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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.

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 1970-1980)
Congenital malformations	Birth Defects Branch Chronic Diseases Division Center for Environmental Health	1985 (SS 34/2) (data from 1970-1983)
Dengue	Dengue Branch Division of Vector-Borne Viral Diseases Center for Infectious Diseases	1985 (SS 34/2) (data from 1983-1984)
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)
Ectopic pregnancy	Pregnancy Epidemiology Branch Division of Reproductive Health Center for Health Promotion and Education	1984 (SS 33/2) (data from 1979-1980)

*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*
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)
Leptospirosis	Bacterial Zoonoses Activity Division of Bacterial Diseases Center for Infectious Diseases	Aug 1979 (1978 data)

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Surveillance Programs
Centers for Disease Control

Surveillance program	Responsible branch	Most recent report/summary*
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 hazard surveillance	Surveillance Branch Division of Surveillance, Hazard Evaluations, and Field Studies National Inst. for Occup. Safety & Hlth.	1985 (SS 34/2) (data from 1970-1983)
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	1985 (SS 34/2) (1984 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)
Salmonella	Enteric Diseases Branch Division of Bacterial Diseases Center for Infectious Diseases	Dec 1982 (1980 data)

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Surveillance Programs
Centers for Disease Control

Surveillance program	Responsible branch	Most recent report/summary*
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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Temporal Trends in the Incidence of Malformation in the United States, Selected Years, 1970-71, 1982-83

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The Birth Defects Monitoring Program, or BDMP, is a national program to monitor and analyze hospital discharge data on newborns for birth defects and other conditions (*1*). The BDMP was initiated at the Centers for Disease Control in December 1974. Data used in this program are derived from information sent by participant hospitals to the Commission on Professional and Hospital Activities (CPHA) as part of its ongoing health-data processing system. Discharge abstracts are coded by hospital medical records department staff and submitted regularly to CPHA for processing. CPHA provides a subset of these data to CDC. Included are abstracts on all liveborn and stillborn infants delivered in each participant CPHA hospital. Approximately 1,000 hospitals, most of which are mid-sized community hospitals, have granted use of their data.

Though this data source is not population-based and not a random sample of U.S. births, it nevertheless represents the largest single set of uniformly collected and coded discharge data on birth defects among newborns in the United States. From 1970 through 1983 over 13 million births were monitored. Over 800,000, or about 22% of U.S. births, were monitored during 1983. The data are reviewed four times a year, and the defects are usually reported 3-6 months after birth. A total of 161 defect categories are analyzed to identify increases or unusual trends.

While the BDMP functions primarily as an early warning system, it can also be useful for correlating incidence patterns with other trends, such as the temporal and geographical distribution of drugs, chemicals and other possible human teratogens.

Data on the incidence trends of 33 selected malformations were examined for the period 1970-1983. These malformations were selected because they 1) occur in sufficient numbers to provide relatively stable rates, 2) affect different organ systems, and 3) are of sufficient severity or frequency to be of public health concern.

U.S. incidence data on these malformations for 1970-1971 and 1982-1983 were compared. For each defect, the geometric mean of the annual percent rate change was computed for the 12 years between the midpoints of these two periods.

These malformations are grouped into three categories: increasing, decreasing, and stable (rates that have changed less than 2% per year). Rates of 11 of these selected malformations increased at an average of 2% or more per year; five decreased 2% or more per year; and 17 remained stable.

Noteworthy among the increases is the continuing rise in the rates of ventricular septal defects and patent ductus arteriosus (Table 1). The reasons for these increases are unknown but could be attributed to better ascertainment of these diseases. Among the decreasing rates are those for Rh hemolytic disease and for anencephaly and spina bifida. Rh hemolytic disease incidence has substantially decreased because more women are receiving appropriate postpartum treatment and also because average parity has been decreasing (Table 2). The decrease in anencephaly and spina bifida rates—two of the most common and serious environmentally-caused birth defects—is unexplained and does not appear to be due to

prenatal diagnosis (*2*). Among rates that have remained unchanged over the last 14 years are those of several major malformations such as the orofacial clefts and Down syndrome (Table 3).

It is important to note that birth defects remain a major cause of infant morbidity and mortality in the United States. Birth defects can lead to lifelong handicaps and are the leading cause of infant mortality. Data from CDC show that the incidence of most types of birth defects has remained substantially unchanged or has increased during the last ten years, suggesting that very little is known about the causes and prevention of birth defects.

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2. Windham GC, Edmonds LD. Current trends in the incidence of neural tube defects. Pediatrics 1982;70:333-7.

TABLE 1. Malformations with increased rates, Birth Defects Monitoring Program, United States, 1970-1971 and 1982-1983

Malformation	Cases		Rates*		Mean annual percentage change
	1970-1971	1982-1983	1970-1971	1982-1983	
Congenital cataract	110	153	0.64	0.97	+3.5
Tetralogy of fallot	99	145	0.57	0.92	+4.4
Ventricular septal defect	770	2,411	4.45	15.23	+10.8
Valve stenosis and atresia	217	434	1.25	2.74	+6.8
Patent ductus arteriosus	686	4,355	3.96	7.50	+17.5
Coarctation of aorta	72	95	0.42	0.60	+3.0
Congenital ureteral obstruction	187	301	1.08	1.90	+4.8
Hypospadias	3,565	4,471	20.60	28.23	+2.7
Renal agenesis	123	278	0.71	1.76	+7.9
Congenital hip dislocation w/o CNS	1,382	4,579	7.99	8.92	+11.3
Autosomal abnormality excluding Down syndrome	197	322	1.14	2.03	+4.9

*Cases/10,000 total births.

TABLE 2. Malformations with decreased rates, Birth Defects Monitoring Program, United States, 1970-1971 and 1982-1983

Malformation	Cases		Rates*		Mean annual percentage change
	1970-1971	1982-1983	1970-1971	1982-1983	
Anencephaly	949	498	5.48	3.14	-4.5
Spina bifida w/o anencephaly	1,306	757	7.55	4.78	-3.7
Anophthalmos	74	38	0.43	0.24	-4.7
Congenital rubella	62	28	0.36	0.18	-5.6
Rh hemolytic newborn disease	7,315	2,474	42.28	15.62	-8.0

*Cases/10,000 total births.

TABLE 3. Malformations with stable rates, Birth Defects Monitoring Program, United States, 1970-1971 and 1982-1983

Malformation	Cases		Rates*		Mean annual percentage change
	1970-1971	1982-1983	1970-1971	1982-1983	
Hydrocephalus w o spina bifida	833	896	4.81	5.66	+1.4
Encephalocele	208	178	1.20	1.12	-0.6
Total CNS	3,803	3,001	21.98	18.95	-1.2
Microphthalmos	94	96	0.54	0.61	+1.0
Aorta pulmonary defect persistent truncus	49	36	0.28	0.23	-1.6
Atrial septal defect	331	269	1.91	1.70	-1.0
Transposition of great arteries	131	149	0.76	0.94	+1.8
Cleft palate w o cleft lip	873	820	5.05	5.18	+0.2
Cleft palate with cleft lip	1,073	925	6.20	5.84	-0.5
Cleft lip with or w o cleft palate	1,715	1,433	9.91	9.05	-0.8
Tracheo-esophageal fistula	289	284	1.67	1.79	+0.6
Rectal atresia and stenosis	648	502	3.75	3.17	-1.4
Cystic kidney disease	200	206	1.16	1.30	+1.0
Bladder extrophy	60	46	0.35	0.29	-1.6
Clubfoot w o CNS defects	4,756	4,055	27.49	25.61	-0.6
Reduction deformity	547	584	3.16	3.69	+1.3
Down syndrome	1,413	1,279	8.17	8.08	-0.1

*Cases 10,000 total births.

Dengue in the United States, 1983-1984

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Introduction

Dengue is an illness that is caused by a virus with four distinct serotypes. It is usually self-limited, acute, and of short duration; classical symptoms include fever, vomiting, myalgia, headache, severe retro-orbital pain, and lower back pain. Infrequent complications include dengue hemorrhagic fever and dengue shock syndrome. There is no specific antiviral therapy for dengue, but symptoms can be treated for both classical dengue and dengue hemorrhagic fever, and supportive measures are effective.

Dengue types 2 and 3 have been present in the Caribbean Basin since at least the 1940s (*1*). Dengue type 1 was first recognized there during an outbreak in Jamaica in 1977; this outbreak was followed by a pandemic that eventually involved most countries of the region (*2*). Dengue type 4 was recognized for the first time in the western hemisphere in 1981, when two travelers from the United States became ill after returning home from the island of St. Barthelemy. According to health authorities, an outbreak of dengue-like illness had been occurring there for several months (*3*). An epidemic of dengue hemorrhagic fever, caused by dengue 2, occurred in Cuba in the summer of 1981, with over 10,000 severe hemorrhagic fever cases and 158 deaths (*4*). Currently, dengue serotypes 1, 2, and 4 are active and widespread in the Caribbean Basin.

Methods

Dengue surveillance in the United States is passive and, as such, depends upon the state health departments to report suspected cases to CDC. Reporting is done on the CDC surveillance form, which is sent to the Centers with single or paired blood samples for serologic and/or virologic confirmation. Similarly, surveillance in the Caribbean region depends on physicians' and health authorities' recognizing and reporting suspected cases and sending blood samples for testing. As a result, the number of suspected cases reported is probably an underestimate of the actual number of cases. Furthermore, only single serum samples are received for many of the suspected cases, making serologic confirmation difficult.

In addition to routine case reporting and serologic testing, surveillance in Puerto Rico includes an active virologic system that depends on collection of acute phase blood samples from viral syndrome patients. This system is designed to monitor the virus serotype(s) transmitted on the island and to detect the introduction of new viruses with as little delay as possible.

In this report, cases specified as confirmed have been documented as dengue serologically and/or virologically.

Results

In 1983 and 1984, there was less epidemic dengue activity in Caribbean Basin countries than there had been in 1981 and 1982. Epidemics were reported from Colombia, El Salvador, Mexico, Haiti, and Trinidad in 1983 and from Mexico and the Dominican Republic in 1984. Dengue 4 was still the predominant virus serotype in the region in 1983, but in 1984, dengue 1 and 2 activity increased again.

In Puerto Rico, following epidemics of dengue 1 in 1981 and dengue 4 in 1982, 1983 and 1984 were periods of low-level sporadic or silent dengue transmission. Cases of suspected

dengue were reported throughout the year in both 1983 and 1984, with more cases occurring from November to February (Figure 1). However, few cases were actually confirmed as dengue infection, suggesting that the increases during the cool winter months were due to influenza or other seasonal infections. In 1983, only 10 (5.1%) of 196 patients who had suitable specimens taken were confirmed as having dengue (Table 1). These patients represented five of the eight regions on the island and had onset of illness between February and September. Only one virus (dengue 4) was isolated in 1983; this was from a patient from Villalba, a small inland community in the Ponce region. No cases of dengue were confirmed in the U.S. Virgin

FIGURE 1. Suspect cases of dengue reported, by month, Puerto Rico, 1983-1984

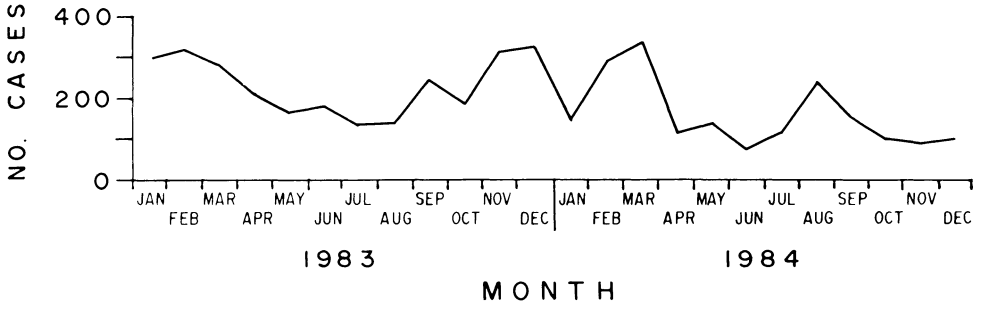

TABLE 1. Confirmed dengue cases, Puerto Rico, 1983

Region	Municipality	Onset date	Confirmation	
			Virus isolation	Serology
San Juan	San Juan	February, 1983	No	Primary
Ponce	Villalba	February, 1983	DEN 4	Not done
		March, 1983	No	Secondary
Arecibo	Camuy	March, 1983	No	Primary
Bayamon	Barranquitas	June, 1983	No	Primary
Mayaguez	Mayaguez	July, 1983	No	Secondary
	Hatillo	August, 1983	No	Primary
	Naranjito	August, 1983	No	Primary
	Cabo Rojo	September, 1983	No	Primary
	Utuado	September, 1983	No	Secondary

TABLE 2. Confirmed dengue cases, Puerto Rico and U.S. Virgin Islands, 1984

Region	Municipality	Onset date	Confirmation	
			Virus isolation	Serology
San Juan	Carolina	May, 1984	DEN 2	Secondary
	San Juan	August, 1984	-	Primary
	San Juan	November, 1984	DEN 1	-
Ponce	Ponce	July, 1984	DEN 1	Primary
	Ponce	August, 1984	-	Primary
Arecibo	Utuado	October, 1984	-	Primary
U.S. Virgin Islands	St. Croix	June, 1984	DEN 1	-
	St. Thomas	August, 1984	DEN 1	-
	St. Thomas	November, 1984	DEN 1	-

Islands in 1983. In 1984, nine (2.7%) of 334 cases were confirmed as dengue infection, six in Puerto Rico and three in the U.S. Virgin Islands (Table 2). As in 1983, confirmed dengue infections were geographically widespread, but most cases occurred in the last 6 months of the year.

It was of interest that no evidence of dengue 4 transmission was observed. All cases identified serologically were compatible with dengue 1 infection, and this serotype was isolated from patients in Puerto Rico from Ponce on the south coast and San Juan in the north. In addition, dengue 1 was isolated from three patients from the U.S. Virgin Islands, one from St. Croix and two from St. Thomas. It is also of interest that it was this virus serotype that caused the large epidemic in Aruba, Netherlands Antilles, in December, 1984. There were two deaths associated with that epidemic; dengue 1 virus was isolated from one of the patients.

Dengue 2 was apparently introduced into Puerto Rico in 1984. Travel history of the patient, detected in the virologic surveillance program, suggested that infection occurred in Haiti, where transmission of this serotype was subsequently confirmed. Mosquito control was initiated immediately in the San Juan area where the patient was living, and surveillance suggested that little or no secondary transmission occurred, since no other cases of dengue 2 were detected.

The clinical illness associated with confirmed dengue infection in 1983 and 1984 was generally mild and of the classical type. None of the patients had hemorrhagic manifestations and, in contrast to 1982, there were no fatal dengue infections during this time in Puerto Rico.

Imported dengue continues to be a potential threat in the United States, although the numbers of reported cases were considerably lower in 1983 and 1984 than in previous years. This decrease was directly related to the amount of dengue transmission occurring in tropical areas where people vacation. There were 107 imported cases reported from 26 states in 1983 and 63 cases from 29 states in 1984 (Table 3). The travel history of persons with suspected dengue included most parts of Asia, the Pacific and Caribbean islands, Central and South America, and Africa. During 1983 and 1984, 32 imported cases in 15 states were confirmed as dengue fever. Only three confirmed cases were imported into southern states where *Aedes aegypti*, the principal vector of dengue is still found. Most of the rest occurred in the eastern half of the United States where another potential vector, *Aedes triseriatus*, is common. All four dengue virus serotypes (dengue 1, 2, 3, and 4) were imported during this period.

Conclusion

The years reported here (1983 and 1984) were periods of low epidemic activity in Caribbean Basin countries, and this is reflected in the lower number of dengue fever cases imported into the United States. However, this decreased activity is considered to be temporary, and if the trend of the past 15 years continues, renewed epidemic activity can be expected. The result would be increased incidence of disease and increased numbers of dengue fever cases imported into the United States. Because *Aedes aegypti* is still prevalent in the southern United States, there is a potential for secondary dengue transmission in that area such as occurred in 1980 (*5*). This potential for increased dengue activity underscores the need for improved surveillance and more effective mosquito control, especially in the southern part of the United States.

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TABLE 3. Suspected dengue cases imported into United States, 1983-1984

State	Number of cases reported 1983	1984	Number of cases confirmed 1983	1984	Probable origin of infection
Alabama*	4	5	-	-	
Arizona	3	1	1	-	Tahiti
Arkansas	-	1	-	-	
California	5	2	3	1	Tahiti, Philippines, Mexico
Colorado	5	1	2	-	India, Philippines
D.C.	11	-	2	-	Jamaica, Antigua, Guyana, Haiti
Connecticut	-	1	-	-	
Florida*	1	1	-	-	
Georgia*	2	2	-	-	
Hawaii*	-	1	-	-	
Iowa	1	-	-	-	
Idaho	1	-	-	-	
Illinois	6	2	2	-	India, Mexico
Indiana	1	1	-	-	
Kansas	3	-	1	-	Haiti
Kentucky	-	1	-	-	
Louisiana	-	1	-	-	
Massachusetts	9	3	2	-	Jamaica, Haiti
Maine	1	1	-	-	
Michigan	7	2	1	-	Yeman
Minnesota	5	2	2	-	Colombia, Haiti
Mississippi*	1	-	-	-	
Missouri	-	2	-	1	Haiti
New Jersey	1	2	1	-	India
New Mexico	-	2	-	-	
New York	20	11	5	1	Jamaica, Haiti, India
Ohio	1	-	-	-	
Oklahoma	-	1	-	-	
Oregon	-	1	-	-	
Pennsylvania	3	1	-	-	
South Carolina	1	-	-	-	
Tennessee*	4	4	2	1	Haiti, Southeast Asia
Texas*	2	2	-	-	
Utah	-	1	-	-	
Vermont	-	1	-	-	
Virginia	7	3	2	-	Tahiti, Unknown
Wisconsin	2	4	1	1	Mexico
Total	**107**	**63**	**27**	**5**	

*States where *Aedes aegypti* occurs at least part of the year.

Plague in the United States, 1984

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Introduction

Bubonic plague is a flea-transmitted disease of rodents transmissible to humans (and other mammalian species) by vector fleas or by direct-contact contamination from infected animals. Humans and mammals other than rodents become infected by chance and are not involved in the plague maintenance cycle; however, they can and often do play an intermediary epidemiologic role. For example, domestic pets may serve as a bridge for infection between rodents and humans, either by transporting infective fleas into the home environment (both dogs and cats) or by direct-contact contamination from a severely ill pet (especially cats; dogs usually do not become clinically ill when infected).

Human cases are relatively rare in the United States, but numbers have increased substantially during the past decade, and averaged approximately 20/year in the period 1975-1984. The fatality rate has remained high (18% of all reported cases), despite the availability of effective antibiotic therapy. In enzootic plague areas, health-care providers could probably reduce this fatality rate by treating patients promptly on strong suspicion of exposure to plague rather than basing treatment on laboratory confirmation of infection (*1*). Although plague is known to occur in rodents and fleas in 15 western states, human cases are most prevalent in the Southwest (Arizona, southern Colorado, and New Mexico) and the Pacific states (California and southern Oregon) (*2*). In the past decade, humans who have contracted plague have ranged in age from 1 week to 79 years, but most patients have been children and adolescents < 20 years of age. The case-fatality rate is highest for persons > 55 years of age. Diagnosis of and therapy for plague, its clinical course, epidemiology, and ecology have been discussed in detail elsewhere (*3*), and 1983 cases have been summarized by Barnes and Poland (2).

Methods

As required by international health regulations (*5*), all human plague cases are reportable internationally as well as at the local, state, and federal levels. All cases reported in the United States are confirmed at CDC. An active surveillance program is conducted by CDC in collaboration with state and other federal agencies in the western states (*3*). Serologic surveys of rodents, wild carnivores, and domestic dogs are a major component of the program, which is designed to detect plague and to provide a basis for implementing control programs to prevent human exposure. Criteria used to classify reported cases—as well as the surveys, strategies, and methods used—are described in a recent *Surveillance Summary* (*1*).

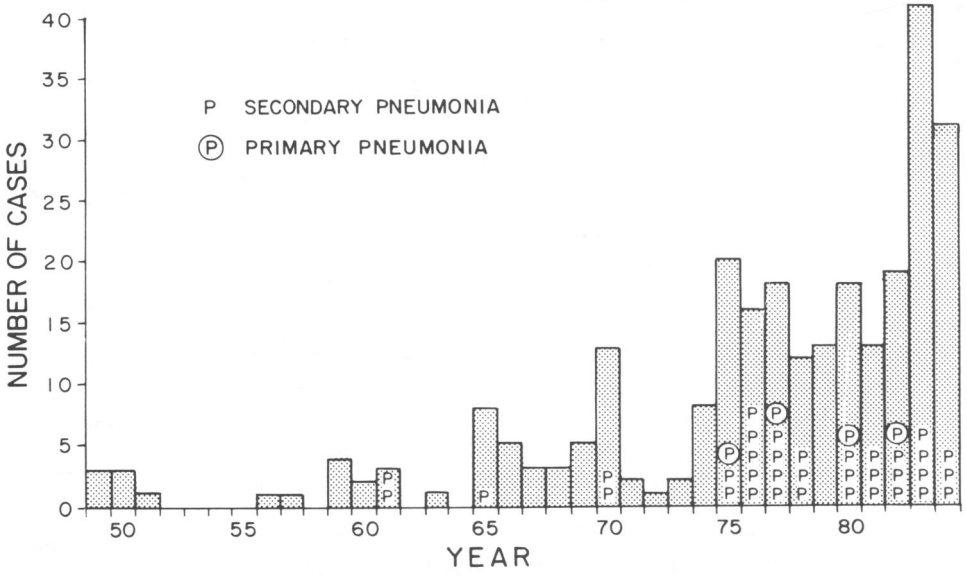
Results

Thirty-one human plague cases were reported from the United States in 1984, reflecting a continued sharp increase in human involvement with this rodent/flea disease, which began in 1983. Forty cases were reported that year, whereas 200 cases occurred in the period 1975-1984 (Figure 1).

Epidemiologic features of 1984 human cases are summarized in Table 1. Six (19%) of the 31 cases were fatal: two of the patients who died were < 20 years of age, three were in their 20s, and one was 65 years old. Patients ranged in age from 1 to 70 years of age, but, as in previous years, younger people were most often involved—with 10 (32%) of the patients being in the 1- to 19-year age group. The sexes were not equally represented: 23 (74%) were male; only eight (26%) were female. Four of the 31 patients had primary plague septicemia on initial examination; 27 of these persons had bubonic plague. Three patients developed secondary plague pneumonia.

As shown in Figure 2, human plague cases in 1984 were reported from 20 counties in six states. Evidence of animal plague was detected in 10 states by local, state, and federal agencies and CDC, either by isolation of *Yersinia pestis* from flea pools or animal tissues or by detection of antibodies in animal serum submitted by collaborators. Four cases occurred in counties that had never before reported human plague: Saguache County, Colorado; Winkler County, Texas; Garfield County, Utah; and Yakima County, Washington. The Yakima County, Washington, case was the first reported from that state since 1913 and the first to occur in the state outside the Seattle-King County area. The Winkler County, Texas, case is only the second indigenous Texas case acquired from a wild animal source; the first was reported from adjacent Ector County in 1982 (*1*). In California, six cases were reported from five counties: Los Angeles (2 cases), Kern (1), Monterey (1), Tulare (1), and Tuolumne (1). One of the Los Angeles County patients was an occupationally exposed veterinarian; the other, another veterinarian's wife, was not apparently infected in association with her husband's practice. The Kern County patient was hospitalized in Los Angeles and developed secondary plague pneumonia. After a 29-day hospital course, he died; death apparently resulted from sequelae of pulmonary damage rather than from persistent plague infection. The six California cases are the largest total of cases to be reported in that state since 1924 (*6*).

FIGURE 1. Incidence of human plague and plague pneumonia, United States, 1949-1984



Of three cases in Colorado, two occurred in areas on the eastern slope of the Rocky Mountains in El Paso and Jefferson Counties; the other was located on the western slope in Saguache County. The El Paso County patient was a 14-month-old child living at the U.S. Air Force Academy. All three Colorado cases were believed to have been transmitted by flea bite,

TABLE 1. Epidemiological features of human plague cases in the United States, 1984

Case number	Date of onset	Age/sex	Race	Course	State/county	Presumed mode of infection and source
1	01/11	30 M	C	B	WA, Yakima	DC/bobcat
2	01/16	48 M	C	B	TX, Winkler	DC/rabbit
3	03/23	11 M	AI	B	NM, McKinley	DC/cat
4	03/30	35 M	C	B,P,M	CA, Los Angeles	DC/cat
5	04/08	46 F	AI	B	UT, San Juan	FB/prairie dog
6	04/28	36 M	C	B	NM, Santa Fe	Undetermined/ undetermined
7*	05/03	24 M	C	BP	CA, Kern	DC/cat
8*	05/18	29 M	AI	B	AZ, Apache	FB/rock squirrel
9	05/21	37 F	C	B	NM, Rio Arriba	FB/rock squirrel
10†	05/20	35 F	C	B	CA, Los Angeles	FB/Calif. gr. sq.
11	05/28	40 M	C	B,S	NM, Sandoval	FB/rock squirrel
12	06/15	43 M	C	S	NM, Santa Fe	FB/rock squirrel
13	06/17	13 M	C	B	CA, Tulare	FB/squirrel
14*	06/22	18 M	C	B	UT, Garfield	DC/squirrel
15	06/27	61 F	C	B	NM, Rio Arriba	FB/undetermined
16	07/09	13 M	C	S	CA, Tuolumne	FB/squirrel
17*	07/30	70 M	C	S	NM, Santa Fe	FB rock squirrel
18	07/26	13 M	C	B,M	NM, Lincoln	FB rabbit
19	08/19	17 M	C	B	NM, San Miguel	FB/undetermined
20	08/21	32 M	C	B	NM, Rio Arriba	FB undetermined
21	08/31	12 F	C	B	NM, Bernalillo	FB rock squirrel
22*	08/29	1 F	C	S	CO, El Paso	FB rock squirrel
23	09/08	11 F	C	B	NM, Bernalillo	FB rock squirrel
24	09/11	44 M	AI	B	AZ, Apache	FB rock squirrel
25	07/09	31 M	C	B	CA, Monterey	FB Calif. gr. sq.
26	09/25	56 F	C	B	CO, Jefferson	FB undetermined
27	09/25	70 M	C	B	NM, Bernalillo	FB rock squirrel
28	10/04	30 M	C	B	CO, Saguache	FB rock squirrel
29	10/07	44 M	C	B	NM, Santa Fe	FB rock squirrel
30*	10/10	24 M	C	B,S	NM, Taos	Undetermined undetermined
31	11/08	14 M	C	B	NM, San Miguel	FB rock squirrel

Abbreviations—*RACE*: AI - American Indian, C - Caucasian; *COURSE*: B - bubonic, S - septicemic, M - meningitis, P - secondary pneumonia; *MODE OF INFECTION*: FB - flea bite, DC - direct contact.

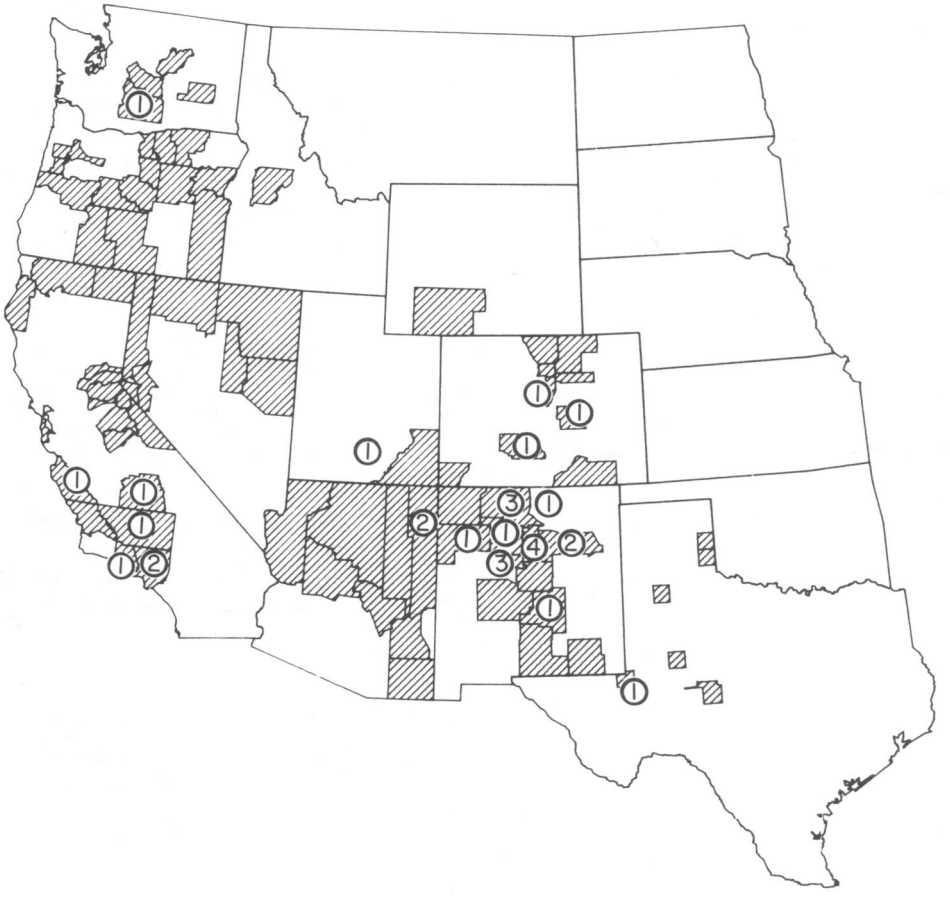
*Fatal.

†Date of hospitalization.

and two are known to have been associated with rock squirrels. The two cases from the eastern slope reflect widespread plague epizootics among rock squirrels and other rodents in the Colorado Front Range.

In 1984, there was a sharp decline in human plague cases on the Navajo Reservation and neighboring areas in northeastern Arizona, northwestern New Mexico, and southern Utah, while numbers of reported plague cases increased in other states and regions (Table 1, Figure 2). Only four cases were reported among Navajos in 1984. In 1983, Arizona reported 10 plague cases from its three northeastern counties (Apache, Navajo, and Coconino, which encompass much of the Navajo Reservation), but in 1984, these counties reported only two

FIGURE 2. Geographic distribution of human and animal plague, United States, 1984



Counties in which animal plague was identified by *Yersinia pestis* isolation and/or presence of antibody in animals.

Numerals in circles represent number of human plague cases in county indicated.

cases. Adjacent McKinley County, New Mexico, reported nine cases in 1983 but only one in 1984. In contrast, north-central New Mexico (Bernalillo, Sandoval, San Miguel, Santa Fe, Rio Arriba, and Taos counties) reported 14 cases in each of the two years.

Serosurveys involving domestic dogs on the Navajo Reservation continued to be a major component of the plague surveillance program in 1983-1984. Collections were concentrated in spring, with most samples being obtained before June 1 (Table 2). In 1983, 1,418 serum specimens from dogs from the Navajo Reservation were tested. Of these, 383 (26.5%) had *Y. pestis* antibody titers of ≥ 32, and 311 (21.9%) had titers of ≥ 128. The geometric mean of positive titers (GMPT) in 1983 was 256. In 1984, 1,168 dog sera were tested; 142 (12.2%) had antibody titers of ≥ 32. Only 55 (3.9%) had titers of ≥ 128, and the GMPT dropped to 84. At the same time, scattered high titers indicated the existence of residual epizootic plague in "hot spots" on the Navajo Reservation.

Discussion

The 31 human cases reported from the United States in 1984 reflect a continuation and apparent geographic expansion of the animal epizootics that resulted in a record 40 human cases in 1983. Human cases were reported from such widely separated places as California, Colorado, Texas, and Washington. Even as epizootic plague and human cases appeared or occurred in increasing numbers in many areas in 1984, plague appeared to have run its course at its 1983-1984 epicenter in the Navajo region of northeastern Arizona, northwestern New

TABLE 2. Results of serological tests for *Yersinia pestis* among domestic dogs, Navajo area, 1983-1984

State/county	Number of serum specimens negative	Number of serum specimens positive at dilution 32	64	128	256	512	≥ 1,024	Total
			1983					
AZ, Apache	327	4	11	15	27	9	15	408
AZ, Coconino	140	0	2	27	16	14	21	220
AZ, Navajo	163	3	17	13	15	9	10	230
NM, McKinley	230	10	22	19	29	25	24	359
NM, Sandoval	13	0	1	1	1	0	0	16
NM, San Juan	136	1	1	4	2	0	12	156
UT, San Juan	26	0	0	1	1	0	1	29
Total	**1,035**	**18**	**54**	**80**	**91**	**57**	**83**	**1418**
			1984					
AZ, Apache	420	20	17	13	8	1	2	481
AZ, Coconino	134	8	9	2	2	0	3	158
AZ, Navajo	78	3	2	3	0	0	0	86
NM, McKinley	296	8	17	10	4	4	1	340
NM, Sandoval	22	0	0	0	0	0	0	22
NM, San Juan	55	0	2	2	0	0	0	59
UT, San Juan	21	1	0	0	0	0	0	22
Total	**1,026**	**40**	**47**	**30**	**14**	**5**	**6**	**1,168**

Mexico, and southernmost Utah. Only four cases were reported from the region in 1984, as compared to 19 in 1983 and nine in 1982, while serologic evidence of plague activity among domestic dogs fell sharply from 21.9% seropositive and a GMPT of 256 in 1983 to 12.2% and a GMPT of 84 in 1984.

In the Upper Rio Grande region of north-central New Mexico, the same number of cases occurred in 1983 and 1984; however, only three were reported in 1982, a year in which the Navajo region reported nine cases. This fluctuating distribution is virtually a trademark of plague in animal populations and, in the western United States, appears to reflect an emergent pattern of movement and periodicity not yet clear or verifiable by history and accumulated surveillance data. Nevertheless, the trend appears to indicate that the present epizootic period is ending and that numbers of cases of both animal and human plague will diminish in 1985. If patterns repeat, the disease can be expected to recrudesce and amplify again in 1988 or 1989.

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Trends of a Decade—A Perspective on Occupational Hazard Surveillance, 1970-1983

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The passage of the Occupational Safety and Health Act of 1970 (OSH Act) resulted in increased concern for the safety and health of workers in the United States. This legislation codified the responsibilities of employers for the safety and health of workers and sought to "assure safe and healthful working conditions" for all working Americans. Since its enactment, standards have replaced guidelines, requirements have replaced recommendations, and research in occupational health and safety has expanded in academia, industry, and government.

Early in 1971, a Hazard and Disease Task Force, formed by the Department of Health, Education, and Welfare, identified a need for more detailed information on the distribution of potential exposures of employees of industries regulated under the OSH Act to chemical and physical hazards. To address this need, the National Institute for Occupational Safety and Health (NIOSH), established by the OSH Act as the principal governmental agency for research in occupational safety and health, has conducted two major national surveys as part of its hazard surveillance program. The first, conducted in 1972-1974, was called the "National Occupational Hazard Survey (NOHS)" (*1*); the second, conducted in 1981-1983, was called the "National Occupational Exposure Survey (NOES)" (*2*). Completed nearly a decade apart, these two surveys permit the analysis of certain trends in patterns of potential exposures and in distribution of in-plant health and safety services and control technology.

Methods

NOHS collected data on a probability sample of 4,636 facilities, distributed among 67 Standard Metropolitan Statistical Areas (SMSA), excluding facilities engaged in agriculture, mining, and government. During the two-year field-investigative phase, 20 engineers surveyed the facilities selected, conducted interviews of management to gather basic information about the business and its occupational health policies, and performed walk-through surveys of the facilities. All possible exposures to specific chemicals, trade-name products, and physical agents observed during the walk-throughs, were recorded as potential exposures. NOHS covered a sample that included 895,725 employees in more than 600 different types of industry (at the 4-digit Standard Industrial Classification [SIC] level) and 453 different occupations. More than 8,000 potential hazards and 86,000 unique trade-name products were identified.

Because the sample was designed to permit extrapolation of the results to the workforce as a whole, it is possible to estimate such information as the total number of workers potentially exposed to a particular hazard, the percentage of those who use personal protective equipment or are protected by other controls, and the percentage who receive periodic medical examinations. It is also possible to identify the hazards associated with particular industries or occupational groups and to estimate the total number of persons potentially exposed in the nation.

By 1979, data from NOHS were becoming progressively outdated and less representative

of the current situation. Since there were no mechanisms to update and supplement the statistics from NOHS, an information need similar to that which characterized the early 1970s was again developing. As a result, planning began for a second such survey, the NOES.

Similar in design to NOHS, NOES had as its objectives to:

1. estimate the number of workers potentially exposed to chemical, physical, and biologic agents
2. describe the nature and extent of exposures to occupational hazards and the degree to which businesses had implemented programs to reduce occupational health problems
3. compile data that, together with similar data from NOHS, would allow analysis of trends in exposures

A probability sample of 4,490 facilities in 98 geographic sampling units was selected for NOES. Field investigations began in November 1980 and continued for 30 months, involving site visits by an average of 15 surveyors who observed processes, administered a questionnaire to plant managers, and recorded potential exposures of all employees. NOES covered a sample that included 1,830,330 employees in 523 different types of industry (identified by SIC Code) and 410 different occupations. More than 10,000 potential hazards and 100,000 unique trade-name products were identified.

Results

Many useful comparisons are possible using the data from these two national surveys. The first such comparison, using answers to selected questions in the management questionnaire, is presented here.

Figures 1 through 6 depict the responses to questions regarding occupational health services, the use of personal protective equipment, and environmental monitoring. These figures are broken down by the size of the business, as determined by the number of employees: small, 8-99 employees; medium, 100-499 employees; large, 500 or more employees.

The results shown in Figures 1 through 4 reveal an increase in the proportion of plants that have 1) an established health unit at the facility (NOHS 14%, NOES 24%), 2) an employee designated to provide emergency medical treatment (NOHS 48%, NOES 57%), 3) at least one nurse on the payroll to provide care for employees (NOHS 8%, NOES 17%), and 4) a requirement that new employees have a medical examination (NOHS 35%, NOES 44%). The percentage of employees covered by these services has also increased.

Figure 5 reveals an upward trend in the proportion of businesses that require or recommend personal protective equipment or devices and in the percentage of employees in plants where such policies exist (NOHS 74%, NOES 85%).

Figure 6 presents a most dramatic result. There was a more than twofold increase in the proportion of plants in which environmental conditions are monitored (NOHS 10%, NOES 28%). This trend was especially prominent for those facilities with small and medium workforces. There are also noteworthy increases in the proportion of employees working in plants with such monitoring practices.

Table 1 presents data on the proportion of facilities in various types of industries (SIC) in which employees were potentially exposed to continuous noise without controls. A general trend toward better control of exposure to noise is evident, with greatest improvements occurring in textile mills, lumber and wood production, paper and allied products, chemicals and allied products, primary metals, miscellaneous manufacturing, and miscellaneous repair services. By contrast, air transportation and auto repair services showed an unexplained *opposite* trend toward worsened noise exposure.

FIGURE 1. Results of NOHS and NOES compared: a formally established health service unit at the facility, by size of facility

FIGURE 1-a. Proportion of facilities with this attribute

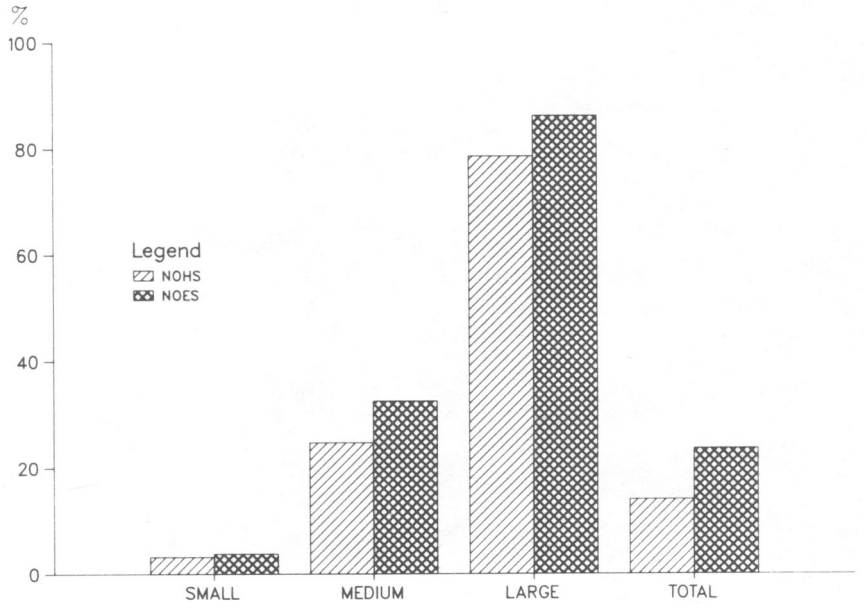

FIGURE 1-b. Proportion of all employees working in facilities with this attribute

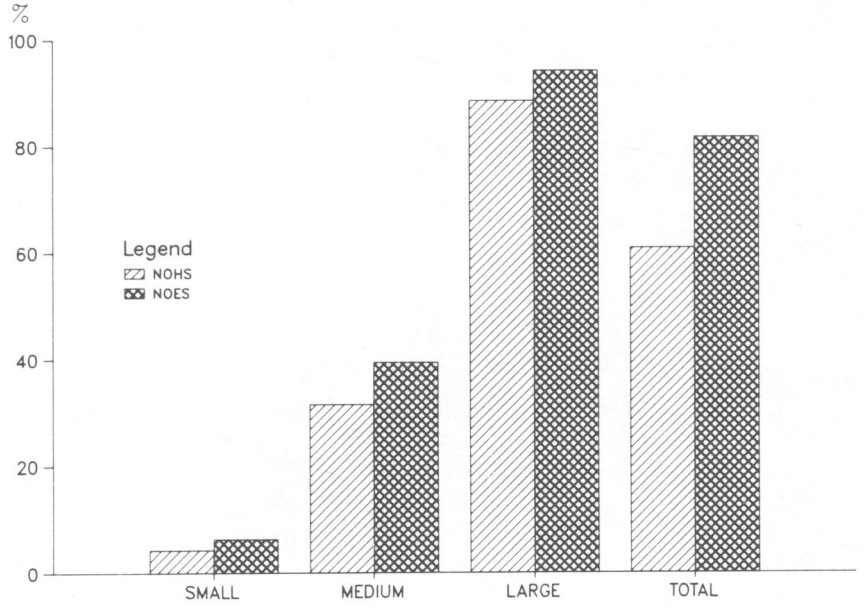

FIGURE 2. Results of NOHS and NOES compared: an employee with formal first-aid training, designated to provide emergency medical treatment at the facility, by size of facility

FIGURE 2-a. Proportion of facilities with this attribute

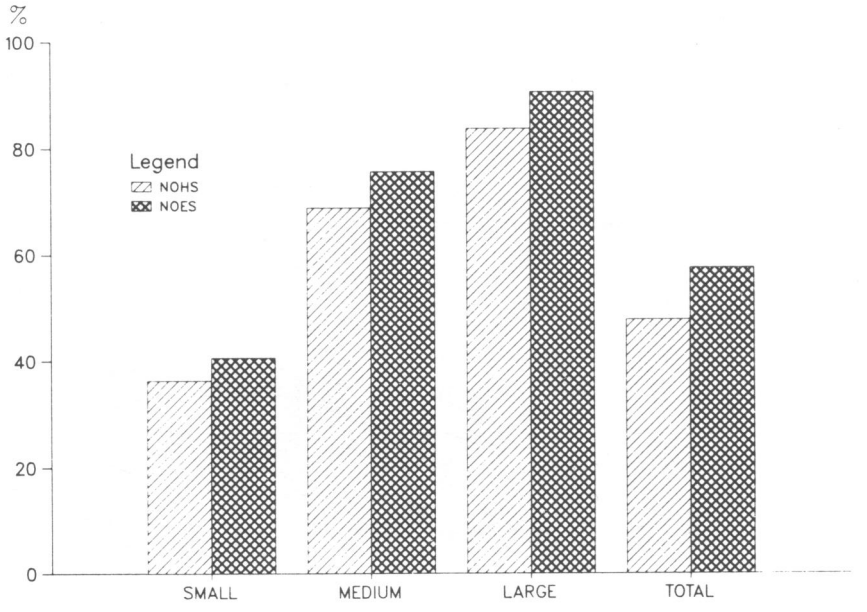

FIGURE 2-b. Proportion of employees working in facilities with this attribute

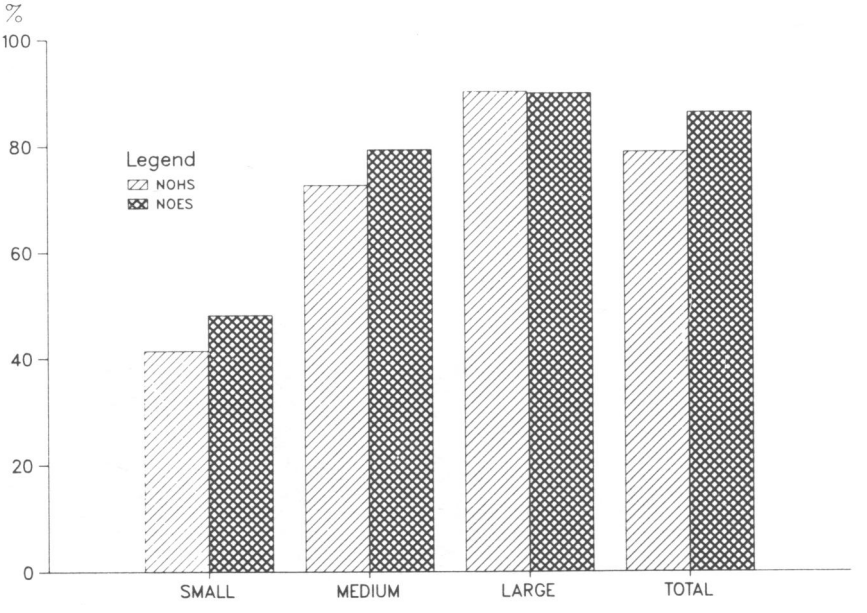

FIGURE 3 Results of NOHS and NOES compared: one or more nurses on the payroll to provide care for employees, by size of facility

FIGURE 3-a. Proportion of facilities with this attribute

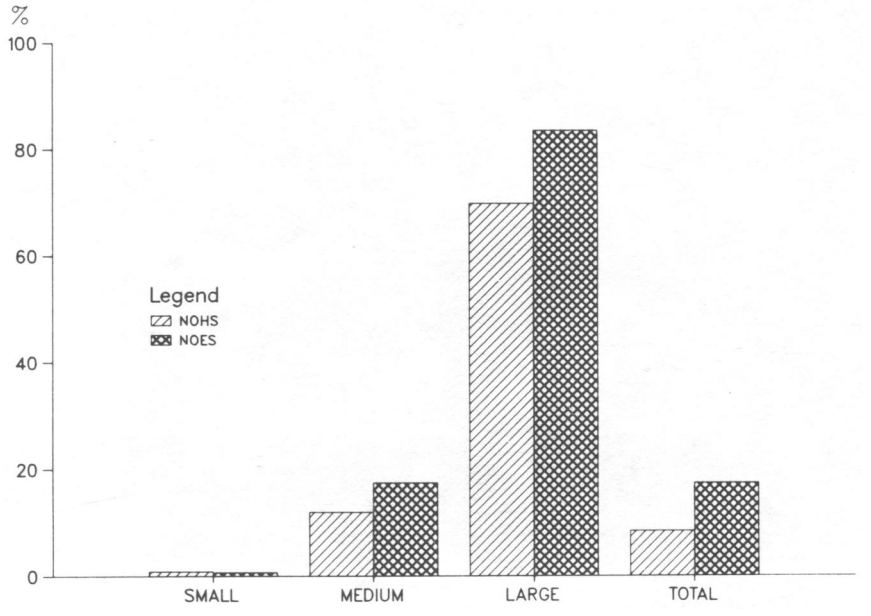

FIGURE 3-b. Proportion of total employees working in facilities with this attribute

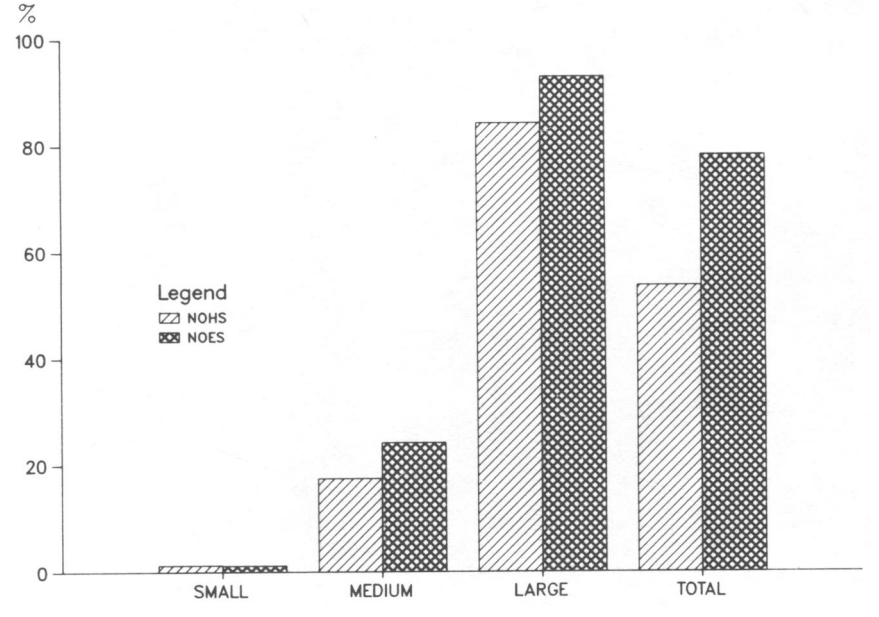

FIGURE 4. Results of NOHS and NOES compared: policy that requires new employees to take a medical examination before being hired or placed; by size of facility

FIGURE 4-a. Proportion of facilities with this attribute

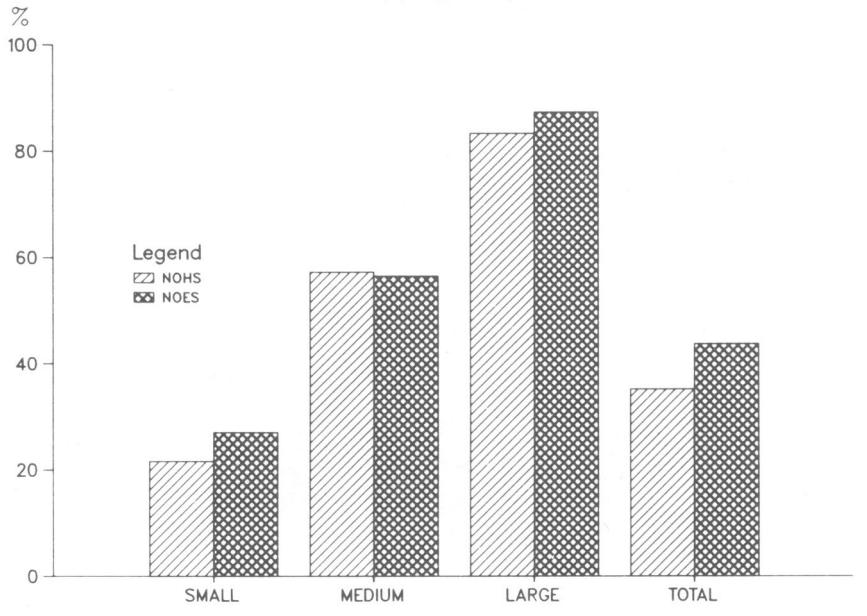

FIGURE 4-b. Proportion of employees working in facilities with this attribute

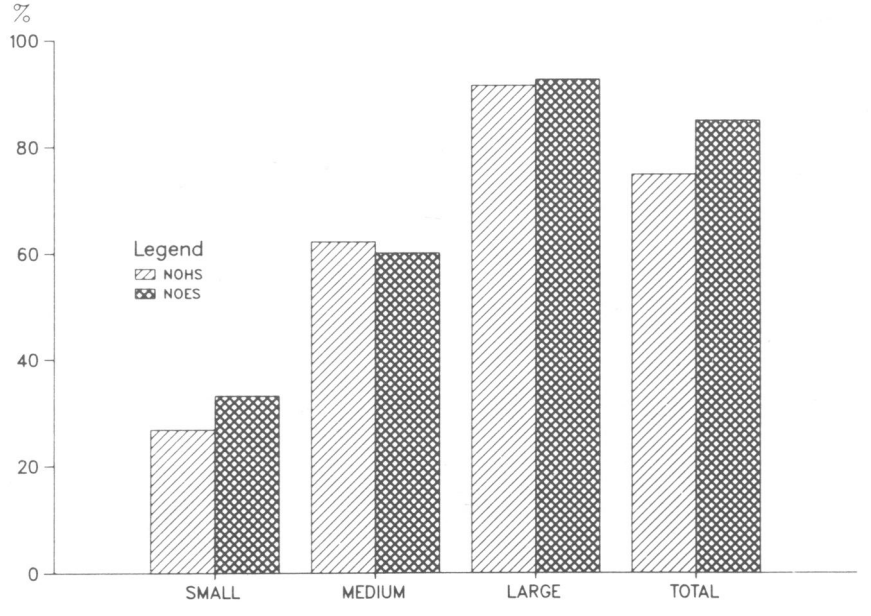

FIGURE 5. Results of NOSH and NOES compared: policy that requires or recommends use of personal protective devices, by size of facility

FIGURE 5-a. Proportion of facilities with this attribute

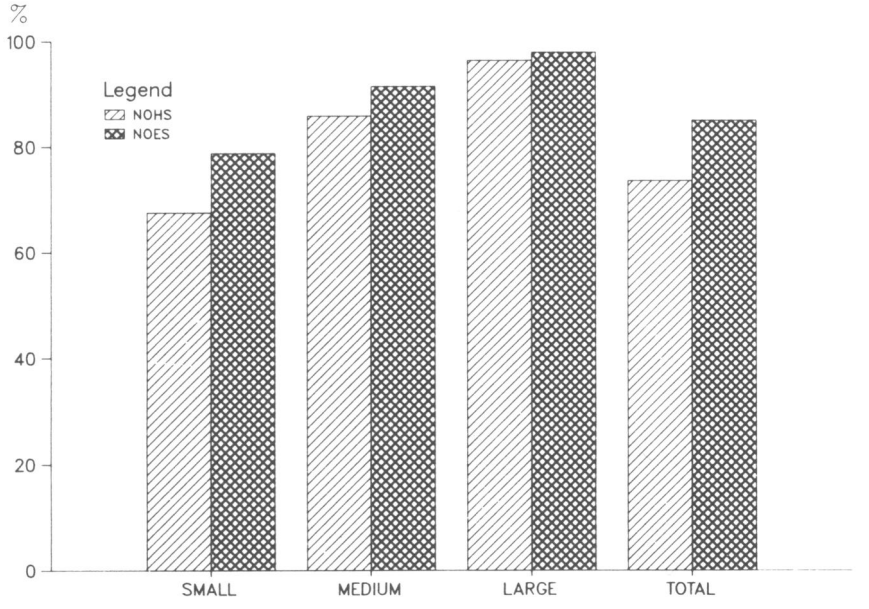

FIGURE 5-b. Proportion of employees working in facilities with this attribute

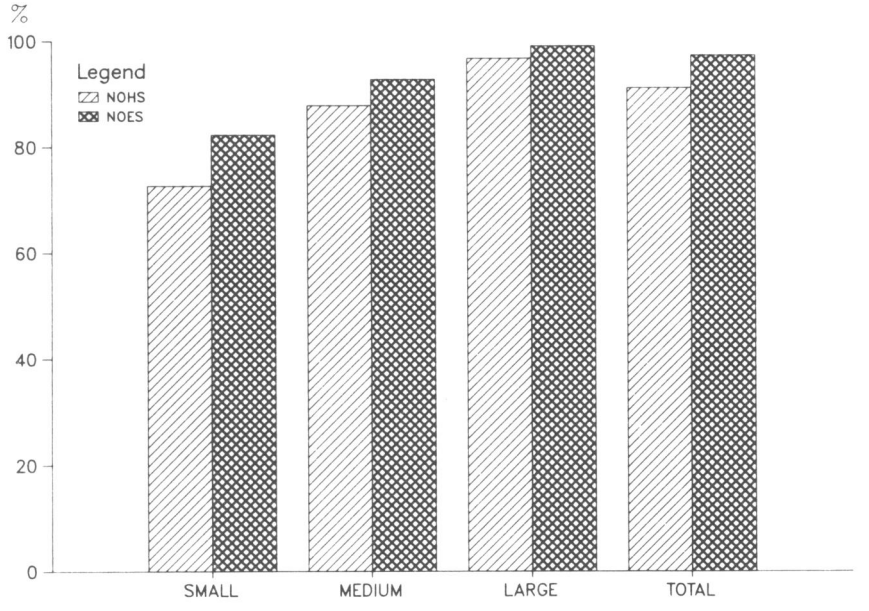

FIGURE 6. Results of NOHS and NOES compared: regular environmental monitoring of fumes, gases, mists, vapors, dust, noise, vibration, radiation, or other similar conditions, by size of facility

FIGURE 6-a. Proportion of facilities with this attribute

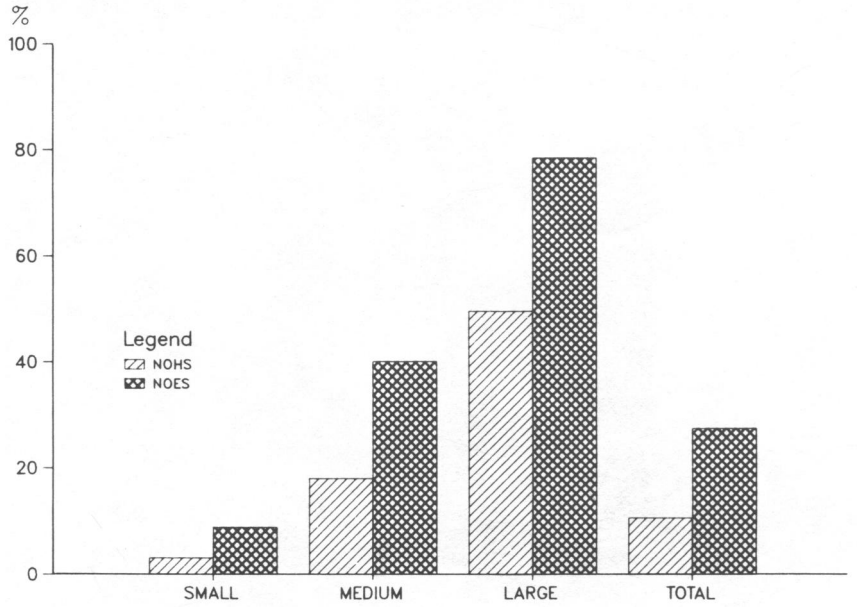

FIGURE 6-b. Proportion of employees working in facilities with this attribute

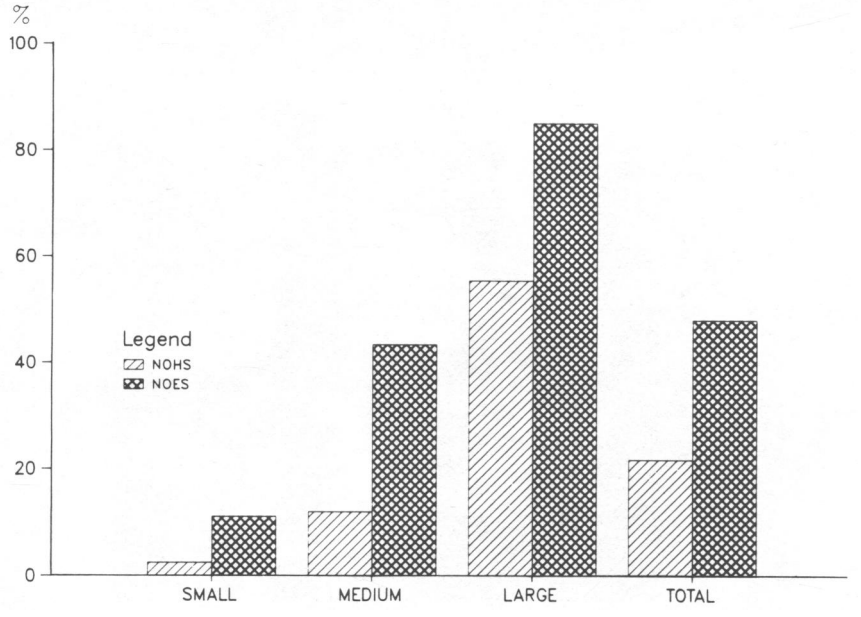

Table 2 reveals general improvement in the prevalence of potential exposure to x-radiation without controls. Indeed, facilities in the primary metal industry control 99.4% of such potential exposures.

Comment

Although it has not yet been possible to identify specific explanations for these trends, any or all of the following may reasonably be advanced as factors contributing to observed improvements:

1. the existence of the Occupational Safety and Health Act of 1970
2. collective bargaining agreements between workers and managers
3. employers' concerns about legal liability
4. employers' increased investments in human resources
5. employees' increased awareness of hazards in the workplace

While it may be interesting to measure quantitatively the significance of these factors, it is not absolutely necessary from a hazard surveillance perspective.

TABLE 1. Results of NOHS (1972) and NOES (1981) compared: proportion of facilities in which potential exposures were found to continuous noise without functioning controls, by SIC

SIC code	Type of industry	Proportion (%) NOHS	NOES
15	General building contractors	92.5	88.4
16	Heavy construction contractors	92.7	72.6
17	Special trade contractors	99.6	90.3
22	Textile mill products	58.7	34.5
23	Apparel and other textile products	99.4	80.9
24	Lumber and wood products	90.2	55.2
26	Paper and allied products	89.1	45.1
27	Printing and publishing	79.3	72.3
28	Chemicals and allied products	88.8	38.0
33	Primary metals industries	87.4	47.2
34	Fabricated metal products	77.0	56.2
35	Machinery, except electrical	86.0	60.1
39	Miscellaneous manufacturing industries	91.2	57.2
45	Transportation by air	37.9	50.0
75	Auto repair services and garages	79.8	99.5
76	Miscellaneous repair services	81.1	21.1

TABLE 2. Results of NOHS (1972) and NOES (1981) compared: proportion of facilities in which potential exposures were found to X-radiation without functioning controls, by SIC

SIC code	Type of industry	Proportion (%) NOHS	NOES
33	Primary metal industry	14.8	0.6
36	Electric and electronic equipment	26.9	18.7
80	Health services	4.1	1.9

Future Plans

Through surveillance of occupational hazards, NIOSH seeks to collect information on environmental conditions existing in workplaces in order to 1) establish a base of information for clarifying the relationship between disease and environmental factors in the workplace, 2) measure the extent to which industry has implemented programs to prevent occupational disease (including methods for reducing hazards in the workplace), and 3) indicate areas were increased concern and more aggressive intervention should be directed.

In both NOHS and NOES, the majority of potential exposures reported were to agents in trade-name products. Since both surveys describe potential exposures by agent identity rather than by trade name, information on the the ingredients of trade-name products must be obtained from the manufacturers. This is an enormously time-consuming process that greatly delays the analysis of results of the surveys. Thus, a more complete interpretation of the discernable trends awaits the painstaking identification of ingredients in the more than 100,000 trade-name products identified in the surveys. To facilitate this, NIOSH plans to use improved techniques for linking data from NOES to data contained in the Registry of Toxic Effects of Chemical Substances (RTECS), using a model that calculates industry- and occupation-specific indices of potential risks of exposure to these substances (*3*). In addition, by correlating information in NOES with national demographic data, NIOSH will be able to generate county-level maps that graphically depict the location of work sites with various potential exposures (*4*). It should be possible to identify geographic areas where changes in patterns of potential exposures to selected agents have been most dramatic, and where greatest attention to preventive measures is warranted. The results of these and other analytic efforts will be published as they become available.

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