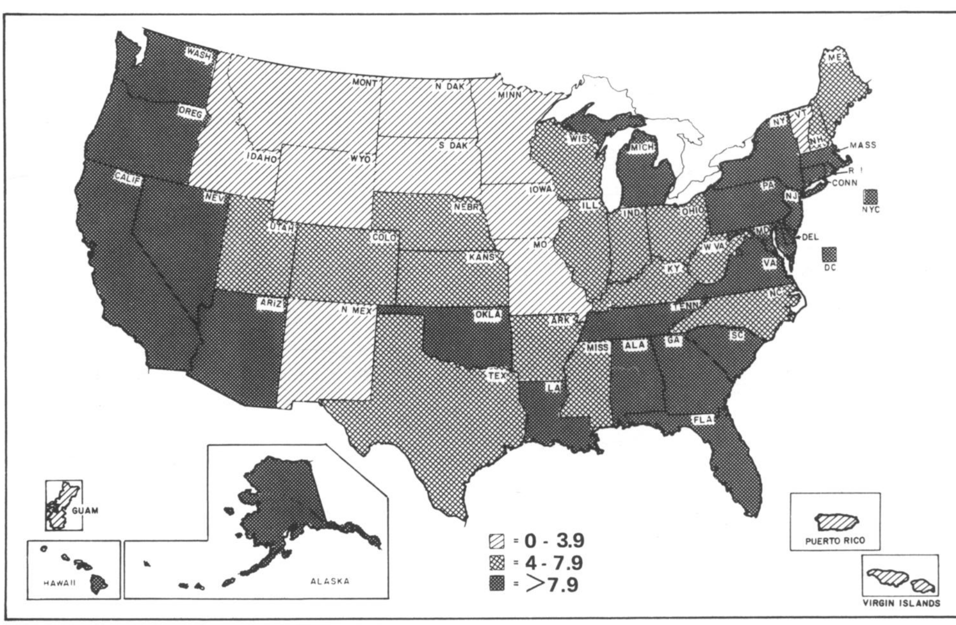


FIGURE 4. Reported cases of hepatitis B per 100,000 population, by state, United States, 1983

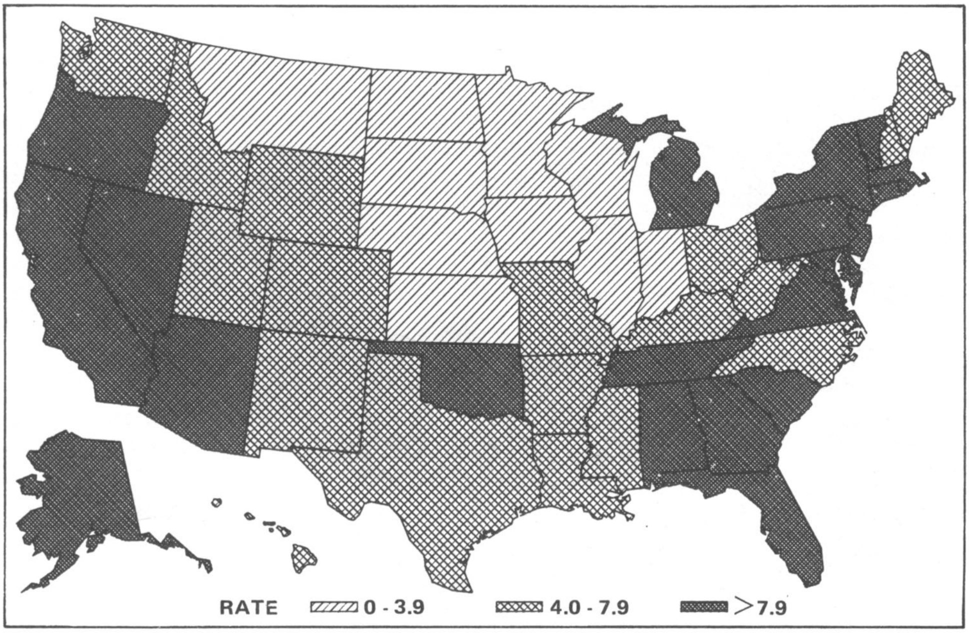
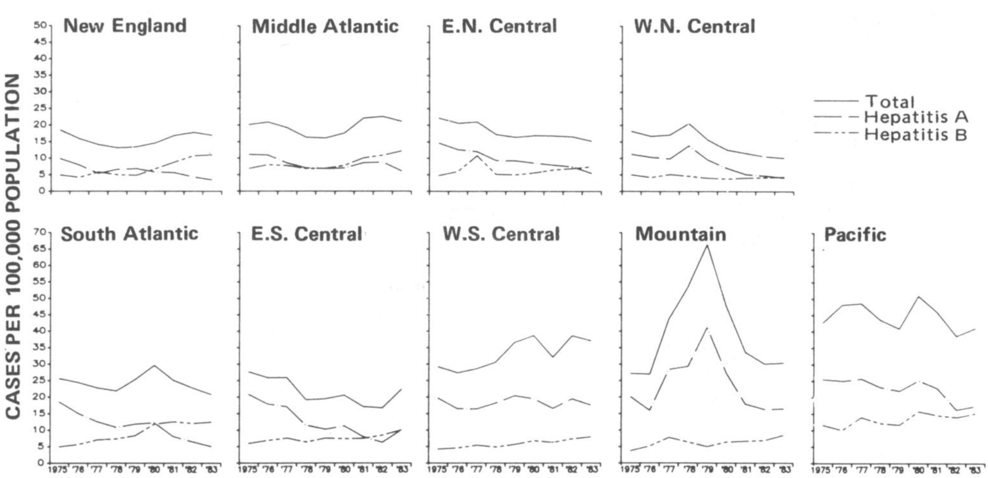


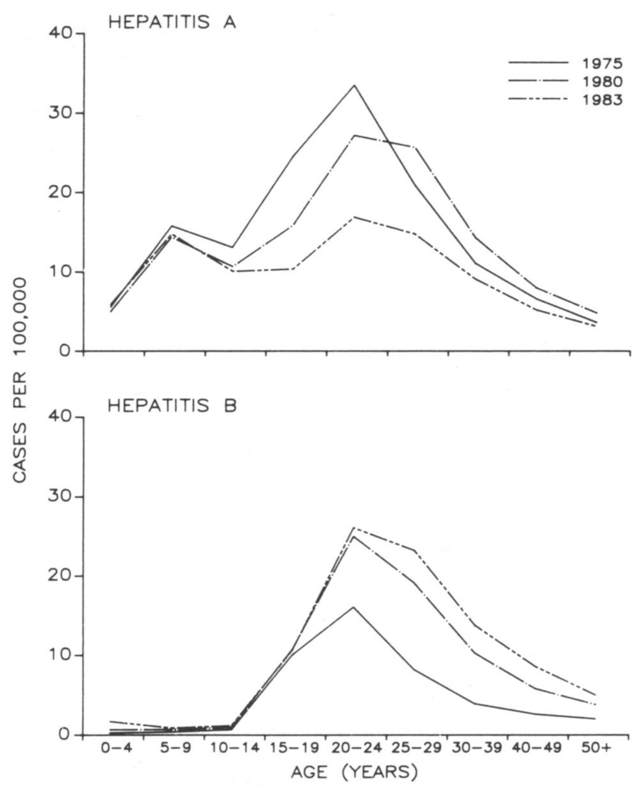
FIGURE 5. Reported cases of viral hepatitis, by region, United States, 1975-1983



In addition to incomplete serologic testing, some of the cases reported did not satisfy the criteria for acute hepatitis, in that no date of onset was reported or the patient was listed as asymptomatic. Among reported cases of hepatitis A and hepatitis non-A, non-B, 3% and 5%, respectively, showed no date of onset. However, 13% of the reported hepatitis B cases either showed no date of onset or were indicated as asymptomatic. These cases were compared with hepatitis B cases that did fulfill the criteria for acute hepatitis; there were no significant differences with respect to age, sex, ethnic group, or most of the epidemiologic risk factors frequently reported for persons with hepatitis B. However, persons with hepatitis B who were asymptomatic or had no date of onset were more likely to be dialysis patients or have histories of blood transfusion, hospitalization prior to their onset of hepatitis, surgery, or dental work. These persons may have been routinely screened for HBsAg and found to be positive without any evidence of acute illness. Since these persons did not fulfill the case definition and might simply be carriers of hepatitis B virus, they were excluded from any further analysis.

Epidemiologic Characteristics. Tables 2 and 3 show the distribution of viral hepatitis types A, B, and non-A, non-B by age, sex, and ethnic group for 1982 and 1983. Hepatitis A was the predominant type of hepatitis occurring among persons < 15 years of age. All three types of hepatitis were seen most frequently among persons 20-29 years of age. However, the age distribution of persons with non-A, non-B hepatitis is bimodal, with peaks occurring in the 20- to 29-year age group and the over-50-year age group. The second peak observed in

FIGURE 6. Reported cases of viral hepatitis, by type and age, United States, 1975, 1980, 1983



the over-50-year age group is largely the result of the greater frequency with which post-transfusion hepatitis occurs in this group. The male-to-female ratio is about 1:1 for both hepatitis A and hepatitis non-A, non-B, and 2:1 for hepatitis B. Each type of hepatitis occurred predominantly among the white ethnic group. Blacks represented a higher proportion of hepatitis B cases than they did of the other two types; and hepatitis B was the predominant type of hepatitis among blacks.

Tables 4 and 5 give the frequencies with which epidemiologic and clinical characteristics were reported for cases with hepatitis types A, B, and non-A, non-B for the years 1982 and 1983. For hepatitis A, contact with a person infected with hepatitis A, association with a day-care center, and international travel were factors reported with the highest frequency. Homosexual men have also been identified as being at high risk of acquiring hepatitis A (*4*). Although only 2% of all the cases reported this behavior, in some states the frequency ranged as high as 20%.

For hepatitis B, contact with a person infected with hepatitis B, parenteral drug abuse, and a variety of other potential percutaneous exposures were among the factors most frequently reported. Health care workers and homosexual men are well recognized high-risk groups for hepatitis B (*5-9*). Although only 7% to 8% of all patients with hepatitis B reported that they were employed in a medical or dental field, this occupational factor accounted for as many as 15% of all hepatitis B cases in some states. In addition, only 8% to 9% of all patients with hepatitis B reported homosexual activity, but in some states the frequency with which this behavior was reported in cases was as high as 20%. The risk factor reported with the greatest frequency among patients with hepatitis B was contact with another case. In some instances, the simultaneous presence of other factors such as drug abuse, working in a health-related

TABLE 2. Distribution of viral hepatitis types A, B, and non-A, non-B, by age, sex and ethnic group, United States, 1982, VHSP

	Hepatitis A N=7,698		Hepatitis B N=8,414		Non-A, non-B hepatitis N=2,543	
Age	**No.**	**%**	**No.**	**%**	**No.**	**%**
< 5	342	4.4	39	0.5	35	1.4
5-9	684	8.9	39	0.5	48	1.9
10-14	605	7.9	70	0.8	78	3.1
15-19	789	10.2	858	10.2	223	8.8
20-29	2,574	33.4	3,924	46.6	847	33.3
30-39	1,251	16.3	1,612	19.2	472	18.6
40-49	512	6.7	683	8.1	202	7.9
50-59	395	5.1	497	5.9	234	9.2
60+	430	5.6	557	6.6	373	14.7
Unknown	116	1.5	135	1.6	31	1.2
Sex						
Male	4,294	55.8	5,222	62.1	1,321	51.9
Female	3,318	43.1	3,114	37.0	1,208	47.5
Unknown	86	1.1	78	0.9	14	0.6
Ethnic group						
White	6,028	78.3	5,432	64.6	1,987	78.1
Black	442	5.7	1,655	19.7	232	9.1
Hispanic	459	6.0	355	4.2	83	3.3
Other	769	10.0	972	11.6	241	9.5

occupation, or homosexual activity may be responsible for transmission. In other instances, however, transmission of hepatitis B due to personal contact is probably the result of heterosexual activity involving multiple sex partners (*10*). Whether other percutaneous exposures, including those related to prior hospitalization and dental work, are true risk factors is unknown. Without a control population, the significance of these factors cannot be assessed.

For non-A, non-B hepatitis, a history of receiving blood transfusions, parenteral drug abuse, and other percutaneous exposures were the factors most frequently reported. The frequency with which these factors were reported, particularly drug abuse, varied widely from state to state. In addition, although only 5% of the patients with non-A, non-B hepatitis reported having worked in a medical or dental field, a previously recognized risk for acquiring non-A, non-B hepatitis (*11*), this occupational factor accounted for up to 20% of the cases in some states. The high frequency with which potential percutaneous exposures such as prior hospitalization and surgery is reported is related to receiving blood transfusions.

Clinical Characteristics. The frequencies with which jaundice and hospitalization for hepatitis were reported were similar for all three types of hepatitis. Cases reported to VHSP have a higher rate of hospitalization than cases identified in other epidemiologic studies (*11,12*), suggesting that reported cases may be more severe. However, this rate has declined from 63% in 1976 to 56% in 1980 to between 33% and 46% in 1983, perhaps as a result of improved reporting. The case-fatality rate is lower for reported cases of hepatitis A and highest for reported cases of hepatitis B and non-A, non-B, even when examined by specific age groups. In addition, patients hospitalized with hepatitis, regardless of the type, have a case-fatality rate four to six times higher than patients not hospitalized for their hepatitis.

TABLE 3. Distribution of viral hepatitis types A, B, and non-A, non-B, by age, sex and ethnic group, United States, 1983, VHSP

	Hepatitis A N=7,854		Hepatitis B N=8,925		Non-A, non-B hepatitis N=2,960	
Age	**No.**	**%**	**No.**	**%**	**No.**	**%**
< 5	353	4.5	46	0.5	31	1.0
5-9	801	10.2	42	0.5	58	2.0
10-14	648	8.3	54	0.6	84	2.8
15-19	712	9.1	775	8.7	217	7.3
20-29	2,486	31.7	4,045	45.3	955	32.3
30-39	1,240	15.8	1,800	20.2	580	19.6
40-49	453	5.8	720	8.1	245	8.3
50-59	351	4.5	498	5.6	243	8.2
60+	473	6.0	582	6.5	425	14.4
Unknown	337	4.3	363	4.1	122	4.1
Sex						
Male	4,210	53.6	5,454	61.1	1,437	48.5
Female	3,494	44.5	3,266	36.6	1,446	48.9
Unknown	150	1.9	205	2.3	77	2.6
Ethnic Group						
White	6,106	77.7	5,840	65.4	2,244	75.8
Black	418	5.3	1,693	19.0	328	11.1
Hispanic	459	5.8	390	4.4	99	3.3
Other	871	11.1	1,002	11.2	289	9.8

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TABLE 4. Epidemiologic and clinical characteristics of reported cases of viral hepatitis, by serologic type, 1982, VHSP

	Percentages of cases		
	Hepatitis A N=7,698	Hepatitis B N=8,414	Non-A, non-B hepatitis N=2,543
Epidemiologic characteristics			
Child/employee in daycare center	6.7	0.7	2.2
Contact of daycare child/employee	10.3	1.8	3.6
Personal contact with hepatitis A	29.5	1.6	4.6
Employed as a foodhandler	6.2	4.0	5.1
Foodborne or waterborne outbreak	6.0	0.3	1.1
International travel	5.2	1.4	2.2
Personal contact with hepatitis B	1.8	14.6	5.0
Employed in medical/dental field	1.9	8.1	5.5
Assoc. with dialysis/transplant	0.3	1.8	1.5
Blood transfusion	0.8	3.9	9.8
Hospitalized prior to illness	4.3	14.4	20.4
Surgery	2.0	7.0	11.2
Dental work	5.5	14.5	13.8
Drug abuse	2.4	13.5	9.1
Homosexual activity	1.9	7.8	2.1
Other percutaneous exposures	3.7	16.6	15.3
Clinical characteristics			
Jaundice	78.3	74.8	63.8
Hospitalized for hepatitis	39.6	47.7	48.0
Death as a result of hepatitis	0.6	1.3	2.5

Note: Percentages are based on the number of persons who answered the question. For hepatitis A, the last 10 epidemiologic characteristics were answered by relatively few cases; therefore, the percentages are underestimated and cannot be accurately compared with the hepatitis B and non-A, non-B groups.

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TABLE 5. Epidemiologic and clinical characteristics of reported cases of viral hepatitis, by serologic type, 1983, VHSP

	Percentages of cases		
	Hepatitis A N=7,854	Hepatitis B N=8,925	Non-A, non-B hepatitis N=2,960
Epidemiologic characteristics			
Child/employee in daycare center	6.3	0.5	1.9
Contact of daycare child/employee	9.8	1.5	3.7
Personal contact with hepatitis A	27.7	1.1	3.3
Employed as a foodhandler	6.1	3.4	4.5
Foodborne or waterborne outbreak	4.0	0.2	0.6
International travel	6.3	0.7	1.7
Personal contact with hepatitis B	1.7	14.8	4.9
Employed in medical/dental field	1.1	6.9	4.9
Assoc. with dialysis/transplant	0.3	1.7	1.7
Blood transfusion	0.7	3.5	10.6
Hospitalized prior to illness	3.6	14.4	21.5
Surgery	1.6	6.7	11.6
Dental work	4.5	13.7	13.6
Drug abuse	2.7	12.7	10.9
Homosexual activity	1.6	8.7	2.1
Other percutaneous exposures	3.8	15.3	14.9
Clinical characteristics			
Jaundice	78.2	74.5	61.4
Hospitalized for hepatitis	33.2	44.4	45.6
Death as a result of hepatitis	0.6	1.6	2.0

Note: Percentages are based on the number of persons who answered the question. For hepatitis A, the last 10 epidemiologic characteristics were answered by relatively few cases; therefore, the percentages are underestimated and cannot be accurately compared with the hepatitis B and non-A, non-B groups.

TABLE 6. Hepatitis types A, B, and non-A, non-B case fatality rates by hospitalization status, 1983, VHSP

	Case fatality rates		
	Hepatitis A N=7,854	Hepatitis B N=8,925	Non-A, non-B hepatitis N=2,960
Hospitalized	1.4	3.0	3.9
Not hospitalized	0.3	0.6	0.6
Total	**0.7**	**1.7**	**2.1**

Rabies in the United States and Canada, 1983

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Introduction

Following a decade of increasing animal rabies, 1981 marked the beginning of a slight decrease in the number of domestic and wild animal rabies. Nevertheless, the raccoon rabies outbreak that began in West Virginia and Virginia in 1978 and now has spread to the other mid-Atlantic states emphasizes the importance of continual surveillance of the disease.

In 1961, national rabies surveillance based on voluntary reporting of rabies cases by the states was begun at the CDC. Since this is a passive surveillance system, it undoubtedly underestimates the number of cases.

Methods

Most of the information in this surveillance was based on reports submitted as the standardized "Monthly Report of Laboratory Confirmed Rabies Cases" completed by each State Public Health Department. This form listed the number of animals diagnosed rabid and the number examined by county and species.

Suspect rabid animals were submitted for examination to state public health laboratories by veterinarians and other public health personnel. Laboratory diagnosis was based on the fluorescent antibody technique and occasional confirmatory mouse inoculation. Monoclonal antibody analysis (rabies virus mapping) was performed as previously described (*1*).

Results

Rabies in Wildlife. Skunks, raccoons, and bats continued to be the major wildlife hosts, accounting for 5,101 (96%) of 5,294 rabies cases in wildlife in 1983. Rabid bats were found in more states than were any other wild species and were reported from all states except Alaska, Hawaii, North Dakota, Rhode Island, and the U.S. Territories (Figure 1).

Although the 5,294 cases in wildlife represented a 5% decrease from the 5,535 cases in 1982, the proportion in raccoons increased from 21% (1,156 cases) in 1982, to 36% (1,906 cases) in 1983. The four Mid-Atlantic states—Maryland, Pennsylvania, Virginia, and West Virginia—and the District of Columbia accounted for 84% of all reported cases of raccoon rabies (see Mid-Atlantic States Raccoon Rabies Outbreak). The rabies outbreak in the Southeast (from 1955 to the present) has also involved primarily raccoons. Although this outbreak continued to spread northward in Georgia and South Carolina and westward in Alabama, the number of cases remained relatively constant with 331 in 1981, 296 in 1982, and 286 in 1983 (Figure 2).

Rabies in Domestic Animals. The total number of reported rabies cases in domestic animals (dogs, cats, and farm animals) continued to decline from the peak of 1,082 cases in 1981 to 743 in 1982 to 584 in 1983. Fewer cases were reported only in 1975 (433), 1976 (420), 1977 (445), and 1978 (469).

FIGURE 1. Counties reporting bat rabies, 1983

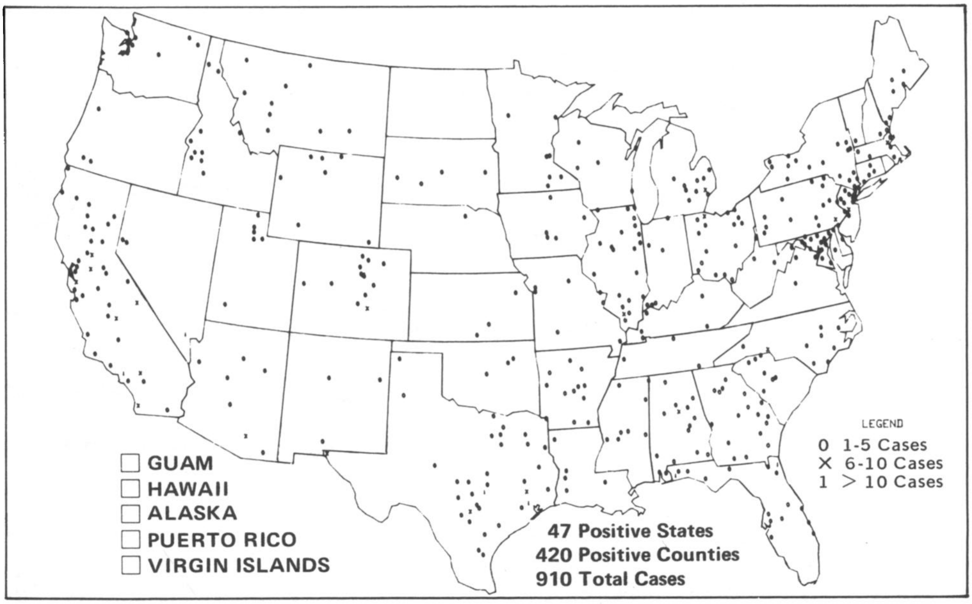
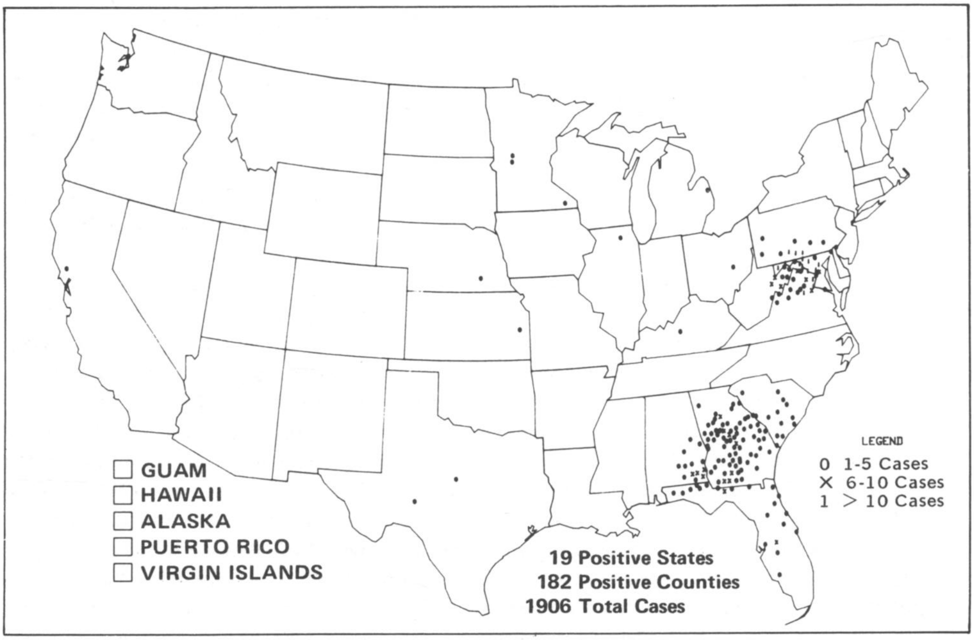


FIGURE 2. Counties reporting raccoon rabies, 1983



The number of rabies cases in cats in 1983 exceeded the number reported in dogs for the third consecutive year (Table 1). Both dogs and cats were most frequently diagnosed rabid in areas where rabies outbreaks in wild animals had been identified. The incidence in cats, however, was more clustered geographically, especially in the Mid-Atlantic states (Figures 3 and 4). One might hypothesize that the greater independence and free-roaming nature of cats, coupled with possibly less stringent rabies vaccination practices, resulted in cats being at greater risk than dogs of contracting rabies from wild animals.

The number of rabid cattle decreased from a peak of 465 in 1981 to 296 in 1982 to 204 in 1983. Despite this decline, cattle continued to be the domestic animal most frequently diagnosed rabid (Table 2).

Wild animals are frequently incriminated as the source of domestic animal rabies. The similar geographical distribution of domestic and wildlife rabies supports this "spillover" theory. This geographic association is most evident in the distribution of cattle and skunk rabies (Figures 5 and 6).

Rabies in Humans. Three rabies cases in U.S. citizens were reported in 1983 (*2,3,4*). Two occurred in adults and one in a 5-year-old child.

The two adults, a 30-year-old man and a 23-year-old woman, acquired rabies outside the United States. Both were presumably exposed when bitten by their own pet dogs, although neither animal was confirmed as rabid in the laboratory. One of the dogs had been recently vaccinated against rabies; the other, a puppy, was too young to vaccinate. The woman had received pre-exposure rabies prophylaxis, but neither of the two adults received post-exposure prophylaxis. (It should be emphasized that regardless of the rabies vaccine status of either the animal or the person, unless the suspect rabid animal is proven negative for rabies by either tissue examination or quarantine, those persons exposed should receive post-exposure prophylaxis.)

The third case involved a 5-year-old girl who never left the United States. The child was apparently exposed to a rabid bat in Michigan. This conclusion was based on the fact that the monoclonal antibody analysis of the rabies virus isolated from her did not reveal the characteristic antigenic patterns found in rabies isolates from terrestrial mammals in Michigan. Also, the similarity between this isolate and those from insectivorous bats in the United States suggests a bat as the origin of this isolate, even though an identical isolate has not been obtained.

A more detailed report of each of these cases follows:

1. The first case was in a 30-year-old man, an American architect from Waltham, Massachusetts. He had been bitten by a suspect rabid dog in Ososo, Nigeria, West Africa and he died on January 28, 1983, 28 days after the onset of symptoms.

   On October 8, 1982, the patient, who worked in Nigeria, was bitten on the right wrist while freeing his pet Doberman pinscher from a trap. The dog died later that day and was buried without being examined for rabies. The patient sought medical attention at a nearby clinic and received tetanus immunization, but was told that post-exposure prophylaxis was unnecessary because the dog reportedly had recently been immunized against rabies.

   The patient returned to the United States 11 weeks later. He remained well until January 1, 1983, 85 days after the bite, when he developed numbness and tingling at the healed bite-site. During the next several days, the patient developed low back pain, a temperature of 38.9°C (102°F), sore throat, anorexia, and malaise. On January 5, he complained of difficulty breathing, mild chest discomfort, excessive salivation, and occasional gagging when attempting to drink. He was examined by a physician, who noted that he had nonspecific ST-T changes on an electrocardiogram. He was admitted to a hospital in Massachusetts for further evaluation. On admission, the patient was anxious and was producing a large volume of saliva, which he refused to swallow. He suggested that a milk deficiency caused his illness, and exhibited unusual fear of some medical procedures. His pharynx was slightly erythematous, and his neck and throat structures contracted when touched with the hands or examining instruments. The remainder of the physical examination was unremarkable. Laboratory tests revealed a white blood cell (WBC) count of 9,900, with a normal differential, normal serum electrolytes and calcium, and normal chest x-ray. On January 6, the patient exhibited marked hyperactivity and refused to swallow barium for a radiologic examination. On the evening of January 6, he had respiratory arrest and a generalized seizure, and an endotracheal tube was inserted. Following the respiratory arrest, his temperature rose to 41.1°C (106°F). Arterial blood gases demonstrated a pO_2 of 60.7 mm Hg, a pCO_2 of 36 mm Hg, and a pH of 7.26 on 40% inspired O_2. A lumbar puncture revealed an opening pressure of 200 mm H_2O, protein of 20 mg/dL, glucose of 113 mg/dL, four white blood cells (one polymorphonuclear leukocyte, three lymphocytes), and no bacteria. A chest x-ray showed diffuse pulmonary infiltrates. A diagnosis of rabies was considered, and the patient was placed in strict isolation. A skin biopsy, taken from the back of his neck above the hairline, was sent to CDC for direct immunofluorescent antibody (FA) testing for rabies.

On January 7, the biopsy was reported positive. The patient was able to communicate rationally with hospital staff by writing notes. He demonstrated marked pharyngeal and laryngeal spasms when his face or neck was stimulated by either a wet sponge or a draft of cool air. Bacterial cultures of cerebrospinal fluid (CSF), blood, urine, and sputum were negative. Computerized tomography and electroencephalogram (EEG) were normal. The patient continued to require ventilatory support and a dopamine infusion to maintain adequate blood pressure. On January 8, he was started on systemic interferon treatment. He was given human leukocyte interferon, 10 million units twice daily intramuscularly, and 5 million units once daily intraventricularly into a Hickham reservoir connected by a cannula to a lateral ventricle of his brain.

During the next 10 days, the patient became progressively less responsive and was in deep coma by January 18. He had numerous medical complications during the course of illness, including Pseudomonas sepsis and keratoconjunctivitis, recurrent seizures, hypo- and hyperthermia, anemia, hypotension, abnormal blood clotting, and acute renal failure. Marked elevation of lactic dehydrogenase (LDH) and serum transaminases (SGOT and SGPT) were noted, and serum creatine phosphokinase (CPK) peaked at 86,000 units/ml. Urine myoglobin remained negative. The interferon therapy was discontinued on January 25, 17 days after the first dose was administered. The patient developed adult respiratory distress syndrome refractory to ventilation and died of cardiovascular collapse on January 28. Serum collected daily from the patient and tested at CDC for rabies antibody by the rapid fluorescent focus inhibition test (RFFIT) was positive (1:12) on the 16th day of illness and demonstrated a low titer (1:25 or less) until his death. CSF samples tested for rabies antibody were negative through the 19th day of illness and were unavailable for testing after that time. Direct FA testing of skin biopsies and a brain biopsy taken early in the illness from the frontal lobe cortex were positive for rabies; corneal impressions were negative. Rabies virus was isolated by mouse inoculation from CSF, nasal secretions, and saliva, both before and after the start of interferon therapy. Results of tests with monoclonal antibodies produced at CDC suggested that these isolates were typical street rabies viruses. At postmortem examination, many tissues were positive for rabies virus, including brain and spinal cord, skin and nerve from the bite site, pancreas, liver, bladder, periaortic lymph node, pericardium, adrenal gland, and salivary gland.

TABLE 1. Reported rabies cases in the United States,* by type of animal, 1965-1983

YEAR	DOGS	CATS	FARM ANIMALS	FOXES	SKUNKS	BATS	RACCOONS	OTHER ANIMALS	MAN	TOTAL
1965	412	289	625	1,038	1,582	484	99	54	1	4,584
1966	412	252	587	864	1,522	377	133	50	1	4,198
1967	412	293	691	979	1,568	414	143	107	2	4,609
1968	296	157	457	801	1,400	291	153	57	1	3,613
1969	256	165	428	888	1,156	321	255	52	1	3,522
1970	185	135	399	771	1,235	296	181	71	3	3,276
1971	235	222	484	677	2,018	465	190	99	2	4,392
1972	232	184	547	645	2,095	504	162	56	2	4,427
1973	180	139	448	477	1,851	432	114	56	1	3,698
1974	232	121	303	302	1,421	537	176	63	0	3,155
1975	129	104	200	276	1,226	514	192	31	3	2,675
1976	116	106	198	187	1,468	737	277	55	2	3,146
1977	120	108	217	122	1,631	637	281	65	1	3,182
1978	119	96	254	148	1,657	567	404	49	4	3,298
1979	196	156	284	145	3,031	756	543	34	5	5,150
1980	247	214	499	213	4,096	726	394	92	0	6,481
1981	216	285	581	196	4,480	858	481	111	2	7,210
1982	153	209	381	222	3,088	975	1,156	94	0	6,278
1983	132	168	284	111	2,285	910	1,906	82	2†	5,880

*Includes Guam, Puerto Rico, and Virgin Islands.
†Does not include one human who acquired and was treated for rabies outside the United States.

FIGURE 3. Counties reporting dog rabies, 1983

FIGURE 4. Counties reporting cat rabies, 1983

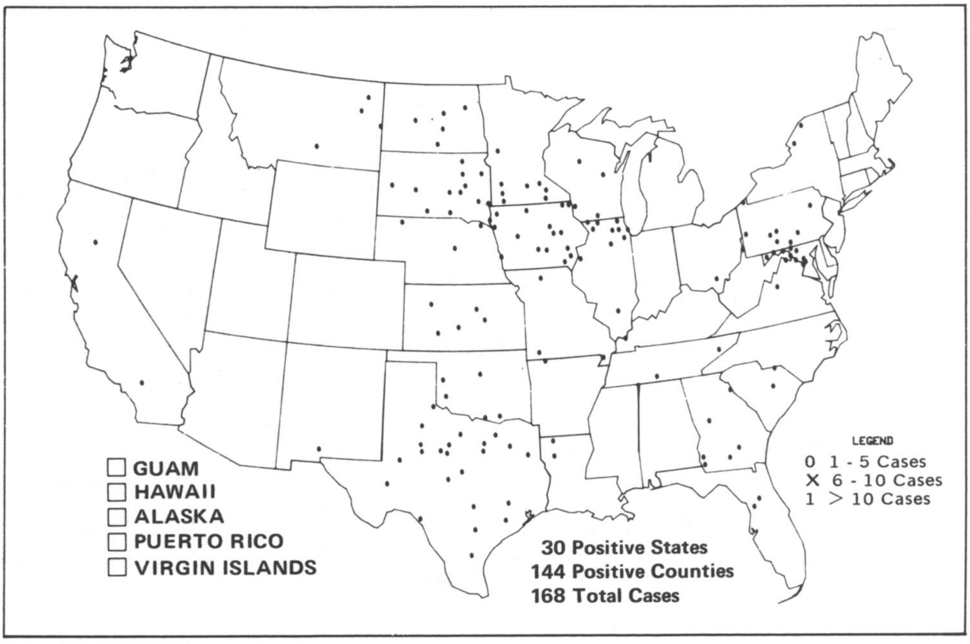


TABLE 2. Confirmed rabies cases in the United States, by state and animal, 1983

	DOMESTIC ANIMAL							WILD ANIMAL												
	Dogs	Cats	Cattle	Horses & Mules	Sheep & Goats	Swine	Domestic Animal Total	Skunks	Bobcats	Coyotes	Foxes	Raccoons	Bats	Rodents & Lagomorphs	Other Wild Animals	Wild Animal Total	Human	Total All Sources	More or Less Than 1982	
TOTALS	132	168	204	64	13	3	584	2,285	5	1	111	1,906	910	21	55	5,294	2	5,880		
STATE																				STATE
Alabama	1	0	1	0			2	8			1	42	30	0	0	81		83	–	Alabama
Alaska	2	0	0	0			2	0			15	0	0	0	3 Artic Foxes	18		20	–	Alaska
Arizona	0	0	0	0			0	10	1	1	2	0	19	0	0	33		33	–	Arizona
Arkansas	4	1	7	2			14	128			2	0	16	0	0	146		160	+	Arkansas
California	1	2	5	2			10	194	1		1	4	148	0	0	348		358	–	California
Colorado	0	0	0	0			0	0			0	0	36	0	0	36		36	–	Colorado
Connecticut	0	0	0	0			0	0			0	0	6	0	0	6		6	+	Connecticut
Delaware	0	0	0	0			0	0			0	1	5	1	0	7		7	+	Delaware
Dist. of Columbia	0	1	0	0			1	0			0	158	1	0	1 Opossum 1 Lesser Panda	161		162	++	Dist. of Columbia
Florida	1	2	1	0			4	1	1		0	56	69	0	0	127		131	+	Florida
Georgia	1	6	1	1			9	7			8	168	22	0	0	205		214	+	Georgia
Hawaii	0	0	0	0			0	0			0	0	0	0	0	0		0	0	Hawaii
Idaho	0	0	0	0			0	0			0	0	17	0	0	17		17	+	Idaho
Illinois	17	12	10	3			42	153			2	1	38	0	0	194		236	–	Illinois
Indiana	0	0	3	2			5	17			0	0	7	1	0	25		30	–	Indiana
Iowa	14	18	34	6	3		75	120			0	0	5	0	0	125		200	–	Iowa
Kansas	1	5	1	5			12	67			0	1	3	0	0	71		83	–	Kansas
Kentucky	14	1	2	3		1	21	52			4	1	5	0	0	62		83	–	Kentucky
Louisiana	1	2	0	1			4	23			0	0	7	0	0	30		34	+	Louisiana
Maine	0	0	0	0			0	0			10	0	7	0	0	17		17	–	Maine
Maryland	0	9	3	0			12	28			5	732	43	7	1 Deer	816		828	++	Maryland
Massachusetts	0	0	0	0			0	0			0	0	15	0	0	15	1	16	+	Massachusetts
Michigan	1	0	0	0			1	0			0	1	17	0	0	18	1	20	+	Michigan
Minnesota	3	11	23	0		1	38	120			0	3	9	1	0	133		171	–	Minnesota
Mississippi	0	0	0	0			0	0			0	0	9	0	0	9		9	–	Mississippi
Missouri	5	3	2	0			10	76			0	0	11	0	0	87		97	–	Missouri
Montana	3	4	1	2			10	94			0	0	15	0	0	109		119	+	Montana
Nebraska	3	4	5	1	1		14	48			0	1	1	0	0	50		64	–	Nebraska
Nevada	0	0	0	0			0	0			0	0	38	0	0	38		38	+	Nevada
New Hampshire	0	0	0	1			1	0			1	0	3	0	0	4		5	+	New Hampshire
New Jersey	0	0	0	0			0	0			0	0	24	0	0	24		24	+	New Jersey
New Mexico	0	1	0	0			1	7			0	0	7	0	0	14		15	–	New Mexico
New York	2	2	7	0	1		12	19			24	0	29	0	0	72		84	–	New York
North Carolina	0	0	1	0			1	6			0	0	17	0	0	23		24	–	North Carolina
North Dakota	5	5	12	3			25	67			0	0	0	0	0	67		92	–	North Dakota
Ohio	2	1	3	1			7	26			1	1	25	0	0	53		60	–	Ohio
Oklahoma	6	5	9	6			26	78			0	0	3	0	0	81		107	–	Oklahoma
Oregon	0	0	0	0			0	0			0	0	3	0	0	3		3	–	Oregon
Pennsylvania	5	10	3	1			19	29			0	81	33	4	2 Opossum	149		168	+	Pennsylvania
Rhode Island	0	0	0	0			0	0			0	0	0	0	1 Weasel 1 Unknown	2		2	+	Rhode Island
South Carolina	0	2	0	0			2	1	1		1	20	9	1	0	33		35	–	South Carolina
South Dakota	1	16	17	2	2		38	106			1	0	4	0	0	111		149	+	South Dakota
Tennessee	8	2	1	0			11	171			2	0	5	0	1 Weasel	179		190	–	Tennessee
Texas	13	27	24	20	6	1	91	505	1		14	2	88	0	1 Deer 1 Opossum	612		703	–	Texas
Utah	0	0	0	0			0	1			0	0	10	0	0	11		11		Utah
Vermont	0	0	0	0			0	0			0	0	2	0	0	2		2	0	Vermont
Virginia	0	6	3	0			9	33			15	545	17	6	0	616		625		Virginia
Washington	0	0	0	0			0	0			0	0	10	0	0	10		10	+	Washington
West Virginia	1	6	3	0			10	14			1	88	7	0	0	110		120	+	West Virginia
Wisconsin	9	4	21	1			35	76			1	0	5	0	1 Badger 1 Ferret	84		119		Wisconsin
Wyoming	0	0	0	0			0	0			0	0	10	0	0	10		10		Wyoming
Guam	0	0	0	0			0	0			0	0	0	0	0	0		0	0	Guam
Puerto Rico	8	0	1	1			10	0			0	0	0	0	40 Mongooses	40		50		Puerto Rico
Virgin Islands	0	0	0	0			0	0			0	0	0	0		0		0	0	Virgin Islands

FIGURE 5. Counties reporting cattle rabies, 1983

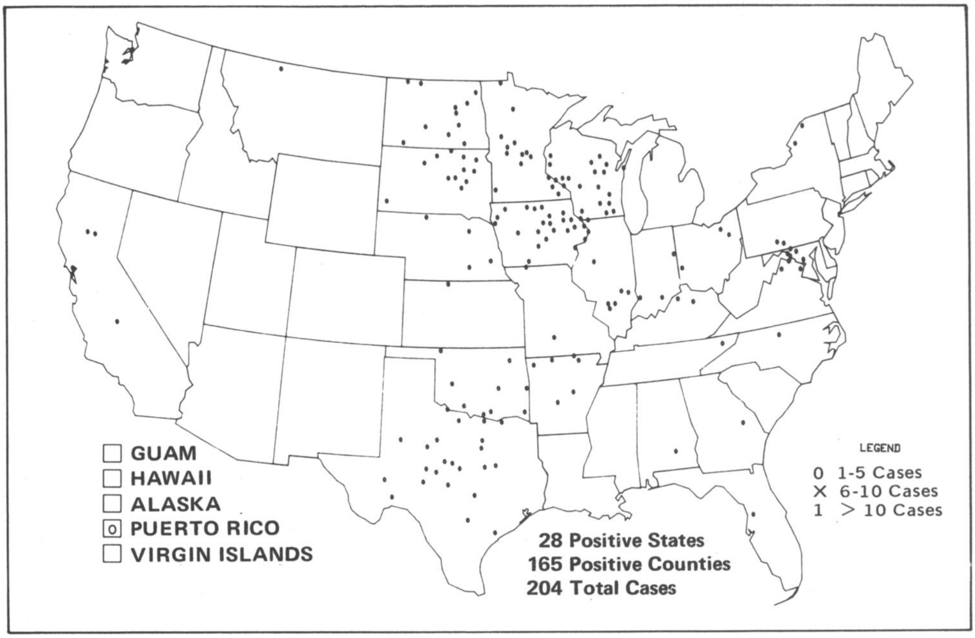
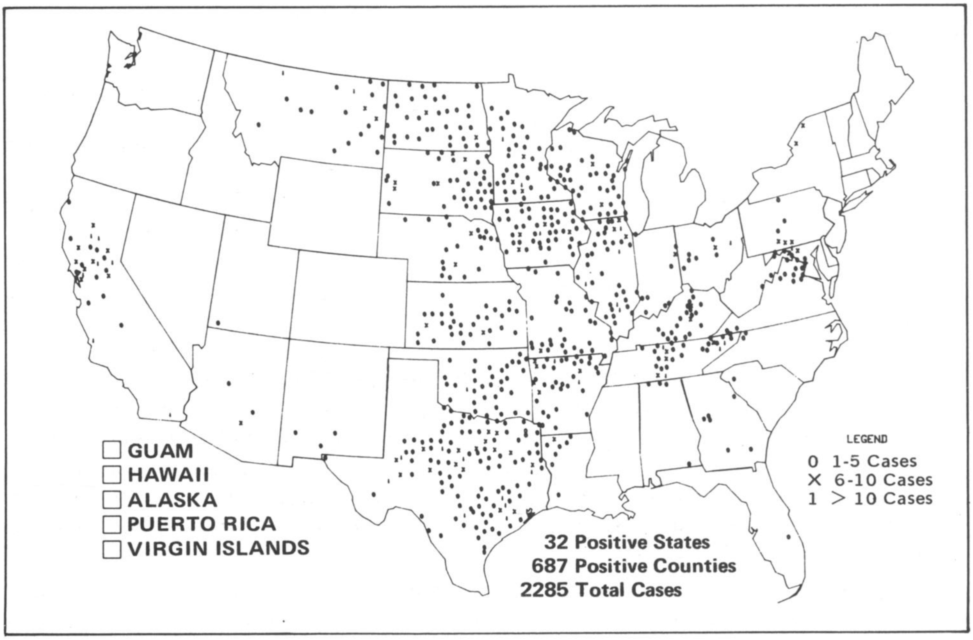


FIGURE 6. Counties reporting skunk rabies, 1983



2. The second case was in a 5-year-old girl from Michigan, who was possibly bitten by a bat in late August 1982; she died on March 9, 1983, 32 days after onset of symptoms. The child had developed right-arm pain and fever after a fall on February 7, 1983. By February 11, she had malaise, anorexia, sore throat, left-heel pain, and right-arm weakness. She appeared ill but was alert and cooperative after hospitalization; she had point tenderness at her right wrist, elbow, shoulder, and left heel. The WBC count was 12,800, and a bone scan of the right wrist showed evidence of osteomyelitis. Over the next 48 hours, she became irritable, with temperatures to 39.3°C (103.9°F), progressive right-arm weakness, urinary incontinence, and difficulty swallowing saliva and water. On February 13, she became lethargic and hypertensive, and was transferred to another hospital. Rabies was considered, but no clear history of animal exposure could be obtained. CSF revealed 10 WBC and negative bacterial cultures. Computerized Axial Tomography and brain scans were normal; an EEG was diffusely abnormal without focal findings. The next day, she became obtunded, developed progressive respiratory distress, and required mechanical ventiliation. The presumptive diagnosis was post-infectious encephalopathy, and treatment with high-dose steroids was initiated. By February 17, she was comatose.

On February 23, the family remembered a possible bat bite in late August 1982.

Sera collected on February 23, 18 days after the onset of symptoms, showed low titers of rabies antibody by RFFIT and by immunoadherence hemagglutination (IAHA) tests performed at the Michigan Department of Public Health (MDPH). Antibody was not present in the CSF. Since skin biopsy and mouse inoculation were negative, the serum results were not considered sufficient to confirm the diagnosis of rabies. Sera and CSF collected around February 28, showed no titer rise, but on March 4, a serum specimen and CSF showed rises to 1:25 and 1:17, respectively, by RFFIT, and a presumptive diagnosis of rabies was made. On March 9, the patient experienced cardiac arrest and died. The MDPH identified rabies virus from the brain by direct FA. Of the 254 persons at the two hospitals who had contact with potentially infectious secretions from the patient, 54 received post-exposure rabies prophylaxis.

3. The third case occurred in a 23-year-old American Peace Corps volunteer working in Kenya. The woman was bitten by her puppy on May 31, 1983 and she died of rabies on August 27, 89 days after the bite and 20 days after the onset of symptoms. Medical records indicated that in November 1982, the patient had been given three intradermal doses of human diploid cell rabies vaccine (HDCV), 0.1 ml each, for pre-exposure prophylaxis. She was reportedly informed at that time that additional doses of vaccine would be needed if she was exposed to rabies. The patient's May 31 diary entry described a behavior change in her puppy (which was too young to be immunized against rabies) and her hope that he was not rabid because he had bitten her.

The patient was well until approximately August 8, when she noted left arm pain. On August 10, she was seen in a Nairobi medical clinic with complaints of insomnia and increasing left arm, shoulder, and neck pain. She was hospitalized on August 11 and placed in the intensive care unit. When asked about animal exposures, she failed to report the bite.

Rabies virus was isolated at CDC from a cervical cord specimen obtained at autopsy, and monoclonal antibody studies indicated that the isolate was street rabies and not one of the rabies-related viruses, such as Mokola or Duvenhage, which have been isolated from humans in sub-Saharan Africa.

Rabies in Rodents. In 1983, rodents were diagnosed as rabid in seven states. These included Maryland (five woodchucks, two beavers); Virginia (six woodchucks); Pennsylvania (three woodchucks, one squirrel); Delaware, Indiana, and Minnesota (one woodchuck each); and South Carolina (one chipmunk). In 1982, 17 rodents were diagnosed as rabid in eight states. The states reporting the most cases in 1983 (Maryland, Virginia, and Pennsylvania), also reported 10 (59%) of the 17 cases in 1982.

Historically, rodents (which, for surveillance purposes, include the members of the order Rodentia—rats, mice, squirrels, muskrats, etc.—and the members of the closely related order Lagamorpha—rabbits, hares, pikas) have not been thought to be an important vector or reservoir of rabies. No cases of human rabies have ever been associated with them. However, rodent bites continue to account for a high proportion of animal bites to humans, and exposures to rodents generate substantial concern regarding the use of both rabies diagnostic test and post-exposure rabies prophylaxis.

Data from the past 13 years recently analyzed at CDC provide additional support to the minimal importance of rodents as rabies hosts. Yet, as unpublished data show (*5*), the actual number of laboratory-confirmed cases of rodent rabies increased from an average of three cases/year during 1971-1973 to an average of 16 cases/year in 1981-1983. Woodchucks are the only species with an actual increase in number of cases, the incidence among other rodents having remained relatively constant or even decreasing. Of the 48 rodent rabies cases reported from 1981 through 1983, 36 occurred in woodchucks (*Marmota monax*); 26 (72%) of these were reported from the Mid-Atlantic states (Maryland, Pennsylvania, Virginia, and West Virginia). Monoclonal studies performed at CDC identified the isolates as raccoon virus.

In summary, the overall incidence of rabies in rodents (0.07% of all cases in 1983) remains very low outside the Mid-Atlantic outbreak area. As a result, bites of humans by rodents do not necessitate testing of the animals or post-exposure rabies prophylaxis, except in unusual circumstances, such as an unprovoked attack.

Mid-Atlantic States Raccoon Rabies Outbreak, 1983. During 1983, the raccoon rabies outbreak in the Mid-Atlantic region remained the most significant U.S. rabies epizootic. The total number of rabid raccoons reported from the four states involved (Maryland, Pennsylvania, Virginia, and West Virginia) and the District of Columbia doubled from 837 reported in 1982 to 1,608 reported in 1983. Of these states, only Virginia reported a decrease in numbers of rabid raccoons, although the outbreak expanded south into eight new counties in that state during the year. Expansion was also evident in all other directions. At least 25 Mid-Atlantic counties reported rabid raccoons for the first time during 1983 (Figures 7 and 8).

Nearly 85% of the rabid animals reported were raccoons, with some spillover to other wildlife and domestic animals. Several species of wildlife not usually considered at high risk for rabies were reported positive including 14 woodchucks, two beavers, three opossums, one deer, one squirrel, and one red panda. The panda was a resident of the National Zoo in Washington, D.C., where at least 14 rabid raccoons were found during the outbreak. It is unknown whether finding rabies in unexpected species is related to the virus strain, the intensity of the epizootic, or to the fact that more animals are being examined. The number of rabid cats (32) reported in the five jurisdictions far exceeded the number of rabid dogs (six).

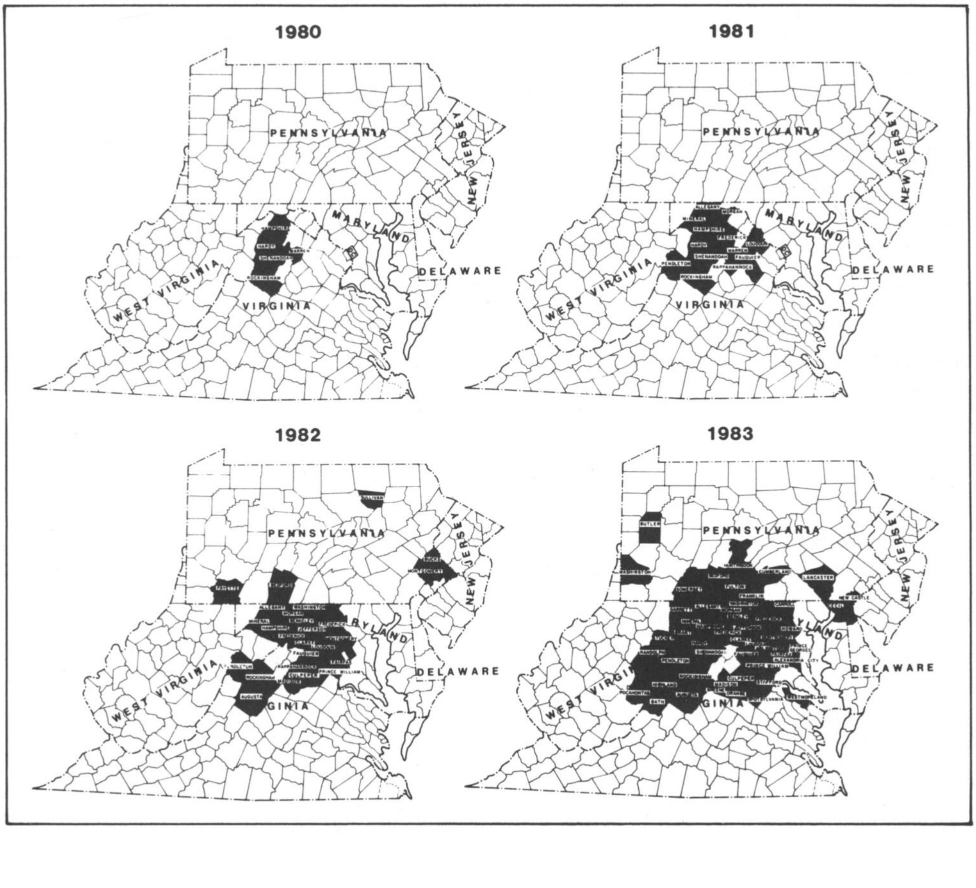
The most intensely affected areas in this outbreak continue to be urban and suburban, as evidenced by the 158 rabid raccoons reported from the District of Columbia. Urban areas apparently provide a very suitable habitat for raccoons, and the high concentration of people and pets in these areas leads to more wildlife encounters that result in submission of wild animals for testing. There is no reason to believe that this outbreak will spare other metropolitan areas such as Baltimore and Philadelphia as it continues to spread.

Monoclonal Antibody Analysis of Various Strains of Rabies Virus. The demonstration of antigenic differences among strains of rabies virus by monoclonal antibodies allows the evaluation of many strains from different animals and geographic regions. Within one outbreak area, a single homogeneous antibody reaction pattern generally is found among viruses from all affected species of terrestrial mammals. In contrast, isolates from different areas can be identified by their different reaction with the antibodies (*1*).

For example, there are at least two strains of rabies virus associated with the large skunk rabies endemic area in the central United States. The first group includes isolates collected from endemic areas of the northern central United States (Minnesota, Wisconsin, Iowa, Illinois), the northeastern portions of Missouri and Arkansas, and isolates from the area of endemic skunk rabies, which stretches from Ohio through the central portions of Tennessee and Kentucky and the western tip of Virginia. Isolates from skunk rabies areas of northern California are included in this group. A second large group of antigenically distinct viruses is found in isolates collected from skunk rabies areas of the south central United States (Texas, Kansas, western Arkansas, and Missouri). Although these two antigenically separate virus groups now appear (with the exception of California) as one large outbreak area, they originated as two separate outbreaks (*6*).

A third group of antigenically distinct rabies viruses is associated with the recent outbreak

FIGURE 7. Counties reporting raccoon rabies, 1980-1983



of rabies in raccoons in the Mid-Atlantic region. The rabies virus from raccoons and other terrestrial animals in this area is identical to that found in rabid raccoons in the southeastern United States. This finding supports the theory that the Mid-Atlantic outbreak may have originated from infected animals transported from the southeastern United States.

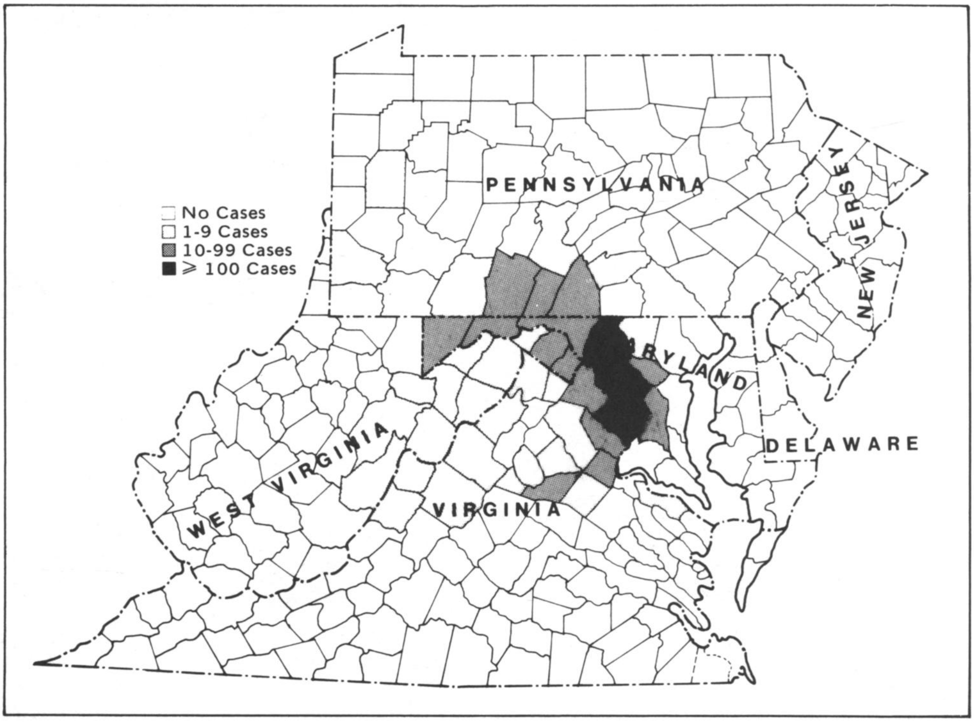
A fourth group of viruses includes isolates from the fox rabies endemic area of the extreme northeast (New York and Maine) (Figure 9) and is identical to virus isolates collected from fox rabies areas of Ontario and Quebec, Canada.

Isolates from a small four-county focus of fox rabies in central Texas are interesting because they differ from skunk virus isolates collected from the same area. This group is an exception to the general finding that a single major host species and virus type is found within an outbreak area, and isolates from other species usually reflect the virus found in the major host species. In this small outbreak area there are two major virus types, each associated with a separate species.

In contrast to the ease with which isolates from terrestrial mammals could be grouped, an interesting diversity of antigens was found among isolates of rabies from bats. With the exception of virus isolates from two bat species (*Tadarida brasiliensis* from Texas and Nevada and *Eptesicus fuscus* from the Atlantic coast), virus isolates collected from bat species within the United States do not readily lend themselves to grouping by analysis with monoclonal antibodies. Isolates collected from the same species and geographic area may vary, and a surprising diversity of antigenic types has been found in the five bat species studied to date.

It was this diversity of antigenic reaction that led CDC to compare the monoclonal antibody

FIGURE 8. Frequency of raccoon rabies cases by county, 1983



rabies diagnostic reagent prepared by Centocor (Centocor Inc., Malvern, Pa.) with the hyperimmune serum reagents currently in use. Excellent correlation of results was reported by public health laboratories in seven states (California, Maryland, Michigan, New York, South Carolina, Texas, and Virginia). In addition, rabies specimens from an additional 20 states were tested at CDC. A total of 1,690 specimens were examined with both hyperimmune serum and monoclonal antibody rabies diagnostic reagents. These included rabies-positive samples from 132 bats and 275 terrestrial animals. The quality, intensity, and amount of staining found in these positive tissues with the monoclonal antibody reagent was identical to that of the hyperimmune serum reagent. All but three of the rabies-negative tissues were negative for staining by both reagents. These three specimens contained a Streptococcus species that was specifically stained only by a commercial hyperimmune serum reagent. These encouraging results suggest that the monoclonal antibody reagent is a suitable alternative to hyperimmune serum antibody for diagnosing rabies.

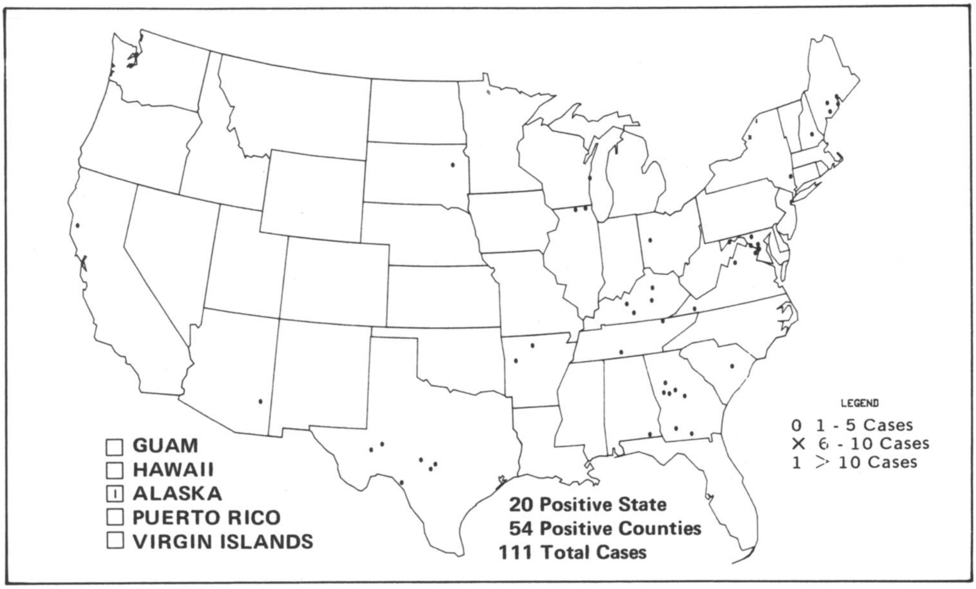
Summary

Primarily as a result of organized canine rabies vaccination, leash laws, and other preventive procedures aimed at the canine population, the number of rabid dogs decreased markedly in the last thirty years (Figure 10). This decrease was accompanied by a similar marked reduction in human rabies (Table 3, Figure 11).

As domestic animal rabies declined, rabies in wildlife increased. Since 1958 the number of cases of rabid wildlife surpassed domestic rabies cases, and today they account for over 85% of all reported rabies cases.

In 1983, a total of 5,880 laboratory-confirmed cases of rabies in the United States and its territories were reported to CDC—a decline of 398 cases compared with 1982 (7) (Table 1). The total number of cases decreased for the second consecutive year. The 13% decline in

FIGURE 9. Counties reporting fox rabies, 1983



1982 was followed by a 6.4% decline in 1983. This decrease in cases, however, was not reported by all states. The four Mid-Atlantic states—Maryland, Pennsylvania, Virginia, and West Virginia—and the District of Columbia actually experienced an 83% increase in cases. These states and the District of Columbia reported 1,903 cases in 1983 (compared with 1,040 cases in 1982) which accounted for approximately one-third (32.4%) of all rabies cases nationally.

Rabies in Canada, 1983

A total of 2,252 cases of animal rabies in Canada were reported in 1983—a 13.5% decline from the 2,602 cases in 1982 (*7,8*). Foxes and skunks continued to be the major sources of rabies among the wild species, as did cattle among domestic animals (Table 4).

The province of Ontario accounted for 88% of all reported cases. The rabies viruses became established in the skunk and fox populations of Ontario in the 1940s and 1950s from an outbreak that extended down from the Arctic. They have continued to sweep across the province in waves with a crest every 3-5 years (*9*).

The rolling terrain of southeastern Ontario province provides a very suitable habitat for foxes and skunks because of its numerous burrows and old farmsteads. Although the terrain of southern Quebec is rather similar to that of Ontario, the Ottawa River has served as a barrier to the spread of this outbreak to the northeast.

FIGURE 10. Reported rabies cases in wild and domestic animals, by year, United States, 1953-1983

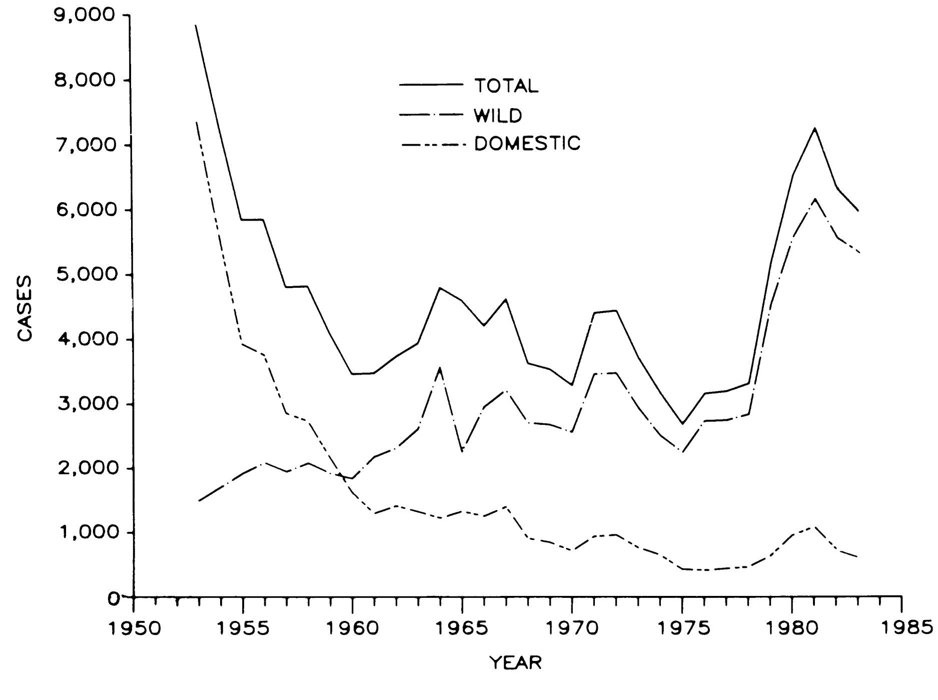


TABLE 3. Human rabies cases, by 4-year period and source of exposure, United States, 1946-1983

Years	Total cases	Cases for which exposure source is identified	Source of exposure* Dog	Cat	Fox	Skunk	Bat	Bobcat
1946-1949	94	48	43	5	0	0	0	0
1950-1953	81	54	47	2	3	1	1	0
1954-1957	37	29	23	1	1	3	1	0
1958-1961	18	15	7	1	3	1	3	0
1962-1965	5	5	3	0	0	1	1	0
1966-1969	5	4	2†	0	0	1	0	1
1970-1973	8	7	2†	0	0	2	3	0
1974-1977	6	5	3†	1	0	0	1	0
1978-1981	11	3	3†	0	0	0	0	0
1982-1983 (2 years)	3	3	2†	0	0	0	1	0
Total	**268**	**173**	**153**	**10**	**7**	**9**	**11**	**1**

*Confirmed or most probable source.

†These exposures occurred outside of continental United States.

FIGURE 11. Reported human rabies cases, United States, January 1952-December 1983

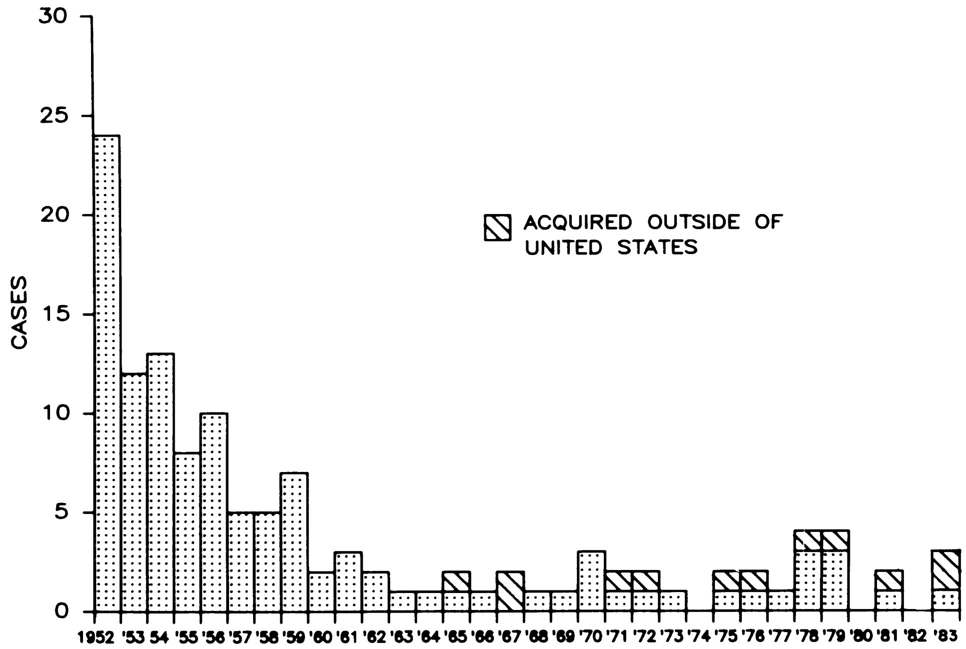


TABLE 4. Reported animal rabies, by animal and province, Canada, 1983

Province	Dog	Cat	Cattle	Other livestock	Fox	Skunk	Bat	Raccoon	Coyote	Other animal	Human	Total
Alberta	—	3	—	—	—	32	5	—	—	—	—	40
Br. Columbia	—	—	—	—	—	—	9	—	—	—	—	9
Manitoba	—	1	6	1*	—	43	—	—	—	—	—	51
Maritimes	—	—	—	—	—	—	—	—	—	—	—	0
N.W.T.	1	—	—	—	4	—	—	—	—	—	—	5
Ontario	60	90	326	58†	735	647	47	8	7	6§	—	1,984
Quebec	2	1	3	—	18	2	—	—	—	—	—	26
Saskatchewan	—	1	5	1*	—	128	2	—	—	—	—	137
Yukon T.	—	—	—	—	—	—	—	—	—	—	—	0
Total	**63**	**96**	**340**	**60**	**757**	**852**	**63**	**8**	**7**	**6**	**0**	**2,252**

*Horse.

†Thirteen horses, 33 sheep, 9 goats, 3 pigs.

§Two ground hogs, 1 wolf, 1 donkey, 1 mink, 1 bison.

A spillover of the virus from the wild species to the domestic animals is strongly suspected because over 95% of all cases of rabies in domestic animals also occurred in Ontario. Currently, monoclonal antibody studies are being carried out to document this crossover. Of the domestic species, cattle were diagnosed rabid most frequently. A probable explanation for this is their increased risk of exposure to wild animals when they forage on pasture.

It is of interest to note that, as in the United States, the reported incidence of rodent rabies in Canada remained very low, accounting for only 0.13% of all cases in 1983.

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Occupational Injuries in the Meatpacking Industry, United States, 1976-1981

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Introduction

For the years 1977-1981, the meatpacking industry (Standard Industrial Classification [SIC] 2011) had the third highest injury rate among all U.S. manufacturing industries. Data from the annual survey of the Bureau of Labor Statistics (BLS) indicate that the meatpacking industry, which employed an average of 161,700 workers during that period, had an average incidence rate for all injuries of 31.4/100 workers. This contrasts with an average of 12.2 injuries/100 workers in all manufacturing industries. In the same period, the average rate for lost workday cases in the meatpacking industry was 15.0/100 workers employed. This was also one of the highest among manufacturing industries, where the mean rate for lost workday cases was 5.2/100 workers (*1*). The meatpacking industry ranked third in a severity index developed from 1977-1981 BLS data by the National Institute for Occupational Safety and Health (NIOSH) (*1*).

The annual survey of the BLS is based on a randomly selected sample of firms from all industrial classifications. The survey provides national incidence rates of total injuries and illnesses, total lost workday cases, and lost workdays/100 full-time-equivalent employees in these industries. However, it does not provide detailed information on these injuries by occupation or by any other variable.

Because of these rankings, NIOSH undertook an analysis of injuries in the meatpacking industry as a continuation of its investigation of traumatic injuries (*2*).

Materials and Methods

For this analysis, NIOSH used a second source of data, the Supplementary Data System (SDS) of the BLS (*3*). The SDS, begun in 1976, is based on workers' compensation cases reported from states voluntarily participating in the program. The number of states participating varies from year to year. Information gathered for each injury includes state, date of injury, age and sex of worker, time of day, duration of employment prior to injury, nature of injury (e.g. cut/laceration, sprain/strain, contusion, abrasion, amputation, etc.), occupation, source of injury (e.g. knives/saws, containers, bodily motion, meat and meat products, etc.), type of injury (e.g. struck by object, lifting object, stationary object, pulling object, overexertion, etc.), and part of body injured. The SDS does not enumerate the total number of persons at risk and, therefore, cannot be used to develop injury rates.

Because SDS data are based on reports from only 33 states and thus result in fewer cases than occur nationally, the entire data base for the years 1976-1981 was used to provide a larger sample population from which to draw trends. A number of tables were prepared using one or two variables at a time. These were examined to see what hypotheses or inferences might be drawn in the absence of rates.

Results

Ten specific occupations accounted for 83% of the injuries in the meatpacking industry, with meatcutters, laborers, material handlers, and miscellaneous operators accounting for 70% (Table 1). The most frequently injured workers were meatcutters (40.8%) and laborers (20.3%).

The largest proportion of injuries involved knives and saws, meat products, and containers (Table 2). Knives and saws were associated with 22.6% of all injuries and meat products with 11.7%. Knives and saws caused 52% of the injuries to meatcutters and 22% to laborers. Sprains and strains, cuts and lacerations, and contusions were the most frequent types of injuries, constituting nearly 75% of all injuries. Sprains and strains were involved in 31.1% of all injuries, while cuts and lacerations made up another 30.5%. Finger injuries accounted for 24%, back injuries for 15.7%, and hand, arm, and wrist injuries for 22.5%.

Discussion

Surveillance is an essential element in the conduct of public health programs, both for determining the extent of the problems and for measuring progress in combating these problems. Unfortunately the occupational injury and illness data systems now available lack both sensitivity and completeness of national coverage. These systems were designed for purposes other than surveillance of occupational health; each system measures a different aspect, covers a different population of workers, and may even have different definitions of recordable injuries or diseases.

For example, the annual survey of the BLS is based on a randomly selected sample of firms from all industrial classifications. It provides national incidence rates of total injuries and illnesses in various industries, total lost workday cases, and lost workdays/100 full-time-equivalent employees in these industries. It does not, however, provide detailed information on injuries by occupation or any other variable. NIOSH uses it to rank industries by rate of injury. The SDS is based on workers' compensation cases reported from 33 states. Since the workers' compensation laws may vary from state to state, the criteria for admission of a report also vary. At one extreme, some states collect information on first reports of injuries, irrespective of the duration of disability or whether the injuries are ultimately adjudicated to be

TABLE 1. Injuries in the meatpacking industry, by occupation, 1976-1981*

Occupation	Number of injuries	Percentage
Meat cutter, butcher	42,758	40.8
Laborer	21,241	20.3
Material handler	4,892	4.7
Operator	4,846	4.6
Meat packer	3,397	3.2
Machinist	2,954	2.8
Truck driver	2,449	2.3
Mechanical worker	1,937	1.8
Foreman	1,635	1.6
Janitor	1,103	1.1
Other classifications	10,870	10.4
Not coded	6,619	6.3
Total	**104,701**	**99.9**

*Adapted from BLS/SDS data; not all 33 SDS states were represented all years.

work-related. At the other extreme, some states require a full week of missed work before the injury incident enters the reports. The latter system would, by excluding short-term disabilities, result in a lower count of injuries.

The SDS provides only the frequency-of-case information: it does not state the total number of persons at risk and, therefore, cannot be used to develop injury rates. Other BLS data systems do state total workers in each SIC code by occupation, but the data presently

TABLE 2. Profile of principal injuries in the meatpacking industry, 1976-1981*

	Number of injuries	Percentage
Source of injury		
Knives/saws	23,654	22.6
Meat products	12,234	11.7
Containers	6,928	6.6
Bodily motion	6,651	6.4
Animals/related products (except meat)†	5,637	5.4
Other classifications	45,851	43.8
Not coded	3,746	3.6
Total	**104,701**	**100.1**
Type of injury		
Struck by object	25,979	24.8
Lifting object	9,090	8.7
Stationary object	7,398	7.1
Pulling object	5,969	5.7
Overexertion	5,901	5.6
Other classifications	47,630	45.5
Not coded	2,734	2.6
Total	**104,701**	**100.0**
Nature of injury		
Sprain/strain	32,525	31.1
Cut/laceration	31,894	30.5
Contusion	12,840	12.3
Inflamed joint	4,979	4.8
Fracture	4,089	3.9
Other classifications	13,927	13.3
Not coded	4,447	4.2
Total	**104,701**	**100.1**
Part of body injured		
Finger	25,107	24.0
Back	16,428	15.7
Hand (excluding fingers)	9,167	8.8
Arm (elbow, forearm, etc.)	8,804	8.4
Wrist	5,554	5.3
Other classifications	39,071	37.3
Not coded	570	0.5
Total	**104,701**	**100.0**

*Adapted from BLS/SDS data; not all 33 SDS states were represented all years.

†Includes categories: animal, animals, animal products, bones, fur, hair, wool, hides, leather, and animal products not elsewhere classified.

are not available at the finest aggregation level (4-digit SIC), and care is required in interpretation, since different coding systems are used.

For occupational health surveillance, two or more data systems must often be used together, combining information where possible and bridging the gaps where necessary. The present study illustrates the use of BLS Annual Survey data to identify a high injury rate in the meatpacking industry for the years 1977-1981. NIOSH then analyzed SDS data for injuries within the meatpacking industry. Analyses such as these can be used to identify future areas for research. As a result of this analysis, NIOSH is developing recommendations for specific research projects to determine the risk factors for injuries in the meatpacking industry and to develop strategies for controlling them.

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Ten Years' Experience with The Coal Workers' Health Surveillance Program, 1970-1981

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Introduction

The occupational disease, coal workers' pneumoconiosis (CWP), results from the inhalation and deposition in the lung of respirable coal-mine dust. Reaction of the lung tissue to the dust may produce coal macules, coal nodules, or progressive massive fibrosis. These relatively specific pathologic changes, and any consequent physiologic abnormalities, constitute CWP. In 1969, the underground mine labor force was estimated at 120,000. These miners, having worked in high dust levels, were potentially at risk of developing simple CWP and its more severe form, the often disabling progressive massive fibrosis.

The Coal Mine Health and Safety Act of 1969 mandated the creation of The Coal Workers Health Surveillance Program (CWHSP). The CWHSP, also called the X-Ray Surveillance Program, was designed to detect CWP, to protect the health of coal miners by allowing miners to transfer to low-dust work areas if chest radiographs show signs of CWP, and to identify mines with a high prevalence of CWP. It also provided a means for monitoring the incidence and prevalence of CWP under the respirable coal dust standard. The standard was established at 3 mg/m^3 in 1970 and reduced to 2 mg/m^3 by December 30, 1972. The National Institute for Occupational Safety and Health (NIOSH) has administered the CWHSP since its beginning in 1970. The program has now completed three "rounds" of examinations (*1,3*): Round 1 from 1970 to 1973, Round 2 from 1973 to 1978, and Round 3 from 1978 to 1981; Round 4 is currently under way. The following gives an overview of 10 years' experience with this program.

Methods

All miners employed since 1970 must have a chest radiograph taken soon after employment and again 3 years later. Subsequently, working coal miners at underground mines are eligible to volunteer for radiographs at intervals not to exceed 5 years. Each coal-mine operator is required to submit a plan specifying the time period for examinations and the facilities at which x-rays will be taken. If no plan is submitted, NIOSH draws up a plan that becomes mandatory for the mine operator. Regardless of who submits the plan, the same specifications and standards for examination and evaluation of results are maintained.

Posterior-anterior chest x-rays of the miners are taken free of charge. X-ray facilities must be certified by NIOSH and may be hospitals, clinics, or mobile units. The films are interpreted by physicians who are also certified by NIOSH; these physicians are designated as either "A" or "B" readers depending on their level of certification. Each x-ray is seen by more than one reader, and a consensus scheme is used to reach a final determination for each film. Supplemental information—such as age, mining tenure, and job in the mine—is collected at the time of x-ray examination. CWP is diagnosed by the identification and classification of opacities on the chest radiograph according to the International Labour Offices's UICC/Cincinnati classification scheme (*1*). The classification scheme and the procedure for interpreting x-rays for pneumoconiosis were modified during the 10 years of the surveillance program. NIOSH stores all the x-rays and releases results only with the permission of the individual miner.

Opacities seen in the lung are classified as large or small. In the 1971 classification scheme, small opacities are read as rounded, irregular, or a combination of both. These fall into three grades of abnormality: Category 1—opacities are present but few in number; Category 2—opacities are more profuse, with lung markings partially obscured; Category 3—opacities are very numerous, with the normal lung markings partially or even totally obscured. Large opacities, associated with massive pulmonary fibrosis, are classified by increasing size as A, B, or C. For Rounds 1 and 2 of the CWHSP, miners were eligible for transfer to a low-dust work area if their x-rays were classified as Category 2 or 3—with no restriction on the length of service—or as Category 1—with less than 10 years' service. Since 1978, all miners whose opacities are classified as Category 1 or higher are eligible for transfer, with no restrictions on time of service. Miners are informed by letter of the x-ray results and of their eligibility for transfer.

Results

The pattern of participation during the three rounds reflects changes in the coal-mine labor force during that time. In 1970, the underground mine labor force was estimated at 120,000; it increased to 159,000 in the mid 1970s and then leveled off at 150,000 in 1980. Round 1 of the CWHSP had 77,758 participants; Round 2, 122,625; and Round 3, 63,519. Of the more than 200,000 individual miners who participated, only 10,700 participated in both Rounds 1 and 3. Table 1 presents a distribution of tenure for the 3 rounds. Round 2 had the highest proportion of participants in the 0- to 4-year year tenure group; this was during a period when large numbers of new miners were entering the industry, and the work force was increasing.

Age distribution of participating miners also reflects this trend: 37% of Round 1 miners were < 30 years of age, compared with 58% at Round 2 and 49% at Round 3. The highest percentage of miners (49%) fell into the 30- to 50-year age group in Round 1, compared with 31% in Round 2 and 40% in Round 3.

The regional distribution of miners in the surveillance programs also reflects general trends in the mining industry. In each round, the largest percentage was from Appalachia: 92% in Round 1, decreasing to 82% in Round 3. The percentage of participants from the West has been increasing, from 2% in Round 1 to 10% in Round 3. Percentages of participants from the Midwest remained stable.

From 1970 to 1980, a total of 9,800 miners were eligible for transfer to low-dust work areas. At Round 1, 4,100 were eligible, 2,800 at Round 2, and 2,900 at Round 3. During this 10-year period, about 1,700 (18%) of these miners actually transferred. By 1980, only 500 of the miners who had transferred to low-dust environments were still employed in mining (*2*). This indicates that a large number of miners who had exercised the transfer option based on eligibility from the earlier rounds had since left the industry.

TABLE 1. Percentage distribution of participants in Rounds 1, 2, and 3, by tenure group, 1970-1981

Years in mining	Round 1	Round 2	Round 3
0-4	42.1	68.7	51.9
5-9	9.8	11.4	24.8
10-19	13.1	7.5	12.9
20-29	18.4	6.5	4.6
30+	16.6	5.9	5.8

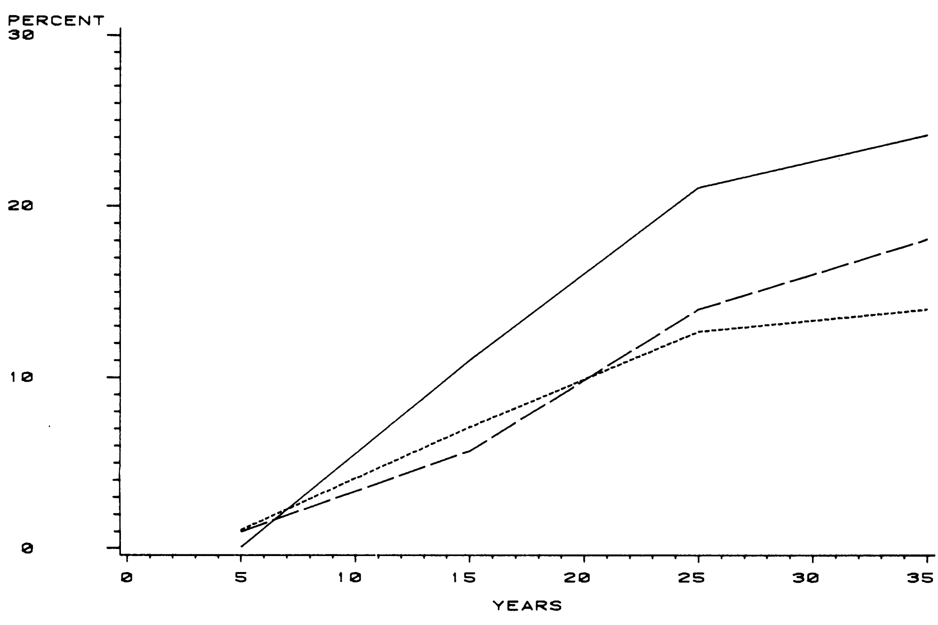
The prevalence of CWP, Category 1, by years in mining, is shown in Figure 1. Within each round, the prevalence of Category 1 CWP increased with tenure. The highest overall prevalence was seen in Round 2—29% at 35 years' experience—compared with 23% for Round 1 and 17% for Round 3. The prevalence of CWP, Category 2 or higher (Figure 2), followed a similar pattern of increasing prevalence with tenure. Overall prevalence values, however, decreased from Round 1 through Round 3. The prevalences increased sharply in the > 20-year tenure group. The pattern of increasing prevalence with tenure is similar to findings reported in other studies (*3*).

Participation of working miners (those who do not have chest radiographs as new employees) has been steadily decreasing over the 3 rounds. Participation during Round 1 was 50%; this fell to 44% for Round 2 and to 32% for Round 3. Information on tenure and age indicated that almost half the participants at each round were new to mining; by contrast, < 13% of participants in Round 2 and 11% in Round 3 had over 20 years' experience. This finding suggests that miners tend to participate initially because they are required to as new employees but do not continue participating in the program.

Discussion

These data should be interpreted with caution. First, the low participation level may introduce a selection bias (*4*). During the 10 years of this program, the mine labor force was increasing, and attrition probably took place among the older, more experienced miners. This fact, combined with the short time period, may lead to low estimates of CWP prevalance. Second, due to changes in the x-ray classification scheme and the procedures for interpreting x-rays during the study period, data from round to round are not strictly comparable. In addition, miners participating during each round are not necessarily representative of all working

FIGURE 1. Prevalence of CWP Category 1, by round and years underground, 1970-1981



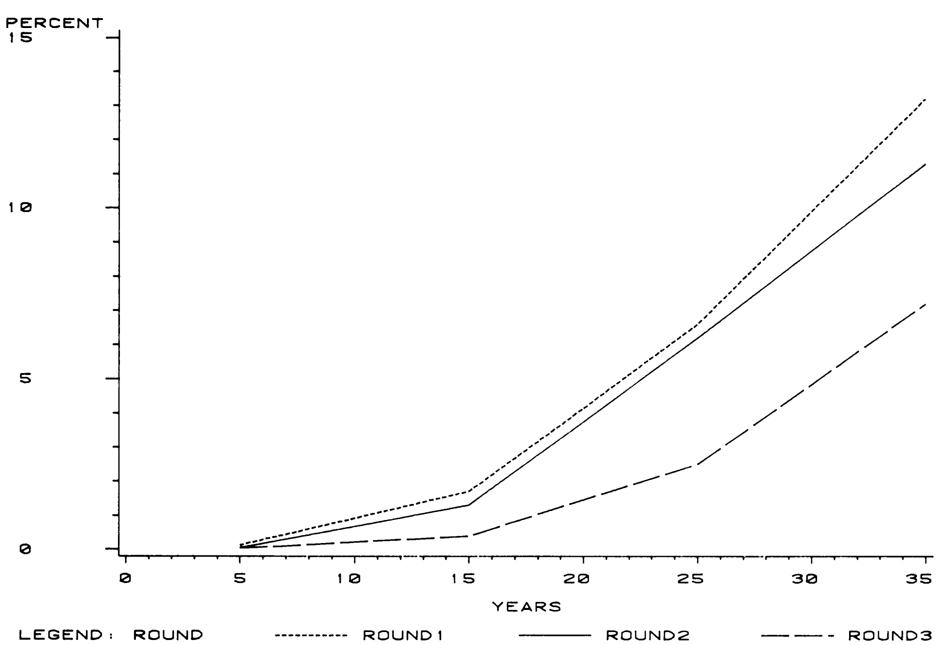
miners. Thus, decreases in the prevalence of Category 2 CWP or higher during the rounds do not necessarily imply success in dust-control methods. A previously reported study of miners who had worked only under the mandated standard indicated, however, that levels of CWP incidence are consistent with predicted levels based on British research when dust standards have been conrolled at 2 mg/m^3 (*5*).

Since only a small percentage of the miners eligible for transfer actually exercise their option to move to a low-dust job, it is difficult at this time to assess the extent to which the program is effective in protecting workers' health. And, because miners do not participate consistently, epidemiologic evaluation over time to determine progression and incidence of CWP is also difficult.

The addition of data from Round 4 will provide pertinent information with which to evaluate the effectiveness of the surveillance program: 1) A longer follow-up period from initial x-ray will have elapsed—up to 15 years for some miners; 2) Repeated participation at Round 4 for those miners new to mining at Round 1 and/or Round 2 will provide a large group of miners who have worked only under mandated dust standards.

Informally reported information suggests that the low level of participation in CWHSP reflects a lack of knowledge within the mining community about the program and its purposes. NIOSH is actively involved in overcoming this problem by promoting informational and educational activities. With a fair degree of success in this promotion effort, the surveillance program can more fully meet its objectives.

FIGURE 2. Prevalence of CWP Category 2 or higher, by round and years underground, 1970-1981



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