

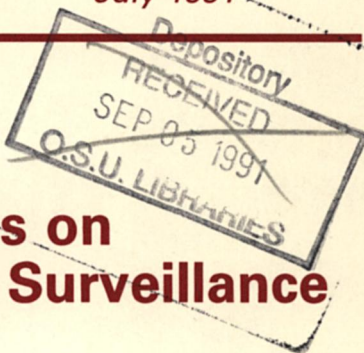
THE OHIO STATE UNIVERSITY  
229 SISSON HALL  
1900 COFFEY ROAD  
COLUMBUS, OH 43210-1092

# M M W R

**CDC**  
**Surveillance**  
**Summaries**

MORBIDITY AND MORTALITY WEEKLY REPORT

July 1991



## Special Focus on Reproductive Health Surveillance

### Contents

**Maternal Mortality Surveillance,  
United States, 1979-1986**

**Abortion Surveillance,  
United States, 1988**

**Surveillance of Postneonatal Mortality,  
United States, 1980-1987**



**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES**  
**PUBLIC HEALTH SERVICE**  
**CENTERS FOR DISEASE CONTROL**  
**ATLANTA, GEORGIA 30333**



*Notices to Readers—Continued*

IOM's six specific measures to alleviate the shortage of O-E physicians are: 1) integrate occupational and environmental medicine into medical school curricula to increase students' interest in these fields; 2) establish 10-15 centers to train future teachers and researchers in occupational and environmental medicine; 3) expand occupational medicine to include the fledgling field of environmental medicine, thereby increasing the number of physicians competent to practice in either area; 4) increase funding to support medical school faculty members committed to teaching and research in occupational and environmental medicine; 5) increase support for residency and fellowship training; and 6) adopt new routes to certification and accreditation in occupational and environmental medicine.

Copies of "Addressing the Physician Shortage in Occupational and Environmental Medicine" are available from the Director, Division of Health Education, ATSDR, 1600 Clifton Road, NE, Mailstop E-33, Atlanta, GA 30333; telephone (404) 639-0730.

### Laboratory Performance Information Exchange System

CDC's Public Health Practice Program Office, Model Performance Evaluation Program, invites laboratories to participate in its recently enhanced, computer-based electronic information exchange system. This system, called the Laboratory Performance Information Exchange System (LPIES), was developed to improve laboratory performance through retroviral and acquired immunodeficiency syndrome (AIDS)-related testing problem identification and resolution; electronic messages and conferences for communication among laboratorians; electronic collection and distribution of laboratory testing performance evaluation data; and access to AIDS-related laboratory information.

The electronic communication system can be accessed by calling (800) 522-6388 ([800] LAB-NETT). For persons in countries other than the United States, the telephone number is (919) 549-9109. The system is compatible with most computers, modems, and communications programs and protocols; no user fees or line charges are incurred by the user.

Additional information is available from the LPIES system manager, telephone (800) 322-4383 (in North Carolina, telephone [919] 549-8330), or CDC's Public Health Practice Program Office, telephone (404) 639-2137.

### Errata: Vol. 40

In SS-2, the surveillance summary number (SS-2) was listed correctly on the cover and inside front cover. However, the number listed at the top of each page and the inside back cover was incorrect and should read SS-2 instead of SS-1.

In addition, in the SS-2 report entitled "Abortion Surveillance, United States, 1988," the following footnotes were omitted from Figure 3 on page 42: † $\leq 8$  weeks gestation. § $\geq 16$  weeks gestation.

In the article "Participation of High School Students in School Physical Education—United States, 1990" (issue no. 35) on page 613, the last sentence of the first paragraph of the editorial note should read, "However, enrollment in PE, a necessary prerequisite for attendance in PE classes, may have decreased (Figure 1), from a total of 65% in 1984 to 52% in 1990...."

The *MMWR* series of publications is published by the Epidemiology Program Office, Centers for Disease Control, Public Health Service, U.S. Department of Health and Human Services, Atlanta, Georgia 30333.

SUGGESTED CITATION,

General: Centers for Disease Control, *CDC Surveillance Summaries*, July 1991, *MMWR* 1991;40(No. SS-2).

Specific: [Authors(s)] [Title of particular article.] In: *CDC Surveillance Summaries*, July 1991, *MMWR* 1991;40(No. SS-2):[inclusive page numbers].

Centers for Disease Control .....William L. Roper, M.D., M.P.H.  
*Director*

The production of this report as an *MMWR* serial publication was coordinated in:

Epidemiology Program Office.....Stephen B. Thacker, M.D., M.Sc.  
*Director*

Richard A. Goodman, M.D., M.P.H.  
*Editor, MMWR Series*

Scientific Communications Program.....R. Elliott Churchill, M.A.  
*Director*

Ann Usey, M.A.  
*Writer-Editor*

Mary T. Vaughan  
*Visual Information Specialist*

Ruth Greenberg

Morie E. Miller

*Editorial Assistants*

Division of Surveillance and Epidemiology.....Donna F. Stroup, Ph.D., M.Sc.  
*Director*

Copies can be purchased from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402-9325. Telephone: (202) 783-3238.

## Contents

|  |    |
|--|----|
| Most Recent Reports Published in the <i>MMWR</i><br>Surveillance Summaries ..... | ii |
| Maternal Mortality Surveillance, United States, 1979-1986 .....                  | 1  |
| Abortion Surveillance, United States, 1988 .....                                 | 15 |
| Surveillance of Postneonatal Mortality, United States, 1980-1987 .....           | 43 |
| State and Territorial Epidemiologists and State Laboratory Directors .....       | 57 |

**Most Recent Reports Published  
in the *MMWR* Surveillance Summaries**

| Subject   | Responsible CIO* | Most Recent Report             |
|---|------------------|--------------------------------|
| Abortion  | NCCDPHP          | 1991; Vol. 40, No. SS-2        |
| AIDS/HIV  |                  |                                |
| Distribution by Racial/Ethnic Group   | NCID             | 1988; Vol. 37, No. SS-3        |
| Among Black and Hispanic Children and Women<br>of Childbearing Age                              | NCEHIC           | 1990; Vol. 39, No. SS-3        |
| Behavioral Risk Factors   | NCCDPHP          | 1990; Vol. 39, No. SS-2        |
| Birth Defects   |                  |                                |
| B.D. Monitoring Program (see also Malformations)  | NCEHIC           | 1990; Vol. 39, No. SS-4        |
| <b>Contribution of B.D. to Infant Mortality<br/>    Among Minority Groups</b>                   | <b>NCEHIC</b>    | <b>1990; Vol. 39, No. SS-3</b> |
| <i>Campylobacter</i>  | NCID             | 1988; Vol. 37, No. SS-2        |
| Coal Workers' Health (see also Mining)  | NIOSH            | 1985; Vol. 34, No. 1SS         |
| Congenital Malformations, Minority Groups   | NCEHIC           | 1988; Vol. 37, No. SS-3        |
| Dengue  | NCID             | 1985; Vol. 34, No. 2SS         |
| Dental Caries and Periodontal Disease Among<br>Mexican-American Children                        | NCPS             | 1988; Vol. 37, No. SS-3        |
| Ectopic Pregnancy   | NCCDPHP          | 1990; Vol. 39, No. SS-4        |
| Ectopic Pregnancy, Mortality  | NCCDPHP          | 1987; Vol. 36, No. SS-2        |
| Elderly, Hospitalizations Among   | NCCDPHP          | 1991; Vol. 40, No. SS-1        |
| Endometrial and Ovarian Cancers   | EPO,<br>NCCDPHP  | 1986; Vol. 35, No. 2SS         |
| <i>Escherichia coli</i> O157  | NCID             | 1991; Vol. 40, No. SS-1        |
| Foodborne Disease   | NCID             | 1990; Vol. 39, No. SS-1        |
| Gonococcal Infection  | NCPS,<br>NCID    | 1984; Vol. 33, No. 4SS         |
| Gonorrhea and Salpingitis, Teenagers  | NCPS,<br>NCID    | 1983; Vol. 32, No. 3SS         |
| Hepatitis   | NCID             | 1985; Vol. 34, No. 1SS         |
| Hepatitis, Viral  | NCID             | 1983; Vol. 32, No. 2SS         |
| Homicide  | NCCDPHP          | 1983; Vol. 32, No. 2SS         |
| Homicides, Black Males  | NCEHIC           | 1988; Vol. 37, No. SS-1        |
| Hysterectomy  | NCCDPHP          | 1986; Vol. 35, No. 1SS         |
| Infant Mortality (see also National Infant Mortality;<br>Birth Defects; Postneonatal Mortality) | NCEHIC           | 1990; Vol. 39, No. SS-3        |
| Injury  |                  |                                |
| Death Rates, Blacks and Whites  | NCEHIC           | 1988; Vol. 37, No. SS-3        |
| Drownings   | NCEHIC           | 1988; Vol. 37, No. SS-1        |
| Falls, Deaths   | NCEHIC           | 1988; Vol. 37, No. SS-1        |
| Firearm-Related Deaths, Unintentional   | NCEHIC           | 1988; Vol. 37, No. SS-1        |
| In the Home, Persons Under 15 Years of Age  | NCEHIC           | 1988; Vol. 37, No. SS-1        |
| Motor Vehicle-Related Deaths  | NCEHIC           | 1988; Vol. 37, No. SS-1        |
| Objectives of Injury Control, State and Local   | NCEHIC           | 1988; Vol. 37, No. SS-1        |
| Objectives of Injury Control, National  | NCEHIC           | 1988; Vol. 37, No. SS-1        |
| Residential Fires, Deaths   | NCEHIC           | 1988; Vol. 37, No. SS-1        |
| Tap Water Scalds  | NCEHIC           | 1988; Vol. 37, No. SS-1        |
| Lead Poisoning, Childhood   | NCEHIC           | 1990; Vol. 39, No. SS-4        |
| Low Birth Weight  | NCCDPHP          | 1990; Vol. 39, No. SS-3        |
| Malaria, Imported   | NCID             | 1983; Vol. 32, No. 3SS         |
| Malformations (see also Birth Defects)  | NCEHIC           | 1985; Vol. 34, No. 2SS         |
| Maternal Mortality  | NCCDPHP          | 1991, Vol. 40, No. SS-2        |
| Mining (see also Coal Workers' Health)  | NIOSH            | 1986; Vol. 35, No. 2SS         |

\*All abbreviations are listed at end of inventory. Readers should check individual summaries when more than one CIO is responsible.

**Most Recent Reports Published  
in the *MMWR* Surveillance Summaries – Continued**

| Subject   | Responsible CIO* | Most Recent Report      |
|---|------------------|-------------------------|
| National Infant Mortality (see also Infant Mortality;<br>Birth Defects) | NCCDPHP          | 1989; Vol. 38, No. SS-3 |
| Nosocomial Infection  | NCID             | 1986; Vol. 35, No. 1SS  |
| Occupational Injuries/Disease   |                  |                         |
| Among Loggers   | NIOSH            | 1983; Vol. 32, No. 3SS  |
| Hazards, Occupational   | NIOSH            | 1985; Vol. 34, No. 2SS  |
| In Meatpacking Industry   | NIOSH            | 1985; Vol. 34, No. 1SS  |
| State Activities  | NIOSH            | 1987; Vol. 36, No. SS-2 |
| Treated in Hospital Emergency Rooms                                     | NIOSH            | 1983; Vol. 32, No. 2SS  |
| Ovarian Cancer (see Endometrial and Ovarian Cancer)                     |                  |                         |
| Pediatric Nutrition   | NCCDPHP          | 1983; Vol. 32, No. 4SS  |
| Pelvic Inflammatory Disease   | NCPS             | 1983; Vol. 32, No. 4SS  |
| Plague  | NCID             | 1985; Vol. 34, No. 2SS  |
| Plague, American Indians  | NCID             | 1988; Vol. 37, No. SS-3 |
| Pneumoconiosis, Coal Miners   | NIOSH            | 1983; Vol. 32, No. 1SS  |
| Postneonatal Mortality  | NCCDPHP          | 1991; Vol. 40, No. SS-2 |
| Pregnancy, Teenage  | NCCDPHP          | 1987; Vol. 36, No. 1SS  |
| Psittacosis   | NCID             | 1983; Vol. 32, No. 1SS  |
| Rabies  | NCID             | 1989; Vol. 38, No. SS-1 |
| Racial/Ethnic Minority Groups   | Various          | 1990; Vol. 39, No. SS-3 |
| Reye Syndrome   | NCID             | 1984; Vol. 33, No. 3SS  |
| Rocky Mountain Spotted Fever  | NCID             | 1984; Vol. 33, No. 3SS  |
| Rubella and Congenital Rubella  | NCPS             | 1984; Vol. 33, No. 4SS  |
| <i>Salmonella</i>   | NCID             | 1988; Vol. 37, No. SS-2 |
| Salpingitis (see Gonorrhea and Salpingitis)                             |                  |                         |
| Smoking   | NCCDPHP          | 1990; Vol. 39, No. SS-3 |
| Sudden Unexplained Death Syndrome Among<br>Southeast Asian Refugees     | NCEHIC,<br>NCPS  | 1987; Vol. 36, No. 1SS  |
| Suicides, Persons 15-24 Years of Age                                    | NCEHIC           | 1988; Vol. 37, No. SS-1 |
| Summer Mortality  | NCEH             | 1983; Vol. 32, No. 1SS  |
| Toxic-Shock Syndrome  | NCID             | 1984; Vol. 33, No. 3SS  |
| Trichinosis   | NCID             | 1988; Vol. 37, No. SS-5 |
| Tubal Sterilization Among Women   | NCCDPHP          | 1983; Vol. 32, No. 3SS  |
| Water-Related Disease   | NCID             | 1990; Vol. 39, No. SS-1 |

**Abbreviations**

|         |  |
|---------|--|
| NCCDPHP | National Center for Chronic Disease Prevention<br>and Health Promotion |
| NCEHIC  | National Center for Environmental Health and<br>Injury Control         |
| NCID    | National Center for Infectious Diseases                                |
| CIO     | Centers/Institute/Offices  |
| NCPS    | National Center for Prevention Services                                |
| EPO     | Epidemiology Program Office  |
| NIOSH   | National Institute for Occupational<br>Safety and Health               |

## Maternal Mortality Surveillance, United States, 1979-1986

Lisa M. Koonin, M.N., M.P.H.

Hani K. Atrash, M.D., M.P.H.

Herschel W. Lawson, M.D.

Jack C. Smith, M.S.

*Division of Reproductive Health  
National Center for Chronic Disease  
Prevention and Health Promotion*

### Summary

*To understand further the epidemiology and causes of maternal death, the Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, CDC, reviewed all identified maternal deaths in the United States, including Puerto Rico, for the period from 1979 through 1986. The maternal mortality ratio for the period was 9.1 deaths/100,000 live births. The ratios increased with age and were higher among women of black and other minority races than among white women for all age groups, particularly for women ages  $\geq 40$  years. Unmarried women had a higher risk of death than married women. Women who had received any prenatal care had a lower risk of dying than women who had received no care (RR= 0.19, 95% confidence limits (CL) 0.15, 0.23). Women who received no prenatal care had a gestational age-adjusted risk of maternal death 5.7 times that of women receiving care defined as "adequate." The risk of maternal death increased with decreasing levels of education for all age groups, particularly among women ages  $\geq 35$  years. The causes of death varied for different outcomes of pregnancy; pulmonary embolism was the leading cause of death following the delivery of a live birth. Future studies aimed at developing strategies to reduce the risk of maternal deaths in the United States should use enhanced surveillance and collect more information about each death, which would allow for better understanding of factors associated with maternal mortality.*

### INTRODUCTION

The 1990 health objectives for the nation included maternal mortality as a priority area needing improvement. A specific goal of no more than 5 deaths/100,000 live births was set for any ethnic group or county (1). This goal was not achieved. In 1988, the latest year for which statistics are available, the maternal mortality ratio among black women continued to be  $>5/100,000$  and was at least three times higher than that among white women (2). The newly developed *Healthy People 2000* objectives again call for reductions in maternal deaths (3).

To understand further the risk factors and leading causes of maternal death, the Division of Reproductive Health (DRH), National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP), CDC, in collaboration with the Maternal Mortality Special Interest Group of the American College of Obstetricians and Gynecologists (ACOG), the Association of Vital Records and Health Statistics (AVRHS), and state and local health departments, initiated National Pregnancy Mortality Surveillance in 1988 (4). This system has two major components: a

retrospective study of all identified maternal deaths that occurred in the United States from 1979 through 1986 and an ongoing prospective investigation of all pregnancy-associated deaths identified through the individual state systems and other sources of reporting, starting with maternal deaths that occurred in 1987. This report summarizes the findings from the retrospective study.

## METHODS

Health departments in the 50 states, the District of Columbia, New York City, and Puerto Rico provided CDC, through AVRHS, with copies of death certificates and available linked pregnancy-outcome records (birth certificates and fetal death records) of all identified maternal deaths for the years from 1979 through 1986.

A woman's death was classified as maternal if it occurred during pregnancy or within 1 year after pregnancy and resulted from a) complications of the pregnancy itself, b) a chain of events that was initiated by the pregnancy, or c) the aggravation of an unrelated condition by the physiologic or pharmacologic effects of the pregnancy. A woman's death was considered to be a potential maternal death if a pregnancy check box was marked on the death certificate, if the death certificate otherwise indicated that the woman was pregnant at the time of death, or if the woman's death certificate was linked to a birth certificate or a fetal death record within 1 year after the pregnancy. Information about each death was reviewed in detail to determine whether it was a maternal death.

Deaths were classified using a new system designed in collaboration with members of the Maternal Mortality Special Interest Group of ACOG. This system distinguishes among the immediate and underlying causes of death as stated on the death certificate, associated obstetrical conditions or complications, and the outcome of pregnancy. The classification scheme allows for better analysis of the multiple factors that led to death and focuses on the causes of death for each outcome of pregnancy.

Classification by cause of death, associated conditions, and outcome of pregnancy was made after information on each death was reviewed. Classification information was derived from death certificates, from notes written on the margins of the death certificates by state health department personnel, and from information on linked birth and fetal death certificates.

The subjects' ages were grouped into 5-year intervals. For race analysis, race was classified as white, black, or other. The white race group included Hispanics, whereas the other group included Asians/Pacific Islanders, Native Americans, and those reported as "other."

Maternal mortality ratios (maternal deaths per 100,000 live births) were calculated by using live-birth data for the United States from the 1979-1986 national natality files from the National Center for Health Statistics. Cornfield's method was used to calculate risk ratios with 95% confidence limits (CL) (5). To control for the effects of age, maternal mortality ratios for marital status were age-adjusted by using the method of direct standardization (6). The standard population comprised all women with a live birth from 1979 to 1986.

Having a linked outcome certificate for the majority of women whose pregnancy outcomes were a live birth or a stillbirth provided data not available on the death certificate alone. This additional information enabled analysis of the risk of maternal death by educational level and by adequacy of prenatal care. The risk of maternal

death by years of education was determined only for women whose pregnancy outcomes were a live birth or a stillbirth. The analysis of education was further restricted to women ages  $\geq 20$  years, most of whom would have at least had the opportunity to graduate from high school by that age. Information on maternal education is recorded on birth certificates in the District of Columbia and in all but three states (California, Texas, and Washington) (7). For four other states—Connecticut, Minnesota, New Mexico, Oklahoma—this information was available for only part of the study period. Women who died in those seven states were excluded from the analysis of education.

Information on prenatal care was limited to women who delivered a live birth, because the information about prenatal care recorded on stillbirth records (fetal death certificates) was insufficient for analysis. Also excluded were deaths that occurred in states that did not consistently report all three components necessary to calculate prenatal care adequacy (i.e., gestational age, the month prenatal care began, and the number of prenatal visits). These states were California, Connecticut, Minnesota, New Mexico, Oklahoma, and Rhode Island.

Prenatal care was assessed using the adequacy of prenatal care use (APCU) index developed by Kotelchuck (8), which measures adequacy of prenatal care by the timing of the first prenatal visit and by the appropriateness of the number of visits based on gestational age at the first prenatal visit and at delivery.

The APCU index defines four levels of adequacy of prenatal care, as shown below.

| Level of PNC*        | Month PNC began | Percentage of recommended PNC visits <sup>†</sup> |
|----------------------|-----------------|---|
| Adequate plus        | $\leq 4$ months | $\geq 110\%$                                      |
| Adequate             | $\leq 4$ months | 80%-109%  |
| Intermediate         | $\leq 4$ months | 50%-79%   |
| Inadequate           | $\geq 5$ months | —   |
|                      | or              |   |
|                      | $\leq 4$ months | $< 50\%$  |
| No care <sup>‡</sup> | none            | none  |

\*PNC = prenatal care.

<sup>†</sup>Based on the ACOG standard for month of gestation (9).

<sup>‡</sup>This study added this category based on information from linked birth certificates.

To control for the confounding effect of gestational age, direct standardization(6) was used to calculate a gestational age-adjusted rate for prenatal care adequacy. The standard population was based on the distribution of gestational age (in weeks) for women whose prenatal care was determined to be "adequate" and who died following a live birth.

## RESULTS

A total of 2,726 pregnancy-associated deaths were reported to CDC for the period 1979-1986. A review of all available records determined that 2,644 were maternal deaths. For deaths for which the outcome of pregnancy was known, linked records were available for 95% of pregnancies that resulted in live births and for 86% of those that resulted in stillbirths. Most of the deaths were associated with a live birth (51.6%), an ectopic pregnancy (13.0%), or a stillbirth (9.9%) (Figure 1).

The overall maternal mortality ratio for the 8-year study period was 9.1 deaths/100,000 live births; the ratio dropped steadily, from 10.9 in 1979 to 7.4 in 1986 (Table 1).

Women who were  $\geq 30$  years of age had a higher risk of maternal death than younger women (Table 2). Women who were 35-39 years old had almost four times the risk of dying that women ages 20-24 years had; this risk was almost ninefold for women who were  $\geq 40$  years.

Race was also strongly associated with maternal mortality, particularly for black women; these women were three times more likely than white women to die from maternal causes (Table 3). Age-specific mortality ratios were also much higher for black women than for white women (Figure 2). Women of other races had slightly higher age-specific maternal mortality ratios than those for whites, although the disparity became more pronounced among women ages  $\geq 40$  years.

Unmarried women had almost three times higher risk of maternal death than married women; the age-adjusted maternal mortality ratio was 20.7/100,000 live births for unmarried women and 7.1 for married women. Unmarried white women had an age-adjusted ratio 2.7 times that for married white women (15.6 versus 5.8), whereas unmarried black women had an age-adjusted ratio only 1.2 times that for married black women (24.7 versus 20.5) (Figure 3).

The risk of maternal death increased with decreasing levels of education (Figure 4). Women ages  $\geq 20$  years who did not complete high school had the highest maternal death ratio. For all age groups, women who had completed  $>12$  years of education had the lowest risk of dying. The risk for women with  $<12$  years of education compared with college-educated women was much more pronounced among women ages  $\geq 35$  years (risk ratio [RR] = 3.5, 95% CL 2.42, 5.15) than among women ages 20-24 years (RR = 1.2, 95% CL 0.82, 1.53).

Analysis of maternal mortality, according to U.S. Census geographic region of residence, showed some differences. Women residing in the Northeast had the highest risk of death and women residing in the north-central region had the lowest risk (Table 4).

Women who had received any amount of prenatal care had a lower risk of dying than women who had received no care (RR = 0.19, 95% CL 0.15, 0.23) (Figure 5). Women who received "inadequate" prenatal care had a slightly higher risk of dying (RR = 1.1, 95% CL 0.92, 1.36) than women receiving "adequate" care (referent group). This risk was somewhat more pronounced for women who had received "intermediate" prenatal care (RR = 1.3, 95% CL 1.08, 1.52). Women whose care was determined to be "adequate plus" had a 1.7 times (95% CL 1.49, 2.03) risk of dying as women receiving "adequate" care. Among women who received any level of prenatal care, only those who received "adequate plus" care had a significantly higher risk of maternal death. Notably, women who received no prenatal care had a crude risk of maternal death 6.5 times (95% CL 5.17, 8.24) that of women receiving "adequate" care. When adjusted for gestational age, the risk of receiving no care dropped somewhat, to 5.7.

The leading causes of death differed by pregnancy outcome (Table 5). For women whose pregnancies ended in a live birth, the leading causes of death were pulmonary embolism (mostly thrombotic embolism), pregnancy-induced hypertension complications (primarily central nervous system complications related to eclampsia and preeclampsia), hemorrhage (primarily postpartum uterine bleeding), and infection.

For women whose pregnancies ended in a stillbirth, the leading causes of death were hemorrhage (largely from abruptio placentae), pregnancy-induced hypertension complications, and pulmonary embolism (primarily amniotic fluid embolism). For women whose pregnancies ended in an ectopic pregnancy, almost 90% of deaths were from hemorrhage resulting from rupture of the ectopic site. For women whose pregnancies ended in a spontaneous or induced abortion, the leading causes of death were hemorrhage from uterine bleeding, generalized infection, and thrombotic pulmonary embolism. Women who had molar pregnancies died from a variety of causes and conditions. Women who were still pregnant at the time of death mostly died from thrombotic and amniotic fluid embolism, hemorrhage from uterine rupture or laceration, and complications of pregnancy-induced hypertension.

## DISCUSSION

Although the maternal mortality ratio declined by 32% from 1979 to 1986, the maternal mortality ratio in 1986 of 7.4 was almost 1.5 times higher than the goal for the 1990 health objectives for the nation (1). The risk of maternal death varied widely for certain population subgroups.

As reported in previous studies, older women had an increased risk of maternal death (10). The ratio for women ages  $\geq 40$  years was 11 times that of the 1990 objective. Numerous previous reports have found, as did this report, that black women have a higher risk of maternal mortality (2, 11-15). The maternal mortality ratio for black women is over four times higher than the 1990 objective.

Being unmarried was strongly associated with maternal mortality; the association was less prominent for black women than white women. Another study found a similar variation by race for the association between marital status and poor pregnancy outcomes, such as low birth weight (LBW) (16).

In contrast to this analysis, a national study of maternal deaths for the period 1974-1978 reported that women residing in the South had the highest risk of death, whereas those in the West had the lowest risk (17). Findings in this report may reflect regional changes in the availability or use of prenatal services or from a change in maternal mortality surveillance activities in some areas of the country. This possibility is supported by a study that found that, for 1986, women residing in the north-central region of the country had the highest level of prenatal care (17). These researchers also observed that the proportion of women receiving delayed or late prenatal care increased more in the Northeast than any other region during the period from 1984 to 1986.

Pregnancy-outcome records linked to death certificates provided information not usually available at the national level, such as educational status and adequacy of prenatal care. A recent report from New York City found, as did this study, that women who did not complete high school had a higher risk of maternal death than women with more education (12). Furthermore, women with limited education have been found to have higher rates of poor pregnancy outcomes, such as LBW (18,19) and infant mortality (20), than college-educated women.

Proportionately, older women who had less than a high school education had a much higher risk of death than did younger women. In fact, higher levels of education seemed to dampen the effect of age on the risk of maternal death.

This analysis could not assess the quality of prenatal care received by the women in the study. The APCU index does not evaluate the content of care in its adequacy assessment, nor do vital records provide information that would allow this assessment.

However, women who had not had any prenatal care were found to be at the greatest risk of maternal death. Deliveries occurred earlier among women who had had no care than among women who had received "adequate" care. The gestational-age-adjusted mortality rate for women with no care was, therefore, lower than the crude rate because many of the pregnancies of women who had received no care terminated early, before these women may have sought prenatal care (21).

Overall, 1.9% of women delivering a live birth in 1986 had had no prenatal care (7). In contrast, 8.3% of women who died following a live birth during the study period had not received prenatal care. More information is needed to determine whether the absence of prenatal care itself or the social and behavioral factors associated with a lack of prenatal care were responsible for the increased risk of maternal death. Other studies have shown that higher risks of maternal death (12, 15, 22) and of other poor outcomes of pregnancy, such as LBW (21,23,24) and infant death (20), are linked with the absence of prenatal care.

Women whose prenatal care was determined to be "adequate plus" had a significantly higher risk of death than women receiving any other level of care. The women who had received more care, however, were likely to have had complicated medical conditions that required these additional visits (23). Such conditions would increase these women's likelihood of having complications in pregnancy and, ultimately, maternal death.

This study and previous studies using similar methods found the same leading causes of maternal death: pulmonary embolism, pregnancy-induced hypertension complications, hemorrhage, and ectopic pregnancy complications (11, 25). Pulmonary embolism, first identified as the leading cause of maternal death in the 1970s, continues to account for most of the maternal deaths associated with live births.

This study's new system of classifying maternal deaths specifically allowed for comparison of causes of death by pregnancy outcome. The system also reported more specific information about associated obstetric conditions that contributed to the cause of death.

Information on most deaths in this study was obtained through surveillance based on routine vital statistics. Other reports using routine vital statistics of maternal deaths (based on death certificate information alone) have three limitations. First, they understate maternal mortality ratios. Studies have shown that maternal deaths that were not identified by vital statistics varied from almost 18% in New York City (26) for 1983–1984 to >150% in North Carolina for 1988–1989 (27).

Second, reports based on death certificates alone are often categorized in a way that does not give specific information on all causes of maternal death; recent national vital statistics reports have attributed >40% of all maternal deaths to "other" causes (2). In fact, pulmonary embolism, which is now the leading cause of maternal death, is not listed separately as a cause of maternal death in routine vital statistics reports (2).

Third, reports based on vital statistics alone do not provide enough detail to assess, for prevention purposes, the pathophysiology and circumstances leading to maternal death or the determination of associated risk factors.

Even though the availability of linked birth and fetal death records improved the quality and quantity of information available for assigning a cause for each death, the absence of detailed clinical information limited this study's ability to assess risk factors and assign specific causes to some of the deaths. Also, because most cases were obtained by routine vital statistics, the ratios likely underestimate the actual number of maternal deaths occurring during the study period.

Despite the decreasing trend in maternal mortality over the eight years, the 1990 objective has not likely been achieved. The gap between white women and women of other races continues. Efforts must be made to enhance the accessibility of prenatal care and to conduct public education about its availability and value. Further analyses are needed for the simultaneous examination of the effects of age, race, marital status, educational level, and adequacy of prenatal care on the risk of maternal death.

Enhanced surveillance of maternal deaths and collection of detailed information from medical records, autopsy reports, reports from maternal mortality review committees, and other sources will help clarify the magnitude, risk factors, characteristics, and causes of maternal deaths. This improved understanding will help public health officials and clinicians develop strategies for risk reduction. More detailed information about maternal mortality surveillance may be obtained by calling the Statistics and Computer Resources Branch at (404) 488-5188 or the Pregnancy and Infant Health Branch at (404) 488-5187, or by writing to Pregnancy Mortality Surveillance, DRH, NCCDPHP, Mailstop K21, Centers for Disease Control, Atlanta, GA 30333.

#### References

1. Public Health Service. Promoting health/preventing disease: objectives for the nation. Washington, DC: US Department of Health and Human Services, Public Health Service, 1980.
2. National Center for Health Statistics. Advance report of final mortality statistics, 1988. Monthly vital statistics report 1990;39(suppl):7. Hyattsville, Maryland: US Department of Health and Human Services, Public Health Service, 1990; DHHS publication no. (PHS)91-1120.
3. Public Health Service. Healthy people 2000: national health promotion and disease prevention objectives. Washington, DC: US Department of Health and Human Services, Public Health Service, 1991; DHHS publication no. (PHS)91-50213..
4. Ellerbrock TV, Atrash HK, Hogue CJR, Smith JC. Pregnancy mortality surveillance: a new initiative. *Contemp Obstet Gynecol* 1988;31:23-34.
5. Cornfield J. A statistical problem arising from retrospective studies. In: Neyman J, ed. *Proceedings of the Third Berkeley Symposium on Mathematical Statistics and Probability*. Berkeley: University of California Press, 1956.
6. Fleiss JL. *Statistical methods for rates and proportions*. 2nd ed. New York: John Wiley & Sons, 1981.
7. National Center for Health Statistics. Advance report of final natality statistics, 1986. Monthly vital statistics report 1988;37(suppl):3. Hyattsville, Maryland: US Department of Health and Human Services, Public Health Service, 1988;DHHS publication no. (PHS)88-1120.
8. Kotelchuck M. The mismeasurement of prenatal care adequacy in the U.S. and a proposed alternative two-part index. Paper presented at the annual meeting of the American Public Health Association. New Orleans, October 18-22, 1987.
9. American College of Obstetricians and Gynecologists. *Standards for obstetric-gynecologic services*. Washington, DC: American College of Obstetricians and Gynecologists, 1985.
10. Buehler JW, Kaunitz AM, Hogue CJR, Hughes JM, Smith JC, Rochat RW. Maternal mortality in women aged 35 years or older: United States. *JAMA* 1986;255:53-7.
11. Kaunitz AM, Hughes JM, Grimes DA, Smith JC, Rochat RW, Kafirissen ME. Causes of maternal mortality in the United States. *Obstet Gynecol* 1985;65:605-12.

12. Syverson CJ, Chavkin W, Atrash HK, Rochat RW, Sharp ES, King GE. Pregnancy-related mortality in New York City, 1980 to 1984: causes of death and associated risk factors. *Am J Obstet Gynecol* 1991;164:603-8.
13. May WJ, Greiss FC. Maternal mortality in North Carolina: a forty-year experience. *Am J Obstet Gynecol* 1989;161:555-60.
14. Gabel HD. Maternal mortality in South Carolina from 1970 to 1984: an analysis. *Obstet Gynecol* 1987;69:307-11.
15. Sachs BP, Brown DA, Driscoll SG, Schulman E, Acker D, Ransil BJ, Jewett JF. Maternal mortality in Massachusetts: trends and prevention. *N Engl J Med* 1987;316:667-72.
16. Taffel SM. Trends in low birth weight: United States, 1975-85. *Vital Health Stat* 1989;series 21, no. 48.
17. Singh S, Forrest JD, Torres A. Prenatal care in the United States: a state and county inventory. New York: The Alan Guttmacher Institute, 1989.
18. Kleinman JC, Kessel SS. Racial differences in low birth weight: trends and risk factors. *N Engl J Med* 1987;317:749-53.
19. Chase HC, Nelson FG. A study of risks, medical care, and infant mortality. *Am J Public Health* 1973;63(suppl II):27-40.
20. Hogue CJR, Buehler JW, Strauss LT, Smith JC. Overview of the National Infant Mortality Surveillance (NIMS) project: design, methods, results. *Public Health Rep* 1987;102:126-37.
21. Institute of Medicine. Preventing low birthweight. Washington, DC: National Academy Press, 1985.
22. Kaunitz AM, Spence C, Danielson TS, Rochat RW, Grimes DA. Perinatal and maternal mortality in a religious group avoiding obstetric care. *Am J Obstet Gynecol* 1984;150:826-31.
23. Greenberg RS. The impact of prenatal care in different social groups. *Am J Obstet Gynecol* 1983;145:797-801.
24. Alexander GR, Cornely DA. Prenatal care utilization: its measurement and relationship to pregnancy outcome. *Am J Prev Med* 1987;3:243-53.
25. Rochat RW, Koonin LM, Atrash HK, Jewett JF. Maternal mortality in the United States: report from the Maternal Mortality Collaborative. *Obstet Gynecol* 1988;72:91-7.
26. Allen MH, Chavkin W, Marinoff J. Ascertainment of maternal deaths in New York City. *Am J Public Health* 1991;81:380-3.
27. CDC. Enhanced maternal mortality surveillance—North Carolina, 1988 and 1989. *MMWR* 1991;40:469-71.

**TABLE 1. Maternal deaths and maternal mortality ratio,\* by year, United States,† 1979-1986**

| Year      | Maternal deaths | Maternal mortality ratio |
|-----------|-----------------|--------------------------|
| 1979      | 380             | 10.9                     |
| 1980      | 379             | 10.5                     |
| 1981      | 346             | 9.5                      |
| 1982      | 337             | 9.2                      |
| 1983      | 313             | 8.6                      |
| 1984      | 304             | 8.3                      |
| 1985      | 307             | 8.2                      |
| 1986      | 278             | 7.4                      |
| 1979-1986 | 2,644           | 9.1                      |

\*Maternal deaths per 100,000 live births.

†Including Puerto Rico.

**TABLE 2. Maternal deaths, maternal mortality ratio,\* and risk ratio, by age group, United States, † 1979-1986**

| Age group (years) | Maternal deaths | Maternal mortality ratio | Risk ratio | 95% Confidence limits |
|-------------------|-----------------|--------------------------|------------|-----------------------|
| <20               | 297             | 7.2                      | 1.1        | (0.97, 1.28)          |
| 20-24             | 609             | 6.5                      | referent   |                       |
| 25-29             | 707             | 7.7                      | 1.2        | (1.06, 1.32)          |
| 30-34             | 586             | 11.8                     | 1.8        | (1.62, 2.04)          |
| 35-39             | 325             | 23.0                     | 3.6        | (3.09, 4.07)          |
| ≥40               | 120             | 55.9                     | 8.6        | (7.05, 10.52)         |
| All ages          | 2,644           | 9.1                      |            |                       |

\*Maternal deaths per 100,000 live births.

†Excludes Puerto Rico.

**TABLE 3. Maternal mortality ratio\* and risk ratio, by race, United States, † 1979-1986**

| Race      | Maternal deaths | Maternal mortality ratio | Risk ratio | 95% Confidence limits |
|-----------|-----------------|--------------------------|------------|-----------------------|
| White     | 1,543           | 6.5                      | referent   |                       |
| Black     | 1,004           | 22.0                     | 3.4        | (3.11, 3.65)          |
| Other     | 97              | 9.8                      | 1.5        | (1.22, 1.85)          |
| All races | 2,644           | 9.1                      |            |                       |

\*Maternal deaths per 100,000 live births.

†Including Puerto Rico.

**TABLE 4. Maternal mortality ratio\* and risk ratio, by region of residence, United States, † 1979-1986**

| Geographic residence† | Maternal deaths | Maternal mortality ratio | Risk ratio | 95% Confidence limits |
|-----------------------|-----------------|--------------------------|------------|-----------------------|
| Northeast             | 538             | 10.0                     | 1.4        | (1.21, 1.55)          |
| North central         | 538             | 7.3                      | referent   |                       |
| South                 | 980             | 9.8                      | 1.3        | (1.20, 1.48)          |
| West                  | 530             | 8.3                      | 1.1        | (1.00, 1.27)          |
| All regions           | 2,586           | 9.1                      |            |                       |

\*Maternal deaths per 100,000 live births.

†Excludes Puerto Rico.

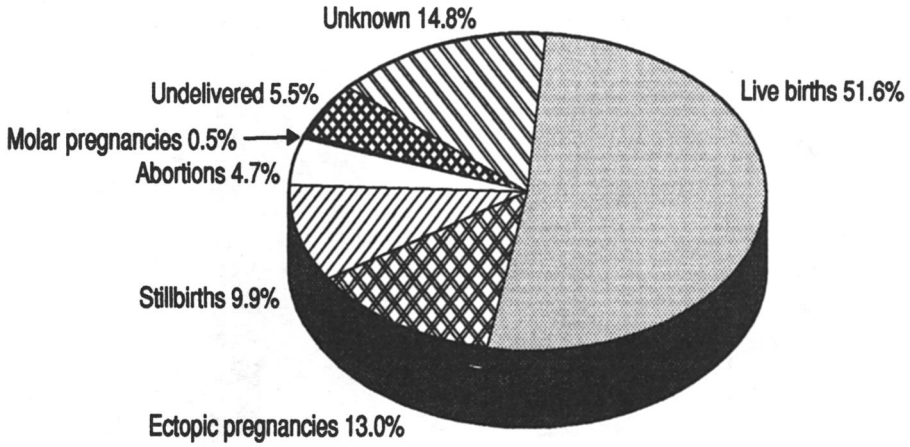
**TABLE 5. Cause of maternal death, by outcome of pregnancy, United States,\* 1979-1986**

| Cause of death                 | Outcome of Pregnancy |       |            |       |         |       |                       |       |       |       |             |       |         |       |       |       |
|--------------------------------|----------------------|-------|------------|-------|---------|-------|-----------------------|-------|-------|-------|-------------|-------|---------|-------|-------|-------|
|                                | Live birth           |       | Stillbirth |       | Ectopic |       | Abortion <sup>†</sup> |       | Molar |       | Undelivered |       | Unknown |       | Total |       |
|                                | No.                  | %     | No.        | %     | No.     | %     | No.                   | %     | No.   | %     | No.         | %     | No.     | %     | No.   | %     |
| Hemorrhage                     | 249                  | 18.3  | 89         | 33.9  | 305     | 88.9  | 43                    | 34.8  | 2     | 14.3  | 30          | 20.5  | 81      | 20.7  | 799   | 30.2  |
| Pulmonary embolism             | 370                  | 27.1  | 47         | 17.9  | 10      | 2.9   | 24                    | 19.4  | 2     | 14.3  | 60          | 41.1  | 106     | 27.1  | 619   | 23.4  |
| Pregnancy-induced hypertension | 307                  | 22.5  | 59         | 22.4  | 1       | 0.3   | 1                     | 0.8   | 2     | 14.3  | 17          | 11.6  | 92      | 23.5  | 479   | 18.1  |
| Infection                      | 101                  | 7.4   | 22         | 8.4   | 6       | 1.7   | 35                    | 28.2  | 2     | 14.3  | 8           | 5.5   | 28      | 7.2   | 202   | 7.6   |
| Cardiomyopathy                 | 53                   | 3.9   | 4          | 1.5   | 0       | 0.0   | 1                     | 0.8   | 0     | 0.0   | 2           | 1.4   | 30      | 7.7   | 90    | 3.4   |
| Anesthesia complications       | 65                   | 4.8   | 3          | 1.1   | 4       | 1.2   | 11                    | 8.9   | 0     | 0.0   | 0           | 0.0   | 3       | 0.8   | 86    | 3.3   |
| Other                          | 218                  | 16.0  | 39         | 14.8  | 17      | 5.0   | 9                     | 7.3   | 6     | 43.0  | 29          | 19.9  | 51      | 13.0  | 369   | 14.0  |
| Total maternal deaths          | 1,363                | 100.0 | 263        | 100.0 | 343     | 100.0 | 124                   | 100.0 | 14    | 100.0 | 146         | 100.0 | 391     | 100.0 | 2,644 | 100.0 |

\*Including Puerto Rico.

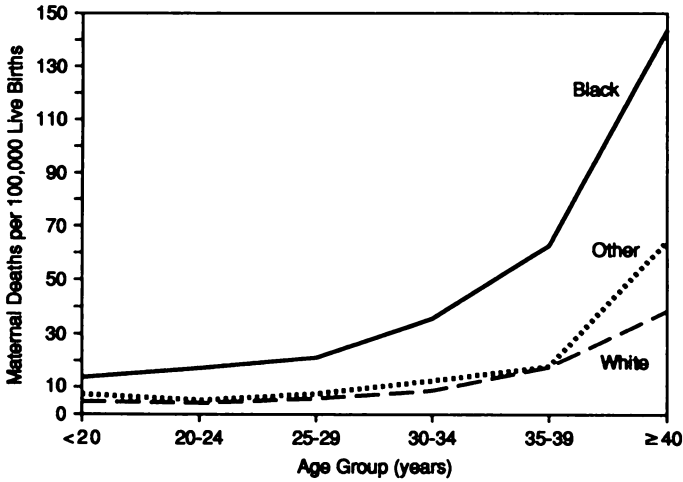
<sup>†</sup>Includes spontaneous and induced abortions.

FIGURE 1. Maternal deaths, by outcome of pregnancy, United States,\* 1979–1986



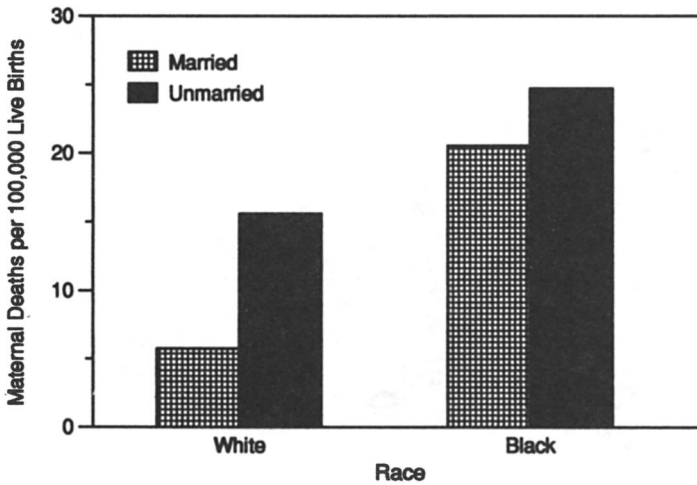
\*Includes Puerto Rico.

FIGURE 2. Maternal mortality ratio, by age group and race, United States,\* 1979–1986



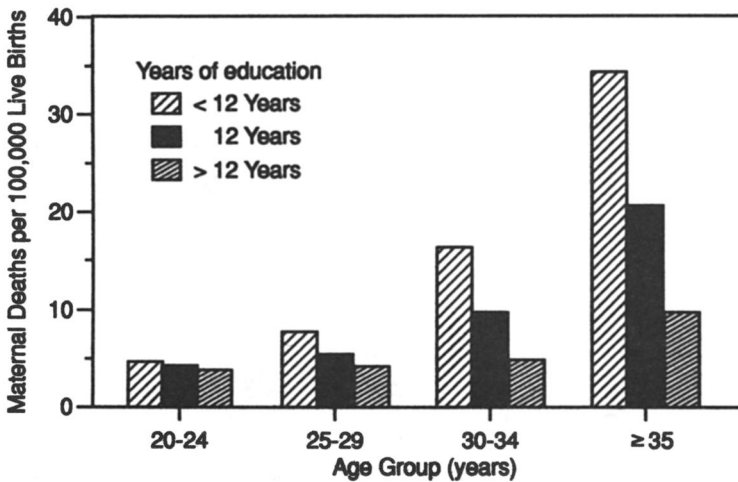
\*Includes Puerto Rico.

**FIGURE 3. Age-adjusted maternal mortality ratio, by race and marital status, United States,\* 1979–1986**



\*Includes Puerto Rico.

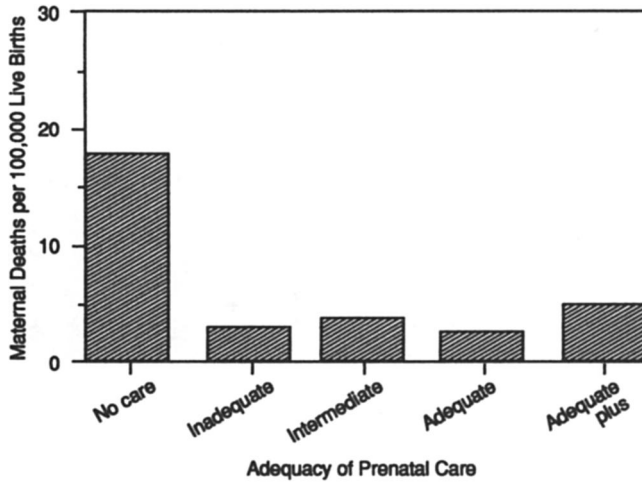
**FIGURE 4. Age-specific maternal mortality ratio,\* by education, live births and stillbirths, United States,† 1979–1986**



\*Maternal deaths per 100,000 live births for women ages ≥20 years.

†Includes Puerto Rico and excludes California, Connecticut, Minnesota, Texas, and Washington.

**FIGURE 5. Adjusted\* maternal mortality rate, by levels of prenatal care adequacy, live births, United States,† 1979–1986**



\*Gestational age-adjusted rates.

†Includes Puerto Rico and excludes California, Connecticut, Minnesota, Oklahoma, New Mexico, and Rhode Island.

## Abortion Surveillance, United States, 1988

Lisa M. Koonin, M.N., M.P.H.\*

Kenneth D. Kochanek, M.A.†

Jack C. Smith, M.S.\*

Merrell Ramick\*

*\*Statistics and Computer Resources Branch*

*Division of Reproductive Health*

*National Center for Chronic Disease Prevention and Health Promotion*

*†Mortality Statistics Branch*

*Division of Vital Statistics*

*National Center for Health Statistics*

### Summary

*Since 1980, the number of legal abortions reported to CDC has remained fairly stable, varying each year by <3%. In 1988, 1,371,285 abortions were reported—a 1.3% increase from 1987. The abortion ratio for 1988 was 352 legally induced abortions/1,000 live births, and the abortion rate was 24/1,000 women ages 15-44 years. The abortion ratio was higher for black women and women of other minority races and for women <15 years of age. However, the abortion ratio for women <15 years was lower in 1988 than in any previous year since 1972. Women undergoing legally induced abortions tended 1) to be young, white, and unmarried, 2) to live in a metropolitan area, 3) to have had no previous live births, and 4) to be having the procedure for the first time. Approximately half of all abortions were performed before the eighth week of gestation, and >85% were performed during the first trimester of pregnancy (<13 weeks of gestation). Black women and women of other minority races tended to obtain abortions later in pregnancy than did white women; however, age was a more dominant influence than race. Younger women tended to obtain abortions later than older women. Educational level strongly influenced when an abortion was performed; better educated women had an abortion earlier in gestation.*

### INTRODUCTION

In 1969, CDC began abortion surveillance to document the number and characteristics of women obtaining legally induced abortions and to assist efforts to eliminate preventable causes of morbidity and mortality associated with abortions. This report, as in past years, is based primarily on abortion data provided to the Division of Reproductive Health (DRH), National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP), CDC. For the first time, this report incorporates additional abortion data reported to the Division of Vital Statistics (DVS), National Center for Health Statistics (NCHS), CDC.

### METHODS

For 1988, the DRH received data from 52 reporting areas: 50 states, New York City, and the District of Columbia. The total number of legally induced abortions was

available from all reporting areas, most of which provided information on the characteristics of women obtaining abortions. Central health agencies\* reported data for 45 areas; hospitals and other medical facilities reported data for seven areas. Data are reported by the state in which the abortion occurred, unless otherwise noted.

In addition to abortion data provided to DRH, data are reported to the DVS of NCHS. NCHS abortion data for 1988 represent approximately 22% of all abortions reported to the DRH. The data were collected at the state/registration-area level for each induced abortion and were provided to NCHS on magnetic tape as a part of the Vital Statistics Cooperative Program. The NCHS data contain information on two demographic characteristics not collected by DRH: educational level and area of residence (metropolitan or nonmetropolitan). The NCHS data system enables detailed cross-classification of these and other characteristics.

Data on induced abortions from NCHS (except for education) were reported from New York City and 14 states: Colorado, Indiana, Kansas, Maine, Missouri, Montana, New York, Oregon, Rhode Island, South Carolina, Tennessee, Utah, Vermont, and Virginia (1). Data on education were reported from New York City and 11 states (Indiana, Kansas, Maine, Missouri, Montana, Oregon, South Carolina, Tennessee, Utah, Vermont, and Virginia) (see Appendix A).

Age was classified in 5-year intervals. Race was classified as white or black/other races.

Abortion statistics for 1988 and selected previous years are presented in a summary table (Table 1) and in Table 2. Percentage distributions in Table 1 include data from all areas reporting a given characteristic and exclude all unknown values unless otherwise noted. Information about education and area of residence from NCHS was available for 1980 through 1988 only; a different number of states reported each characteristic for different years (see Appendix A).

State-specific characteristics of women obtaining abortions in 1988 are also presented (Tables 3 through 7), and tabulations of selected characteristics are given (Tables 8 through 18).

## RESULTS

In 1988, 1,371,285 legal abortions were reported to the DRH—an 1.3% increase over the number reported for the preceding year (2). The national abortion rate increased from 23 abortions/1,000 women ages 15-44 years in 1986 to 24/1,000 in 1987 and remained at that rate in 1988. The abortion ratio rose slightly from 354 abortions/1,000 live births in 1986 to 356/1,000 in 1987 and then declined to 352/1,000 in 1988 (Table 1, Figure 1).

In 1988, as in previous years, most abortions were performed in California, New York City, and Texas; the fewest were performed in Wyoming, South Dakota, and Alaska (2,3). For women whose state of residence was known, approximately 92% had the abortion done within their state of residence. The percentage of abortions obtained by out-of-state residents ranged from approximately 50% in the District of Columbia to <1% in Hawaii (Table 3). Data on the percentage of abortions obtained by out-of-state residents were not available for 12 reporting areas in 1988.

In 1988, 40 states, the District of Columbia, and New York City reported legal abortions by age. Women 20-24 years of age had approximately 33% of all abortions, whereas women <15 years of age had approximately 1% (Table 4). The abortion ratio

\*Includes state health departments and health departments from New York City and the District of Columbia.

was highest for the youngest women (949 abortions/1,000 live births for women <15 years of age and 624/1,000 for women 15-19 years of age) and for women of the oldest age category (514/1,000 for women  $\geq$ 40 years); the ratio was lowest for women ages 30-34 years (188/1,000) (Figure 2). Although the abortion ratio was highest for teenagers, the proportion of abortions they obtained decreased slightly—from 26% of all legal abortions in 1987 to 25% in 1988. Among teenagers, the abortion ratio was highest for those <15 years of age and lowest for 19-year-olds (Table 5).

In 1988, approximately 48% of reported legal abortions were performed at or before 8 weeks of gestation, and 87% were done at or before 12 weeks of gestation (Table 6). Four percent of the abortions were performed at 16-20 weeks of gestation, and approximately 1% were performed  $\geq$ 21 weeks of gestation.

Approximately 98% of legal abortions were performed by curettage (Table 7) and approximately 1% by intrauterine saline or prostaglandin instillation. Hysterectomy and hysterotomy were rarely used; <1% of abortions were performed by these methods.

Almost two-thirds of women obtaining legal abortions were white; this finding continued a previously noted trend (2,3) (Table 8). The abortion ratio, however, was 1.9 times higher for black women and women of other minority races (489 abortions/1,000 live births) than for white women (259 abortions/1,000 live births).

The percentage of women undergoing legal abortions who were unmarried increased from 76% in 1986 and 1987\* to almost 78% in 1988. The abortion ratio was 11.7 times higher for unmarried women than for married women: 1,027 abortions/1,000 live births versus 88 abortions/1,000 live births (Table 9).

Fifty-one percent of the women obtaining legal abortions had had no previous live births, and approximately 89% had had two or fewer live births (Table 10). The abortion ratio was highest for women who had had no live births and lowest for women who had had one live birth. Approximately 56% of women obtaining abortions had the procedure for the first time, whereas 15% had had at least two previous abortions (Table 11).

For the 15 reporting areas of the NCHS data system, most women (approximately 88%) who obtained abortions lived in metropolitan areas. For these women, the abortion ratio was approximately 2.2 times greater than that of women who lived in nonmetropolitan areas (373 versus 168 abortions/1,000 live births) (Table 12). The difference by place of residence was greater for black women and women of other minority races than for white women. The abortion ratio for minority women living in a metropolitan area was 2.8 times that for those living in a nonmetropolitan area (599 versus 210 abortions/1,000). In contrast, the abortion ratio for white women living in a metropolitan area was 1.9 times that of white women living in a nonmetropolitan area (302 versus 162 abortions/1,000).

When the proportion of women undergoing legal abortions was analyzed by age group, few differences were found between white women and minority women (Table 13). However, the proportion of minority women <15 years old who had abortions was over twice that of white women in this age group. In addition, a slightly higher proportion of minority women who had abortions were unmarried.

Most women obtained abortions during the first 12 weeks of pregnancy. However, women <15 years of age obtained abortions later in pregnancy than did older women (Table 14). Minority women tended to obtain abortions later in pregnancy than did

\*These findings update previously published data on marital status for 1986 and 1987.

white women. However, age was a more dominant influence than race, particularly for women who obtained abortions at  $\geq 16$  weeks of gestation (Table 15). For all races, the proportion of women obtaining an early abortion ( $\leq 8$  weeks) increased with age, and the proportion obtaining a late abortion ( $\geq 16$  weeks) decreased with age (Figure 3).

When analyzed by gestational age, approximately 99% of abortions at  $\leq 12$  weeks of gestation were performed by curettage (primarily suction procedures) (Table 16). Beyond 12 weeks of gestation, the most common procedure was curettage, which was usually reported as dilatation and evacuation (D&E). Most intrauterine instillations involved the use of saline and were performed at  $\geq 16$  weeks of gestation.

For all racial groups, educational level (years of school completed) strongly influenced when an abortion was performed (Table 17). For example, for white women who obtained an abortion, 60% of the college-educated women ( $\geq 16$  years of school completed) had an early abortion ( $\leq 8$  weeks), compared with 46% of the women who completed high school (12 years) only. For minority women who obtained an abortion, approximately 53% of college-educated women had an early abortion, compared with 42% of women who completed high school only.

Abortion ratios were calculated by race, age, and educational level (Table 18). Patterns were different between whites and minorities. Among white women  $\geq 25$  years, the abortion ratio rose with increasing levels of education for women with less than a high school education, was highest for high school graduates, and declined for women with higher educational levels (Figure 4). For minority women  $\geq 25$  years, the abortion ratio was also highest for high school graduates; it declined for women with some college (13-15 years completed), and then rose for college graduates ( $\geq 16$  years).

## DISCUSSION

From 1970 to 1982, the reported number of legal abortions in the United States increased every year (Figure 1); the largest percentage increase occurred during the period 1970-1972. From 1976 to 1982, this annual increase declined continuously, reaching a low of 0.2% for the period 1981-1982. Since 1983, the number of abortions has remained relatively stable, with only small ( $< 3\%$ ) year-to-year fluctuations.

The abortion ratio increased each year from 1970 to 1980 and has remained relatively stable since 1980 (Figure 1). The abortion rate also increased each year through 1980, when it reached 25 abortions/1,000 women ages 15-44 years. Since that time, the rate has remained stable, fluctuating from 23 to 24 abortions/1,000 women ages 15-44 years (Figure 1).

The number of legal abortions reported to CDC in 1988 was probably lower than the number actually performed. Totals provided by central health agencies are often lower than those obtained by direct surveys of abortion providers (4). For example, in 1988, the total number of abortions reported by DRH was approximately 16% lower than that reported by the Alan Guttmacher Institute, a private organization that obtains information on the number of abortions performed directly from abortion providers (5).

Since 1972, the abortion ratio has declined for all age groups, particularly for women ages  $\geq 30$  years. Higher rates of childbearing among women ages 30-39 years may account for some of this decline (6). The abortion ratio for teens has also steadily declined since 1972. In 1988, the abortion ratio for women  $< 15$  years was lower than in any other year since 1972.

Several other trends were observed—not necessarily related to each other—for women who obtained abortions between 1972 and 1988 (Table 1). During that period, the proportion of women obtaining an abortion in their state of residence increased from 56% to 93% and has remained at approximately 92% since 1984 (Table 1). From 1972 through 1985, the proportion of women who were unmarried obtaining abortions increased steadily—from 70% to 81% (3). In 1986, the proportion of unmarried women obtaining abortions decreased slightly to 80% and remained at that level in 1988. The percentage of abortions among minority women increased from 23% in 1972 to 36% in 1988, and the number of women with one or no previous live births increased from 68% to 76% during the same period. The percent distribution of abortions by gestational age has been relatively stable since 1977.

From 1974 to 1988, the trend of a smaller proportion of women obtaining abortions for the first time—75% of women in 1974 and 56% in 1988—continued. During this 15-year period, the percentage of women who had previously had one induced abortion increased from 10% to 26%, the percentage who had had two increased from about 1% to 10%, and the percentage who had had three or more increased from 0.4% to approximately 5%. These increases probably reflect the increasing number of women at risk of having more than one abortion and the fact that women who have had an abortion are more likely to have another one than are women who have never had one (7,8).

Between 1972 and 1988, the percentage of abortions performed by curettage increased from 89% to almost 99%. Surveillance during the same period showed a sharp decline in the percentage of abortions performed by intrauterine instillation (from 10% to 1%) and by hysterectomy and hysterotomy (from 0.6% to 0.01%).

Between 1975 and 1988, the percentage of second-trimester abortions performed by D&E increased from 33% to 88%, whereas the percentage of second-trimester abortions that were performed by intrauterine instillation decreased from 57% to 9%. The increasing use of D&E may result from the improved technology and the lower risk of complications associated with the procedure (9,10).

For the first time, this report analyzes women having abortions by age, race, and weeks of gestation and includes data on residence and educational status from data reported to NCHS. The abortion data collected through the NCHS data system in selected states may not be representative of all women who obtained abortions in 1988. However, the information on residence and educational status provides an additional characterization of women who use abortion services in certain states.

Previous reports have found, as did this study, that age is inversely correlated with the timing of abortion (11). Moreover, other studies have found that black women have abortions later than white women do (12).

The abortion ratio was higher for women residing in metropolitan areas than in nonmetropolitan areas. This difference was especially marked for minority women. Other studies have consistently found higher use of abortion services among metropolitan women (12-14). Access to local abortion services varies widely by geographic area of the country. In 1988, only 17% of women ages 15-44 years residing in nonmetropolitan counties lived in a county where there was an abortion provider, whereas 84% of women residing in metropolitan counties had such access (5). Distance needed to travel to seek an abortion provider may affect use of such services.

Other studies have found, as did this study, that women with 12 years of education were more likely to have an abortion than were women with <12 years of education (13). This relation was true for women of all races and was previously found for women residing in the NCHS reporting areas (12,15). However, minority women who completed college had an abortion ratio substantially higher than that of women who had some college (13-15 years); this unexplained finding has not been previously observed and may have resulted from population trends in the limited number of states reporting this information. As shown in this and in previous studies, better-educated women had abortions earlier in gestation than did women with limited education (16,17). Future studies that examine educational level and other socioeconomic factors can provide an increased understanding of the characteristics of women obtaining abortions in the United States.

#### References

1. Kochanek KD. Induced terminations of pregnancy: reporting states, 1988. Monthly vital statistics report 1991;39(suppl):12. Hyattsville, Maryland: US Department of Health and Human Services, Public Health Service, National Center for Health Statistics; DHHS publication no. (PHS)91-1120.
2. CDC. Abortion surveillance, 1986-1987. In: CDC Surveillance Summaries, June 1990. MMWR 1990;39(no. SS-2):23-56.
3. CDC. Abortion surveillance, United States, 1984-1985. In: CDC Surveillance Summaries, September 1989. MMWR 1989; 38(no. SS-2):11-45.
4. Atrash HK, Lawson HW, Smith JC. Legal abortion in the US: trends and mortality. Contemp OB GYN 1990;35:58-69.
5. Henshaw SK, Forrest JD, VanVort J. Abortion services in the United States, 1987 and 1988. Fam Plann Perspect 1990;22:102-8.
6. NCHS. Advance report of final natality statistics, 1988. Monthly vital statistics report 1990;39(suppl):4. Hyattsville, Maryland: US Department of Health and Human Services, Public Health Service, National Center for Health Statistics; DHHS Pub. No. (PHS) 90-1120.
7. Tietze C, Jain A. The mathematics of repeat abortion: explaining the increase. Stud Fam Plann 1978;9:294-9.
8. Tietze C, Bougaarts J. Repeat abortion in the United States: new insights. Stud Fam Plann 1982;13:373-9.
9. Cates W Jr, Schulz KF, Grimes DA, et al. Dilatation and evacuation procedures and second-trimester abortion: the role of physician skill and hospital setting. JAMA 1982; 248:559-63.
10. Grimes DA. Second-trimester abortions in the United States. Fam Plann Perspect 1984; 16:260-6.
11. Tietze C, Henshaw SK. Induced abortion: a world review. 6th ed. New York: The Alan Guttmacher Institute, 1986.
12. Kochanek, KD. Induced terminations of pregnancy: reporting states, 1987. Monthly vital statistics report 1989;38(suppl):9. Hyattsville, Maryland: US Department of Health and Human Services, Public Health Service, National Center for Health Statistics; DHHS publication no. (PHS)90-1120.
13. Griner-Powell E, Trent K. Sociodemographic determinants of abortion in the United States. Demography 1987;24:553-61.
14. Henshaw SK, Silverman J. The characteristics and prior contraceptive use of U.S. abortion patients. Fam Plann Perspect 1988;20:158-68.
15. Kochanek KD. Induced terminations of pregnancy: reporting states, 1985 and 1986. Monthly vital statistics report 1989;37(suppl):12. Hyattsville, Maryland: US Department of Health and Human Services, Public Health Service, National Center for Health Statistics; DHHS publication no. (PHS)89-1120.
16. Burr WA, Schultz KF. Delayed abortion in an area of easy accessibility. JAMA 1980;244:44-8.
17. Fielding WL, Sachtleben MR, Friedman LM, Friedman EA. Comparison of women seeking early and late abortion. Am J Obstet Gynecol 1978;131:304-10.

## Appendix A

Areas reporting abortion data to National Center for Health Statistics,  
by year, 1980-1988.

| Areas          | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|----------------|------|------|------|------|------|------|------|------|------|
| Colorado       | x*   | x*   | x*   | x*   | x*   | x*   | x*   | x*   | x*   |
| Indiana        |      |      | x    | x    | x    | x    | x    | x    | x    |
| Kansas         | x*   | x    | x    | x    | x    | x    | x    | x    | x    |
| Maine          |      |      |      |      |      |      |      | x    | x    |
| Missouri       | x    | x    | x    | x    | x    | x    | x    | x    | x    |
| Montana        | x    | x    | x    | x    | x    | x    | x    | x    | x    |
| New York       | x    | x    | x    | x    | x    | x    | x    | x    | x*   |
| New York City  | x    | x    | x    | x    | x    | x    | x    | x    | x    |
| Oregon         | x    | x    | x    | x    | x    | x    | x    | x    | x    |
| Rhode Island   | x*   | x*   | x*   | x*   | x*   | x*   | x*   | x*   | x*   |
| South Carolina | x    | x    | x    | x    | x    | x    | x    | x    | x    |
| Tennessee      | x    | x    | x    | x    | x    | x    | x    | x    | x    |
| Utah           | x    | x    | x    | x    | x    | x    | x    | x    | x    |
| Vermont        | x    | x    | x    | x    | x    | x    | x    | x    | x    |
| Virginia       | x    | x    | x    | x    | x    | x    | x    | x    | x    |

x = Data available.

\*Not included in the analysis of education.

**TABLE 1. Characteristics of women who obtained legal abortions – United States, selected years, 1972-1988\***

| Characteristic  | Year  |         |         |           |           |           |           |                    |                    |           |
|---|---|---------|---------|-----------|-----------|-----------|-----------|--------------------|--------------------|-----------|
|   | 1972  | 1973    | 1976    | 1978      | 1980      | 1982      | 1984      | 1986               | 1987               | 1988      |
| <b>Reported number of legal abortions</b>                 | 586,760                                       | 615,831 | 988,267 | 1,157,776 | 1,297,606 | 1,303,980 | 1,333,521 | 1,328,112          | 1,353,671          | 1,371,285 |
| Abortion ratio <sup>†</sup>                               | 180   | 196     | 312     | 347       | 359       | 354       | 364       | 354                | 356                | 352       |
| Abortion rate <sup>§</sup>                                | 13  | 14      | 21      | 23        | 25        | 24        | 24        | 23                 | 24                 | 24        |
|   | <b>Percentage distribution<sup>¶,**</sup></b> |         |         |           |           |           |           |                    |                    |           |
| <b>Residence</b>  |   |         |         |           |           |           |           |                    |                    |           |
| Abortion in-state   | 56.2  | 74.8    | 90.0    | 89.3      | 92.6      | 92.9      | 92.0      | 92.4               | 91.7               | 91.4      |
| Abortion out-of-state                                     | 43.8  | 25.2    | 10.0    | 10.7      | 7.4       | 7.1       | 8.0       | 7.6                | 8.3                | 8.6       |
| <b>Geographic area<sup>††,§§</sup></b>                    |   |         |         |           |           |           |           |                    |                    |           |
| Metropolitan  | –   | –       | –       | –         | 85.3      | 86.7      | 86.9      | 86.7               | 86.9               | 86.3      |
| Nonmetropolitan   | –   | –       | –       | –         | 14.7      | 13.3      | 13.1      | 13.3               | 13.1               | 13.7      |
| <b>Age (years)</b>  |   |         |         |           |           |           |           |                    |                    |           |
| ≤19   | 32.6  | 32.7    | 32.1    | 30.0      | 29.2      | 27.1      | 26.4      | 25.3               | 25.8               | 25.3      |
| 20-24   | 32.5  | 32.0    | 33.3    | 35.0      | 35.5      | 35.1      | 35.3      | 34.0               | 33.4               | 32.8      |
| ≥25   | 34.9  | 35.3    | 34.6    | 34.9      | 35.3      | 37.8      | 38.3      | 40.7               | 40.8               | 41.9      |
| <b>Race</b>   |   |         |         |           |           |           |           |                    |                    |           |
| White   | 77.0  | 72.5    | 66.6    | 67.0      | 69.9      | 68.5      | 67.4      | 67.0               | 66.4               | 64.4      |
| Black and other   | 23.0  | 27.5    | 33.4    | 33.0      | 30.1      | 31.5      | 32.6      | 33.0               | 33.6               | 35.6      |
| <b>Marital status</b>                                     |   |         |         |           |           |           |           |                    |                    |           |
| Married   | 29.7  | 27.4    | 24.6    | 26.4      | 23.1      | 22.0      | 20.5      | 20.2 <sup>¶¶</sup> | 20.8 <sup>¶¶</sup> | 20.3      |
| Unmarried   | 70.3  | 72.6    | 75.4    | 73.6      | 76.9      | 78.0      | 79.5      | 79.8 <sup>¶¶</sup> | 79.2 <sup>¶¶</sup> | 79.7      |
| <b>Education (years of school completed)<sup>††</sup></b> |   |         |         |           |           |           |           |                    |                    |           |
| 0-8   | –   | –       | –       | –         | 3.3       | 2.8       | 2.5       | 2.5                | 2.3                | 1.6       |
| 9-11  | –   | –       | –       | –         | 20.3      | 19.4      | 18.1      | 18.2               | 18.1               | 13.0      |
| 12  | –   | –       | –       | –         | 44.7      | 44.5      | 46.4      | 47.1               | 49.9               | 54.1      |
| 13-15   | –   | –       | –       | –         | 21.3      | 22.5      | 21.8      | 21.4               | 19.6               | 16.9      |
| ≥16   | –   | –       | –       | –         | 10.4      | 11.0      | 11.2      | 10.8               | 10.1               | 14.4      |

**TABLE 1. Characteristics of women who obtained legal abortions – United States, selected years, 1972-1988\* – Continued**

| Characteristic                  | Year |      |      |      |      |                    |                    |                    |                    |                    |
|---------------------------------|------|------|------|------|------|--------------------|--------------------|--------------------|--------------------|--------------------|
|                                 | 1972 | 1973 | 1976 | 1978 | 1980 | 1982               | 1984               | 1986               | 1987               | 1988               |
| <b>Number of live births***</b> |      |      |      |      |      |                    |                    |                    |                    |                    |
| 0                               | 49.4 | 48.6 | 47.7 | 56.6 | 58.4 | 57.8               | 57.0               | 55.1               | 53.6               | 52.4               |
| 1                               | 18.2 | 18.8 | 20.7 | 19.2 | 19.5 | 20.3               | 20.9               | 22.1               | 22.8               | 23.4               |
| 2                               | 13.3 | 14.2 | 15.4 | 14.1 | 13.7 | 13.9               | 14.4               | 14.9               | 15.5               | 16.0               |
| 3                               | 8.7  | 8.7  | 8.3  | 5.9  | 5.3  | 5.1                | 5.1                | 5.3                | 5.5                | 5.6                |
| ≥4                              | 10.4 | 9.7  | 7.9  | 4.2  | 3.2  | 2.9                | 2.6                | 2.6                | 2.6                | 2.6                |
| <b>Type of procedure</b>        |      |      |      |      |      |                    |                    |                    |                    |                    |
| Curettage                       | 88.6 | 88.4 | 92.8 | 94.6 | 95.5 | 96.4               | 96.8               | 97.0               | 97.2               | 98.6               |
| <i>Suction</i>                  | 65.2 | 74.9 | 82.6 | 90.2 | 89.8 | 90.6               | 93.1               | 94.5               | 93.3               | 95.1               |
| <i>Sharp</i>                    | 23.4 | 13.5 | 10.2 | 4.4  | 5.7  | 5.8                | 3.7                | 2.5                | 3.7                | 3.5                |
| Intrauterine instillation       | 10.4 | 10.4 | 6.0  | 3.9  | 3.1  | 2.5                | 1.9                | 1.4                | 1.3                | 1.1                |
| Hysterotomy/hysterectomy        | 0.6  | 0.7  | 0.2  | 0.1  | 0.1  | 0.0 <sup>†††</sup> | 0.0 <sup>†††</sup> | 0.0 <sup>†††</sup> | 0.0 <sup>†††</sup> | 0.0 <sup>†††</sup> |
| Other                           | 0.5  | 0.6  | 0.9  | 1.4  | 1.3  | 1.0                | 1.3                | 1.6                | 1.5                | 0.3                |
| <b>Weeks of gestation</b>       |      |      |      |      |      |                    |                    |                    |                    |                    |
| ≤8                              | 34.0 | 36.1 | 47.0 | 52.2 | 51.7 | 50.6               | 50.5               | 51.0               | 50.4               | 48.7               |
| 9-10                            | 30.7 | 29.4 | 28.0 | 26.9 | 26.2 | 26.7               | 26.4               | 25.8               | 26.0               | 26.4               |
| 11-12                           | 17.5 | 17.9 | 14.4 | 12.3 | 12.2 | 12.4               | 12.6               | 12.2               | 12.4               | 12.7               |
| 13-15                           | 8.4  | 6.9  | 4.5  | 4.0  | 5.2  | 5.3                | 5.8                | 6.1                | 6.2                | 6.6                |
| 16-20                           | 8.2  | 8.0  | 5.1  | 3.7  | 3.9  | 3.9                | 3.9                | 4.1                | 4.2                | 4.5                |
| ≥21                             | 1.3  | 1.7  | 0.9  | 0.9  | 0.9  | 1.1                | 0.8                | 0.8                | 0.8                | 1.1                |

\*Based on data reported to the Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, unless otherwise noted.

†Number of abortions per 1,000 live births.

‡Number of abortions per 1,000 women 15-44 years of age.

§Excludes unknown values, unless otherwise noted.

\*\*Because the number of states that reported each characteristic varies from year to year, temporal comparisons should be made with caution.

††Reported to the Division of Vital Statistics, National Center for Health Statistics. (See Appendix A.)

‡‡Unknowns have been redistributed, based on known values.

†††Updates data previously published.

\*\*\*For years 1972-1976, data indicate number of living children.

††††<0.05%.

–Not reported.

**TABLE 2. Source of abortion reporting,\* number of reported abortions, and abortion ratio and rate, by year, United States, selected years, 1972-1988**

|   | 1972    | 1976    | 1980      | 1984      | 1986      | 1987      | 1988      |
|---|---------|---------|-----------|-----------|-----------|-----------|-----------|
| Number of reporting areas that reported data through central health agency <sup>†</sup>     | 21      | 41      | 47        | 44        | 43        | 45        | 45        |
| Number of reporting areas that reported data through hospitals and other medical facilities | 8       | 11      | 5         | 8         | 9         | 7         | 7         |
| Total number of abortions reported  | 586,760 | 988,267 | 1,297,606 | 1,333,521 | 1,328,112 | 1,353,671 | 1,371,285 |
| Abortion ratio (per 1,000 live births)  | 180     | 312     | 359       | 364       | 354       | 356       | 352       |
| Abortion rate (per 1,000 women ages 15-44 years)  | 13      | 21      | 25        | 24        | 23        | 24        | 24        |

\*Reported to the Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control. See Appendix A for states reporting to the National Center for Health Statistics.

<sup>†</sup>The reporting areas consist of 50 states, the District of Columbia, and New York City.

**TABLE 3. Reported number of legal abortions, abortion ratio and rate, and percentage of abortions obtained by out-of-state residents, by state of occurrence, 1988**

| State         | Number of abortions*  | Ratio <sup>†</sup> | Rate <sup>§</sup> | Percentage of abortions obtained by out-of-state residents <sup>¶</sup> |
|---------------|-----------------------|--------------------|-------------------|---|
| Alabama       | 14,746**              | 243                | 16                | —   |
| Alaska        | 1,463**               | 132                | 11                | —   |
| Arizona       | 15,922                | 243                | 20                | 8.3   |
| Arkansas      | 5,439                 | 155                | 10                | 2.0   |
| California    | 334,887 <sup>††</sup> | 628                | 49                | —   |
| Colorado      | 12,425                | 233                | 16                | 7.4   |
| Connecticut   | 20,219                | 421                | 28                | 4.3   |
| Delaware      | 5,458                 | 525                | 36                | —   |
| Dist. of Col. | 20,822                | <sup>§§</sup>      | <sup>¶¶</sup>     | 50.4  |
| Florida       | 65,153                | 356                | 23                | —   |
| Georgia       | 35,213                | 335                | 23                | 8.9   |
| Hawaii        | 6,040                 | 319                | 26                | 0.6   |
| Idaho         | 1,650                 | 105                | 8                 | 7.8   |
| Illinois      | 50,478                | 273                | 18                | 2.7   |
| Indiana       | 13,003                | 160                | 10                | 4.6   |
| Iowa          | 6,405**               | 168                | 10                | —   |
| Kansas        | 7,534                 | 195                | 13                | 4.2   |
| Kentucky      | 11,631                | 228                | 13                | 3.2   |

**TABLE 3. Reported number of legal abortions, abortion ratio and rate, and percentage of abortions obtained by out-of-state residents, by state of occurrence, 1988 — Continued**

| State         | Number of abortions* | Ratio†     | Rate‡     | Percentage of abortions obtained by out-of-state residents¶ |
|---------------|----------------------|------------|-----------|---|
| Louisiana     | 15,367               | 208        | 15        | —   |
| Maine         | 4,723                | 275        | 18        | 1.9   |
| Maryland      | 23,707               | 310        | 20        | 1.2   |
| Massachusetts | 38,841               | 441        | 26        | 6.8   |
| Michigan      | 46,747               | 335        | 21        | —   |
| Minnesota     | 17,975               | 269        | 17        | 10.2  |
| Mississippi   | 5,170                | 123        | 9         | 15.2  |
| Missouri      | 17,382               | 228        | 14        | 11.3  |
| Montana       | 2,866                | 245        | 16        | 25.0  |
| Nebraska      | 6,006                | 251        | 17        | 21.0  |
| Nevada        | 6,936                | 377        | 28        | 11.9  |
| New Hampshire | 4,156**              | 239        | 15        | —   |
| New Jersey    | 35,987               | 306        | 19        | 3.2   |
| New Mexico    | 5,126                | 190        | 15        | 4.2   |
| New York      | 142,862              | 519        | 34        | 5.9   |
| (City)        | 90,137***            | 733        | —         | 7.6   |
| (Upstate)     | 52,725               | 346        | —         | 3.2   |
| N. Carolina   | 37,629               | 386        | 25        | 7.7   |
| N. Dakota     | 2,221                | 220        | 15        | 44.1  |
| Ohio          | 34,543               | 215        | 14        | 7.0   |
| Oklahoma      | 11,073**             | 262        | 15        | —   |
| Oregon        | 13,309               | 334        | 21        | 9.2   |
| Pennsylvania  | 50,786               | 307        | 19        | 5.9   |
| Rhode Island  | 7,615                | 537        | 33        | —   |
| S. Carolina   | 14,133               | 257        | 17        | 5.5   |
| S. Dakota     | 898                  | 80         | 5         | 13.1  |
| Tennessee     | 21,589               | 305        | 20        | 17.8  |
| Texas         | 81,474               | 269        | 20        | 4.6   |
| Utah          | 4,732                | 131        | 13        | 14.5  |
| Vermont       | 3,309                | 408        | 26        | 29.1  |
| Virginia      | 34,029               | 367        | 24        | 5.9   |
| Washington    | 29,802               | 411        | 27        | 5.8   |
| West Virginia | 3,467**              | 159        | 8         | —   |
| Wisconsin     | 17,986               | 254        | 16        | 7.1   |
| Wyoming       | 351                  | 49         | 3         | 12.1  |
| <b>Total</b>  | <b>1,371,285</b>     | <b>352</b> | <b>24</b> | <b>8.6</b>  |

\*Abortion data from central health agency unless otherwise noted.

†Abortions per 1,000 live births (live-birth data from central health agency).

‡Abortions per 1,000 women ages 15-44 (number of women ages 15-44 from Bureau of the Census, Current Population Survey, March 1988, Tape Technical Documentation, Washington, DC).

¶Based on number of abortions for which residence status of woman was known.

\*\*Reported from hospitals and/or other medical facilities in state.

††CDC estimate.

‡‡>1,000 abortions per 1,000 live births.

¶¶>100 abortions per 1,000 women ages 15-44.

\*\*\*Reported from New York City Health Department.

—Not reported.

TABLE 4. Reported legal abortions, by age group and state of occurrence, selected states,\* 1988

| State         | Age group (years) |     |        |      |        |      |        |      |        |      |       |     |       |     |         |     |                     |       |
|---------------|-------------------|-----|--------|------|--------|------|--------|------|--------|------|-------|-----|-------|-----|---------|-----|---------------------|-------|
|               | <15               |     | 15-19  |      | 20-24  |      | 25-29  |      | 30-34  |      | 35-39 |     | ≥40   |     | Unknown |     | Total               |       |
|               | No.               | %   | No.    | %    | No.    | %    | No.    | %    | No.    | %    | No.   | %   | No.   | %   | No.     | %   | No.                 | %     |
| Arizona       | 87                | 0.5 | 3,493  | 21.9 | 5,113  | 32.1 | 3,655  | 23.0 | 1,965  | 12.3 | 858   | 5.4 | 184   | 1.2 | 567     | 3.6 | 15,922              | 100.0 |
| Arkansas      | 62                | 1.1 | 1,690  | 31.1 | 1,714  | 31.5 | 1,025  | 18.8 | 563    | 10.4 | 288   | 5.3 | 96    | 1.8 | 1       | 0.0 | 5,439               | 100.0 |
| Colorado      | 76                | 0.6 | 3,106  | 25.0 | 3,851  | 31.0 | 2,636  | 21.2 | 1,608  | 12.9 | 820   | 6.6 | 213   | 1.7 | 115     | 0.9 | 12,425              | 100.0 |
| Connecticut   | 159               | 0.8 | 5,183  | 25.6 | 6,684  | 33.1 | 4,248  | 21.0 | 2,270  | 11.2 | 1,059 | 5.2 | 309   | 1.5 | 307     | 1.5 | 20,219              | 100.0 |
| Dist. of Col. | 357               | 1.7 | 3,746  | 18.0 | 6,622  | 31.8 | 4,942  | 23.7 | 2,871  | 13.8 | 1,280 | 6.1 | 254   | 1.2 | 750     | 3.6 | 20,822              | 100.0 |
| Georgia       | 393               | 1.1 | 8,824  | 25.1 | 11,644 | 33.1 | 7,665  | 21.8 | 4,226  | 12.0 | 1,960 | 5.6 | 493   | 1.4 | 8       | 0.0 | 35,213              | 100.0 |
| Hawaii        | 38                | 0.6 | 1,288  | 21.3 | 1,840  | 30.5 | 1,412  | 23.4 | 842    | 13.9 | 485   | 8.0 | 133   | 2.2 | 2       | 0.0 | 6,040               | 100.0 |
| Idaho         | 11                | 0.7 | 411    | 24.9 | 506    | 30.7 | 333    | 20.2 | 229    | 13.9 | 109   | 6.6 | 44    | 2.7 | 7       | 0.4 | 1,650               | 100.0 |
| Indiana       | 135               | 1.1 | 3,079  | 24.8 | 4,176  | 33.6 | 2,492  | 20.1 | 1,431  | 11.5 | 718   | 5.8 | 180   | 1.5 | 200     | 1.6 | 12,411 <sup>†</sup> | 100.0 |
| Kansas        | 69                | 0.9 | 2,405  | 31.9 | 2,361  | 31.3 | 1,438  | 19.1 | 776    | 10.3 | 385   | 5.1 | 99    | 1.3 | 1       | 0.0 | 7,534               | 100.0 |
| Kentucky      | 155               | 1.3 | 3,568  | 30.7 | 3,838  | 33.0 | 2,030  | 17.5 | 1,186  | 10.2 | 593   | 5.1 | 146   | 1.3 | 115     | 1.0 | 11,631              | 100.0 |
| Louisiana     | 187               | 1.2 | 3,577  | 23.3 | 4,815  | 31.3 | 3,325  | 21.6 | 2,056  | 13.4 | 1,075 | 7.0 | 267   | 1.7 | 65      | 0.4 | 15,367              | 100.0 |
| Maine         | 29                | 0.6 | 1,460  | 30.9 | 1,480  | 31.3 | 872    | 18.5 | 474    | 10.0 | 231   | 4.9 | 68    | 1.4 | 109     | 2.3 | 4,723               | 100.0 |
| Maryland      | 285               | 1.2 | 5,572  | 23.5 | 8,055  | 34.0 | 5,435  | 22.9 | 2,882  | 12.2 | 1,165 | 4.9 | 313   | 1.3 | 0       | 0.0 | 23,707              | 100.0 |
| Massachusetts | 186               | 0.5 | 9,827  | 25.3 | 11,473 | 29.5 | 8,455  | 21.8 | 4,695  | 12.1 | 2,601 | 6.7 | 843   | 2.2 | 761     | 2.0 | 38,841              | 100.0 |
| Michigan      | — <sup>§</sup>    | 0.0 | 12,900 | 28.4 | 14,895 | 32.8 | 9,391  | 20.7 | 5,196  | 11.4 | 2,392 | 5.3 | 570   | 1.3 | 94      | 0.2 | 45,438 <sup>†</sup> | 100.0 |
| Minnesota     | 92                | 0.5 | 4,533  | 25.2 | 6,012  | 33.4 | 3,804  | 21.2 | 2,091  | 11.6 | 1,039 | 5.8 | 281   | 1.6 | 123     | 0.7 | 17,975              | 100.0 |
| Mississippi   | 103               | 2.0 | 1,441  | 27.9 | 1,616  | 31.3 | 1,003  | 19.4 | 620    | 12.0 | 297   | 5.7 | 84    | 1.6 | 6       | 0.1 | 5,170               | 100.0 |
| Missouri      | 194               | 1.1 | 4,022  | 23.1 | 5,855  | 33.7 | 3,795  | 21.8 | 2,149  | 12.4 | 1,072 | 6.2 | 291   | 1.7 | 4       | 0.0 | 17,382              | 100.0 |
| Montana       | 18                | 0.6 | 833    | 29.1 | 847    | 29.6 | 555    | 19.4 | 350    | 12.2 | 195   | 6.8 | 62    | 2.2 | 6       | 0.2 | 2,866               | 100.0 |
| Nebraska      | 34                | 0.6 | 1,725  | 28.7 | 1,937  | 32.3 | 1,233  | 20.5 | 616    | 10.3 | 362   | 6.0 | 99    | 1.6 | 0       | 0.0 | 6,006               | 100.0 |
| Nevada        | 39                | 0.6 | 1,439  | 20.7 | 2,067  | 29.8 | 1,703  | 24.6 | 1,046  | 15.1 | 494   | 7.1 | 107   | 1.5 | 41      | 0.6 | 6,936               | 100.0 |
| New Jersey    | 333               | 0.9 | 8,393  | 23.3 | 12,199 | 33.9 | 7,869  | 21.9 | 4,259  | 11.8 | 2,212 | 6.1 | 694   | 1.9 | 28      | 0.1 | 35,987              | 100.0 |
| New Mexico    | 30                | 0.6 | 1,233  | 24.1 | 1,559  | 30.4 | 1,098  | 21.4 | 692    | 13.5 | 366   | 7.1 | 117   | 2.3 | 31      | 0.6 | 5,126               | 100.0 |
| New York      | 1,092             | 0.8 | 30,110 | 21.1 | 46,052 | 32.2 | 32,199 | 22.5 | 18,295 | 12.8 | 9,109 | 6.4 | 2,608 | 1.8 | 3,397   | 2.4 | 142,862             | 100.0 |
| (City)        | 785               | 0.9 | 16,728 | 18.6 | 27,959 | 31.0 | 21,555 | 23.9 | 12,646 | 14.0 | 6,162 | 6.8 | 1,750 | 1.9 | 2,552   | 2.8 | 90,137              | 100.0 |
| (Upstate)     | 307               | 0.6 | 13,382 | 25.4 | 18,093 | 34.3 | 10,644 | 20.2 | 5,649  | 10.7 | 2,947 | 5.6 | 858   | 1.6 | 845     | 1.6 | 52,725              | 100.0 |
| N. Carolina   | 482               | 1.3 | 10,672 | 28.4 | 12,473 | 33.1 | 7,294  | 19.4 | 3,962  | 10.5 | 1,835 | 4.9 | 449   | 1.2 | 462     | 1.2 | 37,629              | 100.0 |
| N. Dakota     | 13                | 0.6 | 653    | 29.4 | 737    | 33.2 | 422    | 19.0 | 232    | 10.4 | 133   | 6.0 | 31    | 1.4 | 0       | 0.0 | 2,221               | 100.0 |

**TABLE 4. Reported legal abortions, by age group and state of occurrence, selected states,\* 1988 — Continued**

| State                       | Age group (years) |            |                |             |                |             |                |             |                |             |               |            |               |            |              |            |                     |              |
|-----------------------------|-------------------|------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|---------------|------------|---------------|------------|--------------|------------|---------------------|--------------|
|                             | <15               |            | 15-19          |             | 20-24          |             | 25-29          |             | 30-34          |             | 35-39         |            | ≥40           |            | Unknown      |            | Total               |              |
|                             | No.               | %          | No.            | %           | No.            | %           | No.            | %           | No.            | %           | No.           | %          | No.           | %          | No.          | %          | No.                 | %            |
| Ohio                        | 190               | 0.6        | 8,195          | 23.7        | 11,500         | 33.3        | 6,945          | 20.1        | 4,022          | 11.6        | 1,942         | 5.6        | 584           | 1.7        | 1,165        | 3.4        | 34,543              | 100.0        |
| Oregon                      | 69                | 0.5        | 3,586          | 26.9        | 4,192          | 31.5        | 2,727          | 20.5        | 1,649          | 12.4        | 849           | 6.4        | 187           | 1.4        | 50           | 0.4        | 13,309              | 100.0        |
| Pennsylvania                | 511               | 1.0        | 13,595         | 26.8        | 16,173         | 31.8        | 10,464         | 20.6        | 6,201          | 12.2        | 2,997         | 5.9        | 826           | 1.6        | 19           | 0.0        | 50,786              | 100.0        |
| Rhode Island                | 27                | 0.4        | 1,754          | 23.0        | 2,697          | 35.4        | 1,643          | 21.6        | 939            | 12.3        | 427           | 5.6        | 128           | 1.7        | 0            | 0.0        | 7,615               | 100.0        |
| S. Carolina                 | 137               | 1.0        | 3,880          | 27.5        | 4,651          | 32.9        | 2,891          | 20.5        | 1,670          | 11.8        | 711           | 5.0        | 192           | 1.4        | 1            | 0.0        | 14,133              | 100.0        |
| South Dakota                | 7                 | 0.8        | 245            | 27.3        | 292            | 32.5        | 184            | 20.5        | 99             | 11.0        | 50            | 5.6        | 21            | 2.3        | 0            | 0.0        | 898                 | 100.0        |
| Tennessee                   | 202               | 0.9        | 5,946          | 27.5        | 6,990          | 32.4        | 4,424          | 20.5        | 2,418          | 11.2        | 1,261         | 5.8        | 329           | 1.5        | 19           | 0.1        | 21,589              | 100.0        |
| Texas                       | 398               | 0.5        | 16,564         | 20.3        | 26,772         | 32.9        | 19,518         | 24.0        | 11,227         | 13.8        | 5,413         | 6.6        | 1,568         | 1.9        | 14           | 0.0        | 81,474              | 100.0        |
| Utah                        | 35                | 0.7        | 1,154          | 24.4        | 1,539          | 32.5        | 1,052          | 22.2        | 594            | 12.6        | 268           | 5.7        | 76            | 1.6        | 14           | 0.3        | 4,732               | 100.0        |
| Vermont                     | 11                | 0.3        | 897            | 27.1        | 1,088          | 32.9        | 662            | 20.0        | 384            | 11.6        | 203           | 6.1        | 64            | 1.9        | 0            | 0.0        | 3,309               | 100.0        |
| Virginia                    | 297               | 0.9        | 8,442          | 24.8        | 11,191         | 32.9        | 7,316          | 21.5        | 4,190          | 12.3        | 2,003         | 5.9        | 537           | 1.6        | 53           | 0.2        | 34,029              | 100.0        |
| Washington                  | 187               | 0.6        | 7,073          | 23.7        | 9,527          | 32.0        | 6,692          | 22.5        | 3,834          | 12.9        | 1,977         | 6.6        | 497           | 1.7        | 15           | 0.1        | 29,802              | 100.0        |
| Wisconsin                   | 118               | 0.7        | 4,522          | 27.1        | 5,733          | 34.3        | 3,381          | 20.2        | 1,842          | 11.0        | 871           | 5.2        | 222           | 1.3        | 15           | 0.1        | 16,704 <sup>†</sup> | 100.0        |
| Wyoming                     | 9                 | 2.6        | 102            | 29.1        | 97             | 27.6        | 66             | 18.8        | 38             | 10.8        | 32            | 9.1        | 4             | 1.1        | 3            | 0.9        | 351                 | 100.0        |
| <b>Total</b>                | <b>6,857</b>      | <b>0.8</b> | <b>211,138</b> | <b>24.2</b> | <b>282,863</b> | <b>32.5</b> | <b>188,294</b> | <b>21.6</b> | <b>106,689</b> | <b>12.3</b> | <b>52,137</b> | <b>6.0</b> | <b>14,270</b> | <b>1.6</b> | <b>8,568</b> | <b>1.0</b> | <b>870,816</b>      | <b>100.0</b> |
| Abortion ratio <sup>¶</sup> | 949               |            | 624            |             | 374            |             | 214            |             | 188            |             | 280           |            | 514           |            |              |            | 312                 |              |

\*All states for which data were available (40), the District of Columbia, and New York City.

<sup>†</sup>Includes residents only.

<sup>‡</sup>Women <15 years were included with the 15-19 age group.

<sup>¶</sup>Calculated as the number of legal abortions obtained by women in a given age group per 1,000 live births to women in the same age group for these states. For each state, women with unknown age are distributed according to known age distribution for that state. Excludes states reporting age unknown for >15% of women having abortions.

**TABLE 5. Reported legal abortions obtained by teenagers, by age, selected states,\* 1988**

| State         | Age (years) |     |       |     |       |      |       |      |       |      |       |      |        |       |
|---------------|-------------|-----|-------|-----|-------|------|-------|------|-------|------|-------|------|--------|-------|
|               | <15         |     | 15    |     | 16    |      | 17    |      | 18    |      | 19    |      | Total  |       |
|               | No.         | %   | No.   | %   | No.   | %    | No.   | %    | No.   | %    | No.   | %    | No.    | %     |
| Arizona       | 87          | 2.4 | 168   | 4.7 | 403   | 11.3 | 653   | 18.2 | 1,157 | 32.3 | 1,112 | 31.1 | 3,580  | 100.0 |
| Arkansas      | 62          | 3.5 | 116   | 6.6 | 219   | 12.5 | 373   | 21.3 | 489   | 27.9 | 493   | 28.1 | 1,752  | 100.0 |
| Colorado      | 76          | 2.4 | 199   | 6.3 | 421   | 13.2 | 707   | 22.2 | 900   | 28.3 | 879   | 27.6 | 3,182  | 100.0 |
| Connecticut   | 159         | 3.0 | 276   | 5.2 | 756   | 14.2 | 1,272 | 23.8 | 1,463 | 27.4 | 1,416 | 26.5 | 5,342  | 100.0 |
| Georgia       | 393         | 4.3 | 717   | 7.8 | 1,294 | 14.0 | 1,892 | 20.5 | 2,439 | 26.5 | 2,482 | 26.9 | 9,217  | 100.0 |
| Hawaii        | 38          | 2.9 | 82    | 6.2 | 167   | 12.6 | 265   | 20.0 | 405   | 30.5 | 369   | 27.8 | 1,326  | 100.0 |
| Idaho         | 11          | 2.6 | 26    | 6.2 | 50    | 11.8 | 62    | 14.7 | 135   | 32.0 | 138   | 32.7 | 422    | 100.0 |
| Kansas        | 69          | 2.8 | 178   | 7.2 | 393   | 15.9 | 560   | 22.6 | 649   | 26.2 | 625   | 25.3 | 2,474  | 100.0 |
| Kentucky      | 155         | 4.2 | 292   | 7.8 | 549   | 14.7 | 813   | 21.8 | 984   | 26.4 | 930   | 25.0 | 3,723  | 100.0 |
| Louisiana     | 187         | 5.0 | 311   | 8.3 | 458   | 12.2 | 514   | 13.7 | 1,199 | 31.9 | 1,095 | 29.1 | 3,764  | 100.0 |
| Maine         | 29          | 1.9 | 93    | 6.2 | 246   | 16.5 | 382   | 25.7 | 361   | 24.2 | 378   | 25.4 | 1,489  | 100.0 |
| Maryland      | 285         | 4.9 | 423   | 7.2 | 801   | 13.7 | 1,160 | 19.8 | 1,521 | 26.0 | 1,667 | 28.5 | 5,857  | 100.0 |
| Massachusetts | 186         | 1.9 | 630   | 6.3 | 1,175 | 11.7 | 1,740 | 17.4 | 3,057 | 30.5 | 3,225 | 32.2 | 10,013 | 100.0 |
| Minnesota     | 92          | 2.0 | 240   | 5.2 | 567   | 12.3 | 935   | 20.2 | 1,405 | 30.4 | 1,386 | 30.0 | 4,625  | 100.0 |
| Mississippi   | 103         | 6.7 | 134   | 8.7 | 215   | 13.9 | 320   | 20.7 | 386   | 25.0 | 386   | 25.0 | 1,544  | 100.0 |
| Missouri      | 194         | 4.6 | 300   | 7.1 | 497   | 11.8 | 593   | 14.1 | 1,322 | 31.4 | 1,310 | 31.1 | 4,216  | 100.0 |
| Montana       | 18          | 2.1 | 50    | 5.9 | 134   | 15.7 | 210   | 24.7 | 242   | 28.4 | 197   | 23.1 | 851    | 100.0 |
| Nebraska      | 34          | 1.9 | 95    | 5.4 | 221   | 12.6 | 377   | 21.4 | 498   | 28.3 | 534   | 30.4 | 1,759  | 100.0 |
| Nevada        | 39          | 2.6 | 64    | 4.3 | 176   | 11.9 | 310   | 21.0 | 468   | 31.7 | 421   | 28.5 | 1,478  | 100.0 |
| New Mexico    | 30          | 2.4 | 80    | 6.3 | 186   | 14.7 | 287   | 22.7 | 348   | 27.6 | 332   | 26.3 | 1,263  | 100.0 |
| New York      | 1,092       | 3.5 | 1,826 | 5.9 | 3,950 | 12.7 | 6,411 | 20.5 | 8,787 | 28.2 | 9,136 | 29.3 | 31,202 | 100.0 |
| (City)        | 785         | 4.5 | 1,179 | 6.7 | 2,314 | 13.2 | 3,582 | 20.5 | 4,612 | 26.3 | 5,041 | 28.8 | 17,513 | 100.0 |
| (Upstate)     | 307         | 2.2 | 647   | 4.7 | 1,636 | 12.0 | 2,829 | 20.7 | 4,175 | 30.5 | 4,095 | 29.9 | 13,689 | 100.0 |
| N. Carolina   | 482         | 4.3 | 750   | 6.7 | 1,574 | 14.1 | 2,350 | 21.1 | 3,028 | 27.1 | 2,970 | 26.6 | 11,154 | 100.0 |
| N. Dakota     | 13          | 2.0 | 24    | 3.6 | 43    | 6.5  | 103   | 15.5 | 262   | 39.3 | 221   | 33.2 | 666    | 100.0 |
| Oregon        | 69          | 1.9 | 219   | 6.0 | 500   | 13.7 | 763   | 20.9 | 1,098 | 30.0 | 1,006 | 27.5 | 3,655  | 100.0 |
| Pennsylvania  | 511         | 3.6 | 855   | 6.1 | 1,702 | 12.1 | 2,820 | 20.0 | 4,174 | 29.6 | 4,044 | 28.7 | 14,106 | 100.0 |
| Rhode Island  | 27          | 1.5 | 70    | 3.9 | 154   | 8.6  | 252   | 14.1 | 637   | 35.8 | 641   | 36.0 | 1,781  | 100.0 |
| S. Carolina   | 137         | 3.4 | 270   | 6.7 | 580   | 14.4 | 870   | 21.7 | 1,057 | 26.3 | 1,103 | 27.5 | 4,017  | 100.0 |

**TABLE 5. Reported legal abortions obtained by teenagers, by age, selected states,\* 1988 – Continued**

| State                       | Age (years)  |            |               |            |               |             |               |             |               |             |               |             |                    |              |
|-----------------------------|--------------|------------|---------------|------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|-------------|--------------------|--------------|
|                             | <15          |            | 15            |            | 16            |             | 17            |             | 18            |             | 19            |             | Total              |              |
|                             | No.          | %          | No.           | %          | No.           | %           | No.           | %           | No.           | %           | No.           | %           | No.                | %            |
| South Dakota                | 7            | 2.8        | 17            | 6.7        | 33            | 13.1        | 56            | 22.2        | 70            | 27.8        | 69            | 27.4        | 252                | 100.0        |
| Tennessee                   | 202          | 3.3        | 406           | 6.6        | 778           | 12.7        | 1,244         | 20.2        | 1,847         | 30.0        | 1,671         | 27.2        | 6,148              | 100.0        |
| Texas                       | 398          | 2.3        | 829           | 4.9        | 1,881         | 11.1        | 3,333         | 19.6        | 4,876         | 28.7        | 5,645         | 33.3        | 16,962             | 100.0        |
| Utah                        | 35           | 2.9        | 72            | 6.1        | 141           | 11.9        | 208           | 17.5        | 387           | 32.5        | 346           | 29.1        | 1,189              | 100.0        |
| Vermont                     | 11           | 1.2        | 54            | 5.9        | 114           | 12.6        | 188           | 20.7        | 262           | 28.9        | 279           | 30.7        | 908                | 100.0        |
| Virginia                    | 297          | 3.4        | 580           | 6.6        | 1,138         | 13.0        | 1,776         | 20.3        | 2,536         | 29.0        | 2,412         | 27.6        | 8,739              | 100.0        |
| Washington                  | 187          | 2.6        | 403           | 5.6        | 891           | 12.3        | 1,540         | 21.2        | 2,116         | 29.1        | 2,123         | 29.2        | 7,260              | 100.0        |
| Wisconsin                   | 118          | 2.5        | 276           | 5.9        | 601           | 13.0        | 966           | 20.8        | 1,330         | 28.7        | 1,349         | 29.1        | 4,640 <sup>†</sup> | 100.0        |
| Wyoming                     | 9            | 8.1        | 9             | 8.1        | 15            | 13.5        | 23            | 20.7        | 31            | 27.9        | 24            | 21.6        | 111                | 100.0        |
| <b>Total</b>                | <b>5,842</b> | <b>3.2</b> | <b>11,134</b> | <b>6.2</b> | <b>23,023</b> | <b>12.7</b> | <b>36,328</b> | <b>20.1</b> | <b>51,926</b> | <b>28.7</b> | <b>52,414</b> | <b>29.0</b> | <b>180,667</b>     | <b>100.0</b> |
| Abortion ratio <sup>†</sup> | 978          |            | 767           |            | 728           |             | 654           |             | 666           |             | 535           |             | 637                |              |

\*All states for which data were available (36) and New York City.

<sup>†</sup>Includes residents only.

<sup>†</sup>Calculated as the number of legal abortions obtained by women in a given age per 1,000 live births to women in the same age for these states. For each state, women with unknown age are distributed according to known age distribution for that state. Excludes states reporting age unknown for >15% of women having abortions.

**TABLE 6. Reported legal abortions, by weeks of gestation and state of occurrence, selected states,\* 1988**

| State         | Weeks of gestation |      |        |      |        |      |       |      |       |      |       |     |         |     | Total   |       |
|---------------|--------------------|------|--------|------|--------|------|-------|------|-------|------|-------|-----|---------|-----|---------|-------|
|               | <8                 |      | 9-10   |      | 11-12  |      | 13-15 |      | 16-20 |      | ≥21   |     | Unknown |     |         |       |
|               | No.                | %    | No.    | %    | No.    | %    | No.   | %    | No.   | %    | No.   | %   | No.     | %   | No.     | %     |
| Arizona†      | 6,905              | 43.4 | 4,759  | 29.9 | 2,400  | 15.1 | 1,026 | 6.4  | 613   | 3.9  | 55    | 0.3 | 164     | 1.0 | 15,922  | 100.0 |
| Arkansas      | 2,891              | 53.2 | 1,568  | 28.8 | 551    | 10.1 | 269   | 4.9  | 104   | 1.9  | 6     | 0.1 | 50      | 0.9 | 5,439   | 100.0 |
| Colorado      | 4,528              | 36.4 | 4,194  | 33.8 | 2,144  | 17.3 | 926   | 7.5  | 490   | 3.9  | 110   | 0.9 | 33      | 0.3 | 12,425  | 100.0 |
| Connecticut†  | 9,146              | 45.2 | 7,060  | 34.9 | 2,046  | 10.1 | 1,365 | 6.8  | 221   | 1.1  | 11    | 0.1 | 370     | 1.8 | 20,219  | 100.0 |
| Dist. of Col. | 9,919              | 47.6 | 4,713  | 22.6 | 2,592  | 12.4 | 1,589 | 7.6  | 987   | 4.7  | 47    | 0.2 | 975     | 4.7 | 20,822  | 100.0 |
| Georgia       | 12,463             | 35.4 | 9,835  | 27.9 | 5,899  | 16.8 | 3,030 | 8.6  | 1,734 | 4.9  | 674   | 1.9 | 1,578   | 4.5 | 35,213  | 100.0 |
| Hawaii        | 3,326              | 55.1 | 1,340  | 22.2 | 653    | 10.8 | 327   | 5.4  | 350   | 5.8  | 31    | 0.5 | 13      | 0.2 | 6,040   | 100.0 |
| Idaho         | 568                | 34.4 | 690    | 41.8 | 334    | 20.2 | 12    | 0.7  | 8     | 0.5  | 1     | 0.1 | 37      | 2.2 | 1,650   | 100.0 |
| Kansas        | 2,763              | 36.7 | 2,013  | 26.7 | 1,376  | 18.3 | 477   | 6.3  | 572   | 7.6  | 308   | 4.1 | 25      | 0.3 | 7,534   | 100.0 |
| Kentucky      | 5,100              | 43.8 | 2,245  | 19.3 | 1,225  | 10.5 | 1,203 | 10.3 | 1,382 | 11.9 | 393   | 3.4 | 83      | 0.7 | 11,631  | 100.0 |
| Louisiana     | 7,566              | 49.2 | 3,883  | 25.3 | 1,693  | 11.0 | 960   | 6.2  | 970   | 6.3  | 172   | 1.1 | 123     | 0.8 | 15,367  | 100.0 |
| Maine†        | 1,956              | 41.4 | 1,364  | 28.9 | 715    | 15.1 | 455   | 9.6  | 143   | 3.0  | 0     | 0.0 | 90      | 1.9 | 4,723   | 100.0 |
| Maryland†     | 11,779             | 49.7 | 6,516  | 27.5 | 2,998  | 12.6 | 1,283 | 5.4  | 1,054 | 4.4  | 49    | 0.2 | 28      | 0.1 | 23,707  | 100.0 |
| Minnesota     | 9,242              | 51.4 | 4,175  | 23.2 | 2,256  | 12.6 | 1,259 | 7.0  | 853   | 4.7  | 162   | 0.9 | 28      | 0.2 | 17,975  | 100.0 |
| Mississippi   | 2,424              | 46.9 | 1,375  | 26.6 | 740    | 14.3 | 377   | 7.3  | 112   | 2.2  | 10    | 0.2 | 132     | 2.6 | 5,170   | 100.0 |
| Missouri      | 6,852              | 39.4 | 5,237  | 30.1 | 2,922  | 16.8 | 1,152 | 6.6  | 558   | 3.2  | 75    | 0.4 | 586     | 3.4 | 17,382  | 100.0 |
| Montana†      | 1,665              | 58.1 | 583    | 20.3 | 407    | 14.2 | 128   | 4.5  | 75    | 2.6  | 0     | 0.0 | 8       | 0.3 | 2,866   | 100.0 |
| Nevada        | 4,334              | 62.5 | 1,477  | 21.3 | 576    | 8.3  | 333   | 4.8  | 170   | 2.5  | 12    | 0.2 | 34      | 0.5 | 6,936   | 100.0 |
| New Jersey    | 18,559             | 51.6 | 7,652  | 21.3 | 3,197  | 8.9  | 3,321 | 9.2  | 2,981 | 8.3  | 277   | 0.8 | 0       | 0.0 | 35,987  | 100.0 |
| New Mexico    | 2,656              | 51.8 | 1,274  | 24.9 | 544    | 10.6 | 319   | 6.2  | 280   | 5.5  | 15    | 0.3 | 38      | 0.7 | 5,126   | 100.0 |
| New York      | 67,439             | 47.2 | 35,068 | 24.5 | 17,126 | 12.0 | 9,934 | 7.0  | 7,316 | 5.1  | 2,534 | 1.8 | 3,445   | 2.4 | 142,862 | 100.0 |
| (City)        | 41,198             | 45.7 | 21,215 | 23.5 | 10,957 | 12.2 | 6,813 | 7.6  | 5,816 | 6.5  | 2,272 | 2.5 | 1,866   | 2.1 | 90,137  | 100.0 |
| (Upstate)     | 26,241             | 49.8 | 13,853 | 26.3 | 6,169  | 11.7 | 3,121 | 5.9  | 1,500 | 2.8  | 262   | 0.5 | 1,579   | 3.0 | 52,725  | 100.0 |
| N. Carolina   | 17,049             | 45.3 | 9,323  | 24.8 | 5,314  | 14.1 | 3,129 | 8.3  | 1,252 | 3.3  | 115   | 0.3 | 1,447   | 3.8 | 37,629  | 100.0 |
| N. Dakota     | 1,360              | 61.2 | 457    | 20.6 | 255    | 11.5 | 142   | 6.4  | 5     | 0.2  | 0     | 0.0 | 2       | 0.1 | 2,221   | 100.0 |
| Oregon        | 6,385              | 48.0 | 3,754  | 28.2 | 1,692  | 12.7 | 721   | 5.4  | 461   | 3.5  | 211   | 1.6 | 85      | 0.6 | 13,309  | 100.0 |
| Rhode Island  | 3,242              | 42.6 | 2,677  | 35.2 | 1,117  | 14.7 | 457   | 6.0  | 114   | 1.5  | 8     | 0.1 | 0       | 0.0 | 7,615   | 100.0 |
| S. Carolina†  | 8,598              | 60.8 | 3,732  | 26.4 | 1,724  | 12.2 | 30    | 0.2  | 26    | 0.2  | 21    | 0.1 | 2       | 0.0 | 14,133  | 100.0 |
| S. Dakota     | 473                | 52.7 | 381    | 42.4 | 40     | 4.5  | 4     | 0.4  | 0     | 0.0  | 0     | 0.0 | 0       | 0.0 | 898     | 100.0 |

**TABLE 6. Reported legal abortions, by weeks of gestation and state of occurrence, selected states,\* 1988 – Continued**

| State                   | Weeks of gestation |             |                |             |               |             |               |            |               |            |              |            |              |            |                     |              |
|-------------------------|--------------------|-------------|----------------|-------------|---------------|-------------|---------------|------------|---------------|------------|--------------|------------|--------------|------------|---------------------|--------------|
|                         | <8                 |             | 9-10           |             | 11-12         |             | 13-15         |            | 16-20         |            | ≥21          |            | Unknown      |            | Total               |              |
|                         | No.                | %           | No.            | %           | No.           | %           | No.           | %          | No.           | %          | No.          | %          | No.          | %          | No.                 | %            |
| Tennessee               | 8,035              | 37.2        | 7,379          | 34.2        | 4,045         | 18.7        | 1,485         | 6.9        | 180           | 0.8        | 57           | 0.3        | 408          | 1.9        | 21,589              | 100.0        |
| Texas                   | 39,871             | 48.9        | 20,796         | 25.5        | 9,757         | 12.0        | 5,216         | 6.4        | 4,387         | 5.4        | 1,391        | 1.7        | 56           | 0.1        | 81,474              | 100.0        |
| Utah                    | 3,180              | 67.2        | 757            | 16.0        | 350           | 7.4         | 236           | 5.0        | 165           | 3.5        | 0            | 0.0        | 44           | 0.9        | 4,732               | 100.0        |
| Vermont <sup>†</sup>    | 1,820              | 55.0        | 947            | 28.6        | 411           | 12.4        | 112           | 3.4        | 13            | 0.4        | 5            | 0.2        | 1            | 0.0        | 3,309               | 100.0        |
| Virginia <sup>†</sup>   | 19,450             | 57.2        | 8,899          | 26.2        | 4,141         | 12.2        | 560           | 1.6        | 792           | 2.3        | 138          | 0.4        | 49           | 0.1        | 34,029              | 100.0        |
| Washington <sup>†</sup> | 17,350             | 58.2        | 6,993          | 23.5        | 2,548         | 8.5         | 1,335         | 4.5        | 1,164         | 3.9        | 396          | 1.3        | 16           | 0.1        | 29,802              | 100.0        |
| Wisconsin <sup>†</sup>  | 8,388              | 50.2        | 4,366          | 26.1        | 1,870         | 11.2        | 1,173         | 7.0        | 734           | 4.4        | 173          | 1.0        | 0            | 0.0        | 16,704 <sup>§</sup> | 100.0        |
| Wyoming <sup>†</sup>    | 187                | 53.3        | 138            | 39.3        | 22            | 6.3         | 1             | 0.3        | 0             | 0.0        | 0            | 0.0        | 3            | 0.9        | 351                 | 100.0        |
| <b>Total</b>            | <b>327,469</b>     | <b>48.0</b> | <b>177,620</b> | <b>26.0</b> | <b>85,680</b> | <b>12.5</b> | <b>44,346</b> | <b>6.5</b> | <b>30,266</b> | <b>4.4</b> | <b>7,457</b> | <b>1.1</b> | <b>9,953</b> | <b>1.5</b> | <b>682,791</b>      | <b>100.0</b> |

\*All states for which data were available (34), the District of Columbia, and New York City.

<sup>†</sup>Weeks of gestation is physician's estimate.

<sup>§</sup>Includes residents only.

TABLE 7. Reported legal abortions, by type of procedure and state of occurrence, selected states,\* 1988

| State         | Procedure            |       |                 |      |               |       |                                  |     |   |     |                          |     |                    |     |         |     |                      |       |
|---------------|----------------------|-------|-----------------|------|---------------|-------|----------------------------------|-----|---|-----|--------------------------|-----|--------------------|-----|---------|-----|----------------------|-------|
|               | Suction curettage    |       | Sharp curettage |      | All curettage |       | Intrauterine saline instillation |     | Intrauterine prostaglandin instillation |     | Hysterotomy/hysterectomy |     | Other <sup>†</sup> |     | Unknown |     | Total                |       |
|               | No.                  | %     | No.             | %    | No.           | %     | No.                              | %   | No.                                     | %   | No.                      | %   | No.                | %   | No.     | %   | No.                  | %     |
| Arizona       | 15,621               | 98.1  | 5               | 0.0  | 15,626        | 98.1  | 1                                | 0.0 | 0                                       | 0.0 | 0                        | 0.0 | 3                  | 0.0 | 292     | 1.8 | 15,922               | 100.0 |
| Arkansas      | 3,031                | 55.7  | 2,359           | 43.4 | 5,390         | 99.1  | 0                                | 0.0 | 6                                       | 0.1 | 2                        | 0.0 | 5                  | 0.1 | 36      | 0.7 | 5,439                | 100.0 |
| Colorado      | 11,887               | 95.7  | 27              | 0.2  | 11,914        | 95.9  | 9                                | 0.1 | 90                                      | 0.7 | 4                        | 0.0 | 392                | 3.2 | 16      | 0.1 | 12,425               | 100.0 |
| Connecticut   | 19,952 <sup>§</sup>  | 98.7  | 2               | 0.0  | 19,954        | 98.7  | 2                                | 0.0 | —                                       | —   | 0                        | 0.0 | 14                 | 0.1 | 249     | 1.2 | 20,219               | 100.0 |
| Dist. of Col. | 19,709               | 94.7  | 81              | 0.4  | 19,790        | 95.0  | 295                              | 1.4 | 0                                       | 0.0 | 0                        | 0.0 | 2                  | 0.0 | 735     | 3.5 | 20,822               | 100.0 |
| Georgia       | 30,564               | 86.8  | 3,586           | 10.2 | 34,150        | 97.0  | 141                              | 0.4 | 775                                     | 2.2 | 22                       | 0.1 | 103                | 0.3 | 22      | 0.1 | 35,213               | 100.0 |
| Hawaii        | 5,939                | 98.3  | 14              | 0.2  | 5,953         | 98.6  | 0                                | 0.0 | 50                                      | 0.8 | 1                        | 0.0 | 31                 | 0.5 | 5       | 0.1 | 6,040                | 100.0 |
| Idaho         | 1,648                | 99.9  | 0               | 0.0  | 1,648         | 99.9  | 0                                | 0.0 | 1                                       | 0.1 | 0                        | 0.0 | 1                  | 0.1 | 0       | 0.0 | 1,650                | 100.0 |
| Indiana       | 11,864               | 95.6  | 33              | 0.3  | 11,897        | 95.9  | 22                               | 0.2 | 1                                       | 0.0 | —                        | —   | 337 <sup>¶</sup>   | 2.7 | 154     | 1.2 | 12,411 <sup>**</sup> | 100.0 |
| Kansas        | 7,521                | 99.8  | 6               | 0.1  | 7,527         | 99.9  | 0                                | 0.0 | 2                                       | 0.0 | 1                        | 0.0 | 3                  | 0.0 | 1       | 0.0 | 7,534                | 100.0 |
| Kentucky      | 11,327 <sup>††</sup> | 97.4  | 222             | 1.9  | 11,549        | 99.3  | 4                                | 0.0 | 0                                       | 0.0 | 0                        | 0.0 | 2                  | 0.0 | 76      | 0.7 | 11,631               | 100.0 |
| Louisiana     | 14,496 <sup>††</sup> | 94.3  | 45              | 0.3  | 14,541        | 94.6  | 1                                | 0.0 | 0                                       | 0.0 | 1                        | 0.0 | 32                 | 0.2 | 792     | 5.2 | 15,367               | 100.0 |
| Maine         | 4,651 <sup>††</sup>  | 98.5  | 44              | 0.9  | 4,695         | 99.4  | 0                                | 0.0 | 0                                       | 0.0 | 0                        | 0.0 | 28                 | 0.6 | 0       | 0.0 | 4,723                | 100.0 |
| Maryland      | 22,612               | 95.4  | 125             | 0.5  | 22,737        | 95.9  | 160                              | 0.7 | 448                                     | 1.9 | 7                        | 0.0 | 352                | 1.5 | 3       | 0.0 | 23,707               | 100.0 |
| Massachusetts | 37,726               | 97.1  | 182             | 0.5  | 37,908        | 97.6  | 393                              | 1.0 | 520                                     | 1.3 | 0                        | 0.0 | 20                 | 0.1 | 0       | 0.0 | 38,841               | 100.0 |
| Michigan      | 44,994               | 96.3  | 379             | 0.8  | 45,373        | 97.1  | 1,350                            | 2.9 | 23                                      | 0.0 | 0                        | 0.0 | 1                  | 0.0 | 0       | 0.0 | 46,747               | 100.0 |
| Minnesota     | 17,972 <sup>††</sup> | 100.0 | 2               | 0.0  | 17,974        | 100.0 | 0                                | 0.0 | 0                                       | 0.0 | 0                        | 0.0 | 1                  | 0.0 | 0       | 0.0 | 17,975               | 100.0 |
| Mississippi   | 5,138                | 99.4  | 6               | 0.1  | 5,144         | 99.5  | 0                                | 0.0 | 21                                      | 0.4 | 4                        | 0.1 | 1                  | 0.0 | 0       | 0.0 | 5,170                | 100.0 |
| Missouri      | 17,218               | 99.1  | 10              | 0.1  | 17,228        | 99.1  | 0                                | 0.0 | 3                                       | 0.0 | 0                        | 0.0 | 17                 | 0.1 | 134     | 0.8 | 17,382               | 100.0 |
| Montana       | 2,802                | 97.8  | 1               | 0.0  | 2,803         | 97.8  | 0                                | 0.0 | 0                                       | 0.0 | 0                        | 0.0 | 63                 | 2.2 | 0       | 0.0 | 2,866                | 100.0 |
| Nebraska      | 5,992                | 99.7  | 6               | 0.1  | 5,998         | 99.8  | 0                                | 0.0 | 0                                       | 0.0 | 0                        | 0.0 | 4                  | 0.1 | 11      | 0.2 | 6,013 <sup>§§</sup>  | 100.0 |
| Nevada        | 6,616                | 95.4  | 7               | 0.1  | 6,623         | 95.5  | 64                               | 0.9 | 2                                       | 0.0 | 0                        | 0.0 | 2                  | 0.0 | 245     | 3.5 | 6,936                | 100.0 |
| New Jersey    | 28,062               | 78.0  | 7,375           | 20.5 | 35,437        | 98.5  | 421                              | 1.2 | 83                                      | 0.2 | 12                       | 0.0 | 27                 | 0.1 | 7       | 0.0 | 35,987               | 100.0 |
| New Mexico    | 5,102                | 99.5  | 3               | 0.1  | 5,105         | 99.6  | 0                                | 0.0 | 0                                       | 0.0 | 0                        | 0.0 | 0                  | 0.0 | 21      | 0.4 | 5,126                | 100.0 |
| New York      | 135,947              | 91.9  | 5,925           | 4.0  | 141,872       | 95.9  | 2,062                            | 1.4 | 491                                     | 0.3 | 8                        | 0.0 | 260                | 0.2 | 3,204   | 2.2 | 147,897              | 100.0 |
| (City)        | 83,638 <sup>††</sup> | 92.8  | 2,131           | 2.4  | 85,769        | 95.2  | 1,345                            | 1.5 | 209                                     | 0.2 | 2                        | 0.0 | 32                 | 0.0 | 2,780   | 3.1 | 90,137               | 100.0 |
| (Upstate)     | 52,309 <sup>††</sup> | 90.6  | 3,794           | 6.6  | 56,103        | 97.1  | 717                              | 1.2 | 282                                     | 0.5 | 6                        | 0.0 | 228                | 0.4 | 424     | 0.7 | 57,760 <sup>§§</sup> | 100.0 |
| N. Carolina   | 36,206               | 96.2  | 114             | 0.3  | 36,320        | 96.5  | 406                              | 1.1 | 322                                     | 0.9 | 7                        | 0.0 | 513                | 1.4 | 61      | 0.2 | 37,629               | 100.0 |
| N. Dakota     | 2,220                | 100.0 | 0               | 0.0  | 2,220         | 100.0 | 0                                | 0.0 | 0                                       | 0.0 | 0                        | 0.0 | 0                  | 0.0 | 1       | 0.0 | 2,221                | 100.0 |
| Ohio          | 31,885               | 77.2  | 9,429           | 22.8 | 41,314        | 100.0 | 0                                | 0.0 | 0                                       | 0.0 | 0                        | 0.0 | 0                  | 0.0 | 0       | 0.0 | 41,314               | 100.0 |
| Oregon        | 13,121 <sup>††</sup> | 98.6  | 1               | 0.0  | 13,122        | 98.6  | 1                                | 0.0 | 0                                       | 0.0 | 0                        | 0.0 | 47                 | 0.4 | 139     | 1.0 | 13,309               | 100.0 |

**TABLE 7. Reported legal abortions, by type of procedure and state of occurrence, selected states,\* 1988 – Continued**

| State        | Procedure            |                    |                    |            |                  |             |  |            |   |            |                              |            |                    |            |              |            |                |              |
|--------------|----------------------|--------------------|--------------------|------------|------------------|-------------|--|------------|---|------------|------------------------------|------------|--------------------|------------|--------------|------------|----------------|--------------|
|              | Suction<br>curettage |                    | Sharp<br>curettage |            | All<br>curettage |             | Intrauterine<br>saline<br>instillation |            | Intrauterine<br>prostaglandin<br>instillation |            | Hysterotomy/<br>hysterectomy |            | Other <sup>†</sup> |            | Unknown      |            | Total          |              |
|              | No.                  | %                  | No.                | %          | No.              | %           | No.                                    | %          | No.   | %          | No.                          | %          | No.                | %          | No.          | %          | No.            | %            |
| Pennsylvania | 50,188               | <sup>††</sup> 98.8 | 68                 | 0.1        | 50,256           | 99.0        | 471                                    | 0.9        | 41  | 0.1        | 1                            | 0.0        | 17                 | 0.0        | 0            | 0.0        | 50,786         | 100.0        |
| Rhode Island | 7,593                | 99.7               | 8                  | 0.1        | 7,601            | 99.8        | 1                                      | 0.0        | 5   | 0.1        | 0                            | 0.0        | 3                  | 0.0        | 5            | 0.1        | 7,615          | 100.0        |
| S. Carolina  | 14,070               | 99.6               | 7                  | 0.0        | 14,077           | 99.6        | 11                                     | 0.1        | 32  | 0.2        | 4                            | 0.0        | 9                  | 0.1        | 0            | 0.0        | 14,133         | 100.0        |
| S. Dakota    | 897                  | 99.9               | 0                  | 0.0        | 897              | 99.9        | 0                                      | 0.0        | 0   | 0.0        | 0                            | 0.0        | 1                  | 0.1        | 0            | 0.0        | 898            | 100.0        |
| Tennessee    | 21,514               | 99.7               | 15                 | 0.1        | 21,529           | 99.7        | 7                                      | 0.0        | 42  | 0.2        | 5                            | 0.0        | 0                  | 0.0        | 6            | 0.0        | 21,589         | 100.0        |
| Texas        | 81,087               | <sup>††</sup> 99.5 | 0                  | 0.0        | 81,087           | 99.5        | 344                                    | 0.4        | 0   | 0.0        | 5                            | 0.0        | 0                  | 0.0        | 38           | 0.0        | 81,474         | 100.0        |
| Utah         | 4,726                | <sup>††</sup> 99.9 | 3                  | 0.1        | 4,729            | 99.9        | 0                                      | 0.0        | 0   | 0.0        | 2                            | 0.0        | 0                  | 0.0        | 1            | 0.0        | 4,732          | 100.0        |
| Vermont      | 3,290                | 99.4               | 1                  | 0.0        | 3,291            | 99.5        | 1                                      | 0.0        | 0   | 0.0        | 0                            | 0.0        | 17                 | 0.5        | 0            | 0.0        | 3,309          | 100.0        |
| Virginia     | 33,109               | 97.3               | 34                 | 0.1        | 33,143           | 97.4        | 57                                     | 0.2        | 38  | 0.1        | 18                           | 0.1        | 170                | 0.5        | 603          | 1.8        | 34,029         | 100.0        |
| Washington   | 29,593               | <sup>††</sup> 99.3 | 12                 | 0.0        | 29,605           | 99.3        | 94                                     | 0.3        | 91  | 0.3        | 4                            | 0.0        | 4                  | 0.0        | 4            | 0.0        | 29,802         | 100.0        |
| Wyoming      | 348                  | 99.1               | 0                  | 0.0        | 348              | 99.1        | 0                                      | 0.0        | 0   | 0.0        | 0                            | 0.0        | 0                  | 0.0        | 3            | 0.9        | 351            | 100.0        |
| <b>Total</b> | <b>818,238</b>       | <b>94.4</b>        | <b>30,137</b>      | <b>3.5</b> | <b>848,375</b>   | <b>97.8</b> | <b>6,318</b>                           | <b>0.7</b> | <b>3,087</b>                                  | <b>0.4</b> | <b>108</b>                   | <b>0.0</b> | <b>2,482</b>       | <b>0.3</b> | <b>6,846</b> | <b>0.8</b> | <b>867,234</b> | <b>100.0</b> |

\*All states for which data were available (39), the District of Columbia, and New York City.

<sup>†</sup>Includes instillation procedures not reported as a specific category and procedures reported as "other."

<sup>§</sup>Includes abortions performed by both suction and sharp curettage.

<sup>¶</sup>Reported as "all other procedures."

\*\*Includes residents only.

<sup>††</sup>Includes dilatation and evacuation procedures.

<sup>§§</sup>Does not add to total abductions because of some reported combination procedures.

–Not reported.

**TABLE 8. Percentage distribution and abortion ratios, by race, 1988**

| Race                        |             |         |       |
|-----------------------------|-------------|---------|-------|
| White                       | Black/other | Unknown | Total |
| % Distribution*             |             |         |       |
| 63.3                        | 35.0        | 1.8     | 100.0 |
| Abortion ratio <sup>†</sup> |             |         |       |
| 259                         | 489         |         | 311   |

\*Based on 632,405 abortions reported from 31 states, the District of Columbia, and New York City.

<sup>†</sup>Calculated as the number of legal abortions obtained by women of a given race per 1,000 live births to women of the same race. "Unknown" race for each state was distributed according to known race distribution for that state. Excludes states reporting race unknown for >15% of women having abortions.

**TABLE 9. Percentage distribution and abortion ratios, by marital status, 1988**

| Marital Status              |           |         |       |
|-----------------------------|-----------|---------|-------|
| Married                     | Unmarried | Unknown | Total |
| % Distribution*             |           |         |       |
| 19.8                        | 77.5      | 2.7     | 100.0 |
| Abortion ratio <sup>†</sup> |           |         |       |
| 88                          | 1,027     |         | 322   |

\*Based on 748,636 abortions reported from 35 states, the District of Columbia, and New York City.

<sup>†</sup>Calculated as the number of legal abortions obtained by women of a given marital status per 1,000 live births to women of the same marital status. "Unknown" marital status for each state was distributed according to known marital status distribution for that state. Excludes states reporting marital status unknown for >15% of women having abortions.

**TABLE 10. Percentage distribution and abortion ratios, by number of previous live births, 1988**

| Live births                 |      |      |     |     |         |       |
|-----------------------------|------|------|-----|-----|---------|-------|
| 0                           | 1    | 2    | 3   | ≥4  | Unknown | Total |
| % Distribution*             |      |      |     |     |         |       |
| 51.0                        | 22.8 | 15.6 | 5.5 | 2.5 | 2.6     | 100.0 |
| Abortion ratio <sup>†</sup> |      |      |     |     |         |       |
| 377                         | 218  | 304  | 291 | 219 |         | 303   |

\*Based on 672,864 abortions reported from 32 states and New York City.

<sup>†</sup>Calculated as the number of legal abortions obtained by women with a given number of live births per 1,000 live births to women of the same number of live births. "Unknown" number of live births for each state was distributed according to known number of live births for that state. Excludes states reporting number of live births for >15% of women having abortions.

**TABLE 11. Percentage distribution of reported legal abortions, by number of previous induced abortions, 1988**

| Previous induced abortions |      |      |     |         |       |
|----------------------------|------|------|-----|---------|-------|
| 0                          | 1    | 2    | ≥3  | Unknown | Total |
| % Distribution*            |      |      |     |         |       |
| 56.4                       | 26.2 | 10.2 | 4.8 | 2.5     | 100.0 |

\*Based on 693,686 abortions reported from 34 states, the District of Columbia, and New York City.

**Table 12. Percentage distribution and abortion ratio, by race and metropolitan/nonmetropolitan residence, 1988\***

| Geographic area | Race                              |             |         | Total |
|-----------------|-----------------------------------|-------------|---------|-------|
|                 | White                             | Black/other | Unknown |       |
|                 | Percent distribution <sup>†</sup> |             |         |       |
| Metropolitan    | 59.3                              | 37.0        | 3.7     | 100.0 |
| Nonmetropolitan | 82.1                              | 15.3        | 2.7     | 100.0 |
|                 | Abortion ratios <sup>‡</sup>      |             |         |       |
| Metropolitan    | 302                               | 599         |         | 373   |
| Nonmetropolitan | 162                               | 210         |         | 168   |

\*Based on 278,887 abortions reported to the National Center for Health Statistics from 14 states. (See Appendix A.)

<sup>†</sup>Abortions occurring in the area to residents of the area.

<sup>‡</sup>Ratios per 1,000 live births. Abortions and live births among state residents only.

**TABLE 13. Number and percentage of reported legal abortions, by race, age group, and marital status, 1988**

| Age group and marital status* | Race           |              |                |              |                |              |
|-------------------------------|----------------|--------------|----------------|--------------|----------------|--------------|
|                               | White          |              | Black/other    |              | Total          |              |
|                               | No.            | %            | No.            | %            | No.            | %            |
| <b>Age group (years)</b>      |                |              |                |              |                |              |
| <15                           | 2,328          | 0.6          | 2,922          | 1.4          | 5,250          | 0.8          |
| 15-19                         | 103,835        | 25.0         | 46,372         | 22.2         | 150,207        | 24.1         |
| 20-24                         | 135,931        | 32.7         | 69,905         | 33.5         | 205,836        | 33.0         |
| 25-29                         | 89,314         | 21.5         | 47,894         | 22.9         | 137,208        | 22.0         |
| 30-34                         | 50,795         | 12.2         | 26,814         | 12.8         | 77,609         | 12.4         |
| 35-39                         | 25,777         | 6.2          | 12,076         | 5.8          | 37,853         | 6.1          |
| ≥40                           | 7,432          | 1.8          | 2,941          | 1.4          | 10,373         | 1.7          |
| <b>Total<sup>†</sup></b>      | <b>415,412</b> | <b>100.0</b> | <b>208,924</b> | <b>100.0</b> | <b>624,336</b> | <b>100.0</b> |
| <b>Marital status</b>         |                |              |                |              |                |              |
| Married                       | 80,596         | 20.9         | 36,694         | 18.6         | 117,290        | 20.1         |
| Unmarried                     | 305,784        | 79.1         | 160,619        | 81.4         | 466,403        | 79.9         |
| <b>Total<sup>‡</sup></b>      | <b>386,380</b> | <b>100.0</b> | <b>197,313</b> | <b>100.0</b> | <b>583,693</b> | <b>100.0</b> |

\*Excludes unknowns.

<sup>†</sup>Reported by 32 states and New York City.

<sup>‡</sup>Reported by 31 states and New York City.

**TABLE 14. Number and percentage of reported legal abortions, by weeks of gestation, age group, and race, 1988**

| Age group<br>and race*       | Weeks of gestation |             |                |             |               |             |               |            |               |            |              |            |                |              |
|------------------------------|--------------------|-------------|----------------|-------------|---------------|-------------|---------------|------------|---------------|------------|--------------|------------|----------------|--------------|
|                              | ≤8                 |             | 9-10           |             | 11-12         |             | 13-15         |            | 16-20         |            | ≥21          |            | Total          |              |
|                              | No.                | %           | No.            | %           | No.           | %           | No.           | %          | No.           | %          | No.          | %          | No.            | %            |
| <b>Age group<br/>(years)</b> |                    |             |                |             |               |             |               |            |               |            |              |            |                |              |
| <15                          | 1,679              | 31.7        | 1,365          | 25.8        | 832           | 15.7        | 640           | 12.1       | 590           | 11.1       | 190          | 3.6        | 5,296          | 100.0        |
| 15-19                        | 63,599             | 40.8        | 42,609         | 27.3        | 23,620        | 15.1        | 13,519        | 8.7        | 9,877         | 6.3        | 2,684        | 1.7        | 155,908        | 100.0        |
| 20-24                        | 100,271            | 47.0        | 57,901         | 27.1        | 28,354        | 13.3        | 14,698        | 6.9        | 9,701         | 4.5        | 2,400        | 1.1        | 213,325        | 100.0        |
| 25-29                        | 74,621             | 52.4        | 37,354         | 26.2        | 16,616        | 11.7        | 7,822         | 5.5        | 4,950         | 3.5        | 1,132        | 0.8        | 142,495        | 100.0        |
| 30-34                        | 45,409             | 56.3        | 20,213         | 25.1        | 8,334         | 10.3        | 3,684         | 4.6        | 2,410         | 3.0        | 553          | 0.7        | 80,603         | 100.0        |
| 35-39                        | 23,106             | 58.8        | 9,472          | 24.1        | 3,672         | 9.3         | 1,576         | 4.0        | 1,180         | 3.0        | 278          | 0.7        | 39,284         | 100.0        |
| ≥40                          | 6,332              | 58.9        | 2,573          | 23.9        | 985           | 9.2         | 445           | 4.1        | 324           | 3.0        | 95           | 0.9        | 10,754         | 100.0        |
| <b>Total<sup>†</sup></b>     | <b>315,017</b>     | <b>48.6</b> | <b>171,487</b> | <b>26.5</b> | <b>82,413</b> | <b>12.7</b> | <b>42,384</b> | <b>6.5</b> | <b>29,032</b> | <b>4.5</b> | <b>7,332</b> | <b>1.1</b> | <b>647,665</b> | <b>100.0</b> |
| <b>Race</b>                  |                    |             |                |             |               |             |               |            |               |            |              |            |                |              |
| White                        | 205,975            | 51.0        | 105,703        | 26.2        | 48,454        | 12.0        | 23,566        | 5.8        | 16,158        | 4.0        | 4,349        | 1.1        | 404,205        | 100.0        |
| Black/other                  | 90,272             | 44.0        | 53,728         | 26.2        | 29,815        | 14.5        | 16,326        | 8.0        | 12,095        | 5.9        | 2,843        | 1.4        | 205,079        | 100.0        |
| <b>Total<sup>§</sup></b>     | <b>296,247</b>     | <b>48.6</b> | <b>159,431</b> | <b>26.2</b> | <b>78,269</b> | <b>12.8</b> | <b>39,892</b> | <b>6.5</b> | <b>28,253</b> | <b>4.6</b> | <b>7,192</b> | <b>1.2</b> | <b>609,284</b> | <b>100.0</b> |

\*Excludes unknowns.

<sup>†</sup>Reported by 34 states and New York City.<sup>§</sup>Reported by 32 states and New York City.

**Table 15. Number of abortions and percent distribution, by weeks of gestation, race, and age, 1988\***

| Race and age group (years)   | Weeks of gestation <sup>†</sup>  |                  |                  |                 |                 |                | Unknown        | Total              |
|------------------------------|----------------------------------|------------------|------------------|-----------------|-----------------|----------------|----------------|--------------------|
|                              | ≤8                               | 9-10             | 11-12            | 13-15           | 16-20           | ≥21            |                |                    |
|                              | Percent distribution<br>(number) |                  |                  |                 |                 |                |                |                    |
| <b>All races<sup>§</sup></b> | 45.5<br>(135,286)                | 28.6<br>(85,091) | 14.4<br>(42,818) | 6.1<br>(18,169) | 3.7<br>(11,116) | 1.2<br>(3,643) | 0.4<br>(1,128) | 100.0<br>(297,251) |
| <15                          | 28.9                             | 28.4             | 16.5             | 12.1            | 9.7             | 3.9            | 0.5            | 100.0              |
| 15-17                        | 33.0                             | 30.4             | 18.2             | 9.5             | 6.3             | 2.2            | 0.3            | 100.0              |
| 18-19                        | 38.6                             | 30.3             | 17.3             | 7.5             | 4.6             | 1.4            | 0.3            | 100.0              |
| 20-24                        | 43.8                             | 29.5             | 15.1             | 6.3             | 3.7             | 1.2            | 0.3            | 100.0              |
| 25-29                        | 49.4                             | 28.1             | 13.1             | 5.2             | 2.9             | 1.0            | 0.4            | 100.0              |
| 30-34                        | 54.1                             | 26.7             | 11.5             | 4.1             | 2.5             | 0.8            | 0.4            | 100.0              |
| ≥35                          | 57.4                             | 25.0             | 9.8              | 3.6             | 2.7             | 0.9            | 0.6            | 100.0              |
| Unknown                      | 47.0                             | 26.0             | 12.9             | 6.1             | 5.0             | 1.6            | 1.4            | 100.0              |
| <b>White</b>                 | 47.7<br>(89,077)                 | 28.9<br>(53,968) | 13.8<br>(25,679) | 5.4<br>(9,990)  | 2.9<br>(5,399)  | 1.0<br>(1,843) | 0.3<br>(625)   | 100.0<br>(186,581) |
| <15                          | 30.8                             | 30.7             | 16.8             | 10.6            | 7.6             | 3.1            | 0.4            | 100.0              |
| 15-17                        | 35.4                             | 31.8             | 17.6             | 8.5             | 4.8             | 1.6            | 0.3            | 100.0              |
| 18-19                        | 41.3                             | 30.8             | 16.7             | 6.6             | 3.3             | 1.0            | 0.2            | 100.0              |
| 20-24                        | 46.0                             | 29.9             | 14.5             | 5.5             | 2.8             | 1.0            | 0.3            | 100.0              |
| 25-29                        | 51.5                             | 28.1             | 12.5             | 4.5             | 2.3             | 0.8            | 0.3            | 100.0              |
| 30-34                        | 56.7                             | 25.9             | 10.6             | 3.6             | 2.1             | 0.7            | 0.4            | 100.0              |
| ≥35                          | 59.9                             | 24.5             | 8.8              | 3.0             | 2.3             | 0.9            | 0.6            | 100.0              |
| Unknown                      | 49.2                             | 27.1             | 12.1             | 5.3             | 4.0             | 1.4            | 1.0            | 100.0              |
| <b>Black/other</b>           | 41.7<br>(41,701)                 | 28.1<br>(28,155) | 15.6<br>(15,594) | 7.4<br>(7,421)  | 5.3<br>(5,272)  | 1.6<br>(1,649) | 0.3<br>(312)   | 100.0<br>(100,104) |
| <15                          | 27.6                             | 26.8             | 16.4             | 13.1            | 11.3            | 4.4            | 0.3            | 100.0              |
| 15-17                        | 28.6                             | 27.9             | 19.4             | 11.2            | 9.2             | 3.4            | 0.4            | 100.0              |
| 18-19                        | 32.5                             | 29.4             | 18.6             | 9.5             | 7.4             | 2.3            | 0.3            | 100.0              |
| 20-24                        | 39.9                             | 28.7             | 16.4             | 7.7             | 5.4             | 1.6            | 0.3            | 100.0              |
| 25-29                        | 46.1                             | 28.0             | 14.2             | 6.3             | 3.9             | 1.1            | 0.4            | 100.0              |
| 30-34                        | 50.0                             | 28.0             | 12.9             | 5.0             | 3.1             | 0.9            | 0.2            | 100.0              |
| ≥35                          | 53.0                             | 25.9             | 11.6             | 4.9             | 3.3             | 0.8            | 0.5            | 100.0              |
| Unknown                      | 46.2                             | 24.2             | 14.0             | 6.8             | 6.1             | 1.9            | 0.8            | 100.0              |

\*Based on data reported to the National Center for Health Statistics from 14 states. (See Appendix A.)

<sup>†</sup>Data on gestation were computed from information on date of termination and date of last normal menses. If date of last normal menses was not stated or if computed gestation in weeks was not possible, physician's estimate of gestation in weeks was used.

<sup>§</sup>Includes unknown race.

**TABLE 16. Number and percentage of reported legal abortions, by weeks of gestation, and procedure, 1988**

| Type of procedure*                         | Weeks of gestation |                  |                |                  |               |                  |               |                  |               |              |              |              |                |                  |
|--|--------------------|------------------|----------------|------------------|---------------|------------------|---------------|------------------|---------------|--------------|--------------|--------------|----------------|------------------|
|  | ≤8                 |                  | 9-10           |                  | 11-12         |                  | 13-15         |                  | 16-20         |              | ≥21          |              | Total          |                  |
|  | No.                | %                | No.            | %                | No.           | %                | No.           | %                | No.           | %            | No.          | %            | No.            | %                |
| Curettage<br>(suction or sharp)            | 326,192            | 99.9             | 177,694        | 99.9             | 85,517        | 99.6             | 43,399        | 97.2             | 25,018        | 81.9         | 5,979        | 78.4         | 663,799        | 98.6             |
| Intrauterine saline<br>instillation        | 74                 | 0.0 <sup>†</sup> | 80             | 0.0 <sup>†</sup> | 180           | 0.2              | 547           | 1.2              | 3,058         | 10.0         | 918          | 12.0         | 4,857          | 0.7              |
| Intrauterine prostaglandin<br>instillation | 52                 | 0.0 <sup>†</sup> | 47             | 0.0 <sup>†</sup> | 61            | 0.1              | 252           | 0.6              | 1,459         | 4.8          | 541          | 7.1          | 2,412          | 0.4              |
| Hysterotomy/<br>hysterectomy               | 31                 | 0.0 <sup>†</sup> | 12             | 0.0 <sup>†</sup> | 9             | 0.0 <sup>†</sup> | 20            | 0.0 <sup>†</sup> | 19            | 0.1          | 8            | 0.1          | 99             | 0.0 <sup>†</sup> |
| Other                                      | 181                | 0.1              | 88             | 0.0 <sup>†</sup> | 132           | 0.2              | 424           | 1.0              | 984           | 3.2          | 187          | 2.4          | 1,996          | 0.3              |
| <b>Total<sup>§</sup></b>                   | <b>326,530</b>     | <b>100.0</b>     | <b>177,921</b> | <b>100.0</b>     | <b>85,899</b> | <b>100.0</b>     | <b>44,642</b> | <b>100.0</b>     | <b>30,538</b> | <b>100.0</b> | <b>7,633</b> | <b>100.0</b> | <b>673,163</b> | <b>100.0</b>     |

\*Excludes unknowns.

<sup>†</sup> ≤0.05%<sup>§</sup>Reported by 33 states and New York City.

**TABLE 17. Number of abortions and percent distribution, by weeks of gestation for women  $\geq 18$  years, race, and education completed, 1988\***

| Race and education completed (years) | Weeks of gestation <sup>†</sup>      |                  |                  |                 |                |                |              | Total              |
|--------------------------------------|--------------------------------------|------------------|------------------|-----------------|----------------|----------------|--------------|--------------------|
|                                      | $\leq 8$                             | 9-10             | 11-12            | 13-15           | 16-20          | $\geq 21$      | Unknown      |                    |
|                                      | <b>Percent distribution (number)</b> |                  |                  |                 |                |                |              |                    |
| <b>All races<sup>§</sup></b>         | 46.6<br>(92,336)                     | 28.4<br>(56,217) | 14.3<br>(28,398) | 5.6<br>(11,151) | 3.6<br>(7,050) | 1.3<br>(2,538) | 0.2<br>(458) | 100.0<br>(198,148) |
| 0-8                                  | 41.8                                 | 29.0             | 17.9             | 6.5             | 3.1            | 0.9            | 0.7          | 100.0              |
| 9-11                                 | 36.7                                 | 30.9             | 19.3             | 7.9             | 4.1            | 0.9            | 0.3          | 100.0              |
| 12                                   | 44.4                                 | 28.3             | 15.1             | 6.3             | 4.2            | 1.5            | 0.2          | 100.0              |
| 13-15                                | 48.4                                 | 30.6             | 14.4             | 4.2             | 1.7            | 0.6            | 0.1          | 100.0              |
| $\geq 16$                            | 56.9                                 | 25.4             | 9.5              | 3.9             | 2.9            | 1.3            | 0.1          | 100.0              |
| Unknown                              | 48.6                                 | 26.1             | 12.2             | 5.5             | 4.6            | 1.8            | 1.3          | 100.0              |
| <b>White</b>                         | 48.8<br>(58,017)                     | 28.5<br>(33,834) | 13.7<br>(16,312) | 4.9<br>(5,803)  | 2.8<br>(3,282) | 1.1<br>(1,285) | 0.2<br>(245) | 100.0<br>(118,778) |
| 0-8                                  | 41.7                                 | 29.0             | 18.1             | 6.6             | 2.8            | 1.1            | 0.7          | 100.0              |
| 9-11                                 | 37.3                                 | 31.4             | 19.3             | 7.5             | 3.3            | 0.9            | 0.3          | 100.0              |
| 12                                   | 46.4                                 | 28.7             | 14.7             | 5.5             | 3.3            | 1.2            | 0.2          | 100.0              |
| 13-15                                | 51.4                                 | 29.9             | 13.0             | 3.6             | 1.4            | 0.6            | 0.2          | 100.0              |
| $\geq 16$                            | 59.9                                 | 24.9             | 8.6              | 3.0             | 2.2            | 1.2            | 0.1          | 100.0              |
| Unknown                              | 51.7                                 | 25.5             | 11.5             | 4.6             | 4.2            | 1.6            | 1.0          | 100.0              |
| <b>Black/other</b>                   | 43.1<br>(33,027)                     | 28.3<br>(21,628) | 15.3<br>(11,687) | 6.8<br>(5,174)  | 4.8<br>(3,640) | 1.6<br>(1,211) | 0.2<br>(181) | 100.0<br>(76,548)  |
| 0-8                                  | 42.5                                 | 29.1             | 17.7             | 6.3             | 3.0            | 0.6            | 0.8          | 100.0              |
| 9-11                                 | 35.1                                 | 29.9             | 19.3             | 8.7             | 5.7            | 0.9            | 0.3          | 100.0              |
| 12                                   | 41.6                                 | 27.8             | 15.6             | 7.3             | 5.5            | 1.9            | 0.2          | 100.0              |
| 13-15                                | 42.3                                 | 31.9             | 17.4             | 5.5             | 2.3            | 0.5            | 0.1          | 100.0              |
| $\geq 16$                            | 52.5                                 | 26.1             | 10.9             | 5.1             | 3.8            | 1.4            | 0.1          | 100.0              |
| Unknown                              | 44.2                                 | 27.1             | 12.6             | 6.8             | 5.5            | 2.3            | 1.5          | 100.0              |

\*Based on data reported to the National Center for Health Statistics from 11 states. (See Appendix A.)

<sup>†</sup>Data on gestation were computed from information on date of termination and date of last normal menses. If date of last normal menses was not stated, or if computed gestation in weeks was not possible, physician's estimate of gestation in weeks was used.

<sup>§</sup>Includes unknown race.

**TABLE 18. Number of abortions and abortion ratios, by education completed, race, and age, 1988\***

| Race and age (years)         | Education completed (years)           |                   |                    |                   |                   | Total              |
|------------------------------|---------------------------------------|-------------------|--------------------|-------------------|-------------------|--------------------|
|                              | 0-8                                   | 9-11              | 12                 | 13-15             | ≥16               |                    |
|                              | <b>Ratio<sup>†</sup><br/>(number)</b> |                   |                    |                   |                   |                    |
| <b>All races<sup>§</sup></b> | 146.4<br>(3,372)                      | 235.4<br>(26,897) | 433.1<br>(114,567) | 269.0<br>(35,138) | 273.7<br>(30,116) | 327.0<br>(210,090) |
| <15                          | 910.6                                 | 1,815.8           | —                  | —                 | —                 | 1,105.5            |
| 15-17                        | 177.4                                 | 516.2             | 3,057.1            | —                 | —                 | 682.2              |
| 18-19                        | 72.8                                  | 188.1             | 788.8              | 1,808.1           | —                 | 564.0              |
| 20-24                        | 81.3                                  | 146.3             | 404.5              | 398.4             | 1,154.1           | 373.4              |
| 25-29                        | 81.7                                  | 153.0             | 308.6              | 163.0             | 229.8             | 235.2              |
| 30-34                        | 91.9                                  | 154.4             | 339.5              | 153.7             | 153.5             | 214.9              |
| ≥35                          | 117.5                                 | 198.8             | 581.9              | 250.9             | 231.4             | 333.7              |
| <b>White</b>                 | 123.4<br>(2,040)                      | 241.9<br>(18,297) | 232.6<br>(63,819)  | 231.1<br>(23,603) | 188.8<br>(17,900) | 258.4<br>(125,658) |
| <15                          | 1,065.2                               | 2,322.6           | —                  | —                 | —                 | 1,336.3            |
| 15-17                        | 165.0                                 | 595.8             | 2,422.5            | —                 | —                 | 690.8              |
| 18-19                        | 75.6                                  | 188.9             | 737.6              | 2,103.1           | —                 | 538.5              |
| 20-24                        | 79.4                                  | 147.4             | 300.1              | 362.5             | 828.1             | 301.3              |
| 25-29                        | 84.2                                  | 153.8             | 217.6              | 127.4             | 155.5             | 172.6              |
| 30-34                        | 89.3                                  | 155.1             | 244.6              | 121.1             | 103.8             | 155.5              |
| ≥35                          | 110.3                                 | 197.1             | 448.9              | 225.5             | 175.3             | 260.4              |
| <b>Black/other</b>           | 206.7<br>(1,332)                      | 223.7<br>(8,600)  | 751.2<br>(50,749)  | 404.5<br>(11,536) | 808.6<br>(12,215) | 540.9<br>(84,432)  |
| <15                          | 801.2                                 | 1,583.3           | —                  | —                 | —                 | 981.1              |
| 15-17                        | 195.9                                 | 399.5             | 4,150.8            | —                 | —                 | 669.0              |
| 18-19                        | 74.3                                  | 186.4             | 889.9              | 1,285.7           | —                 | 618.4              |
| 20-24                        | 100.5                                 | 143.8             | 698.5              | 503.9             | 2,691.9           | 577.0              |
| 25-29                        | 83.2                                  | 151.2             | 633.9              | 303.0             | 677.8             | 470.9              |
| 30-34                        | 102.8                                 | 153.3             | 628.0              | 290.1             | 484.2             | 442.7              |
| ≥35                          | 135.5                                 | 201.1             | 915.5              | 352.4             | 604.4             | 592.5              |

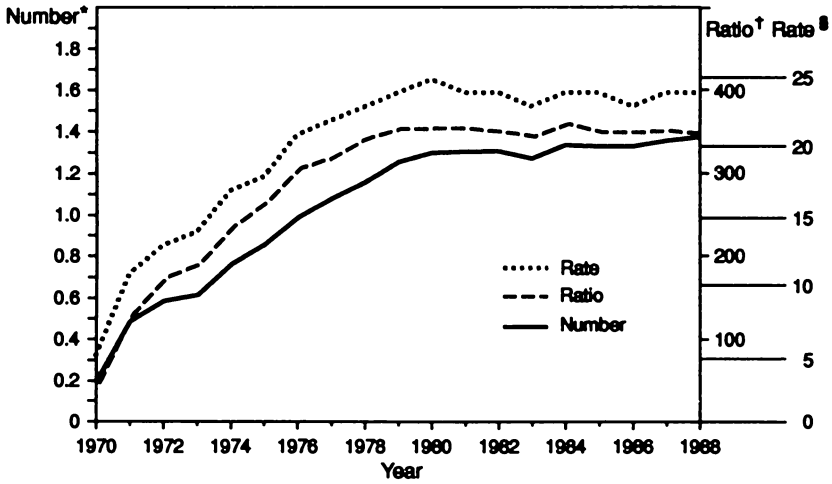
\*Based on data reported to the National Center for Health Statistics from 11 states. (See Appendix A.)

<sup>†</sup>Ratios per 1,000 live births. Abortions and live births are only those occurring in the area to residents of the area.

<sup>§</sup>Includes unknown race.

—Excludes ratios based on <100 live births.

FIGURE 1. Legal abortions, ratio, and rate, by year, United States, 1970–1988

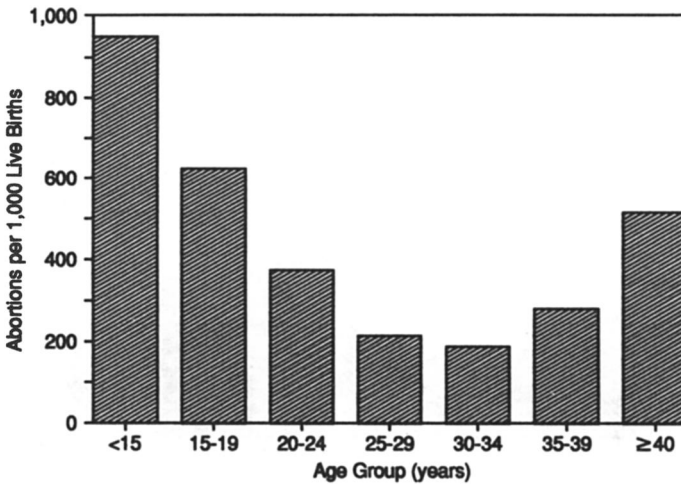


\*In millions.

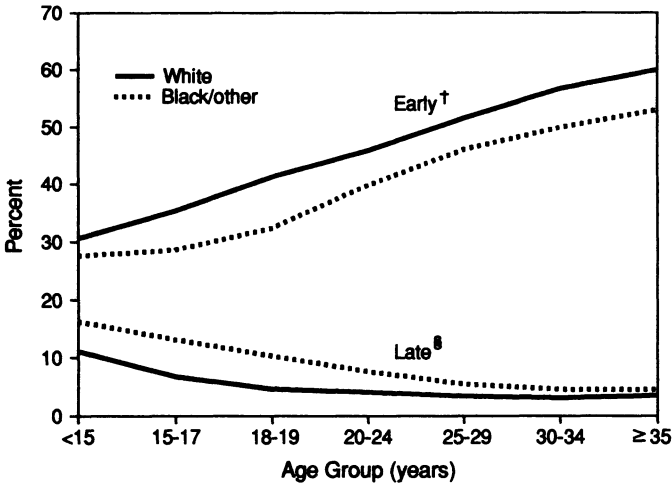
†Ratio per 1,000 live births.

‡Rate per 1,000 women ages 15–44 years.

FIGURE 2. Abortion ratio, by age group, United States, 1988

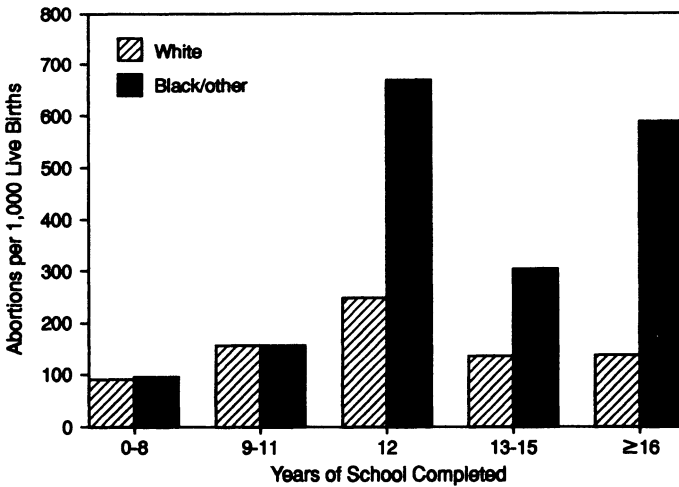


**FIGURE 3. Percentage of women having early and late abortions,\* by age group and race, United States, 1988**



\*Based on data reported to the National Center for Health Statistics from 14 states and New York City. (See Appendix A.)

**FIGURE 4. Abortion ratio\* among women ages ≥25 years, by education and race, United States, 1988**



\*Based on data reported to the National Center for Health Statistics from 11 states and New York City. (See Appendix A.)

## Surveillance of Postneonatal Mortality, United States, 1980-1987

Solomon Iyasu, M.B.B.S., M.P.H.  
Michele C. Lynberg, Ph.D., M.P.H.\*  
Diane Rowley, M.D., M.P.H.  
Audrey F. Saftlas, Ph.D., M.P.H.  
Hani K. Atrash, M.D., M.P.H.

*Pregnancy and Infant Health Branch  
Division of Reproductive Health*

*National Center for Chronic Disease Prevention and Health Promotion*

*\*Division of Birth Defects and Developmental Disabilities  
National Center for Environmental Health and Injury Control*

### Summary

*In the United States, one-third of all infant deaths (deaths of infants ages 0-364 days) occurs in the postneonatal period (28-364 days). A substantial proportion of these deaths potentially could be prevented. To examine recent trends in postneonatal mortality (PNM) in the United States, the investigators analyzed birth and death certificate data for resident infants for the period from 1980 through 1987. Rates of PNM declined 11% from 3.5 to 3.1/1,000 live births among white infants and declined 16% from 7.3 to 6.1/1,000 live births among black infants. Most of the decline resulted from reduced mortality from infectious diseases and injuries. A decreased mortality attributable to sudden infant death syndrome (SIDS) among black infants additionally accounted for the decline. Autopsy rates for SIDS increased from 82% to 92% but did not differ for black infants and white infants. Birth defects-related PNM declined more among white infants than among black infants. The racial gap in PNM (rate ratio (RR) = approximately 2.0) persisted. However, the largest black/white gap occurred in the Northeast (RR = 2.5), the region with the lowest PNM. Black infants were 2.7 and 2.3 times more likely to die of infections and injuries, respectively, than were white infants. Although PNM rates declined during the 1980s, a greater rate of reduction is needed to achieve the Year 2000 objectives, especially among black infants. Such reductions are possible through improved access to comprehensive pediatric care as well as education and community-oriented prevention programs designed to reduce deaths due to infections and injuries. A better understanding of the etiology of SIDS and birth defects is critical for preventing postneonatal deaths.*

### INTRODUCTION

Until the late 1960s, improvement in infant mortality resulted primarily from declines in postneonatal mortality (PNM) (defined as deaths among infants 28-364 days of age) (1,2). As a result, deaths in the postneonatal period contributed a progressively smaller proportion of total infant deaths in the United States: 50% in the 1920s, 35% in the 1940s, and 25% in the mid-1960s (1). Between 1960 and 1970, PNM declined by 32.9%, whereas neonatal mortality (NM) (defined as

deaths among infants <28 days of age) declined by 19.2%. However, since 1970, because of a slower rate of decline in PNM than that in NM (3), the proportion of infant deaths occurring in the postneonatal period has increased steadily from 24.7% in 1970 to 31.2% in 1980 (1). In recent years, PNM has improved only slightly (4), and the United States continues to have higher PNM rates than do many industrialized countries (5). The investigators used vital statistics data for the years 1980 through 1987 to examine recent trends in PNM for white and black infants and to explore potential areas for further reduction in PNM.

## METHODS

Data on infants born to U.S. residents during the years 1980 through 1987 were obtained from public-use mortality tapes prepared by the National Center for Health Statistics (NCHS) (6). The investigators analyzed postneonatal deaths by race, sex, age at death, region of residence, and underlying cause of death, as classified within the International Classification of Diseases, 9th Revision (ICD-9) (7). Analysis was limited to white and black infants because of the small numbers in other ethnic/racial groups.

Data on live births were obtained from published U.S. natality statistics (8). For each year of the study period, the number of live births was obtained by race, sex, region of residence, and residence status. Rates of PNM were calculated by dividing the number of deaths in each year by the number of live births in the same year. For comparison, we used the same data sources to calculate NM rates for white and black infants. Rate ratios were calculated by dividing rates for black infants by rates for white infants. The annual percentage change in rates was based on the slopes of regression lines that were fitted to the logarithms of rates.

## RESULTS

From 1980 through 1987, 112,477 postneonatal deaths occurred in the United States; these deaths included 77,328 (68.8%) whites and 31,470 (28.0%) blacks (Table 1). The PNM rate among all U.S. infants declined by 12.2% (11% among white infants and 16% among black infants). Moreover, PNM declined more rapidly among black infants (2% per year) than among white infants (1.6% per year). However, black infants continued to have a PNM rate twice that of white infants.

Among white infants, the NM rate declined more than did PNM (27% [7.5 to 5.5/1,000 live births] and 11% [3.5 to 3.1/1,000 live births]) (Figure 1). Thus, the proportion of infant deaths occurring in the postneonatal period progressively increased from 32% in 1980 to 36.3% in 1987, continuing the trend seen in the 1970s. For black infants, the decline in NM and PNM rates was similar (17% [14.1 to 11.7/1,000 live births] and 16% [7.3 to 6.1/1,000 live births]) so that the proportion of infant deaths in the postneonatal period remained relatively constant (34.1% in 1980 and 34.4% in 1987) (Figure 2).

Sudden infant death syndrome (SIDS), the leading cause of PNM among both black and white infants, accounted for one-third of the deaths in the postneonatal period (Table 2). Among white infants, the second leading cause of death was birth defects, followed by infections and injuries. Among black infants, the second leading cause of death was infections, followed by birth defects and injuries.

From 1980 through 1987, PNM rates declined in all four regions of the United States; however, the extent of the reduction varied by region and race (Table 3).

Among white infants, the percentage of decline in PNM was similar in all regions except in the Northeast, where the percentage of reduction was twice that of the other regions. At the beginning of the study period, the regional rates of PNM among black infants varied. Due to varying rates of decline among black infants over the study period, the rates became increasingly similar.

In 1980, the north-central and northeast regions had the largest gap between blacks and whites in PNM. From 1980 through 1987, PNM in the Northeast declined more among white infants (20%) than among black infants (13%), whereas in the north-central region, PNM declined more among blacks infants than among white infants. Thus, the gap between black and white PNM rates widened in the Northeast and narrowed in the north-central region. In 1987, although the Northeast had the lowest overall PNM rate, the region had the largest racial gap in PNM. In the South and the West, the PNM ratio showed relatively little change.

### **Sudden Infant Death Syndrome**

During the study period, PNM due to SIDS declined more among black infants than white (20% versus 5%) (Table 4). The male-to-female ratio of 1.5 among all SIDS deaths remained unchanged during the study period.

Autopsy rates among SIDS cases increased from 82% to 92% over the study period and did not differ by race; of the regions, the South had the lowest autopsy rates throughout the study period (Table 4). Regional differences in PNM rates for SIDS persisted. The PNM due to SIDS declined more among blacks than among whites in all regions. An increasing east-to-west gradient in PNM due to SIDS was more apparent among white infants than among black infants and was more pronounced in 1987 than in 1980.

From 1980 through 1987, the black-to-white ratio in PNM due to SIDS in the United States decreased from 2.2 in 1980 to 1.8 in 1987. The black-to-white ratio in PNM due to SIDS declined more in the Northeast (19%) and the north-central region (21%) than in the South (10%) and the West (6%). Differences in PNM between blacks and whites due to SIDS decreased from west to east.

### **Birth Defects**

Birth defects-related PNM declined among both white and black infants in the United States (Table 5). The decline in birth defects-related mortality, however, was greater among white infants than among black infants. Birth defects-related PNM was higher among blacks in 1980 and remained higher in 1987. Cardiovascular defects continued to account for more than half of all birth defects-related PNM; cardiovascular defects, in combination with central nervous system and chromosomal defects, accounted for approximately 80% of all birth defects-related PNM. The fastest rates of decline among the leading causes of birth defects-related PNM were observed for PNM due to central nervous system defects. The PNM due to cardiovascular system defects declined more among white infants than among black infants. The PNM due to chromosomal defects increased among both racial groups but increased more among black infants than among white infants and thus emerged as the second leading cause of birth defects-related PNM.

### **Infections**

During the study period, PNM due to infections declined substantially and at a similar rate for both white and black infants (Table 6). Most of the decline resulted

from continued reductions in mortality from central nervous system and respiratory infections. Respiratory infections continued to account for the largest proportion of PNM due to infections (42% for whites and 38% for blacks in 1987). Black infants had PNM rates for infections 2.7 times greater than those of white infants.

### **Injuries**

The PNM due to injuries declined among both white and black infants but at a greater rate among white infants (Table 7). The PNM rate for injuries among black infants continued to be 2.2 to 2.3 times that for white infants. Among infants of both races, the proportion of postneonatal deaths due to injuries decreased slightly over the study period.

In 1980, deaths due to unintentional injuries accounted for 83% of the white and 79% of the black postneonatal deaths due to injuries. These proportions, however, decreased over the study period because of a steady increase in deaths due to intentional injuries (homicide). For 1986 and 1987 combined, the leading cause of PNM due to injuries among black infants was intentional injuries (homicides) (27%), followed by suffocation (26%) and fire (15%). Among white infants, the leading cause of postneonatal death due to injuries continued to be suffocation (30%), followed by motor-vehicle crashes (18%) and intentional injuries (18%). For 1986 and 1987, the PNM rate for unintentional injuries was 2.0 times greater for black infants than for white infants, and the rate due to intentional injuries was 3.5 times greater for blacks than for whites.

### **Perinatal Conditions**

From 1980 through 1987, the proportion of postneonatal deaths due to perinatal conditions increased. Perinatal conditions include certain conditions originating in the perinatal period that are coded with ICD-9 rubrics 760-79. Examples are prematurity/low birth weight (LBW), respiratory distress syndrome, bronchopulmonary dysplasia, birth trauma, and intrauterine hypoxia and birth asphyxia. The PNM rate due to these conditions increased by approximately 13% among both white and black infants.

## **DISCUSSION**

Although total PNM rates declined for both black and white infants in the 1980s, the rate of decline was greater for black infants than for white infants. Also, among whites, PNM declined at a slower rate than NM, so the proportion of infant deaths occurring in the postneonatal period increased over time. Among blacks, PNM and NM declined at about the same rate, so the proportion of infants dying in the postneonatal period remained relatively constant. Furthermore, important racial differences in trends of cause-specific PNM were observed. PNM due to infectious diseases declined at similar rates for black and white infants. Rates of decline, however, for PNM due to injuries and birth defects were lower for blacks than for whites, whereas PNM due to SIDS declined appreciably for black infants only.

Several possible explanations may account for the slower rate of decline of PNM in the United States in the 1980s compared with the previous decade (3,5). First, the rate of decline in PNM due to infectious diseases has been slower in the 1980s than in previous decades (3). Second, socioeconomic status and factors related to access to health care may not have improved, especially among segments of the population

at highest risk of PNM (e.g., unmarried women, women with <12 years of education, and teenage mothers). Finally, the slower rate of decline in PNM may also be a consequence of postponement of some infant deaths from the neonatal to the postneonatal period.

Since the early part of the century, the main impetus for reducing PNM in the United States has been to prevent deaths due to infections. During the past 50 years, rapid declines in PNM occurred in the mid-to-late 1940s and the late 1960s. In the mid-to-late 1940s, the decline was associated with the widespread availability and use of antibiotics that helped further reduce mortality from infectious diseases. In the late 1960s, the rapid decline coincided with the implementation of Medicaid and other federal programs targeted toward the poor (2,5).

The lack of improvement in socioeconomic status indicators among segments of the population at highest risk of PNM (e.g., unmarried women, women with <12 years of education, and teenage mothers) may account for the slow decline in PNM. From 1980 through 1987, the proportion of births among unmarried women in the United States increased by 33%, from 18.4% to 24.5% (11% to 18% for whites, 55% to 62% for blacks) (9). Families with unmarried mothers are more likely to live in poverty than are families with married couples. In 1987, 56% of black families and 38% of white families with no male head of household and with children <18 years of age were classified as living below the poverty level (9); these figures have essentially not changed since 1980.

Several studies have attributed the decrease in PNM to the postponement of some infant deaths from the neonatal to the postneonatal period (10-13). From 1980 to 1987, the proportion of postneonatal deaths due to conditions arising in the perinatal period increased (from 5.6% to 7.1% for whites and 6.7% to 9.0% for blacks). To evaluate whether some infant deaths are being postponed from the neonatal to the postneonatal period, one should analyze linked birth and death certificates data by birth weight. However, the steady increase in PNM due to perinatal conditions (since the early 1970s) lends support to this hypothesis.

Although SIDS remains the leading cause of PNM among both white and black infants, the substantial decrease in SIDS mortality observed among blacks represents a new trend. Differences in autopsy rates between white and black infants do not explain this trend; autopsy rates were similar for both racial groups and increased by the same magnitude during the study period. One likely explanation may be that better use of information from autopsies has occurred among blacks than among whites. If ascertainment of the cause(s) of death has improved among blacks, one should observe a shift in cause of death from SIDS to other conditions. When rates of PNM due to SIDS, bed suffocation, and ill-defined conditions are combined into one category, the decreasing trend in PNM for blacks was still apparent. When we combined rates of PNM due to SIDS and respiratory infections, the same trend persisted for blacks, although the decline was not as sharp. For whites, rates for this combined category increased. These findings suggest that some deaths previously attributed to SIDS have been reported as respiratory infections, but probably no more for blacks than for whites.

Many risk factors, including LBW, have been identified for SIDS (14). The LBW rates for both white and black infants remained relatively constant during the study period. For this reason, the reduction in SIDS mortality among blacks is unlikely to be due to changes in birth-weight distribution. Moreover, most SIDS deaths occurred

among infants of normal birth weight (15,16). The decline in SIDS among blacks cannot be explained by one or more demographic risk factors. Risk factors for SIDS, (e.g., unmarried status, <12 years of high school education, and teenage motherhood) have not decreased more among black mothers than among white mothers (17). Cigarette smoking is a strong risk factor for SIDS (14,16). According to recent data from Missouri on trends in smoking during pregnancy, smoking rates declined more among black than among white mothers in the 1980s, and the decline occurred primarily among teenage mothers. Although data on national trends in smoking among pregnant mothers are not available, a similar trend for the United States overall might explain the greater decline in PNM due to SIDS among black than among white infants (18).

The decline in birth defects-related PNM throughout the United States in the 1980s more likely reflects improved survival of infants with birth defects rather than declining incidence. Survival may be related to delivery of and access to health care. Although national rates of birth defects have remained stable over time, notable exceptions include neural tube defects, which have been decreasing (19), and cardiovascular and chromosomal defects, which apparently have been increasing (19). These reported increases may be partly due to improved diagnostic techniques (19,20). Cardiovascular defects continue to be an important cause of infant mortality and account for more than half of all birth defects-related PNM. A greater decline in birth defects-related mortality was observed among white infants than among black infants; birth defects-related PNM was higher among blacks in 1980 and remained higher in 1987. Rates of survival of black and white infants born with serious birth defects is currently being examined within the Metropolitan Atlanta Congenital Defects Program.

With the exception of homicide-related PNM, PNM due to most causes of injury declined among both white and black infants. Deaths due to fire, an important cause of PNM among black infants, declined at a rate half that for white infants. There was no decline in deaths due to motor vehicle crashes among black infants. This lack of decline during a time when many states imposed child-restraint laws raises concern about financial barriers or ineffective methods for increasing awareness among black parents. The increasing trend in homicide-related PNM may be explained partly by an increased awareness of a traditionally underreported problem (3). The faster rate of increase among blacks (3.5 times that of white infants) requires a different explanation. Because deaths due to fire and homicide are associated with low income (21), examining income levels may be helpful in understanding this trend.

In conclusion, PNM is related to environmental factors such as socioeconomic status (21-23); demographic factors such as maternal age, marital status, and parity; and utilization of and access to health care (1,2). During the study period, black infants had a twofold or greater risk of PNM for all causes, except for birth defects. In the postneonatal period, race may be acting as a proxy measure of factors that influence access to health care and exposure to environmental hazards that affect the health of the infant (24,25). Compared with deaths from other causes, deaths due to infections and injuries have a stronger relationship with socioeconomic status (26). The large differences between black and white infants in PNM due to infections and injury are consistent with this explanation.

Strategies to reduce PNM in the United States should include increasing the availability of health care in medically underserved areas and removing the financial

barriers to health care for the poor. Improving access to health care, however, should be accompanied by education and community-oriented programs that focus on increasing awareness that equips parents with knowledge of available preventive measures for injuries (child restraints, smoke detectors) and infections (rehydration for diarrhea). Improving access to health care and reducing income disparities between the poor and the rich, especially between blacks and whites, may influence the PNM. Finally, because demographic risk factors contribute substantially to PNM (5), reducing births to teenage women and women with less than a high school education and improving prenatal care should have a positive impact on PNM. Although these strategies may help reduce PNM, a better understanding of the etiology of the leading causes of PNM (especially SIDS and birth defects) is the critical factor for preventing deaths in the postneonatal period.

#### References

1. Starfield B. Postneonatal mortality. *Annu Rev Public Health* 1985;6:21-40.
2. Pharoah POD, Morris JN. Postneonatal mortality. *Epidemiol Rev* 1979;1:170-83.
3. Khoury MJ, Erickson JD, Adams MJ. Trends in postneonatal mortality in the United States, 1962 through 1978. *JAMA* 1984;252:367-72.
4. National Center for Health Statistics. Advance report of final mortality statistics, 1988. Hyattsville, Maryland: US Department of Health and Human Services, Public Health Service, CDC, 1990. (Monthly vital statistics report; vol 39, no. 7.)
5. Kleinman JC, Kiely JL. Postneonatal mortality in the United States: an international perspective. *Pediatrics* 1990;86:1091-7.
6. National Center for Health Statistics. Public use data tape documentation, 1980 to 1987 mortality detail. Public Health Service, Hyattsville, Maryland: 1980-1987.
7. The International Classification of Diseases, 9th revision, Clinical Modification. Vol. 1. Washington, DC: U.S. Department of Health and Human Services, Public Health Service-Health Care Financing Administration, 1980; DHHS publication no. (PHS)80-1260.
8. National Center for Health Statistics: Vital statistics of the United States, 1980-1987 (annual), Vol. II, Mortality, Part A. Public Health Service, Washington. U.S. Government Printing Office, 1988-89.
9. Bureau of the Census. Money income and poverty in the United States, 1988. Washington, DC: US Department of Commerce, Bureau of the Census, 1989. (Advance data from the 1989 Current Population Survey; series P60, no. 166.)
10. Hack M, Merckatz IR, Jones PK, Fanaroff AA. Changing trends in neonatal and postneonatal deaths in very-low-birth-weight infants. *Am J Obstet Gynecol* 1980;137:797-800.
11. Zdeb MS. Differences in trends of postneonatal mortality by birth weight in upstate New York, 1968-1979. *Am J Public Health* 1982;72:734-5.
12. Buehler JW, Hogue CJR, Zero SM. Postponing or preventing infant deaths? Trends in infant survival, Georgia, 1974 through 1981. *JAMA* 1985;253:3564-7.
13. Friede A, Rhodes PH, Guyer B, Binkin NJ, Hannan MT, Hogue CJR. The postponement of neonatal deaths into the postneonatal period: evidence from Massachusetts. *Am J Epidemiol* 1987;127:161-10.
14. Hoffman HJ, Damus K, Hillman L, Krongrad E. Risk factors for SIDS: results of the National Institute of Child Health and Human Development SIDS Cooperative Epidemiological Study. *Ann N Y Acad Sci* 1988;533:13-30.
15. Buehler JW, Kleinman JC, Hogue CJR, Strauss LT, Smith JC. Birth weight-specific infant mortality, United States, 1980. *Public Health Rep* 1987;102:162-71.
16. Bentele KH, Albani M. Are there tests predictive for prolonged apnea and SIDS? A review of epidemiologic and functional studies. *Acta Paediatr Scand [Suppl]* 1988;342:1-21.
17. National Center for Health Statistics: Health United States 1989. Hyattsville, Maryland: Public Health Service, 1990.
18. Stockbauer JW, Land GH. Changes in characteristics of women who smoke during pregnancy: Missouri, 1978-88. *Public Health Rep* 1991;106:52-8.
19. Edmonds LD, James LM. Temporal trends in the prevalence of congenital malformations at birth based on the Birth Defects Monitoring Program, United States, 1979-1987. In: CDC Surveillance Summaries, December 1990. *MMWR* 1990;39(No. SS-4):19-23.

20. Martin GR, Perry LW, Ferenz CF. Increased prevalence of ventricular septal defect: epidemic or improved diagnosis. *Pediatrics* 1989;83:200-3.
21. Wise PH, Kotelchuck M, Wilson ML, Mills M. Racial and socioeconomic disparities in childhood mortality in Boston. *N Engl J Med* 1985;313:360-6.
22. Bertoli F, et al. Infant mortality by socioeconomic status for blacks, Indians, and whites: a longitudinal analysis of North Carolina. *Soc Soc Res* 1984;68:364-77.
23. Markides KS, McFarland C. A note on recent trends in the infant mortality-socioeconomic status relationship. *Soc Forces* 1982;61:268-76.
24. Hayward J, D'Alessio DJ. SIDS: race as a factor. *Wis Med J* 1990;88:11-4.
25. Buehler JW, Strauss LT, Hogue CJ, Smith JC. Birth weight-specific causes of infant mortality. *Public Health Rep* 1987;102:171-81.
26. Stockwell EG, Swanson A, Wicks W. Economic status differences in infant mortality by cause of death. *Public Health Rep* 1988;103:135-42.

**TABLE 1. Number and rates of postneonatal mortality, by race, United States, 1980-1987**

| Race                         | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   | Total   |
|------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| <b>Number of deaths</b>      |        |        |        |        |        |        |        |        |         |
| White                        | 10,194 | 9,885  | 9,700  | 9,698  | 9,550  | 9,631  | 9,308  | 9,362  | 77,328  |
| Black                        | 4,300  | 3,857  | 3,898  | 3,965  | 3,879  | 3,723  | 3,907  | 3,941  | 31,470  |
| All races                    | 14,908 | 14,183 | 14,066 | 14,120 | 13,889 | 13,851 | 13,679 | 13,781 | 112,477 |
| <b>Rate per 1,000 births</b> |        |        |        |        |        |        |        |        |         |
| White                        | 3.5    | 3.4    | 3.3    | 3.3    | 3.3    | 3.2    | 3.1    | 3.1    | 3.3     |
| Black                        | 7.3    | 6.6    | 6.6    | 6.8    | 6.5    | 6.1    | 6.3    | 6.1    | 6.5     |
| All races                    | 4.1    | 3.9    | 3.8    | 3.9    | 3.8    | 3.7    | 3.6    | 3.6    | 3.8     |
| <b>Ratio</b>                 |        |        |        |        |        |        |        |        |         |
| Black vs. white              | 2.1    | 1.9    | 2.0    | 2.0    | 2.0    | 1.9    | 2.0    | 2.0    | 2.0     |

**TABLE 2. Postneonatal mortality rates,\* by race and cause of death, United States, 1980 and 1987**

| Cause of death                      | White |       |       |       |                    | Black |       |       |       |                    |
|-------------------------------------|-------|-------|-------|-------|--------------------|-------|-------|-------|-------|--------------------|
|                                     | 1980  |       | 1987  |       | %† change per year | 1980  |       | 1987  |       | %† change per year |
|                                     | Rate  | %†    | Rate  | %†    |                    | Rate  | %†    | Rate  | %†    |                    |
| Sudden infant death syndrome (SIDS) | 118.9 | 33.8  | 113.0 | 36.1  | -0.4               | 257.1 | 35.6  | 205.9 | 33.5  | -2.7               |
| Congenital anomalies                | 68.0  | 19.4  | 53.8  | 17.2  | -3.4               | 79.5  | 10.9  | 71.9  | 11.7  | -1.6               |
| Infections                          | 42.3  | 12.0  | 31.7  | 10.1  | -4.2               | 120.2 | 16.5  | 86.2  | 14.0  | -4.3               |
| Injuries                            | 31.1  | 8.9   | 25.3  | 8.1   | -3.1               | 66.5  | 9.1   | 55.0  | 9.0   | -1.9               |
| Perinatal conditions                | 19.6  | 5.6   | 22.1  | 7.1   | +2.2               | 48.5  | 6.7   | 55.0  | 9.0   | +2.7               |
| Ill-defined conditions              | 9.2   | 2.6   | 15.0  | 4.8   | +4.6               | 27.3  | 3.7   | 40.5  | 6.6   | +3.9               |
| Others                              | 62.2  | 17.7  | 51.9  | 16.6  | -1.9               | 129.9 | 17.8  | 99.4  | 16.2  | -2.7               |
| Total                               | 351.7 | 100.0 | 312.9 | 100.0 | -1.6               | 729.3 | 100.0 | 614.3 | 100.0 | -2.0               |

\*Per 100,000 live births.

†Percentages may not add up to 100 because of rounding.

**TABLE 3. Postneonatal mortality rates,\* by region and race, United States, 1980 and 1987**

| Region        | White |      |                    | Black |      |                    | Black/white |      |
|---------------|-------|------|--------------------|-------|------|--------------------|-------------|------|
|               | Rate  |      | % change 1980-1987 | Rate  |      | % change 1980-1987 | 1980        | 1987 |
|               | 1980  | 1987 |                    | 1980  | 1987 |                    | 1980        | 1987 |
| Northeast     | 3.0   | 2.4  | -20.0              | 6.9   | 6.0  | -13.0              | 2.3         | 2.5  |
| North central | 3.5   | 3.2  | -8.6               | 8.4   | 6.8  | -19.0              | 2.4         | 2.1  |
| South         | 3.6   | 3.2  | -11.1              | 7.1   | 6.0  | -15.5              | 2.0         | 1.9  |
| West          | 3.9   | 3.5  | -10.0              | 6.7   | 6.3  | -6.0               | 1.7         | 1.8  |

\*Per 100,000 live births.

**TABLE 4. Postneonatal mortality rates\* for sudden infant death syndrome as underlying cause of death, by region and race, United States, 1980 and 1987**

| Region        | White |           |       |           |                                      | Black |           |       |           |                                      |
|---------------|-------|-----------|-------|-----------|--------------------------------------|-------|-----------|-------|-----------|--------------------------------------|
|               | 1980  |           | 1987  |           | % Change<br>in rate<br>1980 vs. 1987 | 1980  |           | 1987  |           | % Change<br>in rate<br>1980 vs. 1987 |
|               | Rate  | Autopsy % | Rate  | Autopsy % |                                      | Rate  | Autopsy % | Rate  | Autopsy % |                                      |
| Northeast     | 87.4  | 86.4      | 69.3  | 92.7      | -20.7                                | 267.7 | 95.9      | 175.5 | 96.3      | -34.4                                |
| North central | 118.7 | 81.8      | 124.3 | 90.4      | -5.6                                 | 331.1 | 93.9      | 277.8 | 98.9      | -16.0                                |
| South         | 104.2 | 70.2      | 96.5  | 86.8      | -7.3                                 | 219.6 | 64.3      | 183.1 | 84.9      | -16.6                                |
| West          | 166.2 | 93.6      | 147.5 | 96.7      | -11.3                                | 286.1 | 99.4      | 238.1 | 97.5      | -16.8                                |
| Total         | 118.9 | 82.9      | 113.0 | 91.8      | -5.0                                 | 257.0 | 81.4      | 205.9 | 91.9      | -19.9                                |

\*Per 100,000 live births.

**TABLE 5. Postneonatal mortality rates\* for birth defects as underlying cause of death, by type of defect and race, United States, 1980-1981 and 1986-1987.**

| Type of birth defect   | White     |                |           |                |                      | Black     |                |           |                |                      |
|------------------------|-----------|----------------|-----------|----------------|----------------------|-----------|----------------|-----------|----------------|----------------------|
|                        | 1980-1981 |                | 1986-1987 |                | % Change<br>per year | 1980-1981 |                | 1986-1987 |                | % Change<br>per year |
|                        | Rate      | % <sup>†</sup> | Rate      | % <sup>†</sup> |                      | Rate      | % <sup>†</sup> | Rate      | % <sup>†</sup> |                      |
| Cardiovascular         | 37.2      | 55.8           | 29.6      | 55.4           | -3.7                 | 40.3      | 52.0           | 37.4      | 52.7           | -1.4                 |
| Central nervous system | 10.0      | 15.0           | 6.5       | 12.1           | -7.2                 | 12.4      | 16.0           | 8.0       | 11.3           | -6.3                 |
| Chromosomal            | 7.1       | 10.6           | 7.4       | 13.9           | +1.2                 | 8.3       | 10.7           | 10.8      | 15.3           | +3.7                 |
| Musculoskeletal        | 2.2       | 3.3            | 1.5       | 2.8            | -5.5                 | 2.4       | 3.1            | 2.4       | 3.4            | -1.2                 |
| Respiratory            | 1.6       | 2.4            | 1.9       | 3.5            | +4.9                 | 2.9       | 3.7            | 3.0       | 4.2            | +1.4                 |
| Gastrointestinal       | 3.9       | 5.9            | 1.9       | 3.6            | -11.9                | 5.1       | 6.6            | 3.1       | 4.4            | -9.2                 |
| Other                  | 4.6       | 6.9            | 4.6       | 8.6            | +0.6                 | 6.2       | 8.0            | 6.2       | 8.7            | -0.3                 |
| Total                  | 66.7      | 100.0          | 53.4      | 100.0          | -3.4                 | 77.6      | 100.0          | 70.9      | 100.0          | -1.6                 |

\*Per 100,000 live births.

<sup>†</sup>Percentages may not add up to 100 because of rounding.

**TABLE 6. Postneonatal mortality rates\* for infections as underlying cause of death, by type of infection and race, United States, 1980-1981 and 1986-1987**

| Type of infection      | White       |                |             |                |                      | Black        |                |             |                |                      |
|------------------------|-------------|----------------|-------------|----------------|----------------------|--------------|----------------|-------------|----------------|----------------------|
|                        | 1980-1981   |                | 1986-1987   |                | % Change<br>per year | 1980-1981    |                | 1986-1987   |                | % Change<br>per year |
|                        | Rate        | % <sup>†</sup> | Rate        | % <sup>†</sup> |                      | Rate         | % <sup>†</sup> | Rate        | % <sup>†</sup> |                      |
| Respiratory            | 18.6        | 44.0           | 13.5        | 41.8           | -5.1                 | 54.6         | 48.9           | 33.3        | 38.0           | -7.6                 |
| Central nervous system | 9.0         | 21.1           | 4.7         | 14.7           | -9.5                 | 20.3         | 18.2           | 10.0        | 11.4           | -10.2                |
| Gastrointestinal       | 2.8         | 6.7            | 2.0         | 6.3            | -6.5                 | 10.1         | 9.1            | 7.0         | 8.0            | -4.2                 |
| Septicemia             | 5.6         | 13.2           | 5.7         | 17.5           | +0.1                 | 16.3         | 14.6           | 15.7        | 17.9           | +0.7                 |
| Other                  | 6.4         | 15.0           | 6.4         | 19.7           | +0.3                 | 10.3         | 9.2            | 21.7        | 24.8           | +8.1                 |
| <b>Total</b>           | <b>42.4</b> | <b>100.0</b>   | <b>32.3</b> | <b>100.0</b>   | <b>-4.2</b>          | <b>111.6</b> | <b>100.0</b>   | <b>87.6</b> | <b>100.0</b>   | <b>4.3</b>           |

\*Per 100,000 live births.

†Percentages may not add up to 100 because of rounding.

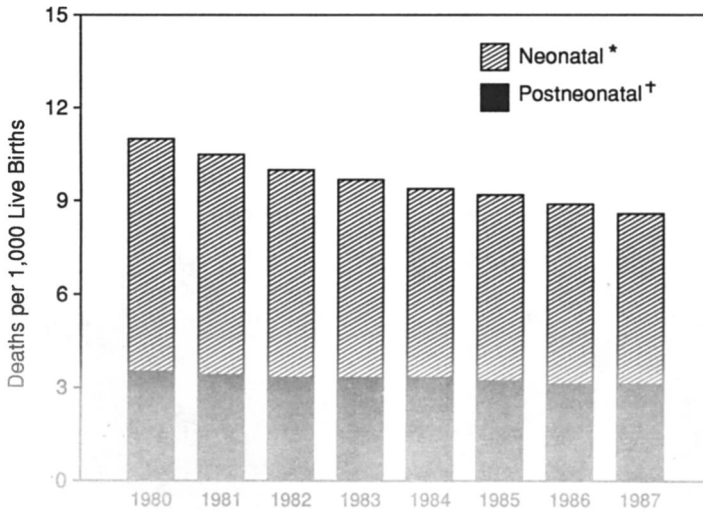
**TABLE 7. Postneonatal mortality rates\* for injuries as underlying cause of death, by type of injury and race, United States, 1980-1981 and 1986-1987**

| Type of injury         | White     |                |           |                |                      | Black     |                |           |                |                      |
|------------------------|-----------|----------------|-----------|----------------|----------------------|-----------|----------------|-----------|----------------|----------------------|
|                        | 1980-1981 |                | 1986-1987 |                | % Change<br>per year | 1980-1981 |                | 1986-1987 |                | % Change<br>per year |
|                        | Rate      | % <sup>†</sup> | Rate      | % <sup>†</sup> |                      | Rate      | % <sup>†</sup> | Rate      | % <sup>†</sup> |                      |
| Unintentional          | 23.7      | 82.7           | 19.1      | 78.7           | -3.9                 | 44.7      | 74.4           | 38.9      | 68.5           | -3.2                 |
| Suffocation            | 8.7       | 30.3           | 7.3       | 30.3           | -3.0                 | 19.1      | 31.8           | 14.7      | 25.8           | -4.9                 |
| Motor vehicle crashes  | 6.2       | 21.5           | 4.3       | 17.8           | -6.5                 | 5.1       | 8.5            | 5.8       | 10.2           | +3.0                 |
| Fire                   | 2.9       | 10.2           | 2.0       | 8.1            | -5.8                 | 8.8       | 14.7           | 8.3       | 14.6           | -2.6                 |
| Drowning               | 2.1       | 7.2            | 2.3       | 9.7            | +1.5                 | 2.9       | 4.8            | 2.8       | 4.9            | -1.7                 |
| Falls                  | 1.1       | 3.7            | 0.7       | 2.7            | -7.6                 | 2.2       | 3.7            | 1.8       | 3.2            | -6.0                 |
| Poisoning              | 0.4       | 1.3            | 0.4       | 1.6            | -0.7                 | 0.8       | 1.3            | 0.9       | 1.5            | -2.0                 |
| Other                  | 2.5       | 8.6            | 2.0       | 8.4            | -3.6                 | 5.8       | 9.6            | 4.7       | 8.2            | -4.3                 |
| Intentional (homicide) | 3.6       | 12.5           | 4.3       | 17.9           | +2.2                 | 10.9      | 18.1           | 15.1      | 26.6           | +4.1                 |
| All others             | 1.4       | 4.7            | 0.8       | 3.5            | -7.7                 | 4.5       | 7.5            | 2.8       | 4.9            | -7.4                 |
| Total                  | 28.5      | 100.0          | 24.2      | 100.0          | -3.1                 | 60.0      | 100.0          | 56.8      | 100.0          | -1.9                 |

\*Per 100,000 live births.

†Percentages may not add up to 100 because of rounding.

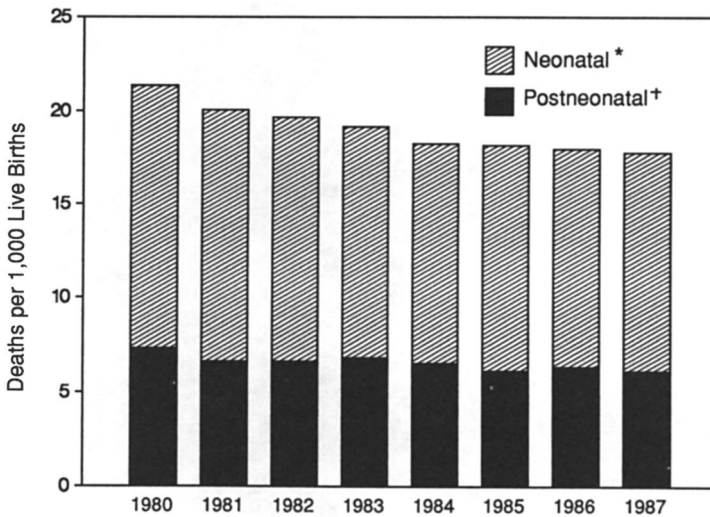
**FIGURE 1. Infant mortality among whites, by age at death, United States, 1980–1987**



\*Neonatal = deaths among infants ≤27 days old.

†Postneonatal = deaths among infants 28–364 days old.

**FIGURE 2. Infant mortality among blacks, by age at death, United States, 1980–1987**



\*Neonatal = deaths among infants ≤27 days old.

†Postneonatal = deaths among infants 28–364 days old.

### State and Territorial Epidemiologists and Laboratory Directors

State and Territorial Epidemiologists and Laboratory Directors are gratefully acknowledged for their contributions to this report. The epidemiologists listed below were in the positions shown as of July 1991, and the laboratory directors listed below were in the positions shown as of April 1991.

#### State/Territory

Alabama  
Alaska  
Arizona  
Arkansas  
California  
Colorado  
Connecticut  
Delaware  
District of Columbia  
Florida  
Georgia  
Hawaii  
Idaho  
Illinois  
Indiana  
Iowa  
Kansas  
Kentucky  
Louisiana  
Maine  
Maryland  
Massachusetts  
Michigan  
Minnesota  
Mississippi  
Missouri  
Montana  
Nebraska  
Nevada  
New Hampshire  
New Jersey  
New Mexico  
New York City  
New York State  
North Carolina  
North Dakota  
Ohio  
Oklahoma  
Oregon  
Pennsylvania  
Rhode Island  
South Carolina  
South Dakota  
Tennessee  
Texas  
Utah  
Vermont  
Virginia  
Washington  
West Virginia  
Wisconsin  
Wyoming  
American Samoa  
Federated States of  
  Micronesia  
Guam  
Marshall Islands  
Northern Mariana Islands  
Palau  
Puerto Rico  
Virgin Islands

#### Epidemiologist

Charles H. Woernle, MD, MPH  
John P. Middaugh, MD  
Steven J. Englender, MD, MPH  
Thomas C. McChesney, DVM  
George W. Rutherford, MD  
Richard E. Hoffman, MD, MPH  
James L. Hadler, MD, MPH  
Paul R. Silverman, DrPH  
Martin E. Levy, MD, MPH  
Richard S. Hopkins, MD, MSPH  
Joseph A. Wilber, MD, Acting  
Eugene Pon, MD, MPH  
Fritz R. Dixon, MD  
Byron J. Francis, MD, DrPH  
Mary Lou Fleissner, DrPH  
Laverne A. Wintermeyer, MD  
Andrew R. Pelletier, MD  
Reginald Finger, MD, MPH  
Louise McFarland, DrPH  
Geoff Beckett, PA-C, MPH  
Ebenezer Israel, MD, MPH  
Alfred DeMaria, Jr, MD  
Kenneth R. Wilcox, Jr, MD, DrPH  
Michael T. Osterholm, PhD, MPH  
Fred E. Thompson, MD, MPH  
H. Denny Donnell, Jr, MD, MPH  
Todd Damrow, PhD, MPH  
Thomas J. Safranek, MD  
Debra Brus, DVM  
M. Geoffrey Smith, MD, MPH  
Kenneth C. Spitalny, MD  
C. Mack Sewell, DrPH, MS  
Kenneth Ong, MD  
Dale L. Morse, MD, MS  
J. N. MacCormack, MD, MPH  
Larry Shireley, MS  
Thomas J. Halpin, MD, MPH  
Paul Zenker, MD, MPH  
Laurence R. Foster, MD, MPH  
Dale R. Tavis, MD, MPH  
Barbara A. DeBuono, MD, MPH  
Jeffrey L. Jones, MD  
Kenneth A. Senger, BS  
Robert H. Hutcheson, MD, MPH  
Diane Simpson, MD, PhD  
Craig R. Nichols, MPA  
Richard L. Vogt, MD  
Grayson B. Miller, Jr, MD  
John M. Kobayashi, MD, MPH  
Loretta E. Haddy, MS  
Jeffrey P. Davis, MD  
Stanley I. Music, MD, DTPH  
Julia L. Lyons, MD, MPH  
  
Steven Auerbach, MD, MPH  
Robert L. Haddock, DVM, MPH  
Tony de Brum  
Jose T. Nilla-Gomez  
Maso Kumangai, MD  
John V. Rullan, MD, MPH  
Cora L.E. Christian, MD, MPH

#### Laboratory Director

William J. Callan, PhD  
Katherine A. Kelley, DrPH  
Thomas S. Davis  
Robert L. Horn  
Michael G. Volz, PhD  
Ronald L. Cada, DrPH  
Jesse S. Tucker, PhD  
Mahadeo P. Verma, PhD  
James B. Thomas, ScD  
E. Charles Hartwig, ScD  
Frank M. Rumph, MD  
Vernon K. Miyamoto, PhD  
Richard Perotto, Acting  
David F. Carpenter, PhD  
Gregory V. Hayes, DrPH  
W. J. Hausler, Jr, PhD  
Roger H. Carlson, PhD  
Thomas E. Maxson, DrPH  
Henry Bradford, Jr, PhD  
Philip W. Haines, DrPH  
J. Mehens Joseph, PhD  
Ralph J. Timperi, MPH  
Robert Martin, DrPH  
Pauline Bouchard, JD  
R. H. Andrews, MPH  
Eric C. Blank, DrPH  
Douglas Abbott, PhD  
John Blosser  
Arthur F. DiSalvo, MD  
Veronica C. Malmberg  
Bernard F. Taylor, PhD  
Loris W. Hughes, PhD  
Kenneth P. Dressler, PhD  
Lawrence Sturman, MD, PhD  
Samuel N. Merritt, DrPH  
James L. Pearson, DrPH  
Gary D. Davidson, DrPH  
Garry L. McKee, PhD  
Charles D. Brokopp, DrPH  
Vern Pidcoke, DrPH  
Raymond G. Lundgren, Jr, PhD  
Arthur F. DiSalvo, MD  
Kathleen L. Meckstroth, DrPH  
Michael W. Kimberly, DrPH  
Charles E. Sweet, DrPH  
A. Richard Melton, DrPH  
Burton W. Wilcke, Jr, PhD  
Frank W. Lambert, Jr, DrPH  
Jon M. Counts, DrPH  
Charlotte S. Billingsley, Acting  
Ronald H. Laessig, PhD  
Richard F. Hudson, PhD  
Vacant  
Vacant  
Angelina S. Roman  
Vacant  
Vacant  
Vacant  
Vacant  
Raul Baco Dapena, MD  
Norbert Mantor, PhD

**MMWR**

The *Morbidity and Mortality Weekly Report (MMWR)* Series is prepared by the Centers for Disease Control and is available on a paid subscription basis from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; telephone (202) 783-3238.

The data in the weekly *MMWR* are provisional, based on weekly reports to CDC by state health departments. The reporting week concludes at close of business on Friday; compiled data on a national basis are officially released to the public on the succeeding Friday. Inquiries about the *MMWR* Series, including material to be considered for publication, should be directed to: Editor, *MMWR* Series, Mailstop C-08, Centers for Disease Control, Atlanta, GA 30333; telephone (404) 332-4555.

☆U.S. Government Printing Office: 1991-531-130/42027 Region IV

**UNITED STATES GOVERNMENT PRINTING OFFICE**  
**SUPERINTENDENT OF DOCUMENTS**  
Washington, D.C. 20402

**OFFICIAL BUSINESS**

Penalty for Private Use, \$300

**BULK RATE**  
**POSTAGE & FEES PAID**  
GPO  
Permit No. G-26



HHS Publication No. (CDC) 91-8017

Redistribution using permit imprint is illegal.